

UNDERSTANDING ENVIRONMENTAL POLICY PROCESSES: A REVIEW*

IDS WORKING PAPER 89

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SUMMARY

Environmental policies in developing countries are increasingly criticised for being predicated on highly questionable assumptions. This presents two challenges. The first is to explain how and why particular types of knowledge get established in policy. The second is to think about how policy processes might be opened up to more diverse forms of knowledge. Understanding the knowledge-policy relationship involves clarifying exactly what policy is and how it is developed, and reflecting on the particular nature of scientific knowledge which plays such a major role in environmental policy-making. Analysing the policy process also cuts to the heart of key debates in social science: why is reality framed and dealt with in certain ways? How important is political conflict over distribution of power and resources? What is the role of individual actors in policy change? Three contrasting explanations of policy change are explored: that policy reflects political interests, that change reflects the actions of actor-networks; and that policy is a product of discourse. The paper addresses the extent to which these explanations are compatible and argues that they can be taken together using a structuration argument, where discourses and interests are seen as shaping each other, and where both are additionally influenced by the actions of actor-networks. The analysis emphasises the importance of agency and suggests that powerful interests and discourses should not necessarily prohibit the emergence of more participatory policy processes: those allowing room for citizen science and the diverse perspectives of different actors.

* This paper has been produced with support from the Economic and Social Research Council (ESRC) under the project 'Understanding environmental policy processes: the case of soils management in Africa'. The project is linked to ongoing work funded by the Dutch government under the Nutrient Networking in Africa (NUTNET) project and the Indigenous Soil and Water Conservation project.

INTRODUCTION

Recent literature on environment and development has drawn attention to the persistence of highly problematic policy approaches in a range of areas (Roe, 1991; Leach and Mearns, 1996).¹ Perceptions of crisis have informed and shaped environmental policy-making in a variety of different settings since the colonial period. For example, in sub-Saharan Africa the issues of soil fertility decline, deforestation and desertification are deeply entrenched as problems for policy. Accordingly projects, strategies and legislation have been consistently formulated to address these concerns. The frame of reference in much policy debate is: ‘what tools are there to attack better these problems’, rather than an examination of whether the questions posed have been correctly framed in the first place.

The aim of this paper is to look beyond specific policy debates to the more general, but important, underlying question of how ‘received wisdoms’ and the knowledge they reflect find their way into policy and manage to stay there with such tenacity. Understanding this relationship between knowledge and the policy process alters the focus of research from policy analysis to policy process analysis. One response to ‘bad’ policy is to explain why it is misguided and suggest how it might be improved: the technical approach. However, if there is something intrinsic to the policy process that means that policies invariably take a particular shape, then technical policy analysis may have limited utility, and what may be needed is a more wide ranging examination of policy-making itself. This paper makes such a case and, through a review of different bodies of literature, aims to open up environmental policy-making to scrutiny.

The paper draws on a wide range of sources from a variety of disciplinary approaches to understanding the policy process. Our aim is not to provide an exhaustive and comprehensive review, but to point to issues, themes and questions raised by the literature that may provide useful conceptual and methodological tools for investigating environmental policy processes in developing country contexts. Much of the existing literature, however, emerges from ‘northern’ settings where concerns with the analysis of processes surrounding public policy have a long tradition (Hill, 1997). With some notable exceptions², there have been surprisingly few reflections on questions surrounding the policy process in the ‘south’, despite the long-running emphasis on policy reform initiatives in development. We have therefore cast our net wide to review literature and examples from a range of settings. Rather than commenting on any particular developing country situation, our aim has been to attempt to draw out a conceptual approach for further empirical research, which provides the opportunity to assess whether the broader themes evident in the wider policy analysis literature are relevant in different developing country contexts³.

WHAT IS POLICY? MODELS OF THE POLICY PROCESS

In order to understand how received wisdoms find expression as policy – to prise open the black box of policy – it is necessary to have some conceptualisation of how policy is made, and more broadly what policy actually is. The traditional starting point for defining policy is that policy constitutes the decisions taken by those with responsibility for a given policy area, and these decisions usually take the form of

statements or formal positions on an issue, which are then executed by the bureaucracy.⁴ Conceived of in this way, policy is a product of a linear process moving through stages of agenda-setting, decision making and finally implementation.

However, in practice, policy is notoriously difficult to define. As one British civil servant commented: 'Policy is rather like the elephant – you know it when you see it but you cannot easily define it' (Cunningham, 1963, cited in Hill, 1997:6). Rather than seeing policy as simply a single decision implemented in a linear fashion, many observers have noted that, in practice, policies generally consist of a broad course of action (or inaction, for that matter, cf. Smith, 1976) or a web of interrelated decisions which evolve over time during the process of implementation (Hill, 1997). Policy also needs to be seen as an inherently political process, rather than simply the instrumental execution of rational decisions.

In attempts to understand the policy process three broad approaches can be characterised. First, the linear model, based on assumptions of rational and instrumental behaviour on behalf of decision takers (Simon, 1957). The focus is on the decision and the subsequent stages of implementation that follow (cf. Easton, 1965; Jenkins, 1978; Hogwood and Gunn, 1984). Such linear, stagist models offer a prescriptive, essentially top-down solution as to how things should work (Sabatier, 1986). These approaches make an important distinction between processes of decision and processes of execution. Awareness of this distinction has a long history in social science, dating at least to Max Weber's writings on the inevitability, as societies became more complex and differentiated into specialist areas, of the spread of the 'iron cage' of rationalisation and bureaucratisation (Weber, 1991). However the assumption that the organisation of all aspects of human life would become progressively smoother and more efficient has proved problematic. Even for those writing within the public administration tradition, with some level of commitment to the linear model, the problems and, in some areas, virtual impossibility of monitoring field-level bureaucrats is well recognised (Wilson, 1993)⁵. For example, Israel, a theorist of institutional development, elaborates the concept of 'specificity' and argues that key areas of rural development policy, such as agriculture and natural resource management, are inherently of low specificity, as the exact outputs demanded of staff and the steps for achieving them are hard to precisely define, making monitoring of performance correspondingly highly complex (Israel, 1989).

The linear schema, then, is useful up to a point; and very broadly this is often what happens. However, there is also plenty of evidence to say things do not actually work in such a tidy way – policy comes from many directions, and implementation can be as much about agenda-setting and decision-making as execution of decisions. Roe, for example, building on Wildavsky's work on the politics of the budgetary process, argues that budgets, far from being examples of classic examples of linear policy-making, where allocations are agreed and announced at fixed points in time and then spent as planned, are in fact texts to be interpreted. He argues that the moment of decision is in fact a fiction given the revisions and amendments to budgets and parallel fiscal processes at work (Wildavsky, 1974; Roe, 1994a). A focus on policies as courses of action, part of on-going processes of negotiation and bargaining between multiple actors over time therefore provides a second approach to understanding policies (Dobuzinskis, 1992).

In such a view, policies may not even be associated with specific decisions, and, if they are, they are almost always multiple and overlapping. Lindblom, for example, famously described policy-making as the ‘science of muddling through’ (Lindblom, 1959) and advocated an incrementalist perspective on policy process (Braybrooke and Lindblom, 1963; Lindblom, 1979; Dror, 1964; Etzioni, 1967; Smith and May, 1980) which focussed on the actions of policy actors and the bureaucratic politics of the policy process. Such a perspective suggests a more ‘bottom-up’ view of policy (cf. Hjern and Porter, 1981), whereby the agency of different actors across multiple ‘interfaces’ is emphasised (cf. Long and Long, 1992). Here, an analysis of practitioners and their day-to-day dealings with policy issues is key (cf. Schon, 1983), as is an insight into the timing of ‘trigger events’ and the role of ‘policy entrepreneurs’ in pushing policy discussions in new directions (Cobb and Elder, 1972; Kingdon, 1984).

The degree to which the classic linear model is useful in understanding policy processes depends on the policy area being considered. In the context of environmental policies, a top-down, instrumentalist perspective may be appropriate for analysing simple, easily monitored and controlled regulatory policy issues set within a well-enforced legal framework, for instance. However, when looking at the complex, uncertain and variable contexts of rural resource management, by contrast, an emphasis on local negotiation and incremental field-level action may be more appropriate⁶.

However, both the two broad approaches outlined above, that have dominated the policy science literature over several decades (see reviews in Parsons, 1995; Hill, 1997; John, 1998), remain surprisingly silent on issues of power. A third approach to understanding policy processes, then, can be added which takes the relationship between knowledge, power and policy as the centre of analysis. Foucault, for instance, sees policies operating as ‘political technologies’, enmeshed in the relations of power between citizens, experts and political authorities (Foucault, 1991; Burchell et al, 1991). Dreyfus and Rabinow (1982: 196, cited by Shore and Wright, 1997) argue that:

Political technologies advance by taking what is essentially a political problem, removing it from the realm of political discourse, and recasting it in the neutral language of science.

In this view, by mobilising a legitimising discourse – and the associated metaphors, labels and symbols of scientific authority – support is granted to ‘official’ policies. Through the power of expertise, certain assumptions are normalised and subsequently internalised by individuals (Shore and Wright, 1997). In the context of environmental policies, where scientific expertise plays a major role in framing policy debates, it can be argued that conceptions of the world which become dominant in policy discussions are a reflection of the norms through which people are governed. By seeing policy as discourse, analytical attention is turned to the webs of power underlying the practices of different actors in the policy process, as well as the discursive and non-discursive practices which are invested in policy negotiation and contestation. Thus linguistic and textual styles, classificatory systems and particular discursive formations can be seen to empower some and silence others⁷.

These different perspectives on understanding the policy process assume different relationships between state authorities, bureaucrats, various forms of expertise and broader civil society (Torgerson, 1986). In the largely top-down, decision-oriented, linear model a privileged role for expertise is granted, and rational actions in the implementation process are assumed. Science creates a ‘technocracy’ (Habermas, 1973; Fischer, 1990, 1993b, 1995) and rational decisions are implemented in a clearly defined way by administrators, bureaucrats and field agents. With the process of implementation seen as unproblematic – merely a matter of good administrative management – the key political focus is on agenda setting. For most commentators, this is ideally served by a representative, liberal democratic politics, whereby citizens participate in elections, and science and bureaucracy are left to get on with it (Mazmanian and Sabatier, 1983).

By contrast, a bottom-up, more implementation-oriented perspective problematises the multiple, incremental and complex processes of policy formation and implementation to a far greater extent. While there are some who still regard such divergences from the linear model as a problem of ‘implementation deficits’ (Pressman and Wildavsky, 1973; Hogwood and Gunn, 1984) to be dealt with by more effective public management approaches – communication, incentives, sanctions and rewards and so on – to get aberrant rational actors back in line; others see the processes of negotiation and bargaining among actors with different forms and styles of expertise as central. Proponents of such a view may take a pluralist stance, where a variety of interest groups compete over policy positions (Dahl, 1961), or a more participatory approach to democratic process, where citizens have a more direct role in the creation of policy (Held, 1996; see below).

Such standard models of democracy – whether liberal, pluralist or participatory – have been critiqued by more post-structuralist perspectives on politics and policy. Such analyses adopt a more fragmented view of the state and relationships with the multiple actors of ‘civil society’. Relations of power operating as part of the policy process act to construct individuals as subjects with a range of identities, with local actions set within the context of wider ‘global ethnoscares’ (Appadurai, 1991). With changing styles of governance – for example in the context of neo-liberal reforms and decentralisation – policies can be used in new ways as instruments of power (Shore and Wright, 1997), resulting in new challenges for citizen action, the negotiation of expertises and participation in the policy process.

Across this range of perspectives, different emphases on individual, everyday practical action and wider structuring processes are evident. With this comes contrasting views of the role of the state, the nature of scientific and other expertise, and the relationship with other actors and interests in civil society. Cutting across all perspectives are different conceptualisations of power, ranging from essentially instrumentalist views to perspectives which highlight a much more diffuse and fragmented view⁸.

In subsequent sections of this paper we will explore elements of these themes in more depth, with a particular focus on environmental policy processes. In the next section we look at the relationships between science, expertise and policy which, given the complex and uncertain nature of many environmental problems, are central to the environmental policy process. In subsequent sections we take three different

approaches to understanding policy processes. These focus on the role of political interests, actors and agency, and discourse in the policy process. While not completely distinct, each suggest different conceptual perspectives on the relationships between knowledge, power and policy. The paper then turns to a consideration of how such structural and actor-oriented perspectives might be usefully combined, where structure and agency mutually reinforce each other as part of the policy process. The final section returns to the theme of knowledge in policy and looks at how and if policy-making might be made more participatory and reflective of diverse forms of knowledge.

SCIENCE IN THE POLICY PROCESS

Science, technocracy and expertise

While knowledge may not get established in policy in a straightforward linear fashion, it is still often assumed that what drives environmental policy-making is scientific knowledge: scientists establish the facts about environmental realities, and policy-makers come up with policy options in the light of the facts. This positivist conceptualisation of the relationship between science and policy is often applied to the practice of technical - not necessarily scientific - policy analysis. In a range of policy areas, analysts in think tanks and research institutes are perceived as providing rational, technical policy analysis that rises above politicisation of policy issues: 'speaking truth to power' (Price, 1965; Wildavsky, 1979)⁹. In separating out the role of scientific and technical expertise in the policy process, policy formulation becomes increasingly technocratic, with science given a major role and lay publics are often labelled as ignorant, or incapable of handling the scientific complexities which guide decisions.

The case for technocracy is that it is efficient in a complex society to specialise. Those with expertise, it is argued, are highly experienced in a given area with detailed knowledge of a range of relevant cases, they are trained in the specialised collection of data, and the systematic analysis of information, and, as professionals, they tackle issues with neutrality and aim at dispassionate objectivity. Further, if one takes a positivist view of knowledge, there is simply no need for excessive consultation over technical decisions, as any group of experts would eventually arrive at similar conclusions for policy (cf. Fischer, 1993b).

The literature criticising technocracy has pinpointed a range of problems with the idea of rational, scientifically-driven policy-making. Firstly, it is not always clear when a policy issue is going to be decided on technical arguments and when on other criteria, and even how these choices should be made. Do politicians use technical arguments and draft in technical experts to escape difficult issues and absolve themselves of responsibility for policy areas? Fischer quotes Habermas as saying that the 'scientific practices' of technocracy are inherently depoliticising (Fischer, 1993b:166)¹⁰. Secondly, it is not always clear as to who should decide on who is a technical expert: why is this think tank neutral and objective and that one not?¹¹ And thirdly, what happens to democracy and public debate when issues are reified as technical and the preserve of experts? Does this result in disaffection with the policy process that has deleterious long-term consequences?¹²

These questions are equally prominent when one thinks about science and environmental policy-making. Work on the politics of science underlines the importance of contests over which scientists are deemed authoritative and allowed to speak on an issue; which policy questions are seen as issues for scientific deliberation and which are firmly kept within the realm of politics; and which potential biases emerge from commercial and government funding of scientific research (Ezrahi, 1990; Jasanoff, 1990; Nelkin, 1979, 1992). Clearly the stakes in terms of resource allocation around many environmental issues are extremely high and so having authoritative scientists supporting your case can be critical. All these contests exist alongside the scientific professions' concern to maintain their own credibility with the public as a neutral mediator of reliable information.

The social construction of scientific facts

What is unique about the claims of science, according to Latour, is that scientists attempt to shortcut the political process and access 'nature' by scientific experiment to bring back 'facts' (science) to speak to the world of 'values' (politics) (Latour, 1993). So rangeland ecologists, for example, deliver the facts about what is happening to pastures; climatologists tell us what is happening to the greenhouse; soil scientists offer assessments of changes in the soil fertility status of soils; and forest scientists inform us of rates of loss of primary forest cover. With 'truth speaking to power', bodies of scientific expertise then inform policy in an unproblematic manner.

Such a view has, of course, been widely criticised¹³. Weinberg (1972), for instance, identified the domain of 'trans-science' where policies are developed before scientific closure, and so science and policy interact in the context of continuing uncertainty and unresolved debates. Much work on the sociology of science has highlighted how science needs to be seen as constructed knowledge¹⁴, the result of competition between different interest groups (cf. Barnes, 1974, 1977; Bloor, 1976; Barnes and Shapin, 1979; Shapin, 1979) and the micro-social negotiations among scientists over scientific controversies (cf. Latour and Woolgar, 1979). For example, studies of the actual everyday practice of scientific activity have provided important insights into how certain scientific ideas gain ascendancy (Pickering, 1992). Through such work, the performative aspects of scientific activity have been emphasised, whereby a continuous interaction of resistance and accommodation occurs between human agency and the material world (Pickering, 1995). Expert knowledges therefore are not insulated from their social deployment and use, carrying with them a variety of social commitments (Irwin and Wynne, 1996a). Therefore seen in this way:

Science.. offers a framework which is unavoidably social as well as technical, since in public domains scientific knowledge embodies implicit models or assumptions about the social world (Irwin and Wynne, 1996b:3).

Science therefore acts to frame the basis for debate about policy issues and policy debates and popular concerns, in turn, influence the way scientists working on the interface with policy conduct their work and

frame the problems for investigation. The whole process is thus bound up in the power relations underlying the conduct and organisation of science, highlighting issues of funding, professional organisation and institutional governance.

An important part of the scientific enterprise is seen as generating universalisable statements. This often requires the containment of uncertainties through the standardisation of procedures, measurements, classifications and modelling routines; sometimes removing such uncertainties from wider discussion (Jasanoff and Wynne, 1997). For Latour the type of firm scientific pronouncement seen in policy statements are no more than effective and extensive knowledge networks¹⁵. Scientists, he argues, create facts by closing controversies, by black-boxing uncertainties and assumptions away from further scrutiny, while simultaneously universalising locally specific knowledge through enlisting the support of institutionalised knowledge networks (Latour, 1987; see also Callon and Latour, 1981; Callon, 1986a, 1986b). What counts as a valid scientific experiment¹⁶, and hence as acceptable evidence, has been shown to be highly political, dependent on the role of networks in establishing the validity of scientific facts.

Mutual construction of scientific knowledge and policy

What is clear is that, as one begins to explore the social construction of scientific facts, the knowledge–policy dynamic becomes more complicated than ‘rationally’ addressing objective problems. It becomes necessary to ask how and where knowledge was co-produced and to what ends (Barnes and Edge, 1982; Jasanoff, 1987, 1996). Such an approach rejects both a purely natural realism and an exclusively social constructivist stance (Wynne, 1996b). The problem, as Haraway has observed, is:

How to have simultaneously an account of radical historical contingency for all knowledge claims and knowing subjects, a critical practice for recognising our own ‘semiotic technologies’ for making meanings, and a no-nonsense commitment to faithful accounts of a ‘real’ world (Haraway, 1991: 187).

The complexity of the relationship between science and policy is captured by Shackley and Wynne in their work on global climate change modelling. They argue that scientists and policy-makers engage in processes of ‘mutual construction’ (Shackley and Wynne, 1995a,b; see Box 1). Scientists contribute to the framing of issues and the agenda for climate change by defining what evidence they can produce and by making claims about its significance for policy-makers. The negotiation process works both ways, however, and policy-makers also delimit areas for scientific enquiry in the process of effectively cutting off certain avenues of research, and the very possibility of the creation of certain facts.

In the environmental arena, the internationalisation of the science-policy interaction has become an important feature of the contemporary scene. Debates about global climate change have been of particular importance in recent years; also since the Rio conference of 1992, debates about desertification, biodiversity, deforestation, water management and other themes are increasingly being held in international

**Box 1: The mutual construction of science and policy:
the case of global climate change modelling**

Shackley and Wynne develop the notion of the 'mutual construction' of both science and policy in an examination of the use of Global Climate Change Models for climate change policy. GCMs predict patterns of anthropogenically induced climate change and are now, according to Shackley and Wynne, so central to the institutional practices of both science and policy-making for climate change that the range of alternative policy options and alternative avenues of scientific research have been drastically curtailed. GCMs are particularly attractive to policy-makers when they are used to produce regional data suggesting anticipated impacts on agriculture, water resources and rural economies. Shackley and Wynne argue that this type of information, taken with social, economic and political data, is well suited to the needs of bureaucratic planning and so the regional outputs of GCMs are increasingly being demanded, with research centres like the UK Meteorological Office being encouraged to market their outputs to generate finance. However, this scientific and policy support of regionally focussed outputs of GCMs may well be problematic in that the predictions themselves rely on key and questionable assumptions about the inputs used in the models – in relation to scale, for example. Further to this, relations between variables are assumed to be linear with dramatic non-linear climatic change ruled out. The Intergovernmental Panel on Climate Change according to the chairman of its scientific working group produces 'best estimates' for 'sensible planning'. This mutual construction of science and policy through use of GCMs is taking both scientific research and policy choice in specific directions, not only through underemphasis on non-linear scientific thinking, but through a strong emphasis on the future and not the present through plans for 'smart adaptation' to future climatic scenarios. Hence climate is arguably seen as a resource and not a hazard, and policy and science move away from thinking about difficult present-day issues such as reductions in greenhouse emissions.

contexts. Scientific commissions, advisory panels, expert consultations and large conferences are all part of the process. These are the emerging sites for the mutual construction of science and policy on an international stage, where knowledges and practices are exchanged, discourses are shaped and political actions are designed (Jasanoff and Wynne, 1997).

In the processes of the production of globalised knowledge and policy about the environment, models of various sorts play an important part. From the International Biological Programme and Club of Rome 'limits to growth' systems models of the 1970s to 'gap deficit models' which encapsulate the assumed 'woodfuel crisis' or 'soil nutrient crisis' to the highly sophisticated global climate change models of today, modelling of various forms has been an important part of the science-policy interaction, and increasingly institutionalised in the global environmental change community.

Uncertainty and indeterminacy

The simple policy prescriptions which sometimes emerge from such modelling attempts, however, may hide from view a range of uncertainties (Wynne, 1992a; Funtowicz and Ravetz, 1993). Sometimes this may be well known but conveniently ignored by both scientists and policy-makers. On other occasions caveats may be present in scientific papers, but these may be obscured by the way findings are cited and taken up in policy documents, having the effect of creating an artificial sense of certainty. In other instances, scientific methodologies may themselves be problematic, with assumptions that appear to hold true under one set of circumstances failing under alternative scenarios.

Mackenzie (1990) has pointed out how perceptions and admissions of uncertainty vary depending who you are and your relationship to the production of knowledge. Scientists directly involved in producing knowledge may admit high levels of uncertainty, whereas users who are institutionally committed to the knowledge being produced may admit far lower levels of uncertainty. By contrast, those distant from the sites of knowledge production, who are alienated from it and mistrust the institutions associated with its production may perceive high levels of uncertainty.

Wynne's work on radiation risks to Cumbrian sheep following the Chernobyl nuclear accident illustrates how predictive models when transferred from the laboratory to real-world situations were caught out by unanticipated variables and relationships between variables (Wynne, 1992a; see Box 2). Fundamental indeterminacies were concealed which, once exposed, had the effect of undermining the presumed objectivity of scientific knowledge entering the policy process (Wynne, 1992a). Such issues are particularly apparent during the creation of predictive models for looking at environmental change. When what are in essence indeterminacies are presented as 'deterministic uncertainty' – elements of the model which require further work – the hope of prediction, management and control is held on to (Wynne, 1992a). However, if the basic character of uncertainty in complex ecological systems is accepted, a rather different policy conclusion would be the result (Holling, 1993).

The 'risk society' and public participation in science

The literature on the 'risk society' again illustrates the problematic nature of science and policy interactions. Beck argues that industrial societies are currently undergoing a transformation into risk societies. During the earlier emergence of industrial society, through processes labelled as simple modernisation, science played the role of freeing societies from traditional constraints through the promise of greater control and management: the benefits for social and economic life were generally perceived as benign. In the period of what Beck identifies as 'reflexive modernisation', science, as opposed to offering control and predictability, creates risks and uncertainties as side-effects of the processes of scientific discovery and technical change (Beck, 1992, 1995, 1997; Beck et al, 1994). While this work focuses on industrial countries and takes issues such as genetic engineering, nuclear energy and industrial pollution as its examples, the concept of the risk

**Box 2: Uncertainty, indeterminacy and ignorance:
the case of radiocaesium pollution in Cumbria, England**

Wynne discusses different types of uncertainty: risk where we know the probability of 'x' occurring; uncertainty – where we know what may occur but not the probability; ignorance – where we don't know what we don't know, and finally indeterminacy – where the 'causal chains or networks are open'. Wynne illustrates 'ignorance' using the case of radiation uptake and sheep farming. After the Chernobyl disaster a radiocaesium cloud passed over upland areas of England and Wales – scientists proclaimed that this was not a problem as radiation gets immobilised in the soil. But it transpired that they had not allowed for a key uncertainty -namely that immobilisation processes that work on clay soils simply do not occur in the same way on acid peaty soils meaning that the knowledge upon which policy pronouncements had been confidently made was fundamentally incomplete. But, as Wynne notes, this is standard scientific practice and not unusual: when what is observed in practice is not what is expected one returns to the original model and alters the assumptions. Indeterminacy is when you just don't know the causal connections. Not only are the scientific commitments upon which predictions such as risk assessments are based uncertain, the social commitments upon which judgements are predicated may also be open-ended. Wynne illustrates indeterminacy returning to the case of radiocaesium in soil. There had been scientific experiments on radiocaesium exposure in the 1960s and these had concluded that for both acid peats and alkaline clays gamma radiation emissions measured above ground were insignificant posing no risk to humans. However this confidence that radiation was not a serious problem overlooked the possibility that humans might be exposed to radiation via mobile radiocaesium being taken up by vegetation subsequently grazed by sheep. Knowledge rested on unexamined social commitments – assumptions about human behaviour – which ultimately came to be seen as misplaced, reflecting the indeterminacy of scientific knowledge.

society can equally be applied to a range of environment and development issues, where uncritical application of science and technology may have dislocating social and economic consequences.

If what Beck argues is happening is correct then this has important consequences for the policy process. Scientific knowledge can no longer be taken as supporting social development unproblematically, and critical reflection on the practices and products of science need to become part of policy development, and, as with other policies, need to be subject to forms of popular, democratic control. The literature on trust and public perceptions of science picks up these issues (Irwin, 1995; Wynne, 1992c, 1993, 1995, 1996a). The authority of formal scientific pronouncements on a range of public policy issues has increasingly been called into question by publics lacking trust in official positions. With a growing lack of

faith in scientists and the policy institutions associated with science, and the legitimacy and authority assumed for the successful implementation of the rational linear model are being undermined. Thus with the outbreak of ‘mad cow disease’ (BSE) in the UK, no matter what scientists and politicians said, the public refused to buy beef, even if deemed ‘safe’ (Irwin, 1995:115-6).

With growing public distrust of institutionalised science, publics, in some instances, have taken up their own ‘citizen science’, developing their own methodologies and partnerships with experts and, for example, carrying out epidemiological surveys of disease profiles around toxic waste sites and pushing these into the public policy arena (Brown and Mikkelsen, 1990; Fischer, 1993b; Irwin and Wynne, 1996). This raises questions of who does science for policy, given the social construction of scientific facts, the politics of science and the endemic nature of risk and uncertainty within environmental policy-making, a theme we will return to later in this paper.

Thus encouraging the ‘public understanding of science’ must not simply be seen as a process of stimulating communication of facts to an essentially ignorant, or at least disinterested, public. Instead, broader questions of institutional legitimacy and public trust arise, and the importance of encouraging a greater reflexivity in the interactions between scientific institutions and increasingly informed and environmentally aware publics (Irwin and Wynne, 1996).

In addition, a recognition of a wider range of knowledges and perspectives beyond the confines of science and scientists suggests new ways of interacting with lay publics. If acknowledged as having something to contribute – another set of partial knowledges, carrying with them, of course, their own social commitments and assumptions – the unhelpful divide between ‘science’ and ‘lay public’ or ‘local knowledge’ begins to break down (cf. Agrawal, 1995). Thus across a variety of actors – scientists, policy-makers, lay publics – a variety of partial positions arise, which are intimately bound up with the situated subject positions of the actors concerned (cf. Haraway, 1991; Harding, 1991). And it is these plural and partial positions on environmental issues which must be negotiated in the context of wider political interests, discourses and interactions of different actors. It is to these themes which we now turn.

EXPLAINING POLICY CHANGE: POLITICAL INTERESTS, ACTORS AND POLICY DISCOURSES

Knowledge, we have argued, does not get established in policy as part of a simple linear process where problems are identified and solutions are operationalised. Policy contests – which are substantially contests about knowledge – run throughout the policy process from macro to micro scales. At the same time – as examination of the relationship between science and policy suggests – neither is policy-making a gradual process of moving closer to an ideal and ‘rational’ approach to problems. So how does policy change and how do different types of knowledge get established in policy? This section identifies three distinct ways of explaining policy change: explanations identifying, in turn, key roles for political interests, actor-networks and policy discourses.

POLITICAL INTERESTS AND POLICY CHANGE

The first approach identifies policy change as primarily the upshot of interactions between different groups with differing political interests, a position traditionally associated with political science. Knowledge in these accounts is presented as essentially subordinate to interests. What different groups or categories of actors believe and do about a policy question is a reflection of their interests: if you understand policy as the consequence of political interactions then you will understand why particular types of knowledge prevail. Assessments of the key political fault lines have changed over time: they are alternatively between classes, between different interest groups within society, between the state and society, and between different factions within the state, or some combination of these (Grindle and Thomas, 1991; Hill, 1997).

Society-centred accounts

Interactions between state and society actors in the policy process are primary concerns of political scientists. Early attempts to explain the origins of policy focussed on competition between groups within society over the allocation of resources and the formulation of rules for social and economic life: what came to be known as pluralism (Truman, 1951; Dahl, 1961). Policy to these political scientists is essentially about processes of bargaining and competition between different groups in society. While some influential advocates of pluralism such as Dahl do not entirely ignore the state, state agencies are portrayed as only one of many competing actors around different policy issues (Hill, 1997). Groups in a pluralist polity might be organised around a whole range of variables: region, ethnicity, professional and industrial sectors, economic class. Marxists, too, have made the case for policy being related to diverging interests in society; in this case the struggle between different economic classes (cf. McLennan, 1989)¹⁷.

This society-centred slant on the policy process remains influential, with the earlier language of interest groups finding echoes in concerns with civil society, NGOs, and new social movements¹⁸ (Offe, 1985). Much of the environmental governance literature frames the difficulties within environmental policy-making in terms of the need to balance competing social interests (Hempel, 1996). So, whether the subject be genetically-modified food, transport policy, or climate change negotiations, it is often possible to identify core conflicts between environmental, business, consumer and local interest groups as central to the policy process.

The growth of environmental NGOs and movements in different parts of the world has received extensive commentary (e.g. Jamison, 1996; Yearley, 1994; Wapner, 1996; Newell, forthcoming). An important question arises about the degree to which environmental groups are entering a new arena for policy influence created by the withdrawal of command-and-control state regulation, the apparent failure of formal international environmental agreements and the emergence of international, trans-border dimensions of environmental change (Litfin, 1994; Paterson, 1996; Vogler and Imber, 1996). Different relationships with other interest groups can be delineated, ranging from cooperation and collaboration with governments, international agencies and the corporate sector to a more critical approach involving confrontation and

direct action. A similarly varied articulation with science can be observed. On the one hand, many environmental groups base their campaigns on a basic distrust of 'high science' and the supposed negative consequences of modern technology; but on the other hand, in order to make their case, they must appeal to scientific authority for universalistic statements about the consequences of environmental destruction. Thus compromises are made, resulting in campaign strategies based on 'pragmatic epistemological flexibility' (Yearley 1996:183). The role of the media in the framing of issues and in developing public and political commitment to particular campaign themes is also an important aspect of contemporary environmental policy processes, and in many countries, the environmental concerns of the media may be key to the highlighting of particular issues and the exclusion of others (Burgess, 1990; Burgess and Harrison, 1998).

State-centred accounts

However, contemporary political debates are seldom explained purely in pluralist terms. Following the widely-cited work of Nordlinger (1981, 1987) and Skocpol (1985) there has been a renewed emphasis on the state and its agencies as key variables in policy change. Two broad approaches are identifiable: those that concentrate on the state in broad macro-terms and those who look at the activities of specific components of the state. At the macro-level, writers such as Skocpol argue that phenomena such as late-industrialisation are primarily explicable in terms of active states pursuing concrete projects¹⁹. While the developmental states literature (White, 1988; Amsden, 1989; Wade, 1990) looks at aggregate economic and social development, what lies behind these macro processes are specific policy processes. So state theorists make the case that the state is not a neutral arbiter of social conflicts, but is active in shaping policy. The literature of course observes that states vary immensely and that it is important to understand in detail why some states are strong (guiding the policy process to clearly defined ends) and why others are weak (leaving policy incoherent and more captive to limited interests in society) (Migdal, 1988).²⁰

The bureaucratic politics literature (Allison, 1971; Halperin, 1971) in recognising the considerable expertise and discretion residing in the executive arm of government picks up themes discussed earlier in relation to the non-linearity of policy-making and the importance of implementation processes in defining policy. This perspective is less concerned with states as macro-actors than with the way that policy emerges from contests between different parts of the state. Different bureaux, ministries and agencies have differing functions, histories and are staffed by people with different types of (often technical) training. These differences in perspective and more general predilections for increasing jurisdictions and agency resources mean that policies emerge often incrementally from the micro-level trade-offs and contests within the bureaucracy.

Policy and bureaucracy

The traditional, if increasingly problematised, view within political science of bureaucrats as neutral executors of policies made elsewhere is the corollary of the view that policy emerges discretely from high

places (Aberbach et al, 1981). For example, the extensive rational-choice literature casts bureaucrats as ‘rent-seekers’ acting to maximise the resources under their control (Tullock, 1965; Niskanen, 1971). However, the literature on street-level bureaucrats would question the concept of implementation within the linear model. Lipsky (1979) makes clear that front-line workers, far from being cogs in a Weberian machine²¹, exercise considerable agency in the policy process.²² They prioritise, interpret instructions, deal with overlapping and contradictory directives, and take the initiative in areas where there might be a policy vacuum. To other commentators in this tradition the policy-making – implementation distinction is quite simply a fiction (Ferman, 1989). Even where directives are clear, street-level workers can block, deflect or ignore instructions. Furthermore, as Anuradha Joshi’s work on Joint Forest Management in West Bengal illustrates, in certain circumstances front-line staff can be the prime movers in high profile policy change (Joshi, 1997; see Box 3).

Thus knowledge and policy can interact dynamically at a variety of points in a process, often in the context of highly heterogeneous bureaucracies. To avoid failing to differentiate between bureaucracies, the specific characteristics and histories of different bureaucracies need to be understood. This involves engaging critically with the broader processes of state formation that shape political and governance institutions (Young, 1988, 1994; Sivaramakrishnan, 1995). Bureaucracies and formal systems of decision-making understood in context enable us to understand the variability of possible knowledge-policy interactions in the policy process.²³ Robert Wade’s history of environmental policy at the World Bank (Wade, 1997; see Box 4) provides an illustration of how management and organisational processes and configurations can be crucial to performance and ultimately policy-making processes²⁴.

**Box 3: Front-line workers and policy change:
the case of joint forest management in West Bengal**

A number of explanations for the origins of joint forest management initiatives in West Bengal have been offered. These include a focus on internal reform as a result of the initiatives of particular senior forest officers and external pressure through the influence of tribal autonomy movements. However, Joshi argues, these accounts fail to acknowledge the part played by field-level foresters and their union in the process of a significant policy change from conventional forest management to a joint, community-based approach. She shows how the nature of the work situation – with increasing conflicts over forest resources increasingly putting the security of field-level foresters at risk – led to the support for, and even demand of, new ways of working with local communities. Given the contextual conditions of support for such an approach by the environment lobby, NGOs and donors – notably the World Bank and the Ford Foundation – and the political conditions provided by the Left Front coalition which had been in power since 1977, actions by field-level workers were received favourably by the wider bureaucracy. The apparently progressive response by a bureaucracy, conventionally seen as highly conservative, must be seen, at least in part, as a result of actions at the local level which significantly preceded any formal policy shift.

Box 4: Bureaucratic politics: environment and development in the World Bank

Through documentary analysis and interviews with former and present staff, Wade suggests that in many ways the Bank has transformed its whole approach to environmental questions in response to criticism – particularly by NGOs – of the poor track record of many of its projects. The Bank now has an Environment Department and Regional Environment Divisions under the Regional Vice Presidencies. It has made completion of National Environmental Action Plans a prerequisite for borrower countries, and environmental sustainability has become a core objective of the Bank alongside economic growth and poverty reduction. The new REDs have been given responsibility for signing off project proposals before sending them to the Vice-President for approval. Before approving a project the RED can decide that a project needs a full or partial Environmental Assessment and then it passes judgement on whether that EA has been done satisfactorily. This would appear to be positive in terms of encouraging good environmental outcomes.

However, Wade argues that, despite these changes, the Bank's internal structure and organisational culture prevent environmental issues being dealt with in a comprehensive, imaginative and non-perfunctory fashion. One of the core reasons for this is that the Bank country teams are organised to carry out sectoral projects, and corresponding budgetary and personnel incentive systems are primarily geared towards securing loan approval. Cross-sectoral and cross-country approaches which might be preferable for an area like environment are hard to manage given this set up. So the focus of the Bank's environmental work tends to be sectoral environmental projects. Even within the Country Assistance Strategy, the highly important three year planning document for each country, the chance to think strategically about environmental issues usually loses out to apparently more pressing macroeconomic concerns. Indeed environmental specialists complain that it is hard to even get a look in when these are drawn up. The Environmental Assessments which the REDs approve also suffer from problems, Wade argues, again for internal organisational reasons. The reason for this is that the RED staff have to sell over half their time to Country Task Managers, and if they get a reputation for being too difficult and slowing down the progress of projects they fall out of favour and may have problems getting work. EAs as a consequence tend to be comprehensive to forestall criticism but result in little adaptation of project design. In addition, recent attempts to 'mainstream' environment within the Bank have resulted in environmental specialists assuming more operational roles where the personal incentive is for them to become managers of environmental projects which allows them less time to oversee the whole portfolio of country projects from an environmental perspective.

Despite then a quite radical organisational overhaul designed to foster a new approach to environmental issues, bureaucratic politics within the World Bank make environmental work predominantly defensive, geared more to identifying potentially controversial public relations disasters, such as the Narmada dam project in India, than to developing imaginative cross-sectoral approaches. The Bank's ability as a stakeholder in environmental policy processes to develop a strategic and integrated style is correspondingly not what it might be.

Policy communities and networks

These differing strands within the political science literature are brought together to some extent in work on policy communities and policy networks²⁵. This body of literature attempts to offer an explanatory role to both society and state in the policy process. It also seeks to disaggregate the state by looking at different policy domains where it may be possible to speak of ‘sub-governments’. Each policy domain, according to policy community theorists, needs to be looked at empirically to see whether the state is weak or strong in this or that area, how bureaucratic interactions might work and how different social forces might be able to shape a policy. Policy, it is argued, emerges from the deals forged in the policy networks that constitute these sub-governments. These networks vary in composition from domain to domain, but they are likely to consist of government agencies, key legislators, pressure groups, relevant business and industry representatives, consultants and policy analysts and journalists.

Rydin (1997; see Box 5) uses the policy network and policy community concepts to discuss development and implementation of sustainable development policies in Leicester and Edinburgh in the UK. She takes three issues – traffic management, retail location and green-space management, and argues that for each of these issues in the two cities, policy development is mediated by particular types of policy network.

Box 5: Policy communities: urban environmental policy in the UK

In Leicester in relation to traffic management and retail location, Rydin argues that policy networks are particularly cohesive and should be understood as policy communities. The network of state and society actors – the local authority, businesses and citizen groups – identified around these policy issues are labelled as policy communities because patterns of interaction are regularised, open political conflict is minimal and there is a high degree of consensus about policy direction. Environmental groups are a key part of the policy community but they work within tightly defined parameters. In these instances, this means not challenging the core policy principle of the policy community which is to develop the city centre retail trade. Discussions of traffic policy, for example, are subordinate to this primary aim.

In Edinburgh, for these two issues, policy communities are much weaker, as businesses are represented by a variety of poorly connected lobby groups and links with the district council are weak. Further, much traffic policy is controlled by the Scottish Office or the regional council removing it from the networks of city politics. Policy networks for green-space management issues in both cities are characterised by Rydin as issue networks. Here there is far less regularised interaction and far less consensus. This has, she argues, been in some respects to the advantage of environmental groups in that, while conflict is more openly political (with local landowners for example), there is no core policy principle uniting local authorities and businesses and focusing policy options.

The work of Sabatier (1988, 1998; Sabatier and Jenkins-Smith, 1993), who uses the related term, advocacy coalition, supports the assertion that knowledge is subordinate to interests in these type of accounts.²⁶ He argues that different groups with different political interests negotiate core values and beliefs according to their concerns. Rival coalitions may negotiate around peripheral beliefs, but pursue core beliefs uncompromisingly, until, over the longer term, broader social and economic contexts change, forcing some reevaluation of core knowledge²⁷. Other policy network analysts argue that policy communities are examples of tight and highly coherent policy networks where there is substantial agreement over key 'policy principles' (Daugbjerg, 1997). Substantial policy changes are unlikely to occur unless these core principles weaken.

Three broad comments about the policy networks literature can be made which will help draw together some of the relevance of the political interests approach for the broader task of understanding the dynamics of knowledge in the policy process. Firstly, the policy networks approach has the advantage of moving debates beyond the oppositions of state and society that have characterised earlier discussions about what drives policy change. Depending on the policy domain a more pluralist or a more state-centred approach may be appropriate, since states may be weak or strong in different areas. Thus we are obliged to look at the historical context of particular state formations²⁸, the lack of homogeneity in the state and bureaucracy, and the way networks of political patronage and lines of affiliation have been formed over time (for example in Africa, see Bayart, 1993; Mamdani, 1996). Secondly, the policy networks literature makes links between aggregated sets of interests and the actions of individuals and groups in networks. There is an explicit recognition that processes of interaction, bargaining and construction of coalitions is important. We cannot simply read off political change from reified representations of state and society. The third point of interest concerns the theme of knowledge. The talk of core beliefs and policy principles as negotiated positions reached by different political actors offers one way of explaining how knowledge finds its way into policy. It should be emphasised again, however, that knowledge in these accounts is not the prime mover, understandings emerge as reflections of the interests of individuals and groups of actors. The question of the degree to which interests, and even categories of political actors, are in some sense *a priori* is a fundamental theme which will be picked up in the third explanation of policy change, that of policy discourses.

ACTOR-ORIENTED APPROACHES TO UNDERSTANDING POLICY CHANGE

The second approach to understanding policy processes we wish to highlight concentrates on actors in networks in a slightly different way to the policy networks concept discussed above. In this section we explore briefly four strands of literature that take an actor-oriented approach to understanding policy processes. First, we mention the sociological literature concerned with how actors interact at the 'interfaces' between contrasting knowledge domains. Second, we examine actor-network theory which is concerned with the practices of science and its interaction with policy through the creation of networks. Third, we explore the notion of epistemic communities, where groupings of experts with a particular focus. Finally,

we note the importance of particular individuals in policy processes – either as entrepreneurs encouraging the development of particular policy themes or as saboteurs who act to block and divert.

Actors and interfaces

In this view, individual actors involved in the policy process – whether field level extension workers or senior officials in ministries – are seen to have a degree of discretion and choice in their actions, although such actions are seen to occur within socially embedded networks and cultural settings. Such an approach draws on theories of practice and agency (cf. Bourdieu, 1977; Giddens, 1984), and rejects the more structural analyses typical of the political science literature highlighted above, centred as it often is around aggregate pictures of interest groups and policy communities. The expressions of this agency through repeated practice may result in both intended and unintended outcomes; often serendipity, contingency and chance are important elements. This makes any idea of predictable, rational and linearly planned intervention or policy-making very unlikely (Long and van der Ploeg, 1989).

A particular focus for analysis in development sociology are interfaces which emerge between different actors as they go about their work (Long and Long, 1992). In the context of the policy process, such key interfaces would include interactions between farmers and extension workers, between extensionists and scientists, between national officials and international experts or donors, and so on. Such interactions provide an opportunity for an interaction between lifeworlds and knowledges, sometimes resulting in new forms of insight and action, and new directions in the policy process (cf. Long and Long, 1992; Mosse et al, 1998).

Actor-network theory

The two key characteristics of actor-network theory are, firstly, an emphasis on the micro-detail of how particular networks – encompassing both human and non-human actors – get established, and secondly, on the ways in which the process of establishing actor-networks is simultaneously a process of establishing knowledge²⁹. We saw in the earlier discussion of science and policy that, according to commentators such as Latour, scientific facts are only as strong as the networks that uphold them. If key individuals or institutions withdraw their support from the network, then the power of the facts weakens. In terms of understanding how knowledge finds its way into the policy process this is useful as it enables us to understand in historic terms how particular understandings of environmental problems became dominant. We can trace the spread of statistics and theories from research to journals to conferences to policy documents to reiteration by key policy-makers. The construction of these chains of persuasion and influence can be deconstructed to reveal specific meetings, informal introductions or even periods of shared study or employment. This type of detail helps us see how unquestioned orthodoxies do not exist inevitably and how what is taken for granted might have been otherwise if, for example, a certain key connection had been missing, if a particular person had not made this keynote address with these individuals from these

organisations present, or if those academic referees had recommended this paper be reworked. The value here is that actor-network theory opens up recognition of some of the contingency that surrounds knowledge and policy and the importance of small actions, or expressions of agency.

Charis Cussins' (forthcoming; see Box 6) account of the contests between ecologists and elephant behaviourists over the fate of protected elephant populations in the Amboseli National Park in Kenya provides a sharp illustration of how processes of constructing support for particular scientific positions are simultaneously political processes and processes of network building. The case challenges assumptions about what counts as scientific fact and what is a legitimate scientific experiment.

Epistemic communities

The epistemic communities literature (Haas, 1990; 1992) which is more explicitly rooted in political science, and particularly international relations theory, makes similar points. According to Haas, international environmental cooperation over Mediterranean pollution (see Box 7) and the ozone layer was unlikely because states would find it difficult to sacrifice their immediate short-term interests for the common good. However, such cooperation did in fact come about, and this was because of the staging of 'epistemic communities': networks of individuals sharing core – often predominantly technically informed – beliefs about the subject area. These communities filled key positions in national bureaucracies, created international negotiation processes and generally enrolled important target individuals and institutions to create national and international supporting constituencies.³⁰

Epistemic communities are defined as a type of knowledge elite, often from disciplines such as ecology, they share similar basic assumptions about cause and effect relationships, and, according to Haas, if presented with similar scenarios different members of the community would reach broadly similar policy conclusions. The spaces that allow epistemic communities to achieve influence derive from the uncertainty that policy-makers face in an increasingly complex range of policy domains. Where the community can convince policy-makers that there is uncertainty, or where they can take advantage of already perceived uncertainty, they can help shape the framing of problems and suggest appropriate courses of action³¹.

Policy entrepreneurs

Linking the worlds of science and policy are a range of key actors in the policy process whose aim is to push policy in particular ways through the mobilisation of knowledge and expertise in particular ways. Such individuals and groups are usually well placed in relation to the networks of both scientists and policy-makers, and indeed invest considerable efforts in creating their own networks of influence. They are also well attuned to the timing of policy: they are able to see policy spaces opening up and are able to respond to 'trigger' or 'focussing' events when they arise (Cobb and Elder, 1972; Kingdon, 1984).

**Box 6: Building scientific facts:
biodiversity conservation in Amboseli National Park, Kenya**

David Western – a Kenyan conservationist and ecologist – conducted a series of experiments suggesting that concentration of elephants within Amboseli National Park was responsible for biodiversity loss both within the park, where there had been a marked decline in woodland cover, and outside the park, where the opposite had occurred and where too many trees were contributing to altered hydrological patterns. Western was opposed by Cynthia Moss, a researcher of elephant social behaviour and long-standing opponent of policies of elephant culling proposed by Richard Leakey, the then head of the Kenyan Wildlife Service. Western's alternative to a culling policy was to allow elephants outside the park onto old migration routes in order to encourage biodiversity regeneration both outside and within the park. To promote this alternative to intensive park management Western needed to make strategic alliances with Maasai pastoralists outside the park who would need to tolerate elephants on their land. When Western replaced Leakey as head of the Wildlife Service he convened a workshop on the fate of the elephants. Moss argued against Western's proposed solution in the workshop claiming that the Amboseli population of elephants had intrinsic rights as social animals and that, concentrated in the park, they were a unique scientific resource.

Cussins shows how Moss and Western attempted to construct networks in support of their differing positions. Critical to this was their ability to argue that the evidence they presented was in some sense more valid than that of their rival. For Moss this meant arguing that Western's experiments should be submitted to peer-reviewed academic journals and be carried out following the conventions of international scientific practice. Western, however, resisted this, arguing that following the dictates of disciplinary science was inappropriate for the needs of Kenyan conservation. He argued that science should be developed locally and in relation to the needs of local communities. The lengthy procedures needed for the production of universalistic scientific claims were inappropriate for rapidly shifting local ecosystems, and a situation that required immediate action. According to Western the arbiters of good scientific experiment should be the stakeholders at the workshop (government officials, donors, Maasai representatives and tour operators) who should look at his woodland experiments (examining the links between tree cover and elephant density) and 'see for themselves'. This 'local witnessing' of the validity of knowledge claims by the actors enrolled in Western's network of actors was essential to the establishment of a particular social and political order, and the triumph of Western's position. Western was effective, Cussins argues, because he 'built more links than the elephant watchers': alongside the importance of ecological arguments he recognised the importance of local livelihood issues and their broader political setting. He did not try to blend all the economic, moral, legal, political and scientific questions surrounding the elephants in a reductionist fashion. But by building connections between the stakeholders associated with different positions he was able to build a stronger, and ultimately more effective, actor-network than his rivals.

**Box 7: Epistemic communities and environmental protection in the
Mediterranean**

Peter Haas argues that international cooperation in relation to a range of environmental issues has been secured through the strategising of epistemic communities. Haas takes as an example the drafting of the 1975 Mediterranean Action Plan. This comprehensive plan, and the associated protocols, tackle a range of sources of pollution and have forced changes in agricultural, industrial and waste disposal practices in a variety of states. Haas argues that this type of cooperation is not usually expected in a world of competing nation states. However it came about because the epistemic community were able to strategically create a role for UNEP and the International Marine Organisation as legitimate international authorities, and because they were able to build alliances in the bureaucracies of Mediterranean states. According to Haas: 'The countries taking the strongest measures for pollution control were those in which the epistemic community and its allies were most strongly entrenched in the bureaucracy'.

Such policy entrepreneurs may emerge from the scientific community, from politics, from business, from the NGO sector or from the arts. In the environmental policy field, there are good examples of from all fields (Hempel, 1996). For example, James Hansen, the NASA scientist, became a key player in promoting the climate change debate following his Senate testimony in 1988; the Earthwatch Institute, and Lester Brown in particular, continues to trumpet environmental doom-and-gloom to great effect; and Maurice Strong, originally from the business community, has played an enormously influential role in the international environment and development debate from Stockholm in 1972 through to Rio in 1992.

Insights from actor-oriented approaches

An actor-oriented approach therefore makes it clear how the processes of mutual construction of science and policy are often obscured from view by the authoritative declarations of the scientists and policy-makers framing facts and suitable courses of action in particular ways.³² The putative neutrality of science and the prestige of powerful scientific institutions throw a veil over the politics of who gets funded, who is discredited as a crank, how particular scientific bodies and particular researchers have access to key government committees, and how and why and on what terms politicians invoke scientific authority. Understanding actor-networks also leads us back to original pieces of research and to the processes – often battles – that led to closure of scientific controversies, the black-boxing of uncertainties and indeterminacies and the establishment of knowledge.

Actor-oriented approaches are then primarily a way of understanding the spread of knowledge. They differ from the political interests literature, which presents the dominance of particular forms of knowledge

as the result of successful bargaining or exercise of political power. As discussed in the previous section, this provides a useful broad framework for thinking about the type of policy communities that form around the environmental policy process in different contexts, but often fails to explore the social relations and micro-level interactions involved. Thus a perspective that emphasises the practices and actions of multiple and interacting actors helps to break down the divisions between such categories as state, civil society, community and scientific establishment imposed by a more structural approach to interest groups and policy change.

It is therefore the relentlessly detailed prising apart of the linkages in the skeins and webs of knowledge that an actor-oriented approach offers, that enables us to understand how received wisdoms are built, and subsequently upheld, through the actions of different actors operating in the context of organisations and bureaucratic settings seen as constituted by social relations and embedded in cultural norms and values. With these tools we can explain, for example, why exactly there is a widespread consensus that forests are disappearing at a particular rate in a particular place; why an action plan is being formulated to deal with it; or why it is widely accepted that soil losses are this many tons per hectare in this country, and why certain technologies are necessary for amelioration.

This approach also need not mean a linear model of policy: the enrolment processes extend to those who implement policy, as much as to formal decision-makers. So the agency of 'street-level bureaucrats' is important, as well as that of the epistemic communities of higher profile actors who share and promote different technical paradigms.

POLICY AS DISCOURSE

A third way of understanding policy change is to look at policy as discourse. This section sets out what is meant by the term discourse, where discourses originate from, and what the effects of discourses are. The aim is to show that the concept helps understandings of the relationship between knowledge, power and policy.

Policy as discourse

Hajer defines discourse as 'a specific ensemble of ideas, concepts, and categorizations that are produced, reproduced and transformed in a particular set of practices and through which meaning is given to physical and social realities' (1995: 44).³³ In Foucauldian terms 'ideas, concepts and categorisations' are expressions of knowledge and power (Foucault, 1980), controlling human subjects by the definitions and categories imposed upon them. Discourses are frames which define the world in certain ways, in the process excluding alternative interpretations (Schram, 1993; Apthorpe and Gasper, 1996; Grillo, 1997). Discourses do not emanate exclusively from particular individuals and institutions, they are larger than this: the cumulative effect of many practices. Even the discursive practices of identifiable actors are themselves reflections of other discourses.

In relating discourse to policy, two ideas stand out. The first is that the very idea of policy itself needs to be problematised. Shore and Wright (1997), following Foucault (1991), suggest that policy is itself a 'political technology'. Policy involves categorising the world into different sectors and areas, for the purposes of management and the maintenance of social order. It entails categorising populations in different ways, and so relates to a range of practices such as collection of data, regulation of social and economic life and allocation of resources (cf. Darier, 1996). Thus the basic units in the policy analysis and planning vocabulary such as policy areas or sectors (environment, for instance), are not givens but are themselves discursively created (Apthorpe, 1986). Behind the widely-unquestioned phenomenon of policy, Shore and Wright (1997:3-4) suggest, stands the notion of governance which is not value-free; it is necessary to ask who is being governed by whom and to what ends and with what effects.

Policy discourses and discourse coalitions

The second aspect of the policy and discourse interface is the concept of policy discourses. Here one moves from the broad concept of policy to the idea that, in different policy areas, the way that issues are talked about is highly significant. Key concepts in different policy sectors do not exist in some neutral and purely technical sense. Concepts have histories, and they reflect types of knowledge: they empower some institutions and individuals whose concerns and competencies they are associated with, and simultaneously they marginalise others (Drysek, 1997). They also guide thinking about a policy area in certain directions either explicitly or implicitly. In the environmental sociology literature, commentators such as Yearley (1996) and Taylor and Buttel (1992) have pointed to the way in which concerns originally rooted in specific localities, such as the ozone layer and global-warming, have been globalised through discourses that utilise non-localised terminology. The idea of sustainability has similarly become a seemingly irreversible part of the environment and development lexicon (Redclift and Benton, 1994).

The politics of acid rain in the UK are examined by Maarten Hajer (1995). He argues that the substantial contests over identification and management of acid rain in the 1980s can be understood as contests between two discourse coalitions. Hajer argues that discourse coalitions are alliances between a range of different actors and organisations around a common approach to a problem, often expressed as a common story-line. The coalitions bring together many institutional and discursive practices: some actors utilise economic discourses, others scientific institutional practices, for example. In relation to acid rain two key coalitions are identifiable: a traditional pragmatist coalition and an ecological modernisation coalition (see Box 8).

Policy narratives

A range of linguistic and literary terms and ideas complement the notion of discourse, emphasising the importance of linguistic devices and styles of story-telling in policy analysis: examples include narratives

Box 8: Discourse coalitions: acid rain in the UK

The traditional pragmatist approach, Hajer argues is characterised by an *ad hoc* approach to pollution issues addressing individual cases through 'end-of-pipe' solutions. This contrasts with an ecological modernist approach where pollution concerns are integrated comprehensively into industrial processes at the earliest stages. The traditional pragmatist coalition in the UK when dealing with the acid rain issue brought together a range of industrial, bureaucratic and scientific actors: notably, the Central Electricity Generating Board, the Alkali Inspectorate – responsible for issuing advice on pollution concerns – and the Royal Society. These differing institutions brought to the coalition different institutional practices that together reinforced the traditional pragmatist position. The Royal Society demanded the highest standards of conclusive scientific proof (akin to those demanded for physics and chemistry experiments) before recommendations could be made on acid rain. The Alkali Inspectorate promoted the concept of 'Best Practicable Means', the notion that regulations should only be made when the benefits of tackling pollution clearly outweighed the costs to industry. The links between institutions were also strengthened by personal connections: the chair of the CEGB, Lord Marshall, for example, was a member of the Royal Society.

By contrast, key actors in the ecological modernisation coalition were the House of Commons Select Committee on the Environment, the Royal Commission on Environmental Pollution and Friends of the Earth. The debate about acid rain went on through the 1980s and culminated in the adoption of a policy of retro-fitting of coal-fired power stations with flue gas desulphurisation equipment, in order to combat sulphur dioxide emissions. However, while this was a substantial policy change towards a position previously rejected by traditional pragmatists, and thus in many ways a victory for ecological modernists, Hajer argues that it was paradoxically not indicative of broader shift in favour of the discursive commitments and institutional practices of the ecological modernisation coalition: pollution management still proceeded on the basis of 'good scientific evidence', rather than precautionary action, and pollution management practices continued to depoliticise environmental concerns by making them issues for experts and cost-benefit calculations, while denying that public concerns and perceptions are fundamental to on-going debates.

(Kaplan, 1990; Roe, 1991), tropes (Throgmorton, 1993), rhetoric (Apthorpe, 1996), and styles of argumentation (Toulmin, 1958; Majone, 1989; Fischer and Forester, 1993). The broad point is that it is impossible to talk about policy neutrally, as the critics of technocracy and positivist science suggest. Rather, whatever one says carries assumptions, and is in some sense prescriptive; the language in which it is framed is as significant as (and is indivisible from) the actual content.

At times the embedded assumptions in the way specific policy areas are talked about come together in particularly explicit and quite simplistic summaries of situations. Policy narratives are one example of these simplified framings. Many of the received wisdoms about African environmental issues discussed earlier rely for a lot of their power on their narrative format³⁴. Knowledge finds its way into policy through the prolonged reiteration of these programmatic tales of cause and effect. Such messages are easily communicated, they make for good sound-bite political marketing, and they fit well with the demands for clarity and measurable manageability of large-scale bureaucratic organisation. Given these selling-points the reasons for their persistence seem all too clear.

While making insightful links between knowledge, power and policy, some of the more extreme interpretations of a discourse perspective on policy processes see science and its associated institutions as somehow monolithic and integrated; simply reproducing relations of power due to their historical location (Ferguson, 1994; Escobar, 1995). But such analyses perhaps fail to give credit to varied actors' consciousness, intentionality and responsibilities – in other words their agency. The result, often, is a presentation of simple confrontations of competing discourses – experts versus publics, developers versus local people and so on. This acts to create unhelpful divides between social categories and sources of knowledge, rather than seeing the actual and potential interactions across such boundaries as important.

AGENCY AND STRUCTURE IN THE POLICY PROCESS

The challenge, then, is to seek ways in which these different perspectives on policy change can be combined in ways that expand our understanding of complex environmental policy processes. The three approaches to policy change presented above suggest that knowledge is established in policy in different ways: as a reflection of structured political interests, as a product of the agency of actors engaged in a policy area, and as part of overarching knowledge that frames practice in particular ways.

How commensurable are these different positions? From one point of view not at all. The political interests approach presents knowledge as subservient to interests, it also works at a more aggregated macro level than the actor-oriented approach: what matters is the structures that shape individuals' behaviour; without these, political conflict and the policy and dominant types of knowledge that emerge from conflicts, make no sense. The second position would obviously cavil at this. By exploring the micro detail of different policy and knowledge controversies it can detail precisely why a certain statistic or methodology became influential for policy-makers. The world is in large part what people do, the choices they make and the agency they exercise. Finally, the third position would take a post-structuralist skeptical glance at both the other positions. Interests are socially-constructed; political conflicts look different depending on where you stand and they change as discourses shift; and likewise actors' agency makes sense only within the context of broader narratives and frames of reference.

Theories of power

The three approaches to understanding policy change thus make use of different models of power. Within the political interests literature there are three identifiable positions. According to pluralists, different interests compete openly and the more adept and better resourced win (Dahl, 1961; Hill 1997). Critics argue a second position: contests are not open, the powerful exert their power by keeping certain issues off the agenda (Schnattscheider, 1960; Bachrach and Baratz, 1970). A third position, associated with Lukes (1975), puts it that power works by ensuring that the marginalised are not even aware of their interests. All these assume some type of intentional behaviour by those with power.

The actor-network literature would claim that power lies in the strength and reach of the networks that are constructed. The more actors that are enrolled into accepting the knowledge of the network, the more pervasive the network. The degree of vulnerability to collapse or substantial modification if certain actors withdraw are all therefore indicators of the strength of a network. Also, the more the newly established network differs from previously established knowledge networks the more agency and correspondingly power has been exercised.

For the discourse literature power is not individual, it lies in discourse itself. Discourses are the sum of numerous micro-practices: it is through these small practices that power is exercised. Taken together they form a discourse that is powerful in the sense of framing how people behave in, and think about, the world. But discourses, not even the constituent micro-practices, are not controlled in their entirety by individual actors: the discourse exists independently of the will of individual groups and actors (Hajer, 1995).

Agency, structure and structuration

Across these three positions there are two essential conflicts. The first is about the relationship between the first and third positions. Does knowledge follow from interests, or are interests socially constructed, the product of free-floating discourses? The second concerns the role of individual actors: how much room, in the face of interests and discourses, do individuals have to make real choices?

We would argue that, 'yes' interests are shaped by larger discourses, but that these discourses are also shaped actively by political interests. Neither can claim total explanatory power. In trying to understand specific environmental policy processes we can take the two together and hopefully build a richer picture of what is going on. In essence this constitutes a 'structuration' approach (Giddens, 1984, 1990) where structure and agency continuously and recursively interact³⁵. Bringing together social and political theory may not be straightforward, but the attempt to do so will hopefully yield valuable insights into both social and political phenomena.

The second conflict is again amenable to a structuration approach. Actor-network theory emphasises individual agency in creating knowledge (or knowledge discourses). But of course how actors behave in enrolling and extending networks is partly linked to political interests and discourses. Choices are partly socially and politically constructed. However, what is suggested by analysis of the micro-detail of particular

interactions, is that real choices are made and these make a difference in terms of what knowledge and policy becomes influential, and so these networks can establish discursive influence and potentially recast the parameters of political conflict.

Again within political theory, agency is becoming important as all-embracing structural attempts to explain political interactions look increasingly tired (Booth, 1994). Grindle and Thomas' widely cited concept of 'policy space' makes a structuration type argument without using the term. They argue that analysis of the varying levels of success of attempted policy reforms in often similar circumstances supports the hypothesis that policy elites make a difference, and that, while they are influenced by broad social, political, economic, international and institutional factors, and even by their own accumulated experiences, they do make real choices and, in particular, are able to take advantage of confluences of specific circumstances and contexts to initiate successful change (Grindle and Thomas, 1991).

It would appear, then, that the three ways of understanding policy discussed above can be linked to provide a multi-faceted analysis of the knowledge-policy relationship. However, while we can say something about how received wisdoms enter and become entrenched in policy, the question remains as to how – given what we understand about the policy process – to challenge orthodoxies and create processes that are more participatory, allow room for citizen science, local knowledge and marginalised interests. This is a theme to which we now turn.

PARTICIPATORY POLICY PROCESSES: DEMOCRATISING EXPERTISE?

The paper so far has made the case that policy-making is complex, political and power-laden. We have argued that the science-policy relationship needs to be treated critically as a social and mutually-shaping process. We have argued that environmental policy-making can be seen as a discursive phenomenon constructing reality and individuals as the subjects of policy in a variety of ways. In relation to particular policy processes, we have argued that policy approaches are likely to be influenced by dominant policy discourses and narratives, by powerful combinations of political interests and by effective actor-networks. And it is these dynamics that – to answer the original question posed in the introduction to this paper – keep received wisdoms entrenched in policy. But we have also suggested that this should not lead to the conclusion that policy processes inevitably end in an impasse. Each discourse, actor-network or policy network involves institutional practices and interactions that are made up of the activities of individuals. At these multiple interfaces there may be 'policy spaces' (Grindle and Thomas, 1991) or 'room for manoeuvre' (Clay and Schaffer, 1984) to promote alternative approaches to policy.

This final section takes these reflections further. Having suggested that something can be done, we attempt to answer the question: what should be done? There are two broad responses. The difference between them in essence is between a more confrontational, advocacy stance and a more participatory, consensual approach. One response identifies that there are forms of knowledge and associated interests that are excluded from policy processes resulting in poor or inappropriate policy decisions. Proponents of this position might argue that particular dominant policy narratives are wrong, and that certain received

wisdoms need overturning. The emphasis then moves to the development of counter-narratives (Roe, 1994b, 1995), and a process of strategising and taking advantage of policy spaces to build alternative actor-networks, a process of dislodging dominant positions and their associated networks. Where scientific institutions fail to address the concerns of citizens this may mean lay people developing their own forms of scientific research and pushing these into the policy arena, as in the Woburn epidemiological surveys investigating the effects of hazardous wastes (Brown and Mikkelson, 1990) and activist work on HIV/AIDS (Epstein, 1991; see Box 9).

Box 9: Democratising science: HIV/AIDS research

This is a case about lay people becoming insiders within scientific practice and learning to some extent to speak as experts. Epstein documents how AIDS activists challenged the US medical establishment and attempted to deconstruct ideological biases and criticise the political organisation of medicine. Activists targeted the practices and the underlying epistemological commitments associated with clinical trials of AIDS drugs. Getting onto the committees overseeing clinical trials of AIDS drugs enabled activists to question methods for evaluating the success of drugs and to demand alternative indicators, to question the nature of control groups, and to demand more socially representative clinical trials. A key question was 'how do we test a new drug, and how do we decide it works?' The medical establishment was committed to the practice of pure trials and the notion of clean data. These practices mean that trial participants are unable to try two drugs at same time; they cannot not participate in a second trial if a first one fails; and they sometimes cannot get prescribed drugs for treatment of opportunistic infections – critical as it is opportunistic infections that kill patients.

Activists argued the importance of the social context within which this positivist approach to research is located. Clinical trials, they argued, are the cheap way to get drugs and, in practice, people lie to get on trials; they also take other drugs illegally out of fear they are the placebo. An alternative approach was tried out by Project Inform which emphasised experimentation under real-world conditions where participants could take several drugs at the same time. Epstein argues that activists are contributing to the redesign of clinical trials to meet peoples needs and challenging the institutional practices behind the production of scientific knowledge, rather than just arguing for access to knowledge. At the same time they argued for investigation of alternatives to the HIV theory of AIDS causation. Epstein also recognises some of the dilemmas this politicisation of knowledge creates. Alternative popular critiques of expertise may also be associated with fear of AIDS transmission and prejudice towards the communities associated with HIV infection. This raises difficult issues: how do we evaluate different claims? How do we recognise the nature of the links of capital and the state to science, or alternatively of social movements? Do those who learn to speak the language of experts only manage to do so because they come from similar social backgrounds? How do those who are highly socially marginalised engage in debates?

The second response emerges from a position that recognises the contingency of different knowledge claims and so places more emphasis on developing institutions that promote communication and address policy issues through participatory processes of argumentation and deliberation. A new paradigm is emerging that comes under a variety of labels: the argumentative turn (Fischer and Forester, 1993; Dunn, 1993; Lapintie, 1998); collaborative planning (Healey, 1992, 1997, 1998); discursive democracy (Drysek, 1990, 1993); deliberative democracy (Bohman and Rehg, 1997); institutional reflexivity (Mol, 1996); and frame reflection (Schon and Rein, 1994).

This work largely comes from a 'northern' context, and has been informed by and informs new approaches to planning and policy development. For example, implementation of Agenda 21 has been one post-Rio attempt to engage different stakeholders in environmental planning and policy-making at the local level (Freeman et al, 1996; Selman and Parker, 1997; Selman, 1998). This experience has contributed to attempts to renew local government and develop new forms of participatory democracy. An array of techniques and methods are contributing to the strengthening of what Healey (1997) calls the 'soft infrastructure' of government. Deliberative Inclusionary Processes (DIPs), such as consensus conferences, citizens' juries, focus groups, citizens panels, and so on (NEF, 1998), are emerging mechanisms aimed at opening the policy process to greater citizen participation and contributing to the redemocratisation of the 'hard infrastructure' of government (Healey, 1997; Bloomfield et al, 1998; O'Riordan, 1998).

In developing country settings, to some extent, similar processes are at work. For example, drawing on the huge explosion of interest in participatory methods over the last decade (Chambers, 1997), there have been attempts to develop 'stakeholder platforms' for local resource management (Dangbégnon et al, 1995) and to encourage environmental action planning on a participatory basis at a range of scales. In parallel, there is a widespread concern with the question of how to scale up often effective participatory project processes into more participatory forms of governance (Blackburn, 1998; Holland, 1998). This may be in terms of institutionalising participatory approaches in bureaucracies (Thompson, 1995), or attempts to link experience of community-based natural resource management to wider processes of decentralisation, and the development of what Ribot (1998) calls 'integral local development'.

The theoretical basis for much of the 'northern' work draws on the ideas of Habermas, and his theory of communicative action (Habermas, 1971, 1991). In line with the discussions presented earlier in this paper, commentators such as Healey, Drysek and Fischer, in the policy analysis and planning traditions, have effectively critiqued the positivist assumptions of conventional linear policy analysis and the instrumentally rationalist nature of contemporary planning and administrative systems. According to Healey (1997: 237):

Reason, understood as logic coupled with scientifically constructed empirical knowledge, was unveiled as having achieved hegemonic power over other ways of being and knowing, crowding out moral and aesthetic discourses.... For [Habermas] the notion of the self-conscious autonomous individual, refining his or her knowledge against principles of logic and science, can be replaced by a notion of

reason as intersubjective mutual understanding arrived at by particular people in particular times and places; that is, reason is historically situated.

Thus the creation of communicative institutions allows multiple perspectives to come into debate, and, through processes of argumentation, the negotiation of goals and values and appropriate courses of action results. Rein and Schon (1993: 501) argue for the creation of 'a policy discourse in which participants would reflect on the frame conflicts implicit in their controversies and explore the potentials for their resolution'.

This is particularly appropriate in the environmental arena where, as we have discussed already, understanding of biophysical processes may be characterised by high levels of uncertainty – as in climate change or desertification, for instance. Equally, in environmental debates, understandings of the environment and values placed on different types of 'nature' are socially constructed, often in markedly different ways by different actors, and so are subject to significant contestation. Deliberation, as the citizen science literature makes clear, needs to be extended to the relationship between scientific experts and citizens in ways that do not mean negating the institutions of science, but transforming them so that, where decision stakes and uncertainty are high, the deliberations of scientists are subject to 'extended peer review' (Funtowicz and Ravetz, 1993). The literature on risk, trust and reflexive modernisation also supports the argument for the development of this type of reflexive capacity. Where debates about science and technology are not neutral and to be judged by a single expert rationality – as vividly highlighted by the controversies in the UK over GMOs or BSE – values are central and inclusionary reflection may be essential to the development of social trust between different stakeholders (Eden, 1996).

So, to what extent are participatory processes the solution to some of the difficulties associated with environmental policy-making? How feasible is it to develop genuinely inclusionary and reflexive policy processes that challenge particular styles of science and entrenched discourse coalitions?³⁶ We have argued that policy processes need to be understood in discursive and political context and that the power of political interests – in both state and society – and embedded patterns of knowledge are significant constraints on any policy process.

A discourse or political interests perspective on the policy process might suggest therefore that the options for open, participatory forms of policy process are highly constrained. Surely, some might argue, deliberative policy processes are just extensions of state discourse and power and simply examples of new forms of governmentality under the guise of participatory rhetoric and manipulative methods. From a political interests perspective, equally, the power of 'vested interests' in political, business or bureaucratic structures should, it would seem, override any potential for more open debate and participatory deliberation on policy issues, especially if the stakes are high.

But such a universalising view of discourse and static interpretation of political interests potentially conceals other dynamics. In relation to any particular policy issue, multiple and competing discourses coexist, associated with different located perspectives and different coalitions of people where, under

particular circumstances, opportunities for ‘argumentative interaction’ (cf. Hajer, 1995) may open up. Similarly, where uncertainty dominates debates about science and technology, previously powerful and intransigent interests may begin to recognise that public perceptions and values matter, and inclusionary reflection may be essential to the development of social trust between different stakeholders, and so for the pursuit of commercial, political and other interests. This, again, offers space for new actors and new voices to enter the policy arena, and the need for new types of reflexive capacity to be built into the policy process. As the actor-orientated literature – from Long’s work on interfaces to that of Lipsky on street-level bureaucrats and Grindle and Thomas on policy space – makes clear, within the complex dynamics of policy processes, there is always the possibility for new and unpredicted development of policy to take place as a consequence of the agency and interaction of different actors.

This, of course, is not to deny the considerable challenges of encouraging effective inclusionary and deliberative policy processes. Questions of who is represented, who speaks and who remains silent remain. Equally, more practical issues of time, resources and facilitation skills are also significant, as are challenges of how to link more participatory deliberative processes to representative structures and the ‘hard infrastructure’ of regulation and planning (Healey, 1997) through a variety of intermediary institutions³⁷.

CONCLUSION

In arguing against a linear view of policy, Clay and Schaffer (1984) claim in their influential examination of rural development policy processes that ‘the whole life of policy is a chaos of purposes and accidents’. We would not go so far. Analysis of policy processes from a variety of different conceptual lenses highlights the continuous interplay of discourse, political interests and the agency of multiple actors. While certainly non-linear, the policy process, we would argue, is not simply chaotic and down to chance and accident. A combination of these different analytical perspectives highlights both complex dynamics and structural constraints, but also opportunities for agency, action and change. Improved understandings arising from such analysis therefore may indeed show opportunities to open up environmental policy debates to a greater range of perspectives.

NOTES

- ¹ For particular examples see Thompson et al, 1986; Ives, 1987; Fairhead and Leach, 1996; Scoones, 1996; Swift, 1996.
- ² For example: Clay and Schaffer, 1984; Horowitz, 1989; Grindle and Thomas, 1991; Juma and Clark, 1995; Turner and Hulme, 1997.
- ³ The empirical research which has followed on from this review has focussed on policy processes surrounding environment and land degradation issues in Ethiopia, Mali and Zimbabwe (Keeley and Scoones, 1998; 1999; forthcoming).
- ⁴ For a selection of definitions of the term 'policy' see Walt, 1994: 40-1; Parsons, 1995: 13-16; Hill, 1997: 6-7. For some useful reviews of policy process issues, see: Lasswell, 1956; Jenkins, 1978; Lindblom, 1980, 1991; Jordan, 1981; Hogwood and Gunn, 1984; Hill, 1993; 1997; Parsons, 1995; Hempel, 1996; Healey, 1997; John, 1998; Vickers, 1965.
- ⁵ On implementation see Pressman and Wildavsky, 1973; Bardach, 1977; Hjern and Porter, 1981; Hjern, 1982; Mazmanian and Sabatier, 1983; Ferman, 1989; Thomas and Grindle, 1990.
- ⁶ In most settings, though, increased understanding may emerge from the application of a range of different perspectives, as in Allison's classic (1971) examination of the Cuban Missile Crisis through rational actor, organisational process and bureaucratic politics lenses.
- ⁷ See, for example, Apthorpe, 1986, 1996, 1997; Apthorpe and Gasper, 1996; Shore and Wright, 1997, for literature in this vein.
- ⁸ See, for example, Lukes, 1974; Bourdieu, 1977; Gaventa, 1980; Foucault, 1980; Latour, 1986; Gledhill, 1994, for different perspectives on the question of power.
- ⁹ See Torgerson (1986) for reflections on different conceptualisations of the knowledge and power relationship in different policy analysis traditions. For a more general examination of the use of social science research for policy see, Weiss, 1977, 1992.
- ¹⁰ J. F. Kennedy, for example, asserted: 'Most of us are conditioned to have a political viewpoint. Republican or Democratic- liberal, conservative, moderate. The fact...is that most of the problems... we now face are technical problems, are administrative problems' (Kennedy, 1963, quoted in Fischer, 1993a).
- ¹¹ Fischer (1993a) documents the sponsorship of right-wing think tanks in the late 1970s and early 1980s and argues they contributed substantially to the Reagan 'revolution' giving credibility to the interests of particular elite groups. It is possible, then, to see the growth of professional policy expertise as reflecting the growth of a market for ideas, a claim that undermines the professed objectivity of policy analysis (see also Smith, 1991).
- ¹² See the debate between advocates of representative democracy and participatory democracy (Pateman, 1970; Dahl, 1971, 1989; Barber, 1984; Morrissey, 1996). On environmental democracy, see Press, 1994.
- ¹³ For an early statement of the social constructivist position see Berger and Luckmann (1972).

- ¹⁴ For an introduction to the science studies literature see: Knorr-Cetina (1981); Callon et al (1986) Woolgar (1988); Pickering (1992); Jasanoff et al (1995); Irwin, (1995); Gieryn (1995); Barnes et al, (1996); Jasanoff and Wynne (1997).
- ¹⁵ Actor-network theory, initially propounded by Callon and Latour (1981), argues that knowledge involves the enrollment of human (actors) and non-humans (actants) into networks contingent for their stability on each actor and actant adhering to its role in the network. Such a 'symmetrical view' breaks down the Kantian 'great divide' between nature and society, and sees practice as where nature and society are continuously made and remade (Callon and Latour, 1992). The 'extended symmetry' of the actor-network theory approach, however, has been criticised as leading to unnecessarily prosaic accounts lacking the political effect of more conventional sociology of scientific knowledge approaches (Collins and Yearley, 1992). See also, Callon, 1986a, 1986b; Law, 1986; Latour, 1986, 1987, 1988, 1993; Murdoch and Clark, 1994; Murdoch, 1997.
- ¹⁶ For an account of the origins of the concept of experiment and the importance of 'witnessing' see Shapin and Schaffer, 1985. On extending experiments see Latour's account of the 'pasteurization of France' (1988).
- ¹⁷ Most commentators view Marxism as essentially a society-centred approach to policy change. The state is seen as reflecting the interests of the dominant class, or as another arena for class struggle. Later Marxist accounts (see the Miliband (1969) and Poulantzas (1973) debate) looked again at the role of the state and argued that the state may on occasions behave independently of specific class interests.
- ¹⁸ Groups are perhaps less clearly institutionalised in new social movements making this phenomena rather different from pluralism, but the point that the motor of change lies in society is similar.
- ¹⁹ This may even mean pursuing long-term goals that run counter to the interests of dominant societal interest groups in a particular policy area.
- ²⁰ Skocpol (1985:13) also argues on the basis of her work on US New Deal agricultural policies that certain ministries maybe powerful even when the state in aggregate may be 'weak'.
- ²¹ Drysek (1990) talks about the Weberian model as the dominant approach to the social organisation of policy and labels it instrumentally rationalist.
- ²² See Long (1992: 33-4) for an actor-oriented critique of linear models of policy: 'There is no straight line from policy to outcomes'. Long also notes that it is not only governments and development agencies that have policies but also local groups who have 'programmes of development'.
- ²³ See also writings within the 'new institutionalism' school in political science emphasising the importance of institutional political contexts for policy outcomes (March and Olsen, 1984; for reviews see Jordan, 1990a; John, 1998).
- ²⁴ The management and organisations literature also reflects on such issues. See, for example: Cohen et al (1980); Handy (1976); Crosby (1996), among many others.

- ²⁵ Jordan and Richardson, 1987; Jordan, 1990b; Knoke, 1990; Kenis and Schneider, 1991; Marin and Mayntz, 1991; Atkinson and Coleman, 1989, 1992; Coleman et al, 1997; Marsh and Rhodes, 1992; Rhodes and Marsh, 1992; Smith, 1993; Dowding, 1995; Rhodes, 1997.
- ²⁶ See Hajer (1995) for a critique of Sabatier's work on this account.
- ²⁷ Sabatier's emphasis on policy-learning builds on Heclo (1974). Politics it is argued engage in processes of incremental learning over prolonged periods.
- ²⁸ This is perhaps particularly the case in settings where the legacies of colonial rule on policy, politics and the operation of the state are evident.
- ²⁹ See footnote 16 for details of key sources in this area.
- ³⁰ For further discussion see Goldstein and Keohane (1993); Haas et al (1993); Vogler (1996).
- ³¹ Skocpol (1985) also makes the point in relation to state autonomy that it can be international actor-network linkages that enable states to receive information and support and enable them to make policy not captive to societal interests.
- ³² A recent example: Stanley Prusiner the Nobel Prize winning 'discoverer' of the prion protein responsible for BSE has been denied funding to study similar processes in sheep. Until the network of funding, and the peer and political support it entails has been established there can be no research, and more importantly no facts, no new knowledge and no incremental shift in social order (Guardian, Thursday 11th June 1998).
- ³³ An alternative definition: 'A discourse is a shared way of apprehending the world. Embedded in language, it enables those who subscribe to it to interpret bits of information and put them together into coherent stories or accounts. Each discourse rests on assumptions, judgements, and contentions that provide the basic terms for analysis, debates, agreements and disagreements...' (Drysek, 1997: 8).
- ³⁴ See Roe (1995) and Leach and Mearns (eds) (1996) for case studies.
- ³⁵ Hajer's work on the politics of environmental discourse is one attempt to synthesise, although he is ultimately more inclined to social constructivism (1995). In mainstream political science the work of March and Olsen (1984) on the 'new institutionalism', looking at the importance of socially constructed political institutions to political behaviour, has been influential.
- ³⁶ For a critical commentary on the possibilities of deliberative inclusionary process, see, for example: Tewdwr-Jones and Thomas (1997); Tewdwr-Jones and Allmendinger (1998) with cases from Wales.
- ³⁷ These are, of course, not new questions: they have been widely debated following the widespread advocacy of participatory approaches for research and project planning in development. See for example: Scoones and Thompson (1994); Mosse (1995); Fleming and Cornwall (1995). See also Scott (1990) for a discussion of 'hidden transcripts'. See also literature on learning organisations for some of the institutional challenges (e.g. Argyris and Schön, 1978).

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