Environment and Planning A 2003, volume 35, pages 1095 – 1110

DOI:10.1068/a35289

Governance for sustainability: towards a 'thick' analysis of environmental decisionmaking

W Neil Adger, Katrina Brown¶, Jenny Fairbrass, Andrew Jordan, Jouni Paavola, Sergio Rosendo, Gill Seyfang

Centre for Social and Economic Research on the Global Environment (CSERGE), University of East Anglia, Norwich NR4 7TJ, England; e-mail: n.adger@uea.ac.uk, k.brown@uea.ac.uk, j.fairbrass@uea.ac.uk, a.jordan@uea.ac.uk, j.paavola@uea.ac.uk, s.rosendo@uea.ac.uk, g.seyfang@uea.ac.uk

Received 31 October 2002; in revised form 3 January 2003

Abstract. Environmental decisions made by individuals, civil society, and the state involve questions of economic efficiency, environmental effectiveness, equity, and political legitimacy. These four criteria are constitutive of the economic, social, and environmental dimensions of sustainable development, which has become the dominant rhetorical device of environmental governance. We discuss the tendency for disciplinary research to focus on particular subsets of the four criteria, and argue that such a practice promotes solutions that do not acknowledge the dynamics of scale and the heterogeneity of institutional contexts. We advocate an interdisciplinary framework for the analysis of environmental decisionmaking that seeks to identify legitimate and context-sensitive institutional solutions producing equitable, efficient, and effective outcomes. We demonstrate the usefulness of our approach by using it to examine decisions concerning contested nature conservation and multiple-use commons in the management of Hickling Broad in Norfolk in the United Kingdom. We conclude that interdisciplinary approaches enable the generalisation and transfer of lessons in a way that respects the specifics and context of the issue at hand.

> "Culture is not a power, something to which social events, behaviours, institutions, or processes can be causally attributed; it is a context, something within which they can be intelligibly—that is, thickly—described."
>
> Geertz (1973, page 14)

1 Introduction

In a seminal book published thirty years ago, Clifford Geertz (1973) advocated 'thick description' in anthropology. Geertz offered thick description as one way to overcome the methodological caveats that he perceived to be plaguing anthropological scholarship. For Geertz, thick description was an approach which, on one hand, avoided descriptive noncumulative cataloguing of 'culture' whilst, on the other hand, not succumbing to universal theorising of the type that is detached from the rich texture and meaning of everyday life. One of the hallmarks of thick description for Geertz was *generalisation*—the identification of connections and general patterns that are characteristic of a certain context (pages 25 – 26). In this paper we argue that there is an equally compelling argument for a 'thick analysis' of environmental decisionmaking.

Decisionmaking can be thought of as a process which proceeds via a series of stages or phases as part of a problem-solving exercise. It is usually a process to which all or some of those individuals or groups who have a vested interest (that is, the stakeholders) may have access and in which they may be able to participate. When undertaken on behalf of society by some authority, decisionmaking is akin to policymaking (Parsons, 1995). Easton (1953, page 130) has defined policy as "web of decisions and actions that allocate ... values" in society. In effect, decisions occur at every stage of

¶Also at the School of Development Studies, University of East Anglia.

the policy cycle where a 'decision' can be defined as a position, an opinion, a judgment, or a conclusion reached after consideration has taken place (Barrett and Fudge, 1981). Decisionmaking is generally characterised by the presence of features such as alternatives, uncertainty, and outcomes. It is crucial to recognise that outcomes and decisions are not one and the same: decisions can lead to unintended and unexpected outcomes because alternatives combine with the uncertainties to produce unexpected outcomes. Decisionmaking thus refers both to process and to outcome, and is an intrinsic part of the environmental policy process (Jordan, 2001).

Research into environmental decisions is clearly underpinned by a number of traditionally separate disciplines located in the natural sciences and social sciences: biology, chemistry, environmental sciences, politics, law, human geography, and economics, to name a few. Consequently, a complete, or at least fuller or thicker, analysis of environmental decisionmaking would seem to necessitate interdisciplinary research. This is partly because each discipline tends to have its own concerns: the focus of political science is on power and conflict; the concern of geography is with location, space, and representation; and the preoccupation of economics is with the examination of the production and consumption of goods and services. These preoccupations and their related lexicons can present a barrier to dialogue across and between the subject specialisations. Partly as a result of these factors, there is a tendency for scholars to retreat into the safety of their home domain which, in turn, can lead to further specialisation and the emergence of even narrower subdisciplines such as environmental economics and environmental philosophy.

Tensions between alternative and specialist knowledges are, of course, reflected within contemporary geography. Clearly, geographical analyses of human action related to the environment can lead to integrative insights embracing "most ways of knowing ranging from the sciences to the humanities and claiming a bridging role across realms of understanding" (Turner, 2002, page 53). Yet for various reasons, geography, like the other social science disciplines, largely fails to live up to this promise. There are many explanations for this failure to illuminate a 'thick understanding' within geography, all of them related in some way to dualism within geography between spatial approaches and geography as the study of human–environment interactions (Turner, 2002; see also responses by Butzer, 2002; Kates, 2002; Wescoat, 2002). A hybrid geography of environmental decisionmaking would necessarily describe and explain diversity, scale, and flows of knowledge, power, and resources as outcomes of decisions (to use the terminology proposed by Wilbanks, 1994; see also Zimmerer, 2000). Wilbanks (1994) argues that geography is well placed to overcome the conceptual obstacles to understanding decisionmaking and sustainability within their complexities, and we agree with these sentiments. In general, all the building blocks necessary for a thick understanding of environmental decisions are present, if somewhat underemphasised, within the major social and environmental science disciplines.

Hence we argue for an interdisciplinary approach in which ideas and tools from a number of subject areas are combined. Insights are required across the social sciences in particular, which at least share some common concerns. In this way, we contend, it will be possible to work towards a 'thick' understanding and analysis of environmental decisionmaking. Efficiency, equity, effectiveness, and legitimacy are key integrative elements for examining environmental decisionmaking across the breadth and range both of positivist and of critical social sciences. No single discipline can claim sole ownership of any one of these issues, though clearly some subjects may place greater emphasis on one or more dimensions than others. For example, economics tends to treat efficiency as a pivotal concept, and political science often focuses on questions about legitimacy. Most of those who participate in

environmental decisionmaking in practice would attest to the interconnectedness of the four criteria. For example, however efficient or effective a decision, things tend to unravel if it seriously compromises equity or legitimacy. In a similar vein, the supposed equity or legitimacy of a decision does not seem to justify its lack of efficiency and effectiveness. Therefore, we need to pay simultaneous attention to the four criteria that challenge the problem-solving capabilities of most decisionmakers concerned with environmental governance and with sustainability.

In addition to these four dimensions, an in-depth analysis of environmental decisionmaking should also recognise and examine the part played by institutions, scale, and context. Any given environmental decision is likely to be the product of a particular configuration of institutions (that is, both formal and informal), scale (whether it is local, national, or global), and cultural and historical context. A thick analysis of environmental decisionmaking therefore demands that these aspects are also incorporated. In this way the dangers of universalism may be averted, but the valuable insights gained from generalisation can be exploited.

In the remainder of this paper we proceed as follows. In section 2 we discuss how an interdisciplinary and multidimensional analytical strategy can be based on insights of different social sciences. In section 3 we argue that the analytical approach must also pay adequate attention to institutions, scale, and context in order to overcome problems associated with universalism. In the fourth section we seek to demonstrate the usefulness of the approach by applying it to a case study based on environmental decisionmaking concerned with Hickling Broad in East Anglia in the United Kingdom. In the final section we propose a research agenda suggested by our strategy.

2 Understanding environmental decisions: interdisciplinarity and pluralism

We propose a broad social scientific approach to environmental decisionmaking which builds upon and combines perspectives from a number of disciplines and seeks to overcome the deficiencies of a narrow approach based on a single discipline. Disciplinary social scientific approaches are bound to particular paradigmatic tenets and these are exhibited in research on environmental decisions (Guba, 1990; Guba and Lincoln, 1994). Therefore, monodisciplinary analyses of environmental decisions are unable to reflect the nature of decisionmaking adequately, leading to 'thin' explanations. In contrast, the interdisciplinary approach we propose enables a more holistic or 'thick' understanding of environmental decisions.

McNeill (1999) argues that *interdisciplinarity* involves "the formulation of a uniform, discipline-like terminology or common methodology" as well as "cooperation within a common framework shared by the disciplines involved" (page 313). In contrast, *multidisciplinarity* involves several disciplines, but does not require shared intellectual constructs. *Transdisciplinarity* in turn involves unification of the involved disciplines at the paradigmatic (metaphysical) level. We envision an interdisciplinary approach that would not remain a crude combination of disciplinary perspectives but rather is a synthetic approach that amalgamates aspects and concepts from different disciplines so as to enable interdisciplinary research both at the individual and at the team level.

An interdisciplinary approach has, we argue, advantages over a transdisciplinary research, because it better accommodates plural methodologies and methods. It can potentially support enquiries that focus on macrolevel outcomes of environmental decisions as well as those which examine the experiences of individuals participating in (or left out of) environmental decisionmaking. These studies can be based on quantitative or qualitative methods, case studies, or historical inquiries (see Guba, 1990; Guba and Lincoln, 1994). This sort of interdisciplinary research draws upon a

wide range of materials and sources to understand environmental decisionmaking from different perspectives, and yet has the potential to generate lessons that are comparable, transferable, and instrumentally useful.

Another strength of an interdisciplinary approach is that it can accommodate a pluralist view of environmental decisionmaking. By 'pluralism' we refer here to the fact that the goals informing environmental decisionmaking are plural both in a substantial and in a formal sense. That is, environmental decisions do not only have to arbitrate between the substantially different values of actors regarding desirable environmental and other outcomes: they also need to strike a balance between values that are based on formally different ethical premises. For example, nature conservation and biodiversity protection may be premised on utilitarian values that emphasise the instrumental value of conserving nature. On the other hand, the preservation of species and habitat may also be considered an outcome that is valuable in itself, irrespective of its welfare consequences. Third, still other value bases may identify nature conservation or biodiversity protection as simply the 'virtuous thing to do', without regard to any of their consequences (see Paavola, 2002). Of course, a parallel set of standpoints opposing nature conservation can also exist.

Sensitivity to pluralism is important for the analysis of environmental decisions, because there may be good reasons why the relative weight given to different values could and *should* differ across a range of environmental decisions. For one thing, environmental decisions differ from each other. Everyday environmental decisions that will result in determinate outcomes of local scope may present different dilemmas from those that can endanger presently living and future humans over large geographical areas (such as is the Hickling Broad case, which is set out below). There are also decisions where human interests are for good reasons decisive, whereas other decisions could and possibly should be governed by consideration of nonhumans. Moreover, the context in which environmental decisions are made matters because it may influence which values guide environmental decisions, as we discuss in greater detail in the next section. We argue that a pluralist analysis of environmental decisionmaking can be achieved by paying simultaneous attention to efficiency, effectiveness, equity, and legitimacy. We will discuss each aspect of environmental decisions in greater detail below.

Typically, the notion of *efficiency* receives most attention in economics of environmental decisions and is often narrowly focused on welfare maximisation. This exclusive focus on human welfare creates controversy around economic efficiency (see Bromley and Paavola, 2002; Dore, 1999; Holland, 2002). Critics within and outside mainstream economics have argued for a wider array of values to be incorporated into environmental decisions. The key for many critics is the need to accommodate other values in addition to human welfare in environmental decisionmaking (see Anderson, 1993). Incorporating diverse and plural values in decisionmaking also means that assumptions cannot be made concerning which goals should prevail in the process: deliberation must be used to muster good reasons for establishing priorities and making compromises (see Bromley and Paavola, 2002; Holland, 2002).

Effectiveness relates to the capacity of a decision or alternative to achieve its expressed objectives, and is typically of considerable interest to engineers, planners, and policy scientists (Desimone and Popoff, 2000; Grant et al, 2001; Young, 1999). An economic interpretation of effectiveness relates to the cost of achieving a given goal, or to the outcome achievable for a given cost. All environmental decisions can be analysed for their effectiveness independent of economic welfare concerns. Decisions, where the outcome is important for public health, for example, are socially effective independent of economic welfare or intrinsic values attributed to certain states of the environment.

Equity is a central consequentialist concern in a range of social sciences from sociology and political science to jurisprudence as well as in critical scholarship. Equity perspectives tend to focus on distributive justice or the distributional consequences of environmental decisions—from the uneven spatial impacts of environmental change to the distribution and consequences of political and social change (see Adger, 2002; ESRC GEC Programme, 2001; Harvey, 1996; Low and Gleeson, 1998; Rinquist, 1998; Schlosberg, 1999). Again, disciplinary approaches tend to incorporate their own views of what constitutes equity. For example, environmental justice literature has often started from a standpoint that equity implies equality in the exposure to environmental hazards and access to environmental assets (see Weinberg, 1998). Economists, on the other hand, typically associate equity with preference satisfaction or the incidence of costs and benefits (see Aldy et al, 1999; Whitehead, 2000). In practice, however, rules of equity vary from one context to another (Bromley and Paavola, 2002; Radin, 1996; Walzer, 1983). Sometimes equity may require distribution according to contribution, whereas at other times need or equality may be the most appropriate basis for equitable decisions in terms of their outcomes.

Legitimacy relates to procedural justice and the extent to which decisions are acceptable to participants on the basis of who makes and implements the decisions. For political scientists, legitimacy is linked to social rules, beliefs, and norms (Beetham, 1991). Legitimacy can be gained as well as compromised through the process of making environmental decisions (see Brechin et al, 2002; Smith and McDonough, 2001). Rules and practices that regulate participation in environmental decisionmaking, and determine how environmental decisions are made, are intimately tied to legitimacy. Yet there is no set of procedures that would universally guarantee the legitimacy of environmental decisions. On the contrary, cultural expectations and interpretations define what is or is not legitimate. This highlights the need to develop a contextual understanding of legitimacy. In addition, legitimacy also explicitly brings into focus questions of political power. According to Beetham (1991), the powerful in society maintain their privileged position by legitimising it through a system of rules, conventions, and institutions. Environmental conflicts are often triggered when the powerful in society seek to act in ways that are regarded as manifestly illegitimate.

Simultaneous attention to these four dimensions of environmental decisions constitutes a broad-based interdisciplinary approach to the analysis of environmental decisionmaking. Attention paid to the effectiveness of environmental decisions acknowledges a potentially broad range of values and goals that may inform them. The attention paid to the equity of environmental decisions sheds light on their distributive outcomes and distributive justice. The acknowledgement of the economic efficiency of environmental decisions brings up their welfare consequences, which will remain important, although not exclusively so. Fourth, the attention paid to legitimacy highlights the process of environmental decisionmaking and brings in the viewpoint of procedural justice. In what follows we discuss in greater detail how attention to efficiency, effectiveness, equity, and legitimacy must be accompanied by sensitivity to institutions, context, and scale.

3 From universalism to generalisation: institutions, scale, and context

Single-discipline approaches to understanding environmental decisions have typically aimed to produce universally relevant observations and understandings. We argue that the emphasis on the universal can be counterproductive. Environmental decisions occur within and are influenced by particular economic, political, social, cultural, and ecological contexts. They also encompass different geographical settings and scales. Approaches that emphasise the universal overlook the specificity and

contextuality of environmental decisions. Yet it is instrumentally and intrinsically important to understand how the subject and context of environmental decisions influence them.

Our proposed interdisciplinary approach to the analysis of environmental decisions also needs to be sensitive to the specificity of environmental decisions. Acknowledging specificity does not necessarily mean a surrender of any attempt at generalisation or instrumental use of analytical findings. As Geertz (1973) argued when he proposed thick description in anthropology, there is an intermediate position between descriptive cataloguing and universalist abstraction which he called 'generalisation'. Generalisation works from the bottom up: it rests on understanding the differences and similarities between cases and modifying and cushioning generalisations to reflect the influence of context and other particularising forces. We argue that the specificity of environmental decisions can be incorporated into the analysis by paying attention to the role of institutions, scale, and context. In what follows, we will discuss each of these foci of analysis in greater detail.

Institutions are the set of informal and formal rules that facilitate and constrain human behaviour, or define 'the rules of the game' (Bromley, 1989; Ciriacy-Wantrup, 1971; Kiser and Ostrom, 1982; North, 1990). Institutions include the *institutional framework* (the totality of institutions) within which environmental decisions are made, and *institutional arrangements* (particular sets of rules) through which such decisions are implemented. Institutions often form nested structures in which higher level institutions set limits to the procedures and alternatives that are available at lower levels. Institutions also constitute agents in particular ways, vesting them with different powers, immunities, rights, and duties (Bromley, 1991). Participation in environmental decisions has largely taken place through citizenship, for example, which vests agents with certain individual political rights. A change in environmental outcomes, in terms of revising whose values are privileged by environmental decisions, often requires institutional changes at different levels. For example, the activism of US environmental groups in the courts in the 1960s and 1970s, aiming to stem pollution and determine the liability of private companies, sought to alter particular environmental outcomes. But the campaigns and the litigation also transformed higher level rules regarding the nature of evidence in the courts and ultimately the balance of power between polluters, regulators, and campaigners (see Orren, 1976). Similarly, the spontaneous emergence of social movements and institutions for forest conservation in Brazilian Amazonia has resulted both in new legislation and new responsibilities, and in the requirement for government agencies to accommodate and control these emerging forms of governance (Brown and Rosendo, 2000a; Simmons, 2002).

At a more pragmatic level, institutions play a role both in causing and in mitigating environmental problems (Bromley, 1991; O'Riordan and Jordan, 1999; Young, 2002). They shape the perception of and professed solutions to such problems. Institutions are embedded in the specifics of culture, history, and social practices, which vary substantially across different social settings (Cleaver, 2000; Granovetter, 1985; Mosse, 1997). The impact of institutions on environmental problems and decisions, therefore, varies from one context to another. This means that generalisations from specific cases must be made with caution, giving adequate attention to their context (Edwards and Steins, 1999; Mehta et al, 1999).

Scale forms an important analytical focus for several reasons. First, environmental problems can have different spatial and temporal scopes. Some, such as the loss of a wetland, may have mainly local consequences that instantly affect the local users. Others, such as climate change, have global impacts that will be felt by generations to come. Second, institutional responses to environmental problems can be taken

at different, and often multiple, levels. The scale of particular environmental problems may not determine the scale of institutional responses: other considerations, such as those of equity, also influence the choice of level of institutional solutions. In some research levels of decisionmaking have been conventionally examined as if they were independent, although developments in political science research and cognate subjects has recently focused on the concept of multilevel governance and the interface between different tiers of governance (for example, Hooghe and Marks, 2001). There is a growing awareness that important linkages exist between levels of decisionmaking. For example, international rules may influence the livelihoods of local populations. This is the case with the prohibitions on the trade of endangered species, which have affected the livelihoods of local populations harvesting such species for sale. Conversely, actions of local populations can have cumulative effects on the resolution of global problems. For example, the role of local communities in conserving biodiversity through the sustainable use of natural resources is increasingly recognised and supported by a range of governmental, nongovernmental, and multilateral actors and initiatives.

Scale also relates to distinctions between decisionmaking, monitoring, enforcement, and compliance, and how these functions of environmental governance are organised. For example, Brown and Rosendo (2000b) analyse how the implementation of extractive reserves in Brazilian Amazonia works as a strategy to integrate conservation and development. Such strategies have been shaped by the interaction between grass-roots organisations, environmental nongovernment organisations (NGOs), government agencies, and multilateral institutions located in multiple sites with contrasting knowledge systems and goals in natural resource management. Brown (2002), in turn, discusses how decisions about carbon sequestration in forestry weigh up costs and benefits at different scales. She shows how, on the one hand, the global community is interested in sequestering carbon from the atmosphere to mitigate climate change while, on the other hand, local forest-resource managers are concerned with maximising benefits from managing a range of diverse forest resources. Such issues call into question what, if any, is the optimal level of decisionmaking, and how environmental decisionmaking regarding sequestration of carbon in forests can be institutionalised so as to account for the interests of different stakeholders. It may also be difficult to implement environmental decisions if the voices and priorities of the subjects of those decisions are not acknowledged. One way to bridge the gap between decisionmakers and those affected by decisions is the use of novel, inclusionary, decisionmaking processes that seek to reconcile multiple interests (Holmes and Scoones, 2000), recognising that the evolution of new structures may have profound implications for legitimacy at all scales of governance.

It is therefore increasingly recognised that environmental governance is often neither small-scale nor large-scale, but cross-scale (Berkes, 2002). Ostrom and colleagues (1999) argue that institutional diversity is necessary to tackle complex environmental issues, and that lessons from local and global resource management highlight the challenges for managing large-scale environmental or global commons resources. For example, the process of scaling up increases the number of participants. This potentially makes the organisation, agreement, and enforcement of rules more difficult. Increased cultural diversity may hinder the sharing of interests and understandings. Although environmental problems might well be best addressed simultaneously at multiple levels, it is still unclear how local-level, bottom-up, participatory approaches to environmental governance can articulate with international and national top-down regulatory strategies.

This leads us to the third analytical focus—the context of environmental decisions. Calls to pay more attention to context relate to dissatisfaction with the proposals for the universal application of either market forces or institutional blueprints to 'solve' environmental problems (for example, Bromley, 1989). Research on environmental governance has already proposed ways to account for context. For example, Edwards and Steins (1999) suggest the use of a continuum of contextual factors, ranging from local to remote ones. Their analytical strategy is to trace back, or 'backsolve', from resource-use outcomes to contextual factors by focusing on the choice sets available to resource users in terms of (a) the products and services demanded of the resource system, (b) the different decision-making rules possible, and (c) the composition and characteristics of the user community. This approach, however, only indicates how local resource users are impacted upon by higher levels of political, economic, and other forces.

A more generally applicable way of bringing context into the analysis is to first make a distinction between the physical and social context of environmental decisions. Physical context consists of those aspects of the physical environment that shape the decisionmaking problem at hand. Research on communal management of natural resources has shown that physical attributes of environmental resources such as size, the incompatibility or rivalry of use, joint use, difficulty of exclusion, and fluctuation of yields shape the issues that have to be addressed in environmental decisionmaking (Agrawal, 2001; Ostrom, 1990; Paavola, 2002; Schlager and Ostrom, 1992; Schlager et al, 1994; Schmid, 1987). Yet the determinants of successful decisionmaking in resource contexts are also shaped by the attributes of social context. Crucially, these include the size of the group involved or affected, the existence and character of coalitions within the group, homogeneity or heterogeneity of the group and its external coalitions, and the nature of social relations in the group (see Agrawal, 2001; Brown, et al, 2002).

These concepts, suggested by research on communal management of natural resources, are applicable to environmental governance in general. The concepts characterising physical and social contexts help to make distinctions and to find similarities between instances of environmental decisionmaking. This should facilitate *qualified* generalisations that are transferable from one context of environmental decisionmaking to another one. For example, the outcomes of local fisheries management can vary immensely across different contexts, depending on interactions between biophysical, social, and institutional contexts. This suggests that: (a) similarity of physical context has to be verified; (b) social contexts have to be scrutinised and compared to find possible explanations for different environmental outcomes; and (c) institutional solutions used in the two contexts must be analysed and compared, as well as contrasted with the attributes of physical and social contexts.

To conclude, analysis of environmental decisions has to pay attention to institutions, scale, and context simultaneously and interactively, because they are interdependent in reality. For example, research has proposed new institutional arrangements which are arguably capable of protecting the legitimate rights and interests of local actors within larger governance structures aimed at addressing higher scale environmental problems. However, in structures involving institutions and actors with contrasting perceptions and goals, and in particular asymmetric distribution of power, local stakeholders may continue to find it difficult to have their interests recognised alongside the interests of other stakeholders. Moreover, the scale of institutions can differ according to the physical attributes of the environmental resource (Hanna et al, 1996); such differences have been characterised as problems of institutional fit (Brown and Rosendo, 2000b; Pritchard et al, 1998; Young, 2002). According to Ostrom et al (1999), to overcome these obstacles requires innovative forms of communication, information, and trust in order to make links between scales and to make solutions generalisable and transferable from

one context to another. In the next section we exemplify these issues and demonstrate the usefulness of an interdisciplinary approach by examining contested nature conservation decisions.

4 Trade-offs and context in conservation decisions: an example

An understanding of decisions requires the analysis of institutions and outcomes at diverse scales. In contemporary contexts of nature conservation these are manifest in representational issues, symbolic perceptions of nature, as well as ecological outcomes across complex institutional structures. Hickling Broad is one of the largest expanses of water forming part of the Norfolk Broads in eastern England. It is owned by Norfolk Wildlife Trust and managed in conjunction with a statutory body—the Broads Authority. Hence, management decisions demand attention to multiple conservation, as well as recreational and navigation, objectives and interests. These three concerns are brought into direct conflict when aquatic plant growth significantly hinders boating activities, which periodically occurs. Tensions grew in the late 1990s when the Broads Authority took the decision to undertake some limited cutting of the pondweed at Hickling Broad (for details, see Ledoux et al, 2000). However, the decision was not simply a local one. Crucially, several of the species of fauna and flora found in and around the Broad, and the habitat types it encompasses, are protected under national and international law. In reaching its decision, the Broads Authority had to take into account the demands of national regulatory bodies (that is, English Nature), European Union legislation, and wider international biodiversity agreements. The case study discussed here represents an example of environmental decisions impacting on a range of interests and influenced by actors and policies at various levels. An analysis of the decisionmaking process made using our framework reveals the relevance and interplay of the four dimensions: efficiency, effectiveness, equity, and legitimacy. In addition, the case study demonstrates the significance of institutions, context, and scale.

4.1 Background to the decisionmaking process

Hickling Broad is one of the largest expanses of water within the Norfolk Broads—a network of rivers and lakes totalling approximately 560 km^2. In 1958 Hickling Broad was designated a National Nature Reserve; in 1973 it was listed by the UK government as a Ramsar site; and in 1988 it was redesignated as a Site of Special Scientific Interest (SSSI). The Broad and its margins host priority habitats and species and, therefore, also qualifies as a Special Protected Area (SPA) under the EU's 1979 Birds Directive and as a Special Area of Conservation (SAC) under the 1992 Habitats Directive. The Norfolk Wildlife Trust owns the Broad and jointly manages it with the Broads Authority. The Authority has a statutory duty to preserve and enhance the natural beauty of the Broads, to promote its enjoyment by the public, and to protect the interests of navigation. The Broads Authority is therefore required to balance a number of potentially conflicting demands and interests.

The Broad is not only important in terms of its wildlife: it also has recreational and commercial value (Jackson et al, 2002). For example, local businesses such as public houses and shops benefit from the visitors that are attracted to the Broad and its surroundings. Some local residents rely on the employment provided by such activities. Private owners and hire companies utilise the Broad for sailing, windsurfing, and motor cruising. The Broad is also utilised by anglers and those with a recreational interest in the wildlife (for example, bird-watchers). These different stakeholders tend to pursue contrasting goals and to support diverse values. They also possess greater or lesser degrees of power in the decisions over the management of the Broads.

Historically, boating on the Broad has been inhibited by the summer growth of some of the aquatic plants (macrophytes) protected under the measures referred to above. Since the 1950s the Broads in general, and Hickling Broad in particular, have suffered episodes of ecological degradation and recovery. During most of the 1970s and 1980s, for example, the waterways remained relatively free from aquatic plants in the summer and boating continued year-round over large sections of the Broad. In the 1990s, however, the aquatic vegetation increased (including a population of the rare and important plant, Intermediate Stonewort) thereby creating a perceived impediment to summer boating. As a result, the Broads Authority initiated a series of small-scale cutting trials in 1994 and, after much lobbying from the boating community (Jackson et al, 2002, page 3), this was followed by more extensive cutting in 1995. In 1998 a dramatic change occurred when water clarity in the Broad improved significantly and macrophytes grew to an unprecedented height of one metre. The Broads Authority then proposed to undertake a more extensive cutting programme, beyond the traditional navigation channel in the Broad and encompassing around 38 ha of open water. However, English Nature, the statutory nature conservation agency, opposed the cutting programme on the grounds that the cutting of aquatic plants is likely to have a significant detrimental effect on native plants and hence on the conservation interest.

As Hickling Broad includes priority natural habitat types and hosts priority species, the EU's 1992 Habitats Directive requires the competent authority to carry out an appropriate assessment of the action that is thought to be affecting the conservation interest of the site. If a significant negative effect is 'proved' then the action is banned. This finding can only be overturned if public health and safety is compromised. Consideration of issues such as impact on recreation and related socioeconomic activities, and any visual impact, is not thought to carry any legal weight under the Habitats Directive. Accordingly, in the spring of 1999 the Broads Authority set up an independent panel of experts to assess the ecological significance of the proposed plant-cutting programme and to advice the Broads Authority. The panel responded in July 1999 and unanimously agreed that, given the application of the precautionary principle (see O'Riordan and Jordan, 1995, on contemporary applications), the extensive cutting programme originally proposed posed a direct threat to the integrity of the ecosystem. The panel recommended a reduced cutting programme, covering only 14.8 ha of the water body. The cutting was to be completed by August 1999 and was to allow plants to grow up to 40 cm above the bed of the broad. As a result of careful monitoring, the cutting height was later raised to 60 cm. The scale of plant cutting approved by the Broads Authority was in line with the panel's recommendations and meant that boating activity across the traditional 80 ha of the Broad would be severely curtailed. The concept of a broad and holistic management plan was also embraced by consensus among the major stakeholders together with the need to quantify more precisely the socioeconomic impacts of curtailed sailing activities on Hickling Broad.

4.2 Analysis of the ecological restoration decision

It is entirely possible to undertake a single-discipline analysis of the decision to cut pondweeds in Hickling Broad. Disciplines such as ecology, economics, political science, philosophy, sociology, management, or organisational science could each offer particular insights and understandings. Each, we would argue, would amount to a 'thin' or 'narrow' analysis, that might be constrained by particular preoccupations and methodologies. Alternatively it is possible to proffer a 'thick' assessment of the decision and the decisionmaking process.

In adopting such an approach we can, first, consider the notion of *efficiency*. As often defined (that is, in a relatively narrow sense, relating to the maximisation of human welfare) it would seem that the decision to cut the pondweed was influenced by efficiency considerations to some extent. The cutting of the pondweed, even to a limited degree, was designed to reduce (or eliminate) the impediments to boating, and clearly this has a human-welfare impact. For example, if boating could take place unhindered, the firms that hire out motor cruisers and sailing boats could enjoy commercial benefits, and the private owners of boats could experience recreational benefits. However, the decision to limit the programme of weed cutting may not have satisfied the boating community. Moreover, it may well have been perceived as a decision that prioritised conservation objectives over navigation objectives. As a result, there are quite clearly considerations of *equity* arising from this decision as we define it (that is, 'equity' as a consequentialist concept related to the distributive implications of environmental decisions).

Furthermore, the decision itself and the manner in which it was reached may well raise questions about *legitimacy*. Legitimacy, as we define it here, relates to procedural justice—the extent to which environmental decisions are accepted by the participants on procedural grounds. The decisionmaking process by which the Broads Authority reached its decision about the programme of limited weed cutting made use of a panel of experts, rather than being an inclusive participatory process directly involving the various stakeholder groups. A lack of extensive consultation in the decisionmaking process may lead the excluded groups to regard the decision as illegitimate. The process reflects an asymmetrical distribution of power between the different stakeholders. However, there are different degrees and means of participation and, as some authors have demonstrated, simply inviting stakeholders to the negotiating table may not necessarily ensure that their views are taken into consideration in the decisionmaking process (Cleaver, 1999; Cooke and Kothari, 2001). Participation and inclusion may serve to legitimise the decisionmaking process without the decisions reached being necessarily equitable.

On *effectiveness* (that is, the capacity of a decision or policy alternative to achieve its expressed objectives) the Broads Authority may not have been perceived by some stakeholders as having been successful as nature conservation objectives were given priority over navigation. Such an outcome may be regarded by the stakeholders as inequitable: conservation 'won' and boating 'lost'. The Broads Authority is expected to give equal or balanced status to these objectives, although its capacity to reach a negotiated compromise between different interests was clearly affected by other important nonlocal considerations such as the Habitats Directive of the EU. As we argue below, the Broads Authority decision is set within a specific institutional and policy context that placed constraints on its ability to reconcile local and nonlocal interests and demands.

We contend that, by considering all four elements (efficiency, equity, legitimacy, and effectiveness) and examining the institutional and scale context, we can reach a more complete understanding of the decisionmaking process and resulting decisions. Below, we illustrate the contribution that attention to context, institutions, and scale can make to the analysis of environmental decisions.

As suggested earlier in this paper, institutions define the 'rules of the game' in formal and informal ways. Institutions often take the form of tiered structures in which higher level institutions place limits on the options available to lower levels. Clearly, in the Hickling Broad case, national-level (that is, English Nature, the national regulatory body, and national regulations) and international-level (that is, EU and broader international biodiversity agreements and measures) institutions constrain the local body

(that is, the Broads Authority). Hence the Broads Authority does not have an entirely free rein to act. The particular institutional configuration surrounding the weed-cutting decision vested the Broads Authority with specific powers and duties that were reflected in the decision and actions taken. In making such decisions, there are trade-offs between conflicting demands and principles reflecting wider social values (Cowell and Owens, 1998; Owens, 1997). In the case of the conservation of habitats and biodiversity, the decisions are intimately bound up with the social construction of what constitutes 'nature', and what is considered critical to conserve. In other words, factors such as the 'cultural' and the 'historical' played a role in the Hickling Broad weed-cutting decision to the extent that these factors helped to define the 'environmental problem' (how to conserve value species and habitats in the Broad and how to accommodate recreational and navigational demands) and the possible solutions.

The issues of scale and context also provide important analytical focal points. On the surface, the decision to cut weed in Hickling Broad looks like a local matter. It may not be immediately obvious that such a decision has wider geographical implications. However, the species and habitats affected by the cutting programme were considered not only to be valuable at the local level, but also at the national and international level: hence the legal protection established for them by the EU and through wider international agreements. The case study highlights the multilevel and multiscale character of environmental decisions (Fairbrass and Jordan, 2001). What the Hickling Broad case study also illustrates is that, although environmental problems might well be best addressed and decisions made simultaneously at multiple levels, it may not always be possible to reconcile the local with the national and the international. In the case of Hickling Broad, it could be argued that a decision taken at the local level, entirely for the benefit of local people, might well not have been acceptable at a national or international level.

Although the Hickling Broad case is specific, it is reasonable to expect that all environmental decisions have efficiency, equity, legitimacy, and effectiveness dimensions and are affected by institutions, context, and scale. The interdisciplinary framework we propose enables generalisations rather than findings that can be universally applied to all situations involving multiple-use wetlands. In the case of the Hickling Broad, it enables us to draw useful lessons regarding the process of decisionmaking over wetland management. For example, examining the limited weed-cutting programme for its efficiency, equity, legitimacy, and effectiveness implications demonstrated that environmental management decisions are shaped by different considerations depending on the stakeholders involved, their degree of power in the decisionmaking process, and the influence of institutions and legislative frameworks at higher levels.

5 Towards a new research agenda

We have argued that efficiency, effectiveness, equity, and legitimacy are linked in one way or another in actual environmental decisions, but are not usually attended to or integrated in either ex ante or ex post analyses of such decisions. Our case example illustrates the need for an interdisciplinary analytical approach which is pluralistic in its consideration of the different values that inform decisionmaking, and recognises the complex and context-specific nature of environmental decisions and the centrality of institutional arrangements for the implementation of these decisions. We further propose lines of inquiry that would contribute to the development of such a new research strategy.

First, we need to improve our understanding of the institutional framing and embeddedness of environmental decisions. Actors participating in environmental decisions, such as citizens, voters, plaintiffs, defendants, judges, political representatives,

and administrators, are not neutral: they are constituted by institutions which define their rights, duties, power, and immunities. These actors participate in decisionmaking to a variable degree in diverse arenas, such as local politics and government, the courts, national politics and administrative decisionmaking, the media, and international fora such as multilateral environmental agreements. These arenas of action are all continually evolving institutional creations that follow different rules of decisionmaking and interact in complex ways. These arenas also influence the behaviour of actors. As Sagoff (1988) has argued, we may behave as consumers in the marketplace, but are not necessarily willing to assume that role with regard to making environmental decisions.

Yet the institutional framing of environmental decisions has more complex consequences for the behaviour of actors than the dichotomy between consumers and citizens. Institutions influence the goals which actors pursue, and what choices and choice processes they will consider legitimate. There is an urgent need to conduct research on these issues so as to develop generic strategies and concepts that allow comparative analysis across decisionmaking contexts and the drawing of transferable lessons across scales and contexts. Two decades of research have identified universal principles for the design of common property resource institutions (see Ostrom et al, 2002), but a similar comparative effort is required across an evolving range of environmental decisions.

Second, greater understanding of how environmental decisions are translated into governance outcomes is important for policy purposes. As we have already argued, there is a need to account simultaneously for efficiency, effectiveness, equity, and legitimacy—potentially at different scales and in different contexts. The first element is to develop a robust conceptual understanding of policy issues that facilitates generalisation, classification, and comparable observations. The second element is to develop new ways to analyse policy responses themselves. Environmental decisions are implemented by established institutions: the decisions either reaffirm the existing power relationships or demand change of governance institutions, and it is clear that inertia and protection of the status quo is a prime objective of many formal institutions. Yet the analysis of governance institutions is still relatively rudimentary. For example, for an economist, an 'environmental fee' is primarily a price confronting an environmental decisionmaker. But for the lawyer drafting the legislation that establishes the fee, as well as for the politicians who decide on the passage of the proposed legislation, the task is much more detailed and complex. A thick understanding of the consequences of environmental decisions requires a convergence between the extremes of consequentialist and process-based explanations of decisions. A hybrid approach enables the making of general (albeit not necessarily universal), comparable, and transferable observations about the adopted institutional arrangements and the problems they are supposed to resolve.

A framework for research which encompasses multiple scales and levels, which can be used to compare and generalise from different contexts, which examines both processes and outcomes, and which explicitly addresses plural environmental values and goals, is a step forward for interdisciplinary research on environmental decisionmaking. Although many of the issues, from sustainability to the optimal scale of governance institutions, are proposed within geographical as well as other theories (Wilbanks, 1994), they have yet to be consistently applied. We propose that research that encompasses scale and generalisation, and which can capture both process and outcome, could develop a 'thick' understanding of environmental decisionmaking. This thick understanding would better inform policy processes, including implementation, and support initiatives in environmental management and planning ranging from grass-roots social movements, through to national and regional governmental planning structures, as well as international and global frameworks and conventions, in order to address critical environmental dilemmas and their interactions.

Acknowledgements. This work is part of the Economic and Social Research Council (ESRC) Research Programme on Environmental Decision-Making of the Centre for Social and Economic Research on the Global Environment (CSERGE). We thank the ESRC for its support. We also thank Andrew Dobson, Mat Paterson, Tim O'Riordan, and three anonymous referees for critical and helpful comments. We retain full responsibility for this final version.

References

Adger W N, 2002, "Inequality, environment, and planning" *Environment and Planning A* **34** 1716 – 1719

Agrawal A, 2001, "Common property institutions and sustainable governance of resources" *World Development* **29** 1649 – 1672

Aldy J E, Kramer R A, Holmes T P, 1999, "Environmental equity and the conservation of unique ecosystems: an analysis of the distribution of benefits for protecting southern Appalachian spruce – fir forests" *Society and Natural Resources* **12** 93 – 106

Anderson E, 1993 *Value in Ethics and Economics* (Harvard University Press, Cambridge, MA)

Barrett S, Fudge C, 1981 *Policy and Action* (Methuen, London)

Beetham D, 1991 *The Legitimation of Power* (Macmillan, London)

Berkes F, 2002, "Cross-scale institutional linkages for commons management: perspectives from the bottom up", in *The Drama of the Commons* Eds E Ostrom, T Dietz, N Dolsak, P C Stern, S Stonich, E U Weber (National Academy Press, Washington, DC) pp 293 – 321

Brechin S P, Wilshusen P R, Fortwangler C L, West P C, 2002, "Beyond the square wheel: toward a more comprehensive understanding of biodiversity conservation as social and political process" *Society and Natural Resources* **15** 41 – 64

Bromley D W, 1989 *Economic Interests and Institutions: The Conceptual Foundations of Public Policy* (Blackwell, Oxford)

Bromley D W, 1991 *Environment and Economy: Property Rights and Public Policy* (Blackwell, Oxford)

Bromley D W, Paavola J, 2002, "Economics, ethics and environmental policy", in *Economics, Ethics, and Environmental Policy: Contested Choices* Eds D W Bromley, J Paavola (Blackwell, Oxford) pp 261 – 276

Brown K, 2002, "Equity and development in the new carbon economy", paper presented at the 7th Biennial Conference of International Society for Ecological Economics, Sousse, Tunisia, March; copy available from the author

Brown K, Rosendo S, 2000a, "Environmentalists, rubber tappers and empowerment: the political and economic dimensions of extractive reserves" *Development and Change* **31** 201 – 227

Brown K, Rosendo S, 2000b, "The institutional architecture of extractive resources in Rondonia, Brazil" *Geographical Journal* **166** 35 – 48

Brown K, Tompkins E L, Adger W N, 2002 *Making Waves: Integrating Coastal Conservation and Development* (Earthscan, London)

Butzer K W, 2002, "The rising cost of contestation" *Annals of the Association of American Geographers* **92** 75 – 78

Ciriacy-Wantrup S V, 1971, "The economics of environmental policy" *Land Economics* **47** 36 – 45

Cleaver F, 1999, "Paradoxes of participation: questioning participatory approaches to development" *Journal of International Development* **11** 597 – 612

Cleaver F, 2000, "Moral ecological rationality, institutions and the management of common property resources" *Development and Change* **31** 361 – 383

Cooke B, Kothari U (Eds), 2001 *Participation: The New Tyranny?* (Zed Books, London)

Cowell R, Owens S, 1998, "Suitable locations: equity and sustainability in the minerals planning process" *Regional Studies* **32** 797 – 811

Desimone L D, Popoff F, 2000 *Eco-efficiency* (MIT Press, Cambridge, MA)

Dore M H I, 1999, "The economics of well-being: a review of post welfarist economics", in *Global Environmental Economics* Eds M H I Dore, T Mount (Blackwell, Oxford) pp 21 – 38

Easton D, 1953 *The Political System* (Alfred A Knopf, New York)

Edwards V M, Steins N A, 1999, "A framework for analysing contextual factors in common pool resource research" *Journal of Environmental Policy and Planning* **1** 205 – 221

ESRC GEC Programme, 2001 *Environmental Justice* Special Briefing 7, SPRU, University of Sussex, Brighton, Sussex

Fairbrass J, Jordan A, 2001, "European Union environmental policy and the role of the UK government: passive observer or strategic manager" *Environment Politics* **10**(2) 1 – 21

Geertz C, 1973 *The Interpretation of Cultures* (Basic Books, New York)

Granovetter M, 1985, "The economic action and social structure: the problem of embeddedness" *American Journal of Sociology* **91** 481 – 510
Grant W, Matthews D, Newell P, 2001 *The Effectiveness of European Union Environmental Policy* (Palgrave, London)
Guba E G, 1990 *Paradigm Dialog* (Sage, London)
Guba E G, Lincoln Y S, 1994, "Competing paradigms in qualitative research", in *Handbook of Qualitative Research* Eds N K Denzin, Y S Lincoln (Sage, London) pp 105 – 117
Hanna S S, Folke C, Mäler K-G (Eds), 1996 *Rights to Nature* (Island Press, Washington, DC)
Harvey D, 1996 *Justice, Nature and the Geography of Difference* (Blackwell, Oxford)
Holland A, 2002, "Are choices trade-offs?", in *Economics, Ethics, and Environmental Policy; Contested Choices* Eds D W Bromley, J Paavola (Blackwell, Oxford) pp 17 – 34
Holmes T, Scoones I, 2000, "Participatory environmental policy processes; experiences from North and South", WP 113, Institute of Development Studies, University of Sussex, Brighton, Sussex
Hooghe L, Marks G, 2001 *Multi-level Governance and European Integration* (Rowman and Littlefield, Boulder, CO)
Jackson D, Georgiou S, Crooks S, 2002, "Social impact assessment of the Hickling Broad conflict", working paper Environmental Change and Management series (ECM 01-02), Centre for Social and Economic Research on the Global Environment, University of East Anglia, Norwich, Norfolk
Jordan A J, 2001, "Environmental policy (protection and regulation)", in *International Encyclopaedia of the Social and Behavioural Sciences* volume 7, Eds N Smelser, P Baltes (Elsevier, Oxford) pp 4644 – 4651
Kates R W, 2002, "Humboldt's dream, beyond disciplines, and sustainability science: contested identities in a restructuring academy" *Annals of the Association of American Geographers* **92** 79 – 81
Kiser L L, Ostrom E, 1982, "The three worlds of action: a meta-theoretical synthesis of institutional approaches", in *Strategies of Political Inquiry* Ed. E Ostrom (Sage, London) pp 179 – 222
Ledoux L, Crooks S, Jordan A J, Turner R K, 2000, "Implementing EU biodiversity policy: UK experiences" *Land Use Policy* **17** 257 – 268
Low N, Gleeson B, 1998 *Justice, Society and Nature: An Exploration of Political Ecology* (Routledge, London)
McNeill D, 1999, "On interdisciplinary research: with particular reference to the field of environment and development" *Higher Education Quarterly* **53** 312 – 332
Mehta L, Leach M, Newall P, Scoones I, Sivaramakrishnan K, Way S-A, 1999, "Exploring understandings of institutions and uncertainty: new directions in natural resource management", DP 372, Institute of Development Studies, University of Sussex, Brighton, Sussex
Mosse D, 1997, "The symbolic making of a common property resource: history, ecology and locality in a tank-irrigated landscape in South India" *Development and Change* **28** 467 – 504
North D C, 1990 *Institutions, Institutional Change and Economic Performance* (Cambridge University Press, Cambridge)
O'Riordan T, Jordan A, 1995, "The precautionary principle in contemporary environmental politics" *Environmental Values* **4** 191 – 212
O'Riordan T, Jordan A, 1999, "Institutions, climate change and cultural theory: towards a common analytical framework" *Global Environmental Change* **9** 81 – 94
Orren K, 1976, "Standing to sue: interest group conflict in the federal courts" *American Political Science Review* **70** 723 – 741
Ostrom E, 1990 *Governing the Commons* (Cambridge University Press, Cambridge)
Ostrom E, Burger J, Field C B, Norgaard R B, Policansky D, 1999, "Revisiting the commons: local lessons, global challenges" *Science* **284** 278 – 282
Ostrom E, Dietz T, Dolsak N, Stern P C, Stonich S, Weber E U (Eds), 2002 *The Drama of the Commons* (National Academy Press, Washington, DC)
Owens S, 1997, "Negotiated environments: needs, demands, and values in the age of sustainability" *Environment and Planning A* **29** 571 – 580
Paavola J, 2002, "Rethinking the choice and performance of environmental policies", in *Economics, Ethics, and Environmental Policy: Contested Choices* Eds D W Bromley, J Paavola (Blackwell, Oxford) pp 87 – 102
Parsons W, 1995 *Public Policy* (Edward Elgar, Cheltenham, Glos)

Pritchard Jr L, Colding J, Berkes F, Svedin U, Folke C, 1998, "The problem of fit between ecosystems and institutions", WP 2, International Human Dimensions Program, Bonn
Radin M J, 1996 *Contested Commodities* (Harvard University Press, Cambridge, MA)
Rinquist E J, 1998, "A question of justice: equity in environmental litigation, 1974 – 1991" *Journal of Politics* **60** 1148 – 1165
Sagoff M, 1988 *The Economy of the Earth: Philosophy, Law and the Environment* (Cambridge University Press, Cambridge)
Schlager E, Ostrom E, 1992, "Property-rights regimes and natural resources: a conceptual analysis" *Land Economics* **68** 249 – 262
Schlager E, Blomquist W, Tang S Y, 1994, "Mobile flows, storage, and self-organized institutions for governing common-pool resources" *Land Economics* **70** 294 – 317
Schlosberg D, 1999 *Environmental Justice and the New Pluralism: The Challenge of Difference for Environmentalism* (Oxford University Press, Oxford)
Schmid A A, 1987 *Property, Power, and Public Choice: An Inquiry into Law and Economics* 2nd edition (Praeger, New York)
Simmons C S, 2002, "The local articulation of policy conflict: land use, environment, and Amerindian rights in Eastern Amazonia" *The Professional Geographer* **54** 241 – 258
Smith P D, Mcdonough M H, 2001, "Beyond public participation: fairness in natural resource decision making" *Society and Natural Resources* **14** 239 – 249
Turner II B L, 2002, "Contested identities: human-environment geography and disciplinary implications in a restructuring academy" *Annals of the Association of American Geographers* **92** 52 – 74
Walzer M, 1983 *Spheres of Justice: A Defence of Pluralism and Equality* (Basic Books, New York)
Weinberg A S, 1998, "The environmental justice debate: new agendas for a third generation of research" *Society and Natural Resources* **11** 605 – 614
Wescoat Jr R W, 2002, "Environmental geography—history and prospect" *Annals of the Association of American Geographers* **92** 81 – 83
Whitehead J C, 2000, "Demand-side factors and environmental equity analysis" *Society and Natural Resources* **13** 75 – 81
Wilbanks T J, 1994, "Sustainable development in geographic perspective" *Annals of the Association of American Geographers* **84** 541 – 556
Young O R (Ed.), 1999 *The Effectiveness of International Environmental Regimes* (MIT Press, Cambridge, MA)
Young O R, 2002, "Institutional interplay; the environmental consequences of cross-scale interactions", in *The Drama of the Commons* Eds E Ostrom, T Dietz, N Dolsak, P C Stern, S Stonich, E U Weber (National Academy Press, Washington, DC) pp 263 – 291
Zimmerer K, 2000, "The reworking of conservation geographies: nonequilibrium landscapes and nature-society hybrids" *Annals of the Association of American Geographers* **90** 356 – 369