ECOLOGICALLY UNEQUAL EXCHANGE

ENVIRONMENTAL INJUSTICE IN COMPARATIVE AND HISTORICAL PERSPECTIVE

Edited by R. Scott Frey, Paul K. Gellert, and Harry F. Dahms

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Editors

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Introduction: Ecologically Unequal Exchange in Comparative and Historical Perspective

R. Scott Frey, Paul K. Gellert, and Harry F. Dahms

At a time of increased societal urgency surrounding ecological crises from depleted fisheries (Longo, Clausen, and Clark 2015) to mineral extraction (Bunker and Ciccantell 2005) and potential pathways toward environmental justice (Martinez-Alier et al. 2016; Smith, Plummer, and Hughes 2016), this collection of papers re-examines ecologically unequal exchange (EUE) in historical and comparative perspective. The theory of EUE, grounded in Wallerstein's (1974–2011) world-systems perspective and the work of Amin (1976), Bunker (1985), and Emmanuel (1972), posits that core or northern consumption and capital accumulation are based on peripheral or southern environmental degradation and extraction. In other words, structures of social and environmental inequality between the Global North and Global South are founded in the extraction of materials from, as well as the displacement of hazardous production processes and wastes to, the Global

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South (Frey, Gellert, and Dahms 2017; Hornborg and Martinez-Alier 2016; Jorgenson 2016a, 2016b; Jorgenson and Clark 2009a). These unequal relations underscore a large ecological debt owed to the periphery by the core countries; this debt is a key source for many of the previous and current environmental distribution conflicts that have taken place and continue to take place throughout the world-system (Hornborg and Martinez-Alier 2016; Martinez-Alier et al. 2016).

This volume consists of ten chapters based on papers presented at the conference on *Ecologically Unequal Exchange: Environmental Injustice in Historical and Comparative Perspective* held on the campus of the University of Tennessee, Knoxville, on October 15–16, 2015. The conference is part of an ongoing effort by the Center for the Study of Social Justice, housed in the Department of Sociology at the University of Tennessee, to study issues of social justice broadly defined. Additional papers presented at the conference were published in a special issue of the *Journal of World-Systems Research* (Frey et al. 2017).

EUE is an important theory for understanding the uneven socionatural contours of global development and it has fostered research demonstrating that the structure of international trade contributes to environmental degradation in the periphery (see, e.g., Clark and Foster 2009; Frey 2015; Jorgenson 2016b; Jorgenson and Clark 2009b). Various scholars have commented on the "under-utilization" of EUE (Roberts and Parks 2007:195), but there has been a flurry of renewed interest as witnessed by several recent conferences and the publication of several special journal issues devoted to EUE (Frey et al. 2017; Hornborg and Martinez-Alier 2016; Jorgenson and Clark 2009a) and recent contributions by Foster and Holleman (2014), Hornborg (1998, 2009, 2011, 2015), and Jorgenson (2016a, 2016b). In principle, it should be possible to integrate a range of theorists from the ecological economics of Nicholas Georgescu-Roegen (1971) and Howard T. Odum (1971; see also Foster and Holleman 2014) to the promulgation of a theory of EUE by Stephen G. Bunker (1984, 1985, 2005) and from Wackernagel and Rees's (1996) ecological footprint to the ecosocialism of Foster (2002; see also White, Gareau, and Rudy 2017) and the material flow analysis of Marina Fischer-Kowalski (1998; Fischer-Kowalski and Huttler 1999) into a "single theoretical framework clarifying how societal relations of exchange and the

material dimensions of production are intertwined," as Alf Hornborg (2009:250) argues.

It is not an easy task to formulate such a single framework, however. As summarized by Oalu (2016:448), the theory has been dubbed "vague and roundabout" (Foster and Holleman 2014:210) and considered at risk of "remaining *scholastic*" (Hornborg 2011:109–114). This lack of specificity in the concept or, more ambitiously, the theory of EUE contributes to the perpetuation of ecological modernization theory's five "interconnected illusions" culminating in the idea that "sustainable development" is possible and not an oxymoron (Hornborg 2009:256). On the other hand, EUE theory can also be considered as *too* specific because it relies on a narrow economistic view of the structure of the capitalist world-economy as hierarchical. Or, at least the methods used to analyze it are economistic in their emphasis on trade data.

In this volume, we try to push scholarship on EUE forward as a useful framework for research by paying attention to the theoretical debates, empirical analyses, and implications for praxis. The authors of the chapters contained in this volume do not all agree with one another—and neither did all of the participants at the conference that formed the basis for this book—yet we believe that presenting them together offers the reader the chance to reflect, adjudicate, and evaluate these contributions. We hope this volume expands critical discussion of EUE.

Book Overview

This volume is organized into three distinct sections: theoretical foundations and critical reflections on EUE; empirical research on economic development, mining, deforestation, fisheries, and the like from the perspective of EUE; and current responses to the adverse socioecological consequences associated with EUE. The first section consists of four chapters examining the theoretical foundations of EUE. Chapter 2 is a condensed reprint of the key theoretical arguments of Stephen G. Bunker's (1985) *Underdeveloping the Amazon: Extraction, Unequal Exchange, and the Failure of the Modern State*. This work is an often cited classic in the field. Yet many have not taken the time to actually read it. By including

it here, we hope to re-kindle attention to the formative contributions Bunker made to our understanding of EUE three decades ago. In this book, Bunker argues that the socioecological consequences of extractive economies are quite different from those of production economies. He presents a model of EUE that is a synthesis of various theories of development and underdevelopment, focusing on how local modes of extraction are organized in response to world-system demands. The model is grounded in a case study of the extractive export economies characterizing the Brazilian Amazon Basin during the past 500 years.

Paul Ciccantell in Chapter 3 updates Bunker's original conception by bringing the EUE literature into dialogue with the raw materialism conception that he and Bunker developed (Bunker and Ciccantell 2005). The model focuses attention on "the raw materials-based industries and linked transport systems that are used to solve the most fundamental challenge to rapid economic growth: how to acquire growing volumes of raw materials at lower costs and in greater and more secure volumes than other competing economies." Ciccantell argues that many economies have ascended by using strategies for stealing raw material peripheries from established economies. He goes on to observe that "The current historical juncture in China's economic ascent and in the coal industry creates an opportunity for integrating the insights of ecologically unequal exchange and raw materialism to understand the multidimensional causes and consequences of global inequalities over the very long term."

In Chapter 4, Mariko Frame observes that EUE relations, and the related phenomenon of ecological imperialism, underlie the deep inequalities of the world-system and the exploitation of peripheral countries by core countries. But she notes that semi-peripheral economies are increasingly engaging in economic activities in peripheral countries as they attempt to develop that are as exploitative as those between core and periphery. Frame illustrates her argument by examining land grabbing in Cambodia by various semi-peripheral countries in the Asia region, including Malaysia, Thailand, and Vietnam. Even as these countries are engaging in ecological imperialism with Cambodia and other peripheral countries, they remain subordinate to the core economies and experience adverse socioecological consequences of EUE relations with their core counterparts. Frame concludes that greater theoretical clarity is needed

regarding the role played by semi-peripheral countries in EUE relations in the world-system.

Paul K. Gellert in Chapter 5 rounds out the section by returning our attention to Bunker's work, including his posthumously published *The Snake with Golden Braids* (Bunker 2006). He examines the questions of whether and how the seemingly disparate perspectives following Bunker's EUE—specifically Foster's metabolic rift (1999, 2000; Foster, Clark, and York 2010) and Moore's (2000, 2011, 2015; Patel and Moore 2017) world-ecology—are interrelated and in fact complement one another. All three address the unjust manner in which dominant actors in the capitalist world-system simultaneously exploit labor and non-human or biophysical nature while undermining sustainability. Gellert highlights these fundamental agreements regarding EUE across the three perspectives. Then, he unpacks the real distinctions among them regarding capitalism as causing degradation, nature's ontology, epistemology and dialectical analysis, and possible futures that might overturn the current unsustainable situation.

The second section of the book consists of four empirical studies examining EUE in comparative and historical context. Each chapter also stretches the theorization of EUE in fascinating ways. Laura McKinney's Chapter 6 is a cross-national examination of the links between the environment and trajectories of economic development. Drawing on physical science and thermodynamic principles, she presents cross-national data indicating that it is the *liquidation* of resources that stifles economic growth in the periphery, not the abundance of resources identified as the so-called *resource curse*. The structure of the world-system and EUE relationships between core and periphery foster resource appropriation and liquidation that stifle the economic development of the peripheral regions of the world-system. In sum, EUEs and the associated environmental losses in poor nations are driving the wedge that creates unequal economic development.

Jamie Sommer, John Shandra, and Carolyn Coburn in Chapter 7 present cross-national data showing how the flow of mining exports from the periphery to the core affects deforestation in the periphery. Using ordinary least squares regression for a sample of low and middle income nations, they find little support for the expected positive relationship

between mining exports and deforestation. They refine their analysis by examining how repressive countries foster EUE in the mining sector by providing a "good business climate" including environmental law exemptions and tax holidays. Their quantitative data indicate that mining export flows from the peripheral countries increase forest loss more in repressive than in democratic countries.

Brett Clark, Stefano Longo, Rebecca Clausen, and Daniel Auerbach in Chapter 8 examine how unequal economic and ecological exchange underlies fish production in Thailand. They find that in the effort to reduce production costs in the fishing industry, slave labor is used in fish harvesting and child and migrant labor is used in processing plants. These highly exploitative operations supply fish to Europe and the United States. They argue that as seafood production shifts with the ongoing growth of aquaculture, fish depletion, and the expansion of fishmeal and fish oil production, the relationships connecting slave labor, slime lines, environmental degradation, and the depletion of marine systems become more deeply embedded in a world-system based on constant capital accumulation that creates socioecological inequalities.

Shellen Wu joins this volume as a historian among sociologists and adds a unique perspective in Chapter 9. Not fully embracing theories of underdevelopment such as Bunker's, she argues that energy extraction and use in China developed in a very different way than in Europe or in the Amazon Basin of Brazil that Bunker studied in the development of the EUE narrative. Differences resulted from the unique aspects of Chinese geography and geology, as well as China's response to imperialism from the late nineteenth century. Nor did the so-called *resource curse* strike China, despite considerable Western interest in its coal reserves in the nineteenth century. The case of China discussed by Wu reinforces the importance of history and contingency in any understanding of EUE relations.

The third section of the volume examines responses to patterns of EUE: What has been done? What is to be done? And who should do it? Jackie Smith and Jacqueline Patterson in Chapter 10 examine political activism as it relates to climate change. They argue that real change emerges in movement spaces where people have worked to develop shared perspectives and organization. Specifically, they link their discussion to

the earlier theoretical section of the book by highlighting the alternative ontologies and epistemologies being envisioned and forged by the climate justice movement. As they put it, these are not just alternatives but thorough reconceptualizations of identities, values, and social relations. Furthermore, these reconceptualizations rely on indigenous understandings of humanness in relation to/with the earth. By illuminating three examples of transformative projects that are increasingly important—food sovereignty, solidarity economies, and Human Rights Communities—they argue that if the strategies of these projects were widely adopted, then climate change mitigation would be possible.

In the last chapter, David Ciplet and Timmons Roberts also focus on the issue of climate change politics but take a very different route than Smith and Patterson. They analyze the ways in which the Global South is "splintering" over climate change policies. They critique the classic world-systems perspective for dividing the world into a small group of rich countries and a large group of poor, peripheral, and dependent ones. Ciplet and Roberts present rich insights into the series of Conference of Parties (COP) climate change meetings and how they have broken down due to the splintering of previously unified Global South representatives. As they point out, the EUE narrative is increasingly difficult to maintain in the face of climate change politics.

The epilogue of the volume by Harry F. Dahms and R. Scott Frey outlines the major issues discussed in the ten chapters, the implications of these issues, and current gaps in the EUE literature and directions for future theoretical and empirical inquiry.

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Part I

Theoretical Foundations of Ecologically Unequal Exchange

2

Toward a Theory of Ecologically Unequal Exchange

Stephen G. Bunker

The development or underdevelopment of any region results from the organization, coordination, and use of human and nonhuman energies and from the distribution of resources derived from and transformed in that environment or traded for resources derived from or transformed in other regions. Human uses of any regional environment depend on its ecosystemic characteristics; these are shaped in part by earlier uses and by deliberate human modifications. Social organization, which may enhance or limit access to, and the useful transformation of, natural resources, is both bounded by and further shapes these ecosystems.

Theories of development have focused on economic processes of material transformation, or production, but they have not recognized the absolute dependency of material production on resource extraction. Nor have they accounted for the ways that the extraction, transport, and use

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of natural resources and the social formations that emerge from these processes affect the subsequent developmental potential of the environments from which resources are extracted. Instead, most theories of development have been attempts to extend models derived from systems of industrial production to nonindustrial systems for which they have only limited relevance.

Recent theoretical literature on national development has compounded the distortions inherent in this bias to production models. Its primary focus has been a fruitless debate about whether the causes of underdevelopment occur in a global system of exchange dominated by industrial nations or within specific regional systems of production. … In fact, a global system of exchange, made up of all importing and exporting regions, determines terms of trade which differentially affect all of these regions, but distinct regional social structures and political arrangements determine how the commodities on which the global system depends are actually extracted or produced. … [We cannot] adequately integrate [competing] perspectives [on national development] unless we recast and incorporate them into ecological and evolutionary models of social change that consider simultaneously the physical dependence of production on extraction and the interaction between regional and global systems. … [R]egardless of the degree to which exchange systems have become global, commodities can emerge only out of locally based extraction and production systems. Models of regional and global systems must be complementary rather than competitive because these systems coevolve. … [D]ifferent regional levels of development result from the interaction between changing demand in the world market for specific commodities and the local reorganization of modes of production and extraction in response. …

The cumulative ecological, demographic, and infrastructural effects of the sequence of modes of production and extraction in any region establish limits and potentials for the productive capacities and the living standards of regional populations. The flow of energy from extractive to productive economies reduces the complexity and power of the first and increases complexity and power in the second. The actions and characteristics of modern states and of their complex and costly bureaucracies accelerate these sequences. Modernization, as ideology, as bureaucratic structure and procedure, and as centralized control through complex

regulatory organization, mediates and intensifies the socioeconomic consequences of the interaction between global and regional systems. Modern systems are themselves highly energy-intensive and can only emerge in regions where industrial modes of production derive large amounts of energy and matter from subordinate modes of extraction. The modern state is but one of the forms of social organization which draw on energy flows out of modes of extraction and which extend the dominance of energy-concentrating modes of production, both globally and within nations. I examine these propositions in a case study of the sequence of export economies in the Brazilian Amazon from the time of colonial conquest to the present.

Modes of Extraction and the Creation of Extreme Peripheries

The first essential step toward adequate analysis of the coevolution of regional social formations requires that we free ourselves from notions relevant only to industrial production systems. Concepts derived from the European experience of capital accumulation and technological innovations in industrial production still provide the basic metaphors for the analysis of nonindustrial economies. Economic models of industrial production neglect the extractive origins of the materials which industrial processes transform (Georgescu-Roegen 1975). The internal dynamics of the extractive economies that have provided most of the exports from the least developed regions differ significantly from those of productive economies in their effects on the natural environment, the distribution of human populations, the growth of economic infrastructure (understood here as everything humanly constructed or organized which facilitates social and economic activity), and therefore on the subsequent developmental potential of the affected regions. … [P]roduction models cannot explain the internal dynamics of extractive economies because the exploitation of natural resources uses and destroys values in energy and material which cannot be calculated in terms of labor or capital. When natural resources are extracted from one regional ecosystem to be transformed

and consumed in another, the resource-exporting region loses values that occur in its physical environment. These losses eventually decelerate the extractive region's economy, while the resource-consuming communities gain value and their economies accelerate. An adequate model of the interaction between global and regional economies must account for both the differences and the interdependence between the two systems.

The differences between the internal dynamics of modes of extraction and of modes of production create unequal exchange not only in terms of the labor value incorporated into products but also through the direct appropriation of rapidly depleted or nonrenewable natural resources. Extractive appropriation impoverishes the environment on which local populations depend both for their own reproduction and for the extraction of commodities for export. Because this appropriation and its ecological results affect the class structures, the organization of labor, systems of exchange and property, the activities of the state, the distribution of populations, the development of physical infrastructure, and the kinds of information, beliefs, and ideologies which shape social organization and behavior, I introduce the idea, mode of extraction, to suggest the systemic connections between these phenomena. … [B]oth modes of extraction and modes of production can only be understood in terms of their integral interdependence and their impacts on natural ecosystemic processes. Orthodox Marxist notions of the reproduction of modes of production must be reformulated to account for these ecological interdependencies.

While the specific characteristics and dynamics of particular modes of extraction and of particular extractive commodity markets must be analyzed individually, it is possible to outline some general tendencies in extractive export economies. … The extractive process frequently entails an extremely low ratio of both labor and capital to value, so it may initially produce rapid rises in regional incomes. These may be followed by equally rapid collapses when the depletion of easily accessible resources requires additional inputs of labor and capital without corresponding increases in volume. The rapidly rising cost of extraction usually stimulates a search for substitutes or new sources for the original good. Either alternative profoundly disrupts the economy of the exporting region. The ephemeral nature of extractive economies may lead to a series of demographic and infrastructural dislocations.

Productive enterprises typically are located in close proximity to each other. Transportation, communication, and energy transmission costs are thus shared by multiple enterprises. New enterprises can start without assuming the total costs of the infrastructure they require. Populations attracted to these locations provide a labor force which can move easily between enterprises with different rates and directions of growth. While individual enterprises may become obsolete, the infrastructure to which they contribute and the labor which they have employed remain for subsequent enterprise.

Extractive enterprises, on the other hand, must be located in close proximity to the natural resources they exploit. These resources are randomly distributed in relation to productive centers, so proximity to other enterprises occurs only by chance and becomes less likely as the most accessible resources are depleted. Extractive economies, therefore, seldom enjoy the continuities with earlier settlement patterns and infrastructural development which shared productive locations provide. Nor do they usually contribute to the labor and infrastructural requirements of subsequent economies. Instead, whatever changes they bring about in the distribution of population and in the physical environment serve little or no purpose when the specific resources to which they are geared are depleted or are no longer in demand.

Regions whose economic ties to the world system are based almost exclusively on the exchange of extracted commodities (i.e., resources which occur in nature and in whose existence or continued reproduction there is no deliberate human intervention) can be characterized as extreme peripheries because of the low proportions of capital and labor incorporated in the total value of their exports and because of the low level of linkages to other economic activities and social organization in the same region. Even when depletion raises extraction costs, the additional capital and labor are most frequently required for exploration and transport rather than actual extraction. Even then, these costs constitute a relatively small proportion of eventual price, and an even smaller proportion of what their price would be if depletion rates were taken into account (Georgescu-Roegen 1970; Schnaiberg 1980; Schumacher 1973). Examples of such commodities include not only petroleum and minerals but also lumber from natural forests, the oils, meats, hides of wild animals,