

**EXPLORING UNDERSTANDINGS OF
INSTITUTIONS AND UNCERTAINTY:
NEW DIRECTIONS IN NATURAL
RESOURCE MANAGEMENT**

IDS DISCUSSION PAPER 372

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SUMMARY

The paper examines the nexus between institutions and uncertainty in natural resources management contexts. It argues that conventional understandings of institutions fail to focus on how institutions deal with the ever-increasing forms of uncertainty impinging on rural livelihoods. The paper outlines three different forms of uncertainty: ecological, livelihood and knowledge uncertainty. By reviewing a large literature, the paper demonstrates how conventional understandings of institutions neglect the everyday contexts within which institutions are located and the overlapping domains between different institutional arrangements. By drawing on a wide range of theoretical approaches to understanding institutions and by exploring case studies around water, pastoralism and biotechnology, the paper argues that a sophisticated understanding of the relationship between institutions and uncertainty calls for a radical re-thinking of conventional ways of viewing resources, legal systems and, property regimes. This calls for new forms of governance, inclusionary decision-making arenas, the addressing of questions of power and the overhauling of sharp dichotomies between local and the global as well as formal and informal processes.

PREFACE AND ACKNOWLEDGEMENTS

The IDS Environment Group has long been concerned with enhancing understandings of the role of institutions in natural resource management. This paper – made possible by a grant from the Ford Foundation – expands the scope of our earlier work to address explicitly the role of uncertainty and institutions in natural resources management. Due to the exploratory nature of this work, it was necessary to focus on theoretical and conceptual reflections before proceeding to the more practical implications of the debate. This paper, thus, largely serves as a conceptual 'think piece' which discusses emerging views on questions concerning natural resources management and raises questions concerning theory, policy and practice. The wider contextualisation of these debates and their concrete implications for policy and practice will be the focus of future research outputs, conducted through interactions with Ford Foundation programme officers, their grantees and other researchers.

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Melissa Leach is a social anthropologist interested in the social dynamics of landscape change and the construction of environmental knowledge, especially relating to humid tropical areas of Africa (Guinea, Sierra Leone, Ghana) and the Caribbean. Her research, frequently combining anthropological perspectives with history and ecology, has focused on issues including gender–environment relations, local forest resource management, forest–Savanna dynamics, and agricultural change. Current interests include the relationships between social institutions and ecological knowledge in local and global contexts, and the politics of environmental science and policy processes.

Peter Newell is a specialist in international relations and has worked on the global politics of the environment for the last six years. His previous research was on the political influence of non-state actors in the international climate change regime. Recent research has focused on non-state practices of environmental governance in a context of globalisation and he is currently developing a research agenda on the politics of biotechnology regulation in developing countries with colleagues in the environment team.

Underpinning all of these projects is a core interest in the relationship between the global political economy and the practice of environmental politics.

Ian Scoones is a natural resource ecologist interested in exploring the links between ecological dynamics and local resource management with a focus on dryland areas in Africa, particularly Ethiopia and Zimbabwe. Research with an interdisciplinary perspective has involved examining issues of rangeland and pastoral development, soil and water conservation, forestry and woodland management, as well as biodiversity and protected area issues. A social and institutional perspective is at the centre of his work, which explores the linkages between local knowledges and practices and the processes of scientific enquiry, development policy-making and field-level implementation.

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EXECUTIVE SUMMARY

This paper examines the nexus between institutions and uncertainty in natural resources management contexts. A considerable literature now emphasises the key role played by institutions in making and sustaining livelihoods and in managing and governing natural resources. However, theoretical and policy debates have not focused on how institutions deal with the various forms of uncertainty impinging on rural livelihoods. In an increasingly globalised world characterised by dynamic ecologies and rapid technological change, there is an urgent need to deal with the complex interlocking of local and global forms of uncertainty and their interactions with local livelihoods.

This paper addresses the nature and extent of the problematic gap between the dominant theory and current realities. It begins by arguing that environmental governance is confronted by many challenges as a result of global trends in technology which have multiplied both the range of uncertainties affecting people's lives and the spread of environmental risks. This increase in the challenges facing environmental governance, combined with contradictory tendencies in environmental resource management (namely, simultaneous processes of centralisation to the global level in the form of international regulation, and processes of decentralisation and devolution to the local level), leads to overlapping and conflictual institutional arrangements, increasing locally felt uncertainties.

Uncertainty is usually defined as a situation characterised by indeterminacies. Unlike risk, the probabilities are impossible to calculate. The paper outlines three different forms of uncertainty which we have chosen to term ecological, livelihood and knowledge uncertainties. The term 'ecological uncertainties' refers to uncertainties arising from the unpredictable and variable nature of the ecosystems with which rural people interact. The term 'livelihood uncertainties' encapsulates the unpredictable conditions in the social, ecological and economic worlds such as unprecedented environmental hazards and unpredictable market behaviour. Finally, uncertainty also characterises knowledge, since it is increasingly clear that knowledge, both scientific and lay, is partial and plural, giving rise to uncertainties about how to deal with risks and hazards invisible from partial perspectives.

There is no standard definition of institutions. They are understood as both enabling (in providing ways through which people negotiate their way through the world) and constraining (in providing the rules for action). Mainstream institutional theory tends to view institutions in managerial and functionalist terms, where institutions are considered to be rules, regulations or conventions. Other approaches offer alternatives which see institutions in more processual and dynamic ways as the product of social and political practices.

The paper examines how institutions are understood by a wide range of theoretical approaches, some of which have rarely been applied in the natural resources management policy context. It begins with New Institutional Economics (NIE) and Common Property Resources (CPR) theories which have had a strong influence on the policy field. Whilst these approaches have made important contributions in focusing attention on the importance of local institutions in natural resources management, they have tended to neglect the many everyday contexts within which institutions are located and their rootedness in local history and society. Furthermore, their conceptualisation of collective action tends to promote a corporate and homogeneous view of 'community', downplaying issues concerning difference, power and politics. These

approaches have also presupposed a non-interactive divide between formal and informal institutions, neglecting the 'messy middle' where different institutional domains overlap and are beset by ambiguity. Though NIE/CPR approaches see institutions as key in eliminating uncertainty, this uncertainty is usually conceived of in terms of people's behaviour (the Prisoner's Dilemma). The analyses are usually not extended to address ecological, livelihood or knowledge uncertainties.

The international governance literature offers certain new ways of conceptualising the increasingly complex institutional mix, given the multi-tiered and multiple levels of decision-making in environmental processes. However, much of the literature still draws largely on problematic notions of collective action akin to those in CPR/NIE approaches. The international arena is seen as a 'global commons', and 'uncertainty' in terms of a Hobbesian anarchy said to characterise the international system where there is no central authority. Furthermore, the focus is largely on formal institutions, and sharp distinctions are often maintained between local/domestic and global settings. In thinking about rural livelihoods, we need to be more aware of overlapping jurisdictions which cross-cut formal–informal and global–local divides and which involve contested knowledges. The paper thus goes on to explore other approaches, including approaches within anthropology, sociology and legal pluralism, which have started to explore ways of breaking down these dichotomies.

Anthropological and sociological work on institutions suggests at least three important emphases which stand out as suggesting useful ways forward in considering institutions and natural resource management in relation to uncertainties. First, institutions are conceived in terms of practices and their social, cultural and political structuration; in terms of what people do, and their structured capacity to respond to events in shaping their own histories. Second, by employing ethnographic approaches to the processes and relations operating within and between multiple sites, recent work has succeeded in transcending local–global and formal–informal divides. Third, a conceptual linking of institutions, knowledge and power suggests the importance of analysing institutions and uncertainties as part of what people know or believe, as well as what they do.

Some of these themes are echoed in the literature on legal pluralism. Law is increasingly being conceptualised as plural, open to a variety of interpretations. Uncertainties emerge from the processes of institutional negotiation over rights, rules and order. Whilst conventional approaches focused on one singular 'rule of law' to deal with an uncertain world, new approaches argue that plural and overlapping legal arrangements may offer more effective routes to negotiation of outcomes and compromises in an uncertain world (as indicated in studies of legal pluralism and forum shopping). New insights concerning the overlapping nature of institutions in legal pluralism help comprehend how interpretations are negotiated across institutional arenas, with law emerging less as fixed rules than as practice worked out in context. Thus processes of mediation, bargaining, conflict and power become key in institutional landscapes where uncertainties prevail.

The paper then takes up three case studies to illustrate these dominant themes. Case 1 uses the example of grazing resource management and tenure in pastoral areas in Africa to illustrate the crucial aspects of ecological uncertainty which rural institutions adapt, respond to and shape. Pastoralists adopt opportunistic,

ad hoc strategies to cope with the ecological uncertainties dominating the highly variable pastoral systems of Africa, calling for new forms of governance based on plural and legal frameworks and institutions. Case 2 illustrates institutional responses to livelihood uncertainty by examining water management institutions. Coping with scarce and variable water supplies constitute an intrinsic element of the livelihood uncertainties confronting many rural people. Recent work has argued for the need to see institutions governing water as rooted in social practice, history and culture. A failure to appreciate the dynamic nature of institutions often leads to the proliferation of simplistic interventions for community management which undermine the dynamic nature of people's responses to livelihood uncertainty. Case 3 takes up the case of biotechnology to examine knowledge uncertainties where issues of ownership and control over resources and the commodification of knowledge are key. Knowledge uncertainties frame the way policy debates over biotechnology are played out in realms where conventional local–global divides are increasingly viewed as redundant. This calls for new institutional forms which encourage dialogue, negotiation and debates over highly divided positions and perceptions of risk.

The paper draws some general lessons for theory, practice and future work. Recognition that uncertainties impinge upon livelihoods and institutions in different ways prompts a re-evaluation of several key themes in environment and development, complementing earlier approaches. For example, resources need to be viewed as both material and symbolic products, rooted in contests of power. Institutions emerge as sites of social interaction, negotiation and contestation comprising heterogeneous actors having diverse goals. This suggests a need for interventions that have a processual rather than product-oriented character, encouraging rather than undermining institutional flexibility. Knowledge uncertainties emerge as central to contested areas of natural resources management. This suggests a need both for inclusionary, participatory decision-making processes and for approaches to institutional learning that make best use of a plurality of perspectives. The reconceptualisation of how, in the context of uncertainty, we see resources, their management and their interaction with local livelihoods raises a range of fundamental questions about institutional dynamics. These touch on issues of property rights, legal systems, and governance, as well as on broader questions of knowledge, power and control.

The paper concludes by arguing that it is no longer possible to posit a simple relationship between institutions and uncertainty. Institutions can work to embrace, moderate or exacerbate uncertainty, and they are embedded in social relations that span temporal and spatial scales that are not self-evident. In this context the dual processes of localisation and globalisation need to be linked in addressing the nexus of interactions between issues concerning governance, institutions and livelihoods in a globalised and uncertain world. In terms of future research and action this will require a more multi-sited approach to understanding natural resource management questions, based on understandings of the precise relationships and processes operating within and across local, national and international arenas. Studies are also required to address the ways in which rural, state and international actors conceive of particular ecological, livelihood and knowledge uncertainties and how these perceptions are linked with their social/institutional positionings.

1. INTRODUCTION

People living in rural areas of developing countries face increasing uncertainties that impinge on their livelihoods. A considerable literature now emphasises the importance of institutions in making and sustaining livelihoods, and in managing and governing the natural resources that contribute to them. Nevertheless, much theorising about institutions in natural resource management – and certainly the theoretical perspectives that have most influenced policy – does not attempt to address these uncertainties and depends on the image of a predictable world with knowable calculus. Furthermore, in an increasingly globalised world there is a need to analyse how institutions deal with the complex interlocking of local and global forms of uncertainty impinging upon rural livelihoods.

In this paper we address the nature and extent of this problematic gap between dominant theory and current realities. We explore assorted theoretical perspectives which offer other ways of conceptualising institutions; ways that might better capture how people encounter and deal with uncertainties in their unfolding livelihood strategies, and that might therefore inform better-focused research and policy.

We begin by setting the scene, outlining how rural people today face an unprecedented level and array of uncertainties in sustaining their livelihoods, and considering how these circumstances relate to recent trends in environmental governance. We go on in section 3 to highlight the importance for livelihoods of three particular types of uncertainty, which we term respectively 'ecological', 'livelihood' and 'knowledge' uncertainty.

In the following sections, we explore how these three types of uncertainty might be understood to influence institutional arrangements for environmental and natural resource management. Section 4 examines how institutions are understood by a wide range of theoretical approaches in the social sciences, starting with the New Institutional Economics and Common Property theories which have dominated natural resource management debates to date. This applies both in work with a local focus and – with certain adaptations – in work on international relations and issues of global governance. We then move on to diverse approaches from anthropology, sociology and from legal studies. The intention is not to provide a comprehensive literature review, but instead to highlight the strengths and limitations of each approach, particularly in their capacity to address the institutions/uncertainty nexus. Section 5 moves on to present three brief case studies of rural livelihoods, institutions and uncertainties, illustrating the kinds of process and interrelationship that well-attuned analysis of environmental and natural resource management now needs to comprehend. In Section 6, we draw together lessons both from the theoretical review and from the case studies to suggest a prospectus for conceptual and field-based research/action, with the aim of improving policy-relevant analysis of the institutional dimensions of rural livelihoods and environmental governance in the context of uncertainties.

2. ENVIRONMENTAL GOVERNANCE IN AN AGE OF UNCERTAINTY

Rural people have always employed flexible institutional arrangements and livelihood strategies to deal with ecological and seasonal variation, especially in risk-prone environments such as drylands. Yet the forces of

globalisation now bring new forms of uncertainty and vulnerability, as local practices and institutions are increasingly caught up with global processes of change.¹ For example, international trade and the agreements surrounding it now link the rural poor and their products, markets and natural resources to global commodity chains, northern markets and global capital flows. It is ever more apparent that processes of rural livelihood maintenance and natural resource management are firmly linked to economic, political and aesthetic regimes constructed in multiple sites across the world. This linkage engenders new forms of uncertainty which add to those already impinging on poor people's lives. It also underscores that, increasingly, the institutional arrangements mediating access to resources for poor people must be understood as part of a complex set of arrangements linking local and global arenas.

Other contemporary global trends help to multiply the range of uncertainties now affecting people's lives. First, rapid technological change – for example in the context of the emergence of biotechnology or new information technology – has gone hand in hand with both the spread of environmental risks and unprecedented social change. In response, Ulrich Beck (1991) has made the case for the emergence of a 'risk society' which is marked by new forms of risks and hazards spanning the biophysical, scientific and knowledge domains. These risks cannot be confined within spatial and temporal boundaries and are not statistically calculable. There exists fundamental uncertainty in determining and perceiving risks. It is useful at this point to distinguish between risk and uncertainty. Risk can be seen as a situation where probability or alternative outcomes can be calculated. Uncertainty, by contrast, describes a situation characterised by indeterminacies where the probabilities are impossible to calculate (see Knight, 1921; Douglas, 1985). 'Risk society' – a concept developed in Northern industrial contexts – becomes relevant for rural livelihoods given that local-level uncertainties and perceptions of risk are increasingly interlocked with uncertainty on a global scale, driven by rapid environmental and technological change. Former institutional frameworks for environmental management, and their assumed relationships between the state, scientific expertise and publics, are, it is implied, inadequate to comprehend or govern these interlocked processes. Thus major shifts in thinking about forms of governance are required.

Second, widespread programmes of structural economic reform, privatisation and decentralisation – frequently emanating from international institutions and globalised conceptions of effective markets or good governance – now interact with the local processes shaping people's livelihoods. An understanding of institutional arrangements for resource access must comprehend these interactions and the uncertainties they generate. For example, privatisation and changes in property regimes have given rise to new conflicts over natural resources, linked to contested institutional responsibility between formal and informal rules or between competing user groups.

Worldwide, environmental resource management at present tends to be caught in two contradictory processes which both impinge, though in different ways, on the lives of the poor. At one end a globalisation of processes is evident through international conventions, laws and structures of fiscal discipline, yet, at a more local scale, schemes to increase local participation in the management of natural resources are proliferating. Thus discussions afoot in international fora on new protocols for biosafety, genetically modified foods, and regulatory mechanisms for governing intellectual property rights combine with earlier

initiatives on forests, desertification, biodiversity, wildlife, and oceans to generate a formidable international constellation of regulations. Harmonisation of environmental standards and trade restrictions has also become a major preoccupation of international agencies administering economic aspects of globalisation (Esty, 1994). Backed by the weight of international organisations such as the United Nations, global conventions have also spawned in their image a series of national action plans and private initiatives such as sustainable forest harvest certification programmes led by non-governmental organisations (NGOs).

Calls for local participation and devolution in the management of natural resources are also proliferating. Devolution has emerged as the major strategy for implementing Agenda 21 decisions on the environment, promoting governance reform, and encouraging economic enterprise. Notable examples in the natural resources sector are irrigation co-operatives, joint forest management and community wildlife management initiatives (Pimbert and Pretty, 1995; Poffenburger and McGean, 1996; Stig Toft Madsen, 1998). On one hand, such devolution – like privatisation programmes – responds to global economic ideas that markets, and local governments, should take on more of the tasks hitherto performed by large, inefficient, central state machineries (Crook and Manor, 1998). On the other hand, the spread of community-based conservation and natural resource management initiatives has sought to rediscover the virtues of indigenous knowledge, promote small-scale local and communal resource management, and support and empower peoples' own initiatives in self-management of natural resources that are key to local livelihoods. Government, donor or NGO-supported devolution initiatives have frequently followed the identification of communities that are presumed stable and capable of orderly common-pool resource management. These communities have then been vested with some degree of formal responsibility for a specific territorially bounded resource unit. Yet the large literature on local institutions in natural resource management on which this policy interest has built, and to which it contributes further, has largely failed to take account of how decentralisation programmes can themselves multiply locally felt uncertainties. Uncertainties already present in the interplay of multiple claims on common-pool resources come to interlock with new, overlain institutional structures that are intended to promote local empowerment and democratisation, but in practice involve new relationships with national and international institutions.

This complex, historically emergent layering of institutional domains that results from attempts at environmental governance over time renders ever more complex the institutional arrangements for natural resource management and livelihood sustainability in the contemporary world. And the multiplication of institutional forms and sites for environmental governance and natural resource management itself generates greater uncertainty as individuals, social groups, and organisations jostle for control over resources and their futures. The result is both that conventional theoretical divides between local and global, formal and informal have been made redundant, and that ambiguity, complexity and uncertainty increasingly characterise the conditions under which resources are governed and managed. The institutional arrangements through which people make and sustain their livelihoods need to be understood in terms that take adequate account of these contemporary conditions.

Before exploring how far current theoretical approaches to the study of institutions are able to deal with uncertainties as they affect rural livelihoods, it is helpful for analytical purposes to delimit the field of

'uncertainties' more precisely. Thus Section 3 outlines three types of uncertainty on which we have chosen to focus.

3. UNDERSTANDING UNCERTAINTY

The lead-up to the new millennium has been characterised by growing awareness of numerous risks, uncertainties and indeterminacies that characterise the natural and social worlds that we inhabit and within which institutions are located and operate. Without aiming to be comprehensive, in this section we highlight three types of uncertainty which seem to be of particular significance to poor rural people, and which suggest interesting analytical distinctions in the ways they operate and might relate to institutions: ecological uncertainties, livelihood uncertainties and knowledge uncertainties.

New understandings in ecology have challenged the notions of stability and balance in nature (Zimmerer, 1994; Scoones, 1994). Instead, ecosystems are increasingly characterised by variability and unpredictability across time and space, with non-equilibrium dynamics often being prevalent. This change in perspective has helped appreciation of how rural people continuously adapt to the various uncertainties arising out of variations in climate and resource availability. It has, for example, prompted reassessments in fields such as range ecology, forest management, fisheries and pest control. Appreciating *ecological uncertainties* is thus fundamental to an appreciation of the dynamics of resource management systems in a range of environmental settings.

The post-industrial and late modern condition has given rise to other forms of *livelihood uncertainties* caused by a range of factors spanning the ecological, economic and social worlds. These include, for example, unpredictable environmental events and hazards originating outside the locality (for example, nuclear hazards, increasing effluents and pollution; see Beck, 1991). Increasingly, economic systems too are characterised as uncertain and in constant flux, with capital flows knowing no boundaries and financial markets often behaving in an unpredictable manner. The social world too is characterised by uncertainty and complexity in terms of heterogeneous actors and institutional pluralism.

How do these uncertainties link with the livelihoods of the rural poor? Although many risks are widespread, exposure inevitably reflects the existing distribution of power and status, leaving poor people's livelihoods most vulnerable. Whether such risks emerge from biophysical sources (for example earthquakes, drought) or are 'manufactured' risks (see Giddens, 1995) due to human interventions (for example, pollution or shifts in commodity prices), they represent realities to which people must respond. The well-documented variety of livelihood adaptive and coping strategies and associated institutional arrangements is witness to the importance, to the resilience and sustainability of livelihoods, of mechanisms that enable a response to uncertainty (Davies, 1996; Chambers, 1989; Scoones, 1994). Given the new contexts created by globalisation, however, including emerging forms of livelihood uncertainties affecting vast populations over and above those living in risk-prone environments, new understandings of how people and institutions cope with these livelihood uncertainties may be required.

Uncertainty also characterises knowledge about environmental phenomena and change. Many studies now highlight how scientific assumptions are rooted in particular social and political commitments, needs

and biases. Hence, scientific knowledge is always partial, without absolute or certain claims to truth. Equally, 'lay' people's knowledge about the ecological or social world is never complete, but instead is plural, partial, contingent, situated and contested (for example, Funtowicz and Ravetz, 1993; Wynne, 1990; Harding, 1987). Uncertainties arise, first, because any person's knowledge is incomplete and incapable of dealing with risks and hazards invisible from their partial perspective. Thus, decisions must inevitably be made without complete knowledge. Second, the very plurality of knowledges and perspectives on any given issue generates uncertainties: it becomes impossible to predict the behaviour of others who may see things in different ways, and it becomes difficult to understand the unpredicted consequences where causal connections are contested and science is also seen as grounded in different perspectives. We refer to all these various uncertainties as *knowledge uncertainties*.

In Section 4 we explore how various literatures focusing on institutions view these different forms of uncertainty which span the ecological, social and economic realms. By taking this integrative approach, we hope to capture the complexities and uncertainties in both the social and the natural worlds. On the one hand, whilst social institutions in natural resource management have sometimes been investigated in a sophisticated manner, these analyses have frequently viewed the environment as an undifferentiated black box or using inappropriate static concepts. On the other hand, approaches that capture environmental and ecological dynamics and uncertainties effectively have frequently disregarded the dynamic and differentiated nature of social institutions and organisations. One of our aims is to show how insights from recent social and ecological theory might better be combined.

4. UNDERSTANDING INSTITUTIONS AND UNCERTAINTY

A wide social science literature has focused on understanding 'risk' and, to a somewhat lesser extent, on 'uncertainty'. In the UK, debates on risk have made clear distinctions between those understandings of risk that draw on a positivist understanding of science and those which focus more on the cultural and sociological aspects of risk.² Generally, risk is understood either in biophysical or in cultural terms. Regardless of the approach, the importance of institutions is being increasingly highlighted in two ways: one, as key in managing risk in terms of facilitating local-level adaptations (Batterbury and Forsyth, 1999); and, two, in the discursive construction of what is meant by risk (see, for example, Wynne, 1990). The more sociological and cultural analyses have informed discourses concerning risk assessment, perceptions of risk and their links with history, political and institutional contexts. However, these perspectives have tended to be Northern-focused and have neglected understandings of rural livelihoods and the multiple ways in which people cope with different forms of uncertainties in various institutional contexts.

In the natural resource management literature, institutions are considered to be key in sustainable livelihood adaptation and natural resources management, and an understanding of institutions is now seen as central to successful policies in this area. These analyses in the natural resources policy field have tended to draw, whether explicitly or implicitly, on approaches grounded in the Common Property Resources (CPR) approach, which has close links with the New Institutional Economics (NIE). These approaches have

established firmly that institutions matter and that local people, as well as state governments, can successfully manage resources through property regimes varying in scale and space.

These approaches have succeeded admirably in directing attention away from simplistic neo-Malthusian equations concerning population, resource availability and environmental degradation. They have also offered a strong, theoretically informed set of factors leading to effective collective action in natural resource management. At the same time, however, it has become apparent that the ways these perspectives conceive of institutions and their operation frequently fail to match realities. First, formal institutional theories which specify rights, rules and regulations are inadequate in treating resource management situations characterised by complex, overlapping and ambiguous local relationships and practices. Second, these approaches have tended to assume non-interactive divides between formal and informal institutions, and local, national and international arrangements. Yet evidence suggests that natural resources are actually managed amidst a mix of institutional types and arrangements which transcend these divides and tend to be messy, overlapping and power-ridden (see Section 5). Finally, some of the more conventional approaches have tended to view institutions as static and ahistorical, and are unable to account for how they may respond dynamically to risks and uncertainties.

There is no standard definition of institutions and, as the following sub-sections will show, they are defined in different ways by different analysts and within different theoretical traditions. In general, institutions are understood as both enabling (in terms of providing people with ways through which they can negotiate their way through the world) and constraining (in providing the rules for action). Most mainstream institutional theory – and the theoretical traditions that have most influenced work on natural resource management to date – tends to view institutions as rules, regulations or conventions imposing constraints on human behaviour to facilitate collective action (for example, North, 1990). These approaches have tended to view institutions in functionalist and managerialist terms. Other approaches offer alternatives that see institutions in more processual and dynamic terms (for example, Cleaver, 1998); as the product of social and political practices; as sites where production, authority and obligation are contested and negotiated (Berry, 1989), or as part of the interplay of knowledge and power. Rather than mere rules or regulations, institutions are seen to be what people 'do' or how people 'behave'; such approaches thus endow actors with a greater agentive role. And, at least in some perspectives, institutions are seen as inseparable from what people know or believe.

A number of literatures and analytical traditions have dealt with institutions from this range of perspectives. Some of these approaches have been only rarely applied in the natural resource management policy context. However, a reflection on some of these wider literatures potentially offers some important leads towards a more sophisticated analysis of the relationships between institutions and uncertainty in the globalised context described above. The following sections therefore highlight a range of different theoretical approaches and offer a discussion of their particular strengths and limitations in understanding how institutions operate.

4.1 New Institutional Economics, collective action and common property theory

The transaction cost approach and the collective action approach are the two key approaches within the NIE literature. Both these approaches conceive of institutions in slightly different ways, despite sharing several central tenets. Institutions are generally conceived of as the 'rules of the game in society' (see Ostrom, 1990) which provide constraints on action. North sees 'institutions' as the formal rules and conventions, including informal codes of behaviour or norms, which emerge to regulate human behaviour and interaction. In tending towards a transaction cost orientation, this suggests that institutions work to minimise the costs of constantly monitoring and responding to others' individually motivated behaviour. Institutions important for natural resource management can either be purposive (for example, land tenure rules) or non-purposive (for example, the market). Others have conceptualised institutions more in terms of networks, including those described by the term 'social capital', or in terms of more formal organisations, which are the formal, hierarchical and geographically concentrated expressions of rule-governed structures for the conduct of social relations (for example, corporate entities, bureaucracies, federations, resource management committees).

Common property analysts such as Ostrom (1990), by contrast, tend to take their theoretical grounding from game theory, looking at collective action dilemmas and focusing on the ways in which institutions or rules can be purposively crafted to produce collective action. The now large literature on CPR management has been central in establishing the significance of local institutions, particularly, in natural resource management. Initially formulated in response to Hardin's (1968) pessimistic 'tragedy of the commons', the early literature emphasised the distinction between open-access situations (to which Hardin's thesis may be somewhat more applicable) and true commons situations in which institutions regulated resource use and management (for example, Bromley and Cernea, 1989). Much of the CPR literature has focused on local situations, and on establishing the conditions under which collective action in resource management operates effectively, including clear resource boundaries and relative socio-economic homogeneity among users (Ostrom, 1990; Wade, 1988).

CPR analysis has also made important contributions in focusing attention on the importance of informal institutions in natural resource management. In the realm of water resources management, for example, formal institutions include state-run water committees which manage canals and irrigation systems and levy fines and charges. Informal institutions could include the authority of the local priest and a centuries-old tradition of maintaining a particular canal system. These informal institutions are legitimised by customary law and by social or religious norms and behaviour patterns. From a policy perspective, CPR analysts have shown how planners have erroneously neglected and often delegitimised indigenous institutions governing resources (Bromley and Cernea, 1989).

CPR approaches have nevertheless focused largely on purposive institutions, indeed frequently assuming that institutions are designed (or 'crafted', in Ostrom's terms) specifically to perform certain natural resource management functions. Hence emphasis is placed on a matching of particular institutions to particular issues – water management committees, fishing groups etcetera. This contrasts both with the emphases of much sociological and anthropological work (and some more recent CPR perspectives which

have broadened out to incorporate these approaches) which, as we discuss below, examines the complex matrix of institutions in which people live their lives, and in which natural resource management may implicate many different social institutions.

In addition, earlier work on common property in natural resource management has drawn on and served to reproduce particular notions of the 'community' – as a bounded, relatively homogeneous entity. The 'community' emphasis tends to lead to a particular conceptualisation of relations with non-local actors and institutions. Either these are seen as causing external pressures (thus inappropriate state intervention has been seen as causing 'breakdown' in CPR systems), or – in a more positive vein – there are arguments for 'enabling external environments' and appropriate levels of 'nesting' of local within higher-level institutions, to enable effective self-government by CPR institutions (Ostrom, 1990). The result often is the ignoring of the ambiguities of institutional overlaps and the complex interaction between local and non-local institutional forms.

With a corporate, homogeneous view of 'community', much mainstream work on institutions has neglected questions concerning social difference and the diverse – and sometimes conflicting – interests of resource users. The focus on collective action has tended to direct attention away from the fact that whilst institutions can enhance co-operation, they can also be beset with conflict, factional division and power politics. Recent work on CPRs has acknowledged that early work on collective action assumed homogenous actors in order for the analysis to be more tractable (Keohane and Ostrom, 1995). The recent work has paid more attention to differences in people's capabilities (largely conceived of in terms of their assets), preferences (over policies and outcomes) and knowledge (conceived of as access to information, and 'belief'). Nevertheless this work is still open to critique for neglecting the socio-cultural dimensions of beliefs and information, as well as power asymmetries. The analysis also largely focuses on whether institutions can facilitate collective action despite heterogeneity, neglecting that institutions *per se* are heterogeneous, power-ridden and exclusive, and so might reinforce heterogeneous patterns of resource use based on dominance and dependence.

The over-reliance of early CPR work on economic views of human behaviour and on the notion of a universal rational, self-maximising actor has also been a source of critique of these approaches. Socioeconomics theorists (for example, Etzioni, 1985) and economic sociologists (for example, Granovetter, 1985; Granovetter and Swedberg, 1992) argue against methodological individualism. They stress the embeddedness of economic action in ongoing social and personal networks, and the socially constructed nature of economic institutions.

Anthropologists and sociologists working in natural resources management have argued that, in the NIE view, institutions are portrayed in functionalist and static terms, and their rootedness in the specifics of local history and sociality is ignored (Mosse, 1997; Mehta, 1997; Cleaver, 1998). There is an overemphasis on evolutionary perspectives which view institutions as moving towards 'efficiency', ignoring questions concerning political economy and history, as well as how what is 'efficient' for one person may not be 'efficient' for another. North (1990), for example, does use an historical analysis to argue why inefficient institutions are allowed to persist despite high transaction costs. However, there is a tendency to use

deterministic models to chart a high degree of causality between efficient or 'right' institutions and culture and economies, suggesting that some countries or cultures are prone to inefficiency due to the 'wrong' institutions. Hence, institutions are viewed in managerial or interventionist terms, still as outside people's ways of life and histories. Alternative approaches, grounded in anthropology and sociology, suggest that institutions can be viewed in less static and more processual and dynamic ways (see below).

In an attempt to break out of the local focus of much CPR research, attempts have recently been made to use CPR theory to address global environmental problems (Keohane and Ostrom, 1995). These explicit applications complement other work on the global governance of environmental issues which we discuss in Section 4.4. Applications of CPR theory have compared the local and international domains by using 'scale' to signify the differences between them, thus omitting the possibility of seeing them as interlocked. In applying the same analytical framework, this work therefore replicates many of the problems of the more local analyses. Without the conceptual tools for examining local–global relations in natural resource management in a more dynamic way, opportunities for seeing how local uncertainties are linked to global processes cannot be taken up. Furthermore, NIE approaches assume bounded and closed economic and social systems and equilibrating environments, rather than viewing the social, economic and ecological worlds as open and constantly subject to change and uncertainty. Consequently, livelihood strategies are not viewed as variable and diverse.

CPR/NIE approaches in general also presuppose a non-interactive divide between formal and informal institutions. Consequently, policy prescriptions have tended to focus either on state-level recommendations or on local-level (informal) institutions. This dichotomy fails to capture empirical realities in which interrelationships and overlaps link various institutional domains, refuting the existence of a watertight formal–informal divide. In this 'messy middle', institutional arrangements may be highly contested, and beset by ambiguity and openness to divergent interpretations. This may be a particularly significant area for understanding the arrangements through which people sustain their livelihoods in the context of uncertainties emanating from state programmes and environmental governance efforts (see Section 5). Yet within NIE and CPR theory, there has been virtually no attempt to conceptualise this messy middle terrain; indeed it has been obscured as an area of inquiry by the privileging of either the formal or the informal realm.

In effect, the mainstream NIE/CPR literature tends to see institutions as key in eliminating uncertainty, in terms of transaction and information costs. The basic assumption is that commonly shared institutions save the costs of monitoring and enforcing other people's behaviour. In most cases, institutions are seen as efficient ways of reducing uncertainty (for example, Williamson, 1985). Collective action theory also presents institutions as 'rules of the game' (Ostrom, 1990) and suggests that collective action will work where expectations persist that people and organisations will behave according to the rules. Collective action and compliance may be seen as 'rational options when they produce results that are beneficial to all, at times when self-interested action would otherwise produce collectively suboptimal results.

Hence, institutions tend to be seen as a way of regulating action to eliminate uncertainty, usually in terms of people's behaviour (for example, the Prisoner's Dilemma). Many analyses are not extended to include ecological uncertainties or the uncertainties created by global economic or environmental events,

which we term here livelihood uncertainties, even where the underlying collective action dilemma is conceptualised in terms of exogenous impacts on livelihoods, such as resource scarcity (for example, Wade, 1988). Thus policy suggestions often result in a focus on 'getting the institutions right' in order to guarantee or stabilise uncertain human behaviour, by, for example, establishing a formal legal system, fixed property rights or fixed norms of behaviour. Opportunistic and unpredictable behaviour are seen as liabilities. This is despite the fact that empirical research stresses the value of opportunistic strategies in coping with ecological and livelihood uncertainties (see Case 1, discussed in Section 5).

We do not intend to dismiss the many achievements of NIE and CPR theory. Not least, these perspectives have successfully established a tradition of concern with the significance of local institutions in natural resource management, underpinned by apparently robust theory especially appealing to economically minded policy-makers. Nevertheless the mounting critiques which we have briefly summarised here suggest a growing inability of these theoretical perspectives to comprehend the complex institutional arrangements in which people live their lives amidst today's uncertainties.

To some extent these perspectives – and their shortcomings – are echoed in the literature on governance of environmental issues in international contexts, to which we now turn. Our focus here is on how the literature conceptualises the complex interlocking of global and local realities. This is important given the ways in which the international arena is increasingly characterised by negotiations that have direct impacts on local-level livelihoods. Section 4.2 goes on to review whether and how debates around global governance within the literature of international relations conceptualise institutions and uncertainty.

4.2 The international context and questions of global governance

The last decades have seen a growth in the influence of supra-national and international institutions of governance – treaty organisations, trading blocs, conventions, standard-setting and monitoring organisations, donor consortia – which are increasingly embedded in a larger set of globalised economic and political processes. Such global institutions increasingly influence the control of resources and their management and exchange, thus directly and indirectly interlocking with local resource management practices. The growth of such institutions is validated by the scope of environmental problems, particularly those that are said to be global in scope and therefore beyond the sovereign jurisdiction of nation-states. The politics of the provision of solutions to the problems involves resource and technology transfer, elaborate financing arrangements, and international systems of surveillance for reporting and compliance. It is frequently assumed that international organisations are the appropriate vehicles to operate such mechanisms.

The crucial governance question for scholars of international relations (IR) centres on the relationship between these international institutions and the governments whose behaviour they are intended to regulate. Certain approaches within IR have tended to use similar arguments to those found in the CPR literature, looking at the international arena as a 'global commons'. Many such approaches, focused on the 'tragedy of the commons' scenario following Hardin (1968), view co-operation between 'self-interested' states as difficult to achieve in the absence of overarching regulatory institutions. 'Uncertainty' is thus viewed, for the most part, in terms of a Hobbesian anarchy which is said to characterise an international system in which there is

no central authority (Bull, 1977), suggesting the need for the establishment of global institutions to regulate the behaviour of states and to deter 'free-riding'. In the environmental arena this understanding leads to, for example, the efforts of states to impose technocratic, 'command and control' policy mechanisms which apply pollution targets to all parties to global accords on an equal basis.

In general, this literature tends to focus on the problems of collective action, conceptualising institutions as the formal organisations that will regulate action. While the scale of analysis is different, many of the critiques of this approach outlined in Section 4.1 in relation to local institutions also apply here. Thus much conceptual analysis of global governance centres on a single type of formal organisation – the state – viewing it as somewhat homogeneous, and takes a rather static and ahistorical view of institutions (Young, 1994; Gordenker and Weiss, 1995; Haas *et al.*, 1993). Regime theory, which is the dominant framework for thinking about how the international system can address issues of environmental change (Rittberger, 1995; Haas *et al.*, 1993; Vogler, 1995; Smith, 1993), has a limited view of institutions and focuses on particular issue areas, formal institutional arrangements and the configurations of state interests. A preoccupation with inter-state relations has helped to enforce a distinction between international and domestic politics, the global and the local, despite the recognition that the permeability of the distinction between the two is such that the binary opposition serves only to add to rather than resolve analytical confusion (Putman, 1988; Keohane and Milner, 1996). Because of this, neither the 'messy middle' between national and international (such as links between particular sections of the state and foreign donor or business interests), nor the myriad capillaries of political and economic power that connect systems of natural resource management across the globe have received systematic attention in the study of global environmental politics.

Recent work in the IR literature on 'governance' is exploring useful ways of thinking about the plurality of institutions involved in these networks of environmental governance, even though institutions still tend to be defined in terms of formal organisations. The term 'governance' in IR has become something of a catch-all to describe the ways in which the activities of a multitude of actors, including governments, NGOs and international organisations, increasingly overlap (Rosenau and Czempiel, 1992). It describes a complex tapestry of competing authority claims. For many, pluralist models of global governance are seen as the most appropriate, efficient and legitimate means of handling problems that lie beyond the ability of any one actor to address (Gordenker and Weiss, 1995). The international system of environmental governance is characterised by competing institutions and overlapping jurisdictions of state and private interest groups. This has produced a complex institutional mix, including exclusively 'private regimes' (Haufler, 1995), public-private partnerships (Glasbergen, 1998) and non-state 'regimes' such as the Forestry and Marine Stewardship Councils (see Newell, 1996). What these changing alliances of authority indicate is a dispersal of regulatory power within the global system, partly in response to the impact of globalisation upon traditional structures of authority. These new understandings see networks of governance as operating both horizontally – involving the co-operation of a plethora of actors relevant to the task of addressing the process of environmental change – and vertically – seeking to draw in the participation and co-operation of actors at national and local levels.

It is increasingly recognised that institutions for the governance of the global environment must address issues of knowledge uncertainty. A significant literature on 'epistemic communities' (see Haas, 1992) argues that, under conditions of knowledge uncertainty, when confronted with a new environmental challenge governments call upon scientists to define risks and provide them with an assessment of what types of institutional response are appropriate. Whilst these arguments recognise the existence of knowledge uncertainties, they tend to privilege the knowledge of an elite minority, rather than accepting plural definitions of risk and uncertainty as understood in other knowledge systems. Science is regarded as being neutral, objective, and above the political fray. The perception among policy-makers and the public alike of science as the highest form of knowledge serves to render other forms of relevant knowledge marginal to environmental decision-making. Policy-relevant inputs become those that are technically oriented and scientifically grounded. This privileges organised scientific lobbies and institutes in the North and downplays other forms of knowledge (for example, 'lay', indigenous, and non-Western knowledges). The fact that all forms of knowledge, including that of scientists, are uncertain is rarely problematised, although some recent strands in literature on the international relations of environmental change draw on work in the sociology of science to offer a more nuanced account of the role of science in international relations. Litfin (1993) and others, for example, have shown how science is used as a validating mechanism for competing authority claims about what is relevant knowledge for policy.

In sum, the international governance literature offers certain new means for conceptualising the increasingly complex institutional mix, given the multi-tiered and multiple levels of decision-making in environmental processes. However, as with the CPR work, much of the literature still draws largely on notions of collective action that are open to serious critique. Furthermore, the focus is largely on formal institutions, and sharp distinctions are often maintained between local, national and global settings. Although the notion of the 'state' as the key actor in environmental governance has been problematised, this has not been extended to the complex, interlocking and 'messy' nature of institutions, except in emerging work on networks. In thinking about rural livelihoods, we need to be more aware of overlapping jurisdictions that cross-cut formal–informal and global–local divides and that involve contested knowledges. We now go on to explore other approaches, including from within anthropology, sociology and legal pluralism, which have started to explore ways of breaking down these dichotomies. These perspectives offer a range of alternative theoretical perspectives which might offer ways of rethinking conventional approaches concerning institutions in the context of uncertainty.

4.3 Anthropological and sociological perspectives on institutions

Much social anthropology has been concerned, broadly, with the study of institutions. Anthropological interest in institutions certainly did not emerge from a natural resource management context; rather it addressed the institutionalisation of a far broader range of social, economic and political affairs, including kinship, descent and inheritance; religious issues; production, reproduction and distribution; and (as will be discussed in Section 4.4) social ordering and justice. Consequently, anthropological approaches to natural resource management have been less a search for purposive natural resource management institutions (or

based on assumptions that these exist or existed), and more a reflection on how natural resource management takes place through and in the context of social institutions not formed for that purpose. Perspectives have differed, however, and each change in theoretical traditions treats institutions in different ways.

The anthropological study of social institutions for natural resource use and management proceeded, therefore, along lines of debate drawn in wider anthropological discussions of society and culture. To those who understood cultures as symbolic systems, ideational constructs, and the overt expression of deep mental structures characteristic of specific societies, social institutions were the manifestation of these logics of ideation. To others, everything was explained in terms of practical reason: functional or instrumental principles of social action that worked to maintain social structure, social order, or to satisfy basic human desires. Both these approaches – whether deep-cultural or rational-pragmatic – were ahistorical and static. They focused on extant institutions and assumed them to be seeking stable equilibria through either the development of functional complementarities or rule-governed competition. None of these approaches examined the dynamic formation and change of social institutions over time and space. This meant that, viewed from any of these perspectives, uncertainty always had a disruptive influence on societies. Historical approaches to the development and change of institutions came largely from Marxist theory – which has its own internal debates. They brought attention to bear on social change, and they sparked a slightly different set of debates on the primary causes of change – do individuals initiate change that is significant and lasting, or does social transformation always arise from contradictions present in social relations that determine what actors actually do?

The 'middle ground' has been a much inhabited terrain of more recent and eclectic social theory, throwing up assorted perspectives on the relationships between institutions and uncertainty. In brief, sociologists of the middle ground such as Giddens (1984) and Bourdieu (1977) argue that structure and action reinforce each other, thus conceiving of institutions less in terms of fixed rules and more in terms of practices. Some action and practices serve to reproduce structures, whereas other action has agency, subverting established norms and perhaps serving over time to shift them. This interplay of agency and structure only becomes visible through a historical sociology, albeit perhaps a micro-history over short periods of time (Abrams, 1982). From this perspective emerges a view of institutions as what people do – their practices – albeit those practices that are relatively regularised over a period of time. Institutions exist only in as much as they are continually practised or invested in, and rules and norms cannot be considered apart from their constant making and re-making through people's practices.

In this sense, formalisation of an institution itself needs to be seen as a practice which regularises other practices; for example, the constituting of a committee with a secretary and treasurer may be seen as an alignment with the state's legal forms and norms. Equally, casting something as an 'institution', (re)inventing tradition and presenting something as 'the way we have always done this' and as a matter of 'collective interest', can similarly be understood as a social practice to gloss over unwanted complexity, conflict and ambiguity (for example, Li, 1996; Nuijten, 1992). In these respects, a practice-based approach to institutions

helps to deconstruct the distinction between formal and informal institutions which, as we have shown, characterises mainstream approaches to institutions in natural resource management.

Giddens's structurationist perspective offers a conception of institutional dynamics that accommodates the structuration of power and influence, in a frame that is open to both agency and uncertainty. This perspective could illuminate how uncertainties engender rapid institutional dynamics: new conditions or sudden events provoke creative agency which may lead rapidly to new sets of more or less regular practices, only for these to shift again as conditions change once more. In as much as past conditions leave a legacy on which future responses depend, this perspective on institutional dynamics acknowledges path dependency. It can accommodate the articulation of regularities in local activity with those of the broader world, as neo-Marxists emphasised, while seeing this articulation through the lens of people's practices, and the ways they reflect on and exert control over their activities.

Work taking this perspective to the impacts of development policy shows clearly how planned interventions have unpredictable outcomes as state projects and practices play out in relation to people's own projects and practices, and the relations of power in which they are structured (Long and Van der Ploeg, 1994; Long and Long, 1992). In paying attention to the interlocking of different stakeholders and their practices emanating from different sites, this approach to 'interface analysis' enables a focus on the processes operating in the 'messy middle ground' between community and state, which, as discussed earlier, mainstream CPR approaches have conceptualised poorly.

A growing body of work by anthropologists, geographers and social historians is using and developing this broad type of perspective on institutions as social practice in relation to natural resource management issues (for example, Leach, 1994; Berry, 1993, Li, 1996). Attention is drawn to people's socially differentiated experiences in relation to the structuration of particular institutions, and to how people may draw differentially on a wide range of social and political institutions in order to obtain or defend access to the same resource; for instance, land may be accessed and claims may be defended through appeals to patrilineal descent, matrilineal relations, marriage, borrowing, markets or relations with state agents, depending on one's gender, age, identity, origins etcetera. These insights are similar to those formalised in work on 'forum shopping' within legal anthropology (see Section 4.4). At the same time, Berry (1993) notes how people may actively 'invest in' social institutions that might be significant in defending their future resource use and management claims – for instance by gift-giving or contributing to ceremonies, even to the extent of sacrificing productive investment in natural resource management in the present.

Anthropologists and sociologists have also argued for the need to incorporate the symbolic dimensions that people accord to resources. Seen in this light, struggles over resources are seen as simultaneously struggles over meaning (Agarwal, 1994), where the use and control of resources may be both material and symbolic means of renegotiating one's social position within broader social networks (Whitehead, 1984; Guyer and Peters, 1987). Increasingly, it is recognised that people are always members of multiple institutions and that people's access to resources is influenced by their positions in a wide variety of social networks, not necessarily linked to natural resource management (for example, a woman's access to resources may depend

on her position in her household which is in turn linked with the status of her natal family in descent institutions).

The notion of investing in multiple institutions with different meanings can help comprehend the enabling aspects of institutions. By keeping open diverse options and opportunities, people cope with ecological uncertainties or the uncertainties for livelihoods generated by vagaries in national or international markets or by political shifts. Whilst livelihoods in flux may draw only periodically on any particular social institution for natural resource management, its persistence may nevertheless be buffered by people's investment in it for other social reasons.

A second way in which a focus on practice helps clarify the 'messy middle ground' is through its transcendence of local versus national or global distinctions in concepts and ideals. Anthropological work has amply shown how the concepts people practise in understanding their broader world are those of their everyday lives writ large. Inversely, it has shown how mass reflection on society at large (for example, in mass media) influences people's own everyday relationships. These approaches have been important in several fields, whether in understanding how people reflect on their economy (for example, Parry and Bloch, 1989) or their environments (for example, Croll and Parkin, 1992; Fairhead, 1992). Work on the sociology of knowledge, and in particular on feminist critiques of science, has shown explicitly how people's perspectives on the world, and the questions they ask science of it reflect their broader position in social institutions (see, for example, Harding, 1987; Haraway, 1989). Indeed, the existence of plural and partial perspectives is one of the sources of what we have termed 'knowledge uncertainties'. Anthropological work on rural people's knowledge complements work in the sociology of science (for example, Jasanoff and Wynne, 1995) to show how diverse knowledges reflect diverse social commitments and power positions within rural societies, as well as between citizens and scientists or administrators.

These insights suggest important – and as yet little-researched – questions concerning the categories through which people understand the ecological and livelihood uncertainties they are known to face. Whilst some work has explored how publics understand environmental uncertainties and hazards in the North (for example, Irwin and Wynne, 1996; Irwin, 1995), including those uncertainties related to global environmental change, there has been little, if any, research in relation to the uncertainties affecting rural livelihoods. Within the large anthropological literature on rural people's knowledge (for example, Scoones and Thompson, 1994), only a few works have examined how people conceive of uncertainties (for example, Richards, 1989) and this examination has not extended to differing perceptions of uncertainties and risks linked to global environmental and economic processes.

There have been attempts recently to move beyond the local in anthropology to include the 'global' without setting up dichotomies (for example, the 'multi-sited' ethnography of Marcus, 1995, and the recent work of Appadurai, 1996) Some work in this genre has applied a structurationist perspective to processes linking rural livelihoods to national and international processes (for example, the actor-oriented work of Long and Long, 1992). However, a rather different theoretical tradition has drawn on the work of Foucault and his concept of discourse (for example, Ferguson, 1990). Rather than focusing on the structuration of institutions through the interplay of agency and structure, where both agents and structures 'have power',³

Foucault stresses the mutual production of institutions and knowledges, which embodies and reproduces relations of power (Foucault, 1980). In strong contrast with structuration theory, people's apparent agency – and even their belief in it – is ultimately a product of these relations, and is analytically relevant less for the creativity it brings to social life, than for the way in which it is structured by and constrained within dominant discourse.

This perspective serves to highlight how discourses of global or state development or environmental governance are embodied in policies, their rationale and implementing bureaucracies. Work in this vein explores the effects these discourses may have on rural people's lives – not least in introducing uncertainties as people have to deal with these policies and bureaucratic effects (for example, Ferguson, 1990). Rural livelihoods and local institutions for natural resource management may be conceived of as offering alternative discourses of resistance which development discourses encounter, or which may become manifest as new social movements (for example, Peet and Watts, 1996; Escobar, 1995).

However, several anthropologists have once again expressed concern at the subsumption of institutional dynamics and agency into the play of discourses, at least as incorporated into the development studies literature. Bureaucracies have been portrayed as overly monolithic; the subsumption of practice into discourse appears to absolve the actors involved of consciousness, intentionality and, in particular, responsibility, while obscuring the everyday dilemmas and situations of interaction faced by rural people and administrators (Grillo and Stirrat, 1997; Sivaramakrishnan and Agrawal, 1998).

Nevertheless, what discourse theory has done is, first, to focus attention closely on the relationship between institutions and the knowledges they purvey, showing the centrality of power relations to exploring knowledge uncertainties. Second, it emphasises that an analysis of institutions – including those involved in environmental governance – must extend to include the conceptual regimes of its publics, since part of an institution's power is public belief in the institution's categories, concepts and issues.

It also focuses attention on how the discourses of powerful institutions – and the broader 'regimes of truth' they promulgate – present as both certain and predictable processes that may actually be uncertain and unpredictable. In relation to ecological uncertainties this has been argued for the framing of scientific and policy knowledge around global climate change (Wynne, 1990) and tropical forest dynamics (Fairhead and Leach, 1998), for example; in relation to livelihood uncertainties, Carter (1997) explores how economic theorising and policy-making have been dominated by equilibrational images of national and global economies.

Amidst the diversity of traditions and contributions, then, anthropological and sociological work on institutions suggests at least three important emphases which stand out as suggesting useful ways forward in considering institutions and natural resource management in relation to uncertainties. The first is a conception of institutions in terms of practices and their social, cultural and political structuration; of what people do, and their structured capacity to respond to events in shaping their own histories. The second is an ethnographic approach to the processes and relations operating within and between multiple sites, transcending local–global and formal–informal divides. And the third is a conceptual linking of institutions, knowledge and power, suggesting the importance of analysing institutions and uncertainties as part of what people know or believe, as well as of what they do.

Some of these themes are echoed when we turn to studies of law and society and the ways they conceptualise institutions and uncertainty.

4.4 Law, institutions and society

Rules are easily discussed as institutions, but whether particular rules fall within the domain of formal or informal institutions can often be a difficult question. Law presents no such problem. Laws are generally the generative principles of formal institutions. They also govern the conduct of such institutions. In most situations, institutional change requires a prior amendment to law or at least reinterpretation of extant legal wisdom.

Legal institutions concerned with the definition and maintenance of justice, social order and boundaries of legitimate conduct exhibit several interesting relationships to uncertainty. At the normative level, formal institutions are designed to minimise uncertainty (in terms of standardising interpretations of the law) and to concentrate judicial powers in authorised structures. This contrasts with realities at the practical level where a multiplicity of legal institutions exists. These institutions can either work to provide opportunities for negotiation or accentuate uncertainty, especially for socially less privileged groups. We witness such processes when principles of customary law, natural justice and universal rights are introduced into arenas governed by national legal systems.

Scholarship on law and society has generally sought to describe, in evolutionary terms or otherwise, the emergence of legal rationality and the fixed set of normative considerations that exemplify jurisprudence (Moore, 1978). Most frequently legal scholarship, whether rational-choice or structural-functionalist in persuasion, has also assumed law to serve as a social glue and ordering mechanism. When we discern the patterns depicting the rule of law in any society, we are assumed to be making visible the contours of relatively stable authorised rules that are enforced by legitimate procedures for the maintenance of social order. The belief that societies have a single dominant legal framework has been a cornerstone of those theoretical approaches that associate law with legitimated state power and a shared rationality informing socially administered justice (Humphrey, 1985).

When the study of law and society first admitted to the existence of legal pluralism, it proceeded with the understanding that there was a Western legal sensibility and several non-Western legal rationalities. Pluralism, and the institutional flux that accompanied it, was described as the conflict between and coexistence of modern Western jurisprudence and custom. Since the 1980s, it has been left to legal studies in the last two decades, especially legal anthropology, to come up with a more dynamic and processual understanding of law and society (Merry, 1988). In this new work we find that realms defined by different legal rationalities are themselves seen to be internally differentiated, changing over time, and constituting in their interaction other realms that do not neatly fit into the categories modern and customary, local and national, formal and informal.

A pioneer of legal anthropology, Max Gluckman has expressed these ideas very well:

We have to see societies as not entirely different in kind, but as varying in the kinds of disputes between individuals, related in some specific way, which provoke major confrontations in the wider polity ... we have also to analyse the types of public arenas in which battles can be fought without recourse to arms. (Gluckman 1975: 337)

Numerous studies have demonstrated the value of this approach (Moore, 1986, Starr and Collier, 1989; Lazarus-Black and Hirsch, 1994). This work has documented the proliferation of legal institutions with the growing complexity of cultural encounters. It has also shown that people actively seek, and thereby maintain, legal forms that operate under different principles as a way to deal with uncertainty.

National and international contexts are increasingly important in developing an understanding of local situations, as the law of the nation-state and even international regulations have penetrated and shaped local arenas. Colonialism pulled entire legal systems across national borders and imposed them on very different social-cultural systems (Merry, 1991; Chanock, 1985). The process of nation-state formation has produced multi-ethnic societies in which local groups struggle to maintain autonomous legal systems, while national interests endeavour to unify and standardise these diverse systems. Recent analyses also stress the transnational contexts that circumscribe and influence local systems (Merry, 1992). For example, 'indigenous peoples' often use transnational discourses of human rights or self-determination to support local legal claims (Wilson, 1997). Again, global and local shifts in identity and sovereignty are occurring as local self-determination is legitimised by an increasingly global, multinational legal order.⁴ The emphasis on pluralism and multiple institutional domains thus focuses attention on how different local or informal forms of ordering still persist in the context of globalisation.

Recent studies of legal pluralism have focused on the mutually constitutive nature of coexisting legal systems. This includes the study of the relationship between state law and other normative orders. There are four new ingredients in the contemporary anthropology of law: first, a shift toward national and international contexts; second, greater interest in cultural analysis – in the way legal institutions and actors create meanings, the impact of meanings on social relations, and the effect of cultural frameworks on legal procedures; third, a renewed interest in legal pluralism freed of static perspectives – situations of legal pluralism are now often defined as relations between different sets of cultural practices and discourses; and fourth, an increased attention to power and the way law constructs and deconstructs power relations.

Law itself is increasingly conceptualised as plural, open to a variety of interpretations and therefore either indeterminate or incoherent (Merry, 1992). Uncertainties inevitably emerge from the processes of institutional negotiation over rights, rules and order. The variety of ways in which these are interpreted can increase knowledge uncertainties. Given such negotiation, power relations become all-important. This has significant implications for notions of governance. A conventional view sees the 'rule of law' as the one certainty in an uncertain world, with rules as the final arbiter and guarantor of effective action. The creation of a unifying legal and regulatory system is therefore seen as a central task, whereby the uncertainties of multiple overlapping formal and informal legal systems are eliminated and order is imposed.

Yet, in practice, such plural systems may offer more effective routes to negotiation of outcomes and compromises in complex and uncertain settings, as shown for examples in studies of legal pluralism and

forum shopping (Benda-Beckmann *et al.*, 1981, 1997; Meinen-Dick and Bruns, forthcoming). Recourse to different sites for negotiation at different levels offers opportunities for more adaptive, locally attuned responses to the inevitable consequences of ecological, livelihood and knowledge uncertainties. Whilst formal law may help to specify a broad and common framework, there will always exist a plurality of interpretations. The new insights on the overlapping nature of institutions in legal pluralism help us to comprehend how interpretations are negotiated across institutional arenas, with law emerging less as fixed rules than as practice worked out in context. Thus processes of mediation, bargaining, conflict and power become key in institutional landscapes where uncertainties prevail.

5. UNCERTAINTY AND INSTITUTIONS: THREE CASE STUDIES

This section offers three short case studies that examine the interrelationships between ecological, livelihood and knowledge uncertainty and institutional forms. The three studies address different aspects of the linkages between institutions and uncertainty. Case 1 sets out to illustrate the crucial aspects of ecological uncertainties that rural institutions adapt and respond to. Case 2 takes the case of water to illustrate how conventional approaches in water management have failed to recognise the dynamic, *ad hoc* and messy character of institutions governing people's livelihoods and how they respond to livelihood uncertainties caused by water scarcity. Finally, Case 3 uses the example of biotechnology to argue that local and global divides are rendered increasingly redundant, while it also examines the interrelationship between institutions, knowledge forms and uncertainty.

Case 1. Ecological uncertainties: grazing resource management and tenure in pastoral areas of Africa⁵

Ecological uncertainties dominate the highly variable pastoral systems of Africa. Spatial variation in resources – from poor-quality, low-productivity dryland pastures to higher-value lowland 'key resources' – combines with temporal seasonal and interannual variation, with rainfall being the key driving variable. The result is a system that can often be characterised by non-equilibrium ecological dynamics (Behnke *et al.*, 1993; Ellis and Swift, 1988), where the features of equilibrium regulation, static carrying capacities, and fixed resource units, so often assumed in pastoral area planning and development, are inappropriate (Scoones, 1994). Pastoral strategies based on opportunism – focused on flexible movement and responsive livelihood adaptation – are therefore central to pastoral systems in dryland Africa (Sandford, 1983).

In the context of such ecological uncertainties, pastoral resource management institutions must respond and adapt. Where negotiations⁵ must happen in response to a sudden change in the local situation, and where new and flexible contracts must be formed in consequence of unexpected circumstances, institutions derived from a complex interplay of individual and group interaction, based on the negotiation of rights within and between social networks, are likely to be the most effective at managing resource access in such dynamic ecological settings. Formalised organisational structures, based on territorial boundaries, may be too inflexible to adapt to such ecological uncertainty, being too cumbersome and unwieldy in consequence of the

constraints of procedure, bureaucracy and legalistic approaches. The result may be excessively high transaction costs, as well as failure to respond quickly and opportunistically. As Roy Behnke observes:

In pastoral African tenure systems the natural landscape is seldom carved up into neat territorial packages owned by distinct groups or individuals. Instead, any area is likely to be used by a myriad of different ownership groups of variable size and composition, with overlapping claims to territory derived from particular claims to different categories of resources within it. (Behnke 1994: 7)

Therefore, with a disaggregated view of the grazing landscape and the social processes governing its management, a complex pattern of tenure institutions is observed, with some patches being exclusively managed, while others are managed intermittently as exclusive resources and at other times more loosely. It is therefore likely that property regimes will overlap in both time and space with a variety of different institutions – operating at different scales and with different degrees of intensity – being involved in the management of different portions of the landscape.

But are complex, overlapping tenure regimes, regulated by vague or ambiguous rights and governed by flexible institutions with competing claims, an effective response to inherent ecological uncertainties? In situations where various resources coexist within the landscape – grazing is juxtaposed with arable; water points and salt licks are scattered across the landscape; and high-value key resources are found alongside low-value extensive resources – it is not surprising that a complex system of multiple use rights emerges. Superimpose upon this the temporal dimension of changes in the relative values of different resources, and the need for flexible responses to local resource scarcity and the likelihood of competing claims increases. Thus, in highly variable grazing environments local, flexible and *ad hoc* institutions, with low transactions costs and rooted in existing social networks, appear an effective way of coping with ecological uncertainties (Sylla, 1994).

This complexity in institutional forms may appear to some observers to be chaotic and inherently inefficient. Indeed many attempts during the colonial era and since have been focused on somehow 'rationalising' this apparently disorderly mess (Chanock, 1991). Thus chiefs, headmen, councillors and committee members are often creations of the state wishing to intervene, organise and develop. The search for tradition on which to base such interventions has been a powerful guiding principle. Somewhere, it is argued, behind the apparent mess of conflicting, overlapping and contested institutions, there must be an original, legitimate and 'traditional' form. The argument for 'resurrecting traditional institutions', which have somehow 'broken down' or 'disintegrated', has of course become a rallying cry for development agencies today in search of sustainable development solutions.

For example, across Africa different types of intervention – such as grazing schemes, reserves and associations – have been encouraged, based on the notion of a corporate management 'community' linked to a territorially defined grazing resource. For a variety of reasons, these have not been huge successes. Ecological variations in resource productivity and quality mean that a fixed, sometimes fenced, boundary restricts the ability to move flexibly. The result has often been an increase in conflicts, and a decline in regular but informal *ad hoc* institutional arrangements for grazing management (Scoones, 1999). In addition,

certain individuals may gain to the detriment of others by being granted new authority and resources under re-created 'customary' institutional forms. Thus, reflecting on a grazing scheme in Zimbabwe, Ben Cousins observes:

The 'grazing scheme' ... denoted much more than a project to manage grass and livestock; it was at the centre of a carefully nurtured image, or representation, of a self-reliant and dynamic 'resource managing community'. This image was being used as a vehicle for the establishment of purely private economic ventures undertaken by the Chamatamba elite. (Cousins, 1993: 30)

Thus a recognition of ecological uncertainties in pastoral areas requires an appreciation of the effectiveness of informal, *ad hoc*, often ambiguous and overlapping institutional arrangements for resource management. Such a recognition also points to the limitations of a standard corporate model of territory-based resource management. But there are clearly limits to exclusively local, informal arrangements in pastoral areas. As ecological and other uncertainties extend their spatial reach, and resource competition in pastoral areas intensifies, other institutional arrangements for allocating resources, defining property regimes and resolving conflicts need to emerge. Our understanding of the local institutional processes points to particular directions for such arrangements. Strictly defined land use plans or legal stipulations cannot be sufficiently responsive to the inherent ecological uncertainties that prevail in such areas. Instead, a more processual approach to wider enabling institutional frameworks is required. Rather than focusing on territories, boundaries and resource regulations, this instead would emphasise the processes by which negotiations at this wider level – for example between pastoralists and agriculturalists in the Sahel, or protected area managers and pastoralists in east and southern Africa – can take place (Vedeld, 1993). This requires new forms of governance, based on flexible and plural legal frameworks, and institutions that are rooted in an appreciation of the consequences of ecological uncertainty in pastoral areas.

Case 2. Livelihood uncertainties: water management institutions as rooted in social practice, history and culture

Coping with scarce and variable water supplies constitutes an intrinsic element of the livelihood uncertainties confronting many rural people. A vast body of work has documented the various institutional arrangements employed by rural people in managing their water supplies, often under conditions of water scarcity.⁶ For example, early pioneering work on irrigation by Coward (1985) and Uphoff (1992) highlighted the various strengths of indigenous systems and the fallacies committed by planners who assumed that they were working *de novo*, instead of investigating and building on existing institutional structures in water schemes. Similarly, work by authors such as Wade (1988) and Ostrom (1990), drawing on collective action theory (see Section 4.1), has analysed the factors enhancing collective action in irrigation systems and the conditions under which local institutions are employed to manage local water resources. Another strand of work has turned its attention to the flaws and failures of public water management systems and processes; consequently it advocated a shift to devolve management to local farmers, thus increasing economic

efficiency and transferring the responsibility of resources management to local users (see Sengupta 1991; Meinzen-Dick *et al.*, 1994).

Despite the differences in approach and disciplines, most of this work has had a clear policy message, namely that community management is both possible and desirable, and that local institutions matter. This has led to 'community management' becoming a buzz phrase in the water sector. Within policy circles, participatory, decentralised farmer-managed irrigation systems are being promoted, alongside indigenous techniques of water management and local water user committees, as the best alternatives to the failed top-down centralised water management systems of the past.

In recent years, however, a growing body of work has employed historical, sociological and anthropological approaches to point to some of the limitations of CPR and economic approaches to studying and promoting water-related institutions (for example, Mosse, 1997; Mehta, 1997; Cleaver 1998; Potkanski and Adams, 1998). Drawing largely on the anthropological critiques of CPR theory discussed in Section 4.3, this work has criticised the tendency to valorise the virtues of indigenous institutional arrangements without understanding their complexity. Criticism is also levelled at the use of ahistorical and apolitical understandings of local institutions, at static notions of the dynamic relationship between individuals and institutions, and at the ignoring of overlaps between state and local institutions. Moreover, conventional community-based management approaches have based their analyses on simplistic notions of the 'community' and community management. The cases presented below highlight some of the themes now being emphasised.

Mehta's (1998) work in the water-scarce Kutch district of India suggests that institutions governing water use are highly differentiated and often serve to reinforce dominant power and social relations. In Kutch, which is characterised by uncertain and erratic rainfall, tanks are often the only water sources and are central to the lives of the people. They are used for bathing, drinking, watering livestock and, in some cases, irrigation. Until recently, tank management was the responsibility of the rich and powerful, who would pay for their upkeep. Tank management went hand in hand with the notions of blessing and benediction. Hence, tank cleaning and management activities are considered to generate an important form of symbolic capital (see Bourdieu, 1977) in the community. The gains arising out of tank management are therefore not just material but also symbolic, such as reward in the afterlife and prosperity for one's descendants. By enhancing the power and status of tank benefactors, indigenous institutions thus reinforce the power and prestige of the rich and powerful in the community. In the past few decades, state-sponsored drought relief programmes have increasingly assumed responsibility for tank maintenance with the aim of drought-proofing the area and eliminating water scarcity. Contrary to the popular view that these have displaced local initiatives, informal arrangements to manage tanks still exist. As and when the need arises, local collections are initiated and tanks are de-silted. These activities do not proceed according to fixed rules, but instead have an *ad hoc* character. In practice, tanks are managed through both state and local initiatives, though the local initiatives are not openly acknowledged. In both cases, it is the rich and powerful – usually men of the higher castes – who tend to benefit due to their control over land and other resources.

In a similar vein, research by Mosse (1997) has shown that community institutions concerning tank irrigation management in south India cannot be viewed in isolation from the political structures of region and state and the wider set of exchanges between different villagers. Tank management also needs to be viewed within the specificity of local socio-cultural forms and historical particularity. The systems are sustained not merely by a system of agreed rules (Mosse, 1997: 481) for the benefit of all; instead rules generally encode the interests of the elite and easily serve to establish relations of dominance and control. When viewed in such a way, irrigation tanks in Tamil Nadu are not 'simply resources of physical inputs (irrigation water). They are also repositories of symbolic resource' (Mosse: 1997: 474). Like village temples, they are public institutions characterised by social relations, status, honour and prestige. Hence, the institutions governing them cannot merely be viewed in terms of individual economic costs and benefits as espoused by much conventional institutional theory. Such views do not make room for the fact that material interests cannot be separated from social relationships, or for the fact that natural resources management also proceeds out of shared assumptions concerning issues such as justice, fairness and reciprocity (Douglas 1985; Mosse, 1997).

Cleaver's (1998) research in the Nkayi district of Zimbabwe reinforces the view that institutions governing water management are opaque, flexible and contingent. Conventional institutional theory would have us believe that most water management practices take place through formal bodies, such as water committees. Cleaver's research findings suggest, however, that most of the action concerning water takes place outside the formal realm in the context of the daily practices of everyday life and through regular forms of social interaction mediated by existing social networks. This contradicts a notion of 'robust' institutions that deal with problems collectively when a problem arises with fixed rules concerning compliance and non-compliance. Despite being in a water-scarce area, Cleaver recorded no fixed rules about the rationing of water during drought periods. Water was considered a 'moral right'; hence stealing it was tolerated, and villagers tended to steer clear of sanction, opting often instead for negotiation and conflict avoidance. Here, too, we see uncertainty being dealt with by means of variable institutional responses that lack explicit or rational rules or regulations.

These three examples all show how – in contrast to the assumptions of much conventional institutional theory – institutions are embodiments of social practice and are moulded by social and power relations (as was argued in Section 4.3). Institutions do not merely serve rational or economic ends, but are also rooted in symbolic constructs or meanings and hence cannot be viewed merely in purposive terms. In many respects, natural resources management (NRM) institutions and practices are synonymous with people's everyday life practices and ways of viewing the world. Institutions respond to livelihood uncertainty in flexible ways, without a display of hard-and-fast rules, often endowing rules with an *ad hoc* character. Frequently the distinctions between formal and informal arrangements are blurred. Frequently donor attempts to eliminate livelihood uncertainties caused by water shortages neglect these crucial aspects concerning coping with livelihood uncertainty. Consequently, we have witnessed the proliferation of simplistic interventions for 'community' management – increasingly promoted in donor discourses – which both override on-the-ground realities and undermine the flexible and dynamic character of local institutional arrangements, their dynamic

responses to uncertainty, and the socio-cultural, economic and political contexts within which they are embedded.

Case 3. Knowledge uncertainties: the case of biotechnology

Livelihood uncertainties have always characterised the lives of rural people in relation to the management of natural resources. Yet the growing importance of new technologies such as biotechnology points to various ways in which the range of uncertainties impinging on poor people's lives is increasing, and in which the institutional arrangements mediating access to and control over natural resources are becoming increasingly complex. Current debates around biotechnology illustrate well the interaction between ecological, livelihood and knowledge uncertainties. Through processes of genetic engineering, new forms of ecological uncertainty are being manufactured, as isolated genetic materials are altered and recombined to produce organisms that would not occur under natural recombination. Debates within science on these processes are highly contested, increasing the knowledge uncertainties that confront both policy-makers and consumers. And, as these processes become increasingly technologically controlled, local natural resources are caught up in global circuits of commerce, a development that has significant implications for poor people's control over their livelihoods.

Issues of ownership and control over resources, and the commodification of local knowledge, are being defined in terms of economic, political and aesthetic regimes constructed and contested at a global level, bringing local practices and institutions into struggle over access to and use of resources, and producing new forms of uncertainty and resistance. The contradictory tendencies in natural resource management caught between structures of global governance and local participation become evident. On the one hand, there is the increasingly monopolistic and exclusive use of resources granted under global conventions on patenting and intellectual property rights which devalue local knowledge and privilege the technology of global corporations. On the other hand, indigenous knowledge and local products are being revalued at the same time and as part of the same process, though power relations mould the relations between local and global institutional structures.

Work by Miller (1999), focusing on the case of the neem tree in India, looks at the process of enclosure and commodification of local knowledge and local resources by global corporations. She describes the transformation of local systems of knowledge, or commonly shared intellectual property, into private property through the use of patenting, and she draws parallels with the dispossession that occurred as a result of the transformation of the shared commons into private property. She suggests that the controversy in India regarding the neem tree illustrates the process of global corporations enclosing local knowledge, often benefiting from extensive indigenous experimentation and local scientific research. Neem tree products have been used for centuries for their medicinal and pesticidal properties, yet in the last fifteen years neem has become 'an agro-industrial celebrity'. Since 1985, US and Japanese firms have taken out more than a dozen US patents for a variety of neem compounds. The process of patenting shifts control, and grants monopoly rights to transnational corporations over resources that have long been locally identified. Collective knowledge of nature is enclosed and transformed into a resource for national and global production, yet the

local communities are unrewarded and neem seeds become too expensive for farmers to purchase, threatening local livelihoods.

In many ways, the current 'gene revolution' finds echoes in the earlier debates around the 'green revolution', particularly in relation to the loss of control over livelihoods where farmers cannot save their own seeds. Shiva (1995), for example, highlights how biotechnology changes biological systems to produce seeds that cannot reproduce themselves, thus dispossessing the farmer of seed as a means of production. This shift in control is starkly illustrated by Monsanto's 'terminator technology'. This is a method of incorporating certain genes which cause a seed to die in the early stages of germination if planted for a second year. Farmers therefore cannot grow food from saved seeds, and have no option but to buy new seeds every year from the corporation (Cornerhouse, 1997). Livelihoods become increasingly uncertain and institutional arrangements more complex as global institutions, such as patents and the World Trade Organisation, impinge on and intersect with local institutions in mediating access to and control over natural resources. Distinctions between the 'local' and the 'global' are thus rendered increasingly indistinct.

Studies on the 'harmonisation' of the intellectual property rights regime under the TRIPs (Trade Related Intellectual Property) agreement of the World Trade Organisation have shown how national laws have been pressured into conforming with globalised patent laws that meet 'US standards' (Miller, 1999; Shiva, 1995). *Sui generis* clauses allowed under the WTO have permitted simultaneous localisation of patent laws, as countries develop their own systems of intellectual property rights, but these clauses have been strenuously opposed by proponents of global standards in the US (Cornerhouse, 1997). Miller (1999) shows how India's patent laws are being brought into line with the demands of the WTO, even where local laws previously prohibited the patenting of life forms. More informal institutions such as local norms have also played a part in the definition of the 'patentable'. As Shiva and Holl-Bhar (1993) point out, in the case of neem tree products in India, the common knowledge and common use of neem were among the primary reasons given by the Indian Central Insecticide Board for not registering neem products in 1968. Thus, informal institutions, such as norms and practices, and formal institutions, such as global laws, become intrinsically interlocked as they redefine and are redefined by one another through power-laden processes of resistance and negotiation.

As Fowler has argued, 'Patents are a means of allocating ownership, assigning control, regulating access and apportioning benefits' (1995: 224). Patents are socially constructed institutions which reflect power relationships and, as such, they are open to resistance and change. Many people are now attempting to resist 'biopiracy' and the privatisation of knowledge previously held in common. Resistance produces its own forms of uncertainty as both ownership and the definition of knowledge are contested in a variety of different institutional arenas. Local institutions become caught up in contesting the ways in which international institutions of governance, such as the WTO, are privileging certain forms of knowledge and regulating the rights of access to the global commons. Locally understood cultural definitions of natural resources begin to compete with formalised standard definitions of resources: for example, within a formal institutional setting neem might be a commodity, whereas in informal institutional practices it has a variety of cultural meanings.⁷

Increasing concerns about the scientific uncertainties, as well as differing perceptions of risk – or what we have called 'knowledge uncertainties' – are adding to pressures for biotechnological innovations to be subject to public debate and strict regulation. Corporations are attempting to define the debate in narrow technological terms, privileging science in ways that tend to exclude social concerns over livelihoods, and to ignore other knowledges and scientific uncertainties. Levidow and Tait (1995) show how metaphors have been deployed that represent biotechnology in terms of precision control and natural selection in an attempt to assuage public fears. According to Levidow and Tait, some scientists argue that the precise genetic changes that are attempted in genetic engineering do not guarantee the precise prediction of ecological characteristics: hence outcomes are ecologically uncertain.

Knowledge uncertainties frame the way policy debates over biotechnology are being played out. The institutions that mediate the relationships between science, publics, the state and private-sector corporations are bound up with relationships of knowledge and power that are central to contests over uncertain knowledge claims. If plural, yet necessarily partial, perspectives on uncertain and contested areas of knowledge – such as biotechnology – are to be expected and indeed encouraged, then new institutional forms that encourage open dialogue and debate, reflection and negotiation, and the building of trust relationships across often highly divided positions, are urgently required.

6. LESSONS FROM THE CASE STUDIES – AND NEW DIRECTIONS

The case studies presented in Section 5 highlight the varied institutional responses to the different forms of uncertainty confronting rural livelihoods. Case 1 stressed the in-built adaptive and flexible components within institutions that help cope with perennial ecological uncertainties. Case 2 argued that institutions governing water use are embedded in social interactions and social practices. Hence, livelihood uncertainty cannot be isolated from the social relations governing everyday life. Finally, Case 3 showed how knowledge uncertainties arising from biotechnology are making conventional divides between local and global issues in the field of natural resource management increasingly redundant. A recognition of the different types of uncertainties and how they impinge upon livelihoods and institutions prompts a re-evaluation of the way in which we conceive a number of key, overlapping themes in environment and development. Let us discuss them briefly.

i. Resources have material and symbolic dimensions

The case studies show that instead of being regarded merely as physical, material or tangible products, resources also need to be viewed in symbolic terms, endowed with historically and culturally constructed meanings and values. For example, neem has physical attributes useful for agricultural and medicinal purposes. At the same time, it is a symbolic resource which has deep cultural and religious significance in Indian society (Case 3). However, widespread ignorance of the locally and historically designated meanings and social constructs of natural resources comes to the fore when one views the economic and use-value emphasis of TRIPs and other international conventions and discourses. Given the various and often

conflicting uses and meanings that resources have for different stakeholders, the understanding that these processes involve struggles over meaning and resource distribution is important, and recognition and analysis of the power-laden processes through which these are negotiated and contested in different institutional arenas is vital.

ii. Livelihoods and resource management amid uncertainty

Conventional wisdom often posits unidimensional links between resources and users. Thus, for example, forestry interventions tend to focus only on direct forest users, forgetting indigenous institutions that, for example, allow for the use rights of other users such as pastoralists. The case studies have shown that livelihood strategies are flexible, mutable and adaptive, and that a particular resource is used by different users in multiple ways. People live out their lives amidst various uncertainties – be they ecological, scientific or knowledge uncertainties. They also invest in multiple institutions endowed with different meanings. Hence, there is an urgent need for interventions also to encapsulate this plurality. This suggests a need for interventions to move away from being overly sector-oriented, and instead to strive towards more inter-sectoral co-operation, supporting livelihood diversification.

iii. Communities as differentiated

All three case studies have highlighted flaws in the ways that conventional approaches view the 'community' in natural resource management. Case 2 revealed both the differentiated nature of community members in institutional arrangements governing water use, and the tendency of policy discourses both to assume homogeneity rather heterogeneity amongst community members and to downplay power struggles and heterogeneous aims and outcomes within communities. Case 3 indicated that the actors involved in livelihood struggles are not spatially bounded or restricted by a particular locality. The emergence of transnational alliances and what have been called 'epistemic communities' shows that communities are located in multiple sites with conflicting knowledge systems and priorities in natural resource management. Global institutions have tended to privilege dominant (usually Northern) discourses; yet there is an urgent need to understand and capture the various stakeholder interests within communities in order to address issues concerning justice and equity. There are also lessons to be learnt from legal pluralism and forum shopping (Benda-Beckmann *et al.*, 1981, 1997) about how different actors utilise cross-cutting discourses in different institutional arenas as different claims and meanings are negotiated in dispute processes. Policy directives need to focus on these multiple voices and priorities, which might entail at times the need to be 'aggressively partisan' (see Mehta, 1997). Policy may also require a broadening of approaches, employing 'deliberative democracy' as used in discussions of scientific uncertainty, and other forms of inclusionary decision-making processes that attempt to engage with knowledge uncertainties and multiple uses and meanings.

iv. Institutions as sites of social interaction and negotiation

When analysed in conjunction with uncertainty, institutions need to be seen not as mere rules of the game or rigid organisations but rather as sites of social interaction, negotiation and contestation comprising heterogeneous actors having diverse goals (not all of which are material or economic in nature). Institutions in natural resources management are not singularly purposive and cannot easily be separated from the everyday lives, beliefs and practices of people. People also resort to opportunistic behaviour by making *ad hoc* arrangements and by drawing on institutions that may be left unused in normal times, albeit perhaps buffered by their other social significance (Case 1). Finally, the multiple institutional arrangements in natural resources management are characterised by intersecting points and often a marked lack of distinction between formal and informal or local and state, something that Cleaver (1998) terms 'institutional bricolage'. Clearly, more research is required to understand the nature of this 'institutional chaos' or 'messiness' which, as demonstrated, is not really messy or chaotic, but illustrates the complex ways in which practices, knowledge systems and priorities unfold. Hence, rather than emphasising either 'informal' or 'formal' institutional arrangements, interventions might need to have a processual rather than a product-oriented character, encouraging rather than undermining institutional flexibility.

v. The uncertain nature of knowledge

Knowledge uncertainties are central to contested areas of natural resource management, especially where scientific uncertainties surrounding risks and outcomes prevail (Case 3). Different sources of knowledge, embedded in particular, necessarily partial, understandings of complex environmental phenomena, result in different perceptions of environmental change and different constructions of risk. Yet by privileging a particular source of knowledge – in most cases conventional science – national and global policies and regulatory frameworks act to mask knowledge uncertainties and to exclude alternative perspectives and perceptions. This points to the need not only for inclusionary, participatory decision-making processes, but also for approaches to institutional learning that reflect on, and make best use of, the plurality of perspectives available. Through these, alternative perspectives on environment that go beyond static notions of equilibrium and balance, and that incorporate rather than attempt to eliminate uncertainties, may become more central.

vi. Power and control over resources

In a world characterised by growing uncertainty, power emerges as crucial when the focus of the analysis is on competing discourses or knowledge systems concerning environment change or management (Case 3). Our discussion has also demonstrated the fallacy of traditional approaches in downplaying the dimension of power by assuming social homogeneity within communities and institutions and by assuming common interests across local and global divides. Analyses have not focused on the ways in which power moulds and pervades institutional arrangements and gives rise to differentiated access to and control over resources. In emerging views, power relations are central to the analysis of how institutions govern the use of natural

resources (for example, as we saw in Case 2, tanks must be seen as repositories of power/prestige in South India) or how certain discourses or knowledge systems emerge as dominant and key. Unless issues concerning power and control are adequately addressed, comprehension of the relationships between institutions and uncertainty will remain partial, and equity will remain unaddressed in natural resource management.

vii. Property regimes as a result of social processes

In contrast to the ahistorical and asocial analyses typical of more conventional institutional approaches, interpretations more effectively grounded in field complexity recognise the importance of the embedded nature of property regimes (Cases 1 and 2). As Sara Berry notes (1993: 104): 'People's ability to exercise claims over land remains closely linked to membership of social networks and participation in both formal and informal processes.' This social and political negotiation over resource rights means that people are not operating simply as individuals independent of context; they are social actors engaged in processes of negotiation with a wide range of social and political implications. Thus property regimes and associated rural institutions may not simply reflect the result of repeated games between individual rational actors seeking to maximise utility. Instead, they are the result of complex social processes which are often poorly explained by simple 'rational actor' models, particularly given the range of uncertainties experienced. In consequence of people's continuous investment in the 'means of negotiation as well as the means of production' (Berry, 1993:15) 'rural institutions often operate as arenas of negotiation and struggle, rather than as closed corporate units of accumulation and resource management' (Berry, 1993: 20–21), as is conventionally assumed. Hence property regimes are characterised by often ambiguous rules, by flexible membership of organisations, and by overlapping and contested boundaries, and they are sustained in such forms by ongoing social processes.

viii. Legal systems are plural and overlapping

The case studies have demonstrated that conventional approaches and interventions have tended to focus largely on formal legal systems, neglecting informal 'forms of social ordering' such as norms or social networks that are largely regulated by reciprocity and shared tacit understandings (Merry, 1988). Legal pluralism and legal anthropology are disciplines that enhance our understanding of the historical, dynamic and interactive nature of different, often incommensurable systems of law and their overlapping with less formal institutions and forms of social ordering (for example, Meinen-Dick and Bruns, forthcoming). An understanding of overlapping institutions is important because it is these informal arrangements that accord individuals a variety of means for enhancing and protecting their rights at the local level (although, as we have shown, these informal institutions are increasingly interlocked with global processes). It is important to be aware that these institutions may accord rights to certain marginalised groups (for example, pastoralists or women) whose rights are not encoded in formal legal systems, and that these informal institutions risk being undermined by more formal rules or arrangements. On the other hand, it is also important to be aware where

such informal institutions encode structures of inequity. Nor must we ignore the changing and processual nature of these institutions over time.

ix. Contradictions in environmental governance

We began this paper by arguing that environmental management currently is being confronted by a series of contradictions. On the one hand, the trend towards devolution is giving rise to a surge in community-based participatory projects (Case 2). On the other hand, globally defined formal regulations such as TRIPs etcetera are undermining the control that local producers and resource users have over their environments and knowledge systems (Case 3). The withdrawal of the state has led to more complex forms of governance with the increasing influence of not only NGO actors but also private corporations and TNCs on environmental issues. Local resource users are often confronted by different forms of environment management and governance, and the interactions between these levels are increasingly fuzzy. Globalisation has proceeded with a simultaneous process of localisation (see, for example, the special issue of *Development and Change* 1998) As Case 3 demonstrates, conventional divides between the local and the global are increasingly redundant where local realities are caught up in global changes and vice versa. The challenge, therefore, is to move away from these conventional divides and to explore new forms of governance that safeguard the rights and livelihoods of local resource users confronted by rapid and uncertain global changes and processes.

NEW DIRECTIONS

This section has highlighted nine key areas where both the case studies and our reflections on emerging debates in the wider literature suggest new perspectives in conceptualising our understanding of the relationships between institutions and uncertainty. These themes are summarised in Table 1 which offers a condensed characterisation of the key elements of our assessment of emergent thinking in this area. Without wanting to set up new dichotomies, we suggest that these new perspectives complement and extend our understanding of mainstream perspectives.

So where does this lead us? What are the practical and policy consequences of such new thinking? By identifying several kinds of uncertainty operating at multiple social scales, we have highlighted how it is no longer possible to posit a simple relationship between institutions and uncertainty. This relationship, irrespective of theoretical persuasion, has generally been seen as one where institutions work to mitigate uncertainty, and regulate, discipline and express managerial responses to uncertainty in conformity with one dominant set of ideas about problem definition and required policy. By contrast, this paper has argued that institutions emerge historically, they can work to embrace, moderate or exacerbate uncertainty, and they are embedded in social relations that span temporal and spatial scales that are not self-evident. We therefore suggest that key analytical work needs to be done to understand what mediates between produced localities and perceived global forces, and how this mediation occurs.

Table 1. A summary of emerging views complementing and/or contrasted with mainstream perspectives

Theme	Mainstream views	Emerging views
<i>Resources</i>	Material, economic, direct use-value, property	Also as symbolic, with meanings that are locally and historically embedded, and socially constructed
<i>Livelihoods and resource management</i>	Links between single resource and use (e.g. rangelands, forests, fisheries)	Multiple users, complex and diverse livelihood systems
<i>Community</i>	Local, specific user groups, homogeneous, bounded	Multiple locations, diffuse, heterogeneous, diverse, multiple social identities
<i>Institutions</i>	Static, rules, functionalist, formal	Social interaction and process, embedded in practice, struggles over meaning; formal and informal; interlinked with knowledge and power
<i>Knowledge</i>	Linear transfer; science as sole source of expertise	Multiple sources; plural and partial knowledges; negotiated understandings
<i>Power and control</i>	Transaction cost focus; elites; community leaders	Differentiated actors; conflict, bargaining, negotiation and power relations central
<i>Property regimes</i>	Common Property Resources as a set of rules based on collective action outcomes; clear boundaries	Practice not rule-determined; strategic; tactical; overlapping rights and responsibilities; ambiguity, inconsistency, flexibility
<i>Legal systems</i>	Formal legislation	Law in practice; different systems coexisting
<i>Governance</i>	Separated levels – international, national, local	Multi-level governance approaches; fuzzy/messy interactions; local and global interconnected

Such work also needs to examine the proliferation of means and meanings in the way institutions form, change and interlock across conventionally assumed boundaries. Inquiry needs to be directed not only at the explicit manifestations of strategies, struggles, rules and behaviour, but also at their implicit meanings. This becomes especially important where we find ambivalences, conflicts, and negotiations that indicate a somewhat fluid institutional state or a loose constellation of institutions.

To take an example: the arguments we have put forward from the perspective of the anthropology of institutions would suggest that it is important to start from a conception of institutions in terms of practices and their social, cultural and political structuration; from a conception of what people do, and their structured capacity to respond to events in shaping their own histories. Anthropological research has shown that people often invest in multiple social institutions, and examples can be found of such multiplication of social ties in resource management, dispute resolution, or livelihood security contexts. Ethnographic approaches to the study of processes and relations operating within and between multiple sites, transcending

local–global and formal–informal divides, become important because they can not only highlight the formal–rational scope of the arrangements but also unravel the cultural and symbolic content of institutions that develop, change, and wither at the intermediate levels.

Thus with a reconceptualisation of how we see resources, their management and interaction with local livelihoods in the context of uncertainty, a range of fundamental questions about institutional dynamics are raised. As already discussed (see Table 1), these touch on issues of property rights, legal systems and broader questions of knowledge, power and control. With the interconnections between the local and global becoming increasingly important, the simple divide breaks down and encourages us to explore new ways of thinking about institutional and governance issues.

Therefore the nexus of interactions between issues of governance, institutions and livelihoods in a globalised and uncertain world suggest some major challenges for future research and action in the field of environment and development. In this context the dual processes of localisation and globalisation need to be linked: how should local-level participatory and decentralised solutions to natural resource management articulate with changes in international regulatory frameworks, the growth of private sector involvement and the rapid development of a globalised economy? What new institutional and governance arrangements are required?

The theme of uncertainty – whether ecological, livelihood or knowledge uncertainty – suggests some particularly important questions around how knowledges of different actors are articulated in development planning and policy processes. For instance, how do rural people, state actors, international policy-makers and others variously conceive of particular ecological and livelihood uncertainties and how are these knowledges linked with their social and institutional positionings? How is uncertainty understood, conceptualised or represented as certainty by different actors, and why? What options are there for more inclusive and deliberative policy processes that acknowledge uncertainties, and encourage more open and trusting interaction between key actors? What are the prospects for global forms of environmental regulation and management when these are mediated by a complex interlocking with local institutions, and when ecological certainties can neither be known nor guaranteed?

Future research and action will require a more multi-sited approach than those currently used to the understanding of natural resource management questions, based on understandings of the precise relationships and processes operating within and across local, national and international arenas. Research and action could usefully focus on cases that explore the diverse types of environmental governance (for example, the coexistence of privatisation and decentralisation approaches in water management and their institutional implications, or the impact of national devolution and international regulation on local forest management).

Studies are also required to address the ways in which rural, state and international actors conceive of particular ecological, livelihood and knowledge uncertainties and how these perceptions are linked with their social/institutional positionings. For example: how do different social actors understand, conceptualise and present notions of uncertainty, and why? Such work would parallel for the 'South' work done on public understandings of science and risk by sociologists of science such as Wynne (1990) and others. Such work

would not only enhance our understanding of knowledge uncertainties, but also help develop theoretically attuned understandings of knowledge and institutions in relation to rural livelihoods. The challenge would also be to pursue such work together with policy-makers implementing and formulating natural resource management policies (for example, in the form of participatory action research). Given that past theory has obscured many of these interactions and that little is known of how people live their livelihoods and create institutions amid uncertainties, such multidisciplinary work could lead to the generation of new empirical insights that address theoretical debates and provide future directions for policy.

NOTES

1. The notion of globalisation is in itself rather open-ended. Our purpose in this paper is to question the conventional dichotomies between local and global. In fact, it can be argued that globalisation goes hand in hand with simultaneous trends in localisation and regionalisation (Appadurai, 1996; see also special issue of *Development and Change*, 1998, Vol. 29, No. 4).
2. Largely, though, these debates have focused on what we defined as knowledge uncertainties. According to Mary Douglas, 'every choice we make is beset with uncertainty. That is the basic condition of human knowledge. A great deal of risk analysis is about trying to turn uncertainties into probabilities' (Douglas, 1985: 42). A large body of work on 'risk' has focused on perceptions of risk, some of it making use of Douglas's cultural theory (see, for example, Douglas and Wildavsky, 1982; O'Riordan and Jordan, 1999).
3. These views follow conventional views of power in sociology (see Lukes, 1974), including *power to* – power as motivating to achieve ends including collective action; *power over* – power as influence or force; and power as ideology or hegemony which serves to obscure real interests or keep certain issues off the agenda.
4. This is happening, for example, in local forums and disputing processes, although Merry (1992) suggests that this might neglect legal institutions that are largely transnational in inspiration: for example, police, prisons, lawyers, administrative regulations, taxes, and social security systems.
5. This section is based largely on Scoones (1994; 1999).
6. See, for example, Coward, 1985; Uphoff, 1992; Lansing, 1987; Wade, 1988; Mosse, 1997; Cleaver, forthcoming; Mehta, 1997; and Meinzen-Dick and Bruns, forthcoming. This list is by no means exhaustive.
7. Recently, the controversy in India surrounding Monsanto and its genetically engineered products has resulted in action by indigenous institutions, which are becoming increasingly involved in global networks. One such example is of the 400 Indian farmers who visited Europe as part of the Inter-Continental Caravan-99 (ICC-99) to protest at the offices of Monsanto and link up with Northern NGOs engaged in similar struggles for recognition of the livelihood and ecological uncertainties that are being produced by the biotechnology revolution.

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