

## The Politics of Environmental Knowledge

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### Abstract

This essay offers a critical engagement with the ideal of policy relevant environmental knowledge. Using examples in environmental governance and conservation, it argues that by packaging knowledge in terms and categories that are considered politically salient, scientists do not just inform policy-making by providing information about presumed pre-existing objects in nature and environment; rather, science is constitutive of those objects and renders them amenable for policy and governance. These political implications of scientific knowledge imply a need for critical scrutiny of the interests that science serves and fails to serve as well as mechanisms to ensure the accountability of science. This essay is a modified and expanded version of the inaugural lecture with the same title that was delivered on June 2, 2016 at Wageningen University, the Netherlands.

**Keywords:** accountability, biodiversity governance, ecosystem services, neoliberalism, representation, science-policy interface

### SCIENCE'S SOCIAL AND POLITICAL LIFE

In conservation, and environmental governance more generally, we have become acutely aware of the social and political life of science. Discussions about what nature to protect, the risks of GMOs, or the acceptable levels of atmospheric CO<sub>2</sub>, all revolve around specific numbers, borne out of often complicated model projections and calculations. Given the uncertainties involved in these projections and calculations, it is not surprising that these numbers can become the subject of technical scientific debate. Such debate becomes even less surprising when taking into consideration their possible social and political implications. When projections and calculations are used to legitimise policies and interventions, actors that do not support these policies will oppose them. This exemplifies what has become known as the politics of environmental knowledge. It must be recognised that it is an inevitable

outcome of how environmental and conservation policy are conceived. Dominant discourse holds that policy must be based on sound science, so in this context where we have so thoroughly scientised policy, we should not be surprised that in turn science gets politicised (Weingart 1999).

In this essay, I will extend our understanding of the politics of knowledge beyond only those processes related to the uptake and use of knowledge towards critical scrutiny of the workings of scientific knowledge itself. Drawing on insights from science and technology studies, political theory, and political ecology, this essay develops a specific understanding of the politics of knowledge, demonstrates its significance for environmental governance, and outlines an agenda for research. Rather than offering a full and exhaustive review, it builds on a number of key concepts and applies these to examples from environmental and biodiversity governance. The structure of the argument is as follows: First, I will argue that through knowledge, specific and selective representations of the environment are produced. I will continue by drawing attention to the performativity of these representations, arguing that these representations are much more than just (imperfect) mirrors of nature because they shape not only how we conceptualise and know the environment, but also how we enact it in policy and management. This, then, forms the basis for further discussion of how science can be accountable for

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the political implications of the environmental knowledge that it produces.

### REPRESENTATION AND CLASSIFICATION

‘This is not a pipe’, reads the subscript below what ostensibly is a pipe in Magritte’s famous painting ‘La Trahison des Images’ (The Treachery of Images). I refer to this painting here because it takes us to the heart of the problem of representation. Of course Magritte is right: this is not a pipe; it is a picture of a pipe. But there is a deeper meaning here, because if this is not a pipe, what then is a pipe? The question that Magritte poses is whether we can ever really know the real pipe.

As has long been established in the philosophy of science, the knowledge that science produces is inevitably, at least partly, the result of human choices, values, theories, or experimental designs. The thorny issue is that there is no way to determine whether or to what extent the results that come out of our experiments or studies are facts, truthful representations of reality, or whether they are artifacts, produced by our measuring instruments or theoretical assumptions. Because we simply do not have direct, unmediated, access to reality, scientific knowledge is inevitably an inextricable mixture of both. We cannot know reality outside of and independent from our representations of it.

This is in no way a radical or relativist position that is dismissive of science but a basic starting point of modern theorisations of science, including those of Popper (1959) and Kuhn (1962). However, it is important to take this general point beyond the realm of epistemology and use it as a starting point to examine critically the effects that knowledge produces. The account of knowledge offered here points to the situatedness of knowledge (Haraway 1988): instead of offering a view from nowhere, the credibility and validity of knowledge are situated in the context in which it is produced and used. Recognising that all knowledge – scientific or other – is situated rather than universal implies that we must evaluate it on the basis of its practical implications (Robbins 2003). This means that we must take knowledge to be performative. The performativity of knowledge implies that while attempting to represent reality, knowledge ultimately and at the same time constitutes that very reality (Callon 2007; Law 2009). Our representations of reality, in other words, are what reality comes to be.

Representation starts in the field. Imagine a scientist standing in meadow. How can this meadow be represented? A botanist may start by identifying the plant species and organise the findings in a table. The table can now represent the meadow. It has become an immutable mobile (Latour 1987); a stable but mobile object that enables the meadow to travel, for example to the desks of the NGO that manages it, to policy institutions who decide about its conservation status, or to international biodiversity databases (Latour 1999; Turnhout et al. 2016a). However, before representation is possible - before such a table can be created - a system of order must be in place. The botanist requires a classification system, in this case Linnaean taxonomy. Classification systems are essential in all scientific

activities because they tell scientists what to look for and what items to group in which category. Classification systems, in other words, reflect the differences that make a difference; that are significant enough to define the boundaries of its categories. Such significance is not inherent; it is attributed. Classifications, after all, are human made (Bowker and Star 2000). Once in place, they fundamentally structure what is observed and how, and they can become difficult to change. They become naturalised; seen as directly stemming from nature itself (Foucault 1970; Mitchell 2002). Subsequently, its categories are seen as the items that nature really consists of, species for example, but also categories like gender or race have become naturalised in a similar way.

The story of the discovery of the platypus helps us to understand this process (Ritvo 1997). When this creature was first discovered, a skin and an accompanying description were sent to England. There was no place for a creature like this in existing classifications. So, among the first responses was the suggestion that it must be a hoax, constructed out of a skin of a mole with a duckbill artificially attached to it. Disbelief grew further when it was reported that the platypus laid eggs. It took almost a 100 years to settle the issue and include the platypus in the category of mammals where we now believe it belongs. This involved the shooting of an animal in the process of laying an egg in order to finally produce definitive proof as well as the redefinition of the category of mammals. This example illustrates not only the, often conservative, power of scientific knowledge, but also the process of what Bowker (2000) calls bootstrapping. Bootstrapping refers to the way in which the definition of categories co-evolves together with the items that are put into them. One does not precede the other or can be taken as its cause. In other words, reality and the categories we use to impose order onto it are coproduced (Jasanoff 2004).

The representations of nature that follow from these categories and classification systems are inevitably partial and selective: they foreground specific elements of nature while silencing or ignoring others (Turnhout et al. 2007; Turnhout 2009). This selectivity is by no means neutral. The categorisations that inform and structure environmental knowledge-making reflect specific values, preferences and priorities as well as potentially problematic histories (Robbins and Bishop 2008). For example, the concept natural resources offers a specific classification of what nature and environment are made of and makes us see them in terms of yield, harvest and exploitation (Luke 1995). As I will discuss in more detail in the next section, in much of biodiversity conservation and environmental science, this selectivity is intentional and purposeful: scientists aim to secure the relevance of their research by using categories that they hope will be policy relevant (Miller 2007; Löwbrand 2011; Turnhout et al. 2016b).

### RELEVANCE, CATEGORIES AND STANDARDISATION

The role of categories in the pursuit of relevance can be illustrated by the example of forest carbon. Recently,

advocates of tropical forest conservation have started to use the increasing attention on climate change to draw renewed attention to the importance of forest conservation. However, to make a successful connection, they were compelled to use the category of carbon to repackage their message in terms that were meaningful to actors in the climate regime and convince them that keeping the forest standing would contribute to climate mitigation. This idea, captured in the mechanism called REDD+, has triggered not just complicated negotiations, but also the development of measurement and technologies which enable the calculation of the carbon content of trees, the CO<sub>2</sub> emissions that have been avoided by not logging these trees, and the financial benefits that this could bring when these carbon credits are traded on a carbon market.

As many have pointed out, the relation between nature and markets that is created in the context of REDD+ signifies the neoliberalisation of nature (Corbera 2012; Mahanty et al. 2012). In such neoliberalised forms of environmental governance, they argue, ever more elements of nature are turned into commodities - the commodity in this case being avoided emissions - which can be brought to market so that nature can pay for its own protection. Critics have pointed to the many problems associated with this line of reasoning that I will not repeat here (Igoe and Brockington 2007; Sullivan 2010; Dressler and Roth 2011; Turnhout et al. 2013a). Rather, my focus is on the science involved. Scientific representations of the environment are never neutral and always selective, and this also holds for the representation of forests in terms of carbon content (Gupta et al. 2012, 2014). Perhaps the scientists involved in these activities are driven by a search for new arguments to strengthen the case of halting deforestation, or by a desire to have impact on climate policies, or by an interest in testing out new technologies. Regardless of their motivations, even if they do not necessarily endorse market-based or neoliberal environmental governance, it should be clear that by using carbon as the unit to represent the forest they have made themselves complicit to it. These carbonised representations do serve as the raw materials, so to say, for the production of the commodity that is to be traded and exchanged (Robertson 2006; Turnhout et al. 2014a).

In biodiversity governance, we have witnessed a parade of classifications intended to represent biodiversity so as to enhance its conservation, including for example the IUCN red lists, the Living Planet Index, or the CORINE habitat classification. Each of these is an attempt to produce policy relevant knowledge that can be used to inform decisions. And, as in the example of forest carbon, each has been accompanied by elaborate systems of measurement and calculation. Although there is a difference in that these biodiversity classifications are not currently connected to a market like carbon, the commonalities are important. Like the forest carbon example, they intend to produce relevant, usable knowledge. And also like the forest carbon example, the associated systems of measurement and calculation standardise knowledge by expressing biodiversity in common and commensurable units, thereby facilitating comparison and exchange.

One clear example is wetland banking. Notwithstanding the complexities involved related to amongst others the (in)stability of wetland vegetation science and the problems of bundling and stacking ecosystem services (Robertson 2006, 2012), the central idea is relatively simple. A wetland bank owns a piece of wetland area as capital, not unlike normal banks. When project developers plan to destroy wetlands, they are legally required to compensate for that. They do so by paying money to the wetland bank that then uses it to maintain and improve the wetland it holds as capital. Now, in order to assess how much money the project developer has to pay, the wetland that is going to be destroyed will have to be expressed in standardised metrics. These are the so-called wetland credits, which are calculated on the basis of a selection of indicator species and a number of other biotic and abiotic parameters. Subsequently, so is the idea, the wetland bank will create the equal amount of wetland credits that will be lost in the project development; this is the no-net-loss principle. What happens here is that two different wetland areas - the one owned by the bank and the one that will be destroyed - that are likely to vary considerably not just ecologically but also in terms of their social and cultural meaning, are made commensurable.

REDD+ and wetland mitigation banking are examples of the broader idea of payment for ecosystem services (PES). My criticism of this idea does not necessarily focus on the way in which it puts nature up for sale and subjects it to capitalist markets. In fact, most of these schemes are not set up that way, and if they are, they have often not been able to attract enough capital to actually warrant such a critique (McElwee 2012; Shapiro-Garza 2013; Dempsey and Suarez 2016; Turnhout et al. 2017). Rather, I am concerned with how the concept of Ecosystem Services represents nature and specifically on the role of standardised categories and metrics in rendering natural areas, species or habitats commensurable and making their different values comparable and exchangeable, whether through markets or otherwise (Lave 2012; McElwee 2017). In the next section, I will further discuss how the concept of Ecosystem Services is employed to produce policy relevant biodiversity knowledge.

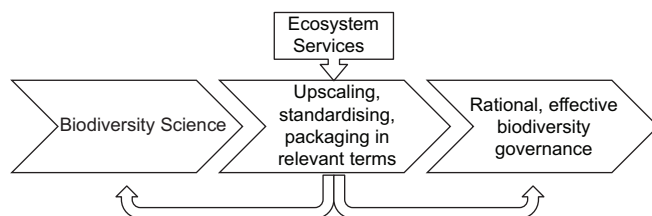
## MEASUREMENTALITY

Ecosystem Services has emerged as an important new classification of nature, arguably to replace biodiversity measures like species indexes or red lists that are considered very technical and not useful for decision-making. Many conservationists and scientists have jumped on this bandwagon, hoping that this new concept would finally help them get their messages across. It has been taken up in large global initiatives like The Economics of Ecosystems and Biodiversity (TEEB) and the Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES), a new UN body that aims to play a comparable role as the Intergovernmental Panel on Climate Change (IPCC) for climate by offering authoritative scientific assessments that will inform policy. In IPBES, the concept of Ecosystem Services has become articulated in

what I have called a measurementality logic (Turnhout et al. 2014b). This measurementality logic combines three powerful discourses that are characteristic of environmental governance. The first is technocratic discourse, which has a long history in conservation and environmental governance (Escobar 1998). It rests on a linear model of science society relations, which holds that science provides neutral input for policy and that decisions must be based on sound science (Beck 2011). The second is managerial discourse. This discourse adds values of efficiency and effectiveness to the mix and suggests that for science to play such a role in decision-making, we need efficient and well-managed science-policy interfaces. The third is policy discourse, which argues that knowledge must be usable and relevant and that currently promotes Ecosystem Services as the preferred policy relevant category (Turnhout et al. 2014b). When these three discourses are put together, like it is being done in IPBES, you get a self-referential system (as depicted in figure 1) which privileges science-based techniques that, to ensure efficiency and relevance, should focus exclusively on the representation of nature as Ecosystem Services. Ironically, this is not a diverse way of representing the diversity of life. One result of this is that the category of Ecosystem Services is starting to become naturalised: we are beginning to view and enact nature differently, or rather, we are enacting and living in and with a different nature, one that is increasingly seen to be made up of ecosystem services that are in need of management, conservation or exchange (Robertson 2012; Turnhout et al. 2014a).

The relevance of this argument goes beyond the concept of Ecosystem Services, and beyond commodification, or neoliberalism in the environmental domain. My point is that when electing to represent the environment in a specific way, science produces objects that are amenable to certain specific governance logics and which attract and privilege certain groups of actors (see Hulme 2010 for a similar argument about climate knowledge). Consequently, these representations also inevitably exclude other actors and other governance logics.

In making this argument, I do not wish to exaggerate the power of science. Particularly in the environmental domain, many would argue that - perhaps particularly in the current times of post-truth and alternative facts - science is not powerful enough and that policy makers should make better use of science to inform their decisions. While I understand (but do not necessarily support) this view, the kind of power that I refer to here is not about policy makers following science-based advice, but about the power to define and classify the environment,



**Figure 1**  
*Measurementality in biodiversity science and governance*

and in doing so, reorder relationships between humans, environment, and society (Foucault 1970, 1977; Turnhout et al. 2016b). Seen from this perspective, producing knowledge constitutes world-making. This is politics. More specifically, it is ontological politics (Mol 1999). So, to use a popular character from Sesame Street, powerful scientific elites act as veritable Counts von Count, who, by determining what should be counted and how, are also determining what can be taken into account in decision-making. Since we can only act upon what we know, all that is not counted easily gets forgotten. This means that the decisions that scientists make when designing their metrics and monitoring systems have consequences that reach far beyond seemingly objective and innocent processes of classification and representation. But, as is generally the case for elites such as Counts, they lack accountability.

## REPRESENTATION AND ACCOUNTABILITY

To understand better why science should be concerned with accountability, it is useful to reconsider the idea of representation. Within democratic theory, it has long been recognised that representation has two distinct but interrelated meanings (Pitkin 1967; Brown 2009). The first meaning is that of a mirror. The basic assumption here is that representatives have to be similar to their constituencies in terms of relevant criteria, such as education level, gender, class, or occupation. For the second meaning, representation as spokesperson, similarity is less important. Instead, what matters is how well you represent the interests and needs of your constituencies and how you are accountable to them. While in representative democracy, both meanings are considered important, scientific representations are almost exclusively viewed from the perspective of the mirror. The job of scientists, so is the idea, is to mirror nature and the representations that they produce are evaluated according to their truth-value. This account of science is not just naïve and, as we have established, quite impossible, it also neglects the spokesperson dimension of representation. In doing so, it has obscured from view the politics involved in scientific representation and it has enabled science to escape questions of accountability. This should no longer be acceptable. There is far too much at stake in current environmental problems to leave it to scientists to define these problems and thereby shape their solutions.

According to this view on the relation between representation and accountability outlined just now, a central element of accountable science must concern the fostering of productive connections between the scientists, who do the representing, and their constituencies, the human and non-human natures that get represented. This is an area of considerable activity and initiative. Captured by concepts such transdisciplinarity (In't Veld 2010), knowledge brokering (Pielke 2007; Meyer 2010), responsible research and innovation (Owen et al. 2012), participatory approaches to mapping and GIS (Robbins 2003), or scenario analysis (Kok et al. 2017), research projects are exploring ways to create better connections between science, policy and society. However, we often see that that

the hopes and ideals associated with them are not achieved. In practice science tends to end up in a dominant position, in charge of the facts and of the problem definition, with non-scientific actors in the position of receivers of knowledge and co-creators of solutions or options (Maasen and Lieven 2006; Turnhout et al. 2013b). Thus, while the employment of standards can help people to make credible knowledge claims, the use of these standards is a double edged sword since it also disciplines and structures the shape of those knowledge claims (Ottinger 2010; Bryan 2011). While this poses a thorny dilemma for which no easy solutions are available, it is evident that current approaches to participatory knowledge making are not sufficient to ensure accountability. We need to up our game, both in research and in practice.

I suggest that part of this challenge involves active resistance against too quickly going into a managerial mode. A crucial mistake that is often made lies in assuming that currently connections between scientists and non-scientists are absent and that they can be newly created with a good process and a good facilitator. Much more likely however is that there are in fact connections and relations already in place, but these are not always the ones that managerial approaches like, or are able to see; they can be contentious, they are often erased from formal accounts, and they are ill-understood. However, these politicised and troubled relations need careful attending to in order to understand the diverse practices and sites where the politics of environmental knowledge plays out. As will be discussed further in the next section, this requires a closer look at practice, performativity, and situated agency (Arts et al. 2013, 2014; Behagel et al. 2017).

### **PRACTICE, UNPREDICTABILITY AND CONTESTATION**

While systems of order and concomitant measuring and calculation techniques are powerful, the effects that they produce are contingent. Applying classifications, monitoring frameworks or standards is inevitably a matter of practice. In practice, these classifications, frameworks and standards meet with local realities and it is there that their effects materialise. These practical effects can take the shape of resistance against formal categories and measures (Li 2007, McAfee and Shapiro 2010; Shapiro-Garza 2013), but that is not my main point. Rather, I want to focus on the scope for agency that lies in the application of these categories and standards. This is what the concept of performativity highlights. Butler (1990) famously made this argument in relation to gender: gender is not something that you are, in essence, or in biology, but something that you do, over and over again (see Li 2000 for an analysis of Indigenous identity that makes a similar point). And each performance is simultaneously an act of subjectification as well as an opportunity for change. In other words, the use of standards and categories is never only technical but always also a matter of practicing politics (Waterton 2002; Li 2007; Behagel 2012).

These processes of tinkering have been well documented in studies about auditing, evaluation, and performance

measurement (Power 1997; Smith 1995; De Bruijn 2007). Such tinkering is not necessarily cheating or manipulation: putting things into practice is not possible without the exercise of situated agency. However, it does mean that we need to be cautious in using the outcomes as unproblematic evidence for quality, performance or compliance. Recognising situated agency means that we have to accept that it is always possible to interpret and enact formally established indicators and measurement systems in such a way as to include certain aspects of performance – or lack thereof – while hiding others (Turnhout et al. 2015). It is important to recognise that such interpretation is not (just) about resistance - although it can be viewed as such – but equally, and at the same time, about compliance (Turnhout et al. 2015). This dialectical relation between compliance and resistance is captured well with the concept of governmentality (Foucault 1991; Rose 1999; Agrawal 2005; Rose and Miller 2010). From this perspective, standardised measurement and monitoring systems produce subjects that are able to simultaneously work with, against and around the measurement and monitoring systems in place.

### **AN AGENDA FOR RESEARCH AND ENGAGEMENT**

How these dialectics between compliance and resistance play out in the domain of environment and conservation requires more in-depth research for example in community-based carbon or biodiversity monitoring and citizen science. This will contribute important insights into the diverse and often contentious - or frictionous (Tsing 2005) - relations between science and non-science, and the fragmented politics in which representations of the environment are shaped and enacted.

Such research will also extend our understanding of local knowledge beyond approaches that highlight the differences between science and local knowledge to emphasise the unique qualities of local knowledge and its value and usefulness for resource management (Forsyth 1996; Berkes et al. 2000) or promote the rights of the holders of this knowledge (Nadasdy 1999; 2003). Rather, what I am proposing builds on research that treats science and local knowledge in a symmetrical way (Agrawal 1995, 2002; Turnbull 1997) and that has demonstrated the historical interlinkages between science and local knowledge (Neves-Graca 2006) as well as the contextual character of our understanding and definition of local knowledge (Raffles 2002, Forsyth 2003). Indeed, as established early in the essay, all knowledge – local as well scientific – must be understood as situated and partial (Haraway 1988; Robbins 2003). Therefore, following the arguments developed in this essay, also local knowledge must be understood as performative and must be evaluated on the basis of the effects it produces in practice.

In relation to this point, IPBES is an important site for investigating the politics of environmental knowledge. IPBES has committed itself to incorporating local and indigenous experts and knowledge systems into all its activities and products. This is not necessarily interesting or new: the representation of

alternative knowledge systems is a long-standing principle in the UN biodiversity regime. Yet, there are signs that for IPBES this may be more than just a symbolic gesture and that it aims to face the challenge of bringing together different knowledge systems head on (Borie and Hulme 2015; Diaz et al. 2015; Montana 2017). IPBES activities such as the production of the Global Assessment, a report that assesses and synthesises the current state of the art knowledge of biodiversity and ecosystem services and that is scheduled to be published in 2019, provide a unique opportunity to investigate how different forms of biodiversity knowledge - including the natural science, the social sciences and humanities, and indigenous and local knowledge - get integrated; what categories and concepts will structure this integration, and how at the same time those categories and concepts will be reinterpreted to make knowledge fit under them.

What I have outlined here is not only an agenda for critical social science and humanities research, but also an invitation to participate and contribute to the processes under study. Indeed, as Castree et al. (2014) propose, it is important for the environmental social sciences and humanities to get out of their comfort zones and engage. However, the road ahead is challenging. Their role must go beyond science communicators or facilitators of consensus, as is all too often the case in the limited imaginaries of integrative or interdisciplinary research (Viseu 2015, Klenk and Meehan 2015). Instead, their task is to shake up long standing traditions and biases in environmental knowledge as well as the communities of scholars that have formed around them, and to fundamentally and creatively rethink what it means to do environmental knowledge (Turnhout et al. 2012; Lave et al. 2013; Castree et al. 2014; Lahsen 2016). To some extent, what I am proposing implies that their role will have to be one of creative destructors (Schumpeter 1942) who refuse to be persuaded by logics of efficiency and measurementality, who continue to be difficult, who root things up, and who problematise naturalised and taken for granted classifications, frameworks and ways of working.

The agenda for research and engagement outlined here will make productive use of the tensions and frictions that arise when different knowledges meet. It will use these moments not just to analyse and understand the dynamics of resistance and compliance as well as of collaboration, consensus and creativity that take place, but also to reflect and learn. The central idea, following Latour (2004, 2010; see Waterton and Tsouvalis 2015 for an empirical illustration), is to build environmental knowledge collectives where premature closure and consensus are prevented, where space is created for continued questioning and contestation, and where all relevant knowledge holders are able to carve out sufficient space to enact their role in whatever way they see fit.

### SCIENCE FOR IMPACT?

After outlining an agenda for research and engagement, it is important to go back to where the essay started, the politics of environmental knowledge, and specifically of intended policy relevant knowledge, and reflect here on the ideal of

‘science for impact’. In recent years, impact has become a dominant paradigm in science policy (Nature 2013). Scientists are expected to publish well-cited articles in high impact journals, funders require impact paragraphs in proposals with a convincing theory of change, and peer reviews of scientific institutions are increasingly using impact as a key criterion. Many lament the impact agenda, arguing that the autonomy of science is under threat and that there should be a place for curiosity-driven science. As is probably clear from my arguments so far, I do not share that perspective. It is in my view unduly self-congratulatory and inward looking. The promotion of the ideal of science for science’s sake is risky since it enables interested actors, such as scientists inevitably are, to engage in ontological politics, without having to face external scrutiny for the effects their knowledge produces (also see Sarewitz 2016).

However, as an ideal for science, impact is dangerously empty. It may lead scientists to chase blindly any kind of impact they can get without questioning what it is that they are impacting on, who benefits and loses from that, and how this can be justified. With this impact agenda developing so rapidly, we are already beginning to see some of its effects. Recent experiences, for example with the Research Excellence Framework, which is the UK procedure to evaluate research groups, suggest that peer reviewers tend to give high scores to impact case studies that are easy to document — even if this impact is sometimes only symbolic — and that target elite actors in policy or business (Smith and Steward 2016). This leaves areas of scholarship that are more critical in nature or that target non-elite actors with a much more difficult task to demonstrate their importance. Funding agencies such as the Dutch Science Foundation exacerbate this problem when they require in cash co-funding as a condition for research grants. While this could, in principle, be useful and create meaningful interactions between scientists and the societal organisations that provide the co-funding, it will inevitably privilege bigger and wealthier companies who can now enroll science in their R&D activities. Thus, scientists who follow the money will end up serving the interests of the already powerful. As others have also argued, this threatens the public function of science and the university (Halfman and Radder 2015). This is especially relevant for research into conservation and environment that, often explicitly, aims to contribute to the quality of human and non-human life (Robertson and Hull 2001). Scientists in these domains need to ask themselves the difficult question what and whose lives matter and how their research affects them. Or, put in the vocabulary of bio-politics, whose lives they will make live and let die, and how (Foucault 2002).

### CONCLUSION

This essay has drawn attention to the often implicit and underexplored political implications of environmental knowledge. The conceptualisation of environmental knowledge as not only partial, situated and selective but also performative, has enabled deeper insight into how

environmental knowledge produces effects. Subsequently, I have used this insight to outline an agenda for research and engagement for environmental sciences and humanities and to reflect on what is at stake when scientists want to influence decision-making with their knowledge or when policy interventions require specific forms of environmental knowledge in order to operate. Rather than being simply a matter of informing decision-makers by producing relevant knowledge, environmental knowledge-making and decision-making now appear as inseparable and mutually constitutive.

This leads to two interrelated conclusions. First, the production of usable or policy relevant knowledge is not in itself a laudable ideal. Rather than servicing existing policy elites, it may be just as important for environmental science to disrupt these elites and facilitate resistance against dominant conceptions of nature and environment. Second, and related to this point, critical reflection on the interests that science serves and fails to serve, and engagement with elite as well as non-elite actors are absolutely essential and can no longer be treated as outside science's core business or responsibility (Turnhout et al. 2016b). It is time, in other words, that Count von Count is held accountable to his human and non-human constituencies.

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