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James Fairhead , Melissa Leach
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1 Science and society: an ethnographic approach

Introduction

With science now shaping anxieties as much as destinies, poverties as much as opportunities, tracking its conduct and conductors is ever more pressing. Much has been said of economic globalisation, and the effusion of global media, desires and morals. Much less, however, has been said of the 'globalisation' of science, especially as experienced in poorer countries. Perhaps this is because the defining claims of science have long been portrayed not just as global, but universal: not just modern, but eternal. Yet there is a peculiarity to the sciences of any place and era and to the values they embody, and current patterns in the globalisation of science are no exception. It is these which this book sets out to explore.

Contemporary powers and power blocs are grappling to secure their worlds within a voracious global economy, and to tame the global media to their concerns. Yet they must also engage with globalised science, whether natural or social. International conventions, agreements and the deliberations leading to these – whether around climate change, biological diversity or trade – are increasingly important in shaping national policies and international engagements. There are now over two hundred international environmental regimes and supra-national organisations which manage them. Each is co-established and co-evolves with scientific committees.

Within this new world, there is an emerging role for science – a certain kind of it at least – in international governance. In as much as the operation of international regimes depends on particular negotiated, scientifically authenticated truths, the politics of their operation is conducted through the practice of science. There is a negotiation through science: through the determination of key questions, analytical frameworks, methods and monitoring. As negotiations are between governments, the deliberations give new impetus to the idea of 'government scientists', and to negotiators speaking simultaneously in the name of government and of science. Concurrent with the proliferation of international regimes is a tendency towards establishing supra-national regional blocs which can negotiate common interests in international agreements; a necessity

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within the international system. Regional political unions are being shadowed by regional scientific unions, with regional inquiry shaped in articulation with global debate. The co-production of science with policy, and the political and economic forces shaping it, has never been clearer.

Yet contradictory tendencies seem to run counter to this increasing internationalisation. The presence of non-governmental organisations, public pressure groups and 'indigenous people' in the streets, on the television and at times in the negotiation chambers of international deliberations defies simplistic pictures of nation states and their scientists forging international orders. Complex alliances and oppositions link elements of international research and policy organisations with citizen's groups and private enterprises. These tendencies seem to signal a greater role for 'voices from below' in the shaping of international science and governance. Similarly, political decentralisation, the claims and protests of social movements and citizen action have been associated with new engagements with science in national and local settings. Publics are increasingly unwilling to place unquestioning trust in formal expertise and public institutions. Citizen action is now frequently articulated through 'citizen science', and curious alliances have formed in appreciation of 'indigenous knowledges' and 'ethnoscience'. The questions begged by these terms are certainly interesting– what constitutes science and citizenship, and what differentiates indigenous knowledge, citizen science, and 'normal' (non-citizen?) science. But the terms do capture something of the way that science has ever more visibly come out of the laboratory, field station or university to be conducted, contested and authenticated in society, in politics and in the law courts; something of the way the conduct of science is becoming important to moral and economic contestation. Indeed to the extent that social and moral debates and dissent are being conducted through science and its media mediation, it is possible to speak of the structuring of social life in relation to the practices of science, and the ways in which they choreograph relationships with commodities, kin, religion and authority.

As this book argues, however, these apparently contradictory trends between globalising and localising forces of science in governance are rarely so opposed. First, they can be united by shared problem-framings: the local concerns or forms of knowledge which come to be represented in national and international debates frequently share dominant, globalised questions (for instance about what is happening, and which trends need to be arrested or modified), while alternative framings and their implications drop out of view. Indeed such local-global links are often fostered explicitly, whether from below (when local groups appeal to the authority and economy of global discourses) or from above (when international institutions appeal to the authority of locality and participation). In this sense, even the most distantly 'local' actors and their everyday lives may be caught up in the vortex of global debate – although with highly unequal capacities to shape its terms.

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Second, an apparent polarity between globalising and localising forces obscures important 'intermediate' processes operating within national settings: the complex, historically-embedded relations between politics, bureaucracies, institutions and research traditions which articulate with and shape the engagement of local and global pressures. This is, in part, the field of national governance and science. The so-called civil character of 'non-governmental organisations' (NGOs) does not mean dissociation from this field. On the contrary, the alliances forged between different NGOs, government departments and research organisations within countries are powerfully constitutive of it. Switching the focus from institutions to the processes of science and policy, as we do in this book, helps discern these alliances and the ways different publics become involved in them, in ways which transcend conventional dichotomies between state and society, expert and public, global and local. It is not just 'the state' that sees (cf. Scott 1998), and states embody antagonistic forms of expertise.

Shared problem-framings, and the institutional complexity within which analysis is conducted, must qualify arguments that located, everyday activities and cultural expressions are excluded or distanced from the global networks which orchestrate political and economic power (Castells 1997). Rather, how local activities are incorporated into such networks is a central research question. As we shall explore, this complicates and compromises calls for change which imagine that 'participation' or 'social movements' will enable local knowledges to challenge global perspectives in a straightforward way. Rather, it becomes necessary to understand the links between science and policy, identifying the circumstances in which citizen critique (or at least expression of alternative, located perspectives) can be forged, and the conditions in which it can be effective.

To discern contemporary relationships between science and society, then, will require a multi-sited and ethnographic approach (Marcus 1995), extending from international organisations and networks, through national bureaucracies, scientists and activists and their local staff and activities, to the complexities of everyday life. This is the complex task that this book undertakes. One needs to focus on the processes by which different strands of science and policy come to shape each other, and gain authority, but also do so in the broader social field of which they are a part.

Science and society: comparing issues and settings

'Hi-tech' science, tropical forests and conservation

Public engagement with science has never been a simple enchantment. The killing of scientists in Mao's China, and the suppression of genetic science and politics in the former Soviet Union or fundamentalist religions in the United

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States, underscore the extent to which the conduct of science is part of social and moral struggle. Nevertheless, several commentators have discerned a new moment of heightened moral concern and transformed public engagement with science. In what Beck (1992, 1995) would describe as reflexive modernity and Giddens (1990, 1991) as late modernity, and as elaborated by Lash (1996, 2000) and others (e.g. Adam 2000, House of Lords 2000), there is seen to be a new mood of anxiety with 'expert' institutions and their knowledges, new forms of personal and cultural engagement with science, and increasing public critique and demands for new sorts of dialogue.

Yet this contemporary writing on science and society is imbued with a sense of here and now; the here which is high-tech Europe and North America, and the now which is the right now of 'post-modernity'. This sense is conveyed in the examples used: genetics, biotechnology, new reproductive technologies, nuclear physics and so on.[1] Anxious publics question the values and risks linked to rapid technological change, and the capacity of established forms of expertise to deal with them. Techno-economy increasingly determines both bodies – farming and food, immune and reproductive systems – and the social world, configuring communication, vocabularies, fears and fortunes.

This book looks at very different domains: the science and policy surrounding rural environments, land and forests. It does so in very different places: in West Africa, and in the Caribbean. The broad concerns of contemporary science and society debates apply here, but are manifested quite differently and carry different implications. In the histories and social relations of these once-colonised regions, environmental questions are central to policies and programmes exerting control over the rural world. Deliberations at the intersection of science and policy have been central to the shaping of social categories, identities and oppositions: to ideas of gender, ethnicity, citizenship, criminality, and so on. Land, trees and ecologies have also been central to the social lives and livelihoods of publics in these places, although frequently for very different reasons, and understood in different terms. Thus rural environmental issues have long been points of contest between citizens and the state, and indeed between patternings of social coalition and alliance which make mockery of this simple distinction. In engaging with such issues, this book links contemporary debates on science, technology and society with the concerns of environmental and development anthropology, showing how the latter can be enriched and rejuvenated through an ethnographic approach to science and policy.

Moreover the last two decades have seen a massive increase in international attention to the rural environments of tropical countries, and in particular forests. These have been re-positioned on an international stage as repositories of global value: as sinks of tradeable carbon, stores of biodiversity wealth, and symbols of cultural alterity. As will unfold, this new internationalism, its science and governance now intersect with national and local social relations of science

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whose institutions, practices and debates have been shaped by earlier colonial experiences. At the same time, the domination of much of the policy arena that falls under the rubric of conservation and development by certain disciplines (notably conservation biology) and by international perspectives has shaped and inflected critical debate, and at times, as will become clear, enabled the production and deployment of what are often experienced locally as highly coercive practices. Claims to liberal and participatory approaches have come to characterise forms of conservation intervention that often seem to disavow the colonial past only to reproduce its practices in another guise. This book explores the politics of knowledge in such contemporary, liberal managerialist conservation, and alternatives to it.

Sciences focusing on forests may not be icons of modernity, and the sense of rapid technological advance and associated risks which preoccupy contemporary science and society debates is often absent. Nevertheless, the lens of tropical forests is compelling for an anthropology of science first, because it focuses on a discursive terrain strongly inflected by exigencies of environmental crisis, and the assorted disciplinary and policy positions associated with this. It invites critical reflection on how the environment comes to be problematised, when and by whom and with what implications. Second, forest ecology has, for a number of years, been on the cusp of major reconceptualisation in its core assumptions. Different views emerging from a variety of disciplines offer opportunities for discursive coalition with different policy and land user interests, revealing how perspectives and debates in science interlock with questions of material and social control.

First, forests have long been analysed as if they were stable and equilibrial: as vegetation communities specific to climatic and other conditions which reproduced themselves, and if disturbed would eventually revert to their original form. Models for applied management from colonial times onwards were based on these assumptions, and hence on the view that vegetation succession could be directed for economic or environmental ends. While such core assumptions of stability always had their dissenters, since the latter decades of the twentieth century they have become more thoroughly challenged by research in several disciplines.[2] Analyses of climate and vegetation history suggest major fluctuations in forest cover and quality over recent centuries and millennia (Maley 2002; Tardy 1998). Work in ecology underscores this, and suggests the importance of disturbance events and path dependency to forest dynamics, quality and species distributions (e.g. Hawthorne 1996; Sprugel 1991). At the same time, studies in social anthropology and history show the long term shaping – in some circumstances enrichment – of vegetation through local practices, and highlight the relationship between landscape, memory and resource claims (e.g. Amanor 1994; Fairhead and Leach 1998). Emerging work thus suggests that vegetation patterns reflect the real historical legacy of many interacting

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influences, human and other, over many, overlapping timescales; what one might term a 'dynamic landscape perspective' on forests. Second, questions and analytics around tropical forests have been reconceptualised in relation to new concepts, such as biodiversity, which themselves reflect new social meanings, desires, and uses, particularly in the arena of conservation.

The world of tropical forests can thus illuminate powerfully the contemporary shaping of relations between different scientific traditions and governance, allowing one to address important questions about which strands of debate become pursued and embodied in policy at different times and which do not, and why this might be. Equally the very existence of a multiplicity of perspectives on the nature and value of forests gives forest science a particular quality; something recognised by many practising foresters who, acknowledging that their work intrinsically involves social questions concerning people and resources, frequently reflect on it as 'more of an art than a science'. This has always been the case, but is now more pronounced than ever. So as a science, forestry might be considered a 'weak' one – similar perhaps to psychology or criminology – in which the social implications are particularly visible (cf. Foucault 1980).

Moreover, the stakes are high. Debates in forest science intersect starkly with resource interests. Diverse conceptualisations of forest problematics are intimately related to claims over forest stewardship and resources. In their different ways, forests and their resources are valuable, economically and symbolically, to local users, to administrations, to corporations, to nations and to the globe. Issues of forest control lie at the heart of both local political economies, and global interests. The political economy of timber extraction and forest conversion for commercial farming and ranching, and the national and trans-national interests in these, are key dimensions of these dynamics; ones which much conservation-oriented research and policy aim to tackle in the avowed interests of environmental and social justice. Yet these environment and conservation efforts themselves involve political economies, and it is on these that we largely focus. There are many local forest governance initiatives which link forest exploitation with conservation, invoke community control, participation and decentralisation, and involve varied relationships with local state representation. At the same time, forests are now embroiled within international conventions and deliberations concerning biological diversity, climate change, desertification and sustainable use. The lens of tropical forests, then, is peculiarly apt for comprehending and theorising the interrelationships between the apparently contradictory forces of globalising and localising governance, and their politics.

These concerns around tropical forests indicate why science and society issues are not just a concern of the hi-tech high-latitudes, and why tropical countries' experiences of science-society relations cannot be captured within an analytical fascination with the hyper-modernity of the hi-tech. They remind

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us of a much longer engagement between the shaping of science, governance and the social world, and of a world of unequal economic and political power; an engagement which this book sets out to explore.

Addressing public engagement with science

That the place of scientific expertise in colonial, fascist and democratic regimes is very different raises sharp questions concerning how publics relate to 'scientific expertise'. Who has the capacity to establish certain questions and agendas as legitimate foci of study, and to carry these through? Is this confined to specialists in laboratories or projects? Or open to citizen participation – and if so, by whom? What are the dynamics of ordinary people's engagements (and confrontations) with experts? Linked to these issues are the ways in which science is becoming important to moral and economic contestation.

These questions have been a central concern in emergent debate on science and society in Europe. Indeed they have been core to celebrated depictions of a new social order, and a resurgence of 'grand theory' about it. Central here is the work of Beck (1992, 1995, 1998) whose 'Risk Society' thesis suggests that publics are increasingly concerned with risks that are no longer 'external', but continually thrown up by the processes and systems of industrial technology and its governance. This engenders a critically reflective attitude among a wider public to expert institutions and their knowledges, and a growing lack of trust. Yet for Beck, science not only creates the problems, but also the analytics required to recognise them; 'the pre-requisite for "overcoming" the threats for which it is responsible itself' (Beck 1992:162). That this reflection is also enwrapped in science plays down attention to alternative knowledges, sciences and forms of social order in the public realm (Wynne 1992, 1996).

It is precisely these alternative framings that have been the focus of two very different research traditions, one concerning 'citizen science' (conducted largely in Europe and North America) and the other 'ethno-science' or indigenous knowledge (conducted largely in low income countries, and among 'indigenous peoples').

It is critical engagement by publics with the perspectives of expert institutions either through funding or orchestrating their own scientific investigations, or lobbying to transform research questions, that has been dubbed 'citizen science' (e.g. Irwin 1995; Irwin and Wynne 1996; Fischer 2000). This is associated with both a crisis of legitimacy in science among lay publics, and a critique of the view that this just reflects a 'deficit' in public knowledge that good science education could fill. Public understandings of science have been shown to be more sophisticated and nuanced than they had been given credit for, focusing not just on the content and methods of science, but also on forms of its institutional embedding, patronage and control (Wynne 1992). Work on citizen science has

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now documented many cases where lay people have explicitly engaged with and contested science and its advice by conducting their own investigations and experiments (for instance in 'popular epidemiology' around issues of toxic waste pollution, see Brown 1990; Brown and Mikkelsen 1990; Hofrichter 1993). The emphasis has thus been on citizen science as alternative science, conforming with its broad categories, more than on the ways in which public's knowledges develop in an embedded relationship with local social processes and differences, concepts and moralities.

In contrast, rural environmental issues in Africa, Asia and the Caribbean have more usually been addressed through a very different theoretical vocabulary, concerned with indigenous knowledge (IK) and its relations with development. This tradition is rooted in social anthropological work from early in the twentieth century, which detailed 'knowledge systems' concerning issues such as health, agriculture and ecology in the context of broader ethnographies of society and culture (e.g. Richards 1939; Evans-Pritchard 1937). It thus emphasised how knowledge and beliefs about 'technical' issues were largely inseparable from ideas about cosmology or local religion on the one hand, and the maintenance of social order and prevailing relations of authority on the other.

IK has been seen in ambiguous relationship with 'western science' in its modernist guise, sometimes depicted as a valuable and complementary resource to be repackaged in the terms of modernising, expert scientific institutions (Brokensha *et al.* 1980; Warren *et al.* 1990), and by others as rooted in incommensurable concepts and framings, necessitating a more comparative framework of analysis (Fairhead 1992; Scoones and Thompson 1994). Whilst it shows how dispute and debate over agro-ecological issues in 'localities' are locked into struggles over control of resources, and over socio-political authority, this work, however, has been largely silent on engagements of contestation with 'expert' science – in stark contrast with the citizen science tradition. Works in the anthropology of development have tended to describe distrust in development expertise as manifested in withdrawal from, and resistance to its effects, rather than active engagement with the science underlying development interventions (e.g. Crush 1995; Fairhead and Leach 2000).

Thus while works on citizen science show how science has 'come out of the laboratory' in the sense of being conducted within wider social relations, works in the IK tradition suggest that some forms of science have never been in it. Emerging in very different parts of the world, it might be argued that each of these analytical traditions relates to the particularity of its settings. Yet in imagining a shift from modernity to more fragmented and critical public reflection in 'late' or 'reflexive' modernity, analysts may be over-emphasising past acceptance of scientific expertise (Lash *et al.* 1996; Latour 1993), and hiding the experiences of certain social and cultural groups. Equally, analytical traditions emphasising the non-integration of indigenous knowledge and

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expert science have been questioned as overplaying the coherence of each (e.g. Agrawal 1995; Last 1980). A comparative ethnographic approach is necessary to 'dig beneath' these different analytical traditions to see how far these respectively more autonomous and more engaged modes of public interaction with science take place in different settings. Comparative analysis can also consider such differences between countries, as opposed to aligning with particular social constituencies, positionalities and issues which may cross-cut inter-country distinctions.

Environment and tropical forests in Guinea and Trinidad

The comparative ethnography in this book focuses on the Republic of Guinea in West Africa, and Trinidad within the twin-island Republic of Trinidad and Tobago in the Caribbean. This is an appropriate choice of countries for several reasons. In common, both share important similarities of environmental setting and tropical forest ecology. In each, too, environmental policy concerns run high, and turn on similar issues – especially on the conservation of biodiversity and on ensuring sustainability of timber production. In contrast, however, Trinidad is a middle income, industrialised and urbanised country, while Guinea is a very low income country with much higher dependence on agriculture and rural livelihoods. In line with this, Guinea is far more dependent on donor aid than Trinidad, a difference which influences how each country's scientific and policy institutions relate to the international world. Perhaps most significantly, different patterns of public engagement with science appear to dominate in each country. As will become clear, Trinidad has stronger traditions of public participation and critique through national politics, the media and citizen science. In Guinea, by contrast, indigenous knowledge and 'traditional' local institutions appear much stronger and more vibrant.

In these respects, then, patterns in Trinidad appear closer to those identified by science-society analysts for Europe and North America, while those in Guinea would appear to typify those identified in Africanist analytical traditions. The analysis in subsequent chapters will trace how and why these seemingly different patterns have emerged, and their implications; however it will also show that these apparent dichotomies turn out to be more complicated than such simple stereotypes, obscuring some important commonalities of experience between particular groups of people in each country setting.

Inflected by these country contexts and animated by the international world, a cacophony of voices now speaks of 'forests' and 'environment' in both Guinea and Trinidad. In Guinea, French bacteriologists researching nitrogen-fixing leguminous trees justify their work as 'to minimise the environmental impact of refugees'. Much European, German and World Bank-funded assistance to Guinea's rice farming, coffee cropping and even bee-keeping is financed by

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Figure 1.1 Processing the upland rice staple in a Guinean village

environmental programmes. Curiously, it is environmental programmes which have the funding to provide schools, bridges and wells, as inducements to villagers to transform their land management ways. All three Guinean universities are altering their structures to respond to 'environmental' questions, and to the international funding these are attracting. The only PhD programme in the country is in environmental studies, not agriculture, geography, history, politics, mining, or economics as one might expect. The environmental research centre is a stunning oasis of Canadian funding in an otherwise near-destitute institution. Foreign researchers – even at times in their very critique of environmental anxiety – animate the debate. At the other end of the educational scale, primary school teachers' latest and glossiest handbooks are not for mathematics, science or history, but for environmental education.

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