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Review

Evidence, politics and power in public policy for the environment

Meri Juntti^{a,1}, Duncan Russel^{b,*}, John Turnpenny^{c,2}

^a Department of Social Sciences, Middlesex University, UK

^b Department of Politics, Exeter University, UK

^c Centre for Social and Economic Research on the Global Environment, School of Environmental Sciences, University of East Anglia, Norwich, UK

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ABSTRACT

Despite a recent emphasis on ‘evidence based policy’ accompanied by an abundance of ‘green’ policy instruments, experience from the European Union and OECD countries shows that decisions which truly aim to balance environmental considerations with social and economic ones remain thin on the ground. Moreover, many policies seem to fall short of, or directly contradict what the available ‘evidence’ suggests is required. This is a synthesis paper bringing together literature from the fields of political science, geography, sociology and science and technology studies to outline some of the obscurities relating to the use of scientific evidence in environmental decision-making. In this paper, we suggest that an exploration of three key inter-related issues is necessary to develop a richer understanding of why evidence and policy interact as they do. These are the nature of evidence itself; the normative, moral or ethical ‘politics’ of policy-making; and the operation of power in the policy process. Our primary goal is to bring various literatures together to better conceptualise the evidence–policy relationship. In so doing, we outline specific challenges for knowledge producers who set research priorities, and design and direct research projects. We also highlight significant implications for policy decision-making processes.

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1. Introduction

The idea that environmental issues should, at the least, be given equal consideration with social and economic issues in decision-making has gained increased political currency since the publication of the United Nations-sponsored Brundtland report (WCED, 1987). It has been argued by, among others,

prominent scientists (e.g. Sir David King, former Chief Scientist in United Kingdom Government (King and Thomas, 2007)) and the Organization for Economic Cooperation and Development (OECD) that this may be achieved through ‘improved scientific input to policy development...’ (OECD, 2002: 7).

While such a goal may be eminently desirable, the complex relationship between knowledge and policy – as we seek to

* Corresponding author. Tel.: +44 1603 591384.

E-mail addresses: m.juntti@mdx.ac.uk (M. Juntti), D.Russel@uea.ac.uk (D. Russel).

¹ Also at Department of Social Sciences, Middlesex University, Hendon Campus, The Burroughs, London, UK.

² Also affiliated to the Tyndall Centre for Climate Change Research, School of Environmental Sciences, University of East Anglia, Norwich, UK.

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demonstrate in this paper – makes it more difficult to achieve than it initially seems. Indeed, while individuals, organisations and public policy-makers are subjected to increasing volumes of evidence on the state of the environment and potential impacts of their decisions and activities, experience from OECD countries shows that decisions which truly aim to balance environmental considerations with social and economic ones still seem rather thin on the ground (UNEP, 2002; Jordan and Lenschow, 2008). For example, the science surrounding climate change and the need for urgent action is now finding its way to the highest political levels, as demonstrated by the numerous speeches by former British Prime Minister Tony Blair on the urgent need to tackle climate change and the UK's commitment to reduce emissions greenhouse gases by 80% by 2050 (Her Majesty's Government, 2007). Yet, despite this high level recognition of climate change science, we are still faced with decision-making that is likely to increase UK greenhouse gas emissions, e.g. the proposed expansion of the London airports and the proposed building of a new coal-fired power station at Kingsnorth.

Moreover, while many policies seem to fall short of or, indeed, directly contradict what the available evidence suggests is required (e.g. see Owens et al., 2006), existing literature highlights how this particularly occurs in the conditions of uncertainty, which is a prominent characteristic of environmental policy. It appears that evidence is often used *strategically or symbolically* to legitimise policy solutions that have been arrived at on overtly political grounds (Bulmer, 1980; Majone, 1989; Radaelli, 1995; Fischer, 1995; Owens, 2005; Rayner and Malone, 1998). This is demonstrated particularly well by case studies of, for example, policy appraisal (e.g. Russel and Jordan, 2007; Hertin et al., 2009) and UK transport policy (Terry, 1999).

Our aim in this paper is to provide a synthesis of literature addressing the complicated relationship between knowledge of the state of the environment and environmental processes, and the policies which affect or are affected by these. We draw on a variety of theoretical approaches and case studies conducted under different disciplines – namely, political science, geography, sociology and science and technology studies – and in different contexts. We use these to demonstrate that the evidence–policy relationship is not as clear cut as some advocates of more evidence based policy might like. We claim that the way evidence is produced, selected for and interpreted in policy-making and implementation is heavily influenced by decisions about social values and moral and ethical choices pertinent to environmental policy. Moreover, the evidence–policy relationship is further complicated by the interplay of complex institutional processes and actors representing different forms of expertise and interests. Such interactions characteristically operate in obscure and complicated power relationships in environmental policy decision-making (e.g. Flyvbjerg, 1998; Castree, 2001; Jasanoff, 2005; Kanie and Haas, 2004). We aim to unravel some of the obscurities related to the role of evidence, norms and power in environmental policy processes, and outline ways of addressing the complications these dimensions bring to knowledge production and to the practice of environmental policy-making.

2. Muddying the waters of the evidence–policy dynamic: three key dimensions

We suggest that there are three key inter-related issues which must be addressed by any discussion of evidence and policy-making: the nature of evidence itself; the normative, moral or ethical ‘politics’ of policy-making; and the role of power. We argue that an exploration of these different but overlapping dimensions is necessary to develop a richer understanding of why evidence and policy interact as they do. In the following three sections, we bring together theoretical literature on evidence production and engagement in policy decision-making and implementation, as well as empirical research, conducted in different kinds of contexts, to highlight practical implications. By bringing together this empirical and theoretical material, we aim to draw a coherent picture of the pitfalls and challenges of evidence production, and outline potential ways of addressing these. The synthesis aspires to alert knowledge producers and policy practitioners to the challenges posed by the above three dimensions of policy decision-making and to highlight some of the possible implications for how research priorities are set and how policy decision-making is designed and managed.

2.1. What is evidence? Contested claims on what counts

There is an abundance of uses of the term ‘evidence’ in the literature [e.g. see review in Nutley et al., 2007: 23–25], and perhaps the most concise summary of these is: *all types of science and social science knowledge generated by a process of research and analysis either within or without the policy-making institution*. While the institutionalised practices of policy decision-making seem to place much emphasis on scientifically generated (expert) knowledge (e.g. Turnpenny et al., 2008), in order to qualify as ‘usable knowledge’ (Haas, 2004a: 573) scientific information needs to be regarded as relevant, accessible and ‘neutral’ (in other words produced in conditions free of the influence of non-scientific interests). One of the defining claims for scientific knowledge is its objectivity, and freedom from distorting factors that may alter the way that the object of study is detected, measured and reported. Indeed, this interpretation of scientific knowledge may be described as abstract and, for the sake of universal validity, disjointed from contextual factors such as local stakeholder experience and opinions (Murdoch and Clark, 1994). However, as Haas (2004a) points out, some studies suggest that in order to qualify as ‘usable knowledge’ for policy decision-making, scientific knowledge needs to be capable of commanding sufficient political support, applicable to the problem at hand and representative of a scientific consensus.

Many scholars have long stipulated a wider definition of evidence. This includes the knowledge and expertise of lay persons or stakeholders (or ‘experienced-based experts’: Collins and Evans, 2006), which, more often than not, is disconnected from analysis-based, scientific, evidence (Clarence, 2002; see also Fischer, 2002). The proponents of this wider understanding of evidence for policy decision-making point out that knowledge produced without regard for the context in which it is applied is incompatible with the demands of environmental policy-making. For example,

Redclift (2005) argues that traditional scientific definitions and categories obscure local meanings of nature and natural resources, and related environmental and social values. Moreover, while scientific categorisations are themselves ultimately based on human judgement, it is widely agreed that in the increasingly politicised environmental policy-making process, dealing with conflicting interests and normative dilemmas is crucial in order to achieve legitimate and functional policy solutions (e.g. Fischer, 2002; Papadopoulos and Warin, 2007). A poignant example of this is Griffin's (forthcoming) case study of governance of North Sea fisheries, where fishermen successfully use their local knowledge and experience of the state of fish stocks to refute the scientific discourse of diminishing stocks, and to influence policy negotiations towards a more favourable outcome for their livelihood. Thus it could be argued that universal validity and expert consensus are insufficient criteria on which to base practicable environmental policy solutions.

In contrast to scientific knowledge, the defining characteristic of lay (or local) knowledge is that it is embedded in a specific cultural and often also practical context (Murdoch and Clark, 1994). While institutionalised practices of decision-making seem to grant the 'universal validity' of scientific knowledge a superior status, local knowledge is rapidly gaining ground as a means of legitimising policy and improving accountability and transparency, and is thus increasingly seen as instrumental in achieving policy compliance (Radaelli, 1995; Owens, 2005; Papadopoulos and Warin, 2007). Some critics go further and suggest we should move beyond the adversarial juxtaposition of 'experts' and 'citizens' (embodied by most examples of strictly choreographed citizen consultation) in policy decision-making and restructure this relationship altogether (Booher and Innes, 2002). Rather than treating citizens' input to the policy process as instrumental for achieving policy compliance, Fischer (2002) emphasises its role in "bringing forth new knowledge and ideas capable of creating and legitimising new interests, reshaping our understanding of existing interests and in the process, influencing the political pathways along which power and interests travel" (Fischer, 2002, p. xii). This suggests that citizen participation has epistemological implications, in other words, it concerns the commonly held interpretation of how it is possible to acquire meaningful knowledge about different things and phenomena. Lay knowledge is crucial for addressing context-related specificities and for devising policies that actually work in practice. It also offers a different epistemological view point that has potential to lead to new and perhaps more legitimate and valid understandings, framings and even solutions to environmental governance and sustainable development (see also Booher and Innes, 2002).

Work by Yearley (2006) on air quality modelling neatly illustrates the above point in a pertinent example of how lay knowledge can provide valuable insights when used alongside more traditional science. Yearley found that where lay knowledge was not included in the modelling process, local populations were generally sceptical of the analysis and felt it did not match their experience of pollution. Consequently, citizens were concerned about value for money of such research. On other hand, where lay perceptions were included

in air quality models, parameters were widened to include attributes such as dust and odour. Moreover, air quality maps based on citizens' perceptions could be used to determine the sensitivity of expert models. In such cases, Yearley argues that lay knowledge can bridge 'knowledge and policy' through 'contributing to the quality of the available models and by helping to assess the validity of the outputs' (Yearley, 2006: 711).

Formulations such as post-normal science (e.g. Funtowicz and Ravetz, 1993), citizen science (Irwin, 1995) and participatory sustainability science (e.g. Kasemir et al., 2003) set out knowledge-gathering activity as a process of dialogue between specialists and stakeholders. Drawing from the tradition of participatory research, it has been suggested that, to ensure validity of the evidence produced, citizens' experience-based expertise should be engaged in the whole research process, from question formulation to defining the use of findings (Fischer, 2002). While participatory approaches to evidence generation are often hampered by the demands that this places on the capacity of citizens to comprehend complex environmental issues, it is possible to outline some implications that should result from a wider epistemological basis for valid evidence. Instead of endorsing the polarisation of lay vs. expert in evidence generation, experts' roles could include deciphering and interpreting complex issues to a wider public audience, thus facilitating public involvement in decision-making (Fischer, 2002).

Not surprisingly, several writers emphasise that the distinction between lay and expert knowledge is a political one, and ultimately concerns the allocation of power in policy decision-making. Restricting the scope of evidence, whether in favour of lay or expert knowledge, is of course a powerful way of influencing decision-outcomes and sometimes seen as key to achieving any outcome at all (Haas, 2004a). While the superior position of scientific knowledge has in many cases become institutionalised and embedded in the practices of decision-making and knowledge production, the problem is that this is often taken for granted and the implicit politics of power thus remains unquestioned (e.g. Redclift, 1992, 2005; Murdoch and Clark, 1994). In the next section we explore this political dimension in more depth.

2.2. Politics: taking on the normative dimension of environmental policy

Recent decades have seen increased focus on developments surrounding the role of scientific knowledge and technological development within society. The identification of a 'risk society' (Beck, 1992), in which technological advances are no longer simply a positive sign of 'development' but are themselves creating new threats, has been accompanied by increased awareness and understanding among citizens of the complex and sometimes precarious balance between nature and society (see also Castells, 2000). These developments complicate the role of scientific knowledge in policy-making and some are particularly pertinent for environmental issues. Due to the complexity of ecological processes and their interdisciplinary nature, establishing scientific certainty over cause–consequence relationships is particularly challenging (e.g. Haas, 2004a,b). In the light of such problems, it has been

argued that political and value-based statements are gaining ground as legitimate arguments in defining environmental problems and policy solutions (Hajer and Wagenaar, 2003). Environmental policy decision-making frequently brings together a variety of actors with diverse and often conflicting goals and values, which can result in cacophonous negotiations in pursuit of broadly acceptable solutions (Hajer, 1995; Castree, 2001; Braun and Wainwright, 2001; Hajer and Wagenaar, 2003).

Consequently, problem framing (i.e. precisely defining the problem at hand and how severe it is) has become a central issue in attempts to find policy solutions to environmental problems and threats (Hajer and Wagenaar, 2003; Gottweis, 2003; Murdoch, 2006). How we perceive nature, how we define what is natural, what is social and what, within these premises, is regarded as an environmental problem is not self-evident or, indeed, always possible to define on the grounds of scientific knowledge. This is visible, for example, in difficulties experienced in the implementation of the UN Convention to Combat Desertification in southern Europe. Adger et al. (2001) argue that there is a rift between desertification as defined at a global level for the purposes of the convention, and localised understandings based on practical experience. Indeed, case study research from southern EU states shows that the discord over what exactly is meant by desertification and, consequently, who should be held responsible, has diverted attention from devising the National Action Plans prescribed by the convention. This has hindered the implementation of measures that could contribute to the mitigation of problems related to water depletion, and degradation and abandonment of agricultural land in these localities (Juntti and Wilson, 2005).

Thus, defining environmental problems for policy decision-making and finding appropriate policy solutions often involves a complex web of underlying understandings of cause and consequence relationships, as well as normative presumptions about what should be done. Hajer (1995) suggests that problem definitions are shaped by: expert claims concerning the state of the environment; policy solutions promoted by different powerful actors; and responses to expressed preconceived institutional critique by non-governmental organisations and demands and assertions by street level bureaucrats. Along similar lines, some organizational scientists argue that institutional reactions to problems are shaped through a collective definition of what is and is not viewed as an *appropriate policy response* (March and Olsen, 1994: 252). Consequently, “rules, procedures and goals without primary representation in formal organisations” (Jepperson, 1991: 151) are said to determine also the ‘appropriateness’ of the selection of evidence sources, types and use. One example is how discord caused by differing institutional responses to environmental problems hampered government reaction in the UK foot-and-mouth disease crisis in 2001. As the crisis unfolded, different UK departments were pushing for different policy responses: the UK’s agricultural ministry successfully pushed for a policy of culling to eradicate the virus while the environment ministry failed in its calls for a vaccination policy (Richards and Smith, 2002: 9). At the time there were different claims and counterclaims regarding the validity of each

approach, particularly surrounding the economic impacts on beef exports and the UK tourist industry of each policy option. Thus, rather than objective response based on the best science, the issue was framed by institutional conflict over what was considered to be the most ‘appropriate’ policy response.

One way of unravelling this ‘logic of appropriateness’ is to view the decision-making process through so-called discourse oriented approaches which aim to access the often unspoken notions of legitimate normative order (i.e. a certain kind of a hierarchy of interests and needs) (Hajer, 1995; Weaver, 2004). Much like the notion of ‘sustainable development’ that hinges on fitting together economic, social and environmental demands, ‘environmental sustainability’ often involves inevitable trade-offs and compromises by involved interests. A typical example is the difficulty of fitting together short-term economic growth and environmental protection of resources (although, as Rydin (1999) points out, proponents of the ecological modernisation theory perceive significant potential for synergy between economic growth and environmental protection). The various different ways of framing environmental problems and relying on certain sources and types of evidence in decision-making can mask conflicts of interest as well as potential synergies. Several academics have pointed out that to make any real progress (for example more effective policy), conflicting discourses need to be overtly juxtaposed and dealt with in environmental policy decision-making (Redclift, 2005; Rydin, 1999). While deep-rooted tensions can exist between different constructions and framings of environmental problems and policy solutions, the different normative discourses can continue to compete throughout the policy process and obscure policy problems, strategies and even measures themselves (Hajer, 1995). This has specific implications for the policy decision-making process, particularly the capacity that decision-making practices yield for deliberation between different interests and administrative sectors (Hajer and Wagenaar, 2003; Skogstad, 2003). Deliberative policy-making is itself a focus of a vast scope of literature and the following section will highlight a few more examples of the significance of negotiation and deliberation for evidence use in the policy process. Meanwhile, a key question in regard to evidence production, adoption and interpretation in the policy process still remains: namely ‘how does an actor, discourse or indeed specific evidence become dominant and/or institutionalised into a policy?’ This brings us to the issue of ‘power’ in the policy process.

2.3. Power: achieving dominance in policy decision-making

Just as ambiguity of discourses and policy problems may serve to hide conflicts, similarly the ‘genteel veneer’ (Lindblom, 1980: 17) of analysis may be used to obscure politics in the policy process, while the fundamental understanding of what is an appropriate policy solution is defined by the most powerful actors within the normative premises of the dominant discourse (Flyvbjerg, 1998; Owens, 2005). Nevertheless, in order to understand how evidence is marshalled and translated into policy, it is crucial to understand how

certain actors and knowledge claims become ‘powerful’ in the policy process. Radaelli (1999) draws attention to how uncertainty and lack of transparency in policy decision-making procedures provide opportunities for different actors such as representatives of research or administrative expertise to seize power over the ‘logic’, or mode, of policy decision-making. For example, transparency of policy decision-making and public accountability may become compromised by intense bargaining by different administrative bodies, who may act to defend their policy arenas from turf invasion, or act strategically to form networks and coalitions to increase their bargaining power in the policy process. This kind of ‘bureaucratic politics’ (Radaelli, 1999) can include incorporation of new policy goals and measures to seek new justification for the dominant policy model, which often represents short-term problem solving through incremental change of peripheral principles and goals. Problem expansion can also inject new issues into the initial policy problem in order to ‘lure’ new groups of stakeholders into the dominant policy coalition (Skogstad, 1998; Coleman and Perl, 1999). A typical example of this can be found in the EU agricultural sector where the Common Agricultural Policy has arguably maintained its productivist logic based on the idea of ‘agricultural exceptionalism’, justifying the payment of subsidies to farmers (Skogstad, 1998). While in recent times it has become difficult to defend the exceptional need of European agriculture for state subsidies, environmental arguments have been ‘coupled’ with agrarian ones to justify the need to keep farmers on the land (e.g. Wilson, 2007; Gallardo et al., 2003).

On the other hand, Radaelli (1999) posits that high uncertainty is often used to justify the powerful position of expert knowledge and a ‘technocratic logic’ (Radaelli, 1999: 764) in the policy decision-making process. This is a particular characteristic of the EU policy process, where the principle of subsidiarity arguably obscures the conventional ‘power hierarchy’ of government. In such circumstances, policy-making tends to be highly technical, relying heavily on supposedly apolitical committees of experts to broker agreements and prepare policy decisions (Jordan, 2001; Peterson, 2003; Haas, 2004a). Through a combination of bargaining and strategic use of expert knowledge, policy officials act as brokers, mediating and forging compromises among potential supporters in an effort to arrive at ‘optimal’ outcomes attempting to satisfy a range of interests without significant compromise to any. In the case of the EU this refers to decision-making in the Council of the EU where policy needs to be acceptable to all member states (Skogstad, 2003). While ‘expert power’ may to an extent be necessary, Haas (2004b) suggests that more stringent ‘science policy’ involving careful and transparent coordination by government of the use of expertise is key to legitimacy.

Indeed, research by Skogstad (2003) on the regulation of genetically modified organisms (GMO) in the EU suggests it is very difficult to achieve effective policy solutions in this kind of environment, where legitimacy rests not on the basis of deliberation by factions of a representative democratic system but through relying on expert authority. This has led to an implementation deficit in the EU GMO legislation where member states have refused to comply with resulting policies.

Skogstad (2003) however suggests that policy compliance is more readily achieved through so-called ‘integrative decision-making’ aimed at maximizing the common good, rather than a bargaining process. Matland (1995) equally suggests that the extent of ambiguity and/or conflict over policy goals and means is decisive for whether and how policies evolve in implementation. Contextual factors such as local and regional stakeholder involvement and interests gain significance in the case of ambiguous policy objectives. High levels of conflict over means or objectives on the other hand renders policy outcomes dependent on the relative strength of policy coalitions. Thus, the implementation of policy solutions in practice is likely to vary dramatically between different localities based on factors such as local understandings of best practice or competing evidence claims from powerful local policy actors or networks (e.g. Hiedanpaa and Jokinen, 2007).

Summing up, there is a wealth of so-called institutionalist (or neo-institutionalist) approaches which have successfully grappled with the issue of how ‘power’ influences what counts as legitimate knowledge in sustainability and environmental policy debates. Most of the above examples suggest a degree of ‘waywardness’ in how ‘power’ operates in the policy process. We suggest that in order to understand the notion of power, and its role in the policy-evidence relationship, it should be understood as vested in interaction between certain actors and enacted, rather than allocated a priori (Law, 1998; Castree and MacMillan, 2001; Latour, 2005). Such ‘network power’ can be catalysed by the mutual benefits vested in effective collaboration as opposed to traditional power struggles or ‘manoeuvring’ (Booher and Innes, 2002 and as Skogstad, 2003 suggests). In other words, a certain interpretation of evidence or a framing of environmental sustainability becomes powerful only when it is adopted or enacted by a host of relevant decision-makers and stakeholders. By association, this renders the proponents of this specific discourse ‘powerful’. This *relational understanding of power* has been taken further by the Actor-Network-Theory (ANT) (e.g. Latour, 2005), which depicts the notions of agency and power as outcomes of network building (Goodman, 2001). In addition to providing a dynamic understanding of the notions of power and agency, the ANT helps by demonstrating how the material context, for example the natural resources in question (the “non-human content” of the networks), play a role in empowering specific actors in specific contexts (see Murdoch, 2000). Again, mechanisms such as the commissioning of scientific studies, and monitoring policy impact, are employed with varying success in order to stabilise these powerful positions and to ensure specific coherent outcomes of interaction (e.g. Morris, 2004; Lockie, 2006). This emphasises the need to pay attention to the context in which knowledge is commissioned or selected for use, as well as produced. For example, Burgess et al.’s (2000) study of the implementation of a wetlands conservation scheme outlines differences in the make-up of the knowledge base on which different actors, in this case farmers and conservation officials, base their assertions of authority. In both cases it is the ‘actor worlds’, and their interpretations of how nature or natural resources are included in the networks of power that enable agricultural

production, that are under contestation and in competition with each other.

3. Conclusion: challenges and potential solutions for evidence production and engagement in environmental policy

With the rise in the currency of ‘evidence based policy’, the way that evidence is drawn on, commissioned and employed in the policy process certainly merits further attention. We have seen that three overlapping issues – power, politics and what counts as evidence – form a fundamental foundation for environmental policy-making. Our primary goal in this paper has been to provide a conceptual synthesis of theories and empirical findings pertaining to the evidence–policy relationship and contribute towards a better understanding of why aspirations for achieving better policy through more effective use of evidence in the policy process are more difficult to achieve than might first appear.

As we argued at the start of this synthesis, the notion of evidence based policy tends to ‘obscure or neglect important political, social and moral judgments’ (Sanderson, 2002: 70; see also Murdoch and Clark, 1994; Redclift, 2005), and contrasts sharply with the picture we paint above, which suggests that the relationship between evidence and policy is highly politicised, complex and recursive. Our synthesis highlights the significance of the often unclear processes by which knowledge becomes ‘evidence’, including the place of lay expertise within the official definition of evidence. This lack of clarity is compounded by the complex interplay of institutional processes and actors representing different interests and forms of expertise involved in environmental policy decision-making. Moreover, as environmental problems themselves are complex and fall within the realm of a number of scientific and socio-economic disciplines, knowledge about the environment characteristically involves a degree of uncertainty. Thus, environmental policy decision-making tends to be highly politicised (Castree, 2001; Braun and Wainwright, 2001).

Our synthesis suggests a number of possible solutions for dealing with this complexity in the evidence–policy relationship. First, the notion of validity of evidence would benefit from a more transparent treatment of the division into lay and expert knowledge in evidence generation. While this does not mean that ‘basic science’ is in any way redundant in evidence generation (Haas, 2004b), there is a need to see science more as a process of social context negotiation between specialists and stakeholders, and an increased emphasis on the stakeholder perspective ranging from problem formulation to validation of research results (Fischer, 2002; Funtowicz and Ravetz, 1993). This negotiation between different kinds of expertise within the process of producing evidence differs markedly from the notions of consultation or communication that commonly occur in policy decision-making, which mostly refer to imparting of conventional scientific expertise (for example, the requirement to include consultation in policy assessment processes (Russel and Turnpenny, 2009; Hertin et al., 2009)). While it remains unclear in which contexts participatory approaches lead to a more prominent role for lay knowledge in

the policy process, literature suggests that the scale and style of decision-making have significance. On the one hand Turnpenny et al. (2008) find that in the case of policy assessment in the EU, a more ‘narrow’ understanding of what counts as evidence (particularly results from cost–benefit analyses) tends to prevail in spite of extensive participation from a wide range of actors. In Griffin’s case study of North Sea fisheries governance, however, the lay perspective manages to achieve almost disproportionate prominence and influence in negotiations at Regional Advisory Councils, which were established explicitly to produce more locally and ecologically sensitive management advice and to facilitate dialogue between lay stakeholders (i.e. fishers) and scientists (Griffin, *Forthcoming*). In order to better understand exactly how and why these observations occur, exploration of further key research questions is required.

Several authors show that, in a best-case scenario, state–civil society collaboration not only allows the utilisation of different knowledges, but, crucially, provides an opportunity to find new and innovative solutions and agendas (Booher and Innes, 2002; Fischer, 2002). Much like the integration of the lay perspective into evidence generation, this requires a deliberative approach. One pertinent problem and research topic is thus how to achieve such ‘authentic dialogue’ (Booher and Innes, 2002: 15) through participatory practices. Unfortunately, the reasons for enhanced participation can stem from a need to legitimise political decisions, or to aid the implementation of such decisions, instead of (or as well as) to genuinely improve the knowledge about the system. Often such motivations are hidden. It can be revealing to consider cases where stakeholders disagree with ‘official experts’ as to the best course of action (e.g. Few et al., 2007), especially when the validity of stakeholders’ opinions are called into question by the experts. Crucially, we concur with Griffin (*Forthcoming*) who emphasises that instead of prioritising any particular form of knowledge at any particular scale (or stage of decision-making), all knowledge should be treated with caution, seeking to understand the conditions under which it is produced.

Second, it is not only the rift between experts and lay stakeholders that complicates environmental policy, but also the range of involved interests (different administrative sectors and stakeholders, for example) that adds to the political struggles. Thus, who gains discursive power in the policy process and how they maintain it are crucial questions for understanding how the evidence–policy relationship operates. We suggest that an understanding of power as contingent and vested in interaction amongst actors in specific material contexts could offer a significant methodological option for exposing the ways that actors attempt to engage knowledge to their advantage in the policy process (Law, 1998; Castree and MacMillan, 2001; Latour, 2005). As environmental sustainability often involves compromises with economic and possibly even social interests, it is likely that the different actors involved in decision-making will try to influence decision-making through drawing on evidence that supports their respective interests or normative positions. To make real progress towards environmental sustainability, Redclift (2005) suggests that we need to re-examine the normative assumptions behind different interpretations of

sustainability. Along the same lines, Rydin (1999) stipulates the overt juxtaposition of disparate and competing discourses, based on value and interest conflicts, as necessary for any real progress towards more effective policy solutions. While normative issues need to be overtly addressed through deliberative decision-making practices (which can also enable the integration of a variety of knowledges as discussed above), for example Skogstad (2003) suggests that instead of bargaining to minimise individual losses, decision-makers should aspire to finding compromises that maximize the common good, as these are more likely to be viewed as legitimate by stakeholders and achieve policy compliance.

Finally, it has also been suggested that there is a cognitive aspect to evidence use (Owens, 2005), where it is incorporated into the policy process through learning over long timescales (Sabatier, 1998). Such learning is said to be particularly pertinent where problems are trans-scientific and unstructured, as is often the case with environmental sustainability. In such examples, knowledge can lay dormant and is only turned into ‘evidence’ when the political climate is ripe for a problem to be identified (Kingdon, 1995; Sabatier, 1998; Owens, 2005). In this view, evidence is background information rather than directly transferable truth (Rayner, 2003) and in specific cases there is a “gradual diffusion of understanding about how society works, its integration, strains and conflict” rather than “generation of factually useful, instrumental [evidence] which will be of immediate benefit to policy-makers” (Bulmer, 1990: 137). This kind of ‘policy learning’ can be criticised for yielding only incremental change and also for being conditional to when, where and for whom new evidence will become ‘useful’ (Owens, 2005; Sabatier, 1998). However, the deliberative approach in policy decision-making that is seen by many as crucial for managing the normative conflicts and dilemmas of environmental policy also offers potential for ‘structural learning’ that refers to changes in the discursive frames that actors engage when defining their normative view points and interpretations of validity of knowledge for example (e.g. Grin and Van de Graaf, 1996). Structural learning can lead to permanent behavioural change and even change in how actors view their own interests (Grin and Van de Graaf, 1996, see also Hajer and Wagenaar, 2003; Sabatier, 1998). As suggested by the notion of ‘authentic dialogue’, the quality of communication is key to the resolution of conflicts of interest and bridging of different interpretative frames and ways of viewing environmental problems and possible solutions. Booher and Innes (2002) suggest that in order to move beyond adversarial juxtapositions and reap the full benefits of stakeholder collaboration in planning, collaboration partners need to be aware of the potential mutual benefit vested in collaboration (usually improved choice in the form of a wider selection of possible planning options enabled by wider participation). This resonates with the idea of decision-making for the common good put forward by Skogstad (2003) and implies the need to build conditions of trust which will encourage different parties to work together. Booher and Innes (2002) outline the following conditions for ‘authentic dialogue’: communication has to be accurate, sincere and aiming at fully informing all involved parties.

Summing up, we argue that that both academic research and policy decision-making need to become sensitive to these

interpretative and normative dimensions of environmental problems and policy. This can only be done by directly juxtaposing the different takes of lay interests, experts and stakeholder interests relevant in each case-specific instance of decision-making. Moreover, any solution has to be contextualised and embedded as well as (environmentally) sustainable (while remembering that these two are not necessarily synonymous) and thus different types of knowledge are needed. We reinforce the need to bridge the gap between lay and expert understandings of environmental issues, and to respond to the challenge that this poses for the validity and legitimacy of evidence generated specifically for policy decision-making. We believe that addressing the three major dimensions of the policy-evidence relationship set out in this paper is an important step towards a clearer understanding of why policy so often seems to contradict scientific evidence – and to see how we might reach environmentally sustainable policy solutions that will also work to produce environmentally sustainable outcomes.

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- Meri Juntti** is a lecturer in Sustainable Development and Environmental Management at the Department of Social Sciences, Middlesex University and a visiting fellow at the Centre for Social and Economic Research on the Global Environment, University of East Anglia. Her research interests include policy deliberation and agenda setting in the context of environmental policy integration; and participation and learning in policy implementation and planning.
- Duncan Russel** is a lecturer in the Politics of Climate Change and Sustainable Futures at the Department of Politics, Exeter University and a visiting fellow at the Centre for Social and Economic Research on the Global Environment, the University of East Anglia. His research interests include the politics of climate change, politics of policy appraisal, environmental policy integration and evidence based policy-making.
- John Turnpenny** is a Senior Research Associate at the Tyndall Centre and CSERGE, University of East Anglia. With a background in Meteorology, Environmental Science and Social Policy, John has carried out interdisciplinary research on applications including participatory integrated assessment and the nature of the science-policy interface. Current research interests include the use made of policy analysis in policymaking, the 'real world' research needs of policymakers, and the various constraints conditioning selection of policy analysis tools.