Towards a framework for analysing interactions between social science and environmental policy[1]

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1. Introduction

Environmental problems have been a significant part of public debate for over 50 years. Although it is hard to identify trends or stages it is possible to observe the way that particular issues have dominated different times. For example, relatively localised waste and pollution incidents were widely debated in the 1950s through to the mid-1970s, including mercury poisoning in Minamata Bay (Japan) and the Love Canal toxic waste dump (United States). In the early 1970s landmark publications like *Limits to Growth* (Meadows et al, 1972) and *A Blueprint for Survival* (Goldsmith and Allen, 1972) also articulated a wide-ranging even global sense of anxiety and proposed radical solutions. Nuclear power was a concern throughout this period but became a focus with particular accidents e.g. Windscale (1957), Three Mile Island (1979) and Chernobyl (1986). The 1980s were also significant because complex trans-boundary environmental problems like acid rain and ozone depletion came to the fore, although these had many things in common with the bioaccumulation of agricultural chemicals like DDT which Rachel Carson highlighted in the early 1960s (Carson, 1962). Today public debate is more concerned with problems like biodiversity loss and climate change, which are widely regarded as two of the most significant threats facing society.

Perhaps not surprisingly the environment also emerged as a distinct area of public policy over this period. In retrospect the early 1970s was particularly significant because the idea of a global environmental crisis became established leading to the The United Nations Conference on the Human Environment (Stockholm, 1972). Around this time environmental concern was also institutionalised at the national level, with countries creating/passing a long list of environmental regulations, ministries, agencies and acts. In the 1980s environmental policy built on these foundations in different ways. Publication of *Our Common Future* (WCED, 1987) by the Brundtland Commission, for example, popularised the notion of sustainable development and provided policy with an overarching concept. This was accompanied by more concrete successes such as regional action to deal with acid rain and the global action on substances that deplete the ozone layer. Although it can be argued that environmental policy in the 1990s and 2000s was less successful, particularly as it encountered intractable problems like climate change and more powerful political-economic agendas like trade liberalisation, it continued to be important and remains so today.

When social scientists (broadly defined) engaged with these developments new spaces of interaction between them and environmental policy opened up and these have been vibrant and productive for at least 25 years. For example, in the 1980s and 90s new areas of scholarship around environmental policy analysis and ecological modernisation theory emerged (Vogel, 1986; Boehmer-Christiansen and Skea, 1991; Andersen, 1994; Hajer, 1995; Mol, 1995; Gouldson and Murphy, 1998). This work became a platform from which some scholars offered advice to policy on such things as the role of regulation in encouraging innovation and improving competitiveness, and the need to integrate environmental concerns into all areas of government. At the same time, of course, social science-environmental policy

interactions have facilitated careers (of particular types), shaped research programmes (in specific ways), and became a route through which politics could influence scholarship (see Redclift et al, 2000). Other examples of research agendas where this has happened includes environmental economics, risk society, and, more recently, sustainable transitions.

Whilst recognising the value of environmental research it is notable that there has been very little critical analysis of research-policy interactions in these areas (although see Burgess (2005) and Owens (2005)). In this paper we are not seeking to describe the interactions empirically but instead aim to develop a framework to analyse them, and on that basis offer preliminary answers to the following key questions: in relation to environmental problems: (1) how do social science and public policy interact? and (2) in the future, what types of interactions can social scientists engage in? We believe that it is an important moment to ask these questions particularly because of the complexities and challenges of climate change and related policies which social scientists are increasingly being asked to advise on. In addition, there is renewed interest in enhancing interactions between social science and public policy in general – as illustrated by a recent call for the appointment of a Chief Social Scientist in the UK Government (see House of Lords, 2011).[2]

Our approach builds on recent research which links Policy Studies with Science and Technology Studies (STS) (Murphy and Levidow, 2006; Fischer, 2009; Collins et al, 2010) and extends it through wider debates around public scholarship which are ongoing in Sociology and Geography (Burawoy, 2005; Fuller, 2008; Murphy, 2011). Linking these literatures provides generic insights into interactions between academic research and public policy from which we derive more specific insights for social science and environmental policy. We begin by exploring processes of governance from critical and uncritical

standpoints and locate environmental issues in these (Section 2). Section 3 focuses on policy-making processes and particularly the role of framing while Section 4 extends this to explore knowledge and expertise. Section 5 draws on the public scholarship literature to elucidate the wider role that academics can play in encouraging progressive social change. In the concluding discussion we offer tentative answers to the questions given above and highlight five ways in which social scientists can engage and interact with environmental policy.

2. A changing context of interaction

In recent years the concept of 'governance' has emerged to capture new ways in which polities and problems are being governed (e.g. Hajer and Wagenaar, 2003; Voß, Bauknecht and Kemp, 2006). For many it refers to the state steering social change subtly through complex networks of stakeholders at different levels – local, national and global – using novel means. Widely understood as an alternative way of linking state and society compared to hierarchy (government) and markets, it is important here because it captures the changing context of interaction between social science and public policy in relation to the environment.

Many scholars have discussed environmental issues in governance terms (see Adger et al, 2003; Davidson and Frickel, 2004; Evans, 2004; Jasanoff and Martello, 2004). From an uncritical perspective environmental governance can be understood as a response to the complexity of contemporary environmental problems. This argument suggests that enthusiasm for such things as 'partnership working', 'co-delivery of policy' and 'voluntary agreements with industry' is explained by the instrumental desire of governments to solve problems which they are unable to solve on their own. Governance helps because involving more stakeholders mobilises resources, such as finance and expertise, and builds commitment

(buy-in). From this perspective environmental governance can also be understood as an acknowledgement by governments of their patchy record on environmental problems over recent decades (Raman, 2003; Hajer and Wagenaar, 2003: 3).

More critical accounts of environmental governance tend to explain it through politics rather than the environment. One argument is that environmental governance helps governments to deal with the growing number of conflicts and protests which highlight tensions across policy agendas such as environmental protection, economic growth and trade liberalisation and more broadly signal a loss of legitimacy (Jonas and Gibbs, 2003; Murphy and Levidow, 2006). Environmental governance does this by drawing some stakeholders into the policy process whilst at the same time marginalising the most ardent critics. A related argument is that many examples of environmental governance – such as the transfer of state assets to community control or the application of novel ideas like eco-system services – are deeply ideological and represent further neo-liberalisation of the environment (McCarthy, 2005; Robertson, 2004).

Although any particular example of governance can often be analysed from critical *and* uncritical perspectives the distinction is nevertheless useful because it provokes reflection on the roles and contributions of social scientists when they engage with public policy. Clearly, whilst social scientists might be motivated to contribute their knowledge and expertise to solve environmental problems it is also possible that they are being enrolled into political projects which they might be unaware of and may not support.

It is difficult to resolve this dilemma but further insights can be gained by comparing the concept of 'meta-governance' from political theory/economy with 'reflexive governance' from sociology and STS. Jessop (1998, 2002, 2004) uses the concept of 'meta-governance' to

explore strategies of government in complex governance contexts. Described as 'the organisation of the conditions for governance in its broadest sense' (Jessop, 2004: 240), meta-governance refers to the management of complexity and interactions, possibly by creating visions and agreeing targets, followed by the decision to pursue objectives through mandatory, market or more participatory mechanisms. While acknowledging that power is more widely dispersed across society than it used to be, meta-governance emphasises the ongoing importance of the state as the preeminent actor and sees steering as a way in which governments can continue to pursue their political-economic and other objectives (cf. Murphy and Yanacopulos, 2005).

The concept of 'reflexive governance', in contrast, places more emphasis on learning by a broad range of stakeholders. Voß, Bauknecht and Kemp (2006: xiv-xv) describe it as something

> … which incorporates uncertainty, ignorance, heterogeneity, ambiguity, unintended effects, error and lack of control. These qualities are all aspects that modern problem-solving procedures try to eliminate. Incorporating these indeterminacies implies looking for ways to work with them. This means developing strategies and methods for problem-handling and institutional arrangements, which can make productive use of them as constitutive elements of societal development … It offers a general concept of societal problem-handling; that is, interaction in which a group of interdependent actors constructs problems and tries to influence ongoing development to make them disappear.

Although we do not intend to explore the differences between meta-governance and reflexive

governance in detail they are useful because they position social scientists differently in relation to public policy. In broad terms reflexive governance suggests a wider range of roles and opportunities for social scientists to contribute on terms which are less prescribed than those which might arise in meta-governance situations.

To close this section it is important to strike a note of caution and emphasise that the extent to which governance has actually replaced other ways of governing is debatable. Indeed, this point is illustrated particularly well by environmental policy. As part of an effort to understand the so-called 'shift from government to governance' Jordan et al (2005) examine the use of new environmental policy instruments (NEPIs) in eight countries in the European Union. Such instruments are 'assumed to allow social actors freedom to coordinate amongst themselves in pursuit of societal goals, with far less (or even no) central government involvement' (2005: 478-479). While they find plenty of evidence of NEPIs being used – albeit with variation across jurisdictions, sectors and instrument types – in many cases the new instruments plug gaps or deal with new problems, rather than replacing more traditional approaches. The authors argue that 'far from eclipsing government, governance therefore often complements and, on some occasions, even competes with it …' (Jordan et al, 2005: 477; see also Jordan et al, 2003).

3. Understanding the policy process

While the previous section focused on the context of interactions between social science and public policy, we now develop the argument further by exploring the policy process in more detail. Whereas the orthodox model of policy making assumes that the process is driven by an external problem, interpretive policy analysis starts from the assumption that 'the problem' is

endogenous. This elevates the importance of processes of problem definition, which are not assumed to be linear and logical and objective. Indeed, evidence of a problem may not be needed to drive policy making in a particular direction – a problem claim may be enough (Yearley, 1991: 49). Although it is not our intention to summarise the range of interpretive approaches we adopt this perspective in broad terms and draw out relevant aspects of the debate.

Scholars such as Fischer (2003, 2009) and Hajer and Wagenaar (2003) understand the policy process as a domain of social life which is reproduced or changed by such things as interpretation and argumentation rather than objective facts. They emphasise the importance of ideas, beliefs and discourses, which, more broadly, are understood as 'frames' (Fischer, 2003). From this perspective, therefore, the process of framing becomes central. Laws and Rein (2003: 174) characterise this as '... distinguishing between what demands attention and what can be neglected, and of giving stable shape by providing structure, even when that structure cannot be directly observed.' Although there is no agreement on the precise nature of frames – are they ideas, beliefs or discourses? – there is agreement on the point that there are always competing frames and that a frame in any area of policy is always under negotiation and never 'won'.

We are particularly interested in the work done by frames because they will help us to locate social scientists in the policy process. Perhaps the most important point is that frames bind actors together in coalitions which can include civil servants, politicians, industrialists, pressure groups and journalists. Although there is no consensus regarding the precise nature of the 'glue' which holds a coalition together (see Surel, 2000; Schmidt 2008) there is agreement that frames, in general, play this role. More specifically, Surel (2000) argues that

the dominant frame provides a causal explanation of the current state-of-affairs and is the basis on which a coalition decides what action needs to be taken. The dominant frame also declares some views and stakeholders as illegitimate and their solutions incorrect if not ludicrous. That said, competing coalitions sustain alternative frames and visa versa. For these reasons, Surel (2000: 502) argues, 'A cognitive and normative frame thus marks out the terrain for social exchanges and disagreements, rather than simply supporting an unlikely consensus.'

These arguments have significant implications. Whereas orthodox understandings of policy can suggest that social scientists (and natural scientists) are independent contributors of evidence or analysis regarding an external problem, interpretive approaches draw them into the process. To some extent social scientists become members of coalitions, which are allied to particular frames, which define 'the problem' in a particular way. However, social scientists are not the same as other actors in the policy process because they contribute particular knowledge, expertise and status (see section 4).

Although much of the recent work in Policy Studies emphasises frames and coalitions (see Schmidt 2008) it is important to note that more tangible aspects of policy such as the day-to-day routines of actors are still important and that these things are linked (see Freeman, Griggs and Boaz, 2011; Wagenaar, 2004). In his analysis of acid rain politics in the UK and the Netherlands, for example, Hajer (2005: 302) argues (following Wittgenstein) that 'linguistic utterances cannot be usefully understood outside the practices in which they are uttered'. For this reason, Hajer (2005: 302-303) goes on to conceive of discourse as interconnected with the routines, rules and norms 'that provide coherences to social life'. This means that any realistic understanding of policy must take into account such things as the daily rituals of

ministerial meetings and policy briefings as well as the countless informal interactions between actors through which particular frames are reproduced (see Wagenaar, 2004). In this way, issue frames – as ways of defining 'the problem' and implying 'solutions' – are understood as enmeshed in routines and roles. Murphy and Yanacopulos (2005) illustrate this point by showing how different actors - including policy makers, businesses, consumer and environment NGOs - cooperated and contended with each other to re/frame genetically modified organisms using the 'transatlantic dialogues' process related activities.

This adds another important dimension to our discussion. Emphasising the everyday routines of policy making 'recognises the multiple and overlapping spaces within which policy is produced … [and] … entangled' (Freeman, Griggs and Boaz, 2011: 131). This refines our understanding of the possibilities and limitations of agency for the various actors (including social scientists) involved in (or seeking to be involved in) policy making. In addition to helping explain the changes and continuities of policy discourses (see Paul, 2009: 244), this approach also places social scientists inside policy processes in additional ways – including activities such as attending meetings, sitting on expert panels and applying for grants.

4. Experts interacting with policy

Although the frameworks and approaches discussed in the previous section reject the idea of environmental problems as exogenous to policy this does not mean that experts are the same as other actors or that evidence is the same as interest or opinion (Stone, 2004: 2; see also Fischer, 2003; Hajer, 1995). Rather they recognise that some actors, including natural and social scientists, interact with public policy in particular ways. However, to be more precise we must extend the insights of Policy Studies through related work in Science and

Technology Studies (STS). While STS has focussed on science (as knowledge and practice) and scientists (as experts), and their roles in politics and policy, there are insights to be drawn from this for social science which we organise around three issues: the emergence of new forms of scientific activity; the knowledge dimensions of 'problems'; and multiple interpretations of knowledge claims.

Research shows that the close relationship between science and policy in areas like climate change and genetically modified crops gives rise to new types of science. This has been given various labels, including 'regulatory science' (Irwin et al, 1997; also Murphy and Levidow, 2006), which capture scientific activity whose mandate is to address policy rather than academic problems. For our purposes, the significance of this work is threefold. First, it illustrates how research driven by policy questions transforms the design and scope of the research itself. Second, it shows how the predictive demands typically required for policy can encourage regulatory science 'has to transgress its own cognitive boundaries and limitations' (Irwin et al. 1997: 19). Third, it alerts us to the role that experts play in legitimising both policy processes and outcomes as 'science based' or 'evidence based' rather than 'value-laden' (cf. Murphy and Levidow, 2006) – and 'science based' policies are far more useful in politics than 'value-laden' ones.

Extending this discussion of regulatory science, it is important to ask whether social scientists are similarly vulnerable to the challenges identified when they interact with environmental policy. Put another way, does the concept of regulatory *social* science have merits and can it capture the tensions and ambiguities which surround social scientists in the policy process (cf. Holmwood, 2010; Savage, 2010; Smith, 2010)? We return to this in the conclusion.

A second key issue in STS regarding the role of scientific experts in policy concerns the knowledge dimensions of 'problems'. The work of Wynne (e.g. 1996) and Jasanoff (e.g. 1999), for example, has drawn attention to the framing of policy processes which privilege particular types of knowledge and, therefore, the inclusion of particular types of experts. Wynne's (1996) examination of environmental pollution in Cumbria following the Chernobyl nuclear accident shows that policy decisions were made on the basis of technical expertise forged in the laboratory. This expertise, Wynne shows, stands in contrast to the 'local' lay expertise of the farmers who were excluded by technocratic policy processes. However, it became apparent that the scientists' findings were partial and helped to shape policies that were challenged later, while lay expertise could have helped to generate different experiments, conclusions, policies and outcomes.

The significance of this work for the present paper is it demonstrates how accepted knowledge of the world – or the problem – is inseparable from the ways we organise the world or gather information about it. For social scientists seeking to influence public policy, this highlights the challenge that arises when a narrow group of experts are seen to hold the (most) relevant knowledge. Like Wynne's Cumbrian farmers, social scientists may find it difficult to influence technocratic policy processes. Conversely, they may play the role of Wynne's scientists and be implicated in the exclusion of other forms of knowledge.

A third insight from STS concerns the multiple interpretations of knowledge claims among the various and competing actors. The underpinning argument is that scientific knowledge – in the form of rules, norms and instructions – does not determine action and, therefore, interpretation is ever present (see Sismondo, 2004: 118-127). These processes of interpretation are particularly visible in public controversies such as over the siting of nuclear

power plants (cf. Nelkin, 1984/1979) where knowledge claims are disputed and debated by different actors from various disciplinary and community perspectives. In these situations, scientific knowledge can be selected or interpreted in accordance with preferred social or political positions – as Lahsen (2005) has shown through the U.S. debates about climate change. Specifically, she shows how via well-funded public relations campaigns the anti-environmental lobby emphasised and exploited the uncertainties in scientific models of the threats posed by human-induced climate change. Interestingly, in the case of genetically modified organisms Murphy and Levidow (2006) observed the opposite: the eco-lobby emphasised the uncertainties of scientific evidence.

The interpretive flexibility of knowledge claims, and the potential for politicising science through the strategic deployment of uncertainty, poses a key challenge for social scientists. Rather straightforwardly, it stresses the risks that social science findings might be strategically deployed in unwanted ways. There is, however, a further insight to be gleaned. In contexts where the linkages between research and politics are publicly visible, as Lahsen (2005) illustrates, problems arise because there are 'no transcendent definitions … by which to distinguish true science from "pseudoscience"' (2005: 161). In such situations, constructionist analyses of knowledge claims might appear to offer few tools for drawing normative conclusions. However, we argue, in situations requiring the building of reflexive institutions the need for constructionist social science is enhanced because 'Purported scientific claims, as well as claims to expertise, need to be critically examined, not passively accepted; the contingent, negotiated character of both need to be recognised, leaving room for critical discussion' (Lahsen, 2005: 161).

5. Towards public social science

So far we have focussed on relatively direct engagement with policy-making processes; but the world changes in many different ways and public policy is only one mechanism. Thus, we step back from looking at the roles that experts and publics can play in policy-making to reflect on interactions between experts and publics beyond policy – which, in time and indirectly, may nevertheless contribute to policy changes, even if this is not their objective. To do this we draw on the burgeoning debate around public social science (or public scholarship) which is gathering momentum in Sociology, Geography and other disciplines.

Michael Burawoy's Presidential Address to the 2004 *American Sociological Association* is central to the contemporary debate around public scholarship. Burawoy (2005: 7-10) argues that there are four types of Sociology: (i) professional sociology which 'supplies true and tested methods, accumulated bodies of knowledge, orienting questions, and conceptual frameworks'; (ii) policy sociology which is 'in the service of a goal defined by a client'; (iii) critical sociology whose role is to 'examine the foundations ... of the research programmes of professional sociology'; and (iv) public sociology which 'brings sociology into a conversation with publics, understood as people who are themselves involved in conversation'. He argues that the sociological division of labour, at least in North America, has become distorted and unbalanced, and calls for more public sociology.

Geography is one of the disciplines engaging with the public scholarship debate, building on a long history of engaging with publics and more recent radical and activist thinking (Fuller, 2008; Murphy, 2011; Ward, 2006). Whilst acknowledging this history of public scholarship, however, it is important to note a specific contextual influence which is operating today that

poses challenges for social scientists seeking to influence public and policy debate. As Mitchell (2008: 348) argues:

> ... an increasingly market based logic ... has infiltrated and affected most university systems over the past few decades. This logic makes university life increasingly incompatible with the social and political projects of many potential scholars, and has reduced the number of public intellectuals operating within academic settings.

This context – the neo-liberalisation of higher education (cf. Burrows, 2012) – and the concern it engenders helps to explain why many scholars in Sociology, Geography and beyond have engaged with the public scholarship debate (see also Burgess, 2005; Owens, 2005). Recreating the space for public scholarship as a legitimate activity requires further efforts both inside and outside of the academy.

A central tenet of public scholarship is the need to bring about progressive social change through conversations with publics. Not surprisingly, the objectives of public scholarship make it different to other forms – professional, critical and policy to use Burawoy's typology. For example, Fuller (2008: 838) argues that 'style' and 'strategy' are at least as important as 'substance' because of the desire to engage diverse publics. As Mitchell (2008: 346) observes, when speaking or writing for audiences outside of a university setting there is a need to change ones language, vocabulary and sentence structure. And yet, she goes on to say (2008: 346), it is 'surprisingly easy to jettison words like neoliberalism without losing the thread of my argument, and I've also found audiences generally receptive to critiques of free-market capitalism, even though I rarely use words like capitalism, which has a different resonance inside and outside of the university'.

Distinguishing between substance, strategy and style is a useful starting point for understanding public scholarship but it is important to remember that these are oriented towards achieving progressive social change *with* publics. Embracing such an approach to public scholarship, however, raises troubling questions for social scientists, as Mitchell (2008: 346) also highlights:

> What does it mean to be political? And why does this feel like an intuitive rather than an intellectual question? My sense is that what creates a public scholar is related to a profound urge to participate and intervene in the political practices of the world—to fight injustice or correct misinformation or provide a needed service—in short, to try to make the world a better place, corny as that sounds. But is this desire compatible with an academic project? Does it necessarily involve selling out, either intellectually, personally or politically?

One of the problems here is that visions of a better world vary from person to person and any public scholar's idea of progressive social change is likely to be based on a combination of insights from research and personal or ideological commitments. This is one of the areas where existing ideas and arguments around public scholarship need to be developed further.

The public scholarship debate currently negotiates this problem by emphasising process. Emphasis is placed on 'dialogue' or 'conversation' between publics and academics with 'learning' on both sides (see Ward, 2006: 499). This, however, leads to further problems. For example, who are the 'publics' who will be engaged in these 'conversations'? One difficulty,

of course, is that public scholarship involves constituting publics in the name of progressive social change and not simply empowering ones which already exist.

A further problem arises from the legacy of the ongoing participatory paradigm in contemporary governance: disillusioned, alienated, sceptical publics experiencing participatory fatigue. There is a danger that public scholarship is folded into the public engagement agenda – either by social scientists themselves or by people beyond the academy. Engaging with publics is increasingly marred by the negative impacts of the participatory 'push', leaving social scientists with the difficulty of avoiding reproducing (or being seen to reproduce) exercises in market creation or smoothing pathways for particular visions of social or technical change (Stirling, 2008; Thorpe, 2010; Thorpe and Gregory, 2010). However, despite such problems, the public scholarship debate is useful because it emphasises the point that engaging with publics rather than engaging with policy is an option for social scientists.

6. Concluding Discussion

The purpose for this paper, as stated in the introduction, is to provide a framework for analysing interactions between social science and environmental policy. Although such interactions have not become the focus for social scientific research to date, scholarship across a range of discipline and sub-disciplines provides a wealth of insights for thinking critically about our efforts to influence environmental politics and policy. In this concluding discussion, we use the insights to be gleaned from the above literatures to answer the questions raised in the introduction: in relation to environmental problems: (1) how do social science and public policy interact? and (2) in the future, what types of interactions can social scientists engage in? It is not our intention to provide a toolkit for social scientists, but instead

to set out the terrain for further exploration and action.

How do social science and public policy interact?

While it is commonplace in social science to emphasise the importance of context, we find that understanding the relationship between social science and public policy requires us, once again, to do so. The governance debate suggests – regardless of specific explanations for changes in the distribution of power (i.e. critical or uncritical) – that politics has become more complex and uncertain over the past 25 years. Over this period, new challenges around environment and sustainability have also emerged. A central requirement for understanding how social science is interacting with environmental policy is to include governance in our analytical frameworks. Doing so sheds light on the context in which actors, including social scientists, operate. As the examples of acid rain or genetically modified organisms illustrate, one conclusion to be drawn is that understanding politics helps to explain how/why particular accounts of the world are taken up, marginalised or ignored.

The attention drawn to neo-liberalism as the broader governance context within which actors operate (see Jessop, 2002, 2004) raises the problem of ideology, which, in some cases irrespective of/unbeknown to scholars, shapes and determines research and how it is used. For instance, social scientists involved in the creation of new spaces for public participation are increasingly alert to how the possibilities of empowerment are shaped and circumscribed by neo-liberalism (see Moini, 2011; Stirling, 2008; Thorpe, 2010; Thorpe and Gregory, 2010). Further, efforts to widen participation in decision-making regarding environmental problems are open to the criticism of facilitating neo-liberal agendas through what Clarke describes as the 'shift of social responsibilities from the public sphere (where they formed part of the

business of government) to the *private sphere* (where they become matters of individual, familial or household concern)' (2004: 33, emphasis original). At the same time it is noteworthy that there are examples of environmental research agendas at the interface between social science and public policy that have – at least to some extent – been shaped by but also feed into neo-liberalism. 'Eco-efficiency' and 'eco-system services' illustrate the point by extending particular agendas into new domains of the social and natural worlds. Further, 'ecological modernisation' theory, at best, has walked a tightrope between the politics of its social democratic origins and the politics of neoliberalism, and some would argue that it has fallen off (Oels, 2005).

Moving from politics to focus on policy making draws attention to frames, the roles they play and the relationship between them and research. As the discussion above has highlighted, key areas of Policy Studies and STS have converged on an interpretive/constructionist perspective and do not take 'the problem' as given or even as a starting point for understanding policy. Both aim instead to understand the process by which problems and solutions emerge from a vague area of environmental issues and challenges. Additionally, of those discussed here, both provide a critique of technocratic policy processes and orient their politics towards participatory democracy. Policy Studies and STS are, however, different in significant ways and, therefore, together they provide a more comprehensive analytical picture for understanding the relationship between social science and public policy. Policy Studies avoids narrow definitions of policy actors and instead involves exploring a wide range of actors (including academics) and the way they act in coalitions around particular frames. STS tends to focus on the role of knowledge and expertise and, therefore, is particularly useful for extending Policy Studies to analyse the roles played by research(ers) and specific actors in policy coalitions. Additionally, STS analysis has shown that beyond advice, analysis and

evidence, scholarship can also provide legitimacy.

In this regard, the concept of regulatory science is helpful. Although developed to understand interactions between the natural sciences and policy processes, it encourages us to ask whether (and how) social science research driven by policy questions transforms the research activity itself? That is, is there something we might call regulatory social science and is it exposed to the same set of challenges as regulatory science? Certainly, Burawoy (2005: 266-7) highlights the limitations of what he calls 'policy sociology' whose '*raison d'etre* is to provide solutions to problems that are presented to us, or to legitimate solutions that have already been reached'. As already discussed, we must locate social science inside coalitions of actors that includes policy and not outside of policy processes. In turn, this suggests the need to conceptualise social science and environmental policy as co-constructed with new agendas and approaches, as the outcome of this interplay (cf. Smith, 2010).

For social scientists seeking to influence public policy in relation to environmental issues, in addition to the problems discussed there are more practical ones too. As Owen's (2005) shows, there are differences in the modus operandi of academia and policy that have implications for their relationship. For example, it is not only that social science research insights might be misused (cf. Jasanoff, 1996) but that the time-commitments involved and the need to write for another audience are at odds with the academic pressures of publishing in 'gold-standard peer-review journals' (Owens, 2005: 290; see also Burgess, 2005). Owens similarly points to the mismatch of timetables with which policy and academic research operates. One consequence, as Smith (2010: 189) has shown, is the danger that in our attempts to render our research appealing to policy audiences, we generate ideas that are transformable rather than transforming.

Locating social science in its political or policy context therefore has a number of implications. It moderates (and raises concerns about) the emphasis which is often placed on academics to provide better advice, analysis or evidence to policy. This raises questions about how broader ideologies or discourses shape the interpretation of academic research and its findings, which in turn serves to remind us to remain cautious (but not dismissive) of engaging in efforts to influence public policy. Significantly, it encourages scholars to think about shaping the context within which research and policy is produced – including Higher Education institutions (see Burgess, 2005; Burrows, 2012). More prosaically it highlights the fact that major changes in policy – to the extent that they are associated with changes in politics – take place over many years (a significant part of an academic career rather than the lifetime of a single project) (Owens, 2005).

What types of interactions can social scientists engage in?

Our answer to this question builds on our analysis of the role that context and politics play in shaping policy, and the ways in which social scientists engage with it. Purposeful efforts to bring about policy change must be put in this context. Academics cannot induce crises and as a result there are limits to what they can achieve in bringing about radical changes of policy – they can only exploit crises if they arise. With this in mind, we offer five types of interactions that social scientists can engage in.

Our first type of interaction acknowledges the ongoing importance of providing practical analysis, evidence and advice on the environmental problem/issue within the dominant policy frame e.g. through policy briefs, inquiries or participation in committees. Although the

previous discussion emphasises the significance of context and frames this does not mean that 'better analysis' is irrelevant. As Smith (2010: 188-189) has shown, there are existing tensions between social scientists and policy actors regarding the nature of their roles: should academic research 'be oriented towards providing policy audiences with practical solutions' or facilitating 'radical and critical thinking'? Thus, it raises questions about its role and status and suggests that social scientists should have modest expectations – anticipate partial (at best) rather than wholesale uptake of ideas. Accordingly, it is important to reflect on how our own approaches correspond to the competing coalitions in play and the related institutionalised practices of policy.

Second, in addition to focusing on evidence and analysis, we can aim to enhance the reflexivity of policy processes by working to make existing institutions more reflexive or purposefully contributing to the creation of new reflexive institutions. Such institutions should explore the basis on which policies have been made and 'can therefore never be based on preconceived problem definitions' (Hajer, 1995: 287). Reflexive practices should 'be oriented towards constructing the social problem' that needs a solution (Hajer, 1995: 285–7; cf. Fischer, 2003: 111). In this process, evidence and analysis might be demoted to the role of discursive resources.

Enhancing the reflexivity of the policy process might also be used more instrumentally as part of a strategy to change policy by replacing or modifying a dominant frame/coalition. This would require considerable reflexivity on the part of the social scientists, however. They run the risk, for example, of having 'the solution' and working back to construct 'the problem' in a particular way and in the process marginalising other possible problems/solutions. For example, many environment and sustainability challenges can be understood from the

perspective of (in)justice. By framing the issues and challenges in other ways, thus identifying alternative problems/solutions, social scientists might in effect undermine or weaken this agenda.

Third, enhancing reflexivity of policy processes also involves providing critical accounts of the 'complex webs of routines and roles of individuals, as well as the different objects, artefacts and elements that together produce policy' (Freeman, Griggs and Boaz, 2011: 131). Central to this endeavour involves questions about the mundane aspects of policy in order to ascertain how particular inclusions and exclusions are reproduced. It is worth noting, however, that the reason for doing this is to reveal how power operates with the intention of making the policy process more transparent and perhaps democratic (cf. Collins, Weinel and Evans, 2010).

This relates to a fourth type of interaction involving careful analysis of those policy domains with which we seek to engage and interact in order to identify opportunities or spaces for influence. Whether such enhanced reflexivity results in 'better' or 'worse' (environmental) policy is unclear. Indeed this raises questions about the meaning of these terms and the criteria which would be used to make such judgements.

Finally, this paper also encourages social scientists to think more broadly – beyond policy – about their role in relation to environment and sustainability. The public scholarship debate is particularly useful here. On the one hand it highlights the ideological pressures which are affecting research and the way in which these can discipline the type of research that is done and how we understand such things as 'users' and 'impact' – indeed it suggests where such phrases come from (Burrows, 2012). On the other hand – and in part because of this – it

encourages scholars to engage more broadly with publics as part of efforts to encourage progressive social change. The list includes students, civil society and communities. Dialogue and learning on both sides can take place in traditional (e.g. lectures or popular books) or more organic and unconventional ways (e.g. co-research with publics or adopting novel methodologies (cf. Murphy, 2011)). These are the ways that scholars can work beyond the spaces and agendas which have increasingly been allocated to them by politics over recent years – policy and business. Of course, politics and policy are not separate domains to public debate and therefore shaping public debate around environment and sustainability also offers opportunities for changing politics and policy.

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[2] At the same time, social scientists are increasingly reflecting on their roles in shaping society and how changes to higher education facilitate or constrain them (Mitchell, 2008, Holmwood 2010, Savage 2010, Smith 2010, Ward 2006).