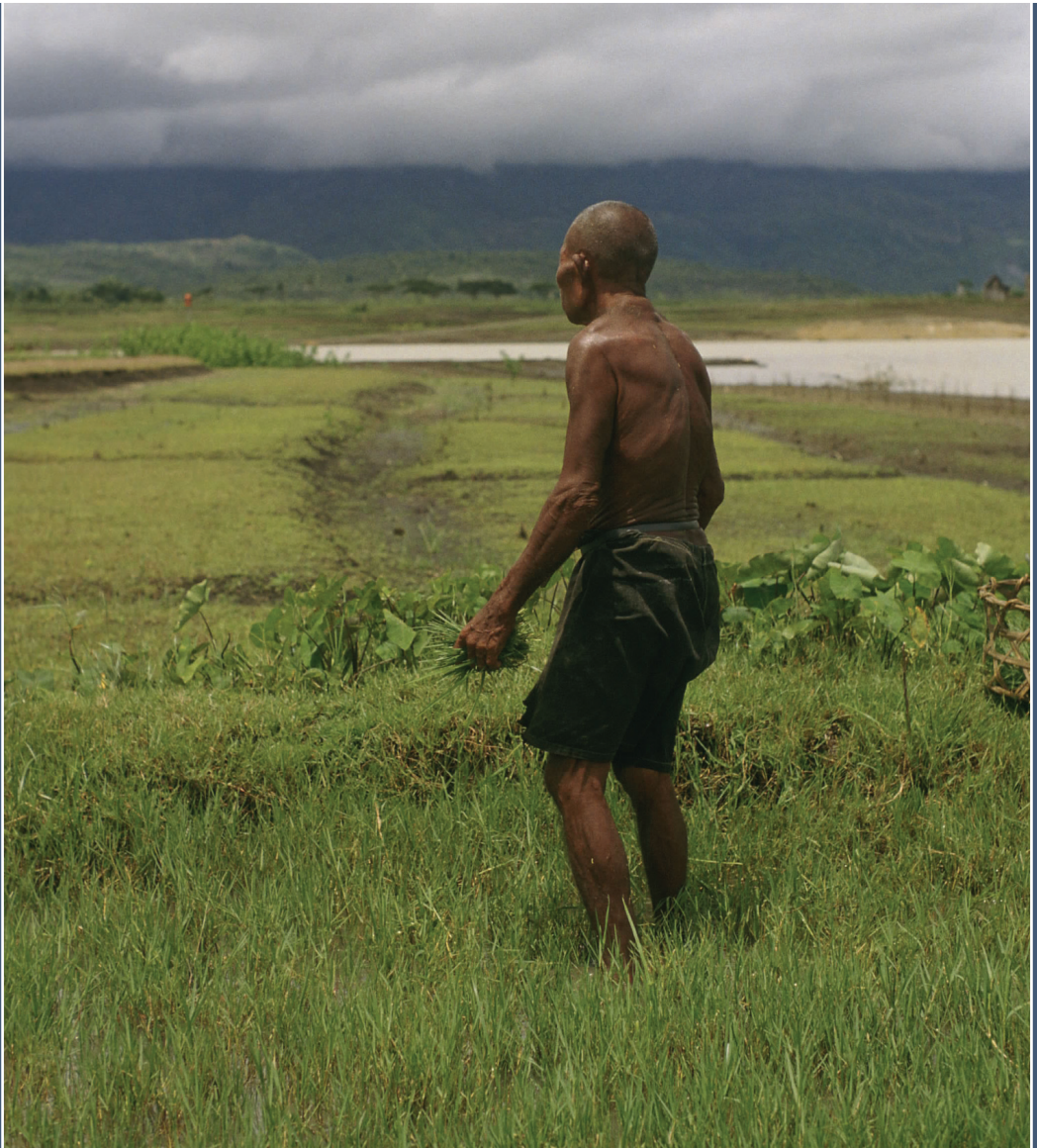


The Anthropology of Climate Change

An Historical Reader

Edited by Michael R. Dove



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The Anthropology of Climate Change

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Contents

Acknowledgments to Sources	viii
About the Editor	x
Preface	xi
Acknowledgments	xiv
Introduction: The Anthropology of Climate Change <i>Six Millennia of Study of the Relationship between Climate and Society</i> Michael R. Dove	1
Part I Continuities	37
<i>Climate Theory</i>	
1 Airs, Waters, Places <i>Hippocrates</i>	41
2 On the Laws in Their Relation to the Nature of the Climate <i>Charles de Secondat Montesquieu</i>	47
<i>Beyond the Greco-Roman Tradition</i>	
3 The Muqaddimah: An Introduction to History <i>Ibn Khaldûn</i>	55
4 The Jungle and the Aroma of Meats: An Ecological Theme in Hindu Medicine <i>Francis Zimmermann</i>	67
<i>Ethno-climatology</i>	
5 Concerning Weather Signs <i>Theophrastus</i>	83

6	Gruff Boreas, Deadly Calms: A Medical Perspective on Winds and the Victorians <i>Vladimir Janković</i>	87
Part II Societal and Environmental Change		103
<i>Environmental Determinism</i>		
7	Nature, Rise, and Spread of Civilization <i>Friedrich Ratzel</i>	107
8	Environment and Culture in the Amazon Basin: An Appraisal of the Theory of Environmental Determinism <i>Betty J. Meggers</i>	115
<i>Climate Change and Societal Collapse</i>		
9	Management for Extinction in Norse Greenland <i>Thomas H. McGovern</i>	131
10	What Drives Societal Collapse? <i>Harvey Weiss and Raymond Bradley</i>	151
<i>Climatic Events as Social Crucibles</i>		
11	Natural Disaster and Political Crisis in a Polynesian Society: An Exploration of Operational Research <i>James Spillius</i>	157
12	Drought as a "Revelatory Crisis": An Exploration of Shifting Entitlements and Hierarchies in the Kalahari, Botswana <i>Jacqueline S. Solway</i>	168
Part III Vulnerability and Control		187
<i>Culture and Control of Climate</i>		
13	Rain-Shrines of the Plateau Tonga of Northern Rhodesia <i>Elizabeth Colson</i>	191
14	El Niño, Early Peruvian Civilization, and Human Agency: Some Thoughts from the Lurin Valley <i>Richard L. Burger</i>	201
<i>Climatic Disasters and Social Marginalization</i>		
15	Katrina: The Disaster and its Doubles <i>Nancy Scheper-Hughes</i>	217
16	"Nature", "Culture" and Disasters: Floods and Gender in Bangladesh <i>Rosalind Shaw</i>	223

Part IV Knowledge and its Circulation	235
<i>Emic Views of Climatic Perturbation/Disaster</i>	
17 Typhoons on Yap <i>David M. Schneider</i>	239
18 The Politics of Place: Inhabiting and Defending Glacier Hazard Zones in Peru's Cordillera Blanca <i>Mark Carey</i>	247
<i>Co-production of Knowledge in Climatic and Social Histories</i>	
19 Melting Glaciers and Emerging Histories in the Saint Elias Mountains <i>Julie Cruikshank</i>	261
20 The Making and Unmaking of Rains and Reigns <i>Todd Sanders</i>	276
<i>"Friction" in the Global Circulation of Climate Knowledge</i>	
21 Transnational Locals: Brazilian Experiences of the Climate Regime <i>Myanna Lahsen</i>	301
22 Channeling Globality: The 1997–98 El Niño Climate Event in Peru <i>Kenneth Broad and Ben Orlove</i>	315
Index	335

Acknowledgments to Sources

- 1 Broad, Kenneth and Ben Orlove. 2007. Channeling Globality: The 1997–98 El Niño Climate Event in Peru. *American Ethnologist* 34(2): 285–302.
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About the Editor

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Preface

The purpose of this volume is to illustrate the contributions that anthropology can make to contemporary research and policy regarding climate change through reprinting, discussing, and putting into conversation with one another a number of key, canonical works in the history of the anthropological study of climate and society. I have evenly divided my selections among early anthropological works, recent ones, and those in between. I have selected papers that are, or will become, classics, by prominent scholars, which make important contributions to academic and policy discussions concerning climate change and, often, to wider theoretical and policy debates as well. I have selected works that are still not only readable but interesting and relevant. I have tried to select “memorable” works, which deliver an argument in such a way that a reader will still recall it five or ten years hence. I have selected works that are neither strictly theoretical essays nor derivative critiques of the works of others, in favor of original, ethnographic, case studies. I have selected works that have a clear, central theme, which relates to one of the four major sections of the book. This approach stems in part from my decision to organize this volume not around historic eras or schools of climate research, but around a number of persistent, cross-cutting, and inter-linked themes, which span eras. I have selected papers that can be thematically linked to multiple other papers in the volume, thereby constituting a sort of intra-volume “dialogue” that reflects the larger one that has characterized the development of the field of climate studies itself. To further this dialogue, I have organized the volume into a series of paired papers, each one of which speaks to the other in a way that is hopefully stimulating for the reader. In some cases, this “conversation” extends across decades, centuries, or millennia, which makes it all the more powerful. I have selected works with balanced, global coverage. I have restricted my selection of papers to those written by anthropologists, defined as scholars either trained as anthropologists or whose work came to focus to such a degree on anthropological topics as to give them a professional identity as anthropologists, with the exception of a number of pre-twentieth-century scholars whose work marks them as the intellectual ancestors of modern anthropologists. Inevitably, there are gaps in the coverage afforded by the papers selected. I have sought to remedy this with a comprehensive Introduction, which reviews the wider literature on the topics taken up in each reading and on the four wider themes of the book.

I selected papers that could be reprinted in their entirety, without abbreviation or other amendment, so that they can serve as authoritative sources for students and scholars, without

the need for recourse to the original publications. For reasons of space, however, I had to violate this rule in a minority of cases, as follows:

Chapter 1 Hippocrates. 5th century B.C. *Airs, Waters, Places*

This work comprises two distinct parts: following an Introductory Chapter I, Chapters II–XI deal with the effects of local climate upon health, and Chapters XII–XXIV deal with the effects of regional climate upon character. For reasons of space, I reprinted here only Chapters I and XII–XXIV, which focus most directly on Hippocrates’ comparative analysis of climate and society, although Chapters II–XI also are relevant to this volume. Also, I deleted notes from the translator concerned solely with questions of translation from Greek to English.

Chapter 2 Charles de Secondat Montesquieu. 1748. *On the Laws in Their Relation to the Nature of the Climate*

Montesquieu’s “The Spirit of the Laws” is a large and wide-ranging work on law and society, comprising six “Parts” and thirty-one “Books.” Montesquieu’s thoughts on climate and society extend through Books 14–17 in Part 3, but the material of greatest theoretical interest to this volume’s study of climate and society is in Book 14, titled as above, which contains 15 chapters, of which I have reprinted 1–6 and 13–15 as being of most direct relevance.

Chapter 3 Ibn Khaldûn. 1370. *The Muqaddimah: An Introduction to History*

This is a sweeping study of history, geography, ethnography, and political science. The material on climate and society is concentrated in one of its six chapters: Chapter I: Human Civilization in General, which is in turn divided into six “Prefatory Discussions.” The Second, Third, Fourth, and Fifth Prefatory Discussions are most relevant to this volume and are reprinted here in their entirety, except for the Second, of which only the “Supplementary Note to the Second Prefatory Discussion” is included, the remainder being largely a detailed exegesis of the map reprinted as Figure 3.1.

Chapter 5 Theophrastus. 4th century B.C. *Concerning Weather Signs*

The text used here is part of a two-volume edition of Theophrastus, “Enquiry Into Plants,” the most extensive botanical treatise of the classical era. “Concerning Weather Signs,” and another work published alongside it, “Concerning Odours,” are not properly part of “Enquiry Into Plants,” but are separate “minor works” dealing largely with non-botanical topics. “Concerning Weather Signs” comprises five sections: “Introductory: General Principles,” “The Signs of Rain,” “The Signs of Wind,” “The Signs of Fair Weather,” and “Miscellaneous Signs.” For reasons of space, only the first two sections are reprinted, although all are relevant to the subject of this volume.

Chapter 20 Todd Sanders. 2008. *The Making and Unmaking of Rains and Reigns*

This is Chapter 2 of Sanders’ book *Beyond Bodies: Rainmaking and Sense Making in Tanzania*. The remainder of the book is an ethnography of an African society, focusing on issues of gender and religion. For reasons of space, some of the extensive notes to Chapter 2, many of them dealing with historical matters, were either deleted or abbreviated, retaining just the references to works cited.

The following chapters were not abridged in any way but are part of larger works.

Chapter 4 Francis Zimmermann. 1988. *The Jungle and the Aroma of Meats: An Ecological Theme in Hindu Medicine*

This is a synopsis of Zimmermann’s 1987 book of the same title, much of which – dealing with the ecological/climatic dimensions of the ancient Vedic teachings – is relevant to the themes of this volume.

Chapter 7 Ratzel, Friedrich. 1896–1898. Nature, Rise, and Spread of Civilization

Ratzel's three-volume 1885–1888 *Völkerkunde*, a sweeping study of humankind and civilization, was translated and published in English as the six-volume *The History of Mankind*. "Nature, Rise, and the Spread of Civilization" is Chapter 4 in Book I, "Principles of Ethnography," of Division/Volume I of this work. This chapter contains Ratzel's clearest statements regarding environmental/climatic determinism, but relevant material is also found elsewhere in the six volumes.

Chapter 11 James Spillius. 1957. Natural Disaster and Political Crisis in a Polynesian Society: An Exploration of Operational Research II

This is the second of a two-part article published on this topic by Spillius. The first part is a detailed ethnographic account of the involvement of him and Raymond Firth in disaster relief efforts. This too is relevant to the subject of this volume, but the second part was chosen for reprinting because it succinctly pulls out of the ethnography the ethical issues of scholarly engagement with climate-related disasters.

Chapter 13 Elizabeth Colson. 1957. Rain-Shrines of the Plateau Tonga of Northern Rhodesia

This is Chapter 3 of Colson's monograph, *The Plateau Tonga of Northern Rhodesia (Zambia)*. Its subject is the means – one of which is the rain-shrines – by which this "stateless" society is held together.

Michael R. Dove
Killingworth, Connecticut
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Earlier versions of the text for this volume were presented and discussed in my advanced seminar in Yale's School of Forestry and Environmental Studies, "Disaster, Degradation, Dystopia: Social Science Approaches to Environmental Perturbation and Change" (Spring 2010 and Spring 2011), and in an undergraduate class in Yale College's Environmental Studies major, "Anthropology of Climate Change" (Fall 2012). The students in these classes, and especially my Associate in Teaching Catherine (Annie) Claus in the last-mentioned class, were wonderful interlocutors for my efforts to develop the themes in this book. I have also been ably assisted in my library research for this volume by several research interns, Katie Hawkes, Julia Fogerite, and Emily Schosid. With administrative and financial matters, I have relied upon the industry of two administrative assistants, Laurie Bozzuto and Julie Cohen.

None of the aforementioned people or organizations necessarily agrees with anything said in this volume, however, for which I am alone responsible.

Introduction: The Anthropology of Climate Change

Six Millennia of Study of the Relationship between Climate and Society

Michael R. Dove

Background

Clarence J. Glacken writes, in his magisterial 1967 (p. vii) *Traces on the Rhodian Shore: Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century*, that Western thinking about humans and the earth has been dominated by three persistent questions:

Is the earth, which is obviously a fit environment for man and other organic life, a purposefully made creation? Have its climates, its relief, the configuration of its continents influenced the moral and social nature of individuals, and have they had an influence in molding the character and nature of human culture? In his long tenure of the earth, in what manner has man changed it from its hypothetical pristine condition?

Glacken further asserts that these questions have been central not just to thinking about the environment, but also to the development of critical thought itself: “In exploring the history of these ideas from the fifth century B.C. to the end of the eighteenth century, it is a striking fact that virtually every great thinker who lived within this 2,300-year period had something to say about one of the ideas, and many had something to say about all of them” (Glacken 1967: 711). That is to say, pondering on the relationship between nature and culture was a key project in the development of civilization in the West (and indeed, throughout the world). However unique modern anthropogenic climate change may be, therefore, a discourse of climate and culture has

been prominent within human society for millennia. Indeed, it might be said to have been an integral part of *the* discourse of civilization itself.

Anthropology has played a central role in this discourse. Thinking of the intellectual forebears of the discipline from the classical era to modern times, as well as anthropology proper over the past two centuries, theorizing regarding the relationship between nature and culture, between environment and society, has been central to the development of anthropology as a field. Consider as an example what is known as “climate theory,” referring to the idea that climate determines human character, culture, and the rise and fall of civilizations. One of its earliest known developments was in the Hippocratic school 2,400 years ago. After it had been periodically reiterated over the succeeding two millennia, a remarkably similar theory was promulgated by two modern scholars who are often claimed as belonging to contemporary anthropology: the French enlightenment political thinker Montesquieu in the eighteenth century and the German geographer and ethnographer Ratzel in the nineteenth. A reaction against simplistic environmental determinism then set in, leading to what Rayner (2003: 286) has called an eighty-year gap in social science studies of climate. By the mid-twentieth century, explicit anthropological studies of climate were limited to very modest analyses of correlations between climate and human biology (Mills 1942; Gladwin 1947; Whiting 1964).

This perceived move by anthropology away from climate was more apparent than real, however. Throughout the twentieth century, anthropologists were very much concerned with climate through their studies of subsistence practices of hunting and gathering, fishing, herding, and agriculture (e.g., Evans-Pritchard 1940; Richards 1948). Classic studies in environmental anthropology by the likes of Steward (1955), Mauss (1979 [1950]), and Conklin (1957) delved deeply into emic or native views of climate. Anthropologists built on this experience when, later in the twentieth century, more explicitly climatic topics emerged, like degradation and desertification (Spooner and Mann 1982; Little and Horowitz 1987). The questions being debated in these studies are as theoretically robust as any that have ever concerned anthropology. More recent, and with more immediate relevance to contemporary concerns about climate change research and policy, has been the contribution of anthropology to a new generation of disaster studies (Vayda and McCay 1975; Oliver-Smith 1996). Rejecting an earlier focus on individual ability or inability to cope with disaster, and the view of disaster as a “break” in the normal (Wallace 1956), the new studies ask how coping ability is affected by the dynamics of the wider society and, further, the role that society plays in determining who does or does not become a disaster victim in the first place (Hewitt 1983; Wisner 1993). As the social dimension of disasters became clear, anthropologists realized that there is a politics of knowledge associated with them (Harwell 2000; Mathews 2005), which historical studies show to have roots in the colonial era (Grove 1995; Davis 2001; Endfield and Nash 2002).

Margaret Mead (1977) is reputed to have been the first anthropologist to talk about climate change. For the past two decades, anthropologists have been involved in a significant way with research on climate change (Crate 2011), whether the involvement is measured by meetings and conferences, or grants and publications, including some noteworthy edited collections (Strauss and Orlove 2003; Casimir 2008; Crate and Nuttall 2009). Initially, this involvement built on traditional anthropological expertise with small, local communities, for example studying issues of risk and vulnerability (Ribot, Magalhães, and Panagides 1995) and the reality or prospects for adaptation (Berkas and Jolly 2001; Finan and Nelson 2001; Eakin 2006). From there anthropologists moved to related topics such as REDD (Reduced Emissions from Deforestation and Degradation), drawing on the field’s expertise on indigenous, forest-dwelling peoples in the tropics (Schwartzman and Moutinho 2008).

A separate and important subgenre of the anthropological study of climate is the emerging field of the history and especially prehistory of human society and climate change. Some anthropologists have drawn on novel oral historical materials to contribute to this study (McIntosh 2000; Cruikshank 2001); but most work has come from archaeology. A long-established interest in the impact of climate change on ancient societies has been greatly reinvigorated by contemporary climate change

debates (Bawden and Reycraft 2000), with special interest in the El Niño–Southern Oscillation (ENSO) phenomenon as a proxy for climate change (see Chapter 14, this volume).

From these beginnings in familiar ground, anthropologists have moved to such non-traditional topics as the international institutions involved in climate change research and policy, for example the IPCC (O'Reilly 2012), the meetings at which the global climate change community attempts to hammer out policy (Doolittle 2010), and thorny issues of communication and public skepticism (Diemberger et al. 2012). Beyond anthropology, there is a voluminous literature on climate change. Of special interest is apposite scholarship in the humanities on climate beliefs embedded in literature and the arts (Mentz 2010), and collections on global governance and climate change (Jasanoff and Martello 2004; Roberts and Parks 2007; Hulme 2009).

These new directions notwithstanding, anthropologists insist that their work on climate change – which some have called “climate anthropology” (Nelson and Finan 2000) or “climate ethnography” (Crate 2011) – takes advantage of the traditional strengths of the field, which Roncoli, Crane, and Orlove (2009) refer to as “being there” and the capacity to provide insight into perceptions, knowledge, valuation, and response. There are a number of dimensions to contemporary climate change that require these sorts of insights: (i) climate change has a reality at the local level; (ii) global debates about climate change policy are affected by North–South post-colonial histories; (iii) climate change has likely been imbricated in the evolution of human society; and (iv) the knowledge, science, and understanding of climate change is itself a social phenomenon, which affects the prospects for mitigation and adaptation. No other discipline matches the capacity to illuminate such issues of anthropology, which thus has something unique to offer to contemporary debates about climate change research and policy (Magistro and Roncoli 2001).

The aim of the current volume is to illustrate the scope and relevance of anthropological work on climate change, and in particular its intellectual roots and historic development. In none of the contemporary work has there been any effort to examine the history of anthropological work on climate and society, much less earlier apposite traditions of scholarly work on this topic. This is a serious gap in the anthropology of climate change. Scholars with an anthropological bent, and indeed human society in general, have been thinking about climate and society for millennia; and this history is a valuable resource for coping with twenty-first century climate change. To assess this resource, this volume presents twenty-two different examples of anthropological work on climate and society, organized into four principal sections. The first, “Continuities,” presents papers that illustrate intellectual continuities from the classical era, through the Enlightenment, and up to the present, focusing on “climate theory.” The second section, “Societal and Environmental Change,” is dedicated to papers dealing with an important corollary question for climate theory: When climate changes, does society follow suit? The third section of the book, “Vulnerability and Control,” contains papers that ask how societies attempt to cope with the impact of extreme climatic events, and how social differentiation affects this impact. The fourth and final section, “Knowledge and its Circulation,” looks at epistemological issues, in particular the factors that determine how climatic perturbation is interpreted.

In the remainder of this Introduction, I will review in detail these four principal parts of the volume and their contents.

Part I: Continuities

The volume begins with an examination of deep historical continuities in thinking about climate and society, beginning with the “climate theory” of the classical era, then looking beyond the Greco-Roman tradition to other civilizations, and then examining some historical currents in that most anthropological of methods, the ethno-scientific study of other conceptual systems.

Climate Theory

One of the most enduring ways of thinking about the relationship between climate and human society is the so-called “climate theory,” which derives the character of society from climate.

*1 Hippocrates. Fifth century B.C. *Airs, Waters, Places**

Important commentaries on environmental matters have been noted in the writings of many scholars of the classical era, including Aristotle, Herodotus, Thucydides, and Pliny. But in terms of an extended, in-depth analysis of the relationship between culture and nature, the work of Hippocrates (born 460 B.C.) is perhaps unsurpassed. His *Airs, Waters, Places* is a seminal work on the linkages between climate, landscape, physique, and temperament: “Some physiqués resemble wooded, well-watered mountains, others light, dry land, others marshy meadows, others a plain of bare, parched earth” (p. 42). Glacken (1967: 81–2) calls this “the earliest systematic treatise concerned with environmental influences on human culture . . .” It was a radical work in explicitly replacing the gods with nature as a causal agent.

The Hippocratic tradition presents two distinct bodies of theory regarding disease and, more generally, the relationship between society and environment. As Glacken (1967: 80) writes, “From early times there have been two types of environmental theory, one based on physiology (such as the theory of the humours) and one on geographical position; both are in the Hippocratic corpus.” The two types of theory are related but still separate; *Airs, Waters, Places* has different chapters for biological man and cultural man, for medicine and ethnography. The independent variable in the case of biology is seasonally driven variation in weather; the independent variable in the case of culture is latitudinally and topographically driven variation in climate. Health and culture are problematized and explained in this formulation, not nature. Nature is the independent variable, and health and culture are the dependent ones. Explanation of difference in the world was sought by examining the impact of nature on people, therefore, not that of people on nature.¹

Jones (1923: 66) observes that the second portion of *Airs, Waters, Places*, which is reprinted here, is “scarcely medical at all, but rather ethnographical.” This refers to Hippocrates’ use of the comparative method, which was to enjoy such a long and productive history within environmental anthropology (Steward 1955). In the first, “medical” part of *Airs, Waters, Places*, not reprinted here, Hippocrates relates human health to the characteristics of the site or locale, whereas in the second, “ethnographic” part, he generalizes from this causal relationship to explain the correlation between the character of entire societies and the regions within which they live: “Now I intend to compare Asia and Europe, and to show how they differ in every respect, and how the nations of the one differ entirely in physique from those of the other.”

Hippocrates uses comparative analysis to explain human difference, not similarity. Early in the ethnographic part of *Airs, Waters, Places*, Hippocrates (p. 42) informs his readers that “The races that differ but little from one another I will omit, and describe the condition only of those which differ greatly, whether it be through nature or through custom.” His attempt to explain different peoples in terms of different climates was a search for an answer to the age-old question: Why is the “other” different? The earth itself, the geomorphology of which produces not sameness but infinite diversity, has throughout human history provided ready at hand one answer to this question.

Hippocrates’ question assumes an underlying common humanity. The “other” is different but still human. There was neither felt need nor actual effort to explain in terms of climate the difference from humans of the fabled races of antiquity, like the cyclops for example. It was only the existence of “others” like us, yet unlike us in *some* respects, that posed a question. In contrast, the existence of “others” like us, in all respects, posed no question at all. Hippocrates could have seen like people in unlike environments as posing an equally logical question, but he did not. The historic ramifications of his choice were enormous; as Glacken (1967: 85) notes, “If Hippocrates had shown an interest in accounting for similarities rather than differences, the history of environmental theories would have been entirely different.”

The intent of *Airs, Waters, Places* is prognostic not programmatic (Glacken 1967: 81): the aim in the first, medical part is to predict the effects of the seasons of the year on human health; whereas the intent of the second, ethnographic part is to predict the effect of the climatic regions of the earth on human character. Hippocrates' (p. 41) intent is "to show" these differences; it is not to present an agenda for action. By offering an explanation of human differences, including problematic differences, this rationalization of the status quo has proved to be politically powerful down to the present day. As Glacken (1967: 258) writes, this explanation is "serviceable in accounting for cultural, and especially for racial, differences"; and, thereby, it helps to justify privilege. It is all the more powerful because it de-privileges others on the basis not of their own character but rather of that of their environment. The continued power of such explanations can be seen in the great current popularity of works of global geographic determinism (e.g., Diamond 1997, 2005). It perhaps also can be seen in the self-privileging stances being taken by the industrialized nations toward the late-industrializing nations with less historic responsibility for, but greater current vulnerability to, climate change, as in distinctions being made between countries with high versus low "adaptive capacity" (Moore 2010). Today, as 2,500 years ago, therefore, climate is an instrument in segmentary politics.

2 *Charles de Secondat Montesquieu. 1748. On the Laws in Their Relation to the Nature of the Climate*

The Hippocratic work on climate and society was, as Glacken writes (1967: 502), "dramatically revived" during the Enlightenment by Montesquieu in his *The Spirit of the Laws*. Montesquieu (1689–1755) published this in 1748, and considered it to be his life's work (Cohler 1989: xi). The writing is clearly reminiscent of *Airs, Waters, Places* (Montesquieu: p. 48): "You will find in the northern climates people who have few vices, enough virtues, and much sincerity and frankness. As you move toward the countries of the south, you will believe you have moved away from morality itself . . ."

Montesquieu read widely and although he does not specifically refer to Hippocrates in *The Spirit of the Laws*, he had a version of *Airs, Waters, Places* in his library and its impact on his work is generally acknowledged (Levin 1936: 26–39; Cohler 1989: xx). Also suggestive is the fact that one of the key intellectual constructs in Montesquieu's climate theory is based on his freezing and thawing of a sheep's tongue, and his observation of the attendant contracting and lengthening of its "papillae," thereby explaining the supposed greater sensitivity of people in warm versus cold climates – which parallels Hippocrates' own experiment in freezing and thawing water.²

Anthropologists claim Montesquieu as an intellectual forebear because of the marked element in *The Spirit of the Laws* of cultural relativism with respect to non-Christian religions and practices like polygamy (Nugent 1752: 6–7; Launay 2010). As Neuman (1949: xxxii) writes, Montesquieu believed that "The reconciliation of might and right must be achieved differently in different cultures." More generally, Montesquieu developed what seems today to often be a social scientific approach to his subject. Referring to his effort to interrelate all of the elements – morals, customs, principles of government, and the spirit of the nation – that shape the character of a country, Neuman (1949: xlvi) remarks that "It is, as one would say today, an attempt to develop the principles of a cultural anthropology." The founder of French sociology/anthropology, Emile Durkheim, devoted his 1892 dissertation to an assertion of the foundational contributions of Montesquieu to this field (Neuman 1949: xxxiii, n.4).

In addition to its political thought, *The Spirit of the Laws* is famed for its theorizing regarding the relationship between nature and culture, in particular between climate and law. Glacken (1967: 653) asserts that "By his advocacy of climatic influences, Montesquieu in the *Esprit des Lois* had provoked some of the most searching thought on social and environmental questions that had yet appeared in Western civilization . . ." Montesquieu's thesis, based on a tradition of thinking that can be traced back to Aristotle and Plato, is that law-making should be suited to the character of the society and that this is influenced by the character of the environment. He writes "If it is true

that the character of the spirit and the passions of the heart are extremely different in the various climates, laws should be relative to the differences in these passions and to the differences in these characters” (p. 47). As Neuman (1949: xlv) writes, “He tries to establish a direct, causal relationship between climate, the physiological condition of man, his character, and the structure of political society.”

The ideal relationship between climate and political control, or law, according to Montesquieu, is for the latter to temper the ill-effects of the former. The role of government, thus, is to negate the un-civilizing influences of environment. Montesquieu (p. 49) writes, “That bad legislators are those who have favored the vices of the climate and good ones are those who have opposed them.” Montesquieu wrote in a tradition of thought that has continued nearly unchecked down to the present day, which postulates that one of the achievements of the advance of civilization has been to lessen the vulnerability of human society to the climate, the environment. Accordingly, the tempering effect of law on the effects of climate was thought to be most needed in the less-developed parts of the world: “As a good education is more necessary to children than to those of mature spirit, so the people of these climates [the sub-continent] have greater need of a wise legislator than the peoples of our own” (p. 49).

Since Montesquieu, like those who went before him in developing and applying “climate theory,” compared nature and culture across space, not time, the resulting studies do not easily accommodate cultural change. Hence Voltaire’s challenge to Montesquieu: since the climate has not changed, how does he explain the difference between modern Greece and Athens of the Periclean Age (Glacken 1967: 582)?²³ Some modern scholars claim that this charge of determinism is based on a faulty reading of Montesquieu. For example, Neumann (1949: xlv) writes, “That he did not attempt to derive political conditions exclusively or even primarily from climatic conditions is clear to everyone who takes the trouble of reading what he wrote. He was not a geopolitician.” Kriesel (1968: 574) categorizes Montesquieu as an early “possibilist” (like Wissler and Kroeber), not an early “determinist” or Ratzelian (see Chapter 7, this volume) .

Montesquieu put the comparative study of politics and environment on an empirical, historical basis (Neumann 1949: x). In several instances he attempts to isolate and examine the influence of what he perceives to be explanatory or independent variables, which distinguishes him from nearly all of his predecessors. For example, he looks at what happens when people living in one environment move to a different one: when the Visigoths migrated from the region of Germany to the Spanish Peninsula; when northern Europeans fought as soldiers in southern Europe in the war of the Spanish succession; and when European colonists reared their children in India. In all cases, Montesquieu maintained, the migrant group took on the character of their new environment.

Beyond the Greco-Roman Tradition

Although little known to audiences in Europe and North America, there are hoary intellectual traditions regarding climate and society outside of the Western tradition, which have had and continue to have an important influence in other parts of the world. McIntosh (2000) represents an unusual effort to tease out from the archaeological record the Mande vision of long-term climatic patterns in West Africa, and Freidel and Shaw (2000) have attempted something similar with the Maya of Central America. The papers reprinted in this section concern equally unusual records from North Africa and the subcontinent.

3 *Ibn Khaldûn. 1958. *The Muqaddimah: An Introduction to History**

Ibn Khaldûn, like Montesquieu, was a scholar-politician trained in law, but in a non-Western tradition. Born in 1332 in Andalusia in southern Spain, to a Moslem family that had migrated there from Yemen in the eighth century, he died in 1406 in Cairo. Formally trained as a *faqih* jurist,

Ibn Khaldûn was also an *adib* or man of letters, and it is for his scholarship that he is still known to us today, in particular his *The Muqaddimah: An Introduction to History*. First published in Arabic in 1370 in Cairo, Toynbee (1935: III, 322) has extravagantly called it “undoubtedly the greatest work of its kind that has ever yet been created by any mind in any time or place.” Written at the end of the intellectual development of medieval Islam, it captured the historical depth and conceptual heights of this development (Rosenthal, 1958: cxiii).

The medieval Islamic renaissance was distinct from but not unconnected to Western intellectual traditions – and the links to classical Greek scholarship were explicit. As Lawrence (2005: xi) writes of Ibn Khaldûn, “He engaged the full spectrum of sciences that were known in Arabic translations from Greek sources by the ninth century.” Ibn Khaldûn himself writes that “The sciences of only one nation, the Greeks, have come down to us . . .” (III: 78). Ibn Khaldûn refers in multiple places to translations of Greek works (II: 203, III: 130, 151, 250), and he explicitly states that “Muslim scientists assiduously studied the (Greek sciences)” (III: 116). Part of the Greek corpus that was passed on involved climate theory. Ibn Khaldûn is seen as a forerunner of Montesquieu and Bodin among others (Rosenthal 1958: lxvii, 86n) and even as a bridge between Hippocrates and these enlightenment thinkers (Gates 1967).

Ibn Khaldûn is one of the earliest historic figures claimed as a direct ancestor of modern anthropology. Of special interest to anthropologists is his theorizing regarding the dynastic cycles of the Islamic states of North Africa, the Maghreb, which Ibn Khaldûn claimed characteristically run their full course – from ascent to decline – in just three generations (Rosenthal 1958: lxxxii; cf. Launay 2010). The driver of this dynastic cycle is the dynamic relationship between the two fundamentally contrasting socio-ecologies of the region – the urban and the hinterland. Going beyond Hippocrates, Ibn Khaldûn does not just distinguish the two socio-ecologies, he examines the relationship between them, their integration into a single system in effect.

As Lawrence writes (2005: x), Ibn Khaldûn’s thesis is that “civilization is always and everywhere marked by the fundamental difference between urban and primitive, producing a tension that is also an interplay between nomad and merchant, desert and city, orality and literacy.” Ibn Khaldûn argues that state formations arise from desert roots, spawn an urban society, forget and then become vulnerable to the values of the desert from whence they sprang, and so collapse. Ibn Khaldûn’s formulation of this dichotomy is one of the most important antecedents of modern political geography.

Ibn Khaldûn was interested in the causes as well as the consequences of the difference between the ways of the desert tribesman and the ways of the urban citizen. He cites some socio-historical determinants of human difference, like descent and custom, but mostly he cites environmental, climatic variables. His thesis is that temperate versus intemperate climates produce, respectively, temperate versus intemperate societies, encompassing “the sciences, the crafts, the buildings, the clothing, the foodstuffs, the fruits, even the animals” and “the bodies, colour, character qualities, and general conditions” of the human inhabitants (p. 59). The temperate zone encompasses the Maghreb, western India, China, Spain, Galicia, and Iraq and Syria.

Just as Hippocrates sees people affected by climatic differentiation at local as well as global scales, so does Ibn Khaldûn see the global, zonal dichotomy reproduced at the local level of desert versus hills. Comparing the peoples of the resource-poor desert and the resource-rich hills of the Maghreb, he says of the former, “Their complexions are clearer, their bodies cleaner, their figures more perfect and better, their characters less intemperate, and their minds keener as far as knowledge and perception are concerned” (p. 63). The principal determinant of these distinctions is material abundance versus dearth, which is partly explained by more localized environmental differences like fertile versus infertile soils. At the global level, this distinction is climatic and based on the forces of hot and cold.

Ibn Khaldûn employs a comparative method to discern and illuminate the dichotomy between temperate and intemperate regions and peoples. As he writes, “If one pays attention to this sort of thing in the various zones and countries, the influence of the varying quality of the climate upon the character of the inhabitants will become apparent” (p. 62). As others have done in applying

climate theory to the explanation of human difference (e.g., Montesquieu), Ibn Khaldûn tests the validity of his thesis by looking at people who move between zones. He asserts that skin color, which reflects temperateness, lightens among the descendants of people who move from South to North and darkens among the descendants of people who move in the opposite direction.

Throughout, the *Muqaddimah* statements are buttressed with the prefatory comment, “Based on observation and continuing tradition . . .” This seemingly innocuous phrase is nothing less than Ibn Khaldûn’s effort to balance the respective authorities of science and religion. He is balancing *inshâ* norm or Tradition, which cannot be qualified; and *khavar* Event, which must be confirmed, qualified, or refuted (Lawrence 2005: xxi). Ibn Khaldûn was not merely developing science, therefore; he was also developing the conceptual space for it within Moslem societies.

4 Francis Zimmermann. 1988. *The Jungle and the Aroma of Meats: An Ecological Theme in Hindu Medicine*

Another important, non-Western tradition, with its own unique development of “climate theory,” is that of ancient India. The Vedic texts on which this tradition is based were composed 2,000–4,000 years ago; but they are living texts, still cited today in Ayurvedic and related teachings. Zimmermann’s paper reprinted here is a synopsis of his 1987 book of the same title, which will also be referred to here. It is based on an exacting interpretation of the ancient Sanskrit texts and their ecological significance.⁴ Francis Olivier Zimmermann, born in France in 1942, is an anthropologist and currently Directeur d’études à l’Ecole des Hautes Etudes en Sciences Sociales in Paris.

Zimmermann argues that the ancient Vedic texts describe a cosmological divide between the semi-arid savanna (*jāṅgala*) of western India and the perennially wet forests (*ānūpa*) of eastern India, which is in turn based on a fundamental underlying polarity between *agni* (fire) and *soma* (water). As in Ibn Khaldûn’s Maghreb, the principal axis of comparison here is wet versus dry. Like the other climatic divides discussed earlier, whether Greek or Moslem, there is a normative, even political dimension to this one – one zone is the abode of the civilized Aryan, whereas the other is that of the uncivilized barbarians. As Zimmermann writes (1987a: 18), “The *jāṅgala* incorporated land that was cultivated, healthy, and open to Aryan colonization, while the barbarians were pushed back into the *ānūpa*, the insalubrious, impenetrable lands.” The polarity between the savanna and the rainforest “is a matter not of physical facts but of brahminic norms,” and thus is not just descriptive but prescriptive (Zimmermann 1987a: 29).

Unlike the Greek and Moslem cases, this socio-climatic divide was partly human-made: the *jāṅgala* was at least partly anthropogenic in character. It both preceded and followed the spread of the Aryan civilization in India; it was both reflection and consequence of Aryan land-use practices. Zimmermann (1987a: 44) suggests that degradation of forests and abandonment of overused lands led unintentionally to the creation, or at least spread, of the savanna. There is evidence to suggest, however, that the savanna-ization of western India was more purposive than this, that it was the product of continual, active land-management, especially burning and grazing by the livestock-oriented Aryans (Dove 1992: 235–7).

In both the Indian and Greek traditions, environmental difference maps onto the body as well as the society, but in the latter case body and society are still distinct. The Vedic sages in India, in contrast, treat the two topics in a much more integrated fashion. As Zimmermann (1987a: 20) writes, “The texts invite a double reading, or, to put it another way, one text is enmeshed in the other: a discourse on the world (natural history) is contained within a discourse on man (medicine).”

Vedic climatic or environmental theory can also be distinguished from the Greek and Islamic traditions based on its empirical character. As Zimmermann (1987a: 198) writes, “The idea of a ‘science’ of Nature is altogether alien to India or, to be more precise, in India it is formulated in a radically different fashion.” Explicit, direct empirical inquiry was deemed unnecessary. Zimmermann (p. 76) writes, “There was no experimental method, or methodic reasoning other

than on the basis of traditional teachings.” Whereas the Greeks developed a method and theory of natural history, therefore, what was developed in India was essentially a lexicon. An example of the unusual empirical character of this lexicon is its inclusion side by side with both real and mythical creatures (e.g., the *karāla* or musk deer on the one hand and on the other the *makara* or sea dragon) (1987: 103).

A normative loading was associated with the semi-empirical character of the Vedic lexicons. As Zimmermann (p. 75) writes of the Sankrit treatises, “They were normative texts that transcribed authentic, orthodox knowledge.” Whereas Ibn Khaldūn constantly cites both “observation and continuing tradition,” for example, the Vedic teachings cite tradition alone.

Appadurai (1988: 207) asks, if Ayurveda really has so little empirical content, how could it have persisted for four millennia? He asks if we should see Ayurveda not as non-scientific, therefore, but rather as an alternative discourse? Zimmermann (p. 79) grants that the Ayurvedic physician “was first of all a man of the soil.” There clearly was an empirical human-ecological basis to the *jāṅgala/ānūpa* polarity (Dove 1992). Perhaps it would be most useful to say that, as Zimmermann himself suggests, the manner of producing and articulating this reality was a radically different one.

Ethno-climatology

One of anthropology’s core methodologies is the close study of local, native, indigenous systems of knowledge – ethno-botany, ethno-ecology, and ethno-zoology all being examples of this. The latest addition to this tradition of work is ethno-climatology, which is a product of the surge of interest in climate studies over the past two decades or so. An early effort is Bharara’s (1982) analysis of the recollection and prediction of drought in Rajasthan. A “stellar” example is the analysis by Orlove, Chiang, and Crane (2002) of the native Andean system of basing forecasts of seasonal patterns of precipitation on changes in the visibility of the Pleiades.⁵ There are also broader studies of the entire spectrum of climate-related knowledge and practice in other cultures, such as Sillitoe’s (1994) study in Papua New Guinea. One of the “thickest” (Geertz 1973) ethno-climatological studies in existence is Zimmermann’s (1987b) analysis of the many dimensions of the monsoon in traditional Indian culture.

5 Theophrastus. Fourth century B.C. Concerning Weather Signs

There are many classic Greco-Roman texts on climate and weather, which are authoritatively surveyed by Sider and Brunschön (2007: 5–29). Major works on weather include the familiar ones – Virgil’s *Georgics*, Pliny’s *Natural History*, and Aristotle’s *Meteorologica*. Specifically having to do with the signs of weather, the major classical works are Hesiod’s *Works and Days* (1914) and the study by Theophrastus reprinted here. Whereas Hesiod focused on the meaning of regular occurrences for the annual weather cycle, Theophrastus focused on the meaning of irregular occurrences for immediate weather conditions (Sider and Brunschön 2007: 3–4). As was typical of these classical works, neither addressed long-term changes in climate. Nor were any of these ancient works self-conscious ethno-climatological studies, although all drew and reported on what was essentially local, folk knowledge.

Theophrastus, a student of Plato and then Aristotle, was born about 370 B.C. in Eresos in Lesbos and died about 285 B.C. “Concerning Weather Signs” is a listing of all of the then-known signs – primarily from either astronomical phenomena or animal behavior – from which weather could be forecast in the short term. The work consists of, first, a prologue, followed by signs of rain, wind, storms, and fair weather. Only the prologue and signs of rain are reprinted here. The forecasts are strictly meteorological in character: that is, they predicted changes in weather, not, at least not directly, changes in the fortunes of humans (Sider and Brunschön 2007: 36).

“Concerning Weather Signs” is rich in “thick description” like the following: “It is a sign of storm or rain when the ox licks his fore-hoof; if he puts his head up towards the sky and sniffs the air, it is a sign of rain” (pp. 85–86). This is based on a celebration of fine-grained knowledge of the sort that environmental anthropologists and human ecologists have treated as major discoveries in recent decades: “It is a sign of rain if ants in a hollow place carry their eggs up from the ant-hill to the high ground, a sign of fair weather if they carry them down” (p. 86). As is the case in most good studies in environmental anthropology and human ecology, this knowledge is locally grounded and place-specific. Theophrastus makes multiple references to observable conditions on the flanks or summits of particular, named mountains, and he explicitly underscores the importance of this locale-specific orientation: “Wherefore good heed must be taken to the local conditions of the region in which one is placed” (pp. 84, 86). He goes on to emphasize the concomitant need for local expertise: “The signs of rain, wind, storm and fair weather we have described so far as was attainable, partly from our own observation, partly from the information of persons of credit” (p. 84). Theophrastus (p. 84) then lists a half-dozen named individuals known to him as “good astronomers.” He also offers a remarkable, early statement regarding the value of such informants with locally situated knowledge: “It is indeed always possible to find such an observer, and the signs learnt from such persons are the most trustworthy” (p. 84).

“Concerning Weather Signs” lacks any meteorological explanation as to why the signs *work*, in contrast to Orlove, Chiang, and Crane (2002), for example. Sider and Brunschön (2007: 4) say that this absence may be due to mischance and the likely abridgement of the text: “[S]ince what we have is largely the signs stripped of any philosophical underpinning or scientific framework that Aristotle or Theophrastus would surely have supplied . . .”

6 Vladimir Janković. 2007. *Gruff Boreas, Deadly Calms: A Medical Perspective on Winds and the Victorians*

Traditionally a subject of little interest except as part of the most detailed ethno-ecological studies (Conklin 1957; Gladwin 1970), wind is drawing increasing attention due to the surge of interest in things climatic (Low and Hsu 2007). These studies of wind fall within the burgeoning literature on climate and culture (Golinski 2007; Hulme 2009). Developing along parallel and often intersecting lines there is also a literature on the history of meteorology (Fleming, Janković, and Coen 2006; Fleming and Janković 2011).

Vladimir Janković, the Wellcome Research Lecturer at the Centre for the History of Science, Technology and Medicine at the University of Manchester in England, studies the cultural history of weather, climate, and meteorology in Britain from the seventeenth through nineteenth centuries (e.g., Janković 2000). The focus of his paper reprinted here is the cultural history of “wind,” which in the nineteenth century was popularly perceived as a threatening, boundary-crossing, mysterious, and heatedly debated phenomenon, much like today’s greenhouse gases. Janković (p. 89) says that his topic is “what might be termed a *meteorological pathogenesis* . . .” As he writes, “In this paper I propose to reflect on the medical meanings of the nineteenth-century winds” (p. 89).⁶

Although Janković is writing about an era separated from that of Theophrastus by two millennia, he employs a similar ethno-climatological method. Like Theophrastus, the data that Janković gathers and analyzes are in part folk beliefs, specifically beliefs concerning the medical properties of winds. This harkens back to the classical period, and to Hippocrates’ (p. 41) interest in “. . . the hot winds and the cold, especially those that are universal, but also those that are peculiar to each particular region.” During the period under study here, Victorian Britain, the Hippocratic tradition of “medical topography” was still very much alive.

Janković draws his data not only from scholarly but also from popular sources, including the novels of Sir Walter Scott, Charlotte Brontë, and Jane Austen. This was a time of great debate over the role of wind in the causality of illness – something that was missing from the Hippocratic

corpus, which posited but did not analyze the influence of winds. This debate was part of a wider intellectual development that ultimately brought an end to a vernacular meteorology in which winds had geographic footprints and peculiar ways of blowing.⁷ Vernacular and commonly accessible public knowledge gave way to the scientific knowledge and obscurity of elites.

Whereas most contemporary ethno-climatological studies compare distant, non-Western beliefs with the more familiar scientific meteorological knowledge of modern, industrialized Western societies, Janković is studying the recent and decidedly non-modern meteorological beliefs of a historic West European population.⁸ Focusing as it does on Victorian-era views of wind, this comes closer to problematizing the cultural reality of the researcher himself. Janković thereby historicizes a modern Western system of climate knowledge that has evinced little interest in studying its own past. His study denaturalizes contemporary, Western views of weather by showing their relative recency.

Janković talks about the nineteenth century as a period of epistemic competition over climate that ended with the decisive rise of the scientific paradigm and marginalization of folk theories. Unexpectedly, this may prove to have been not the end of the epistemic competition but merely a pause in it. The early twenty-first century has seen the unanticipated re-emergence of such a competition with respect to global climate change (Demeritt 2001; Smith and Leiserowitz 2012). Any scientific statement on climate change today that enters a public forum will be passionately debated by critics, who do not hesitate to put forth not only their critiques but also their own alternative theories and interpretations of the data.

Part II: Societal and Environmental Change

Historic change is the subject of the papers in this next section of the book, especially concurrent change in human society and natural environment. Its analysis raises questions about the role of environmental difference and change in the rise and demise of civilizations, and the relevance of the past to the present and future.

Environmental Determinism

The first set of papers have to do with the closest equivalent to climate theory in the modern era, environmental determinism, a more self-consciously academic articulation of the associations noted by Hippocrates, Ibn Khaldūn, and others. This is the theory that a major determinant of the character of human society is the character – the potential and resources – of the bio-physical environment.

7 *Friedrich Ratzel. 1896–1898. Nature, Rise, and Spread of Civilization*

The apogee of environmental determinism in the late nineteenth and early twentieth centuries was reached in the development of the field of “anthropogeography,” a domain largely founded by the German geographer and ethnographer, Friedrich Ratzel (1844–1904), who long taught at the University of Leipzig. His most important contributions were *Anthropogeographie* (1882–1891) and *Völkerkunde* (1885–1890), an English translation of the latter being published in 1896 as *The History of Mankind*.

The History of Mankind was a broadly comparative work, in method and global scope much like *Airs, Waters, Places* and *The Muqaddimah*. It differed from *Airs*, in particular, in that it combined its spatial analysis with an historic one: “Ethnography must acquaint us not only with what man is, but with the means by which he has become what he is, so far as the process has left

any traces of its manifold inner workings. . . . The geographical conception of their surroundings, and the historical consideration of their development, will thus go hand in hand" (1896: 3). In short, Ratzel was approaching cultural differences, mapped across the regions of the globe, as also historical differences.

Ratzel was primarily interested in the difference between what he calls the "civilized" versus uncivilized societies, and the historic process that led from the latter to the former – his premise being that civilized societies were once uncivilized and sometimes could become so again, and savage societies could someday become civilized.⁹ Ratzel (p. 110) glosses the uncivilized societies as "natural races," which he defines by a human developmental metaphor, reminiscent of Montesquieu: "There is a distinction between the quickly ripening immaturity of the child and the limited maturity of the adult who has come to a stop in many respects. What we mean by 'natural' races is something much more like the latter than the former." The most important factor in differentiating the natural races from the civilized ones is environmental. As he writes (1896: 14), "We speak of natural races, not because they stand in the most intimate relations with Nature, but because they are in bondage to Nature." Ratzel is not suggesting that the civilized races are less dependent upon nature, only that their dependence is different.

As with earlier climate theorists, there is a broad, latitudinal dimension to Ratzel's analysis of the differing influence of nature upon different societies; and it is similarly based on a temperate/intemperate distinction. As he notes, "The real zone of civilization, according to all the experience which history up to the present day puts at the disposal of mankind, is the temperate" (p. 114). Ratzel suggests that the evolution of mankind took place in the "soft cradle" (p. 113) of the resource-rich tropics, but civilization developed in the less favorable conditions of the temperate zones. The temperate zone is more stimulating of the development of civilization than the tropical zone because, in part, and echoing the earlier work of Hippocrates, Ibn Khaldûn, and the Vedic sages, it is more austere. As Ratzel says when writing about the development of agriculture, ". . . [W]ant is more favourable than abundance" (1896: 88). A second aspect of the temperate latitudes that stimulates the development of civilization is its higher density of population. This is desirable because, as Ratzel writes, striking an unexpectedly anti-Malthusian note, "In density of population lies not only steadiness of and security for vigorous growth, but also the immediate means of promoting civilization" (p. 113).

Ratzel is conscious of the fact that such generalizations are challenged by exceptional cases. Of agricultural development, for example, he says, "But it is unsafe to say with Buckle that there is no example in history of a country that has become civilized by its own exertions without possessing some one of those [natural] conditions in a highly favourable form" (1896: p. 27). More pointedly, he suggests that the force of humans may or may not overwhelm the influence of natural endowments and conditions. As proof of this, he maintains that there is no exact correlation between the natural races and the environment, even if there is between civilized races and the environment: "Nothing gives a more striking lesson of the way in which the utilisation of Nature depends upon the will of man than the likeness of the conditions in which all savage races live in all parts of the earth, in all climates, in all altitudes" (1896: 14).

Early in the twentieth century, the academic tide turned decisively against Ratzel, forever dimming his legacy. One interlocutor of Ratzel's, Marcel Mauss, writes of the anthropogeographers, "They have, however, attributed to this factor [land] a kind of perfect efficacy, as if it were capable of producing effects on its own without interacting with other factors that might reinforce or neutralize its effects either partially or entirely" (1979 [1950]: 21). Some scholars attribute the reaction against Ratzel at least in part not to his own scholarship but to the subsequent reworking of it into a more extreme form of environmental determinism by his students and followers, notably Ellen Churchill Semple. As Kroeber, an admirer of Ratzel's, wrote in later years of him: "But he did conceive of culture as more than an incidental phenomenon, and was far from being the crass environmentalist which Semple's misrepresentatively selected adaptation makes him out to be" (1947: 7).

The eclipse of Ratzel's determinism a century ago casts in curious relief the modern popularity of the work of the eco-physiologist Jared Diamond (1997, 2005). Like Ratzel's, Diamond's environmental determinism is focused on explaining the historic socio-economic ascendance and continued political-economic dominance of the northern latitudes, but in direct contrast to Ratzel as well as Ibn Khaldūn and the Vedic sages, Diamond attributes this not to the resource dearth but rather the resource abundance of these climes.

8 Betty J. Meggers. 1957. *Environment and Culture in the Amazon Basin: An Appraisal of the Theory of Environmental Determinism*

Although environmental determinism fell out of fashion in academia early in the twentieth century, a fascination with the tropics and their potential or lack thereof for human development did not, the Amazon often being a central test case. One of the most important contributors to the mid-twentieth century anthropological literature on the Amazon was Betty J. Meggers (1921–2012), a Columbia-trained archaeologist, who was long affiliated with the National Museum of Natural History, in the Smithsonian Institution.

Like Kroeber and others in twentieth-century anthropology, Meggers sought to rethink the discipline's post-Ratzel rejection of environmental determinism: "Ridicule of this overembellishment [of environmental determinism] brought about the disgrace of the theory, with little serious effort to determine whether or not the core was sound" (p. 116). Her efforts to determine this included an influential 1971 book and the article reprinted here. The research question that drove Meggers was much the same as in Ratzel's case, namely ". . . the understanding of how and why culture develops when, where and as it does" (p. 125). Equally important in the mid-twentieth century, dominated as it was by the conception of the "Third World" and the developed/underdeveloped dichotomy, was the question when and where culture does *not* develop.

Meggers believes that the environments of the world offer unequal potential for human exploitation, with the tropical forest offering one of the lowest potentials. Whereas Ratzel saw the tropics as being too rich, therefore, Meggers sees it as being too poor. This is due to a high, even temperature that favors bacteria and thus not the accumulation of humus; abundant annual rainfall and thus leaching of nutrients from the soil; intensity of rainfall and thus soil erosion; and variability in rainfall which can stress crops. Any human activity that entails total clearing of the tropical forest exposes the land to all of the ills of these characteristics. This contrasts with what Meggers calls "slash and burn" agriculture: its lack of tillage keeps erosion to a minimum; the brief period between clearing the forest and planting keeps humus destruction to a minimum; leaving the burned and unburned vegetation on the field promotes the return to the soil of nutrients from the cleared vegetation; and the brief period of cropping followed by natural afforestation promotes the recovery of the original fertility of the land.

Although slash and burn agriculture has a beneficial impact on the land, Meggers suggests that it does not have a beneficial impact on the culture: "This type of food production has a conservational effect on soil and soil fertility, which is desirable, but also exercises a conservative influence on the culture, keeping it in a relatively simple level of development" (p. 123). In slash and burn agriculture, the period of cultivation is brief but the period of fallow is long, which means "1) that a relatively large amount of land per capita must be available for agricultural use, and 2) that the settlement cannot remain permanently in one place" (p. 123). She sees this as placing critical limits on settlement size: "[G]enerally speaking 1000 individuals is a large population for villages in the South American tropical forest, and settlements with less than 300 people are typical" (p. 124). This means no differentiation in production and consequently no technological development. The validity of this line of reasoning, Meggers avers, is attested to by the historic lack of development of advanced cultures in the tropical forest based on slash and burn agriculture. As a result, "[I]t seems acceptable to conclude that the Tropical Forest Type of culture characteristic of the Amazon Basin shows the effects of environmental determinism" (p. 125).

Seminal works like those by Freeman (1955 [1970]) and Conklin (1957) all supported Meggers' thesis that slash and burn agriculture was well adapted to the forest and climate of the tropics. However, some of the most influential work by anthropologists in the Amazon took issue with Meggers' findings that slash and burn agriculture inhibited social development. Carneiro's (2008 [1960]) quantitative analysis of carrying capacity under slash and burn agriculture showed that communities up to 500 persons in size could be permanently supported at the same site by this system of cultivation. Dumond (1961) more directly assailed Meggers' thesis by arguing that there is historic evidence of slash and burn agriculture supporting state development in the Amazon.

Meggers' biggest oversight pertains to the political dimension of slash and burn agriculture. She writes, "The disrepute in which it [slash and burn agriculture] is held does not stem from a conservational effect on the landscape, but rather from the conservative influence it exerts over the local culture" (p. 123). In fact, this "disrepute" stems from the illegibility of slash and burn agriculture vis-à-vis centralized states and its consequent ability to frustrate, and thrive beyond the reach of, state control (Scott 2009; Dove 2011). Meggers elides these issues: "If we accept the premise that the standard climate determines that agricultural exploitation must have certain features, then man's problem is to find a solution that fulfills these requirements and in addition meets the demands of modern civilization" (p. 127). The premise that a single new "solution" can be devised that will reward both slash and burn agriculturalists and state elites was typical of Meggers' era.

Climate Change and Societal Collapse

The studies in this section look at the question not of the rise but of the demise of civilizations, and they do so within the histories of specific times and places, which complicate simple deterministic explanations.

9 Thomas H. McGovern. 1994. Management for Extinction in Norse Greenland

The first study in this section is McGovern's history of Norse settlement in Greenland, focusing on the question of adaptation to the so-called "Little Ice Age." Adaptation to climate change is a subject of increasing interest (Roncoli 2006; Ayers and Forsyth 2009; Moore 2010). The Little Ice Age, referring to the cooling of global temperatures by 2–3 degrees centigrade from the mid-fourteenth through the end of the seventeenth centuries, has attracted increasing academic attention both for its intrinsic historic interest and for use as a proxy measure of the impact of the modern climatic perturbation (Nunn et al. 2007; Bulliet 2009; White 2011). With respect to this and related questions, the climatic relations of sub-Arctic aboriginal societies have emerged as a topic of considerable interest (cf. Chapter 19, this volume). Thomas H. McGovern is an archaeologist at Hunter College, City University of New York, who specializes in the study of Norse and Inuit societies in the North Atlantic and Arctic (1981, 1988, 1991). The Norse of Greenland have become one of the most widely cited cases of climatic determinism (Diamond 2005; McAnany and Yoffee 2010).

During the period A.D. 800–1000, Norse seafarers colonized an area stretching from western Norway to eastern North America, and including Greenland around A.D. 985. In that latter island they developed an economy based on the raising of livestock on pastures in the inner fjords and hunting migratory seals in the outer fjords. They also hunted walrus in the north of Greenland to trade their ivory and skins to elites in Europe. In the last quarter of the fifteenth century, however, one half-millennium after their founding, the Norse settlements in Greenland disappeared. Danish expeditions sent in the seventeenth century to re-establish contact were surprised to find only long-abandoned settlements. Many scholars have attributed their disappearance to the Little Ice Age. As McGovern writes, "Many climate impact theories have been proposed, but most may be reduced to the simple statement 'it got cold and they died'" (p. 141). McGovern faults this

explanation on multiple grounds: historic records show that this collapse did not happen abruptly; it did not happen in a resource-poor environment; and it did not affect the aboriginal Inuit who were sharing occupation of Greenland at the time.

When the Little Ice Age made their already marginal economy of localized herding and hunting less productive, McGovern argues, the Norsemen did not adapt, change, diversify. They did not shift their subsistence base to greater dependence on marine mammals; they did not shift their trade-oriented activities from walrus hunting to commercial fishing; and they did not adopt any Inuit technologies for exploiting the island's natural resources. The Inuit not only utilized a wider range of Greenland's resources, but they also adapted as the climate shifted, in particular by moving up and down the coastline as resource zones shifted. In contrast, "The Norse were far less mobile" (p. 144). At the end of the tenth century the Norse developed a successful adaptation to Greenland's environment, but with the onset of the Little Ice Age in the fourteenth century this adaptation became less successful, and the Norse did not adapt.

McGovern attributes the Norse failure to adapt to cultural factors. One problem was their unwavering commitment to their subsistence herding base, which was the source of authority for political and religious elites and thus not easily relinquished. A second problem was their hostile, Christian view of Greenland nature and natural resources, which inhibited their exploitation of the environment to its fullest extent, in contrast to the view taken by the Inuit. A third problem was their cultural distance from the Inuit. As McGovern says, the Norsemen were "culturally preprogrammed to reject all innovations from the Inuit, fatally ignoring tainted technology and alien expertise and keeping closer and closer to home, hearth, and church" (p. 147).

McGovern sees the exercise of human agency here. As he writes, "It is hardly an accident that these life-saving skills were so systematically rejected – it took a great deal of effort on somebody's part" (p. 148). The decision to stick to the traditional but ever less productive subsistence system was a *choice*, in short. The outcome could have been different. McGovern notes that Norse and aboriginal social and economic systems were successfully integrated among the Danes and Inuit in eighteenth-century Greenland and in more recent times among the Norwegians and Sami (cf. Ratzel pp. 113–114, this volume).

McGovern concludes by suggesting that "The case of Norse Greenland may have some disquieting parallels in the modern world" (p. 149). One parallel is the arrogance of certain world views: "Like the Norse elites, we are today very certain of the complete adequacy of a particular world view" (p. 149). Another is the problematic confluence between the self-interest of political-economic elites and dysfunctional environmental relations. But McGovern also says that, like the Norsemen, we have agency. As he writes, "Like the Norse Greenlanders, however, we are not inevitably the prisoners of history and culture. Like them, we have many potential options" (p. 149).

10 *Harvey Weiss and Raymond Bradley. 2001. What Drives Societal Collapse?*

Whereas the disappearance of the Norse settlements looks at first glimpse like a "collapse," other cases complicate both the concept of collapse and its causes. The lead author of this selection, Harvey Weiss, an archaeologist and Professor of Anthropology and Near Eastern Studies at Yale University, has been a pioneer in critiquing orthodox thinking on climatic perturbation and the collapse of civilizations. Like Meggers, he is an anti, anti-determinist. His fieldwork focuses on climate and society in third millennium B.C. Mesopotamia (Weiss 1993, 1996, 2000). His co-author, Raymond Bradley, is a geoscientist at the University of Massachusetts, at Amherst.

There are numerous cases in the archaeological and historical records of seeming societal collapse, which Weiss and Bradley describe as having "frequently involved regional abandonment, replacement of one subsistence base by another (such as agriculture by pastoralism), or conversion to a lower energy sociopolitical organization (such as local state from interregional

empire)” (p. 152). Orthodox opinion long held that these cases were owing to “combinations of social, political, and economic factors” (p. 152). The failure to cite climate as one determinant was associated with the belief that global climate during the past 11,000 years was “uneventful” (p. 154).

Weiss and Bradley directly challenge this view, drawing on new sources of “high-resolution paleoclimatic data” (p. 152), which paint a picture not of stability but instability. They identify a number of episodes of extreme climatic fluctuation, especially abrupt and extended droughts, that had sweeping social consequences. The most notable Old World examples include the 10,800–9,500 B.C. cooling and drying of the Younger Dryas, which impacted Natufian hunters and gatherers in the Levant and Northern Mesopotamia; the 6,400 B.C. drought in the same region; the 3,200–3,000 B.C. drought at Uruk in Southern Mesopotamia; and the 2,200 B.C. drought and cooling from the Aegean to the Indus. Examples of climate-related collapse from the New World include the sixth century A.D. Moche in Peru, the ninth century A.D. Classic Maya, the tenth century A.D. Tiwanaku in the Andes, and the Anasazi of the thirteenth century A.D. in the U.S.

One reason prehistoric and early historic societies were vulnerable to such climatic events is that they occurred with such infrequency that no cultural memory of them was retained during the intervening centuries or millennia. As far as the affected societies were concerned, these were completely unfamiliar events, without precedent. Thus, there were no institutions at the ready to deal with them. Entirely new ways of life had to be developed, and relatively quickly. Under such circumstances, the erasure of existing institutions, and the shifting to radically different life-ways, was the only option available. Collapse was, as Weiss and Bradley put it, “an adaptive response to otherwise insurmountable stresses” (p. 152).

Weiss (2000) elsewhere presents a detailed study of one such case based on his fieldwork in northern Mesopotamia. He describes the late third millennium B.C. climatic perturbation in this region as including an “abrupt onset, ca. 300-year duration, radical increase in airborne dust, major aridification, cooling forest removal, *Sanguisorba minor* ‘land degradation,’ and possible alterations in seasonality” (2000: 83–4). These environmental changes provoked sweeping changes in social-ecological organization, consisting of “collapse to less extractive political organization, directed habitat-tracking to regions where agriculture was sustainable, and the abandonment of reduced-production cultivation for pastoralism” (2000: 88). Weiss (*ibid.*) sees collapse of the social order and flight as adaptive under these circumstances, which moves the debate away from an unrealistic and unproductive dichotomy between societal “collapse” and its logical opposite of unchanging, timeless societal “persistence.”

The collapse of the current world order would doubtless reduce greenhouse gas emissions, but is this “adaptive”? The lesson from history is that traumatic social change does provide adaptation to climate change, but at a huge social cost. The object of enlightened modern society, then, is perhaps to bring about adaptive social changes of the same order of magnitude but in a planned and therefore less costly way.

Climatic Events as Social Crucibles

The papers in this last set on climate change and social collapse examine the changes that take place in the immediate aftermath and as a consequence of climatic events. Several related theses underlie their analyses: climatic perturbations take their greatest toll on economically and politically marginal peoples, at the same time as they offer opportunities for resource capture by political and economic elites; such perturbations throw into relief the stresses and contradictions of society; and climatic perturbations can accelerate ongoing processes of change in society.

11 James Spillius. 1957. *Natural Disaster and Political Crisis in a Polynesian Society: An Exploration of Operational Research II*

The first reading in this section concerns the extreme weather patterns called “typhoons,” “cyclones,” or “hurricanes,” which have long drawn anthropological attention (Marshall 1979; Dove and Khan 1995; see also Chapters 15, 16, and 17, this volume). James Spillius (1922–), a British anthropologist, was involved in one of the most famous anthropological studies of hurricanes of all time, which was initiated as part of Sir Raymond Firth’s re-study of Tikopia in the Solomon Islands in 1952–1953. Seven weeks before their arrival in March 1952, a severe hurricane struck the island. One year later, while Spillius was still there, a second severe hurricane struck the island. Firth (1959) published an extensive account of the ability of Tikopian social structure to “weather” the impact of the hurricane. From Spillius (1957) we have a more detailed description and analysis of the way that he and Firth were drawn by natives and the colonial British government alike into playing a role in post-disaster assistance. Part One, subtitled “Emerging Research Roles in a Crisis Situation,” is a narrative account of their involvement; Part Two, subtitled “Some Principles of Operational Research,” draws out the lessons of this involvement for anthropology. The latter part is reprinted here, and the first part will be extensively quoted from.

Spillius’ circumstances raised many prescient questions for him, which came increasingly to dominate debates within anthropology during the second half of the twentieth century: “Why do administrators make so little use of anthropological writings? Is it possible to do research that is simultaneously of theoretical and practical importance? Can social change be studied in process, and should anthropologists try to affect the course of such change? . . . What are the anthropologist’s responsibilities to the people he studies and works with?” (p. 158).

Spillius represents their situation on Tikopia as one that was, at least for that era, a novel one: “He [the anthropologist] usually takes an active part in the social life of the indigenous community, but he does not try to direct the course of political and social events” (1957: 3–4). Doing so led to a fundamental epistemological challenge, a social science equivalent to physics’ indeterminacy principle. “. . . I realized that I was studying social processes not only as they were going on but as I was affecting them” (1957: 4). This led Spillius to question many of the premises of traditional anthropology, especially its ideal of a disinterested stance. He notes that an “interested” stance, far from being alien to anthropological research, is an inevitable byproduct of the core methodology of anthropology, participant observation, with the intense social engagement that this entails, which leads the anthropologist to identify with the community and its well-being. Such emotional identification can be heightened when the community suffers a calamity like a hurricane. As Spillius writes, “No anthropologist, however set he was on sticking to the role of observer, would have done nothing in this situation” (p. 161). Even a non-anthropologist, “even an entomologist,” as Spillius (p. 161) avers, would have intervened. In justifying the goal of helping to bring about desired changes in society, Spillius notes that change is taking place in such societies anyway.

In an unusual and prescient recommendation, Spillius says that anthropologists must make an effort to understand state actors, something that they seem predisposed not to do: “It is curious that sometimes anthropologists embarked on ‘objective’ studies display compassion and understanding for the indigenous community but find it much more difficult to take a dispassionate view of Government as a social system” (p. 166). This, Spillius (p. 166) argues, is a prerequisite to any hope of achieving the goals of operational research: “The practical aims of research can only be achieved if the social anthropologist shows some sensitivity to the social structure of the government he is dealing with.”

Spillius observes that he found his period of operational research on Tikopia to be unusually productive. This was in part due to the fact that the hurricane-related crisis was revelatory: “[S]everal

aspects of Tikopia social organization were clarified because I watched them changing in response to crisis” (p. 164). In part it was due to the conception of a new research subject, consisting of the relations between community and state and the then-radical view of them as constituting a single social system. Finally, the productivity of Spillius’ research was due in part to his creating a role of “engaged” ethnographer: “At the time I did not fully realize how much I was learning about the workings of the society by taking an active part in it” (1957: 25).

Spillius leaves the reader with a statement about the ethics of research, which has perhaps not been bettered in the half-century since: “[H]aving accepted the fact that his mere presence has some effect on the situation, the anthropologist must constantly make judgements about the course of action most likely to achieve the long-term goal of leaving the people studied better able to cope with problems” (p. 165).

**12 *Jacqueline S. Solway. 1994. Drought as “Revelatory Crisis”:
An Exploration of Shifting Entitlements and Hierarchies
in the Kalahari, Botswana***

There is a growing literature that suggests that extreme climatic events can act as catalysts to social change. Anthony F.C. Wallace (1957) laid the foundations for this work with his mid-twentieth century analyses of how disaster undermines cultural identity, which leads to cultural revitalization movements. The article by Jacqueline Solway reprinted here focuses on drought, which is the subject of much of the anthropological work on climate (West 2009). Solway is an anthropologist in the Departments of Anthropology and International Development Studies at Trent University in Ontario, whose research and publishing has focused on ethnicity, politics, and the “bushman question” in southern Africa (1998, 2003, 2009).

Solway’s analysis focuses on the effects of a recurring drought during the years 1979–1987 in the Kalahari region of Botswana, a semi-arid area receiving 300–350 mm rainfall/year, where the local economy is based on pastoralism, supplemented by rain-fed agriculture. This drought was a “watershed event,” Solway says (p. 170), both because it was unusually severe, and because it occurred at a “critical historical juncture” in Botswana, when commercialization and class formation were proceeding at a rapid pace and the nation’s economy was growing dramatically. Like some of the other authors in this volume (e.g., Cruikshank, Chapter 19, this volume), Solway studies not just the extreme climatic event, but also its co-occurrence with extreme social events. Together these events produce what Agamben (1998) calls a “state of exception,” a state of such disruption of conventional routine that, as Solway writes, “actors are given license to innovate with social and moral ideological and behavioural codes” (p. 170), even to the point of sanctioning what would have previously been seen as anti-social behavior. This exception applies not only to the local community but also to its relations with the central state. Following Ferguson (1990), Solway argues that “The drought was thus an opportunity and provided a point of entry for the state to insert itself in the lives of citizens in new and expanded ways . . .” (p. 170). Since drought conditions tend by their nature to be extended over a long period of time, compared to a hurricane, for example, this opportunity is also extended in time – which perhaps makes drought an inherently state-friendly phenomenon – and raises questions about a similar impact from contemporary global climate change.

Solway begins her study by citing Sahlins’ (1972) description of the way that a “revelatory crisis” can expose the contradictions in the domestic mode production, the example of which he draws from Firth’s work on typhoons and hurricanes in Tikopia (see Chapter 11, this volume). In her study in Botswana, Solway makes clear, these contradictions were pre-existing ones. The drought revealed but was not responsible for a systemic deterioration in rural conditions and a crisis of social reproduction. Because the drought affords unique opportunities for social change, it “offers a perfect lens for viewing the dialectic between structure and agency” (p. 170).

Whereas Solway is not alone in seeing disasters as revelatory crises, she is one of the few scholars to look at the other side of this coin: “However, in a paradoxical fashion, while a crisis such as a drought reveals and exposes contradictions and deteriorating conditions, it also allows them to be concealed and mystified” (p. 170). A disaster like the Botswana drought draws attention away from other matters. The disaster response of the state, cloaked in benignity, can actually exacerbate these problems. Drawing on Sen’s (1982) method of entitlement analysis, Solway argues that the expansion during the drought of social security entitlements from the central government compensated for and thus masked the countervailing contraction in community-based entitlements.

Part III: Vulnerability and Control

This section is concerned with what parts of society are most vulnerable to climatic perturbation, why, and what steps they take to manage their vulnerability, studies of which (not all from anthropologists) include Adger (1999) on coastal Vietnam, Ribot, Magalhães, and Panagides (1995) on the global semi-arid tropics, and Brondizio and Moran (2008) on the Amazon.

Culture and Control of Climate

A great deal of attention is currently being devoted to efforts to mitigate the forces producing climate change and to adapt to those outcomes that are inevitable. There is a history of engagement with such issues. Ratzel and Meggers (Chapters 7 and 8, this volume) suggest that there are but limited means to escape the determinate effects of climate. McGovern (Chapter 9, this volume) sees the potential for both human agency and the failure to exert it. Weiss and Bradley (Chapter 10, this volume) emphasize the inevitability of social collapse in the event of extreme climate events but they also suggest that this is adaptive, whereas Solway (Chapter 12, this volume) sees non-collapse as maladaptive. This next set of papers examines both ideological and material means of mitigating undesirable climatic phenomena and adapting to their effects.

13 Elizabeth Colson. 1957. *Rain-Shrines of the Plateau Tonga of Northern Rhodesia*

One of the most ubiquitous traditional cultural methods of coping with extreme climate events involves ritual (Vogt 1952; Orlove 1979; Sillitoe 1993). Well known within anthropology are studies of ritual regarding thunder and lightning in the Indo-Malay region (Needham 1964; Freeman 1968). A further topic involves community-based rituals of rain-making, which is the subject of the current paper by Colson (cf. Chapter 20, this volume).

Elizabeth Colson (1917–) spent most of her career at the Rhodes-Livingstone Institute in what was then Northern Rhodesia, now Zambia, and taught at Boston University and the University of California, Berkeley, where she is now Professor Emerita. She began work among the Plateau Tonga in Rhodesia in 1946. In later years, she carried out one of the first in-depth ethnographic studies of the impacts of a development project, a study of the dam-displaced Gwembe Tonga (Colson 1971).

The subject of Colson’s paper reprinted here is the rain-shrines of the Tonga. A shrine can be either a natural feature of the land or a man-made hut, in either case thought to be inhabited by a spirit. These spirits can afflict communities with drought, cattle epidemics, or epidemic disease; and they are appealed to on any occasion of community-wide disaster. But their principal concerns are two-fold: first, ensuring the proper rainfall; and second, combating the cultural changes resulting from European contact. In practice, they have an additional concern, concerning socio-political integration.

Colson describes the Tonga as “culturally a have-not group” (p. 192), lacking much of what constitutes society elsewhere in Africa, e.g., an army, an organized state, age-grade sets, secret societies, and social stratification. “Into this anarchy,” Colson (p. 193) writes, “some semblance of order is infused by the rain-rituals, which effectively organize small groups of villages for corporate activity . . .” Colson quotes leaders at one shrine urging all the people and not just the kin-group which controls the shrines to dance and pray for rain: “The rain falls on your fields as well as on ours. You must all dance” (p. 199). In short, there is spatial congruence between climatic events (rain) and social organization (followers of a rain-shrine).

The joint responsibility to carry out annual rites for the upkeep of the rain-shrines obliged villagers to live more or less in peace with one another. Only by fighting against their centrifugal social forces, and by honoring and upholding the tradition of the shrines, are the Tonga able to control the rain. In summary, Colson writes, “It is only in the rain-rituals and their associated shrines that the Tonga show a half-hearted grouping towards the establishment of a larger community than that which existed in the village or in the ties of kinship” (p. 192).

In the absence of other forms of supra-community organization, this allegiance to shrines had political implications, which were reflected in the historic opposition of shrines to the forces of modernization throughout both the colonial and post-colonial eras (cf. Chapter 20, this volume). At the time of Colson’s writing in the mid-twentieth century, however, the importance of the shrines was waning, owing to the forces of modernization, in particular opposition by the Christian missions.

14 *Richard L. Burger. 2003. El Niño, Early Peruvian Civilization, and Human Agency: Some Thoughts from the Lurin Valley*

Whereas Colson looked at how people self-organize to pray for rain, Burger looks at how people self-organize to cope with the effects of too much rain, specifically landslides and debris flows precipitated by El Niño events. The El Niño–Southern Oscillation (ENSO) meteorological pattern has drawn increasing academic attention, including by social scientists and historians (Grove and Chappell 2000; Davis 2001; Sandweiss and Quilter 2008). Many studies in this field have looked at ENSO-related drought and forest fires, as in Indonesia in 1997 and 1998 (Harwell 2000). More recently, some scholars, mainly prehistorians, have begun to focus not simply on the short-term role of ENSO in disrupting society, but also on its long-term role in shaping the evolution of society (Billman and Huckleberry 2008; Richardson and Sandweiss 2008; Roscoe 2008). Interest in ENSO is based in part on its perceived utility as a proxy for contemporary climate change. Personal experience of severe El Niño events in recent decades has also led to what Burger calls a “predisposition to take El Niño seriously in the archaeological modeling of civilizational trajectories in the distant past” (p. 202).

Richard L. Burger is a leading archaeologist of pre-Hispanic Peru and directed the repatriation of much of Yale’s Hiram Bingham collection of Machu Picchu artifacts (Burger and Salazar 2004). In the study reprinted here, Burger asks “whether the peoples of pre-Hispanic Peru anticipated the dangers posed by El Niño events and whether they were able to develop strategies to mitigate them” (p. 203). The danger consisted of floods, landslides, and debris flows in the deeply cut ravines or *quebradas* of the coast.

With the benefit of the *longue durée* vision of the archaeologist, Burger views ENSO events not as stochastic perturbations but as a recurring “normal” feature of the environment. In this respect he follows Hewitt’s (1983) pioneering work in seeing events like ENSO as “characteristic rather than accidental features of the place and societies where they occur” (p. 204). Burger’s analysis of the archaeological record at Manchay Bajo on the Peruvian coast shows an impressive adaptive response to the ENSO threat: (i) the threat of ENSO-related landslides was correctly identified; (ii) a solution – a massive stone dam – was devised using available technology and materials; (iii) labor was mobilized to construct a five-meter high dam three-quarters of