

Introduction

Foundations of Socio-Environmental Research

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In a word, after a long period of peaceful rule, Heaven-and-earth cannot stop the people from reproducing. Yet the resources with which Heaven-and-earth nourish the people are finite. (Hong Liangji (1783) *China's Population Problem*)

Man has reacted upon organized and inorganic nature, and thereby modified, if not determined, the material structure of his earthly home. (George Perkins Marsh (1864) *Man and Nature*)

[Development programmes] fail to recognise that humans, like all living things, are participants in the water cycle and can survive sustainably only through that participation. (Vandana Shiva (1988) *Staying Alive*)

What is Socio-Environmental Research?

Separated by time, geography, discipline, and identity, Hong Liangji, a political advisor to the emperor of China, George Perkins Marsh, an American scholar and naturalist, and Vandana Shiva, an Indian ecofeminist and activist, all capture the challenge and inspiration of socio-environmental research. Each analyzes the complex reciprocal relationships connecting society and environment, with the goal of intervening to protect and enhance both (Palmer 2012). **Hong Liangji's** essay was written in **1783 (Part I)** as a warning to the emperor of China's fourth Qing dynasty, at the end of a century of dramatic population growth. Hong cautioned the emperor to expect "floods, drought and pestilence [as] the means of Heaven to temper the [population] problem." Almost 100 years later, **George Perkins Marsh (1864, Part I)** argued in *Man and Nature; or, Physical Geography as Modified by Human Action* against the prevailing idea that the consequences of human action on the natural world were marginal or benign. Instead, he described the Earth as transformed by human action, from surface to atmosphere. Finally, **Vandana Shiva (1988, Part V)**, after another century of social and technological revolution, reasserts the

interdependence of humans and environments. Her analysis of the large-scale damming of rivers in India showcases that human attempts to dominate nature lead to crisis and failure.

For those conducting socio-environmental research today, the history of reflection and inquiry on society–environment interrelations is a tremendous resource. However, accessing the insights of this history can be challenging. The future-focused nature of current socio-environmental research can limit recognition and engagement with its rich past. The contemporary terrain is characterized by a proliferation of conceptual frameworks (see Binder et al. 2013; Pulver et al. 2018 for reviews), each seeking to define a new approach to socio-environmental research and offering few explicit references to the shared legacies on which they build. Many foundational readings are also siloed by discipline. Over time, academic disciplines have become more specialized, each developing its own distinct theoretical frameworks and research methodologies to investigate socio-environmental concerns (Winder, 2003). Researchers are most familiar with key readings from their own disciplines, missing out on insights from other research traditions. Needed is a guide that introduces the foundations of socio-environmental research across time and discipline and links those foundations to contemporary research communities, bringing thematic coherence and historic grounding to a fragmented terrain. Our volume provides this guide. It assembles a curated set of 53 readings, spanning from the late 1700s to the early 1990s. Each reading provides insight on the interactions between society and environment and adds a new concept, dimension, or empirical approach to the further evolution of socio-environmental inquiry.

We define socio-environmental research as structured inquiry about the reciprocal relationships between society and environment. This definition highlights three common threads linking the 53 reading selections across time, place, and discipline. First, each reading emphasizes both society and environment. While various terms are used to describe the pairing that is the focus of this book – e.g., social–ecological (Berkes and Folke 1998; Ostrom 2009), nature/culture (Goldman and Schurman 2000), human and natural (Holling and Gunderson 2002; Liu et al. 2007a, b), human and environment (Scholz and Binder 2011) – the terms society and environment best capture our aims and align with the common practice of many scholars whose work is assembled here. We choose the word “society” to emphasize that human choices are influenced by the overlapping social structures in which individuals are embedded. Humans are inherently and intensely social, so human interactions with environments are channeled through various aggregations. Family, social group, class, race/ethnicity, gender, geography, politics, and culture all intersect to organize people’s relations to the environment (Moran 2010). We choose the word “environment” to encompass ecosystems from micro to macro scales as well as engineered and built structures and global biophysical systems. Finally, we maintain the distinction between society and environment implied by the term socio-environmental. While humans are a part of the natural world, the level of complexity characterizing human social systems is distinctive (Burnside et al. 2012).

The second common thread is the focus on reciprocal relationships, emphasizing the interdependence of society and environment. The reading selections bring into view the causal role each plays in shaping outcomes in the other. While there is a wealth of research that engages with either the environmental basis of social life or society’s impact on the environment, only a subset gives agency to both by emphasizing their interdependence. The readings introduce key dimensions of society–environment interdependence, including both

the reciprocal relationships between populations and resources and the ways these relationships have been managed by societies, mediated by culture and knowledge systems, and upended by changes in technology. Some readings present society–environment interdependence as a simple relationship between two variables (e.g., population growth and resource productivity), emphasizing short-term and localized feedbacks. Others have developed global frameworks that acknowledge temporally and spatially distant interconnections and link a variety of biophysical, economic, social, and cultural trends and drivers.

Third, each reading engages in some form of structured inquiry. What constitutes structured inquiry varies across discipline and era, and we define it as suggesting researchable propositions that can be evaluated empirically or through argumentation. Our definition is purposely broad, so as to encompass reading selections not only from the Western scientific tradition but also those grounded in Indigenous knowledge, religious scholarship, and from the humanities more generally.

We characterize the selections assembled in this volume as legacy readings, denoting both their continuing influence and the forms of privilege that enabled such influence. The included reading selections have all made a lasting imprint on socio-environmental research, even if the ideas presented have inspired critique. However, this lasting influence is intertwined with the racial, gender, and class hierarchies that have determined and continue to determine which voices are pushed into the foreground. The history of scholarly scientific research is one dominated by white, male, and Western voices, and we recognize the limited representation of non-Western, non-male, and nonwhite perspectives in published socio-environmental research, historically and today. We endeavored to include a diversity of perspectives, though with limited success. Of the 53 legacy readings, seven are solo- or first-authored by women and nine by authors from the Global South.

Each of the included 53 legacy readings was carefully vetted via a multi-stage selection process. First, nominations were elicited from over 50 scholars from a range of disciplines active in socio-environmental research. For tractability, we restricted our focus primarily to selections from the biophysical science, humanities, and social science disciplines. More than 500 nominated selections were then carefully reviewed and winnowed by the editors over a four-year period. Finally, the list of legacy readings was further refined through external peer review and an internal workshop with the six leading scholars who wrote introductory commentaries for the six parts of the book. We acknowledge that some of the selected legacy readings are informed by and reify nativist, racist, and reductionist perspectives. There is debate about the continued inclusion of such readings in research and teaching. Since productive dialogue often emerges to contest such perspectives, we see their inclusion as basic to understanding the history and arc of socio-environmental inquiry.

Socio-Environmental Research in Historical Context

The two centuries that span the readings in this volume begin at the tail end of the Enlightenment and extend to the 1990s, a decade of critical evaluation of the successes and failures of environmental management through state and market institutions. During

this time, research on the reciprocal interactions between human societies and their environments evolved from the observational expeditions of the past to today's data-intensive, multi-regional, interdisciplinary modeling efforts. The book is structured to acknowledge this evolution. The 53 legacy readings, spanning from the late 1700s to the mid-1990s, are organized into six parts, with an introductory commentary to each part written by a prominent scholar. The parts are sequenced to reflect the history of intellectual and political engagement with socio-environmental relationships over time and within and across disciplines.

As introduced by Richard York (Part I), reflections on the interdependence of society and environment trace back to at least the late 1700s and early 1800s, when scholars began to theorize and research the entanglements and interdependencies of societies, their natural resources, and their broader environments. In Europe, the early 1800s were characterized by the questioning of a divine order to nature and by the rise of scientific inquiry aimed at determining the fundamental laws of science governing both nature and society. Scholarship was motivated by population and resource concerns and by comparisons among world regions.

The first discipline-based research frameworks for analyzing the reciprocal relationships between society and environment emerged in geography and anthropology in the early 1900s, as highlighted by Emilio F. Moran in his commentary on Part II. Much of this research occurred in settings of colonial domination, which both enabled the extraction of information and resources and provided racialized and gendered justifications for the continued subjugation of non-Western societies. However, many geographers and anthropologists also bore witness to the disruptions caused by Western influence and documented the environmental practices of Indigenous peoples (Pels 1997; Bonnett 2003).

Parts III through VI all encompass legacy readings beginning in the post-World War II era and extending to the mid-1990s. This period was marked by the rise of industrial capitalism, which seemed to liberate society from nature's limitations, as manifest in claims of human mastery over nature, efforts to scientifically manage natural resources, and in prophecies of unlimited growth (Podeshi 2007). However, industrial capitalism also unleashed a new set of environmental ills, illustrated by the spectacular violence of environmental crises (Kahn 2007) as well as the slow violence of systemic environmental harm from new forms of chemical pollution and creeping habitat loss (Nixon 2011). In response, the twentieth century saw the growth of a range of environmental movements. Starting in the 1970s, these concerns became institutionalized in the creation of governmental agencies dedicated to environmental protection (Meyer et al. 1997). The 1970s also marked the shift to a global point of view. The images of Earth from space both embodied the capacity to collect data about global-scale ecology and evoked concerns about the finiteness of the planet (Jasanoff 2004).

During much of this time, debates about socio-environmental research were occurring mostly within disciplines. In his commentary on Part III, Richard B. Norgaard frames socio-environmental research in economics, sociology, and political science. Patricia Balvanera introduces readings from ecology in Part IV. J. Baird Callicott's commentary on Part V centers on ethical, religious, and historical approaches to socio-environmental research. Finally, Marina Fischer-Kowalski highlights themes of technology, energy, and materials in socio-environmental research in her commentary on Part VI. These disciplinary conversations began to reintegrate at the end of the twentieth century, an evolution almost taken

for granted today. In the 1980s, sustainable development (WCED 1987) was put forward as the resolution to debates about both the incompatibilities of economic growth, social well-being, and environmental protection and the competing environmental priorities of the Global North (i.e., the environmental problems of affluence) and the Global South (i.e., the environmental problems of poverty). Across disciplines, many of the legacy readings from the 1980s and 1990s grapple more or less directly with the potential for sustainable development, some seeking to operationalize its vision and others offering fundamental critiques from the perspectives of race, class, gender, and geography.

While we truncate the collection of legacy readings in the mid-1990s, socio-environmental research has expanded and flourished since then. Motivated by the increasingly global nature of environmental issues, the growing research community is reflected in increasing numbers of interdisciplinary environmental journals (Yarime et al. 2010; McDonough et al. 2017) and graduate research and training programs (Vincent 2010; Vincent et al. 2013, 2017). In our concluding chapter, we examine multiple leading contemporary approaches to socio-environmental research, ranging from those that articulate specific analytic frameworks to the wider set of emerging perspectives and evolving fields that grapple with socio-environmental relationships. Like their predecessors, current research efforts both extend knowledge of socio-environmental interactions and seek to intervene to protect and enhance environmental and social systems.

Key Lineages in Socio-Environmental Research

The above history highlights the dramatic changes over the two centuries separating the oldest and most recent legacy readings in this volume. However, close engagement with the readings reveals that questions at the intersection of society and environment present an enduring challenge. Although societies now grapple with a scale of human impact that has transformed the Earth's surface (Vitousek et al. 1997; Haberl et al. 2007; Barnosky et al. 2012), crises that seem unprecedented have manifested at smaller scales in the past (Mainwaring et al. 2010). Current socio-environmental research shares much with its antecedents. Themes of interest to early scholars, including population, resources, pollution, technology, and justice, remain central to socio-environmental scholarship today. In this section, we whet readers' appetites by introducing five enduring research lineages connecting socio-environmental scholars. Our focus is both longitudinal and lateral, linking backward through time and across disciplines.

The reciprocal relationship between **human populations and their resource base** has been a core theme in socio-environmental research since the 1700s. Foundational is **Thomas Malthus'** famous treatise, *An Essay on the Principle of Population*, first published in **1798 (Part I)**. Equally foundational, though less well known, is **Hong Liangji's** essay on "China's Population Problem," published five years earlier (**1793, Part I**). Malthus argued that while population expands geometrically (i.e., exponentially), food production can increase only arithmetically. As a result, population growth will always outstrip food production, leading to impoverishment and starvation. Likewise, Hong identified famine,

disaster, and plague as natural limits to population growth. Over centuries, Malthus' hypothesis has been challenged, extended, and rediscovered. In direct opposition to Malthus and Hong's thesis, some argued that population growth leads to innovation, urbanism, and agricultural advances. These enable intensified and expanded food production, allowing societies to overcome the purported limits nature sets to population growth (**Marx 1867, Part I; Mumford 1956, Part II; Boserup 1965, Part VI**). However, neo-Malthusian arguments resurged in the 1970s, motivated by rapid global population growth and its purported impact on the environment (**Hardin 1968, Part III; Ehrlich and Holdren 1971, Part VI; Meadows et al. 1972, Part VI**). Although not always in the foreground, concerns of ethics and justice are deeply embedded in these debates. Malthus wrote his 1798 essay in opposition to England's Poor Laws, because he believed support for the poor would foster unsustainable population growth. Concerns about the resource impacts of growing populations were and are used to shield nativist and racist ideologies (e.g., Hardin 1968) and usually don't acknowledge the disproportionate use of resources by industrialized countries.

A closely related lineage considers societies' capacities for the **sustainable management of common-pool resources**, i.e., resources whose consumption by one prevents simultaneous consumption by another and whose use is difficult to restrict (Bromley 1991). A key feature of such resources is that the benefits of resource use accrue to the user while the costs are spread throughout the community, which, according to **Hardin's 1968 (Part III)** article, would lead to a "Tragedy of the Commons." Using a hypothetical example of shared pasture land, Hardin predicted that individual decision-making would lead to overgrazing; an outcome that could only be avoided by either government oversight or the assignment of private property rights. Prefiguring Hardin, **Gordon (1954, Part III)** analyzed fisheries as a classic case of a common-pool resource. **Ostrom (1990, Part III)** challenged Hardin by showing that local self-governed units can manage common-pool resources and have done so for generations. Her work analyzes the conditions that characterize successful common-pool resource management. One key condition is information about the resource, a theme elaborated in **Pauly's (1995, Part IV)** analysis of shifting baselines in fisheries management. These debates still resonate today in policy discussions about global fisheries (Costello et al. 2008) and climate change (Ostrom et al. 1999).

The relationship between **society and land** is a third enduring theme in socio-environmental research, offering a conceptual trove for current efforts to develop a land systems science (Verburg et al. 2015). **Semple (1911, Part II)**, an early proponent of environmental determinism, hypothesized a "land basis of society," arguing that physical environments determined social and cultural practices. That tradition is continued by those who argue that changes in the land base beget social and economic change; see, for example, **Melville's (1990, Part V)** history of environmental and social transformation of the Valle del Mezquital, Mexico. Others pushed back against environmental determinism, noting reciprocal influences between physical geography and human societies (**Humboldt 1814, Part I; Marsh 1864, Part I; Boas 1938, Part II; Mumford 1956, Part II**). Access rules mediate the relationship between society and land, with consequences for both. Private ownership of land is central to accumulating wealth (**Ricardo 1817, Part I; Marx 1867, Part I**), and its obverse limits accumulation of material possession (**Sahlins 1972, Part II; Sen 1981, Part III**). A key feature of the expansion of capitalism, industrialization, and urbanization is the erosion of individuals' and communities' rights and access to land, concentrating control of resources in fewer hands and

exacerbating inequality (**Marx 1867, Part I; Polanyi 1944, Part III; Blaikie and Brookfield 1987, Part II**). This separation also undermines the lived experience of the land, causing the loss of a land ethic (**Leopold 1949; Part V**) and of knowledge of the natural world (**Gadgil et al. 1993, Part IV; Cajete 1994, Part V**).

The role of **technology** in society–environment relationships is a fourth key research lineage (**Fisher-Kowalski and Haberl 1993, Part VI**). Some see technology as generative, providing the means to surpass the limits imposed by nature (**Boserup 1965, Part VI**) or to help internalize the wastes of industry (**Graedel et al. 1993, Part VI**). Readings that analyze the destructive role of technology range from **Marx's (1867, Part I)** analysis of modern agriculture robbing the soil, to feminist analyses of modern engineering's over-harvest of India's water resources (**Shiva 1988, Part V**), to the disproportionate harm from industrial innovations borne by low-income groups and communities of color (**Bullard 1990, Part III**). Another line of research notes the limitations of technological solutions to socio-environmental problems, predicting unforeseen consequences of technological interventions. For example, **Jevons (1865, Part I)** showed that the efficient use of resources can increase their consumption. A century later, **Beck (1986, Part VI)** argued that technological modernization generates new, manufactured risks around which society then organizes itself. **Norgaard (1994, Part III)** offers the specific example of pesticides and the emergence of pesticide tolerance. Finally, it is through technology that changes in the environment are measured, understood, and made legible (**Humboldt 1814, Part I; Moran 1981, Part II**). In linking both society to environment and environment to society, the scale and scope of technology's influence have expanded over time. Current socio-environment research frameworks recognize technology's increasingly global consequences and the increasing permeation of both environment and society by digital technologies (Berkhout and Hertin 2004).

Our final example lineage focuses on the concept of **systems** in socio-environmental research. The idea of a system was already recognized by **Humboldt's (1814, Part I)** view of nature and society as a holistic entity, by **Darwin (1859, Part I)** in the “web of complex relations” that typify ecological systems, and by **Marx (1867, Part I)** in the idea of a metabolic exchange between society and environment. By the 1960s and 1970s, system science was emerging as an influential area of research (von Bertalanffy 1972). One important debate considered the inherent stability versus changeability of socio-environmental systems. In economics, **Daly (1974, Part III)** envisioned the idea of a steady-state or balanced economic–environmental system. In anthropology, **Rappaport (1967, Part II)** considered the role of collectively ritualized rules and norms, such as taboos, that stabilize relationships between communities and local environments, avoiding degradation and rebalancing the system. Likewise, ecologist Eugene **Odum (1969, Part IV)** advanced a “balance of nature” perspective. Shortly thereafter others challenged this equilibrium paradigm. **Meadows et al. (1972, Part VI)** predicted potential global socio-economic system collapse, while **Holling (1973, Part IV)** introduced the ideas of resilience and multiple stable system states. **Ellis and Swift (1988, Part IV)** highlighted the role of abiotic factors driving variability in system conditions and advocated for traditional pastoral management strategies as best suited for adapting to dynamic grassland systems. Taking a broader perspective, **Fischer-Kowalski and Haberl (1993, Part VI)** theorized the material exchanges between societies and environments and the social regulation of those physical exchanges in hunter-gatherer, agricultural, and industrial societies. Systems

framings continue to be widely used in contemporary socio-environmental research (e.g., Turner et al. 2016; Kapsar et al. 2019; Elsayah et al. 2020).

The above lineages introduce some recognized themes in socio-environmental research, yet they are merely examples of the innumerable points of contact and tension across the legacy readings. We hope they showcase how the readings in this volume have been and can be combined and recombined to yield new insights and that readers are inspired to discover and explore new lineages and connections. As a collection, the legacy readings show that current socio-environmental research has deep roots. However, the common threads linking the selections do not point to a single perspective. Rather, multiple voices emerge – some complementary, some contradictory, and all reflecting distinct and diverse ways of knowing (i.e., ontologies) and approaches to research (i.e., epistemologies) (Moon and Blackman 2014). Collectively, the readings also introduce a range of research methods, marked by increasing sophistication over time. Qualitative methods range from ethnography to ethical inquiry to narrative and historical approaches using a range of primary sources. Quantitative methods include simple to complex surveys and models, reflecting a growing computational toolbox for analyzing social and environmental data and their interactions across space and time. Methods are often mixed, explicitly or implicitly.

A Guide to Using This Book

We welcome readers to engage with *Foundations of Socio-Environmental Research* in multiple ways. In addition to this introductory chapter, readers are guided through the volume by the six commentaries. Each describes the historical and scholarly context for the selections, orienting the reader to the socio-political forces and intellectual themes animating the conversations in which the legacy authors were engaged. Each commentary also identifies the key insights and research propositions regarding socio-environmental relationships articulated in the subset of selected readings.

For new scholars of environment and society and for those teaching in this area, this book provides a basic vocabulary and an overview of multiple research traditions that contribute to contemporary scholarship. We made accessibility a central consideration in our vetting process and, for conciseness, chose portions of some of the longer original texts. Nevertheless, some selections, especially older ones, are challenging to read. Observations and ideas are interspersed among tangentially related discussion and require an approach to reading centered on engaging closely with the text to extract key ideas. Moreover, some of the ideas presented in some reading selections may cause offense and can be difficult to read because they present hierarchical relations across social groups that have long since been rejected.

Another aim of our book is to support individuals and groups doing interdisciplinary research. The composite nature of socio-environmental systems does not respect disciplinary boundaries; socio-environmental research is inherently interdisciplinary (Palmer et al. 2016), and research from the biophysical and social sciences, engineering, humanities, and other fields each makes unique and valuable contributions. However, interdisciplinarity

requires bridging differences in research perspective and purpose (Tress et al. 2005). Many of the most interesting research questions are at the interstices between disciplines. We introduce current researchers to multiple lenses and conceptualizations of relationships between society and environment. The readings selected can serve to build shared understanding across multidisciplinary teams.

Finally, this volume seeks to engage those readers who consider themselves specialists in socio-environmental research. For this group, the assembled selections provide a mix of texts that, for any given student or scholar, likely includes readings both known and unfamiliar. The reading of both can stimulate new research questions and lines of inquiry and root seemingly novel ones in forgotten soil. We challenge this community to acknowledge the historical roots of their current concerns and the continuities across centuries in key themes and relationships. Socio-environmental research encompasses a large and expanding community of scholars, institutions, funding sources, and publication outlets. Its dynamism and timeliness belie its deep roots. The climate change challenges and disease crises of today may be unprecedented in scope but not in kind. Seeing the origins and evolution of socio-environmental research along historical lineages can inspire useful clarity, productive growth, and new lines of inquiry for contemporary students and scholars.

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