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Introduction

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Transparency in global sustainability governance: to what effect?

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ABSTRACT

Transparency in environmental governance is no longer an uncontroversial answer to problems of accountability and effectiveness. How to design effective transparency systems and in what policy contexts they are effective remain contested issues. This special section, consisting of this introduction and four research articles, interrogates complex and potentially conflicting links between transparency, accountability, empowerment and effectiveness in environmental governance. Building on existing literature and the four contributions, we discuss persisting diversity in varieties of transparency, the evolving dynamics of commodity chain transparency, and the consequences of emerging novel forms of digitalized transparency. As we show, the contributions to this special section interrogate in novel ways the transformative potential of transparency, through shedding light on the performative effects of transparency in ever more complex environmental governance contexts. These contexts may include, inter alia, the growing ubiquity of traceability in transnational commodity chains, the need for ever more anticipatory (ex-ante) forms of environmental governance, and an ever-broadening quest for digitally monitored environments. In particular, the impacts of the real-time 'radical' transparency engendered by use of novel digital technologies remain under-analyzed in the sustainability domain. We conclude by raising several critical concerns that deserve further scientific research and policy debate.

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Introduction

Ever greater transparency is increasingly becoming a feature of global sustainability governance (Gardner et al., 2018; Gupta & Mason, 2014). Transparency or 'making visible' is variously equated with greater openness, the opposite of secrecy (Florini, 1998) and explicit acts of information disclosure (Gupta, 2008), although definitional debates and disputes abound (Ball, 2014, Michener and Bersch, 2013). In the global sustainability realm, various forms of openness and information disclosure are increasingly demanded *and* supplied by both states and private actors. The aim is to make visible multiple sites and sources of environmental harm that cross national boundaries, thus requiring multilateral and transnational (i.e. global) forms of governance. Increased transparency in various forms is now pervading public and private attempts to govern transboundary environmental challenges in a wide array of issue areas, ranging from trade in hazardous substances to global climate change (Gupta, 2008). Such transparency is increasingly 'multi-directional' (Michener and Bersch, 2013, p. 235), with information disclosure demanded *from* but also provided *to* states, private actors, and citizens alike. Such openness and disclosure pertains, inter alia, to the state of the environment, i.e. parameters of environmental quality or levels of pollution, but also to environmental behavior or performance of specific actors.

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The growing embrace of transparency within global sustainability governance is driven by a belief in its transformative potential, although this potential still remains more assumed than critically interrogated. Greater transparency is seen to facilitate, inter alia, more accountable, democratic and effective sustainability-oriented decision-making and actions across public and private governance (Gheyle & De Ville, 2017; Hood & Heald, 2006; Lord, 2006; Mitchell, 2011; Weil, Graham, & Fung, 2013; Wognum, Bremmers, Trienekens, van der Vorst, & Bloemhof, 2011). Yet does transparency live up to its transformative potential? One of the first systematic analyses of the phenomenon of 'governance-by-disclosure' in global environmental governance provided a comparative assessment of a diverse set of public and private information disclosure initiatives, covering the issue areas of forests, biodiversity, biotechnology, extractive industries and climate change (Gupta & Mason, 2014). The crucial question motivating this analysis was whether transparency was transformative, in what ways and under what conditions. It examined whether transparency succeeded in making visible diverse sites and sources of environmental harm and, in so doing, whether it empowered recipients of disclosed information to participate more effectively in sustainability-oriented decision-making, to hold to account those perpetuating environmental harm, and/or to improve environmental performance, behaviors and outcomes.

As this assessment and others have shown, the assumed links between transparency, empowerment, accountability and environmental effectiveness have not always materialized (see also Ciplet, Adams, Weikmans, & Timmons Roberts, 2018; Mason & Gupta, 2014; Lord, 2006; Weil et al., 2013). Liberal institutionalist perspectives on transparency might point to the flawed design of transparency systems to explain why its transformative potential may not be realized (Mitchell, 2011). A 'critical transparency studies' perspective highlights instead that transparency is often a site of political and normative conflict itself, rather than being a neutral means by which to transcend such conflicts (Gupta, 2008; Gupta & van Asselt, 2019). Seen from such a critical perspective, transparency arrangements become implicated in broader neoliberal forms of global environmental governance that prioritize decentralized, privatized and/or voluntary disclosure initiatives, wherein corporate actors or powerful states may be exempt from stringent forms of mandatory disclosure that could foster, directly or indirectly, a reduction in environmentally harmful practices (e.g. Knox-Hayes & Levy, 2014). A key message of a 'critical transparency studies' perspective is that not only the design of transparency systems but also the normative and political contexts within which such systems are deployed are key to assessing whether and why transparency realizes its transformative potential in global sustainability governance.

Another key characteristic of the growing embrace of transparency in sustainability governance is an increasing reliance on monitoring, reporting and verification (MRV) systems as a means to enhance accountability for environmentally desirable or harmful behaviors, and thereby to improve sustainability performance. The proliferation of MRV systems at all levels of governance and in many environmental issue areas raises compelling questions: who is being held to account, who is empowered, and (how) is sustainability advanced within proliferating reporting and review requirements in multi-actor and multi-scale networked environmental governance? Transparency and traceability may lead to complex reporting, auditing and verification procedures that may not foster desired governance ends (Gupta, Vijge, Turnhout, & Pistorius, 2014; Haufler, 2010). Or enhanced transparency may result in surveillance and control by the powerful, including of those not in positions of authority, such as daily consumers or local communities (Mol, 2014). If so, it becomes important to consider when transparency of environmentally salient behaviors of states, producers, but also consumers and citizens turns into surveillance, and what governance ends are pursued (for a broad assessment of ever-enhanced transparency and big data in a digital age, as morphing into a form of 'surveillance capitalism', see Zuboff, 2019).

This special section takes such conceptual and empirical concerns as its point of departure, and examines links between greater transparency and accountability, empowerment and environmental effectiveness in global sustainability governance. Central to all contributions is a concern with interrogating whether and under what conditions transparency lives up to its sustainability-enhancing promise. Embracing diverse disciplinary and empirical perspectives, each paper engages with the overarching question of whether and how transparency is transformative, that is, whether it enhances the accountability of those perpetuating environmental harm, empowers those adversely affected and/or results in improved environmental outcomes.

Two new trends add additional urgency to this research agenda: first, the potential role of transparency and information disclosure in areas of sustainability that call for *anticipatory* governance, i.e. governance in the face of extreme uncertainty and normative conflict over the very existence and nature of novel forms of future environmental risks and harms (Granjou, Walker, & Salazar, 2017 Gupta & Möller, 2019; Guston, 2014). What role can transparency play, if any, in anticipatory governance of projected and uncertain sustainability futures? How can transparency aid in legitimate and effective anticipatory governance of, for example, novel technologies such as climate engineering, synthetic biology, or nanotechnology (Boettcher, 2019; Craik & Moore, 2014; Guston, 2010, 2014; Stone et al., 2018) that might pose uncertain future risks? The role of transparency in anticipatory governance remains little-analyzed thus far.

A second trend is the growth in 'radical' transparency as a result of advances in digital technologies with the potential to render visible, in real-time, a wide array of environmental behaviors and underlying environmental conditions (Future Earth, 2019; see also Zuboff, 2019). Powerful digital means of generating large volumes of data ensures that ever more information becomes available about (un-)sustainable practices, and it becomes available in real-time. Information can be generated by a greater variety of sources as well (e.g. satellite-based deforestation data or digitally enabled means of identifying levels and locations of carbon emissions). But what are the consequences of knowing much more, and knowing it right now? How does (and how should) this information feed into public and private sites of environmental decision-making? Whose behavior is to be targeted? And to achieve what ends? A crucial research agenda must therefore inquire how radical transparency through digital means (such as blockchain, remote sensing, satellite imagery or mobile devices) interacts with more traditional sources of state and private forms of disclosure, and with what impacts. These developments suggest a renewed need to scrutinize widely assumed links between transparency, accountability, empowerment and improved sustainability performance, now and in the future.

We proceed as follows: We first introduce the contributions to the special section and then identify three cross-cutting themes that these contributions help to shed further light on: first, a persistent diversity in *varieties of transparency* that reflect underlying (and competing) rationales to embrace transparency in environmental governance; second, the evolving dynamics of commodity chain transparency in an increasingly networked global environmental governance context; and third, the consequences of novel forms of digitalized, 'radical' transparency that are now coming to the fore in environmental governance.

Contributions to the special section

This special section consists of four contributions that seek to advance our understanding of the relationship between transparency and sustainability in environmental governance.[1] Taken as a whole, the special section provides an in-depth conceptual interrogation of long-assumed interlinkages between transparency, accountability and empowerment. It also disentangles different meanings of transparency, in both theory and practice, with fundamentally different implications for its transformative potential. As another novel contribution, it contains assessments of the rise of digitalized forms of 'radical' transparency as the latest frontier in rendering (the pursuit of) sustainability visible.

In the first contribution, *Michael Mason* (2020, this section) synthesizes the current state of understanding with regard to assumed linkages between transparency, accountability and environmental sustainability. He does so through a systematic review of latest insights in scholarly literature and use of illustrative empirical examples. On this basis, he interrogates how those who seek to hold powerful actors to account for environmentally damaging behaviors (referred to as 'accountability claimants') are more or less empowered by the disclosure of information. Mason uses Lukes' multi-dimensional theory of power (Lukes 2005, cited in Mason 2020, this section) to shed light on four different manifestations of potential empowerment of accountability claimants: reduced informational asymmetries as a result of disclosure; enhanced capacity to evaluate justifications for environmental behaviors; enhanced capacity to steer behavior of key actors; and political interrogation of decision-making authority underpinning the search for sustainability. Mason finds that across both public and private disclosure initiatives, accountability claimants may well be empowered in the first two ways, insofar as there are often a reduction of informational asymmetries and enhanced prospects to evaluate justifications

offered by key actors for their environmentally salient behaviors. However, evidence for the latter two forms of empowerment – viz. steering behavior or interrogating political decision-making authority – is much more limited. Mason's analysis advances our understanding of the conditions under which transparency might be transformative, through showing that this potential needs to be assessed in light of distinct notions of empowerment.

The contribution by *Kyla Tienhaara* (2020, this section) also critically assesses a conventional view on transparency, understood as a right to know in order to hold decision-makers accountable for decisions taken (a form of after-the-fact transparency concerned primarily with accountability). She uses two regional trade agreements – the Trans Pacific Partnership (TPP) and the Transatlantic Trade and Investment Partnership (TTIP) – as cases to illustrate that such an understanding of transparency (what she calls 'conventional transparency') is only one of five 'varieties of transparency' that are pertinent to consider in evaluating the transformative potential of transparency and its relationship to sustainability. Beyond simply disclosing completed trade agreements to generate *ex-post* accountability, Tienhaara points to a potentially more transformative variety of transparency being demanded by key stakeholders: what she terms *deliberative* transparency, or transparency to enable informed participation and dialogue while trade negotiations are still underway. This type of transparency was of central interest to civil society watchdogs during negotiation of the two regional trade deals, the TPP and TTIP, yet it was largely unobtainable, with the trade negotiations progressing essentially behind closed doors.

Instead, these agreements generate *technocratic* transparency, i.e. a form of transparency delivered by experts, often constituted as technical advisory bodies mandated to review and give input on draft negotiating texts. These bodies, if pluralistic in their expertise and widely representative of diverse stakeholder concerns, could facilitate more conventional aims of accountability or even deliberation. However, Tienhaara argues that they tend to serve a narrow set of trade agendas and emphasize technocratic aims of rationalized decision-making, within the bounds of a market-facilitating and trade-enabling worldview. The aim of technocratic transparency is thus to increase the effectiveness of trade agreements and trade flows, rather than to enhance democratic legitimacy or deliberation.

At the same time, a fourth variety, *disruptive* (rather than deliberative) transparency, occurs if some actors succeed in disclosing information during the negotiating process, often with the goal to derail negotiations through leaked disclosures at critical junctures. Tienhaara documents how some disruptive transparency was realized within these trade negotiations through targeted leaks of documents via, inter alia, Wikileaks and other forms of what has come to be called 'leaktivism' (White 2016; cited in Tienhaara, 2020, p. 7, this section). Such disruptive transparency, however, is less geared towards securing either accountability or deliberation, but rather towards overturning power hierarchies and derailing negotiations to prevent what are seen as undesirable deals from being struck.

While all the above varieties of transparency are feasible in negotiating global and regional trade deals, Tienhaara identifies a fifth variety, *disciplinary* transparency that is also pervasive within these trade agreements, even if less overtly so. As she explains, disciplinary transparency is intended to facilitate market transactions even as it simultaneously disciplines information disclosers to the demands of the market (Tienhaara, 2020, this section). The rationale for such transparency is thus distinct from a democratization rationale (that emphasizes holding the powerful to account or facilitating open deliberation), and is often employed by multinational corporations to influence trade policy-making. More generally, Tienhaara shows that the cumulative impact of distinct varieties of transparency in furthering sustainability through regional trade deals is far less straightforward than a conventional transparency account would suggest.

Hilde Toonen and *Simon Bush* (2020, this section) discuss how new, digitally enabled monitoring and surveillance technologies are being used to counter illegal, unreported and unregulated fishing activity. They analyze the wider governance implications of the use of novel, privately deployed fish attraction devices in oceanic tuna fisheries, as well as unmanned public drones for marine surveillance and global satellite monitoring of fishing vessels. They demonstrate how each of these novel, digitally enabled means of enhancing transparency are becoming central to emerging 'transparency assemblages' that envision a fisheries domain free from illegal, unreported and unregulated activity. Central to their analysis are questions about who designs, owns and is in control of these new techniques and their associated information flows; who gets monitored and by whom; and who is empowered or disempowered by these developments. By focusing on how the roles of public and private

actors become reconfigured in these novel forms of fisheries governance, the article draws attention to the tensions that emerge around the transformative potential of the radical visibility enabled by digitalized transparency.

Building on Toonen and Bush, who focus on top-down and highly advanced visibility techniques, *Angel Hsu*, *Amy Weinfurter*, *Jeffrey Tong* and *Yihao Xie* (2020, this section) critically examine the extent to which widely accessible information and communication technologies are enabling citizen-led transparency in environmental management, and how this is both initiated and limited by governments. Their analysis focuses on China – a country with a high level of surveillance, internet restrictions and a centralized approach to governance. The authors discuss how the Chinese government is gradually opening up to more participatory approaches in the environmental domain, and is even actively seeking citizen support for its water pollution monitoring efforts, as a way to further local government accountability. Hsu and co-authors use as their empirical case the 'Black and Smelly Waters' program launched by the Chinese government to better enforce local government water remediation efforts. By means of a mobile app that functions through WeChat, citizens are actively reporting instances of water pollution to this program. The authors find that, in terms of citizen activity, the program is a success in certain areas, although challenges remain. At the same time, the authors highlight how this program does not necessarily enhance levels of trust in government. This is also because the government is not always able or willing to act on citizens' reports. Information technologies may thus help to enhance citizen involvement in water pollution monitoring, but if this is not followed up, or if it remains obscure what actions and decisions are derived from it, the overall effects of transparency on sustainability remain limited. In flagging these aspects, the contribution highlights more generally the transformative potential of new ICT-enabled forms of radical, citizen-generated transparency, yet also the conditions under which this potential may or may not be realized.

Taken together, these contributions interrogate in novel ways the transformative power of transparency in sustainability governance. Below, we identify three key themes that these contributions help to shed light on, drawing on cross-cutting insights across the four papers.

Cross-cutting themes and future research agenda

Building on the contributions to this special section, we identify three cross-cutting themes that continue to be central to analysis of transparency and sustainability in environmental governance. These are: varieties and typologies of transparency; commodity chain transparency; and digitalized forms of 'radical' transparency. We address each in turn below.

(1) Typologies and Varieties of Transparency

Transparency scholarship often proceeds through identifying typologies and varieties of transparency, stimulated by the still pressing need to get conceptual clarity on the object of inquiry (e.g. Heald, 2006; Mitchell, 2011). This, in our view, remains a crucial component of a continuing research agenda on transparency's role in sustainability, and one given new impetus by contributions to this special section. As Tienhaara (2020, p. 2, this section) notes, the 'suggestion that there are varieties of transparency is not novel', yet the ways in which the notion is unpacked can vary greatly, with consequences for the conclusions regarding its transformative potential. Mol (2014, p. 47) offers one compelling typology, for example, when he distinguishes transparency from what he sees as three closely related, but distinct phenomena: self-monitoring, bench-marking, and surveillance. He bases these distinctions on two key aspects: *whose* information is disclosed, and *for whom* disclosure is intended. As he argues, if producers and states (i.e. conventionally powerful actors) are recipients of information about citizen-consumers, this can veer towards surveillance; if citizen-consumers disclose information about themselves to other citizen-consumers, this is primarily a form of self-monitoring; and if producers and states disclose information to other producers and states, this is a form of internal and/or bench-marking transparency. Only if information about producers and states is disclosed to citizen-consumers can we speak of the kind of transparency normally associated with the term, with the aim to enhance accountability and

empowerment. This typology highlights a theme that is essential to continue to scrutinize: *for whom* is transparency intended (see also Mason, 2008) and *what ends are pursued* though transparency.

Gupta and Mason (2016), in their analysis of transparency in global climate governance, take this further in offering a typology of their own. This distinguishes less between recipients and disclosers of information as the key point of difference across varieties of transparency, but rather between four *different rationales* for the uptake of transparency and the associated diverse ends that transparency is thus intended to advance. These are, first, a *democratization* rationale, whereby transparency is intended to enhance procedural aims such as a right to know, accountability, choice and participation; second, a *marketization* rationale, whereby transparency is required to ascribe economic value to environmental services or performance and thereby to facilitate market exchange; third, a *technocratization* rationale, whereby disclosure of (expert-led scientific) information is intended to rationalize and improve decision-making; and fourth, a *privatization* rationale, whereby (restricted) disclosure is intended to augment private gain and the reach and power of private authority. As these typologies suggest, the transformative potential of transparency and its potential to empower is intimately tied to the *rationale* to embrace it and the ends it is intended (or not intended) to serve.

Tienhaara's (2020, this section) typology of transparency takes these conceptual advances about diverse kinds of transparency further still. As described above, she identifies five 'varieties of transparency': conventional, deliberative, technocratic, disruptive, and disciplinary. Through her analysis of these diverse forms of transparency in trade negotiations, she highlights that, other than *conventional*, after-the-fact transparency of concluded deals, and some instances of *disruptive* transparency, the two most prevalent forms of transparency discernible in negotiating regional trade deals are *technocratic* and *disciplinary* transparency, rather than the *deliberative* transparency demanded by NGOs and civil society. Her conclusions highlight that technocratic transparency is often in the service of a market-facilitating and trade-enabling worldview that aims to enhance trade flows, rather than seeking democratic legitimacy, accountability or deliberation. Disciplinary transparency, meanwhile, is demanded by powerful corporations as a way to ensure that states and others are disciplined to prevent trade-restrictive decisions.

These typologies serve to highlight central elements of an ongoing research agenda relating to the transformative potential of transparency in environmental governance: who is to be transparent, to whom, about what, and to what end. They help to illustrate the broader political and normative context within which transparency arrangements are negotiated and generate effects. As Tienhaara concludes, certain forms of transparency, such as the deliberative transparency demanded by civil society, and, to a lesser extent, the technocratic transparency delivered by experts, are more amenable to furthering sustainability goals than others, such as disciplinary or disruptive transparency. This finding is also given in-depth treatment in Mason's (2020, this section) detailed inquiry into the link between transparency, accountability and empowerment in sustainability governance. Through dissecting the notion of empowerment (by distinguishing between narrow technocratic understandings and more radical forms of empowerment), Mason shows how transparency can also serve to *uphold rather than upend* unequal power relations, particularly within a more neoliberal approach to sustainability, a conclusion echoed by Tienhaara. At the same time, both take the debate further by demonstrating that, despite the prevalence of disciplinary transparency deployed in the service of neoliberalism, *not all* varieties of transparency aspire towards or result in such an outcome. This is but one rationale and one variety of transparency, albeit a dominant one that merits continued scrutiny (see also Mason & Gupta, 2014).

This conclusion becomes particularly compelling in light of newer trends in transparency for sustainability governance, including reliance on novel forms of citizen-generated disclosure (Hsu, Weinfurter, Tong, & Xie, 2020, this section). As Mason (2020, p. 11, this section) suggests, a crucial research agenda going forward is to consider how 'sustainability information permeates and reproduces a dominant matrix of market-liberal dispositions which frame environmental accountability as the domain of private choices and individual responsibility'. The promises and perils of such an approach are exactly the questions that come to the fore in the two areas of inquiry we turn to next, both of which are increasingly central to assessing the transparency-sustainability relationship. These are: greening transnational commodity chains and the associated rise of political consumerism; and the spread of radical, multi-directional transparency enabled by the digital and the information and communication technology (ICT) revolution.

(2) Transparency and Traceability in Commodity Chains

Sustainability governance in the contemporary global network society (Castells, 1996) increasingly calls for transparency to foster greater traceability of products, goods and services that cross borders and are enmeshed in complex supply chains. Traceability refers to the structured transfer of information in value chains to address a range of issues related to the sustainability of products and production practices (Coff, Korthals, & Barling, 2008; Mol, 2015). Traceability has received considerable attention in recent years, in terms of where particular products are sourced from and under what particular conditions they are produced, processed and traded (Jacquet & Pauly, 2008; Miller, Bush, & Mol, 2014). The assumption underlying traceability as a tool for increasing the sustainability of production and consumption practices is that greater transparency of environmentally relevant practices for a product, and its origin, draws attention to sustainability concerns. Producers who allow greater oversight of their practices may get preferential market access for their products on attractive markets. Labels based on certification schemes are often used as tools to differentiate between products with less and those with more sustainability impacts (Boström & Klintman, 2008). This strategy can be understood as conventional transparency (Tienhaara, 2020, this section) because it is presumed that by holding chain actors accountable through information about their production practices, their environmental performance will improve.

More generally, increasing societal complexity (Urry, 2003) means that many societal actors are involved in creating as well as addressing environmental problems. For instance, globalizing commodity chains bridge large distances and involve many different societal actors with potentially considerable sustainability impacts (Boström, Jönsson, Lockie, Mol, & Oosterveer, 2015). Regulating transnational commodity chains, however, remains a challenge. Few global institutions are equipped to do so, even as their effectiveness in promoting sustainability is often challenged, such as in the case of the World Trade Organization (WTO) (Boström et al., 2015). To supplement potentially ineffective multilateral governmental regulation, many consider promoting transparency through supply chains a promising strategy (Mol & Oosterveer, 2015).

Transparency and traceability are rapidly moving to the center of sustainability governance of transnational commodity chains. Increased commodity chain transparency is accompanied by new actor roles and changing power relations. In particular, political consumerism, defined as 'market-oriented engagements emerging from societal concerns associated with production and consumption' (Boström, Micheletti, & Oosterveer, 2019), requires reliable information about the production, processing and trade impacts of a particular commodity to guide consumer action. Environmental NGOs use this strategy to initiate public campaigns to boycott or 'buycott' particular commodities to promote sustainability in global supply chains (Boström et al., 2015).

Recent developments rapidly facilitate access to such information. This includes, for example, the introduction of internet-based consumer information tools, mobile phone apps and automated supply chain monitoring systems for tracking and tracing, all of which provide guidance on sustainability for different supply chain actors (Scrinis & Lyons, 2007). Many products available in retail outlets in industrialized countries are accompanied by specific data on the actual lifecycle they have gone through, but this information is not (yet) fully and easily accessible to consumers (Kiil, Hvolby, Trienekens, Behdani, & Strandhagen, 2019). Pressure is increasing to ever more detailed information about the environmental performance of commodity chains (of the final products as well as of the production and processing methods applied) through transparency and traceability schemes.

Further technological development is expected to result in larger capacities to process and store data, whereby especially the use of AIDC (Automatic Identification and Data Capture, including RFID, Radio Frequency Identification), nanotechnologies and integrated management systems building on the availability of large quantities of electronic data generate high expectations (Badia-Melis, Mishra, & Ruiz-García, 2015; Costa et al., 2013; Trienekens, Wognum, Beulens, & van der Vorst, 2012; Wognum et al., 2011). These technological innovations will have direct impacts on consumer behavior and indirect effects on global supply networks. The potential of these new technologies seems not yet exhausted by far, so further innovations may be expected in the near future. Such expectations are likely to be fueled by the emerging interest in (and again high

expectations of) blockchain technologies, with more significant and ostensibly more secure information sharing in global supply chains (see Chow, 2018).

Thus, a critical reflection on the potential role of transparency and traceability for promoting sustainability is very timely. The expanding technological infrastructures and quantities of data available about sustainability are becoming increasingly contested in globalizing societies (Castells, 2009) and lead to 'a specific form of social organization in which information generation, processing, and transmission become fundamental sources of productivity and power' (Mol, 2006, p. 500). As Mol suggests (2006, p. 501), 'access to, production and verification of, and control over, information' have become a core feature of environmental politics and contestation. Particularly critical is the question whether transparency, i.e. information about different practices and impacts along the global commodity chains, leads to adequate action by the actors networked in and around the (global) supply chain.

Two questions are particularly pertinent here. First, who controls the information that is made accessible through transparency and traceability schemes; and, second, how and by whom is this information used? (Boström et al., 2015) As noted earlier, the contributions to this special section shed light on each of these questions. With regard to the first, control over the information made available through transparency and traceability schemes includes deciding on its content and framing. While many are optimistic about what such transparency can deliver (as elaborated further by Mason, 2020, this section), the contributions to this special section make clear that transparency and traceability is not only a technical or administrative issue but a social and political one as well. As Toonen and Bush (2020, this section) argue, making certain things transparent means rendering other things less transparent. Mostly these decisions are not made by public actors because private schemes, like certification, labeling and business-to-business (B2B) traceability schemes, are controlled by non-state actors such as NGOs and private companies.

The information provided is therefore not neutral, but is framed in particular ways and therefore potentially contested. For instance, private companies are repeatedly accused of presenting biased or partial information or 'greenwashing' (see Mason, 2020, this section). Demanding more information and greater transparency is likely, under such conditions, to generate tensions between different societal actors. As Hatanaka (2009) argues, for example, labeling shrimp from aquaculture in Indonesia was guided by concerns among European consumers, rather than by local producer interests. In this case, making more information available generates greater control over producers and production practices by those designing the transparency and traceability schemes in the global North, rather than empowering producers in the global South. In response to this inequality, producers and citizens might themselves be involved in the design and monitoring of transparency and traceability schemes (Hsu et al., 2020, this section, see also Ilbery, Morris, Buller, Maye, & Kneafsey, 2005). More broadly, this suggests that transparency and traceability schemes have to be analyzed as dynamic social processes, rather than as mere technical challenges. This is particularly salient with new technologies, such as blockchain, which can expand the breadth and reach of (selective) transparency, given the techno-optimism that sometimes accompanies them.

With respect to the second question regarding the use of information, Mason (2020, this section) shows that the effect of transparency and traceability depends on how these are applied by actors in their daily practices. The information provided through traceability and transparency schemes is not simply taken up by consumers and other social actors, thereby resulting in behavioral change in a linear, automatic manner. It is unlikely that information alone changes social practices because 'the meaning of pro-environmental behavior is constructed and defined through interaction and translated into action in different settings' (Nye & Hargreaves, 2010, p. 139). This understanding contradicts the general assumption that 'actors want to do the right thing environmentally, provided that they know how, and that they are given sufficient, appropriate incentives' (Nye & Hargreaves, 2010, p. 139).

Instead, information needs to be fed back into everyday social practices (Spaargaren, Weenink, & Lamers, 2016). In doing this, several challenges arise. First, the information provided needs to be trusted (Möllering, 2005). Second, the information needs to be usable for the relevant actors. For instance, ambivalence, passivity and uncertainty regarding food-related information often prevail among consumers and they often seek for more simple hermeneutics that they can apply in their everyday life (Connolly & Prothero, 2008; Ipsos

Mori, 2010). Third, technological development facilitates the generation of data, making information overload a serious risk (Gardner et al., 2018), so more transparency is not necessarily always better (Tienhaara, 2020, this section; see also Gupta & Mason, 2014). This is particularly the case with digitally enabled, radical transparency. Thus, a conflict may arise between the intention to provide the consumer with a clear and simple message and the need for a comprehensive environmental assessment in the promotion of more sustainable practices (Holmes et al., 2012). As Tienhaara (2020) convincingly argues, transparency is negotiated in social and political interactions. Societal actors may therefore try to make information part of a (broader) learning process, or break information up into smaller categories targeted to special objectives (Hsu et al., 2020, this section), or mediate and render it actionable via trusted information brokers (Gardner et al., 2018). Thus, in order to contribute to more effective sustainability governance, transparency needs to be about more than collecting and presenting data. Rather, it should be considered part of broader social and political processes of information and knowledge generation and sharing, thereby allowing its embedding in everyday social practices.

(3) Transparency as Digitalized Radical Visibility

The digital age has introduced a number of new technologies that can generate visibility of public and private activities and their sustainability effects in ever greater quantities, and in more innovative yet also obscure and even undemocratic ways (Toonen & Bush, 2020, this section; Hsu et al., 2020, this section; Boas, Dahm, & Wrathall, 2019; He, Boas, Mol, & Lu, 2017; Seele, 2016; 2017). Examples range from satellite-based remote sensing systems monitoring human activities impacting on the environment, such as deforestation (e.g. Global Forest Watch, 2018) or fisheries (e.g. Global Fishing Watch, 2018), to government or citizen-based monitoring practices making use of apps or other techniques to monitor socio-environmental space.

What do these developments mean for promoting sustainability through transparency? Do citizens gain greater insight and influence over trajectories of sustainable development? Does this empower them to self- or co-organize sustainable lifestyles? Or do new technologies of visibility actually control and constrain citizen involvement? As has been noted by several scholars (e.g. Mol, 2014; Seele, 2016; Smith, 2016), new information and communication technologies do not always offer more transparency or a democratization of sustainability governance. Instead, the increased sharing of information flows may also have adverse consequences: including enhanced surveillance and control of environmental space and the populations inhabiting these by more established and powerful actors, such as governments, private companies or illicit organizations.

An example of such potential adverse consequences is provided by Toonen and Bush (2020, this section), who show how large-scale surveillance techniques reduce individuals, contexts and circumstances to raw homogenous data. Toonen and Bush note that, in the case of fisheries, 'these technologies tend towards the criminalization of fishers by focusing on the imagery of specific events in time rather than understanding the root cause of illegal practices' (Toonen & Bush, 2020, p. 9, this section). It reduces fishermen to one homogenous subject, which may further disempower small-scale fisheries who already do not have much say in this governance domain. As such, digital technologies might enable us 'to 'watch' (observe) rather than 'see' (interpret) what is going on in the oceans' (Toonen & Bush, 2020, p. 10, this section). In fact, it could make the already marginalized more powerless, if they are subject to more control without having the means to countervail surveillance by the powerful.

The contribution by Hsu et al. (2020, this section) also illustrates the delicate balancing act between the goals of achieving greater transparency and accountability versus the risks of enhanced surveillance posed by digital technologies. The 'Black and Smelly Waters' program reveals, on the one hand, a clear effort by the Chinese government to be more transparent in monitoring local water pollution. As such, the program exemplifies a broader trend in China's environmental governance that seeks to enhance citizen participation as well as transparency in the field of sustainability (Hsu et al., 2020, this section; He et al., 2017). At the same time, however, this case shows how citizens are generating and offering data to the government without it being transparent how this is subsequently used in decision-making processes or for other purposes. This is particularly sensitive, given high rates of citizen surveillance and censorship in China (see discussion in He et al., 2017), including the use of digitally stored information to score and control individuals' social behavior (The Economist, 2016). In

that context, it is important to ask whether citizens' behavior and contributions to such an environmental pollution program also feeds into these social profiling efforts by the Chinese government, and consequently supports China's surveillance of its population. As a more general conclusion, the analysis reveals that we should continue to question whether digital technologies promote 'opaque transparency' (Fox 2007) for the marginalized or those most affected by environmental harm, whilst obscuring the power of established public and new private players (such as big technology 'platform' companies).

Overall, even as new visibility techniques may provide a window of opportunity for transparency to further unfold in the field of environmental governance in real time (Seele, 2017; Toonen & Bush, 2020, this section), and may function as a new avenue for citizens to have a voice (e.g. He et al., 2017; Hsu et al., 2020, this section; Seele, 2016), this outcome is far from secure. This conclusion feeds back into Tienhaara's conclusion that not all varieties of transparency are geared towards enhancing accountability in the first instance. Mason (2020, this section) also underscores this conclusion in highlighting how those most affected still have few means to steer or sanction those responsible for unsustainable or environmentally harmful actions. In any case, this complexity shows the necessity for further research into the implications of digital technologies for transparency, accountability and empowerment. Future research could, for example, assess under what conditions digital technologies do positively impact the relation between transparency and sustainability in inclusive ways; explore which safeguards can be established to prevent misuse; and provide a better understanding of specific technological and governance arrangements that shape who monitors whom and what, who gets empowered or disempowered, and who eventually does the governing.

Conclusion

Taken as a whole, the articles in this special section provide an in-depth conceptual and empirical interrogation of the interlinkages between transparency, accountability and empowerment in environmental governance. The contributions also demonstrate the increasing need to scrutinize the performative effects of transparency, as deployed in ever more complex transnational value chains or as generated in ever greater quantities through innovative, digital ICT technologies. Drawing on the insights of the papers, we highlight three conclusions and an associated future research agenda.

First, the very notion of transparency still needs further conceptual and empirical unpacking (see also Fluck & McCarthy, 2019; McCarthy & Fluck, 2017). This includes discerning what constitutes transparency in the first instance, and how it differs from related notions, such as surveillance. It also includes a continuing focus on how diverse rationales to embrace transparency, diverse ends to which it is put, and even diverse types of disclosed information, add up to very distinct implications about its transformative potential. As various conceptual typologies of transparency highlight, the rationales to embrace transparency can be divergent and potentially conflicting. Thus, the goal of furthering environmental sustainability might be at odds with that of empowering citizens or marginal actors through transparency, as implied in the analysis of the 'Black and Smelly Waters' program (Hsu et al., 2020, this section). This emphasizes again that seeking environmental improvements through transparency will depend not only upon the design of governance-by-disclosure arrangements but also the political context within which transparency is both sought and deployed (Gupta & Mason, 2014, see also Tienhaara, this section). Such a conclusion holds as well for the desired aim of empowerment through transparency.

A second overarching conclusion is that long-assumed close links between greater transparency and enhanced accountability, informed participation, democratic deliberation, but also enhanced trust, continue to need more detailed scrutiny. With regard to accountability, a growing number of analyses are now closely studying this relationship (Fox 2007; Hood, 2010; Gupta & van Asselt, 2019; Mason, 2020, this section). A relationship that still remains understudied in the sustainability realm, however, relates to transparency and *trust*. While the widespread assumption is that greater transparency generates trust, the opposite could well be the case. Particularly in areas of high politics, it might well be that greater trust is a necessary *precondition* for meaningful transparency rather than the other way around. This is an important insight that is also highlighted by Hsu and co-authors (2020, p. 11, this section; see also Johansson & Montin, 2014; De Vries, Van der Zee, Beunen, Kat, & Feindt, 2019).

Finally, a third overarching conclusion is the urgent need to consider the first two conclusions above in light of the era of 'radical', digitally enabled transparency that we currently inhabit. The potential to generate ever greater transparency through digital means raises pressing questions about the merits of such enhanced quantities of data and information about sustainability, including questions of access to, and use of, such information. Who will own and control the vast quantities of data about sustainability now being generated (Hansen & Porter, 2017)? Even if freely accessible through open access platforms, or rendered more user-friendly through data harvesting and synthesizing techniques, will such information be relevant, usable and actionable? To what uses will it be put, and by whom? What are the evolving trade-offs between privacy, secrecy and the enhanced potential for surveillance in an era of radical transparency? Such questions have thus far been little analyzed for the sustainability domain. Another related and timely question is how environmental governance will be transformed when its boundaries blur with other areas of global governance, such as diplomacy or national security (Seele, 2017), for example, as sustainability challenges such as climate change become issues of high politics? And, finally, who will 'watch the watchers', and what novel forms of 'reciprocal transparency' (Mann, 2013) are emerging in the sustainability domain? In an age of radical transparency, this might be the most salient concern of all.

Note

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No potential conflict of interest was reported by the authors.

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References

Badia-Melis, R., Mishra, P., & Ruiz-García, L. (2015). Food traceability: New trends and recent advances. A review. *Food Control*, *57*, 393–401.

Ball, C. (2014). What is transparency? *Public Integrity*, *11*(4), 293–308.

Boas, I., Dahm, R., & Wrathall, D. (2019). Grounding big data on climate-induced human mobility. *Geographical Review*, doi:10.1111/gere.12355

Boettcher, M. (2019). Cracking the code: How discursive structures shape climate engineering research governance. *Environmental Politics*, doi:10.1080/09644016.2019.1670987

Boström, M., Jönsson, A. M., Lockie, S., Mol, A. P. J., & Oosterveer, P. (2015). Sustainable and responsible supply chain governance: Challenges and opportunities. *Journal of Cleaner Production*, *107*, 1–7.

Boström, M., & Klintman, M. (2008). *Eco-standards, product labelling and green consumerism*. Houndmills: Palgrave MacMillan.

Boström, M., Micheletti, M., & Oosterveer, P. (eds.). (2019). *The Oxford handbook of political consumerism*. Oxford: Oxford University Press.

Castells, M. (1996). *The rise of the network society. Volume I of the information age: Economy, society and culture* (Vol. 1). Oxford: Blackwell Publishers.

Castells, M. (2009). *Communication power*. Oxford: Oxford University Press.

Chow, C. (2018). Blockchain for Good? Improving supply chain transparency and human rights management. *Governance Directions*, *70*(1), 39–40.

Ciplet, D., Adams, K. M., Weikmans, R., & Timmons Roberts, J. (2018). The transformative capability of transparency in global environmental governance. *Global Environmental Politics*, *18*, 3. doi:10.1162/glep_a_00472

Coff, C., Korthals, M., & Barling, D. (2008). Ethical traceability and informed food choice. In C. Coff, D. Barling, M. Korthals, & T. Nielsen (Eds.), *Ethical traceability and Communicating food* (pp. 1–18). Dordrecht: Springer Netherlands.

Connolly, J., & Prothero, A. (2008). Green consumption: Life-politics, risk and contradictions. *Journal of Consumer Culture*, *8*(1), 117–145. doi:10.1177/1469540507086422

Costa, C., Antonucci, F., Pallottino, F., Aguzzi, J., Sarriá, D., & Menesatti, P. (2013). A review on agri-food supply chain traceability by means of RFID technology. *Food and Bioprocess Technology*, *6*(2), 353–366. doi:10.1007/s11947-012-0958-7

Craik, N., & Moore, N. (2014). *Disclosure-based governance for climate engineering research*. CIGI papers, No. 50, November.

De Vries, J. R., Van der Zee, E., Beunen, R., Kat, R., & Feindt, P. H. (2019). Trusting the people and the system. The influence of institutional design on interpersonal and institutional trust in collective action for agri-environmental management. *Sustainability*, *11/7022*, doi:10.3390/su11247022

The Economist. (2016). *China's digital dictatorship*. Retrieved from https://www.economist.com/leaders/2016/12/17/chinas-digital-dictatorship, accessed 10 December 2019

Florini, A. (1998). The end of secrecy. *Foreign Policy*, *111*, 50–63.

Fluck, M., & McCarthy, D. R. (2019). Information is power? Transparency and fetishism in international relations. *Globalizations*, *16*(1), 1–16.

Fox, J. (2007). The uncertain relationship between transparency and accountability. *Development in Practice*, *17*(4–5), 663–671.

Future Earth. (2019). *Digital Disruptions for Global Sustainability: Research, Innovation and Action, An Agenda* (on file with author).

Gardner, T. A., Benzie, M., Börner, J., Dawkins, E., Fick, S., Garrett, R., … Wolvekamp, P. (2018). Transparency and sustainability in global commodity supply chains. *World Development*, doi:10.1016/j.worlddev.2018.05.025

Gheyle, N., & De Ville, F. (2017). How much is Enough? Explaining the continuous transparency conflict in TTIP. *Politics and Governance*, *5*(3), 16–28.

Global Fishing Watch. (2018). About the project. Retrieved from http://globalfishingwatch.org/the-project

Global Forest Watch. (2018). About. Retrieved from https://www.globalforestwatch.org/

Granjou, C., Walker, J., & Salazar, J. F. (2017). The politics of anticipation: On knowing and governing environmental futures. *Futures*, *92*, 5–11.

Gupta, A. (2008). Transparency under scrutiny: Information disclosure in global environmental governance. *Global Environmental Politics*, *8*, 1–7.

Gupta, A., & Mason, M. (eds.). (2014). *Transparency in global environmental governance: Critical perspectives*. Cambridge: MIT Press.

Gupta, A., & Mason, M. (2016). Disclosing or obscuring? The politics of transparency in global climate governance. *Current Opinion in Environmental Sustainability*, *18*, 82–90.

Gupta, A., & Möller, I. (2019). De facto governance: How authoritative assessments construct climate engineering as an object of governance. *Environmental Politics*, *28*(3), 480–501. doi:10.1080/09644016.2018.1452373

Gupta, A., & van Asselt, H. (2019). Transparency in multilateral climate politics: Furthering (or distracting from) accountability? *Regulation and Governance*, *13*(1), 18–34.
Gupta, A., Vijge, M. J., Turnhout, E., & Pistorius, T. (2014). Making REDD+ transparent: The politics of measuring, reporting and verification systems. In A. Gupta, & M. Mason (Eds.), *Transparency in global environmental governance: Critical perspectives* (pp. 181–201). Cambridge: MIT Press.
Guston, D. H. (2010). The anticipatory governance of emerging technologies. *Journal of the Korean Vacuum Society*, *19*(6), 432–441. doi:10.5757/JKVS.2010.19.6.432
Guston, D. H. (2014). Understanding 'anticipatory governance.'. *Social Studies of Science*, *44*(2), 218–242. doi:10.1177/0306312713508669
Hansen, H. K., & Porter, T. (2017). What do Big data do in global governance? *Global Governance*, *23*, 31–42.
Hatanaka, M. (2009). Certification, partnership, and morality in an organic shrimp network: Rethinking transnational alternative agrifood networks. *World Development*, *38*(5), 706–716.
Haufler, V. (2010). Disclosure as governance: The extractive industries transparency initiative and resource management in the developing world. *Global Environmental Politics*, *10*(3), 53–73.
He, G., Boas, I., Mol, A. P., & Lu, Y. (2017). E-participation for environmental sustainability in transitional urban China. *Sustainability Science*, *12*(2), 187–202.
Heald, D. (2006). Varieties of transparency. In C. Hood & D. Heald (Eds.), *Transparency: The key to better government?* (pp. 25–53). Oxford: Oxford University Press.
Holmes, M., Wiltshire, J., Wynn, S., Fawcett, C., Nicholson, C., Phillips, K., … Martindale, W. (2012). *Understanding the environmental impacts of consuming foods that are produced locally in season*. Retrieved from London.
Hood, C. (2010). Accountability and transparency: Siemese Twins, Matching Parts, Awkward Couple? *West European Politics*, *33*, 989–1009.
Hood, D., & Heald, C. (2006). *Transparency: The key to better government?* Oxford: University Press.
Hsu, A., Weinfurter, A., Tong, J., & Xie, Y. (2020). Black and smelly waters: How citizen-generated transparency is addressing gaps in China's environmental management. *Journal of Environmental Policy & Planning*, *22*(1), 138–153.
Ilbery, B., Morris, C., Buller, H., Maye, D., & Kneafsey, M. (2005). Product, process and place: An examination of food marketing and labelling schemes in Europe and North America. *European Urban and Regional Studies*, *12*(2), 116–132. doi:10.1177/0969776405048499
Ipsos Mori. (2010). *Qualitative research to explore peoples' use of food labelling information*. Retrieved from London.
Jacquet, J., & Pauly, D. (2008). Funding priorities: Big barriers to small-scale fisheries. *Conservation Biology*, *22*(4), 832–835. doi:10.1111/j.1523-1739.2008.00978.x
Johansson, V., & Montin, S. (2014). What if performance accountability mechanisms engender distrust? *Urban Research and Practice*, *7*(2), 213–227.
Kiil, K., Hvolby, H.-H., Trienekens, J., Behdani, B., & Strandhagen, J. O. (2019). From information sharing to information utilization in food supply chains. *International Journal of Information Systems and Supply Chain Management (IJISSCM)*, *12*(3), 85–109. doi:10.4018/IJISSCM.2019070105
Knox-Hayes, J., & Levy, D. (2014). The political economy of governance by disclosure: Carbon disclosure and nonfinancial reporting as contested fields of governance. In A. Gupta & M. Mason (Eds.), *Transparency in global environmental governance: Critical perspectives* (pp. 205–224). Cambridge: MIT Press.
Lord, K. (2006). *The perils and promise of global transparency: Why the information revolution may not lead to security, democracy or peace*. Albany, NY: Suny.
Mann, S. (2013). Veillance and reciprocal transparency: Surveillance versus sousveillance, Paper presented at the IEEE International Symposium on Technology and Society. Retrieved from https://ieeexplore.ieee.org/document/6613094
Mason, M. (2008). Transparency for whom? Information disclosure and power in global environmental governance. *Global Environmental Politics*, *8*, 8–13.
Mason, M. (2020). Transparency, accountability and empowerment in sustainability governance: A conceptual review. *Journal of Environmental Policy and Planning*. Retrieved from .https://www.tandfonline.com/doi/abs/10.1080/1523908X.2019.1661231.
Mason, M., & Gupta, A. (2014). Transparency revisited. In A. Gupta & M. Mason (Eds.), *Transparency in global environmental governance: Critical perspectives* (pp. 321–340). Cambridge: MIT Press.
McCarthy, D. R., & Fluck, M. (2017). The concept of transparency in international relations: Towards a critical approach. *European Journal of International Relations*, *23*, 416–440.
Michener, G., & Bersch, K. (2013). Identifying transparency. *Information Polity*, *18*, 233–242.
Miller, A. M. M., Bush, S. R., & Mol, A. P. J. (2014). Power Europe: EU and the illegal, unreported and unregulated tuna fisheries regulation in the West and Central Pacific Ocean. *Marine Policy*, *45*(0), 138–145. doi:10.1016/j.marpol.2013.12.009
Mitchell, R. (2011). Transparency for governance: The mechanisms and effectiveness of diclosure-based and education-based transparency policies. *Ecological Economics*, *70*(11), 1882–1890.
Mol, A. (2014). The lost innocence of transparency in environmental politics. In A. Gupta & M. Mason (Eds.), *Transparency in global environmental governance* (pp. 39–60). Cambridge, MA: MIT Press. doi:10.1016/j.jclepro.2013.11.012
Mol, A. P. J. (2006). Environmental governance in the information age: The emergence of informational governance. *Environment and Planning C: Government and Policy*, *24*, 497–514.

Mol, A. P. J. (2015). Transparency and value chain sustainability. *Journal of Cleaner Production*, *107*(Supplement C), 154–161.
Mol, A., & Oosterveer, P. (2015). Certification of markets, markets of certificates: Tracing sustainability in global agro-food value chains. *Sustainability*, *7*(9). 12258-12278.
Möllering, G. (2005). *Understanding trust from the perspective of sociological neoinstitutionalism: The interplay of institutions and agency*. Retrieved from Leibniz.
Nye, M., & Hargreaves, T. (2010). Exploring the social dynamics of proenvironmental behavior change. *Journal of Industrial Ecology*, *14*(1), 137–149. doi:10.1111/j.1530-9290.2009.00193.x
Scrinis, G., & Lyons, K. (2007). The emerging nano-corporate paradigm: Nanotechnology and the transformation of nature, food and agri-food systems. *International Journal of Sociology of Food and Agriculture*, *15*(2), 22–44.
Seele, P. (2016). Envisioning the digital sustainability panopticon: A thought experiment of how big data may help advancing sustainability in the digital age. *Sustain Sci*, *11*, 845–854.
Seele, P. (2017). Predictive sustainability control: A review assessing the potential to transfer big data driven 'predictive policing' to corporate sustainability management. *Journal of Cleaner Production*, *153*, 673–686.
Smith, P. (2016). The rise of the national surveillance state in comparative perspective. In R. Foshay (Ed.), *The digital nexus* (pp. 207–230). Edmonton: AU Press.
Spaargaren, G., Weenink, D., & Lamers, M. (eds.). (2016). *Practice theory and research: Exploring the dynamics of social life*. New York, NY: Routledge.
Stone, V., Führ, M., Feindt, P. H., Bouwmeester, H., Sabella, S., Murphy, F., … Marijn Poortvliet, P. (2018).: The essential elements of a risk governance framework for current and future nanotechnologies. *Risk Analysis: An International Journal*, *38*(7), 1321–1331. doi:10.1111/risa.12954
Tienhaara, K. (2020). Beyond accountability: Alternative rationales for transparency in global trade politics. *Journal of Environmental Policy & Planning*, *22*(1), 112–124.
Toonen, H. M., & Bush, S. R. (2020). The digital frontiers of fisheries governance: Fish attraction devices, drones and satellites. *Journal of Environmental Policy & Planning*, *22*(1), 125–137.
Trienekens, J. H., Wognum, P. M., Beulens, A. J. M., & van der Vorst, J. G. A. J. (2012). Transparency in complex dynamic food supply chains. [Network and supply chain system integration for mass customization and sustainable behavior]. *Advanced Engineering Informatics*, *26*(1), 55–65.
Urry, J. (2003). *Global complexity*. Cambridge: Polity Press.
Weil, D., Graham, M., & Fung, A. (2013). Targeting transparency. *Science*, *340*(June 21), 1410–1411.
Wognum, P. M., Bremmers, H., Trienekens, J. H., van der Vorst, J. G. A. J., & Bloemhof, J. M. (2011). Systems for sustainability and transparency of food supply chains – Current status and challenges. [RFID and sustainable value chains]. *Advanced Engineering Informatics*, *25*(1), 65–76.
Zuboff, S. (2019). The age of surveillance capitalism*: The fight for a human future at the new frontier of power*. Hachette Books.