The politics of environmental knowledge

Prof.dr E.(Esther) Turnhout

Inaugural lecture upon taking up the position of personal professor in
The politics of environmental knowledge at Wageningen University
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Esteemed Rector Magnificus, dear colleagues, friends, and family.

Once upon a time, there was a number. This number was called 18.000 cubic meters per second. It was borne out of complicated model projections and calculations. During the course of its life, the number had assumed a very specific meaning in Dutch climate and water governance as a flood risk norm. Given the uncertainties involved in these kinds of model studies and calculations, it is not surprising that a number like this can become the subject of technical and scientific debate. Such debate becomes even less surprising when taking into consideration the number's social and political life.

In this case, the number had been used to legitimize policy decisions, plans and interventions in river landscapes. These interventions involved interests, some in support of the plans, some in opposition. The number had become a central element of the controversy that followed[1]. From the perspective of the opponents, in this case inhabitants, the legitimacy of the intervention that was planned in the area where they lived could be undermined if they found a way to show that the number was flawed. However, from the perspective of the supporters, there was too much at stake to allow criticism. Many actors stood to gain from the decisions and plans that the number legitimized. Also scientific institutes stood to gain from the authority that the number carried because they helped produce it. For these powerful actors, the number had to be protected. This example offers a useful illustration of the politics of environmental knowledge. Dominant discourse holds that policy must be based on sound science, so in this context where we have so thoroughly scientized policy, we should not be surprised that in turn science gets politicized[2].

1 *This case has been described in During et al. 2016* ***Legitimatie van de nevengeul voor de Waal langs Varik.*** *This report was published after an embargo period that was installed as a precautionary damage control measure. During this period a new internal peer review was conducted which has resulted in changes to the document.*

2 *The dual process of politicization of science and scientization of policy has been described in Weingart 1999* ***Scientific expertise and political accountability: paradoxes of science in politics****, Science and Public Policy.*

But when I speak of the politics of knowledge, I refer not just to the political processes related to the uptake and use of knowledge. Indeed, knowledge may be used to inform policies and decisions, it may be ignored or rejected, or it may become part of controversies, for example about flood measures. However, with politics of knowledge I also refer to the knowledge itself. Processes of knowledge production inevitably involve choices and values. Yet, through knowledge, specific representations of the environment are produced. And these representations shape not only how we conceptualize and know the environment, but also how we enact it in policy and management.

Magritte's famous picture "La Trahison des Images" (figure 1) 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's picture poses to us is whether we can ever really know the real pipe.

Figure 1: "La Trahison des Images", Magritte, 1928-29

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. Now, 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 artefacts, 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. Now, this is in no way a radical or relativist position that is dismissive of science. Rather, it is a very basic starting point of modern theorizations of science, including those of Popper and Kuhn[3]. However, we need to take this general point beyond the realm of epistemology and use it as a starting point to critically examine the effects that knowledge produces in practice. I will take knowledge to be performative, suggesting that any practice of knowledge production, while attempting to represent reality, ultimately and at the same time constitutes that very reality[4]. Our representations of reality are what reality comes to be. Going back to Magritte, indeed, this is not a pipe, but not because it is a representation, but because this is what the picture says.

Imagine a scientist standing in meadow. How can the scientist represent this meadow? A botanist would start by identifying the plant species, and then organize the findings in a table. The table can now represent the meadow. It has, to use Latour's term, become an immutable mobile 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[5]. However, before representation is possible, before the 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, what items to group in the same category, and what items belong in a different category. Classification systems, in other words, reflect the differences that make a difference; that are significant enough to define the boundaries of its categories. However, such significance is not inherent, it is

3 *These include Popper 1959* ***The logic of scientific discovery****; and Kuhn 1962* ***The structure of scientific revolutions****. Particularly Popper remains very influential among scientists who often use his ideas to demarcate science from non-science. In those accounts, Popper's strong opposition against empiricism and positivism often tends to be ignored or forgotten.*

4 *The performativity of knowledge is discussed amongst others in Callon 2007* ***What does it mean to say the economics is performative?*** *In Mackenzie et al. Do economists make markets? On the performativity of economics; and Law 2009* ***Seeing like a survey****, Cultural Sociology.*

5 *The concept of immutable mobile is taken from Latour 1987* ***Science in action: how to follow engineers and scientists through society****. The processes of circulation and translation are described in Latour 1999* ***Circulating reference: sampling the soil in the Amazon forest****, Pandora's hope; and applied to biodiversity in Turnhout et al. 2016* ***Citizen science networks in natural history and the collective validation of biodiversity data****, Conservation Biology.*

attributed. Classifications, after all, are human made[6]. Once in place, they fundamentally structure what is observed and how, and they can become difficult to change. As Foucault has demonstrated, they can become naturalized, seen as directly stemming from nature itself[7]. Subsequently, its categories are seen as the items that nature really consists of, species for example, but also things like gender or race have become naturalized in a similar way.

Ritvo's story of the platypus helps us to understand this process[8]. 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 calls bootstrapping[9]. 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[10].

The representations of nature that follow from these categories and classification systems are inevitably selective: they foreground specific elements of nature while silencing or ignoring others[11]. In much of biodiversity conservation and environmental science, this selectivity is in fact purposeful: scientists aim to secure the relevance of their research by using categories that they expect or hope will be policy relevant[12]. Recently, representations of tropical forest have started to include

6 *Bowker and Star 2000* ***Sorting things out: classification and its consequences*** *contains several examples of the cultural nature and consequences of classification*

7 *Foucault 1970* ***The order of things: an archaeology of the human sciences****. Also see Mitchell 2002* ***Rule of experts: Egypt, techno-politics, modernity****.*

8 *Ritvo 1997* ***The platypus and the mermaid, and other figments of the classifying imagination****.*

9 *Bowker 2000* ***Biodiversity datadiversity****, Social Studies of Science.*

10 *Jasanoff ed. 2004.* ***States of knowledge: the co-production of science and social order****.*

11 *This argument has been made for ecological indicators and the classification of nature in Turnhout et al. 2007* ***Ecological indicators: between the two fires of science and policy****, Ecological Indicators; and in Turnhout 2009* ***The effectiveness of boundary objects: the case of ecological indicators****, Science and Public Policy.*

12 *Turnhout et al. 2016* ***What does policy-relevant global environmental knowledge do? The cases of climate and biodiversity****, Current Opinion in Environmental Sustainability.*

carbon as one such policy relevant category. Advocates of tropical forest conservation have used the increasing attention for climate change as the ultimate global environmental problem to draw renewed attention to the importance of forest conservation. However, to make a successful connection, they were compelled to repackage their message in terms that were meaningful to actors in the global climate regime. Thus, they had to convince them that keeping the forest standing would contribute to climate mitigation.

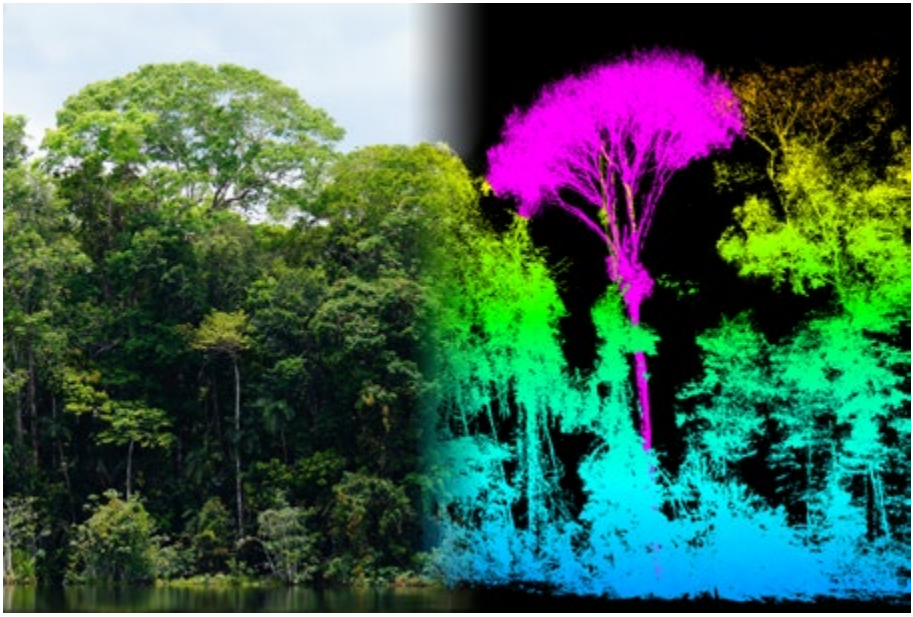

Figure 2: LIDAR based representation of tropical forest (right end)

This idea, captured in the mechanism called REDD+, has triggered not just complicated negotiations, but also a set of measurement and calculative technologies. The right half of figure 2, for example, was created by a LIDAR, a kind of RADAR but then with light instead of radiowaves[13]. The LIDAR creates a point cloud that can be used to model individual trees, like was done for the pink one in the image. A series of calculations can then be applied to assess the carbon content of that specific tree, the CO_2 emissions that have been avoided by not logging this tree, and the financial benefits that this could bring should these credits be traded on a carbon market. Many colleagues have

13 *With thanks to Alvaro Lau Sarmiento and Martin Herold for providing the images and to Jerry van Dijk voor image editing.*

pointed out that this signifies the neoliberalization of nature[14]. In such neoliberalized forms of conservation, 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 which I will not repeat here[15].

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[16]. 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 like LIDAR. 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 carbonized representations do serve as the raw materials, so to say, for the production of the commodity that is to be traded and exchanged[17].

In biodiversity governance, we have witnessed a parade of classifications, concepts and ideas, all intended to represent biodiversity as to enhance its conservation. We have the IUCN red-lists with rare and threatened species, we have biodiversity indices that capture species distribution and relative abundance, we have systems of habitat classifications like the EU CORINE system, and so on. Each of these is an attempt to produce policy relevant knowledge that can be used to inform decisions.

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14 *See amongst others Corbera 2012* ***Problematizing REDD+ as an experiment in payments for ecosystem services****, Current Opinion in Environmental Sustainability; and Mahanty et al. 2012* ***The social life of forest carbon: property and politics in the production of a new commodity****, Human Ecology.*

15 *See for example Igoe and Brockington 2007* ***Neoliberal conservation: a brief introduction****, Conservation and Society; Sullivan 2010* ***Ecosystem service commodities, a new imperial ecology? Implications for animist immanent ecologies, with Deleuze and Guattari****, New Formations; Dressler and Roth 2011* ***The good, the bad, and the contradictory: neoliberal conservation governance in rural Southeast Asia****, World Development; and Turnhout et al. 2013* ***Rethinking biodiversity: from goods and services to 'living with'****, Conservation Letters.*

16 *Gupta et al. 2012* ***In pursuit of carbon accountability: the politics of REDD+ measuring, reporting and verification systems****, Current Opinion in Environmental Sustainability; and Gupta et al. 2014* ***Making REDD+ transparent: the politics of measuring, reporting and verification systems****, In Gupta and Mason eds. Transparency in global environmental governance: critical perspectives.*

17 *This more general point of how measurement may end up serving markets has been made in Robertson 2006,* ***The nature that capital can see: science, state and market in the commodification of ecosystem services****, Environment and Planning D: Society and Space; Turnhout et al. 2013* ***Rethinking biodiversity: from goods and services to 'living with'****, Conservation Letters, 6; and Turnhout et al. 2014* ***Technocratic and economic ideals in the ecosystem services discourse****, Conservation Letters.*

And as in the example of forest carbon, each of these classifications has been accompanied by elaborate systems of measurement and calculation[18]. Although there is an obvious difference in that these biodiversity classifications are not 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 standardize knowledge by expressing biodiversity in common and commensurable units, thereby facilitating comparison and exchange.

One clear example is biodiversity banking. While the US has a longer tradition specifically in wetland mitigation banking, several European countries, including the UK and the Netherlands are currently experimenting with it. The idea is simple[19]. 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 standardized 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 so-called '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 through the use of standardized metrics and credit systems and through this, are they rendered exchangeable.

Another well-known example is the idea of Payment for Ecosystem Services. Now again, the object of my critique is not necessarily that 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

18 *Examples are offered in Turnhout 2009* ***The effectiveness of boundary objects: the case of ecological indicators****, Science and Public Policy.*

19 *This simplicity is deceptive. See Robertson 2004* ***The neoliberalization of ecosystem services: wetland mitigation banking and problems in environmental governance****, Geoforum; Robertson 2006* ***The nature that capital can see: science, state and market in the commodification of ecosystem services****, Environment and Planning D: Society and Space; and Robertson 2012* ***Measurement and alienation: making a world of ecosystem services****, Transactions of the institute of British Geographers.*

warrant such a critique[20]. My focus is on how the concept of Ecosystem Services represents nature. 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 message across. It has also been taken up in large global initiatives like TEEB (Economics of Ecosystems and Biodiversity) and IPBES (Intergovernmental Platform for Biodiversity and Ecosystem Services), a new UN body that aims to play a comparable role as the IPCC for climate by offering authoritative scientific assessments that will inform policy.

In IPBES, the concept of Ecosystem Services has become part of what I call a measurementality logic[21]. This measurementality logic combines three powerful discourses that are characteristic of environmental governance more generally. The first is technocratic discourse. This is a familiar one in environmental governance. It holds that science provides neutral input for policy and that decisions must be based on sound science. 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. Now when you put these three discourses together, like is being done in IPBES, you get a self-referential system (as depicted in figure 3) 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 very diverse way of representing the diversity of life.

20 *This seems particularly clear for the case of REDD+. See Fletcher et al. 2016* ***Questioning REDD+ and the future of market-based conservation****, Conservation Biology; and Turnhout et al 2016.* ***Envisioning REDD+ in a post-Paris era: between evolving expectations and current practice****, WIREs Climate Change. Also see Dempsey and Suarez 2016* ***Arrested development? The promises and paradoxes of 'selling nature to save it'****, Annals of the Association of American Geographers.*

21 *The concept of measurementality is discussed in Turnhout et al. 2014* ***'Measurementality' in biodiversity governance: knowledge, transparency, and the Intergovernmental science–policy Platform on Biodiversity and Ecosystem Services (IPBES)****, Environment and Planning A.*

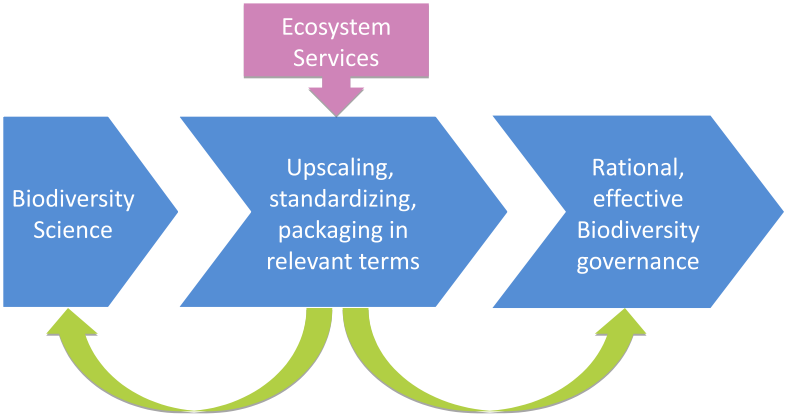

Figure 3: Graphical depiction of the measurementality logic in biodiversity governance

One result of this is that the category of Ecosystem Services is starting to become naturalized: 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[22].

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. Consequently, it also inevitably excludes other actors and other governance logics. Seen from this perspective, producing knowledge constitutes world-making. Now, this is politics. More specifically, it is ontological politics[23]. 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

22 *This point has been made in Robertson 2012* ***Measurement and alienation: making a world of ecosystem services****. Transactions of the institute of British Geographers; and in Turnhout et al. 2014* ***'Measurementality' in biodiversity governance: knowledge, transparency, and the Intergovernmental science–policy Platform on Biodiversity and Ecosystem Services (IPBES)****, Environment and Planning A.*

23 *Mol 1999* ***Ontological politics, a word and some questions****, In Law and Hassard eds. Actor network theory and after.*

monitoring systems have consequences that reach far beyond seemingly objective and innocent processes of classification and representation. But, like the ruling class that the Counthood represents, they generally lack accountability.

To better understand why science should be concerned with accountability, it is useful to reconsider the idea of representation. Within democratic theory, it has long been recognized that representation has two distinct but interrelated meanings[24]. 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 the scientists to define these problems and thereby shape their solutions.

A central element of accountable science has to be the fostering of productive connections between the scientists, who do the representing, and their constituencies, the human and non-human natures that get represented. Here, I draw inspiration from work that is being done amongst others in citizen science, science-policy interface studies, transdisciplinarity, or knowledge brokering[25]. However, when these ideas are put into practice, we often see that that the hopes and ideals associated with them are not achieved. Notwithstanding the good intentions, hard work, and effort with which many programs and projects are set up, in practice science often ends up in a dominant position, in charge of the facts and of the problem definition, with non

24 *Pitkin 1967* ***The concept of representation****. The dual meaning of representation has been applied to science and knowledge in Brown 2009* ***Science in democracy: expertise, institutions, and representation****.*

25 *For example, Irwin 1995* ***Citizen science, a study of people, expertise and sustainable development****; Pielke 2007* ***The honest broker: making sense of science in policy and politics****; Bonney et al. 2009* ***Citizen science: a developing tool for expanding science knowledge and scientific literacy****, BioScience; In 'T Veld ed. 2010* ***Knowledge democracy: implications for science, politics and media****; and Turnhout et al. 2013* ***New roles of science in society: different repertoires of knowledge brokering****, Science and Public Policy.*

scientific actors in the position of receivers of knowledge and co-creators of solutions or options[26]. While such projects can have value, they do not 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, they need attending to in order to understand the diverse practices and sites where the politics of environmental knowledge plays out. This requires a closer look at practice, performativity, and situated agency[27].

While systems of order and concomitant measuring and calculation techniques are powerful, the effects that they produce are to an important extent 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 materialize. In other words, there is scope for agency in their application[28]. This is what the concept of performativity highlights. Butler famously made this argument in relation to gender[29]: gender is not something that you are, in essence, or in biology, but something that you do, over and over again. And each performance is simultaneously an act of subjectification as well as an opportunity for tinkering or change. These processes of tinkering have been well documented in studies about auditing, evaluation, and performance measurement[30]. It is important to recognize that such tinkering is not necessarily cheating or manipulation: putting things into practice is not possible without the

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26 *Metze and Turnhout 2014* ***Politiek, participatie en experts in de besluitvorming over superwicked problems****, Bestuurskunde.*

27 *Situated agency and performativity are, together with logic of practice, the key concepts of the practice-based approach developed in Arts et al. eds. 2013* ***Forest and nature governance, a practice based approach****; and Arts et al. 2014* ***A practice based approach to forest governance****, Forest Policy and Economics.*

28 *This is a key starting point of the practice-based approach, see Arts et al. eds. 2013* ***Forest and nature governance, a practice based approach****; and Arts et al. 2014* ***A practice based approach to forest governance****, Forest Policy and Economics. It is also an important point in Li 2007* ***The will to improve: governmentality, development and the practice of politics****, who demonstrates how attempts to render interventions technical are always alternated with the practicing of politics.*

29 *Butler 1990* ***Gender trouble: Feminism and the subversion of identity****.*

30 *For example see Smith 1995* ***On the unintented consequences of publishing performance data in the public sector****, International journal of Public Administration; Power 1997* ***The audit society: rituals of verification****; and De Bruijn 2007* ***Managing performance in the public sector****.*

exercise of situated agency[31]. However, it does mean that we need to be cautious in using the outcomes as unproblematic evidence for quality, performance or compliance. Recognizing situated agency means that we have to accept that "there will always be aspects of performance or quality that can be left outside the scope of the indicators and categories that are included in standardized accounting or measurement systems and that similarly, it is always possible to interpret indicators and categories in such a way that aspects of performance can be represented through them. Thus actors can use their discretion to render specific performances visible and invisible while still complying with the system" [32].

In other words, it is possible to comply with standards and at the same time resist them. In fact, compliance and resistance are two sides of the same coin. How these dialectics between compliance and resistance to standards play out in practice requires more in-depth research, for example in community based carbon or biodiversity monitoring and citizen science, to analyze how elite and non-elite actors work with, against, or around measurement and monitoring systems[33]. Such research will reveal the potential of local knowledge for contestation and resistance[34] and will contribute important insights into the diverse and often contentious or, to use Tsing's term, frictious[35] relations between science and non-science, and the fragmented politics in which representations of the environment are shaped and enacted.

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

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31 *For the unpredictable and contingent effects of such human or non human situated agency see amongst others Waterton 2002* ***From field to fantasy: classifying nature, constructing Europe****, Social Studies of Science; and Behagel 2012* ***The politics of democratic governance: the implementation of the Water Framework Directive in the Netherlands****.*

32 *This quotation is taken from Turnhout et al. 2015* ***Carbon accounting****, In Bäckstrand and Lövbrand eds. Research handbook of climate governance. The chapter contains a detailed explanation of the mutual constitution of resistance and compliance, which draws on the notion of governmentality as elaborated in Foucault 1991* ***Governmentality****, In Burchell et al. eds The Foucault effect: studies in governmentality; Rose 1999* ***Powers of freedom, reframing political thought****; Agrawal 2005* ***Environmentality: technologies of government and the making of subjects****; Li 2007* ***The will to improve: governmentality, development and the practice of politics****; and Rose and Miller 2010* ***Political power beyond the state: problematics of government****, The British Journal of Sociology.*

33 *The conceptual basis of this research agenda is elaborated in Turnhout et al. 2015* ***Carbon accounting****, In Bäckstrand and Lövbrand eds. Research handbook of climate governance.*

34 *Much of the literature on local, traditional and indigenous knowledge has tended to treat local knowledge in a rather romantic sense as 'the other'; somehow essentially different from, dominated by, and/or superior to science. See amongst others Berkes 1999* ***Sacred ecology: traditional ecological knowledge and resource management****. The argument developed here focuses rather on the potential of local knowledge for contestation and resistance.*

35 *Tsing 2005* ***Friction: an ethnography of global connection****.*

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. In my view, this can only be accomplished by a fundamental rethinking of what it means to do biodiversity knowledge. Such rethinking will be exciting but it will also be very difficult. One of the biggest challenges is to make sure that premature closure and consensus are prevented and that all relevant knowledge systems are able to carve out sufficient space to enact their role in whatever way they see fit.[36] Social sciences and the humanities will be indispensable in these processes. However, not as science communicators or facilitators of consensus as is all too often the case in the limited imaginaries of interdisciplinary research[37], but to some extent as the direct opposite. Their role will have to be one of creative destructors[38] who refuse to be persuaded by logics of efficiency and measurementality, who continue to be difficult, who root things up, and who problematize naturalized and taken for granted classifications, frameworks and ways of working.

I have started with a problematization of scientific knowledge and of policy relevant knowledge in particular and this is also where I would like to end. Impact has quickly become a dominant paradigm in science policy. 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. I should make clear that I do not share that perspective. It is in my view unduly self-congratulatory and inward looking. Science for science's sake is an illusion and pretending that it exists 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.

However, as an ideal for science, impact is dangerously empty. It may lead scientists to blindly chase any kind of impact they can get without questioning what it is that they are impacting on, who benefits and looses from that, and how this can be justified. With this impact agenda developing so rapidly, we are already beginning to

36 *This argument has been made in relation to IPBES in Turnhout et al.* ***Conservation policy: listen to the voices of experience****, Nature.*

37 *Viseu 2015* ***Integration of social science into research is crucial****, Nature.*

38 *The concept of creative destruction is taken from Schumpeter 1942* ***Capitalism, socialism and democracy****.*

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[39]. Now, this leaves areas of scholarship that are more critical in nature or that target non-elite actors with a much more difficult to task to demonstrate their importance. In the Netherlands, the top sector policy further exacerbates this problem. When the Dutch science foundation NWO requires substantial in-cash co-funding, 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[40]. This is particularly relevant for Wageningen. An institution that aims to contribute to the quality of life needs to ask itself the difficult question of what lives matter. Or, put in the vocabulary of bio-politics, whose lives will it make live and let die, and how[41].

To conclude, producing usable or policy relevant knowledge is not in itself a laudable ideal. 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[42]. It is time, in other words, that Count von Count is held accountable to his human and non-human constituencies.

39 *For example Smith and Stewart 2016* ***We need to talk about impact: why social policy academics need to engage with the UK's research impact agenda****, Journal of Social Policy.*

40 *Halffman and Radder 2015* ***The academic manifesto: from an occupied to a public university****, Minerva.*

41 *Foucault 2002* ***Society must be defended: lectures at the Collège de France, 1975–76****.*

42 *Turnhout et al. 2016* ***What does policy-relevant global environmental knowledge do? The cases of climate and biodiversity****, Current Opinion in Environmental Sustainability.*

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Prof.dr E.(Esther) Turnhout

In 'The Politics of Environmental Knowledge', professor Turnhout offers a critical engagement with the ideal of science for impact. Using examples in biodiversity governance, ecosystem services and conservation, she argues that by packaging knowledge in terms and categories that are considered politically salient, scientists do not just 'inform' policy-making, but produce governable objects that are subsequently enacted in policy and management. 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.

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