

Technical knowledge, discursive spaces and politics at the science-policy interface

Anna Wesselink, Sustainability Research Institute, University of Leeds

Karen Buchanan, Centre for Development Innovation, Wageningen University and Research Centre

Yola Georgiadou, Faculty of Geo-Information Science and earth Observation, University of Twente

Esther Turnhout, Forest and Nature Conservation Policy Group, Wageningen University and Research Centre

Abstract

This special issue contributes to a better understanding of science-policy interactions in environmental governance, by assembling studies based on interpretative policy analysis. We introduce the theory and use of interpretative approaches in the analysis of science-policy interactions and draw on Stone's Policy Paradox (2002) to demonstrate how policy discourses are constituted by expertise but also by interests and rhetoric. This enables us to show how policy discourses are shaped by, but also shape their environment, especially when they become dominant and suppress alternative discourses and related knowledge claims and governance practices. In particular, we highlight the role of scientific and other technical expertise in the establishment and interpretation of policy discourses in different settings and argue that current environmental policy discourses afford considerable space for science and expertise to calculate the state of the environment, evaluate the sustainability of policies and forge solutions for green economic growth. In the conclusion we underscore the importance of reflexivity on the part of scientists working at the science-policy interface regarding the political choices implicit in the policy discourses they both work within and help to establish.

1 Introduction

Environmental issues such as climate change pose major societal challenges at local to global scales not least because of tensions between environmental and socio-economic development policies. Ongoing research provides policy actors with scientific knowledge¹ which can be used to enable a societal response to such policy problems. However, the use of scientific knowledge by policy makers is not a linear process of one-directional knowledge transfer from science to policy. Extensive research has shown that knowledge is used in policymaking in different ways, not only instrumentally as often assumed but also conceptually, with science introducing new ideas, or providing ammunition in political arguments. Such processes of 'knowledge use' are highly dependent on contextual and process factors (e.g. Lindblom and Cohen 1979, Weiss 1991, Nutley et al. 2007). An in-depth understanding of the relationship between science and policy is crucial for scientists to be able to inform policy debates and policymaking. This special issue contributes to this understanding by integrating

¹ In this paper 'science' includes all academic endeavour, including social sciences and humanities.

insights from Interpretative Policy Analysis (IPA) and Science and Technology Studies (STS).

The starting point is a move away from a linear model of science-policy relations towards a view of the science-policy interface that recognizes the multiple, two-way and dynamic interactions between processes of knowledge production and decision-making. Many in-depth case studies have shown that actual processes for the production of policy advice cannot be described in terms of clear boundaries between science and politics: the zones of engagement are fluid and vague the traffic between the institutional domains of politics and science is rather dense (Demeritt, 2001; Oreskes, 2004; Lövbrand, 2007; Huitema and Turnhout, 2009; Beck, 2011). From a macro-perspective, science-policy interactions are on-going co-productions (Jasanoff, 2004) between the scientization of politics and the politicization of science (Weingart, 1999). The perspective of the science-policy interface as the locus for continuous interaction between science and policy is particularly relevant for environmental issues. The emergence of what we currently understand as environmental problems has from the outset been closely connected to scientific knowledge because of the predominantly scientific ways in which environmental problems are framed or defined (Kwa, 1989; Yearley, 1995). The 'scientization' (Weingart, 1999) of environmental issues privileges scientific experts as the ones in charge of defining and assessing environmental problems as well as providing the knowledge and solutions to solve them. The seemingly apolitical nature of scientific knowledge facilitates the generation of political decisions and compromises (Turnhout et al., 2008) but it also hides the political character of choices made. Consequently, environmental experts do not usually see themselves as political actors (Pellizzoni, 2011; Wesselink and Hoppe, 2011). However, it is no longer reasonable to assume that politics unilaterally poses research questions to science; science targets politics as well (Hoppe, 2005). STS research has amply demonstrated that the production of scientific knowledge involves all kinds of social and cultural factors (Latour and Woolgar, 1979; Yearley, 1988; Jasanoff and Wynne, 1998) and is often 'driven by local, practical, and sometimes openly political interests, [...] entrepreneurial, fiercely competitive, wildly speculative and methodologically pluralist, and selling itself to government and big business in the search for financial resources' (Hoppe, 2005 p.205).

Global climate change governance and especially the IPCC (Hoppe et al., in prep.) furnish a salient example of an unproductive linear approach to science-policy interaction. From the start the IPCC effectively followed a linear approach to science-policy interaction (Shackley & Wynne, 1996; Pielke, 2010; Beck, 2011). The IPCC was established as a scientific endeavour that assumed that climate change was a technical issue, ignoring fundamental disagreements on goals and profound uncertainty on facts and means. In other words, the IPCC was set up to help deal with what was framed as a structured problem, when in fact climate change was and still is a paradigmatically 'wicked' or unstructured problem (Hulme, 2009). When such circumstances prevail, science-policy interaction should be as much about opening up as about closing down policy debates (Stirling, 2008). Because the UNFCCC from the start advanced a single policy framework, the Kyoto protocol, the political space for debate was effectively closed down. Climate change was from the start framed as a global issue requiring global solutions (Miller, 2004). Thus, support for global climate policy, focusing on carbon emissions reductions through market mechanisms, has become indistinguishable from support for climate science (Sarewitz, 2011), while opposition to the UNFCCC-Kyoto protocol is expressed in terms of distrust of the science. However, the universal, 'policy relevant but policy neutral' science that the IPCC claims to produce is not universally accepted as valid and authoritative. As global climate policymaking matured, national issue politics were given expression in ways differentially impacted by 'universal'

climate change science. In addition, the geographic bias towards participation by experts from developed countries in IPCC assessments means that the issues raised by the global South were marginalised or ignored (Lahsen, 2004; Gupta, 2001). Demeritt perceptively foresaw 'climategate' as an event waiting to happen (Demeritt, 2001). Our analysis provides an important counter-weight to the frequently heard argument that what is blocking progress on the climate issue is a lack of scientific certainty or the predominance of climate scepticism (Oreskes and Conway, 2010). Dessai et al. (2009) in fact explain that decisions can be taken when uncertainty prevails if political will exists: this would indicate that the current lack of progress on the climate change governance agenda is indeed political and does not depend on science producing more knowledge.

In this paper we argue that policy solutions are created by the interweaving of expertise and politics. We refer to 'expertise' rather than 'scientific knowledge' because the source and character of knowledge used in policymaking varies. Technical knowledge can be held by anyone with substantive knowledge about the policy issue, while scientific knowledge is a subcategory of technical knowledge produced by scientists. Expertise includes the tacit and experiential knowledge needed to use technical knowledge in a specific context and to deal with the uncertainty of scientific knowledge. While scientific knowledge is the dominant knowledge form in much policymaking, some controversies over policy can be explained partly as a clash of types of knowledge (Carter, this issue; Negev and Teschner, this issue). Scientific results presented for policymaking are themselves causal stories, albeit in numerical form. A distinction between facts, data and causal stories becomes problematic, as we show below.

Another consequence of the importance of science for environmental policy is that technical stories, or discourses², about the environment have gained prominence in environmental governance across the globe, but often in tandem with other economic, social and development discourses. Prominent global environmental discourses such as ecological modernisation or sustainable development (Hajer 1995; Dryzek, 2005) for example, are imbued with technical, ecological and socio-economic discourses (Bäckstrand and Lövbrand, 2006). A key issue with these prevailing environmental and developmental discourses is the danger of their universal application around the world regardless of local environmental and development dynamics (e.g. Scoones, 2005; Islam, 2012). Where a dominant discourse such as sustainable development is used as a policy imperative, implementation is often based on narrow expert driven interpretations of what constitutes sustainability and which methods are required to implement it. For example, often local 'democratic' and 'participatory' processes are used without questioning whether (the chosen version of) sustainability is what local communities want or need. Additionally, in any local context prevailing developmental and environmental discourses may contradict each other, privileging certain actors and the solutions they prefer. Conflicting and competing discourses thus give rise to hegemony, an issue we discuss below.

Discourses of sustainable development and ecological modernisation, have become dominant precisely because they combine prevailing social, environmental and economic concerns and link them to seemingly straightforward technical solutions derived from apparently value-neutral scientific and other technical knowledge to suggest that a 'techno-fix' may be possible. However, in line with the STS insights into knowledge production, environmental

² As a first approximation, discourse can be defined as 'a shared way of apprehending the world', which 'enables those who subscribe to it to interpret bits of information and put them together into coherent stories or accounts' (Dryzek 2005 9).

discourses are not neutral descriptions of a real world out there, but are in practice based on human, and thus political or partial interpretations of technical knowledge by powerful interests. As Neumann (2005) explains, discourses shape policy priorities and power relations and produce social and environmental effects. Consequently, it is important to scrutinise what these global discourses do in practice: how they connect with local concerns and practices and which actors, knowledge and solutions they privilege. This is what the papers in this special issue set out to do. They focus on the role of technical knowledge *vis-a-vis* other considerations in the political negotiation of environmental planning and policymaking. These processes are characterised by an interplay of technical, social and economic discourses in ways both multi-scalar and cross-cultural in nature. We believe that interpretive approaches are needed to unpack the mobilization of discourses and expertise in environmental policymaking. Before introducing the papers in more detail, the next section discusses the origins and assumptions of interpretive approaches in social science as applied to the science-policy interface.

2 Interpretative approaches to understanding science-policy interfaces

Since its origins in the United States in the 1950s (Lerner and Lasswell, 1951), policy science has aimed to produce and apply knowledge to policymaking (Lasswell, 1971; Dunn, 1994), using cost-benefit analysis and other methods based on notions of economic rationality and the belief in a common societal goal as preferred tools. Classical policy science assumes that political goals can unproblematically be translated into measurable quantitative terms and that the policy process is a linear, rational process conducted top-down by a decision-making authority and leading from problem identification to problem solution. While this model does not explicitly mention how knowledge enters policymaking, it conceptualises the interaction between science and politics as linear and uni-directional (Jasanoff and Wynne, 1998). Notions such as ‘knowledge transfer’, ‘knowledge dissemination’ and ‘research use’ reflect this conceptualisation (e.g. Weiss, 1979; McNie, 2007; Holmes and Clark, 2008).

Over time, critical researchers, both academic and practice-based, eventually began to see that real policy processes contradicted this conceptualisation (Colebatch, 2005). Pressman and Wildavsky’s (1984) study of policy implementation was ground-breaking in this respect. It challenged the dominance of what Stone (2002) calls the ‘rationality project’ of conventional, positivist policy science. The diverse contributions of critical policy scholars, collectively known as post-positivist policy analysis, include participatory policy analysis (de Leon, 1989), critical policy analysis (Dryzek, 1989), political decision making (Stone, 2002), the argumentative turn in policy analysis (Fischer and Forester, 1993), and deliberative policy analysis (Hajer and Wagenaar, 2003). A key tenet of post-positivist policy analysis is that politics is not an unfortunate obstacle that complicates or distorts clear-headed, rational decision-making but a valuable and creative process (Stone, 2002). Instead, the task of policy analysts is to reveal and clarify disputes over policy values, to understand policy actors’ diverse ways of portraying disparities between social and environmental goals and the current state of affairs, and to tackle policymaking as constantly contested, never-ending games of moves and countermoves of policy actors (*ibid.*). Interpretative policy analysis recognizes these features (Hiley et al., 1991; Fischer and Forester, 1993; Hoppe, 1999). It studies how policy actors construct different, competing stories, or discourses, linking a problematic situation with their preferred solutions and how they use facts, interests and metaphors to persuade others of the superiority of their story (Stone, 1989; Stone, 2002; Dryzek, 2005). Interpretative policy analysis focuses on texts since texts are the expressions of meaning and determinants of the action to be undertaken (Yanow, 2007). Through the study of texts, such

as policy and other documents and verbal statements, it is possible to uncover common patterns of meaning. Knowledge is drawn into these policy discourses in various ways as ‘the politics of facts intermingles in subtle ways with the politics of interests and values’ (Pellizzoni, 2011 p.779). Here ‘the exclusivity of expertise and its appeals to facts, data, parameters, and standards correspond to a depoliticising force: discursive black boxes are built and legitimised; the space of discussion shrinks. Yet boxes can be opened; what had been cast out can be brought into question; expertise can become integral to contentious politics’ (Pellizzoni 2011, p.771). When expertise is recruited for partisan use its effect is not necessarily one of settling controversies, as a rational policy cycle model would suggest. Pellizzoni (2011) describes how expertise can have either a largely unpredictable politicising or a depoliticising effect depending, for instance, on whether the relations between policy actors are antagonistic or cooperative. Turnhout et al. (2008) similarly show how processes of interaction that started with elitist deliberations in which scientific experts accommodated policy processes ended up in controversies in which these same experts were positioned in different competing knowledge coalitions. Stirling (2008) argues that expertise used in deliberative processes has to be scrutinised for its implicit politics in order to ensure a complete ‘opening up’ of discussions, so that all possible options are considered. For Sarewitz (2004) science inevitably makes environmental controversies worse since it becomes the ammunition that fuels debate since the science evoked during these controversies often frames them in particular ways and uses lines of argumentation not all stakeholders agree with. Science is thereby inherently and unavoidably subject to becoming politicized in environmental controversies. However, the opposite may be true as well and actors will seek to technicize the discussion in order to reach compromises (Wesselink et al., 2009). Several of the contributions in this special issue confirm this point and demonstrate how fights over values or interest controversies are often conducted through ‘report wars’ where politics are hidden in conflicts over the values which underpin rationales within reports, rather than through explicit political discussion.

A core tenet of interpretative approaches is the likelihood of multiple meanings, or interpretations, of problem definitions and policy texts, and also of the expertise relating to the policy issue (Bacchi, 2012). Interpretative approaches assert that policy implementation requires local elucidation, where contextual factors are paramount (Yanow, 1996, Lejano et al., 2008; Turnhout, 2009). Similarly, scientific findings and other forms of knowledge achieve their meaning, validity and relevance in the context in which they are developed, used and applied (Herrick, 2004). Both scientific knowledge production and policymaking are thus dynamic processes of meaning-making in which the production and use of knowledge is interpreted and interwoven with the generation of ideas about what the problem is and how it might be addressed (Hoppe, 2010). All papers in this special issue use interpretative approaches, calling attention to these two types of meaning-making in different ways to analyse policy issues in their contexts.

Analysts applying interpretative approaches ask not only *what* a policy means – a question about the substance of a specific policy and how it is interpreted by different actors – but also *how* a policy means – a question about the processes by which a policy achieves its meanings (Yanow, 1996). In the contributions to this special issue, two processes of achieving meaning are discernible. On the one hand meaning is created when new discourses are formulated during implementation of (global, national) policies at regional or local scales--interpretation, or meaning making, is a key variable in policy implementation at any governance level (Gains and Clarke, 2007; Green, 2007) as described by Smith et al. (this issue), Wesselink et al. (this issue) and Carter (this issue). The tangible meanings of policy discourses transpire through their effects on society and environment--policy discourses are not only shaped by, but also

shape their context. On the other hand, new policy discourses are constructed as discussed in several of the contributions (Schwedes et al., this issue; Rajao, this issue; Bracken and Oughton, this issue; Warner, this issue; Levidow and Papaioannou, this issue) and the effects discourses have, in other words, their performativity (Buchanan, this issue; Smith et al., this issue; Wesselink et al., this issue). To make the above discussion more concrete we now focus on the construction of discourses from constitutive elements using the contributions to this special issue as examples. In Section 4 we discuss the political implications of hegemony, the privileging of one discourse above another. In Section 5 we suggest what this means for the conduct of environmental science-for-policy.

3 Interpreting science-policy interactions

To show how expertise is interwoven with other constitutive elements, or ‘discursive devices’, in policy discourses, we interpret the contributions to this special issue through the lens of Stone’s Policy Paradox (2002). The multiple, dynamic interactions between processes of knowledge production and decision-making result in stories where both elements are intimately interwoven. Discourse analysis enables us to disentangle these different elements and show their origin and politics (Bacchi, 2012). Stone provides a detailed toolbox with which to analyse policy texts as stories which include discursive devices such as synecdoche, metaphor, rule and interest. Dryzek’s four ‘questions to ask about discourse’ essentially cover the same elements: facts (‘basic entities’), causal stories (‘assumptions about natural relationships’), interests (‘agents and their motives’) and symbols (‘metaphors and other rhetorical devices’) (Dryzek, 2005). It is clear that science, with its conjectures of causality, and appeals to numbers and facts, can potentially make a significant contribution to policy discourses.

Policy *metaphors* make a problem look like another problem, implying sameness in the solution strategy. For example, ‘fragmentation’ is a pervasive metaphor in policy problems and implies ‘integration’ as the solution. Smith et al. (this issue) describe how the popular concept of ‘integrated water management’ arose in Scotland in response to a perceived fragmentation and the inability or unwillingness of public agencies to consider their mandate relative to those of other organisations. In the same case study, GIS technology was used to legitimise the metaphor of ‘environmental capacity’ – the ability of the water environment to withstand new development without suffering damage. Hirschheim & Newman (1991) caution us that metaphors, although pervasive and sometimes helpful, may also mislead. In Brazil a process has taken place whereby local accounts of Amazonia have gradually been replaced by remotely-sensed data. Here the use of satellite-based remote sensing constructs a comprehensive, integrated, panoptic view of a spatially and temporally discontinuous territory. Seeing the entire Amazon at a glance thus seems to do the ‘god-trick of seeing everything from nowhere’ simultaneously (Haraway, 1991 p.189). The god-trick is a powerful metaphor to legitimise satellite imagery as the preferred policy relevant information and perpetuate its control by powerful social groups (Rajao, this issue). Finally, scholars themselves tap into the potentially persuasive power of metaphors, as in the title of the paper ‘White hope for a sustainable development or fig leaf for particular interests?’ by Schwedes et al. (this issue). These authors explain that in the case of the German e-mobility discourse, commercial enterprises use ecological arguments for their desire to promote e-cars. Thus, while the e-mobility discourse appears as a white hope for a sustainable development it is actually a fig leaf for particular economic interests.

Several articles exemplify the use of *synecdoche*³ to scale-up issues by portraying them as part of a larger whole. One outlandish incident can be used to represent the universe of cases, and to build support for changes to policy that are much broader than the isolated incident. In the Netherlands, flood disasters were exploited in the policy arena as windows of opportunity to achieve enough pressure to push changes in policy through (Wesselink et al., this issue). Similarly, in Egypt Mubarak's government decided to construct a new channel and irrigation infrastructure to 'green the desert' after the occurrence of one extraordinary high runoff event, the flood of the Nile in 1988, thereby counting on this exceptional runoff to turn into a structural inflow of 300 m³/s (Warner, this issue). In Germany, e-mobility was portrayed as a holistic sustainable transport solution, while in fact it mainly presents a business case for the private sector (Schwedes et al., this issue). However, not all attempts at using synecdoche are equally influential. In Brazil, local accounts of deforestation alone failed to establish the destruction of the Amazon as a policy problem. It was mainly following the production of satellite-based studies claiming to represent the region as a whole that the Brazilian government started to take the issue seriously (Rajao, this issue).

Causal stories link a problem's cause to an effect, and by implication whose responsibility it is to 'solve' it. Several articles highlight how those who are involved in the construction of causal stories determine their contents to the exclusion of other actors and stories. Carter (this issue) demonstrates that the causal stories around fisheries and aquaculture management are intricately bound up with who is eligible to participate in instrument setting and can thereby claim authority to regulate. She shows how claims to 'have knowledge' about a fishery were not merely mobilised by actors to better inform policymaking; rather, they were simultaneously deployed to legitimise actors' authority to set a rule or sell a fishery product with far-ranging changes in policy as a result. However, not all causal stories succeed in their aim to persuade the targeted audience. Social and cultural norms place limits on how much flexibility one has in creating a convincing causal story. In the case of the Amazon, GIS technologies facilitated the construction of causal stories about the links between particular factors, such as the presence of farmers, roads and deforestation, thereby apportioning blame to certain groups only (Rajao, this issue). Bracken and Oughton (this issue) discuss how the expertise and history of individuals and organisations came together to create a new causal story linking siltation to ecological decline, and effectively excluding water quality issues. The acid test for causal stories is whether they become the dominant belief and guiding assumption for policymakers. In Vink et al. (this issue) the opposite was true: a changing causal story induced a different actor constellation. They show the dynamics of causal story-making in water safety and climate change debates in the Netherlands over a decade and half (1994-2010) and find that attention for climate change was used to urge a change from consensus-based to top-down governance. This was accompanied by a shift in focus from interdisciplinary knowledge on regional spatial planning and water management to technical scientific knowledge on global climate change scenarios.

When policy discourses use a language of *interests*, problems are portrayed as contests between competing interests. Opponents typically portray each other's interests in an unfavourable light, for example as 'individualism' or 'short-termism' as opposed to 'societal benefit' or 'long-termism' (Stone, 2002). This is illustrated in Schwedes et al. (this issue) who show that over time, the e-mobility discourse in Germany was promoted as contributing to sustainability by changing constellations of industrial actors. Any opposition to the miracle

³ Synecdoche is a figure of speech in which a term is used in one of the following ways: part of something is used to refer to the whole thing (*pars pro toto*), or a thing (a 'whole') is used to refer to part of it (*totum pro parte*). (source: wikipedia accessed 18-2-18?)

solution of the electric vehicle was portrayed as anti-environmental. In this discursive struggle, the interests of the energy industry to open up new markets with the urban e-car was rhetorically crafted as a public interest for ecological conservation and integrated transport development. In a similar vein, the Toshka project was elevated to a national interest project and strengthened those in power (Warner, this issue). This however required loyalty to Egypt's water strategy that deterred anyone that questioned the sense of these hydraulic projects as unpatriotic and even deserving of imprisonment.

The role of *facts* and *numbers* comes out clearly in several of the articles in this special issue. Having relevant facts gives access to the negotiations, and facts often take centre stage in policy debates. In the Brazilian environmental policy arena, scientific facts such as reports, measurements, experiments, and satellite images of the Amazon were more influential than indigenous facts in the form of oral accounts (Rajao, this issue). Smith et al. (this issue) demonstrate that in their case GIS-based maps to some degree replaced or undermined dialogue between actors. Carter (this issue) discusses how expert advice on fisheries quotas was initially underpinned by an uncontested vision of scientific facts concerning the status of stocks and the likely impact of fishing. The case of the Toshka project shows that in some cases facts may be absent: detailed plans of the Toshka project were unavailable even to donor groups, potential investors, and other governments (Warner, this issue). Facts in successful policy stories may also be plainly untrue: Egypt was falsely portrayed as a space-constrained country (Warner, this issue). The uptake of facts and data in policy discourses depends on who provides them. Negev and Teschner (this issue) discusses the mobilisation of different types of knowledge in local decision-making and questions the purity of knowledge categories based on the characteristics of stakeholders. She shows how technical data serves the professional health workers and is presented as factual even in circumstances of uncertainty and when different types of professional data (such as epidemiological and toxicological) can be contradictory. Moreover, she shows how in certain conditions laypersons also can learn to use scientific facts and numbers in order to defend their argument in a decision-making environment that values only such data. Bracken and Oughton (this issue) also demonstrate how facts and expert advice may be selectively ignored when choosing on a course of action to meet environmental objectives. They argue that institutions select and shape facts included in a story by the selecting of expertise and evidence, both with respect to the environment and the social behaviour of human beings. In their case, implementation was less about securing all the relevant knowledge and more about mapping it onto regulatory and governance frameworks at multiple scales with 'knowledge brokers' selectively moving knowledge around. Buchanan (this issue) argues that the success of the environmental claim-makers in protecting the Ecuadorian cloud-forest was due to the mobilisation and strategic combination of different types of environmental knowledge (epistemic, technical, phronetic, and anecdotal) in their anti-mining and pro-conservation environmental discourses.

Policy stories only make sense in the wider discursive *context* in which they are mobilized. Several articles in this special issue show how existing and powerful global discourses are used by policy actors to strengthen their stories: 'Sustainable development' is the motivation and justification for the policy processes described by Carter (this issue), Levidow and Papaioannou (this issue), and Schwedes et al. (this issue); 'biodiversity conservation' is the overarching rationale of the anti-mining coalition with which they connect to a global support network of conservationists (Buchanan, this issue); 'integration' is the driver for institutional and methodological changes in Scotland (Smith et al., this issue), and 'security' is used to render other concerns unimportant (Warner, this issue; Wesselink et al., this issue).

References to ‘economic development’ or ‘neoliberalism’ are used in policy stories either to promote environmental sustainability (Levidow and Papaioannou, this issue) or to point out the anti-environmental characteristics of opponents’ discourses (Buchanan, this issue).

By showing how policy stories mobilize synecdoche, metaphors, causal stories, interests, facts and numbers and global discourses, we draw attention to the performativity of these stories: as they are articulated, they produce effects. They are not only shaped by their natural, social and discursive environment but also contribute to the constitution of this environment. In the next section, we discuss further what discourses ‘do’ and why it is important to analyse this.

4 Hegemony and politics at the science-policy interface

Feindt and Oels (2005) ask ‘does discourse matter?’ and Hajer & Versteeg (2011) wonder ‘why talk about words when we have things to do?’ With these authors, we contend that discourses do matter exactly *because* they do things (Austin 1962). Interpretative approaches reveal the elements constituting a policy discourse, with technical knowledge being an important category. They also make visible the power dimensions of these discourses (Feindt and Oels, 2005; Dryzek, 2005). The application of interpretative approaches to the analysis of science-policy interactions is critical if we want to reveal how hegemonic discourses within society threaten the exclusion of counter-discourses and the silencing of voices of dissent from the political sphere of the policy- and decision-making process (Howarth, 2009). While only some of the papers in this special issue explicitly employ the concept of hegemony, the idea of the dominance of one discourse, and related interpretations of science and other knowledge, over others is a unifying theme throughout. The researchers writing in this special issue draw attention to hegemony, the praxis through which environmental science-based knowledge is used to impose and formally establish hegemonic dominance within their socio-political sphere of influence.

Warner (this issue) describes the multi-level hydro-hydraulic dominance of the Egyptian State acting as a hegemon both nationally and in the entire Nile watershed, allowing Egypt to suppress dissenting voices and confirm legitimacy using a developmental discourse of progress supported by authoritative scientific bodies such as FAO. Wesselink et al. (this issue) describe national level hegemony by a dominant northern region over a southern region in the Netherlands which has resulted in the latter area agreeing to the technical implementation of a flood management approach that is only reluctantly accepted by its residents. Buchanan (this issue) locates the concern of her paper within the global context of hegemonic economic developmental forces and environmental discourses and examines how different forms of knowledge are being used as derivative sources and evidence bases for claims and policies being advocated by claim-makers within a local socio-environmental conflict in Ecuador. She argues that the discourses used, particularly the hegemonic discourse of biodiversity conservation, are actively shaping and defining the boundaries of expression and language used by the local claim-makers. They also then delimit their claims for the protection and preservation of the cloud-forest, which ultimately defines the range of environmental policy options and control over the determination of the use and exploitation of their natural living environment. Rajao (this issue) discusses the gradual replacement of indigenous knowledge in environmental policymaking in Amazonia as local accounts are subsumed by scientific knowledge provided by satellite-based remote sensing technology. Implicitly arguing for the exposure of this hegemonic process, he calls for greater scrutiny of how these different kinds of knowledge resonate or conflict with historically-rooted governance discourses, and for the need to revalue indigenous representations in

environmental policymaking to challenge dominant discourses in governance practices. Negev and Teschner (this issue) examines the dynamics of the stakeholder participation process in a health impact assessment of land-use planning for the hazardous waste industry in Israel. She addresses a similar hegemonic discourse on expertise where technical knowledge is generally considered as being objective, true and sufficient in contrast to local knowledge, which is seen as subjective and irrelevant to policymaking. She follows current trends to re-examine the relationships between technical and local knowledge which show that technical knowledge may be disputable, uncertain and based on assumptions while local knowledge can include objective and systematic methods, and she questions the hegemony created through this dichotomy between local and technical knowledge. She then argues for the relevance of multiple types of knowledge for policymaking, and for recognition that stakeholders possess several types of knowledge simultaneously, thus blurring the boundaries between holders of local and technical knowledge.

The contributions to this special issue thereby confirm other analyses of environmental policy discourses which point to the increasing dominance of managerial and technocratic discourses in environmental governance (Behagel and Turnhout, 2011). These discourses either take the shape of green governmentality with the state as a prominent actor (Bäckstrand and Lövbrand, 2006) or market environmentalism, neoliberalism or ecological modernization with the markets as the prominent mechanism (Hajer, 1995; Adams, 2001; Arsel and Büscher, 2012). Regardless of how the scrutinised discourse is structured, technical knowledge plays a prominent role. Scientists, including social scientists, feed into and strengthen such discourses, possibly unwittingly or unaware of the potential consequences.

5 Conclusion

The contributions to this special issue illustrate the importance of discourses, and the discursive devices they include, in several environmental policy domains: fisheries, aquaculture, water, flood protection, and biodiversity conservation, and in different political contexts of the global North and South. They highlight the importance of continuous scrutiny of the interplay of science and policy in the political sphere, with a focus on the environmental domain. Interpretative approaches, with their emphasis on meaning-making and contextuality, can reveal significant aspects of power struggles within the policymaking process. By addressing the hegemonic influence of dominant discourses we can become conscious of the political role of the production and application of technical knowledge. Entering these discursive spaces with analytical intent enables researchers to demonstrate the practice of knowledge use and discourse construction at the science-policy nexus and to locate this within society's frameworks for governance. Since, as interpretative policy analysis argues, policies afford many different, sometimes conflicting, meanings and interpretations, it is clear that the analyses produced by scientific experts for policy are also the product of processes of interpretation. Scientific experts are themselves interpreters, making sense of policy documents along with policy language (e.g., speeches, interviews) and policy-relevant acts. Recognising the politics of the analyses that scientific experts produce can only enhance their quality and relevance because they do not try to erase but instead highlight the values and power relations that are at stake in policy processes (Fischer and Forester, 1993).

Such an orientation toward the power dimensions of scientific expertise and analysis-for-policy shifts the attention to silent, and silenced, voices. This leads us to our final point: the role scientists play in constructing and maintaining (dominant) discourses. This issue has been eloquently raised by Levidow (pers. comm., 2011): 'A question we get asked, and which we ask ourselves, is whether social sciences should be useful, and for whom? Just as there are

embedded journalists, so are there many embedded scientists. They accommodate policy processes, strengthen the policies that result from them, and may even erase politics. We need to show alternative policies to re-introduce the politics.’ Bijker (2003) takes this call for engagement even further when he argues that academics should be public intellectuals who contribute to the public and political debates. As they ‘contribute to making things, to changing the world, [...] they inevitably will dirty their hands, for there is no free ride here’ (Bijker, 2003 p.446).

Although we recognize that an explicit political positioning does not necessarily appeal to individual scientists, our analysis indicates that there is a strong argument for reflexivity on the part of scientists working at the science-policy interface regarding the political choices implicit in the policy discourses they work within and help to construct. Will the expert focus on, and convey, only the views and voices of those who dominate the debate, or will she actively seek out less dominant, and perhaps even power-less or hidden voices? And if this is the intention, does she get a chance to do so? Although it might sometimes be risky or uncomfortable, in some cases experts must be willing, and able, to stir things up by actively mobilizing counter-discourses and by articulating values and options that do not fit with the hegemonic discourse. Doing this is not easy - there are no recipes - but a structural awareness of and orientation toward these possibilities is more promising for environmental governance to achieve justice than a presumably power-free approach (Yanow, 2007 p.116).

6 Acknowledgements

We would like to thank to authors of the papers in this special issue for their contributions and their engagement in discussion. We would also like to thank the reviewers of the papers in this special issue for their support.

Anna Wesselink’s contribution to this article was financially supported by the European Union (European Commission, European Reintegration Grant PERG08-GA-2010-276934).

7 References

Arsel, M., Büscher, B., 2012. Nature™ Inc.: Changes and Continuities in Neoliberal Conservation and Market-based Environmental Policy. *Development and Change* 43(1), 53-78.

Austin, J.L., 1962. *How to do things with words*. Harvard University Press, Cambridge MA.

Bacchi, C., 2012. Why Study Problematizations? Making Politics Visible. *Open Journal of Political Science* 2(1), 1-8.

Bäckstrand, K., Lövbrand, E., 2006. Planting Trees to Mitigate Climate Change: Contested Discourses of Ecological Modernization, Green Governmentality and Civic Environmentalism. *Global Environmental Politics* 6(1), 50-75.

Beck, S., 2011. Moving beyond the linear model of expertise? IPCC and the test of adaptation. *Regional Environmental Change*, 11(2), 297–306.

Behagel, J., Turnhout, E., 2011. Democratic Legitimacy in the Implementation of the Water Framework Directive in the Netherlands: Towards Participatory and Deliberative Norms? *Journal of Environmental Policy & Planning* 13(3), 297-316.

Bijker, W.E., 2003. The Need for Public Intellectuals: A Space for STS. *Science, Technology, & Human Values* 28(4), 443-450.

Bracken, L., Oughton, L., Making sense of policy: The creative uses of evidence in managing freshwater environments. *Environmental Science and Policy*, this issue.

Buchanan, K.S., 2012. Contested discourses, knowledge, and socio-environmental conflict in Ecuador. *Environmental Science and Policy*, this issue.

Carter, C.A., 2012. Rendering Aquaculture and Fisheries Spaces for European Government: The Politics of Sustainability. *Environmental Science and Policy*, this issue.

Colebatch, H.K., 2005. Policy analysis, policy practice and political science. *Australian Journal of Public Administration* 64(3), 14-23.

Demerit, D., 2001. The construction of global warming and the politics of science. *Annals of the American Association of Geographers* 91(2), 307-337.

De Leon, P., 1989. *Advice and Consent: The Development of the Policy Sciences*. The Russell Sage Foundation, New York.

Dessai, S., Hulme, M., Lempert, R., Pielke Jr., R., 2009. Do we need better predictions to adapt to a changing climate? *Eos, Transactions American Geophysical Union* 90(13), 111-112.

Dryzek, J.S., 1989. *Policy Sciences of Democracy*. *Polity* 22 (Fall), 97-118.

Dryzek, J.S., 2005. *The politics of the earth: environmental discourses*. Oxford University Press, Oxford (2nd edition, first published 1997).

Dunn, W.N., 1994. *Public Policy Analysis. An Introduction*. Prentice-Hall, Englewood Cliffs NJ.

Feindt, P.H., Oels, A., 2005. Does discourse matter? Discourse analysis in environmental policymaking. *Journal of Environmental Policy & Planning* 7(3), 161-173.

Fischer, F., Forester, J. eds., 1993. *The argumentative turn in policy analysis and planning*. Duke University Press, Durham NC.

Gains, F., Clarke, K., 2007. Constructing delivery: Implementation as an interpretive process. *Critical Policy Studies* 1(2), 133-138.

Green, M. 2007. Delivering discourse: Some ethnographic reflections on the practice of policy making in international development. *Critical Policy Studies* 1(2), 139-153.

- Gupta, J., 2001. India and climate change policy: between diplomatic defensiveness and industrial transformation. *Energy & Environment* 12(2-3), 217-236.
- Hajer, M., 1995. *The politics of environmental discourse: ecological modernization and the policy process*. Clarendon Press, Oxford.
- Hajer, M., Wagenaar, H., 2003. *Deliberative Policy Analysis*. Cambridge University Press, Cambridge.
- Hajer, M., Versteeg, W., 2005. A decade of discourse analysis of environmental politics, achievements, challenges, perspectives. *Journal of Environmental Policy and Planning*, 7 (3), 175-184.
- Haraway, D., 1991. *Simians, cyborgs and women: the reinvention of nature*. Free Association Books, London.
- Herrick, Ch. N., 2004. Objectivity versus narrative coherence: science, environmental policy, and the U.S. Data Quality Act. *Environmental Science & Policy* 7(5), 419-433.
- Hiley, D.R., Bohman, J.F., Shusterman, R.M., eds., 1991. *The interpretive turn: Philosophy, science, culture*. Cornell University Press, Ithaca NY.
- Hirschheim, R., Newman, M., 1991. Symbolism and information systems development: Myth, metaphor and magic. *Information Systems Research* 2(1), 29-62.
- Holmes, J., Clark, R., 2008. Enhancing the use of science in environmental policymaking and regulation. *Environmental Science & Policy* 11(8), 702-711.
- Hoppe, R., 1999. Policy analysis, science and politics: from 'speaking truth to power' to 'making sense together'. *Science and Public Policy* 26(3), 201-210.
- Hoppe, R., 2005. Rethinking the science-policy nexus: from knowledge utilization and science technology studies to types of boundary arrangements. *Poiesis and Praxis* 3(3), 199-215.
- Hoppe, R., 2010. *The Governance of Problems. Puzzling, Powering, Participation*. Policy Press, Bristol .
- Hoppe, R., Wesselink, A., Cairns, R. Lost in the problem: the role of boundary organisations in the social status of climate change knowledge. *Wiley Interdisciplinary Reviews Climate Change*, in prep.
- Howarth, D., 2009. Power, discourse, and policy: articulating a hegemony approach to critical policy studies. *Critical Policy Studies* 3(3), 309-335.
- Huitema, D., Turnhout, E., 2009. Working at the science-policy interface: A discursive analysis of boundary work at the Netherlands environmental assessment agency. *Environmental Politics* 18 (4), 576-594.

Hulme, M., 2009. *Why we disagree about climate change*. Cambridge University Press, Cambridge.

Islam, Md.S., 2012. Old Philosophy, New Movement: The Rise of the Islamic Ecological Paradigm in the Discourse of Environmentalism. *Nature and Culture* 7(1), 72-94.

Jasanoff, S., Wynne, B., 1998. Science and decision making. In: Rayner, S., Malone, E., eds., *Human Choice and Climate Change*. Volume 1: The Societal Framework. Pacific Northwest Labs, Battelle Press, Richland WA. pp 1-88.

Jasanoff, S., 2004. *States of knowledge: the co-production of science and social order* Routledge, Abingdon.

Kwa, C., 1989. Representations of Nature Mediating between Ecology and Science Policy: The Case of the International Biological Programme. *Social Studies of Science* 17(3), 413-442.

Lahsen, M., 2004. Transnational locals: Brazilian experiences of the climate regime. In: Jasanoff, S., Martello, M.L., eds., *Earthly Politics: Local and Global in Environmental Governance*. MIT Press, Cambridge MA.

Lasswell, H.D., 1971. *A Pre-View of Policy Sciences*. Elsevier, New York.

Latour, B., Woolgar, S., 1979. *Laboratory Life: The Construction of Scientific Facts*. Princeton University Press, Princeton.

Lejano, R.P., Ingram, H.M., Whiteley, J.M., Torres, D., Agduma, S.J, 2007. The Importance of Context: Integrating Resource Conservation with Local Institutions. *Society & Natural Resources* 20(2), 177-185.

Lerner, D., Lasswell, H.D., eds., 1951. *The Policy Sciences*. Stanford University Press, Stanford CA.

Levidow, L., Papaioannou, T. *Imagining Future Bioenergy, Shaping UK Innovation Priorities*. *Environmental Science and Policy*, this issue.

Lindblom, C.E., Cohen, D.K., 1979. *Usable Knowledge, social science and social problem solving*. Yale University Press, London.

Lövbrand, E., 2007. Pure science or policy involvement? Ambiguous boundary-work for swedish carbon cycle science. *Environmental Science & Policy*, 10(1) 39-47.

Lubchenco, J., 1998. Entering the century of the environment: A new social contract for science. *Science*, 279 (5350), 491-497.

McNie, E.C., 2007. Reconciling the supply of scientific information with user demands: an analysis of the problem and review of the literature. *Environmental Science & Policy* 10 (1), 17-38.

Miller, C.A., 2004. Climate science and the making of a global political order. In: Jasanoff, S., ed., *States of knowledge: The coproduction of science and social order*. Routledge, Abingdon.

Negev, M., Teschner, N., Rethinking the relationship between technical and local knowledge: towards multiple types of knowledge. *Environmental Science and Policy*, this issue.

Neumann, R.P., 2005. *Making Political Ecology*. Hodder, London.

Nutley, S.M., Walter, I., Davies, H.T.O., 2007. *Using evidence: How research can inform public services*. The Policy Press, Bristol.

Oreskes, N., 2004. Science and public policy: what's proof got to do with it? *Environmental Science & Policy* 7(5), 369–383.

Oreskes, N., Conway, E.M., 2010. *Merchants of doubt: How a handful of scientists obscured the truth on issues from tobacco smoke to global warming*. Bloomsbury Press, New York.

Pellizzoni, L., 2011. The politics of facts: local environmental conflicts and expertise, *Environmental Politics*. 20 (6), 765-785.

Pressman, J.L., Wildavsky, A., 1984. *Implementation: How great expectations in Washington are dashed in Oakland; or, why it's amazing that federal programs work at all*. University of California Press, Berkeley.

Pielke Jr., R.A., 2010. *The climate fix: what scientists and politicians won't tell you about global warming*. Basic Books, New York.

Radin, B., 2000. *Beyond Machiavelli: Policy Analysis Comes of Age*. Georgetown University Press, Washington, D.C.

Rajao, R. Representations and discourses: the role of local accounts and remote sensing in the formulation of Amazonia's environmental policy. *Environmental Science and Policy*, this issue.

Roe, E., 1994. *Narrative policy analysis. Theory and practice*. Duke University Press, Durham and London.

Sarewitz, D., 2004. How science makes environmental controversies worse. *Environmental Science & Policy* 7(5), 385–403.

Sarewitz, D., 2011. Does climate change knowledge really matter? *Wiley Interdisciplinary Reviews: Climate Change* 2(4), 475-481.

Schwedes, O., Kettner, S., Tiedtke, B. E-Mobility: White Hope for a Sustainable Development or Fig Leaf for Particular Interests? *Environmental Science and Policy*, this issue.

Scoones, I., 2005. Contentious politics, contentious knowledges: mobilising against GM crops in India, South Africa and Brazil. IDS Working Paper 256. Institute for development studies, Brighton.

Shackley, S., Wynne, B., 1996. Representing Uncertainty in Global Climate Change Science and Policy: Boundary-Ordering Devices and Authority. *Science, Technology, & Human Values* 21(3), 275-302.

Smith, H., Wall, G., Blackstock, K. The Role of Environmental Information in Supporting Integration between River Basin Planning and Spatial Planning in Scotland. *Environmental Science and Policy*, this issue.

Stirling, A., 2008. Opening up or closing down: analysis, participation and power in the social appraisal of technology. *Science, Technology and Human Values* 33(2), 262-294.

Stone, D.A., 1989. Causal Stories and the Formation of Policy Agendas. *Political Science Quarterly* 104(2), 281-300.

Stone, D.A., 2002. *Policy Paradox: The Art of Political Decision Making*. Revised edition. Norton and Company, New York/London. (first edition 1988)

Turnhout, E., Hisschemöller, M., Eijsackers, H., 2008. Science in Wadden Sea policy: from accommodation to advocacy. *Environmental Science and Policy* 11(3), 227-239.

Turnhout, E., 2009. The rise and fall of a policy: policy succession and the attempted termination of ecological corridors policy in the Netherlands. *Policy Sciences* 42(1), 57-72.

Vink, M., Boezeman, D., Dewulf, A., Termeer, C. Changing climate, changing frames: critical discourse moments in puzzling and powering over Dutch water safety policy. *Environmental Science and Policy*, this issue.

Wagenaar, H., 2011. *Meaning in Action: Interpretation and Dialogue in Policy Analysis.*: M E Sharpe Inc., Armonk, NY.

Warner, J. The Toshka mirage in the Egyptian desert: river diversion as political diversion. *Environmental Science and Policy*, this issue.

Weingart, P., 1999. Scientific expertise and political accountability: paradoxes of science in politics. *Science and Public Policy* 26(3), 151-161.

Weiss, C.H., 1979. The many meanings of research utilization. *Public Administration Review* 39(5), 426-431.

Weiss, C.H., 1991. Policy research: Data, ideas or arguments? In: Wagner, P., Weiss, C.H., Wittrock, B., Wollman, H., eds. *Social sciences and modern states, national experiences and theoretical crossroads*. Cambridge University Press, Cambridge.

Weiss, C.H., 1995. The Haphazard Connection: Social Science and Public Policy. *International Journal of Educational Research* 23(2), 137-150.

Wesselink, A., De Vriend, H.J., Barneveld, H.J., Krol, M.S., Bijker, W.E., 2009. Hydrology and Hydraulics Expertise in Participatory Processes for Climate Change Adaptation in the Dutch Meuse. *Water Science and Technology* 60(3), 583-595.

Wesselink, A., Hoppe, R., 2011. If post-normal science is the solution, what is the problem? The politics of activist science. *Science, Technology and Human Values* 36(3), 389-412.

Wesselink, A, Warner, J., Kok, M. You gain some funding, you lose some freedom: hegemony in flood protection in The Netherlands. *Environmental Science and Policy*, this issue.

Willems, P., De Lange, W.J., 2007. Concept of technical support to science-policy interfacing with respect to the implementation of the European water framework directive. *Environmental Science and Policy* 10(5), 464-473.

Yanow, D., 1996. How does a policy mean? Interpreting policy and organizational actions. Georgetown University Press, Washington D.C.

Yanow, D., 2007. Interpretation in policy analysis: on methods and practice. *Critical Policy Analysis* 1(1), 109-121.

Yearley, S., 1988. *Science, technology and social change*. Unwin Hyman, London.

Yearley, S., 1995. The environmental challenge to science studies. In: Jasanoff, S., Markle, G.E., Petersen, J.C. & Pinch, T., eds. *Handbook of science and technology studies*. Sage publications, Thousand Oaks.