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Please scroll down for document
Part V

Sustainability
12. Natural resources and constraints
12.1

New historical materialism, extractive economies, and socioeconomic and environmental change

Paul S. Ciccantell

Introduction: Raw materials and long term change in the capitalist world-economy

The relationship between raw materials and economic development has been a central concern of political economic analysis since the 1700s (Marx 1962; Ricardo 1983; Smith 1776). Despite more than two centuries of research, no clear understanding has emerged. Natural resource wealth aids economic development in some times and places, and hinders it in others. Capitalists, government officials, and analysts during the nineteenth and much of the twentieth century viewed raw materials as natural capital to be exploited for development as “gifts of nature.” In the mid-twentieth century, analysts formalized this conceptualization in the growth pole (Perroux 1956) and linkage models of development. However, from the 1960s onward dependency theorists and world-systems analysts emphasized the dramatically contradictory relationship between raw materials wealth and development for colonized extractive peripheries (see e.g., Bunker and Ciccantell 2005; Cardoso and Faletto 1969; Chase-Dunn 1989; Frank 1967; Jalee 1968; Wallerstein 1974, 1979, among many others). More recently, this two-sided relationship between raw materials and economic development has been portrayed by some economists as the “resource curse” of peripheries where these natural resources are extracted (Auty 1995; Gelb 1988; Ross 1999; Sachs and Warner 1999).

However, at the same time it is equally obvious that as the classic political economists argued, raw materials are essential ingredients for economic development; the rapid economic ascent of the core economies that have risen to challenge for hegemony over the last five centuries relied critically on raw materials extraction, processing, and consumption (Bunker and Ciccantell 2005, 2007; Ciccantell 2009). How can these dramatically different effects of raw materials wealth on economic development in different areas and different eras of the capitalist world-economy over the last five centuries be explained? A recent reformulation of world-systems theory, new historical materialism, offers a theoretical model that focuses on the contradictory roles of raw materials extraction, processing, and consumption in shaping the long term evolution of the
capitalist world-economy and its constituent national economies, as well as the socioeconomic and ecological impacts of this evolution.

In this chapter, I examine the dual character of the role of raw materials in the evolution of the capitalist world-economy. The following sections will outline the key elements of new historical materialism, a theoretical model that builds on the work of Wallerstein (1974, 1979), Chase-Dunn (1989), and Arrighi (1994, 2009) in order to understand the multiple roles of raw materials in shaping the past five centuries of the capitalist world-economy. New historical materialism highlights the need to examine economic ascent in the core, the exploitation of the periphery, the relationships between these processes, and the impacts of these relationships on long term socioeconomic and environmental change. This chapter concludes with an outline of directions for future research from the new historical materialist perspective.

**New historical materialism**

The initial formulation of our theoretical model in the late 1990s used the term “raw materialism,” a term we eventually replaced with the less emphatic term “new historical materialism.” This term reflects our intellectual foundation in world-systems theory and the classical political economy of Marx. More critically, it also reflects our goal of understanding social relations of power and inequality in the capitalist world-economy, rather than creating a new model of “environmental determinism” that claimed that the material characteristics of iron ore, coal, trees, and other natural resources determined social outcomes.

However, the key contribution of our theoretical model and research methodology lies precisely in its “raw materialism”: the goal is to understand the material bases of power and inequality in the capitalist world-economy by beginning from first principles of chemistry, physics, geology, hydrology, and ecology, and understanding how the relationship between society and nature has been shaped by these processes and how human action has learned about, adapted to, and sometimes reshaped natural processes. This nature-society nexus is the central focus of our theoretical model and analytic method. Using this approach, we were able to identify and explain the key causal similarities across the five most spectacular cases of systemically transformative economic ascent over the past five centuries: the economic development of Holland, Great Britain, the United States, Japan, and China (Bunker and Ciccantell 2005, 2007).

The key elements of new historical materialism bring together natural and social processes in an integrated understanding of social change. The key locus of innovation and change in the capitalist world-economy at any point in time is found in those societies with rapidly growing economies that (from a post hoc perspective) have the potential to rise to challenge for core or even hegemonic status. These rapidly growing economies face a host of challenges at this nature-society nexus.

State and firm strategies for economic ascent must respond to and take advantage of contemporary technological, geopolitical, environmental, and market conditions in the capitalist world-economy of that time period and of the rising nation’s position and location within that context. States and firms must also coordinate the physical characteristics and location in space and topography of the various raw material resources actually or potentially available with the physical characteristics and location in space and topography of the national territory. In the critical early years of economic ascent, states and firms face the challenge of coordinating domestic technological, organizational, and institutional innovations, particularly in heavy industry and transport, with the often external problem of access to cheap and secure sources of the raw materials used for heavy industry.

The raw materials used in the largest volumes present the greatest challenges to and best opportunities for achieving economies of scale, the reduction of the cost of each unit produced
that results from producing more units more rapidly and with fewer inputs of matter, energy, capital, and labor. These economies of scale, however, drive a contradictory increase in transport costs. Societies deplete the closest, cheapest, and most secure reserves of raw materials rapidly as the scale of their industrial production increases, forcing states and firms to seek more distant resources to supply rapidly growing industries (see Bunker and Ciccantell [2005] for an extended presentation of this theoretical model).

The tension of this contradiction between the economies of scale and the cost of space creates tremendous incentives and opportunities for technological innovation in transport, in technologies that reduce material, energy, and labor inputs per unit of output, and in technologies for controlling heat, pressure, and the mix of chemicals to make each unit stronger and lighter while performing the same work. All of these technological fixes drive each other, and all of them tend to generate increases of scale, thus exacerbating over the long term this same contradiction between scale and space that they are designed to solve (Bunker and Ciccantell 2005).

The efforts undertaken to resolve this contradiction are more than simple technological innovations. These efforts involve organizational and institutional innovations that spread from heavy industry and transport to other economic sectors. The rising economies that have created the most effective technological and organizational solutions to this contradiction simultaneously generated their own rise to economic dominance, restructured the mechanisms and dynamics of accumulation across the capitalist world-economy, and expanded and intensified the commercial arena of raw materials trade and transport. The innovations that resolve this raw materials challenge require the coordination of multiple physical and social processes across geopolitical and physical space with domestic relations between firms, sectors, the state, labor, and new technologies. These innovations include not just new technologies, but also new organizational forms and institutions that become the framework for the rest of the national economy and that eventually transform international markets and institutions in support of the rising economy’s continued development (Bunker and Ciccantell 2005).

The challenges and the opportunities presented by the basic raw materials industries and by the transport systems on which they depend foster generative sectors: sectors that, beyond creating the backward and forward linkages that underlie the concept of a leading sector, also stimulate a broad range of technical skills and learning along with formal institutions designed and funded to promote them, vast and diversified instrumental knowledge held by interdependent specialists about the rest of the world, financial institutions adapted to the requirements of large sunk costs in a variety of social and political contexts, specific formal and informal relations between firms, sectors, and states, and the form of legal distinctions between public and private and between different levels of public jurisdiction (Bunker and Ciccantell 2005).

Generative sectors are not necessarily high profit sectors, even though high profit sectors (whether gold and silver in the seventeenth century or computer technology in the twentieth century) are those that typically attract the most analytical attention (see e.g., Arrighi 1994; O’Hearn 2001). However, as has been shown elsewhere (Bunker and Ciccantell 2003a, 2003b), the highest profit sectors are not necessarily generative sectors, and generative sectors are not necessarily the highest profit sectors. Instead, generative sectors provide the material building blocks, cost reductions across many sectors to increase competitiveness, and patterns of state–sector–firm relations and other institutions that combine to drive economic ascent. Moreover, generative sectors rest on the creation of national and global commodity chains (Ciccantell and Smith 2009; Gereffi et al 1994) that tightly link the rising economy to its extractive peripheries and generate growing levels of economic and political inequality between the rising economy and its peripheries.
Raw materials acquisition strategies

How can rapidly growing economies acquire the raw materials essential to sustain these generative sectors, particularly in the face of domestic raw materials depletion and the resulting diseconomies of space as these raw materials must be brought from more distant areas outside the political control of the ascendant state? One critical strategy to accomplish this task has been to steal raw materials peripheries from earlier ascendant economies that have already undertaken the difficult and expensive tasks of building the necessary infrastructure, creating political, organizational, and legal forms that promote international trade and investment relations between a particular raw materials-producing state and the world-economy, and incorporating these peripheries economically and politically into the world-economy. Earlier processes of economic ascent progressively globalized the world-economy and brought new raw materials peripheries into the global trading system to supply the earlier ascendants’ industries, so new ascendant economies and states have the opportunity initially to purchase raw materials from this established supply system (Ciccantell 2009).

The newer ascendants’ rapid growth, however, means that their demand is increasing dramatically and necessitating a dramatic increase in supply if these growth rates are to be sustained. The combination of the existing social and material infrastructures in the raw materials peripheries established by earlier ascendants, rapid demand growth in the ascendant economy, and the willingness of the newer ascendant economy to pay higher prices for raw materials in order to sustain their domestic growth creates an opportunity that states and firms in the raw materials periphery find very attractive. Higher prices for rapidly increasing volumes of exports (in contrast to slower demand growth in the mature economies of earlier ascendants) motivate firms and domestic elites in the periphery and even from existing core powers with fewer opportunities for profitable investments to invest in production for export to the new ascendant. States in raw materials exporting regions typically support this investment with subsidies for transport and extraction, both in an effort to promote economic development and in hopes of gaining better returns and more political freedom from the power of the existing hegemon. This is particularly apparent in postcolonial situations in which newly independent states seek to break free from neocolonial ties and in situations of resource nationalism in which states seek greater control over and benefits from raw materials exports. Firms, elites, and states in raw materials peripheries come to see the new ascendant as a potential ally in their attempts to promote political independence and economic development (Ciccantell 2009).

From the perspective of the new ascendant, building these relationships with existing raw materials peripheries is much less expensive and difficult than creating their own new peripheries. One of the most important benefits is that most of the cost and the risk of expanding extraction and transport is borne by firms and states in the extractive periphery and often by firms from the earlier ascendant. At the same time, these investments in mines and transport systems also often create opportunities for exports of industrial products from the ascendant economy to the periphery to support the development of these extractive industries and for consumption by the owners of and workers in these industries. “Stealing” these peripheries from earlier ascendants thus further enhances the rapid growth of the new ascendant by reducing costs and risks while simultaneously creating significant new opportunities for profit from trade and investment (Ciccantell 2009).

Over the last 500 years, this process of stealing peripheries has been a key element of rapid ascent in each case of rapid, transformative ascent (Bunker and Ciccantell 2005, 2007). Holland progressively captured more and more of the Brazilian trade from the waning Portuguese empire in the 1600s, taking control of much of the sugar, precious metals, and other raw materials of trade and capturing the benefits of this trade for its own domestic development in shipbuilding,
shipping, finance, and other industries. Great Britain rapidly displaced the Dutch from North America, the Caribbean, India, and Southeast Asia in the late 1600s and 1700s and took control over trade in timber, sugar, and a host of other raw materials. During the 1800s in Latin America, Great Britain similarly displaced the Spanish empire as the region’s main trade and investment partner, inducing states to subsidize the construction of British-owned and manufactured railways to ensure high rates of profit and steady supplies of grain, beef, silver, tin, and other products to British consumers and industries. The rapidly growing United States did the same to support its ascent in the nineteenth and twentieth centuries, displacing Great Britain first in much of North America and later from Canada, Latin America, and the Caribbean to acquire the raw materials for US industrialization. The United States often used the opportunity to escape British hegemony as a key enticement for firms and states to redirect their exports of copper, bauxite, and other raw materials to the US market with its rapidly growing demand (Ciccantell 2009).

Moreover, this process has continued in the late twentieth and early twenty-first centuries. After World War II, the United States effectively took control over Australia’s resources in order to establish a supply relationship with Japan, despite Australian objections, in order to support US Cold War efforts in Asia by rebuilding Japan. This US-led reorganization of Australia’s raw materials trade relations created the pattern for Japan’s progressive globalization of the iron and coal industries via long-term contracts and joint ventures. This raw materials access strategy came to rely on its seeming support for resource nationalism (often to escape the control of the US hegemon and its firms), but greatly benefited Japanese firms and the Japanese state by transferring much of the costs and risks of supplying Japan’s industries to states and firms in Australia, Brazil, Canada, and other nations. The raw materials peripheries that Japanese strategies stole from the United States and Great Britain provided billions of dollars in subsidies to Japanese industrial development and global competitiveness in the form of lower raw materials costs, forming a key pillar of Japan’s rapid economic ascent and ensuring that the steel and other raw materials processing and consuming industries that states and firms in Australia, Brazil, Canada, and other raw materials exporting regions wanted to develop using export revenues from raw materials exports to Japan were instead built in Japan (Bunker and Ciccantell 2007).

The relevance of raw materials in the “Post-Material” world

But why should raw materials continue to be a concern in the current era of high technology industries and supposed dematerialization (see e.g., Cleveland and Ruth 1998; Herman et al 1989)? Claims about dematerialization became possible as heavy industry in the United States and Western Europe became increasingly uncompetitive since the 1970s and closed. However, these industries were simply relocating to lower cost producing nations in the semiperiphery and periphery such as South Korea, Brazil, and especially China. The world-economy uses more material every year; it is simply produced increasingly outside the core nations. World steel production in 2007 was 1.34 billion metric tons, the largest volume of steel production in history, and more than 36 percent of this steel was made in China (Skillings 2008). Steel today is seen as an anachronistic relic in the United States because of the industry’s collapse in the early 1970s in the face of first Japanese and then later other global competition. However, under conditions of rapid economic growth in China in recent years, huge and rapidly growing quantities of steel are needed to build office buildings, factories, roads, and other infrastructure, in addition to the products being exported. The Chinese steel industry simultaneously generates huge profits for steel-producing firms, many of them operating in partnership with Japanese, South Korean, and European steel firms. Steel remains a key ingredient in the process of rapid
economic ascent in China (Ciccantell 2009), and China’s ascent may prove to be another transformative case that reshapes the capitalist world-economy.

On the other side of this dual-sided process, how does raw materials extraction affect the peripheries where extraction takes place? Despite the optimism of the growth pole and linkage models of development (Hirschmann 1958; Perroux 1956), most efforts to use raw materials as the basis for economic development have had at best mixed success and, more commonly, partial or complete failure (see Ciccantell [1994] for a discussion of many examples; Bunker 1989). Extractive peripheries created by rising core powers or stolen from existing core powers typically confront growing domestic and international inequality, political powerlessness, environmental degradation, and a plethora of other negative consequences from raw materials extraction for export to industrial areas, whether these areas are within the same national boundaries or across thousands of miles of ocean. Even in recent years and even in relatively wealthy, highly developed nations with rich raw materials resources such as Australia and Canada, firms and states in extractive regions continue to subsidize the economic ascent first of Japan and, more recently, of China (Bunker and Ciccantell 2007); the cost in strictly economic terms, ignoring all other forms of social and ecological costs, were probably far larger for other extractive peripheries.

In such circumstances, the critiques advanced by Cardoso and Faletto (1969), (Frank 1967), Wallerstein (1974, 1979), and a host of other analysts remain just as salient today: for extractive peripheries, raw materials wealth is extremely unlikely to lead to sustained economic development, despite the essential role of raw materials in making rapid economic ascent possible in other places (Bunker and Ciccantell 2005, 2007). The areas of greatest importance as colonial raw materials peripheries are now among the poorest in the world, with Haiti and northeastern Brazil, once the world’s most valuable sugar-producing colonies, among the world’s poorest and most environmentally degraded areas.

**Directions for future research**

The new historical materialist approach opens a variety of avenues for research into new questions and topics, as well as a fresh approach to topics typically examined from other perspectives. Individual case studies and comparative case studies of particular natural resource-based industries and extractive regions remain critically important, particularly in this era of globalization, the rapid economic growth of China and India, and the growing potential for conflict over raw materials access. One strand of my current research focuses on coal mining in western Canada, while other research focuses on much less well-studied industries, including Brent Kaup’s research on the natural gas industry in Bolivia (Kaup 2008). These case studies should examine a very important issue: are the consequences of extraction different for raw materials peripheries today in the postmodern, “post-material,” transnationalized world, in comparison to the imperial phase prior to 1945 or the postcolonial phase from 1945 through the 1970s? The last three decades of “post-materialism” in the core, globalization, the information age, neoliberalism in most of the world (with the crucial exception of China), and the rise of China and India are generally regarded as a new phase in the evolution of the capitalist world-economy. Is it really a new phase, from the new historical materialist perspective? Or is it merely a continuation of the post-1945 era with a few new characteristics? The rise of China over the past three decades has strong parallels with the ascent of Japan after 1945 (Bunker and Ciccantell 2007; Ciccantell 2009), so this remains an open question.

Another key topic for future research focuses on comparative studies of partial or failed processes of economic ascent and of cases of failed challenges for hegemony. Spectacularly successful cases have transformed the capitalist world-economy and attracted a great deal of
analytic attention, but even comparisons of successful cases need to be expanded to comparison with other cases in which rising economies failed to achieve hegemonic status. Historically, the cases of Germany and France are clearly two of the most important for this broader comparative effort, given their repeated efforts to challenge Great Britain and the United States for hegemonic positions over the last two centuries. Borocz’ (2010) insightful examination of European economic development and the integral role of colonialism in shaping European nationalism and economic development provides an intriguing perspective on the role of heavy and transportation industries and of colonial raw materials access strategies, and I have been working on historical research on this topic.

Another key area for future analysis is bringing new historical materialist analysis of raw materials and transport industries into dialogue with the other major strain of sectoral analysis in world-systems research: the global commodity chains perspective. What are the major similarities and differences between raw materials and transport industries and other key sectors of the world-economy, such as textiles, automobiles, and information technology? Are such comparisons even possible in any meaningful way? What other sectors have served as generative sectors? David Smith and I believe they are and we are working on a research project aimed at making this sort of comparison (Ciccantell and Smith 2009), but expanding this comparative analysis to many different industrial sectors in different locations and different time periods will entail the work of a significant number of analysts.

One of the world’s most important raw materials industries, petroleum, has not been explicitly examined from the new historical materialist perspective, although other world-systems analysts have focused on this industry and its critical roles in the world-economy (Podobnik 2005). Despite its immense profitability and importance, it is not clear that petroleum has served or could ever serve as a generative sector driving economic ascent. This industry shaped US economic ascent in some important ways during the twentieth century, but it seems very doubtful that it will play anything close to a transformative role anywhere else in the capitalist world-economy, despite being the most significant economic sector in a large number of countries. This industry warrants a much closer inspection from this perspective.

Remaining in the area of energy industries, the role of alternative energy and its impacts on core, semiperipheral, and peripheral regions of the capitalist world-economy and on the environment merit careful attention from a new historical materialist perspective. Wind, solar, tidal, and other forms of “clean” energy are the focus of government policies and corporate investment in many areas of the world in an effort to slow global climate change, but we still know very little about this industry and its consequences. Rigorous comparison with other raw materials-based industries is likely to inform our understanding and public policies in this area that is generally regarded as a “good thing” without being subjected to serious social scientific analysis.

Perhaps most fundamentally for the future of the capitalist world-economy, what is the potential for the emergence of a new era of intense conflict between core powers and rising economies over access to key raw materials? Some analysts have already taken up this issue (see e.g., Engdahl 2005; Kenny 2004; Mahbubani 2005; Nayar 2004; Zweig and Jianhai 2005), but a longer term, new historical materialist analysis could contribute significantly to our understanding of what could be the key to the next major global conflict. My current research focuses on the role of conflicts over raw materials during earlier cases of economic ascent and increasing rivalry between core powers, conflicts that helped lead to and then shaped the World War I and World War II. In the case of Germany prior to World War I, firms, political leaders, and government agencies sought access to agricultural land, iron ore, petroleum, and copper in Europe, Africa, and Asia, and emphasized the need for a navy capable of protecting long-distance transport routes, despite their awareness of the potential for these efforts to generate conflict with Great Britain,
France, and Russia and to force these three nations into an alliance against Germany. The choice was stark: without access to these resources, German economic ascent would be severely constrained, but in order to gain access, severe conflict was almost inevitable. After defeat in World War I, the same choice was recognized and the same decision made in the 1930s, with similar disastrous results for Germany and many other parts of the world. Concerns over access to food supplies, oil, iron ore, water, and other resources today confront rapidly growing economies in China and India; raw materials access strategies may once again shape geopolitical alliances and the contours of future conflicts.

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