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Ecology and Power

Edited by Alf Hornborg, Brett Clark, and Kenneth Hermele

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*Struggles over land and material
resources in the past, present, and
future*

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Alf Hornborg, Brett Clark, and
Kenneth Hermele



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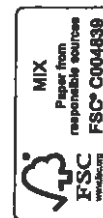
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Introduction

Ecology and power

Alf Hornborg, Brett Clark, and Kenneth Hermele

Power and social inequality shape patterns of land use and resource management. This book explores this relationship from different perspectives, illuminating the complexity of interactions between human societies and nature. Most of the contributors use the perspective of "political ecology" as a point of departure, recognizing that human relations to the environment and human social relations are not separate phenomena but inextricably intertwined (Peet and Watts 1996; Bryant and Bailey 1997; Low and Gleeson 1998; Paulson and Gezon 2005; Biersack and Greenberg 2006; Peet *et al.* 2011). What makes this volume unique is that it sets this approach in a trans-disciplinary, global, and historical framework.

The 26 contributors represent a spectrum of academic fields including anthropology, sociology, geography, economics, economic history, historical archaeology, human ecology, development studies, and sustainability science. They have been recruited from two international research networks recently established by the Human Ecology Division, Lund University, Sweden. The first network includes participants in the international conference *Ecology & Power: Critical Perspectives on Sustainability and Resilience*, organized and hosted by the Human Ecology Division on September 17–19, 2008, with most of the funding from the Bank of Sweden Tercentenary Foundation. The second network involves participants in the research project *Power, Land, and Materiality: Global Studies in Historical Political Ecology as a Framework for Assessing Policies for "Sustainable Development"*, funded by the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS). What unites all these researchers from various disciplines is the recognition that power asymmetries and social inequalities shape patterns of land use and the management of natural resources. Together, they apply a variety of interconnected perspectives to this core theme of political ecology. Whether applying concepts and methods of economic historians, sociologists, or geographers, the authors demonstrate how human interactions with the land are intertwined with global, regional, or local power structures. They analyze phenomena that range from the asymmetries of global capitalism, international trade, and empires to the politics of development, ethnic divisions, and even household organization. The spectrum of approaches represented in this book thus

illustrates ways of bridging the divide between the tangible materiality of uneven resource flows and societal metabolism, on one hand, and the less tangible, symbolic dimension of social stratification, ethnicity, race, and gender, on the other. As a result, this scholarship indicates that an attribution of decisive significance to material parameters in reproducing power structures should not imply downplaying the role of socio-cultural categories in organizing such structures.

In presenting local case studies from all over the world, the contributors develop a global understanding of these politicized environments. They generally apply a broadly conceived world-system approach to issues of land use, resource management, and environmental change. This theoretical framework provides unity of understanding in the midst of disciplinary diversity. Viewing local struggles over land and resources through the lens of the global entails highlighting conditions and causal relationships that tend to be neglected in public discourse. Examples discussed in this book include the cultivation of various crops, such as wheat, rice, sorghum, coffee, sugarcane, Jatropha, and safflower; the raising of livestock such as llamas and cattle; and other extractive activities such as forestry, mining, energy production, and the trade in guano and ivory. As many of these production systems require substantial investments in so-called *landesque* capital, some chapters discuss the social conditions under which such investments are made.

Finally, the volume as a whole adds a deep historical dimension to political ecology. Collectively, it argues that a long-term, historical understanding of how local and global power struggles shape the trajectories of human-environmental relations is crucial to the emergent field of political ecology. This point applies, for example, to the past two centuries of fossil-fuelled capitalism, during which human dependency on land appears to have become less tangible than in pre-industrial times. Against this background, several chapters discuss the implications of the anticipated (re)turn to biofuels, which would transform the rationality of conventional land use and regenerate contradictions between food and energy production in regions of the world that have largely been spared such contradictions over the past two centuries. Other chapters reveal how much of the logic of world trade today can be understood as historical transformations of resource flows established by ancient empires such as Rome, China, and the Inca. Together, the chapters in this volume examine a very wide range of environmental changes, as mediated by various asymmetries and types of power, throughout the world.

The chapters

The contributors were asked to provide chapter titles focusing on one or two words denoting concrete, material phenomena that served as keys toward unraveling specific aspects of global power relations. Inevitably, however, some chapters are more theoretical in nature, and their keys less concrete. Nonetheless, together these contributions provide a comprehensive account of the range of social relations that influence environmental change. In Part I, Alf Hornborg,

in Chapter 1, outlines a theoretical approach to understanding how material and cultural conditions interact in processes of accumulation and unequal exchange. He also suggests that biophysical, non-monetary metrics may help illuminate how specific kinds of trade can generate distinctive types of environmental degradation – and diverse conditions for technological growth – in different sectors of the world system. In Chapter 2, Brett Clark and Richard York examine how the inclination toward “technological fixes”, i.e. obsessive attempts to solve problems by using new technologies without changing social relations, is intrinsic to the capitalist system. Rather than solving ecological problems, these technological fixes generally create new problems or simply displace old ones. Together, these two chapters indicate that modern technological systems are primarily means of redistributing resources and risks in global society, rather than merely ways of organizing human-environmental relations at the local level (cf. Hornborg 2011).

Janken Myrdal, in Chapter 3, compares two ancient empires, Rome and China, in terms of the extent to which they were able to control land areas, populations, and flows of bulk goods. After discussing the need of strict source criticism in writing global history, he reveals that large pre-industrial cities required long-distance imports of substantial volumes of food to sustain urban populations. By the time industrialized agriculture in proximate regions appeared more capable of supporting large cities, he concludes, industrialization itself demanded an unprecedented expansion of global material flows (cf. Chapter 5). Again, industrial technology emerges as a new social strategy, under specific social relations, for appropriating distant resources. Although it seems vastly more democratic and benevolent than imperial tribute, its underlying rationale may be quite similar.

In Chapter 4, Eric Clark and Huei-Min Tsai focus upon the historical political ecologies of island societies in an effort to juxtapose durable improvements to land – so called *landesque* capital, commonly assumed to be inherently positive and sustainable – with ecologically unequal exchange. The histories of three islands in Taiwan over several centuries suggest that accumulation of *landesque* capital can be geared either to local demand or to extraction for distant markets, produced through either local or distant initiatives, and viewed either as charity or as exploitation. These island cases show that formation of such capital can contribute to land degradation either in the location of infrastructural “improvement” (e.g., *landesque* capital for extraction of salt), or in other places from which resources are taken to realize the enhanced productivity of land (asymmetric flows of resources from abroad). Their analysis furthermore suggests that destruction, abandonment, and devaluation of *landesque* capital are often generated by, and thus constitute a significant dimension of, ecologically unequal exchange. The two processes, complex in their own right, are enmeshed through regional and global power relations.

As Brett Clark and John Bellamy Foster discuss in Chapter 5, the international guano trade in the nineteenth century is an exceptionally concrete illustration of ecologically unequal exchange. The guano trade involved stripping the

islands off the Peruvian coast of their deposits of bird dung to be used as fertilizers in European and North American agriculture. A system of *de facto* slavery emerged, as indentured manual labor from China was forced to mine the guano. This particular technological fix of early industrial agriculture exemplifies how the metabolic rift, which Marx identified as dividing city from countryside in the nineteenth century, was extended to the global level, generating massive abuse of labor and ecological impoverishment in the periphery of the world system (cf. Foster *et al.* 2010).

Because money prices represent all market exchange as fundamentally symmetrical, the identification of unequal or asymmetric flows of resources in the modern world requires other metrics than money. This point becomes less of an ideological hurdle when we are investigating the tribute-based metabolism of ancient empires. In Chapter 3, Myrdal's comparison of imperial metabolism in Rome and China is based on units of weight, as in material flow analysis (Fischer-Kowalski 1998). In Chapter 6, Ragnheiður Bogadóttir uses concepts and methods for calculating "time-space appropriation" (Hornborg 2006) to demonstrate how the Inca economy in the sixteenth century can be understood in terms of the appropriation of labor (time) and land (space) embodied in key variables such as cloth. Inca textiles woven from cotton or camelid fleece were pivotal goods used for tribute, trade, and the accumulation of wealth. Like other goods circulated in the past and present, beyond their symbolic and economic significance, Andean textiles represented quantities of embodied labor and land. In estimating how the imperial power structure of *Tawantinsuyu* was maintained through uneven flows of embodied "time" and "space", Bogadóttir presents a way of understanding very different economic systems in comparable, biophysical terms.

In Chapter 7, Mats Widgren explores the relationship between accumulation of landesque capital and slavery in pre-colonial West Africa. In a previous publication, Widgren (2007) has shown that such accumulation need not be attributed to hierarchical political structures but can be the result of the long-term labor investments of local communities, particularly under conditions of relative security. In his chapter in this book, he pursues the issue further through a comparison of three different instances of agricultural intensification in West Africa, concluding that the Atlantic slave trade may be implicated in all three cases, even where intensification occurs in egalitarian societies only indirectly affected by the economic and political repercussions of the slave trade.

Andreas Malm, in Chapter 8, examines the adoption of coal-fuelled steam power in nineteenth-century Britain. He depicts the adoption of an industrial, fossil-fuel technology as a logical consequence of capitalist development and a powerful symbolic confirmation of the superiority of European over non-European peoples. Early nineteenth-century Europe represents a point in time and space where the modern notion of "technological progress" was established. Fundamental to this concept of technology, then as now, is its dissociation from both economy and ecology. There seem to have been few qualms among the ruling classes in nineteenth-century Britain about the distant economic and

ecological correlates of its steam-powered textile industry, e.g., the Atlantic slave trade, colonialism, and soil degradation on the cotton plantations (not to mention the future threat of global warming).

If the footprints of British textiles at this time were formidable, the history of world trade offers plenty of precedents. N. Thomas Håkansson, in Chapter 9, reviews some of the major social and ecological repercussions in East Africa of the global ivory trade. In the nineteenth century, ivory, like slaves, was generally paid for in cloth and beads, and Håkansson suggests that local pastoralists in turn exchanged cloth for cattle. The ivory trade thus stimulated an accumulation of cattle and expansion of specialized pastoralism on the savanna, with obvious ecological consequences. The pastoralists also appear to have exploited neighboring cultivators and foragers through various forms of unequal exchange.

In Chapter 10, Mats Mogren discusses the symbolic significance of colonial lawns and gardens as indicators of European superiority and domination. Examining historical evidence particularly from Ceylon (contemporary Sri Lanka), Mogren suggests that the layout of colonial botanical gardens served primarily as strategic displays of dominance. This mode of organizing ecological space in nineteenth-century Ceylon communicated the power of British imperial rule to control nature as well as society. Mogren's chapter illustrates how patterns of land use, while often serving as material instruments for covert power structures, may conversely assume a primarily symbolic dimension, communicating conspicuous messages about power and superiority.

The first chapter in Part II marks a shift from historical to modern cases. Andrew Jorgenson and Brett Clark, in Chapter 11, apply concepts and statistical methods from environmental sociology to illuminate the ecological consequences of modern consumption patterns and ecologically unequal exchange between nations. They find that both economic growth and military expenditures are positively correlated with environmental degradation. The statistical evidence indicates that affluent nations of the global North tend to have larger ecological footprints per capita and to benefit from unequal exchange with less-developed nations in the South.

In Chapter 12, Michael Sheridan investigates the reasons for the deterioration of indigenous irrigation systems in the North Pare Mountains of Tanzania since independence in 1961. He compares two alternative frameworks for explaining this deterioration – resilience theory and the concept of "adaptive cycles" versus power and political history – and finds the latter more useful. Resilience theory tends to be founded on functionalist assumptions stemming from systems ecology, and thus naturalizes social relations of power, inequality, and exploitation. With analyses incorporating power, the resilience of traditional irrigation systems in North Pare can be accounted for in terms of the ability of older men to control the labor of women and younger men. When agricultural modernization in Tanzania reorganized this gendered political economy, Sheridan concludes, the processes of change cannot be fully analyzed in terms of "adaptive cycles".

Food occupies an important place in political ecology. In Chapter 13, Ulf Jonsson focuses on the expansion of meat consumption throughout the world in

order to assess recent trends within the agro-food system. As vegetable and meat production increasingly become decoupled, the commodity chains associated with various foods become increasingly complex. Jonsson shows how the industrialization and mass production of food has created global supply chains, where animal feed, such as soybeans, are grown in one part of the world – such as Argentina – to be shipped to another part – such as China – to fatten chickens and pigs for domestic consumption. Through vertical and horizontal integration, new food giants have emerged on the world stage. The particular history, power structure, and conditions of countries, such as Brazil and Argentina, can lead to very different outcomes, as illustrated by the expansion of soybean production to support the meatification of diets throughout the world.

In Chapter 14, Pernille Gooch analyzes how changes in state power and policy – such as British colonial rule and recent “conservation” efforts of the Indian state – have impinged on the traditional practices and lives of the Van Gujjars, migratory forest pastoralists in the Himalayas. Under different regimes, political and economic interests sought control of forest resources, disregarding local populations. British colonial policy in India imposed scientific management of the forests, which entailed the commodification of timber, the establishment of tree plantations, and the degradation of local ecosystems. Recent conservation efforts and the park system have attempted to establish “pristine nature” by excluding the local population. Such actions have engendered numerous conflicts. The Van Gujjars continue to challenge attempts to eliminate their traditional rights, which involve access to use forest resources for themselves and their buffalo herds and seasonal migration in and out of forests.

E. Guilla A. Olsson and Lennart Bångens, in Chapter 15, address how state power is transforming the land and largely subsistence-based communities in eastern Tanzania. Local populations graze animals and extract resources (such as food, fiber, fertilizers, medicines, firewood, etc.) from the *miombo* ecosystem – a dry tropical grassland and woodland. The Tanzania government views this land as unproductive and underutilized; it is thus promoting the production of biofuels as a source of economic revenue for the country. This form of economic development involves dispossessing the local population and redistributing the land to private, commercial interests. Establishing biofuel plantations involves the loss of biodiversity due to monocropping, an increase in fertilizer and pesticide use, and the disruption of migratory routes for large mammals, such as elephants. This form of agricultural production also demands an extensive irrigation system in a region with water scarcity, creating an additional ecological problem to address.

In Chapter 16, Cristián Alarcón Ferrari highlights how forest companies are strategically exploiting concerns regarding climate change in order to expand forest harvests and capital accumulation. He presents the distinct historical development of the forest industry in Chile and in Sweden, noting the ecological contradictions associated with “sustainable” developments. In Chile, industrial tree plantations involve displacing native forests, decreasing the biodiversity. In Sweden, high-yield varieties are planted, using increased amounts of fertilizers.

Ironically, these companies emphasize the importance of forests as carbon sinks, neglecting the role they play in turning deforested land into a source of carbon dioxide. The promotion of biomass as a green source of energy has also increased the commercial exploitation of the forests. Recent mergers between international forest companies have concentrated the power of this industry.

The struggle over resources also plays itself out in conflicting interpretations of what a resource is. Marie Widengård, in Chapter 17, uses the example of Jatropa – a feedstock for biodiesel – to disentangle the various interpretations of this bush and its capacity to contribute to “sustainability”, “climate stability”, and socio-economic “development” for small-scale farmers. She sees Jatropa as a “floating signifier” which can be construed to carry positive characteristics that fit the various needs of the economic and political actors that foment the spread of Jatropa, from national governments and international agencies to transnational enterprises and environmental NGOs. In this construction of Jatropa, the real bush is replaced by an imagined resource, which the proponents present as the solution to all that is problematic with the more traditional agrofuels such as palm oil plantations: instead of large-scale it is small-scale; instead of causing deforestation it is grown on marginal lands which have no alternative uses; instead of benefiting agro-businesses it strengthens the peasant economy. Widengård shows that while discourse presents a “magic bullet” – a “win-win” proposition – detailed case studies reveal it is fraught with problems and drawbacks.

The construction of environmental arguments is also the focus of Chapter 18 by Bengt G. Karlsson. He shows how the discussion on dangers of nuclear power has been couched in mystifying language from its very beginning, primarily by the proponents of the industry, while counter-arguments have been classified as based on sentiments and not on science. Nuclear power is seen as “green”, “safe”, or “peaceful”, depending on the audience, and the reasoning has been surprisingly consistent over the decades and in spite of the nuclear accidents and catastrophes that have occurred along the way. There were fundamental continuities between the arguments in favor of nuclear power that arose regarding New Mexico in the 1940s, France in the 1960s, or Chernobyl in the 1980s, regardless of whether the nuclear power plants are placed in Europe or in Asia, or if the test sites are found in an American desert or in Micronesia. Many of the concerns raised in the chapter materialized in the 2011 Fukushima disaster, and Japanese people again have to live under the spell of radiation contamination. The analysis invites further questions about where the international discussion on the dangers of nuclear power will lead after Fukushima. Although the first reactions suggested at least the possibility of a re-evaluation of the pros and cons of nuclear power, and although the catastrophe caused a turn-about in the German policy and a decision to terminate its nuclear power program, the historical record indicates that the pro-nuclear lobby will soon reformulate its arguments in geopolitical, environmental, and security terms.

Returning to agricultural development policy in Africa, Wilhelm Östberg, in Chapter 19, focuses on the Kondoa district in central Tanzania, where safflower

has been introduced as a cash crop holding out the promise to ease the precarious situation of the farmers of the district, whose traditional food crop is millet. Like *Jatropha*, safflower is promoted as a crop that does not compete for land with other crops, as it is planted later than the food crop and can grow on marginal and otherwise unproductive lands. The promoters are a mixture of local and international entrepreneurs, encouraged by the Ministry of Agriculture. The campaign, Östberg argues, should be understood against the backdrop of a general change of development strategy that affected Tanzania as well as most other countries of the periphery over the past two decades, which transferred power from the state to the market, i.e. from the public to the private sector. This change explains why the local branch of the Ministry of Agriculture has had only a subsidiary role in the spread of safflower in Kondo, leaving the initiative and the power in the hands of a private company, which is the only buyer of safflower from the Kondo peasants. Still, safflower could play an important role for the survival strategy of the peasants, if in the final analysis the farmers get a fair price and the promise holds true that the new crop will not exhaust land and unduly compete with other agricultural activities. Here, Östberg concludes, the peasants would have needed the support and protection from the ministry before safflower was adopted; now they alone carry all the risks.

Concepts of race and racism developed in processes associated with power, social inequality, and access to land. As a result, they are social and historical, political and economic, in their origin. In Chapter 20, Susan Paulson describes particular historical changes in policies and practices that articulate race with the appropriation of resources in colonial and contemporary Latin America. She notes that race and racism evolved in conjunction with European conquests of distant lands, in order to implement and justify differential rights, the dispossession of indigenous peoples, and the exploitation of land and people. She indicates how race was variously employed to deny certain people access to land, sometimes by identifying them as Africans, and to grant other populations different kinds of rights to land, based on their identification as Europeans or Native Americans. Paulson focuses on how racialized biopolitics have changed within Latin America. Various nations, such as Bolivia following the 1952 revolution, attempted to overcome racial politics, but these efforts often ended up undermining indigenous communities and peoples, given the existing political-economic structures. At the end of the twentieth and beginning of the twenty-first centuries, communities have foregrounded ethnoracial identities in social movements calling for and ushering in socio-ecological changes in many Latin American countries. In this, race remains intertwined with social, political, economic, cultural, and ecological relations.

Chapter 21, by Anne Jerneck and Lennart Olsson, presents a local perspective, discussing ways to stimulate change on the village and family level by inclusive planning practices. The problems related to inefficient and polluting domestic wood-stoves are well-known – ranging from the time spent by women and children to gather firewood and dung, to the respiratory diseases caused by the smoke – and they have long been the object of projects financed by aid

donors throughout the world. However, Jerneck and Olsson argue that the issues related to inefficient and dangerous kitchen stoves do not receive the attention they merit, especially not when compared to international high-profile programs fighting diseases such as HIV/AIDS, tuberculosis, or malaria. The reason for this, they maintain, is that the kitchen is a highly gendered space, and that the interests and needs of women and children are given less priority by governments as well as by national and international aid donors. They view the kitchen and its stove as embedded in deeper social relations and structures where a gendered division of labor, space, and decision-making play a dominating role. Based on practical experiments and fieldwork in western Kenya, they show that these conditions can be changed for the better by including the men in the discussion of how to construct and install improved stoves that reduce health risks, and that simultaneously improve energy efficiency, thus easing the workload of women and children.

In the final chapter, Kenneth Hermele returns to the task of disentangling the political, economic, and ecological practices, relations, and representations of agrofuels. This time the example is Brazilian sugarcane ethanol. The various representations of this fuel provided by the sugarcane plantations, the ethanol industry, and the Brazilian state are shown to be tailored to the respective needs of these and other stakeholders. Hermele shows that geopolitical and energy security considerations are the main drivers behind the expansion of sugarcane ethanol in Brazil during the last 40 years. After the oil price hikes of 1973–1974, Brazil began promoting sugarcane ethanol in its Pro-Alcool program. More recently, the United States has used a similar reasoning to promote large volumes of ethanol on the US market, the feedstock being primarily maize. However, Hermele makes the case that other arguments in favor of agrofuels play a supportive role, such as the various attempts to brand and certify agrofuels as “sustainable”. Here, a combination of commercial and non-commercial actors have joined forces to define sugarcane ethanol as a clean and fair agrofuel, most notably in the Roundtable of Sustainable Biofuels. Such collaborations help legitimize a fuel that in fact lacks most of the environmental credentials that are pinned to it. The Roundtable thus risks becoming primarily an exercise in “greenwashing”.

From the earliest empires to modern development policy, the more or less covert strategies of power elites have shaped the human use of land and material resources. Such strategies for accumulation of power and wealth have always had symbolic as well as material dimensions, masking uneven resource flows and environmental load displacements in ideologically potent discourses on social superiority, technological progress, development, and even conservation. People whose labor and natural resources have been exploited by means of these strategies and ideologies through the centuries have been classified in terms of slavery, race, gender, tradition, indigenism, or underdevelopment. Today, arguments for “green energy” and sustainable development can similarly serve to promote extraction and accumulation by more powerful groups and individuals, while marginalizing social groups by diminishing their control of land and its

resources. From their various vantage-points, the contributors to this volume thus demonstrate a fundamental continuity in how ecology and power are intertwined.

The book is primarily aimed at three categories of readers: academic researchers in trans-disciplinary fields such as political ecology, human ecology, environmental history, and sustainability studies; students within a number of related disciplines such as anthropology, sociology, geography, economics, economic history, and historical archaeology; and environmentally engaged citizens pursuing more profound understandings of the relations between ecology and power. The editors hope that this collection will prove useful in these and other contexts.

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Part I

Theoretical perspectives on historical political ecology

4 Islands

Ecologically unequal exchange and landesque capital

Eric Clark and Hwei-Min Tsai

Islands have played important roles in the weave of existence. In the long view, islands have been key scenes in the generation of global biodiversity and cultural diversity. More recently – as oceanic hubs and laboratories of colonial enterprises, way stations for provisioning, sources of resource extraction, military outposts, effective spaces for incarceration, convenient sites for dumping waste, strategic geopolitical cornerstones, nodes of the global tourism industry, pockets of escape, and havens for laundering money, evading taxes and accumulating financial wealth – islands have become key places in the operational nuts and bolts of world-systems and arenas of struggles over land and natural resources. As predominantly coastal land, islands are sites from which resources are drawn from oceans and seas, a characteristic they share with continental coastal zones, which account for the bulk of continental populations. Oceanic islands have served as colonial stepping stones en route to distant lands. Continental islands are often closely connected with and form part of the cultures and economic activities of coastal regions, occasionally becoming centers of power – most strikingly Manhattan, Hong Kong and Singapore, so bridged, populated and connected that they do not count as islands by some classifications.

Imaginary sites of utopian and dystopian social experiments and exercises in moral philosophy are commonly islands (Manguel and Guadalupi 1999; Gillis 2004). More concretely, islands have been preferred sites for exercising powers of social and socio-ecological engineering, and in the process have given rise to environmentalism and doctrines of nature conservation (Grove 1995). With more or less rigor, scientific tales of island human ecologies provide insight into real social experiments and (one would hope) less fictional guidance increasingly relevant to planetary sustainability and human survival on Earth Island (e.g., Kirch 1997; Gowdy and McDaniel 1999; Erickson and Gowdy 2000; Clark 2004). As a metaphor for bounded matter, amplifying perspectives of inside and outside, the 'island' represents systemically coherent entities from the scale of microbiology to astronomy – meso-scale communities and geopolitical units of collective action being more relevant to our concerns here. The hoary chestnut of just "what is an island?" suggests that what island studies can reveal about historical-political ecology stands to be relevant to broader continental contexts.

Through the gaze of continental centers of power, islands are objectified from the outside as sites of various potential, not least in terms of resource extraction, but also for strategic land uses serving functions for which boundedness is an advantage – e.g., fortresses, prisons, dumps, pastures. The inside perspective of people who call an island home is very different, indeed often diametrically opposed (Hau'ofa 2008). Tensions between interests from the inside and the outside are perennial forces of island dynamics, as are tensions within island societies. Struggles for power over the entry of entities and events into space and time constitute island life every bit as much as continental life (Hägerstrand 1986). Though often the peripheral and weaker part in the historical struggles that make ecology political, island societies are not powerless and island cultures are not without resilience.

Our purpose in this chapter is to give a brief perspective on islands in global historical-political ecology, focusing on ecologically unequal exchange and the formation of landesque capital. We emphasize how these processes are intertwined and recursively connected in broader contexts of uneven development. Empirical examples draw on our research into the historical-political ecology of islands and archipelagos which have since 1949 been geopolitically part of Taiwan, the Republic of China; Kinmen (Quemoy) Island off the southeast coast of China; the Penghu Archipelago (Pescadores) in the Taiwan Strait; and Pongso no Tau (Lanyu, Orchid Island), a northern outlier of the Batanes Islands, south-east of Taiwan (Figure 4.1). The aim is not so much to draw comparisons between these cases as to draw connections, both between the processes of ecologically unequal exchange and formation of landesque capital, and between the peripheral islands and the global political economy/ecology of which they are part.

Ecologically unequal exchange and landesque capital

Island life does not unfold in absolute isolation, however much relative isolation is a defining characteristic of insularity. Material flows – some intentional, some unintentional, and others with "natural" movements of air, water and (non-human) animals – contribute to the constitution of all places, but we see this more clearly in the bounded room of islands. Trade and other forms of material exchange have been, with few historical exceptions, the *sine qua non* of human life on islands.¹ Goethe was not the first to remind us that every living being lives by means of things outside of it. Maintaining societal metabolism on a small island requires material flows beyond its shores. In this sense, exchange is commonly beneficial to sustaining island communities. But as the growing literature on ecologically unequal exchange – including ecological footprints, material and energy flow analysis, metabolic rift, physical trade balance, environmental load displacement and global commodity chains – makes clear, exchange can entail quite different ecological consequences at both ends, and often severely degrading impacts at one end. It is a matter of power on which side of the exchange a place lands. Boyce (2002: 8–9) usefully distinguishes between five dimensions of power in the political economy of the environment:

Purchasing power is the dimension of power that underpins the notion of “consumer sovereignty” ... the ability and willingness to pay for various goods determines what gets produced. ... *Decision power* – the ability to prevail in contests where different people prefer different outcomes. ... *Agenda power* is the ability to determine which issues enter into the arena of public decision-making at all. ... *Value power* is the ability to influence what others want, what they themselves will choose if given the power to decide. *Event power* is the ability to alter the circumstances in which people make choices, rather than directly determining the choices themselves.

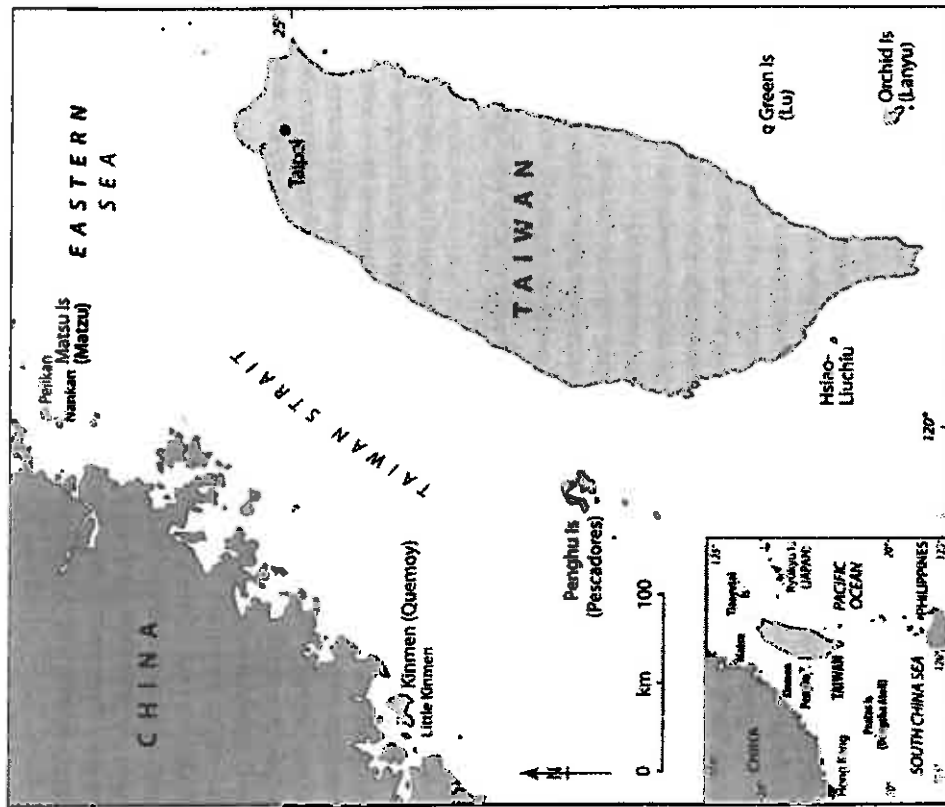


Figure 4.1 Location of Kinmen, Penghu and Pongso no Tau (Orchid Island) (source: Royle and Tsai 2008).

Some places successfully brand themselves as green and sustainable ecocities, while the global flows of exchange upon which their environmental qualities and quality of life rest bring land degradation, toxic waste and environmental impoverishment to other places, the sites of extraction and production underlying the environmental cleanliness of the so-called ecocities (which rely on myopia to be believed) (Anderberg and Clark 2011).

Trade is generally understood by economists as necessarily equal. Those who trade voluntarily exchange what they possess for currency or goods which they assess to be of at least equal value: otherwise they would not trade. Trade, we are told, benefits all, through comparative advantages, specialization and spatial divisions of labor. Critical economic historians have problematized this view of trade with the notion of unequal exchange, based on uneven development between core and periphery and inequalities between societies engaging in trade. Unequal exchange entails “moving accumulated capital from politically weak regions to politically strong regions” (Wallerstein 2004: 28). Leaving the issue of value aside, the concept of ecologically unequal exchange focuses instead on material flows of trade, especially in terms of embodied labor, embodied land and environmental degradation. To paraphrase Wallerstein, it entails moving the ecological burden of politically and economically strong regions to politically and economically weak regions (Hornborg 1998, 2001).

In emphasizing material flows, ecologically unequal exchange problematizes localized analyses of sustainability and environmental improvement or degradation that lack connectivities to broader regional and global contexts. Given the global reach of interdependencies and commodity chains, how might we reasonably understand the sustainability of one place, unless through thorough consideration of the multitude of material flows upon which the metabolism of the place depends? Extractive and productive activities in a central place or core metropolitan region result in a set of ecological consequences for that territory. The set of ecological consequences of total consumption in the same place will, however, be considerably greater, as much of what is consumed is extracted or produced elsewhere. At the other end, in the global periphery, environmental loads and degradation are often greater than what corresponds to consumption. In other words, “domestic environmental conditions are not necessarily an accurate reflection of the environmental burdens engendered by domestic standards of living and rates of material consumption” (Rice 2007: 63).

However multifarious the variables of these environmental conditions may be, we can nevertheless grasp ecologically unequal exchange in such a straightforward way. Not so with landesque capital, which as Bayliss-Smith (1997: 149) suggests, is theoretically “a relatively under-developed concept.” Landesque capital is variously defined as: “any investment in land with an *anticipated* life well beyond that of the present crop, or crop cycle” (Blaikie and Brookfield 1987: 9); “landscape manipulation *designed* for long-term gains in productivity ... [that] allows labor to be environmentally banked” (Fisher and Feinman

2005: 64); and "inalienable modifications of land for the *purpose* of increasing its productivity" (Hornborg 2011) (italics added in all quotes). Marx (1981: 756) referred to *la terre-capital* as capital

fixed in the earth, incorporated into it, both in a more transient way, as is the case with improvements of a chemical kind, application of fertilizer, etc., and more permanently, as with drainage ditches, the provision of irrigation, levelling of land, farm buildings, etc.

Most research into *landesque* capital focuses either on pre-historical and pre-colonial contexts or on societies in the periphery of the world-system where the great transformation (commodification of and the forced creation of markets for land and labor (Polanyi 2001)) had not yet penetrated and radically transformed social relations, or where this process of dislocation is underway. It emphasizes either the relations between agricultural intensification (*landesque* capital being innovations for intensification) and population, or relations between the hierarchically stratified versus egalitarian characteristics of societies and the formation of *landesque* capital, or both (e.g., Brookfield 1984; Kirch 2007; Widgren 2007; Håkansson and Widgren 2007). Our focus here will rather be on recursive connections between ecologically unequal exchange and the formation of *landesque* capital, as articulations of broader forces of uneven geographical development (Harvey 2006; Smith 2008; Clark 2009). However accurate and insightful work on pre-colonial *landesque* capital may be for its purposes, it fails to provide much guidance in analyzing relations between *landesque* capital and other forms of capital imposing land-use change. For this, we find the work of Bayliss-Smith (1997) especially valuable.

Bayliss-Smith's analysis of historical change, from taro field to market garden to pineapple plantation to resort and golf course, brings the formation and abandonment of *landesque* capital into relation with other forms of capital that displace *landesque* capital, along with the communities and cultures that produced it. It allows us to connect analysis of *landesque* capital with issues concerning the impacts of vagabond capitalism on social reproduction (Katz 2001), the powerful mechanism of rent gaps (Clark 1988; Smith 1996) and the "singular principle power" of "landed developer interest" (Harvey 2010: 180–181).² Bayliss-Smith bridges *landesque* capital within (pre)historical agricultural change with broader analyses of land-use change, landed developer interests, built environments (these are also durable immobile manipulations of landscape designed for the purpose of increasing the productivity of land) and finance capital (see Table 4.1). He argues that

the key variable in explaining contrasts in Pacific Island land use today is socio-political organization ... what matters is ... how widespread has been the adoption of those types of social organization that allow different forms of capital to penetrate into the agricultural sector.

(Bayliss-Smith 1997: 144)

Table 4.1 Land use, forms of capital and social organization

Land use	Main form of capital	Social organization
Taro garden	Landesque	Local subsistence and surplus for chiefs
Market garden	Landesque and productive	Peasant production for urban markets
Pineapple plantation	Productive and finance	National agri-business
Resort and golf course	Finance	Multinational tourist industry

Source: Bayliss-Smith 1997.

There is a normative dimension to *landesque* capital that offers potentially valuable instruction, but also renders the concept slippery. Brookfield (2001: 185) argues that "Just as human use can have the effect of stripping and gulying soils, so it can also create enduring beneficial changes that yield capital for use by future generations." Widgren (2007: 63) emphasizes this normative dimension of "improvement," arguing that the concept of *landesque* capital "confronts stereotyped images of relations between humans and nature" in so far as it

acknowledges the role of humankind in improving "natural" conditions. In many areas of the world, humans may have altered conditions for future sustainable use for the better, and not only for the worse, as is often the unproven assumption in much writing on environmental history.

Enduring beneficial change creeps into the very definition of *landesque* capital. There are human practices such as the formation of *landesque* capital that contribute to sustainable development, and then there are practices which contribute to stripping and gulying soils and other forms of land degradation.

While it is useful to make this distinction, it introduces tensions and contradictions with the very definition of *landesque* capital. What about all those investments in land with an *anticipated* life well beyond that of the present crop and all those inalienable modifications of land *designed* for the *purpose* of increasing its productivity, which result in stripping and gulying soils or other forms of environmental degradation? Anticipations, designs and purposes do not always pan out. Ditches and dams are commonly considered *landesque* capital. But are all ditches and dams *landesque* capital – even those which generate land degradation? There seems to be a jump to conclusions from the recognition that the concept acknowledges the *potential* role of humankind in improving environmental conditions to an assumption that all durable investments that increase productivity of land *actually* fit nicely into this category.

The following nutshell histories of ecologically unequal exchange and formation of *landesque* capital in three small island societies focus on their recursive relations as manifestations of power relations positioning these societies in a regional- and world-system. We will argue that the formation of *landesque* capital *here* can be part and parcel of socio-ecological degradation *elsewhere*

through ecologically unequal exchange, and that the destruction, abandonment or devaluation of landesque capital is an important element in the balance sheet of ecologically unequal exchange.

Kinmen Island

Kinmen (or Quemoy, c.135 km², population c.89,000) lies in Xiamen (Amoy) Bay off the southeast coast of China, 8 km east of the island and harbor city of Xiamen and nearly 200 km west of Taiwan. The history of the island is closely tied to that of the coastal region of Fukien (Ng 1983). Early historical records suggest the island was wooded and fertile, and that early settlers invested considerable labor in the formation of landesque capital, including coastal dikes and irrigation works, to enhance agricultural productivity. Designated in the fourteenth century as one of seven major centers of salt production along the Fukien coast, much of the island's forest was cut for firewood in order to increase the volume and pace of production. After only a few decades, large areas of land became barren and sandy, and production shifted from boiling brine to utilizing tides and sun-drying techniques. Nine salt fields were established, covering nearly one-third of the island (Hung 1568). During the seventeenth century, Kinmen became a strategically located military base for launching attacks on Dutch-occupied Taiwan. Much of the remaining timber was used to construct battleships. The environment eventually became so barren and sandy that moving sand dunes buried whole villages. All but one salt field were abandoned during the nineteenth century (Huang 2003).

A decisive battle of the Chinese Civil War was fought on Kinmen in 1949, ending with a wall through the archipelago, cutting off Kinmen's connections with Fukien. Positioned on a critical frontier between the 'free world' and the 'communist world', Kinmen would come to be "affected by outside events tied to international politics by decisions made in Beijing, Washington, Moscow, and elsewhere" (Szonyi 2008: 4). From its new distant power of Taipei it came to be seen as a stepping stone for the nationalist government of the Republic of China in Taiwan to recover control over mainland China and as a site of defense against the People's Republic of China. Self-sufficiency became militarily important in the event of a blockade. Accordingly, policies were implemented to improve the island's capacity to secure provision of food and water. These policies included intensive reforestation, digging water reservoirs and ponds, soil improvement, and the introduction of drought-resistant sorghum for large-scale production of liquor for export.

However much for military purposes, the practical consequences of these programs amounted to a remarkable increase in formation of landesque capital. The island was transformed. More than 65 million saplings were planted between 1955 and 1994, with 35 million reaching maturity (Wang *et al.* 1994; Kinmen Forest Bureau 1998). Wooded land now covers over half of the island. Soldiers stationed on Kinmen (in the early decades commonly more than twice the civilian population) were assigned tree care duties to secure survival of saplings in

the dry environment. Fifteen water reservoirs, 141 small dams and 449 ponds with accompanying irrigation systems were dug and built, securing drinking water and enhancing soil productivity. Imported fertilizers were complemented by careful management and use of manure and vegetative waste to further improve soil quality. About one-tenth of the island's land area became fertile farmland (Tsai 2003; Clark and Tsai 2009). In the 1950s, sweet potato and peanut was about all that could grow on the barren island. In the 1990s, sorghum accounted for over 50 percent and wheat for over 40 percent of cultivated land (Quemoy Gazetteer 2009).

Penghu Archipelago

The Penghu Archipelago (or Pescadores, c.128 km², population c.96,000) consists of 90 small, flat, low-lying, windswept islands in the Taiwan Strait. The abundance of marine resources in the archipelago is not matched on land, where basalt and coral rock, sandy infertile soil and lack of freshwater present challenges to agriculture. Agriculture on Penghu is based on anthropogenic soils built up over generations of fertilizing with seaweed, manure and compost. Walls of coral and basalt rock are built up around small fields to protect against wind erosion, resembling and therefore called "beehive" fields. Only drought-resistant crops are grown, such as peanut, sweet potato, cabbage, gourd, pumpkin, corn and aloe (Tsai 2009).

Fishing has always been the primary livelihood in the archipelago. Receiving abundant sunshine and rich in plankton and nutrients, the tidal flats support a highly diverse marine ecosystem. Utilizing the significant difference between high and low tides (up to 2–3 meters) and the extended shallow shore banks within the inter-islands sea, the islanders developed an ingenious technique for catching fish: stone weirs built with basalt and coral rock. Instead of going out in boats to fish, they let the fish come to them. The stone weir is covered by sea water at high tide, when fish ride the tidal currents in search of food. As the tide goes out, the fish are trapped in the weirs (Chen 1996; Liao 2009). This special form of landesque capital, using the same basalt and coral rock as for the beehive fields, is like extending farmland into the sea. Fish catches were so great that they not only supplied daily food, but also a surplus, serving as a major source of income for many households (Hung 1998).

In use at least since the seventeenth century, there are 589 stone weirs in Penghu, ranging from several meters to over 1 km in length. Building stone weirs is an occupation requiring skill (the construction needs to withstand the sea during storms) and considerable collaborative effort. Each stone weir is named by the villagers who work together in its construction, and is owned in common (Chen and Lin 2003; Lin 2004; Tsai 2009).

Another resource Penghu is richly endowed with is coral, in near-shore coral reefs and deep at sea. During the Japanese occupation (1895–1945), extraction of coral for the lucrative jewelry market intensified. A technique for harvesting deep-sea coral was introduced in the 1920s, followed in the 1960s by

introduction of drag-net machinery. The destruction of coral reefs and deep-water coral resulted in loss of habitat for fish and other marine life, and consequently declining populations.

During the 1960s, heavy investments in large-capacity fishing boats resulted in dramatic increases in volumes of fish catch and in economic growth. Subsequent over-fishing to satisfy Taiwanese and world markets led to equally dramatic decline in volumes of fish catch less than a decade later. This provided incentives to develop cage aquaculture during the 1980s. The high density of cage aquaculture impacted negatively on marine water quality (Ueng and Yu 2000). Cage aquaculture proved to be economically risky as well. In February 2008 a sudden drop in water temperature resulted in a devastating mass-death of caged fish, with corresponding economic loss (Liu 2008).

Seeking alternatives to fishing, and drawing upon strong economic growth in Taiwan, the 1980s also saw large flows of investment into tourism infrastructure in Penghu. In order to position themselves to take advantage of economic opportunities associated with tourism and large motorized fishing boats, each village demanded its own harbor. This was supported by the central government in Taipei. Most of Penghu's 69 harbors (one for every 1,400 residents, some harbors in villages with less than 200 inhabitants) were built or substantially expanded since 1990 (Chen and Lin 2003). Two-thirds of the coastline has been converted, diminishing the sand beaches expected to attract tourism.

With declining fish populations, the unique stone weirs were largely reduced to tourist attractions, but tourism income from the stone weirs is not sufficient to stem continued out-migration. Wealthy landed developer interests proposed the construction of casino resorts. A heated 2009 local referendum – highlighting the negative social and natural impacts on one hand and the need for alternatives to fishing on the other – ended with these casinos narrowly missing out on approval. However, huge hotels have already been constructed in expectation of the casinos.

Pongso no Tau

Pongso no Tau (or Lanyu,³ c.45 km², population c.3,000) is a small volcanic island peaking at 548 meters, situated 65 km east of Taiwan and 105 km north of its closest Batanes neighbor. The Tau (or Yami) came from the Batanes Islands, settling the island about 800 years ago (de Beauclair 1957). Any early contact with Batanes relatives across the deep Bashi Channel was soon discontinued and linguistic and anthropological research suggests the Tau have been unusually isolated from their neighbors for centuries (Li 2001).

The Tau settled in patches of alluvial plains scattered along the coast. Taro root, the main element in their diet, is wet-cultivated in stone-walled fields connected with irrigation channels. Yams, millet and sweet potato are grown in small hillside patches. Fish is the main source of protein. Pigs, chickens and goats are eaten primarily at rituals and festivities. Fishing is done from boats made from specially selected trees in the steep forest. A boat launch is a big

ceremony, for which the family prepares by raising pigs and sheep and cultivating yams and taro to share. Diving and spearing fish is another common practice to harvest food. The Tau may eat over 100 species of fish during a year, but the most significant fish is the flying fish, which come in abundance between February and May (Wei and Liu 1962).

Anthropological studies paint a consistent picture of a highly egalitarian and peaceful society. Leach (1937: 423–424) says:

In every field of activity the society manifests an eager consciousness of the social equality of individuals ... age and experience are respected, but not wealth or inheritance.... This extreme peacefulness ... springs naturally from a state of economic security and isolation in which all forms of competition are lacking ... it is a pleasant, easy-going life, filled with a plenitude of laughter.

With rocky coasts and a reputation for head-hunting savages (clearly false), ship wrecks and malaria, the island was bypassed by Europeans as well as closer neighbors. Colonialism came late to the island, first Japanese (1895–1945), then Taiwanese (since 1945). The Japanese initially kept the island as an anthropological research site. Leach observed that barter was just being introduced by the Japanese, who were also exercising the Tau in the use of currency. There are elders today who were born into a community unaccustomed to practicing barter, let alone trade through currency.

Colonial influence escalated with Taiwanese culture assimilation policy (1947), dispossession of land (1951), establishment of a prison largely for political dissidents (1958–1979), topocide of traditional villages (1966–1980), exploitative tourism (since 1967), strip-logging roughly half the forest (1970s) and dumping nuclear waste (since 1982). Taiwan's gaze on Pongso no Tau accurately fits James C. Scott's (1998: 4–5) description of *Seeing like a state*:

The most tragic episodes of state-initiated social engineering originate in a pernicious combination of four elements ... administrative ordering of nature and society ... a high-modernist ideology ... an authoritarian state that is willing and able to use the full weight of its coercive power to bring these high-modernist designs into being ... [and] a prostrate civil society that lacks the capacity to resist these plans.

Not understanding what private ownership of land means, not knowing what radioactive waste is, not having any tradition of powerful leaders or competitive culture, the Tau capacity to resist these events was weak, however resilient their nature is otherwise. Pongso no Tau appears to be on the verge of becoming yet another "local, capital-intensive, and sustainable system ... abandoned as a direct consequence of colonial expansion" (Widgren 2007: 68). In recent years, however, the Tau have begun to turn the tide in efforts to regain power over their island home.

Power: relating landesque capital and ecologically unequal exchange

Each of the processes of ecologically unequal exchange and formation of landesque capital highlighted in these historical synopses can be analyzed in more detail as manifestations of power relations positioning them in a regional- and world-system, in terms of dimensions of power (Boyce 2002) and competing forms of capital (Bayliss-Smith 1997). Early environmental degradation of Kinmen reflects above all the decision power of core over periphery. Thou shall produce salt! The extraction of open access resources on Penghu, both coral and fish, appear also to reflect decision power, though value power exercised in marketing coral jewelry in distant markets is also involved, as well as agenda power deployed to keep coral extraction and over-fishing out of public debate. The struggle over casino development was largely determined through wielding agenda power and value power, though the premature construction of large hotels may be seen as an expression of event power, altering the circumstances in which the Penghu citizens had to choose (impressive buildings, already there – they may as well be put to good use). Environmental load displacement from Taiwan to Pongso no Tau, extraction of timber, comprehensive dispossession and the wholesale destruction and abandonment of landesque capital on the island display striking asymmetry in power relations across all dimensions.

Much of the landesque capital referred to in these nutshell histories draws on local resources and appears to fulfill the normative requirement of “enduring beneficial changes” suggested by Brookfield (2001: 185): the beehive fields and stone weirs on Penghu; the taro fields and selective forestry for boats on Pongso no Tau. But Kinmen presents two significant deviations. First, the landesque capital invested in to produce salt – modifications of land for the purpose of increasing its productivity – clearly contributed to land degradation, turning the island into a veritable desert. Second, and more interesting, are the massive investments in landesque capital from the 1950s to the 1990s, especially in reforestation and water management. Much of the cement for construction of water management works and fertilizers for soil improvement was extracted or produced on Taiwan, involving localized environmental degradation there. The massive amounts of labor required for reforestation likewise came from Taiwan – again, ecologically unequal exchange, with environmental benefits in the formation of landesque capital to Kinmen, environmental burdens to Taiwan. It is not difficult to find examples where the formation of landesque capital in one place is related to socio-ecological degradation elsewhere, through flows of matter and power (see Table 4.2).

But the connections do not stop there. On both Penghu and Pongso no Tau it appears that an analytically quite distinct consequence of ecologically unequal exchange involves abandonment of landesque capital. On Penghu, the environmental burden of reduced fish stock carried by Penghu was exacerbated by the devaluation and abandonment of landesque capital in stone weirs. On Pongso no Tau, exchange with Taiwan drives out-migration. Decline in available labor

Table 4.2 Landesque capital in relation to ecologically unequal exchange

Island	Landesque capital	Ecologically unequal exchange
Kinmen	Facilities for salt production	Degradation of environment due to resource extraction for export to mainland
Kinmen	Reforestation, water management infrastructure, soil improvement	Improvement of environment through import of labor, cement, fertilizers, etc. from Taiwan
Penghu	Anthropogenic soils, field walls, fish weirs	Initially locally generated improvements with little exchange; later abandonment due to excessive extraction by fisheries
Penghu	Cage aquaculture, harbors	Degradation of environment due to resource extraction for export, and to import of cement
Pongso no Tau	Stone-walled fields with irrigation channels	Initially locally generated with almost no migration, remittances and compensation payments, and imports

power to maintain landesque capital results in deterioration and abandonment, aggravated by remittances and compensation payments for nuclear storage in combination with import of groceries. Destruction, abandonment or devaluation of landesque capital is an important element in the balance sheet of ecologically unequal exchange.

Another form of environmental degradation exemplified on Pongso no Tau is related neither to exchange nor to landesque capital, but is rather straightforward environmental load displacement, e.g., establishment of a prison and a nuclear waste storage site on the island. Finally, we should recognize that much ecologically unequal exchange is generated by the penetration of productive and finance capital into spaces where landesque capital has historically prevailed. The impact of competing forms of capital on the management or abandonment of landesque capital may be analytically distinguished from relations between landesque capital and ecologically unequal exchange, but in the historical political-ecological contexts of capital flows and struggles over place, they are highly enmeshed.

Torsten Hågerstrand suggested that “Modes of acquiring, keeping and using space is the key to how the weave of existence is formed into the future”; he went on to argue that “Within the living world, reach may be considered a phenomenon of similar rank as gravity in physics” (Hågerstrand 2009: 135, 163; our translation). The ways we presently reach out are not sustainable. Though certainly not limited to islands, we see this more clearly in island contexts. Islands provide valuable learning from experiences of alternative modes of acquiring, keeping and using space, and more sustainable ways of reaching out for desired resources. It is crucial, in order to facilitate this learning (and for other good reasons as well), that island development be in the hands of islanders.

Notes

- 1 Historical examples of island cultures that have evolved in near-total isolation for centuries include Nauru, Easter Island and Pongso no Tau. These are exceptions to the rule that the human history of the Pacific Islands involved regular exchange between islands (Terrell 1986) based on navigational knowledge and seafaring skills beyond the conceivable realm of recognition for early European explorers (Davis 2009).
- 2 Harvey identifies the landed developer as "a singular principle power that has yet to be accorded its proper place in our understanding of ... the historical geography of capitalism." He continues:

The power of land and resource owners has been much underestimated, as has the role of land and resource asset values and rents in relation to the overall circulation and accumulation of capital. ... [R]ent has to be brought forward into the forefront of analysis ... Only in this way can we bring together an understanding of the ongoing production of space and geography and the circulation and accumulation of capital.

(Harvey 2010: 180–183)

Space does not allow for a fuller consideration of the place of landesque capital in land rent theories. The notion of durable improvements to land contributing to land rents goes as far back as William Petty's *Political Arithmetick* (1690). See Clark (1987) for a historical overview of land rent theories.

- 3 The island figures on Chinese, Japanese, Dutch, Portuguese and British maps with various names, most commonly Koto-sho (Japanese) or Botel Tobago (British and American). The ROC government named it Lanyu (Mandarin for Orchid Island, currently its English name) in 1946.

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