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Introduction

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ENVIRONMENTAL SOCIAL SCIENCE

Environmental social science has its roots in several disciplines and research traditions, ranging from anthropology to zoology Disciplinary identities and frameworks continue to play a significant role: environmental anthropology, political ecology (centered in geography), environmental social science, and similar named entities in several other disciplines have their own associations, scholarly journals, and sets of issues. But increasingly there is convergence, transdisciplinary interaction, and the forging of a coherent if loosely bounded research community, with scholars and practitioners from many different disciplines in the social sciences, humanities, and applied fields engaged in fruitful dialogue and collaboration. This volume aims to foster this emerging field by presenting authoritative summaries of central research methods in a manner accessible to all. In the next section, we summarize the organization of the volume and the content of each chapter; but first, in the present section, we wish to situate this emerging field in a broader intellectual and historical context.

There are many factors that helped generate environmental social science, but two are prominent. The first was the realization that landscapes and the multitude of components they contain cannot be understood without serious consideration of past and present human communities. It is now widely understood that most terrestrial and near-shore environments are profoundly shaped by human actions – they are "socionatural" systems (Balée 2006; Denevan 1992; Smith and

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Wishnie 2000). These anthropogenic impacts are not limited to large-scale societies, but extend back to the initial dispersal of *Homo sapiens* some 60 000 years ago, and include effects that both enhanced and diminished biodiversity and ecosystem functions.

The second key stimulus for environmental social science is the recognition that human societies cannot be understood without analyzing their interactions with the environments that supported them. There is a long tradition of social analysis of the complex relationships between humans and environment, ranging from the philosophical accounts of Montaigne (1595), Montesquieu (1748), Voltaire (1759) to Malthus (1798), and Boserup (1965) on the relationships between demography and resources, with other classics Morgan (1877) and White (1959) on technology, Engels (1884) and Wittfogel (1956) on environmental drivers of social complexity, and Ratzel (1882), Wissler (1926), Steward (1955), and Rappaport (1984) on ecological adaptation. Some useful reviews and collections include Borgerhoff Mulder and Coppolillo (2005), Haenn and Wilk (2006), Johnson and Earle (2000), Orlove (1980), and Vayda and Rappaport (1968).

Initially, environmental social science emphasized economic factors as key mediators of human–environment relationships (cultural ecology). Economic perspectives, however, were soon joined by analyses of the social construction of knowledge (ethnobiology and science studies), politics and ideology (political ecology), and institutions (property theory and collective action theory), among many others. Although most of the contributors of this volume are anthropologists, this edited book has been explicitly designed to be useful to practitioners interested in the environment from all types of social sciences and humanities. Indeed, none of the tools or frameworks presented here are the exclusive patrimony of a single discipline.

Environmental issues, in any case, have proven to pose extremely complex theoretical and methodological demands. For instance, what is a forest habitat? There is no unique and uncontested answer to this question. To foresters, a forest is a productive unit that should be managed to produce its maximum sustainable yield. To urban dwellers, this same forest constitutes a dramatic and picturesque landscape suitable for camping and contemplation. Local farmers may perceive a forest as wasteland, since it occupies space that is not being cultivated; or they may perceive it as a storehouse of useful wild plants and animals, or (in the case of swidden farmers) the site of once and future gardens. The very same forest, to biologists, may be the habitat that sustains species that they are trying to conserve in a protected area,

or the ecosystem that generates important "services" for people and other living things. The forest is all of these things and more, but the perspective and values of any one individual or "stakeholder" group is necessarily partial. Any analysis of forests must recognize this subjectivity, and the potentially conflicting views and interests this implies. That being said, the analysis is likely to improve if, thanks to ecological analysis, we know it is a tropical rain forest with high species diversity and rapid nutrient turnover, if it has few or many introduced species, what kind of disturbance regime (from fire, wind, etc.) it is characterized by, and so on. In addition, a quantitative analysis of the extraction of timber and non-timber resources, a demographic analysis in and around the forest, and an examination of tourism in the area will offer useful complements to narratives about the forest provided by the various social actors.

In sum, the methodological complexity of socioenvironmental issues emerges in two different dimensions. First, analysis of these issues benefits from the combination of diverse methods and concepts from both natural and social sciences (Abel and Stepp 2003; Borgerhoff Mulder and Coppolillo 2005; Crumley 1994; Scoones 1999). Second, different disciplines and research traditions within the social sciences have developed diverse methodologies to approach the social components of environmental issues that often complement each other. This edited book focuses on the second point, or the need for methodological heterogeneity. The social sciences and humanities have developed a very diverse set of methodologies devoted to producing data on social issues connected, in one way or another, with the environment. This heterogeneity has resulted in qualitative and quantitative approaches that combine localized and multi-sited research, synchronic and diachronic perspectives, and discursive, statistical, or spatial analyses.

Most research projects can be thought of as including three basic elements: (1) an epistemology, or set of assumptions about how to construct, evaluate, and articulate knowledge; (2) a methodology, which is understood as a conceptual and analytical framework; and (3) a set of specific methods used to collect specific types of information, which are hopefully linked to (justified by) the first two elements. The goal of this volume is to introduce students and professionals to diverse methodologies and methods which are currently used in various environmental social sciences. Because the relationships between environment and society are extremely complex, and the methods for studying them have developed in diverse field settings and disciplines,

there is no single methodological framework uniting this work (or the chapters in this volume). Any environmental issue can be studied from a multiplicity of perspectives, causality can be studied from different angles, and information can be extracted from different areas or about different aspects of the issue. Thus, the diversity of theoretical and methodological approaches has resulted in production of information distributed within many different dimensions, often with little cross-referencing (let alone integration) and often highly dependent on the theoretical or research goals of the investigator.

This book presents a representative (if not complete) sample of environmental social science methods and methodologies. The intent is to provide readers with an introduction to several important analytical options for society–environment research. The chapters also highlight case studies that illustrate the application of these methods. Overall, we hope to show how complementary these different approaches and types of information can often be. A research design that incorporates several of the proposed methods may be better equipped to generate a more nuanced approach to a particular issue. This last goal, however, is not easy, as demonstrated by the difficulties we encountered in designing this very book. The last 25 years of social sciences and humanities research have been characterized by considerable theoretical confrontation. The starkest theoretical divide has opposed scientific or positivist approaches to critical, subjectivist, or postmodern schools, with obvious epistemological and methodological consequences. The subjectivist approaches, to simplify the terminology here, have tended to emphasize qualitative approaches in general and discursive analysis in particular. Positivist approaches have gravitated towards systematic collection and statistical analysis of quantifiable information. This book, however, is designed to challenge this dichotomy by incorporating chapters from both sides of the divide, and by explicitly emphasizing multiple levels of complementarity between quantitative and qualitative methods. In fact, we suggest that this plural approach to environmental social research design is required by the complexity of environmental issues.

OVERVIEW OF THE VOLUME

As noted above, this volume is designed to offer researchers and students an array of analytical approaches and associated methods that are available to study different social dimensions of environmental issues. We believe it covers a gap in the available literature, and will

prove useful for both research and teaching. Each chapter emphasizes the nuts and bolts of research design and methods in a different analytical framework. Due to length limitations, we do not expect to train researchers in each of the described methods or research strategies, but rather to make readers aware of their existence, their explanatory potential, and how research using any of them looks, as well as to provide an entry into the published literature in each area.

We have selected 14 themes that we believe cover the most important fields related to environmental social research. While not exhaustive, we believe these themes reflect the main methodological trends available in social sciences (and to some degree the humanities) in relation to environmental issues. The chapter topics, perhaps reflecting the content of the environmental social sciences, include a diverse combination of subjects. These are necessarily covered at varying levels of detail; for example, ethnobiology is a rather more compact field that political economy, which has a massive literature in both Marxist and non-Marxist varieties. A chapter devoted to the socioenvironmental uses of geographic information systems is not necessarily equivalent to one devoted to the environmental aspects of demographic studies. In other words, readers should not expect a homogeneous book, because the field is not a homogeneous one. Even the narrative strategies utilized by the different contributors differ considerably, matching their own epistemological orientations. As editors, we have attempted to provide as much similarity across chapters as possible while not forcing the contributors to adopt styles alien to them or the literature they discuss. Some chapters use a case study as an explanatory vehicle, others have used multiple examples to illustrate the methods they discuss.

In his chapter, Oriol Beltran offers a broad approach to historical demography, discussing its methodological advantages and challenges. He discusses the environmental aspects of human population dynamics, emphasizing demographic distribution, history, and correlated resource use. The chapter surveys demographic variables and their potential uses for landscape interpretation, and provides examples of various demographic patterns such as concentrated versus dispersed inhabitation patterns, as well as migration flows.

Raymond Hames presents some key methods used to describe and analyze household microeconomics – labor inputs and resource outputs. Patterns of resource use and labor allocation exhibit both cross-cultural regularities and historically and culturally specific features. Borrowing from ecology and economics, ecological anthropology

has developed a powerful set of tools to measure and analyze fine-grained productive practices. This chapter explicates key methods such as time allocation, income flows within and between households, and selection of resources and environmental patches.

Utilizing a specific study case in Botswana, Amy Poteete introduces readers to institutional analysis and property theory. This chapter focuses on analysis of the institutions that regulate rights to productive resources, and the forms of natural resource management. It highlights the significance of ownership regimes (from open access to commons to state or private property) and the ways in which these articulate with various political and institutional factors.

Centering his analysis on the impacts of climatic change and hazardous events, Eric C. Jones returns us to the field of economic analysis, connecting social agency to markets and their associated political frameworks. From the perspective of political economy this chapter aims to situate individual and collective economic decisions in both environmental and political contexts, and to explicate the methodologies and conceptual frameworks that have been developed to analyze these systems.

Every human community, from small-scale subsistence-based ones to industrial mega-states, has developed knowledge that is fundamental to its members' livelihoods, and for how they both understand and utilize particular environments. The chapter by Laura Zanotti, Denise Glover, and Jennifer Sepez introduces us to ethnobiology, the study of locally produced environmental knowledge. Ethnobiology has developed a specialized set of techniques to collect and analyze this context-dependent body of knowledge in diverse sociocultural settings. This chapter explains methodologies such as free listing, pile sorting, and participatory mapping, as well as their pragmatic uses in resource management and community-based conservation.

Veronica Strang describes the challenges and the enormous potential of ethnohistory and ethnomapping to collect historical, locally relevant, information about a given environment. The sources of information of environmental anthropology are often oral texts. Dealing with ethnohistory and oral narratives presents specific challenges of fundamental importance for ethnographic research. Using examples from her own fieldwork in Australia, Professor Strang discusses the methods developed for collecting oral accounts and assessing their robustness.

Environmental conflicts are often constructed and debated via written texts. These texts result from and interact with previous

textual depictions of the same or similar conflicts, and are fundamental sources of information to the researcher. Focusing on different media depictions of a recent event with strong environmental undertones, the alleged recent "discovery" of a Lost Tribe in the Amazon, Candace Slater introduces us to the subtleties and analytical potential of literary analysis of environmental discourses.

In a useful complement to the more qualitative methods discussed by Strang and Slater, Amber Wutich and Clarence Gravlee summarize a combination of qualitative and quantitative methods for analyzing textual data. Basic issues discussed include techniques for identifying themes, developing and using codebooks, and suggestions on how to produce qualitative descriptions, make systematic comparisons, and build and formally test models. An extended example is presented that concerns environmental and social aspects of water use in an urban desert context.

In recent years network analysis has emerged as a powerful tool for the analysis of the composition, directionality and intensity of social, economic and political relationships between individuals and groups. In their chapter, Jeffrey C. Johnson and David C. Griffith address the potential of network analysis for understanding complex social and environmental systems. They show how network analysis can reveal patterns that would not be evident to less systematic methods, as well as how it can be used to test explanations about the causes of such patterns.

In an increasingly interconnected world, with unprecedented flows of capital, commodities, information, and labor, numerous scholarly works have emphasized the need for ethnographic research that takes into account the delocalized or multi-sited character of many contemporary social phenomena. Focusing on the analysis of a commodity chain originating in Madagascar, Lisa Gezon describes the methods and challenges of multi-sited research. This chapter explains different ways in which this interconnectness has been addressed, and how it can connect to environmental factors such as local agricultural decision-making or deforestation.

In their chapter, Eduardo Brondízio and R. Roy Chowdhury provide an extended discussion of the usefulness of spatial analysis in environmental social science. The emergence of geographic information systems (GIS) as a powerful and widely accessible tool has revolutionized the analytical potential of social sciences to document and explain how human communities interact with the landscape. Environmental research produces multi-level scalar data that provides

a spatial component to social practices. This chapter discusses how GIS is employed to display ecological and ethnobiological data, highlighting its potential for uncovering data correlation.

The chapter by Emily L. Jones discusses the methods and concepts archaeologists use to analyze long-term interactions between societies and their environments. The specific investigational context of archaeological research (no direct access to agents and processes, dependence on physical remains, and time-averaging) has forced archaeologists to devise specific methods for unveiling how past societies have both shaped and been shaped by their environments. At the same time, the archaeological record provides unique diachronic depth and detailed information on material components of human–environment interaction. This chapter discusses specific archaeological methods such as faunal analysis and paleoecological reconstruction that are useful to understanding both past and contemporary environmental dynamics and problems.

The full potential of environmental social science requires a thorough understanding of the ecology of the area under study, and the role of humans in this ecology. In the last two decades, historical ecology has emerged as an integrative framework for this endeavor. The chapter by Michael D. Scholl, D. Seth Murray, and Carole L. Crumley outlines the basic tenets of historical ecology. They discuss a wide array of issues, including the need to articulate interdisciplinary teams that can manage natural and social sciences alike.

As a way of a synthesizing the diverse themes of this volume, the last chapter, written by volume co-editor Shankar Aswani, provides an example of research located in the Solomon Islands that incorporates several of the methodological approaches described in other chapters. Research by Aswani's team has produced a wealth of data that is being used to design conservation policies which respect the intimate understanding Solomon Islanders have of their environment, as well as taking into account the local political realities and institutional frameworks for policy deployment.

CONCLUSION

In summary, the 14 chapters that follow describe the most important methodological frameworks and techniques currently available in the environmental social sciences. Indeed, this is the book we wish had been available when we were designing our own dissertation research projects. It is our sincere hope that students and researchers in this

exciting and rapidly developing field will find it useful for their own projects that analyze the social aspects of environmental issues.

In conclusion, we want to highlight again the point that environmental issues are extremely complex, especially in their social dimensions, and that this complexity requires diverse and multifaceted analytical approaches. It is our strong belief that many of the methods or methodologies presented here that have been considered incompatible in the past are complementary. In fact, we would argue that these diverse approaches have great potential to become synergistic, such that when combined they produce far more than the sum of what they can offer in isolation.

In any case, environmental social scientists must increasingly become fluent in several methodological languages, either because they need to implement them themselves, or because they need to collaborate with researchers trained in other methodological traditions than their own. We hope this volume will encourage a fruitful dialogue between those using different methods, as well as stimulating individual researchers to diversify their own portfolio of methods for investigating socioenvironmental topics.

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