REVIEW ESSAY

Is the ethnography of mushrooming the royal pathway to the anthropology of the Capitalocene?

Laurent Berger

Moore, Jason. W. 2015. *Capitalism in the web of life: Ecology and the accumulation of capital*. London: Verso.

Tsing, Anna. L. 2015. *The mushroom at the end of the world: On the possibility of life in capitalist ruins*. Princeton, NJ: Princeton University Press.

An anthropologist and a geographer each recently attempted to characterize the dynamics of global capital accumulation, hit as it is today by a quadruple ecological, demographic, economic, and climatic crisis. The first, Anna Tsing, does so by following the line of actor-network theory and the ontological turn initiated by Gilles Deleuze, to play off Spinozian monism against Cartesian dualism. The second, Jason Moore, advocates a return to Marx and his law of value (“turning the work/energy of the biosphere into capital”), also to overcome this nature/culture dualism as well, but within the framework of Immanuel Wallerstein and Giovanni Arrighi’s world-system analysis, which he sees as a “world-ecosystem.” While the two use a very different methodology, they nevertheless share two complementary guiding ideas.

The first idea is that these dynamics can only be understood within the notion of the Capita-

locene and not the Anthropocene. This is because the geological and climatic changes are less the effect of the Industrial Revolution and its use of fossil fuels technologies (responsible for greenhouse gas emission) and more explained as the logic of capitalist valuation and creative destruction of the biosphere unfolding since early modern capitalism. In other words, the causes go back not the nineteenth but to the sixteenth century. For both of them, the long sixteenth century marks the beginning of the worldwide process of ecosystems degradation and biodiversity extinction. This was originally driven by the massive deforestations and large-scale landscape reconfigurations that were the consequence of the systematic quest in the West for productivity gains in the agricultural, mining, textile, and shipbuilding sectors. This is particularly evident in the movements of global commodities (sugar, metal, cotton, wool,

timber, grain), such as the modern sugar-slave plantations transiting from Madeira to Sao Tome, then set up in Northeastern Brazil and the West Indies or the extractive industry complexes (silver, iron, copper) transferred from Central Europe to Potosi and Mexico, as well as to Ireland and Sweden.

The second guiding idea is that these dynamics are not only or not so much based in the exploitation of wage labor and innovations as by the “free gifts” offered by the ecosystem (such as the cost of maintaining and reproducing the multiscale interdependences between the animalia, fungi, plantae, protista, bacteria, and archaea kingdoms)¹. Capitalists put humans and nonhumans to work for accumulation but would assign a monetary value only to certain types of tasks and products in this division of collaborative labor, while devaluing the others, which, however, would still offer free energy transfers for the work that they do. The logics of the demarcation line between the forms of work/energy that will be paid and compensated within the money economy, and are therefore detachable from their life milieu, and those that will not (Tsing’s “patches” or Moore’s “cheap natures” such as labor-power, food, raw and combustible materials) would thus be the main historical engine of capital accumulation dynamics. The “scalability” of world-making capitalist projects for Anna Tsing is thus the counterpart of the “externality of nature” (the abstract mathematization of time, space, and labor power) inherent to these projects for Jason Moore. In both cases, it is a matter of making certain energy transfers within and among ecosystems and the human species imperceptible in favor of those corresponding to the quantified extraction of ready-to-use natural and human resources in an interchangeable environment (like cash-crop monocultures). Indeed, world-making capitalist projects would consist of replicating on several scales of magnitude forms of work organization and extraction of natural resources, based on self-contained, standardized, and alienated elements interacting in quantifiable, measurable,

and predictable relationships, which could be subjected to calculation and rational expectations (technostructures such as plantation or factory prototypes). Naturalism and its Cartesian dualism would be in this perspective the ideological counterpoints to the real separation between direct producers and the means of production, between investors and concrete work processes, between paid work and unpaid ecosystem services. In this way, Tsing and Moore join Philippe Descola ([2005] 2013) in assimilating naturalism to the fundamental ideology of capitalist industrial civilization, as analogism would be for agro-pastoral civilizations or animism and totemism for hunter-gatherer civilizations.

Demarcating the Capitalocene out of mushrooming

At first sight, Anna Tsing’s mushrooming is however an anthropological stance on capitalism in the old-fashioned diffusionist way. As Clark Wissler, Melville Herskovits, or Alfred Kroeber were tracking the behavioral chains and environments necessary to create the main items (plants such as maize and cassava, and animals such as salmon, buffalo, and cattle) whose consumption zones constituted the bases of cultural complexes and areas, Tsing is trying to reconstruct what one could call the “matsutake complex” from multispecies and multiethnic relationships in central Japan, northwestern America, northern Finland, and southwestern China. She reports culture/*umwelt* contacts (I mean “polyphonic assemblages”) between matsutake fungi and overexploited forests; international timber markets; Tibetan entrepreneurs and villagers; Southeast Asian refugees; war veterans; Latino illegal immigrants; transnational networks of pickers, buyers, wholesalers, grocers, and gourmets; associations of nature lovers; and groups of scientists and foresters. All of these participate in matsutake fungi growth or gather, commodify, export, and taste them, and

study their sensitive, reproductive, and adaptive capacities. The lifestyles of these groups also to some extent derive from this “matsutake complex.” Nonetheless, when it comes to thinking about Capitalocene in relation to these aromatic mushrooms, the parallel ends there: these latter are indeed honorary gifts used in Japan to cook luxury dishes, at the same time they grow in symbiosis with pines in the mineral soils of devastated forests. Based on this parable of our contemporary era, Tsing proposes a very innovative take within what appears to be an avant-garde methodological and theoretical framework. She examines how the dynamics of capital accumulation benefit from new and precarious forms of nonhuman and human life that emerge in ecosystems destroyed by past accumulation regimes. Her findings form the basis for at least three lines of discussion.

First, there is the claim that these current dynamics are a “salvage accumulation” based on global supply chains: import, wholesale, manufacture, and retail firms outsource to foreign independent producers and middlemen who provide the goods they sell on specific markets. This allows them to benefit from price differences and information asymmetries, lowered need to invest in technostuctures and territorial planning, and above all, the unpaid work/energy necessary for the reproduction of human labor and living ecosystems implicated directly in this commodification process.

Second, there is the assimilation of this outsourcing to a form of parasitism within resilient living ecosystems from which these commodified goods are extracted, and within which mutualist symbiotic relationships between multispecies predominate. The intertwined lifecycles of these interdependent species are likely to form emerging, non-scalable “patches,” and “polyphonic assemblages” that become renewable sources of capitalist value when the previous “scalable” landscapes are exhausted.

Third, there is the adequacy of a new investigation method and a novel composition of empirical data (the collaborative multisited eth-

nography, and the Matsutake World Research Group) for this type of research in the field of anthropology. The collaborative relationships among researchers and with investigated populations are analogous to the symbiotic relationships among these “polyphonic assemblages.” Therefore, the neo-Boasian objective of textual, cinematographic, and documentary strategies of analytical description is to narrate the temporal entanglement of these singular stories of contingent and indeterminate multispecies encounters co-opted for the accumulation of wealth (“telling a rush of stories as a method”; “the art of noticing without generalizing as a science”).

This last methodological point is fundamental because it is the least convincing and the most subject to criticism. The objective of the international and multidisciplinary Matsutake World Research Group (which is financed by public and private American, Chinese, and Canadian funds) is to work on the matsutake complex (no one has yet been able to cultivate this luxury good). However, within the group there is no organized division of labor to allocate tasks, ensure complementary investigation methods, or gather data within a jointly developed material and conceptual framework (e.g., akin to the Harvard Kalahari Research Group led by Richard Lee and Irven DeVore). Following James Clifford’s “multivocality of collaboration,” each participating scholar is expected to reveal his or her research results in various media (books, articles, essays, documentary films, and websites) after “translation” of the analysis and domain of expertise into those of the other members of the group within a continuous re-examining and reframing process related to the matsutake complex.

The result is a confusing dialogical solipsism (Choy et al. 2009) that removes the devil of analogy from the methodological toolbox. This is to be achieved first, by overinterpreting individually collected empirical data that are not part of any shared questioning or not related to other research (for instance when

Tsing equates mushrooms gathered in Oregon to trophies of freedom sacrificed at the altar of the free market; see below); and second, by establishing mycorrhizal relations between the fungi and host trees as an analogical model of symbiotic functioning for this collaborative research. As a result, the academic outsourcing of empirical data through the use of para-ethnography where direct observation, documentation procedures, and interviews with privileged and well-informed contacts (colleagues, scientists, foresters, wholesalers, restaurateurs, etc.) tend to outweigh the more tedious work of participant observation. This kind of informal subcontracting is particularly visible in the way Tsing reconstitutes the multiple stories of “contaminated diversities” that form the subject matter of her “assemblages.”

Max Gluckman and Ely Devons recognized the difficulty for the ethnographer to demarcate his fieldwork (survey sites, domains of activity, population samples) by moving from an empirical investigation unit to a wider and more complex totality, subsuming in a conceptual and organizational architecture the ordered intelligibility of the data thus produced:² “where to demarcate a field of data or a set of purposive activities out of the total flow?” they wondered (Gluckman 1964:162). What place should ethnography give to physical, biological, ecological, psychological phenomena and their variety of durations? According to them, the essential features of the specific problems under examination determined this move. However, this move could also operate through two main demarcation procedures: the “incorporation” of some relevant events and phenomena taken for granted as given facts by other social and natural sciences, and the “abridgement” of the latter’s conceptual analysis and theories explaining or interpreting these influential events and phenomena. Driven by the outsourcing schema, these two demarcation procedures are omnipresent in Tsing’s work, and especially since the stated objective is to give prominence to the relationships and forms of nonhuman agency in

the web of stories told on different scales and temporalities.

The work of historians and economists is enlisted to tell the story of capital transfers through Japan-United States monetary relations since the Meiji era, in order to report the precariousness of wage employment and the flexibility of the labor market on a global scale (chapter 8). Publications in ecology, mycology, developmental biology, and botany are the media of an alternative history of multi-species co-evolution centered on disturbances to symbiotic relationships and the creation of forest patches based on biotic and abiotic ecosystem engineering (interlude tracking, chapter 11). The comparative conjunctural history of the ability of pines and fungi to inflect human disturbances in the peasant forests of Yunnan, Central Japan, and Lapland and the silvicultural forests of Oregon is drawn mostly of the biogeography, ecology, and history published works from the Portland Oregon Historical Society, for example (chapters 1, 12, 13, 14, 15). Similarly, the community and ethnic-based organization of gatherers’ camps in Oregon (Mien, Lao, Hmong, Khmer, Japanese American, Ladinos, White American, Amerindians) is put into perspective in scholarly studies of Thai anti-communist refugee camps, state policies for the assimilative integration of Chinese and Japanese migrants, and land grabbing in Klamath reserves (chapters 6, 7).

Of course, these incorporation and abridgement procedures are inevitable in any making of anthropological knowledge, and their importance depends on the complexity and extent of the issue addressed, as well as the extension of the data in space and time required for its analysis. However, what is highlighted by the disproportionate place taken here by this form of subcontracting is the contrasting need to develop a real division of labor within a multidisciplinary research group, systematizing the complementarity of investigations and unification of the analytical framework for the simultaneous study of human activities and

physical and biological forms of action. The risk otherwise is that the contributions made by participant observation and its measurement procedures, as developed by Roy Rappaport or Harold Conklin to study ecosystems for example, become dissolved within a patchwork of stories based on data that are not part of ethnography and may be less singular than Tsing believes.

From precarious assemblages to perennial regimes of accumulation

Let us turn now to the first two points related to how Tsing tackles globalized capitalism within a theory of ephemeral assemblages and multi-directional histories. She is obliged to clarify the differences in the notion of “assemblage” in the works of Bruno Latour, Gilles Deleuze, and Michel Foucault (footnote 8, chapter 1), because this notion refers in French to three distinct categories of totality: *collectif d’associations* (Latour), *agencement* (Deleuze), and *dispositif de savoir/pouvoir* (Foucault). But this Foucauldian notion, reduced to the idea of biopower, allows an alternative conceptualization of the data proposed by Tsing under the term “assemblage.”

The biopower *dispositif* is a set of technology implementation networked sites specific to a government project associated to the exercise of state power aimed at controlling and guiding the behavior of the organisms and populations under its sovereignty through the layout of their “life milieu” in a regulated space of constraints and opportunities. Foucault argued that this process of state governmentalization was initiated in Europe during Iberian globalization at the turn of the seventeenth century through the spread of mercantilism and its legal and disciplinary technologies to stimulate labor productivity and export market production. It then guaranteed the respective power of each state within an interstate system backed by the development of modern capitalism. Its technological

mutation into bio-power occurred during the eighteenth-century Industrial Revolution with the advent of liberal governmentality and the articulation of new safety regulation technologies with the previous ones required to integrate merchant, agrarian, and industrial capitalism into a new accumulation regime.³

What is important is the latest technological mutation of biopower Foucault identified in light of the late twentieth-century finance-led capitalism: that is, the “behavioral and environmental” technologies of neoliberal governmentality. These consisted, on the one hand, of the individualization and responsabilization of a population as self-contained entrepreneurs, owners of capital—must it be only human capital for the proletariat. On the other hand, these technologies were based on the principle of transforming people’s living environments into competitive spaces for survival by applying to their domains of activity the formal conditions of concurrence, namely the atomicity and autonomy of agents, free participation of everyone, and the reactions of everyone to a main type of information in free circulation (prices). In other words, remote government action encouraging or discouraging agents to take certain actions was based on the coordination of behaviors through the setting of cardinal prices on the market, or the setting of prices on an artificially created ordinal scale such as the culture of auditing, ranking, and benchmarking. In this case, agents became “eminently governable and manageable because they responded systematically to systematic modifications artificially introduced into their environment” (Foucault [2004] 2008: 270).

The wealth of data collected and presented by Tsing tends to show that in non-scalable patches, far from “becoming agents through circumstances and histories, encounter-based collaborations,” mushrooms and host-trees, like their gatherers, undergo colonization of their lived *umwelt* through a form of remote coordination of their actions and relationships based on prices, while the gatherers are shown to be

subject to the self-contained figures of entrepreneurship whose freedom is reduced to undertaking and escaping the sovereign functions of the state. Tsing's blind spot in making intelligible the process of translating value among the different regimes of labor, exchange, and appropriation along global supply chains lies precisely in this active coordination of monetary prices in each segment. Indeed, she only recognizes this coordination role upstream where the ever-changing geographical bi-partition of scalable and non-scalable landscapes is determined by the movement in the prices of global capital, labor, and goods/services markets. Thus, the forests of Japan and Oregon tend to differ radically under her pen, with the exception of their dependence on fluctuations in wood prices and paid forestry work (chapter 15): let the former decline as a result of Indonesian and Melanesian production between the 1960s and 1990s, and these forests become unprofitable agro-industrial wastelands; let the latter rise or no longer be subsidized by state services and these forests are abandoned. Moreover, the convergence of these fluctuations causes the emergence of patches, and these latter are alienated because of the rise in consumer prices of matsutake in Japan; these prices stimulate the import-export trade because their rise is determined by the scarcity of these mushrooms following the ban on expansion of sugis and hinokis plantations due to Indonesian deforestation.⁴

However, according to Tsing, downstream of these global supply chains, within the non-scalable forest patches, undetermined and collaborative encounters predominate. But it would seem that she largely underestimates the scope of the world-making neoliberal project in these places: symbiotic relations between trees and mushrooms appear to be disturbed by picking fever, which is driven by the sales price of matsutake (providing an alternative, self-employed income for underclass, working poor, farmers, illegal immigrants, and poor pensioners). This picking fever affects self-contained entrepreneurs who are in competition within an ethnic

division of labor counter-balancing the dismantling of the welfare state and transposing some of the traumatic dispossessive experiences of war or exclusion at the level of the competitive struggle for survival (a libertarian freedom Friedrich Hayek and the Mont Pelerin Society would not deny).⁵ The presence of gatherers in Oregon's forests is a dual consequence of low wood prices on world markets and the existence of a (lumpen)proletariat in search of monetary income (with the possibility of earning an undeclared US\$3,000 in one day), fleeing poverty and war, precarious wage employment, unhealthy rental housing, and ghettos controlled by gangs. In the forests of Yunnan and central Japan, gatherers are attracted and selected by the seasonal auctioning of picking and sale rights within peasant villages whose families are the private owners of the plots and share the rents (chapter 19). Moreover, the gathering labor process everywhere is organized according to the expected monetary income: in Oregon, for example, the Japanese or Chinese American pickers maintain the forest plots whose mushrooms are intended exclusively for consumption by their families; they are in open competition with Indo-Chinese refugees and Latino immigrants who "unlike heritage pickers, from whom a half-bucket of mushrooms is a good day's haul, know that a half-bucket won't make a living," and who for this reason "pick for longer days and in wider ranges and more diverse ecosystems," looting everything on their way (interlude dancing; 246). Lao entrepreneurs, white veterans, and white supremacists explore the most remote and least well-marked areas to search for larger and more mature and therefore, more lucrative fungi. The picking fever is motivated by both the principle of auctions and open ticket where buyers who have failed to recruit and retain teams of pickers bet everything to secure their supply of quality mushrooms based on a purchase price guaranteed at the peak of the auction, regardless of the previous time of the transaction (chapter 5). If some ghosts haunt Oregon's forests, these may be reincarna-

tions of low-cost entrepreneurship responding to price fluctuations, the subject and object of the power relations of neoliberal governmentality promoted by state apparatus, think tanks, non-governmental organizations, multilateral institutions (WTO, IMF, World Bank, UN, etc.), institutional investors, and multinational companies, all stakeholders in this governing of populations at a distance (Bayart [2004] 2007; Dardot and Laval [2009] 2013).⁶

This elective affinity between governmentality and dynamics of capital accumulation broadens Tsing's focus, and underlines *a contrario* the relevance of Marxist analyses of capitalism, from Rosa Luxemburg to the contemporary works of David Harvey or the French regulation school (Aglietta [1976] 1979, [2017] 2018; Boyer 2015; Duménil and Lévy [2000] 2005). Tsing ignores or underestimates these works in the name of their alleged adherence to the teleological myth of modernization through growth and technological progress in favor of literary and philosophical approaches (Toni Negri and Michael Hardt, Donna Haraway, etc.) and references to certain concepts proposed by the young Hegelian and humanist Marx (e.g., alienation), which Louis Althusser ([1965] 2005) shows to be foreign to the theoretical apparatus mobilized in *Capital*.

In doing so, Tsing does not anticipate an essential objection to her claims: outsourcing practices, which supply global commodity chains, may be typical of merchant capitalism but are not unique for current accumulation dynamics for at least two reasons. The first is the historical antiquity of these practices attested to by the existence of great empires and commercial diasporas (particularly in the Abbasid Caliphate and Song China), and perceptible in the extent of their manifestation: raids, kidnappings, and the sale of relatives and fellows in the slave trade in Africa and the Indian Ocean; the putting out system in Western Europe; cereal cultivation during the second serfdom in Eastern Europe; cottage industries in East and Southeast Asia, gold mining and ivory hunting for Muslim

and Indian diasporas on the Swahili coast (e.g., Kilwa), etc. The second reason is, as Fernand Braudel (1977) pointed out, that outsourcing in long-distance trade develops systematically over the long term in the course of expansions and contractions of finance capitalism, with a relative decrease in or absence of productive investment in the eras of expansion, and consequently, marked indifference toward methods of work organization and labor/raw materials extraction, de facto delegated to suppliers at the end of the chain.

Converting the web of life into capital

This objection implies that global supply chains must be conceived in articulation with the processes for making and accessing value in the financial sphere that today operates through the mediation of corporate shareholder governance, tax evasion via offshore havens, capital market liquidity, and the fight against inflation, all instituted and guaranteed by states and their banking systems. Indeed, the Braudelian-Marxian perspective expounds that the core of capitalist activity is not the production, exchange, and consumption of commodities, nor the hiring and unemployment of wage earners, nor the private appropriation of debts, knowledge, tools, land, or natural resources. All these practices are dedicated to servicing what is at the heart of the world-making capitalist project (Aglietta 2019): the circulation of liquid monetary assets to ensure their monetary value growth (making money with money). That means it is impossible to think about the current dynamics of capital accumulation without taking into account the centrality of monetarized finance (Hann and Kalb 2020).

In this vein, David Harvey (2010) argues that the investment and fixation of this financial capital in the environment in the form of destructive technostuctures of the biosphere (real estate, roads, airports, ports, energy, communication, hydraulics, etc.) are necessary for its

circulation and subsequent conversion into private money. At the same time, its main source of immobilization and demonetization emerges through political struggles against dispossession, social conflicts over labor organization, technical obsolescence, and the exhaustion of inputs and outlets to which these “spatiotemporal fixes” are subject over time. The contemporary financialization of hitherto dominant capitalist economies can be seen therefore as an extreme solution to this major contradiction, through the successful ensuring of circulation, growth, and appropriation of liquid monetary assets without the need for productive investment and extension of the wage earners’ welfare state. Global supply chains would not be today so much a kind of salvage accumulation, as one means among others to drastically reduce the risks and costs associated with the circulation and valuation of liquid monetary assets by avoiding their immobilization through counter-politics.

It could therefore be a Eurocentric mistake to imagine that today’s financialized capitalism marks the collapse of global industrial civilization because these phases of financial expansion are ancient, cyclical, and transitional in that they depend on the hegemony of an imperial currency (the gold and silver of the Genoese and Iberians, the Dutch gulden florijn, the British pound sterling, the American dollar). Tsing’s diagnosis underestimates the capacity for reinvention and transformation capitalism has always demonstrated through the succession and geopolitical implementation of its multiple accumulation regimes in different parts of the world (Arrighi 1994; Boyer 2015). Just as the Dutch regime internalized and made scalable the costs of protecting its capitalist firms (through chartered companies), the British regime did the same with their production costs (through factories), and the US regime with their transaction costs (through the vertical and horizontal integration of trusts). China may be as well in the process of internalizing externality costs of its enterprises through its

sovereign wealth funds and long-term planning (Aglietta and Bai [2012] 2013), thanks to the massive financing of technological and organizational innovations, particularly in urban planning, artificial intelligence, biotechnology, nanotechnology, renewable energy, nuclear fusion, and ecosystems protection programs. The contemporary development of carbon capture/storage and afforestation technologies could herald a new expansion phase of spatiotemporal fixes and its contradictions, within a renewed geopolitical framework to cope with the complex international logistics and huge amounts of land required for implementation. In other words, capitalist business would be as usual “a nexus of big science, big states, [big wars,] and technologies of power and appropriation that make territory and the biosphere accessible, legible, knowable and utilizable,” to use a slightly modified expression from Jason Moore (2017).

In view of the present climate and ecological crisis that threatens the existence of global industrial civilization, the issue is therefore to know under what conditions its accumulation dynamics are likely to integrate the costs of nature externalization (the externalities due to capitalization and the unpaid work/energy of human populations and nonhuman ecosystems due to appropriation) into the “scalability” of its world-making capitalist project. Moore shares Tsing’s pessimism about the possibility of such a process. He also shows the same Eurocentrism in by overlooking the contemporary neogovernmentalization of the Chinese state as a way to redirect monetarized finance toward productive investment in a low-carbon economy that internalizes these costs. However, he shares it and displays it for different theoretical reasons.

According to him, there is a cyclical evolution of the demarcation line along global supply chains between the commodification and capitalization of “abstract external nature” (technostructures and wage employment) and the discovery and capture of “cheap natures” (labor-

power, food, sources of energy, raw materials). This demarcation line evolves through a “dialectic of exploitation and appropriation” that periodically increases the productivity of the wage labor supplied by these commodity frontiers, and thus cyclically counters the falling trend in the profit rate. This Marxist model describes how each new accumulation regime of industrial centers is driven by the reduction of production costs in “variable” and “constant” capital, thanks to the subcontracted, low-cost supply of labor power, foodstuffs, clothing fibers, or combustible and raw materials that are “kept off the books and outside profit/loss accounting of the cash nexus and the market system.” This appropriation of unpaid human and extra-human work/energy (life-making capacities of ecosystems—forests, soils, rivers—and “women, slaves, and colonies”) is achieved through scientific, metric, cartographic, chemical, agronomical, or botanical revolutions that map, categorize, quantify, and channel new sources of action on the one hand, and through the violent or legal subjection of populations, privatization of common and public goods on the other hand. The possibility of increasing labor productivity in this way with the introduction of cheap natures into the market system without a corresponding rise in “constant capital” (commodified tools, machinery, and inputs) and “variable capital” (wages) in their making is what makes the “surplus value” (and the “exploitation rate”) grow, as well as the “profit rate” rise, in the absence of an increase in the “value composition of capital.”⁷ Nevertheless, the depletion and relentless exhaustion of populations and ecosystems that give rise to these cheap natures produce both an ongoing increase in the prices of these external supplies and an ongoing decrease in the ecological surplus that Moore defines (15) as “the

ratio of the system-wide mass of capital to the system-wide appropriation of unpaid work/energy” measured by the Energy Returned on Capital Invested (calories or joules per dollar). The result is a “developmental crisis” in search of new frontiers of appropriation to launch and sustain new waves of accumulation based on this enlargement of ecological and geographical arenas for such appropriations (158, 301).

The joint discussion of Moore’s and Tsing’s work rests precisely on this Braudelian-Marxian idea according to which the trend for appropriation along the global supply chains expands its scale and scope more rapidly than the movement of capitalization and commodification during these “developmental crises,” that is, during the financialization phases of the global capitalist economy.⁸ Moore’s model has the advantage of resting on broader geographical spaces and historical temporalities, but also of repositioning within the framework of more encompassing systemic cycles of industrial and financial expansion of capital (Arrighi 1994) the dynamic of salvage accumulation identified by Tsing for the contemporary era, which she assimilates to the final swan song of global industrial civilization. This dynamic based on subcontracting with relatively minimal capital outlay is only one of the manifestations among others of these “developmental crises” that have punctuated the transition from one regime of accumulation to the next in the history of capitalism since the alliance of the Genoese business diaspora and the Iberian Empire(s) during the long sixteenth century (1450–1630). Moore takes Arrighi’s long successive systemic cycles of capital accumulation as a “guiding thread” (32, 60) to periodize these phases of financialization of the declining old industrial centers (1560s–1630s, 1740s–1790s, 1870s–1930s, 1970s–?).⁹

Box 1. Arrighi's Long Centuries and Systemic Cycles of Accumulation

The main feature of the temporal profile of historical capitalism sketched here is the similar structure of all long centuries. These constructs all consist of three distinct segments or periods: (1) a first period of financial expansion (stretching from S_{n-1} to T_{n-1}), in the course of which the new regime of accumulation develops within the old, its development being an integral aspect of the full expansion and contradictions of the latter; (2) a period of consolidation and further development of the new regime of accumulation (stretching from T_{n-1} to S_n), in the course of which its leading agencies promote, monitor, and profit from the material expansion of the entire world-economy; (3) a second period of financial expansion (from S_n to T_n), in the course of which the contradictions of the fully developed regime of accumulation create the space for, and are deepened by, the emergence of competing and alternative regimes, one of which will eventually (that is, at time T_n) become the new dominant regime. Borrowing an expression from Gerhard Mensch, we shall designate the beginning of every financial expansion, and there-

fore of every long century, the "signal crisis" (S_1 , S_2 , S_3 , and S_4 in figure) of the dominant regime of accumulation. It is at this time that the leading agency of systemic processes of accumulation begins to switch its capital in increasing quantities from trade and production to financial intermediation and speculation. The switch is the expression of a "crisis" in the sense that it marks a "turning point," a "crucial time of decision," when the leading agency of systemic processes of capital accumulation reveals, through the switch, a negative judgement on the possibility of continuing to profit from the reinvestment of surplus capital in the material expansion of the world-economy, as well as a positive judgement on the possibility of prolonging in time and space its leadership/dominance through a greater specialization in high finance. . . . We call the event, or series of events, that lead to this final supersession the "terminal crisis" (T_1 , T_2 , T_3 in figure) of the dominant regime of accumulation, and we take it to mark the end of the long century that encompasses the rise, full expansion, and demise of that regime. (1994: 219–220)

During these phases (figure 1), two main interdependent processes occur: on the one hand, the emergence, following transnational capital transfers, of new industrial centers and technostuctures expanding the scale and scope of capitalization and commodification; on the other hand, the convergence of “new” imperialism and “new” agriculture, industrial and scientific revolutions, allowing the “localization” and “appropriation” of new sources of free or low cost cheap natures necessary for the unprecedented accumulation regime of these emerging industrial centers (124).

While the first process has been well documented and compared from one phase of globalization to another in the work of Wallerstein and Arrighi, the characterization as well as the empirical illustration of the second and its periodic articulation with the first are supposed to constitute Moore’s essential contribution to the development of this Braudelian-Marxian idea. Therefore, one cannot but be confused by the assumed refusal to systematically put this new Marxist model of capitalism’s reproduction to the test of historical facts and their succession.¹⁰ His theoretical model is implemented by impressionistic touches and short historical incursions, not integrated with each other from the point of view of their sequencing along accumulation trends.

It is thus most unfortunate that Moore does not pursue Arrighi’s approach to the detailed empirical illustration and articulated analysis of the different successive ways in which the three major developmental crises of capitalism are supposed to have been overcome and resolved in the light of these two interrelated processes. Conversely, it is thus up to the reader to gather, in the texts grouped together and sometimes overlapping independent of any order, the historical data likely to validate the proposed model, or to differentiate conceptually, with the help of the scattered historical vignettes provided, the features specific to the commodification and appropriation movements, as well as to the launch or crisis phases of the various accumulation regimes of the “world-ecosystem.”

The result is a picture, historically sketched from the juxtaposition of these processes. One may understand from it that the Genoese-Iberian cycle opened up the expansion of capitalism, from the archipelago of Madeira to the mines and monocultures of Central Europe and the Americas (with the appropriation of cheap silver, gold, iron, plants and indigenous labor), and gave way to the Dutch-led cycle (c. 1560s–1740s) driven by the early modern shipbuilding-cartographic and capitalist agriculture revolutions (polderization, water control, etc.). This cycle would experience a relative decline after the 1680s because of the depletion of cheap timber (from Norway and the Baltic), cheap grain (from Poland), cheap energy from domestic peat, cheap money from the Amsterdam stock market and exchange bank, and cheap labor from slaves and the intensification of children and women’s work in the countryside.¹¹

Similarly, the British-led cycle (c. 1680s–1910s) would be launched with a successful agricultural revolution (enclosures, convertible husbandry, new drainage systems, conversion of nitrogen-rich pastures into arable land at home, sugar-plantation monocultures abroad), flooding the cities with cheap food and labor (Caribbean slaves, dispossessed peasants, housewives) and supporting a two-stage industrial revolution (steam engine and railroad) made it possible first to obtain cheap cotton and cheap coal (Moore took over Kenneth Pomeranz’s argument over ghost acres and the fortunate geographical location of coal deposits), and then cheap grain from the Midwest of the United States after the exhaustion of the “agricultural district” of England in Ireland.

The US-led cycle (c. 1870s–1980s), in decline from 1971 onward, would likewise be fueled by the spread of the mechanized family farm model of the nineteenth century, facilitated by the appropriation of cheap soil, water, and household work, and later combined with the green revolution of the 1930s using hybrid seeds, pesticides, and fertilizers. These agricultural revolutions in providing cheap food would have accompanied the advent of the internal

combustion regime, petrochemicals and the automobile, steel and electrical industries. It would ultimately be the supply of cheap sources of energy (oil) and cheap labor, thanks to the contributions of European and Asian immigration, Afro-Americans, and housewives, which would have made possible the accumulation of capital in this cycle.

Internalizing nature as the price of life

Rather than considering the digital revolution and current financial globalization as the beginning of a new cycle of accumulation from East Asia, Moore likens the contemporary era to the “epochal crisis” of feudalism in fourteenth century Europe, in the sense that it would tend toward the collapse of the capitalist industrial civilization because of the forthcoming breach of the nine planetary boundaries (climate change, stratospheric ozone, deforestation, freshwater, biodiversity, ocean acidity, nitrogen and phosphorus cycles, aerosol loading, chemical pollution).¹² Since 2003, the continuous rise of metals, energy, and food prices and the complementary decrease of the Energy Returned on Capital Invested in food production could not be reversed, according to Moore (235), thanks to the growing relative contribution of unpaid work/energy to capital accumulation. There are three main reasons: first, the imminent depletion of ecosystem services due to the degradation of the biosphere (biodiversity extinction, global warming, toxification, and the end of “cheap garbage”); second, the exhaustion of the global reserve army of workers due to the proletarianization of women and the disappearance of non-capitalist polities across the world; and third, the absence of an epoch-making agricultural revolution in China, expansively reproducing the “Cheap Food/Labor nexus” on the basis of a new systemic cycle of accumulation.¹³

Ruling on these three points would require knowledge, data, and arguments that are impossible to deploy here. One can only suggest a few lines of thought that are at odds with Moore’s

forward-looking exercise. Let us recall first that Tsing shows precisely how in the “heartland” of capitalist industrial civilization, it is quite possible today to mobilize the labor power of its *lumpenproletariat* along global supply chains, within a framework subcontracting outside the salaried workforce, but organized on the basis of a subjection to neoliberal governmentality that has been extended to the majority of multilateral institutions and contemporary nation-states during the Washington Consensus, the making of the EU, and the shock therapies of the former Soviet Bloc, through a “variegated, geographically uneven and path-dependent process of neoliberalization” (Brenner et al. 2010). Likewise, in its “hinterland,” the continent of sub-Saharan Africa is far from entirely submitted to the fictitious commodification of human labor, natural resources, and money, hence the potential of manpower, minerals, and arable lands that it embodies in the eyes of Chinese investors in particular. The new Chinese presence in Africa (van Dijk 2009) could in this sense be interpreted as launching a new wave of appropriation. All the more so as Chinese direct overseas investments in the mining and agricultural sectors seems to be the counterpart of a “hidden agricultural revolution” at home over the last thirty years. Philip Huang (2016) has thus characterized the recent Chinese agrarian development as a form of “capitalization without proletarianization,” in a break with the previous British and Green Revolutions: what is valued is not the increase in land or labor productivity (crops’ output by weight due to new inputs), but rather the selling price of new agricultural products (meat–poultry–fish, milk–eggs, fruits, vegetables) demanded by the newly rich Chinese middle-class population at the expense of traditionally grown grains. This switch implies the importation of the latter and thus the opening of new commodity frontiers, such as Brazilian soy and the Amazon deforestation that its cultivation generates (China is the largest soy import country—60 percent of the global soy trade volume). Moreover, Huang claims that it is Chinese family farms and not cooperatives or

dragon-head enterprises that are the main actors in this revolution and in the growth of agricultural production. They use capital and labor intensification, which does not involve indebtedness to financial markets or the hiring of agricultural workers, since state-owned banks provide lines of credit and the independent rural households remain the production units. At the same time, they cease to be peasants and become commercial, contract, and entrepreneurial farmers, or semi-proletarian farm workers, all working for the market.

This “de-peasantization” is consequently the counterpart of the “de-proletarianization” thought up by Wilhelm Röpke, with the initial neoliberal objective of promoting small enterprises and property owners among independent farmers, breeders, and craftsmen (Dardot and Laval 2009). These new self-contained rural entrepreneurs are all the more confronted with incentives and constraints conveyed by price-setting mechanisms in the agricultural reform of the household responsibility system (China’s township/village enterprises or TVEs) given that they are the target of ecological restoration and conservation programs led by the central, provincial and local governments on the basis of market-based environmental policy instruments and “eco-compensation process” (*shengtai buchang jizhi*) (Bennett 2009).¹⁴ Since the 1998 heavy flood in major river basins, China has been driving the largest public Payment Schemes for Ecosystem Services in the world (US\$90 billion) covering forest, grassland, desert, and wetland environments in order to prevent soil erosion, sequester carbon, manage watershed, enhance biodiversity, and exploit natural resources. The principle is that government officials pay local farmers, foresters, and breeders for the stewardship of ecosystem services on the land they use, while monitoring the provision of these services by calculating their monetary value and assessing the investment and opportunity costs they represent for their stewards. For instance, one of the largest programs in China (“Grain for Green” or the “Conversion of Cropland into Forest and Grassland”) covered 2,279 counties in 25 provinces and encouraged by the end of 2014 more than 124 million rural entrepreneurs to afforest their arable lands or to turn them into meadows by giving them the choice of a larger amount and period of subsidies—cash, food, seedlings—per hectare for the first option (Xingliang et al. 2017).

Facing serious energy and ecological crises (water and air pollution, soil erosion, deforestation, desertification, and so forth) due to the rapid past growth of its population and market economy, which could ultimately hinder its development (Smil 2004), China thus officially opted in the twenty-first century, through the voice of its party-state, for the transition to an “ecological civilization” (*shengtai wenming*).¹⁵ This transition is implemented through the regulation on “eco-compensation,” which is “established in accordance with the principle of [the one] who exploits conserves, who damages pays, who benefits compensates, and who pollutes pays.”¹⁶ This transition is therefore essentially based on the attempt to monetize and remunerate the unpaid work/energy of human and extra-human contributors to ecosystem services by internalizing environmental externalities under the form of avoided, replacement, and operating costs (Bruckermann 2020). However, while there is a major commonality with other forms of “ecological modernization” in Europe and America, there is also a fundamental divergence in this application of neoliberal environmental regulation and governance.

The common denominator is the active mobilization of academic scholars and state power in the development of scientific methods of ecosystem assessment, in order to quantify their value, their associated biodiversity and the services provided, and by consequently to offer cost-benefit analyses for reorienting public policies.¹⁷ As Morgan Robertson (2007) points out, the issue is no longer simply to establish a price to be paid on the basis of weight and volume measures in order to make scalable, for instance, the tons of carbon dioxide or the concentration of a particular pollutant in water or air, with a view to the marketization of their

The common denominator is the active mobilization of academic scholars and state power in the development of scientific methods of ecosystem assessment, in order to quantify their value, their associated biodiversity and the services provided, and by consequently to offer cost-benefit analyses for reorienting public policies.¹⁷ As Morgan Robertson (2007) points out, the issue is no longer simply to establish a price to be paid on the basis of weight and volume measures in order to make scalable, for instance, the tons of carbon dioxide or the concentration of a particular pollutant in water or air, with a view to the marketization of their

emission rights. It is to officially certify the price of “eco-compensation” by measuring it in units of ecosystem function: algorithms are used to score the respective contribution of certain species and parameters to these functions for delimited sites. The fundamental divergence then lies in the fact that these assessment methods are, for the time being in China, put in service of administered exchanges controlled by the political authorities who fix the prices of eco-compensation, and fund the payment of ecosystem services (except for the restoration of mining sites). By contrast, in Costa Rica or the United States, ecosystem services are the pioneering fronts of global commodities in market-led environmental policies: Robertson thus describes the recent development from Chicago of commercial wetland mitigation banks, which buy and sell “wetland credits” certified under the supervision of the US Army Corps of Engineers and private consulting firms, for the number of operational ecological functions per wetland site created or rehabilitated.

But beyond this difference in administered price-setting, the main discrepancy lies in the articulation of this “ecological modernization” with a “green biopolitics 2.0” of populations: the Chinese state is using new information and communication technologies—from mobile internet, IoT (Internet of Things), big data analysis, cloud computing—to network smartphones, intelligent watches, electronic chips, locks, drones, vehicles, surveillance cameras, and iris scanners with the aim of assessing throughout the territory and in the new green smart cities, in real time, the environmental performance of firms, administrative executives, and citizens, in terms of water, timber, energy use, waste treatment, ecological footprint, and the pursuit of healthy eating (René 2019). This project may be articulated with the social credit system (*shehui xinyong tixi*) during this decade. In this imagined panopticon, Chinese citizens, civil servants, and entrepreneurs would thus be given an evolving reputation score, depending on traceable behavior, which would grant or restrict access to certain tax and credit

rates, business permits, public services, subsidies, and so on.¹⁸

This neo-governmentalization of the Chinese state does not correspond to the simple application of the neo-liberal policies defended by the schools of Freiburg, Chicago, or Public Choice. Indeed, this emerging governmentality mixes neoliberal and authoritarian, even totalitarian logics, with regard to the enduring existence of the communist party-state and to the recent imprisonment in the name of the fight against terrorism of one million Uighurs and Kazakhs in Xinjiang concentration camps.¹⁹ But this mode of government is still part of the world-making capitalist project because it aims to induce for the twenty-first century a new systemic cycle of industrial expansion of capital that internalizes the “costs of nature externalization” by adjusting the economic and demographic growth to a sustainable environment. The main reason for this fundamental divergence could be that this post-socialist biopolitics traces its origin in the Leninist demographic policy of strict limitation of births per family, orchestrated from the 1970s by campaigns of contraception, sterilizations, abortions, and heavy fines imposed on women. These anti-natal policies brought the issue of limiting the number, raising the quality, and optimizing the location of China’s population to the heart of Chinese statecraft, until, during the Jiang and Hu Jintao era (1990s–2000s), the neo-liberal reorientation of family planning programs took place through increasingly legal and market-oriented means (Greenhalgh and Winckler 2005). As ecological modernization and surveillance technologies were implemented in parallel with the investment in children’s education to raise the quality of the population (*renkou suzhi*) necessary to the advent of new rational and entrepreneurial citizens (*getihu*) needed for “green development,” Chinese individuated subjects have been sorted into different categories of worth according to their greater or lesser ability to make choices, take risks, and be self-enterprising and self-reliant in order to enrich and strengthen Chinese rule. Aihwa Ong and Li Zhang (2008) thus

argue that state authoritarianism and neoliberal regulation are currently being combined in China through the experiment of “micro-freedoms” within the privatized spheres of consumption tastes, lifestyle, livelihood, health, friendship and personalized social networks (*guanxi*), but always within the political limits set by the communist party. This is “socialism from afar”: an authoritarian neoliberal governmentality whose state commands and controls continue to rule the behaviors of Chinese subjects in parallel to the actions from a distance undertaken through administered prices and artificially fixed scores, but which now targets the behavior of nonhumans in the regulation of ecosystems, with the hope of relaunching a new regime of capital accumulation designed to save the planet by recycling its ruins and postponing its final destruction.

Laurent Berger is Associate Professor of anthropology at the *Ecole des hautes études en sciences sociales* (Paris) and research fellow at the *Laboratoire d'anthropologie Sociale* of the *Collège de France*.

E-mail: laurent.berger@ehess.fr

Notes

1. Robert Costanza's research team and the Millennium Ecosystem Assessment popularized this concept 20 years ago by distinguishing ecosystem services into four categories: provisioning food, fresh water, renewable energy, medicines, raw materials, and biochemical/genetic elements; regulating waste decomposition and detoxification, climate, carbon sequestration, flood/drought mitigation, prey populations, and diseases control; inspiring cultural recreation, tourism, rituals, arts, and education; and supporting nutrient cycles, primary production by photo-/chemo- synthesis, soil formation, habitat building, pollination, and oxygen creation.
2. The history of anthropology could be read as a succession of different ethnographic methods and categories of totality encompassing them, from Morgan's notion of *ethnical period* to Tsing's *assemblage*, via the totalities of *culture* (Boas), *cultural area* (Wissler), *société* (Durkheim), *fait social total* (Mauss), *social structure* (Radcliffe-Brown), *structure* (Lévi-Strauss), *cultural core* (Steward), *social network* (Mitchell), *ecosystem* (Rappaport), *mode of production* (Terray), *champ* (Bourdieu), *scape* (Appadurai), *micro-culture* (Hannerz), *subculture* (Willis), *world-system* (Friedman), or *collectif* (Descola) from among many significant examples. These concepts of totality function de facto as “transcendental ideas” that guide the making of anthropological knowledge without referring to the reified existence of such theoretical entities not perceived in their entirety by the senses: “These regulative ideas direct the understanding to a certain aim, the guiding lines towards which all its laws follow, and in which they all meet in one point. This point—though a mere idea (*focus imaginarius*), that is, not a point from which the conceptions of the understanding do really proceed, for it lies beyond the sphere of possible experience—serves, notwithstanding, to give to these conceptions the greatest possible unity combined with the greatest possible extension” (Kant [1781] 2018: 212).
3. “This biopower was without question an indispensable element in the development of capitalism; the latter would have not been possible without the controlled insertion of bodies into the machinery of production and the adjustment of the phenomena of population to economic processes. But this was not all it required; it also needed the growth of these factors, their reinforcement as well as their availability and docility; it had to have methods of power capable of optimizing forces, aptitudes and life in general without at the same time making them more difficult to govern. If the development of the great instruments of the state, as institutions of power, ensured the maintenance of production relations, the rudiments of anatomo- and bio-politics, created in the eighteenth century as techniques of power present at every level of the social body and utilized by very diverse institutions (the family and the army, schools and the police, individual medicine and the administration of collective bodies), operated in the sphere of economic processes, their develop-

ment, and the forces working to sustain them. They also acted as factors of segregation and social hierarchization, exerting their influence on the respective forces of both these movements, guaranteeing relations of domination and effects of hegemony. The adjustment of the accumulation of men to that of capital, the joining of the growth of human groups to the expansion of productive forces and the differential allocation of profit, were made possible in part by the exercise of biopower in its many forms and modes of application” (Foucault [1976] 1978: 141).

4. Japanese and American applied research on different patches also play an important role upstream in the (non) scalability of landscapes while at the same time being oriented through their private financing to price movements (chapter 16): the American Forest Service aims to reduce the quantities of mushrooms sold on the market to guarantee their sustainable exploitation and upward appreciation of their export price, while the Japanese through application of a different sustainable exploitation mode, aim to increase the quantity collected to reduce consumer prices.
5. See 85: “Most explain their commitments to freedom as stemming from terrifying and tragic experiences in the U.S.–Indochina War and the civil wars that followed.” See 94: “In this practice of freedom, militarism is internalized; it infuses the landscape; it inspires strategies of foraging and entrepreneurship.”
6. See 76: “Open ticket [place] is haunted by many ghosts . . . ; not only the haunting memories of war that will not seem to go away; but also the ghostly appearance of forms of power—held in abeyance—that enter the everyday work of picking and buying. Some kinds of power are there, but not there; this haunting is a place from which to begin to understand this multiply culturally layered enactment of freedom.”
7. According to Marx’s equations:

$$T (\text{Profit Rate}) = \frac{\text{Surplus Value}}{(\text{Constant capital} + \text{Variable capital})}$$

$$T (\text{Profit Rate}) = \frac{\text{Surplus Value} / \text{Variable Capital (Exploitation Rate)}}{\text{Value composition of capital (Constant/Variable)} + 1}$$

Jason Moore goes so far as to argue (61), following Marx who referred to the natural fertility of the soil, that this “periodic introduction of Cheap natures, as civilizational strategy, acts like an increase in fixed capital.”

8. See 130: “This is capitalism’s cardinal rule of systemic reproduction: commodify Nature, but appropriate even faster.” One must underline here the fact that Marx formulated this “rule” through the notion of “primitive accumulation,” and Harvey through the notion of “accumulation by dispossession.”
9. See also Kalb (2020) on this point.
10. See 125: “This book does not reconstruct the narrative because I do not think we know—yet!—how to reconstruct that narrative in a way that recognizes the double internality of capitalism-in-nature/nature-in-capitalism. Such reconstructions are crucial if we are to understand the limits of capitalism today. They will be most effective as they emerge through a sustained conversation among scholars committed to a synthesis in which nature matters. As such, this periodization is a provisional model to allow for reconstructive critique. It is invitation as much as definition.”
11. See Kalb (2013, 2020) on Dutch financialization and the Anglo-Dutch moment.
12. See Rockström et al. 2009.
13. See 137: “There is little to suggest that China is on the brink of an agricultural revolution that will not only feed the world, but lead capitalism into a new golden age.”
14. This Chinese term, officially defined by the China Council for International Cooperation on Environment and Development in 2007, encompasses both payments for ecosystem services-like policies, as well as fiscal policies (taxes, fees, and levy transfers between prefectural governments), market-based policies (Clean Development Mechanism of the Kyoto Protocol, voluntary carbon markets, air and water pollution emissions tradable permits) and state conservation and label certification projects. In 2016, the central government published the *Guidelines on Improving Eco-compensation Mechanism*, and the *Guidelines for Facilitating Lateral Mechanism of Eco-compensation between Upper and Down Streams of Cross Province River*.
15. President Hu Jintao first made use of this term at the seventeenth Party Congress in 2007, as one of the requirements for the late stage of China’s modernization.
16. See Prime Minister Wen Jiabao’s speech at China’s Sixth National Conference on Environmental Protection in 2006.

17. Chinese ecosystem services have been subject to monetization exercises, based on methodologies such as those pioneered by the economist Costanza (China Council for International Cooperation on Environment and Development 2012). The Chinese Academy of Science thus supports an extensive ecosystem research network (see Zhang et al. 2010; Zhongxin and Xinshi 2000). Vaclav Smil (2004: 185–187) was the forerunner in this exercise, reported at the time (1990–92) to the GDP points that China was losing as a result of environmental pollution and ecological degradation.
18. It can be stressed here that this social credit system was originally an initiative of the Central Bank of China to calculate the default risk of customers, which was transposed in the 2000s by the Chinese state to the project of assessing the solvency of Chinese citizens and firms in order to secure confidence in the transactions of the socialist market economy (at the level of investors and order books).
19. See *The New York Times*, 17 November 2019.

References

- Aglietta, Michel. [1976] 1979. *A theory of capitalist regulation: The US experience*. London: Verso.
- Aglietta, Michel. [2017] 2018. *Money: 5,000 years of debt and power*. London: Verso.
- Aglietta, Michel, ed. 2019. *Capitalisme: le temps des ruptures* [Capitalism: The time of disruptions]. Paris: Odile Jacob.
- Aglietta, Michel, and Guo Bai. [2012] 2013. *China's development: Capitalism and empire*. London: Routledge.
- Althusser, Louis. [1965] 2005. *Pour Marx*. Paris: La Découverte.
- Arrighi, Giovanni. 1994. *The long twentieth century: Money, power, and the origins of our times*. London: Verso.
- Bayart, Jean-François. [2004] 2007. *Global subjects: A political critique of globalization*. Cambridge: Polity Press.
- Bennett, Michael. 2009. *Markets for ecosystem services in China: An exploration of China's "eco-compensation" and other market-based environmental policies*. Washington, DC: Forest Trends and the Katoomba Group.
- Boyer, Robert. 2015. *Economie politique des capitalismes: Théorie de la régulation et des crises* [Political economy of capitalisms: Theory of regulation and crises]. Paris: La Découverte.
- Braudel, Fernand. 1977. *Afterthoughts on material civilization and capitalism*. Baltimore, MD: John Hopkins University Press.
- Brenner Neil, Jamie Peck, and Nick Theodore. 2010. "After neoliberalization?" *Globalizations* 7 (3): 327–345.
- Bruckermann, Charlotte. 2020. "Green infrastructure as financialized utopia: Carbon offset forests in China." In *Financialization: Relational approaches*, ed. Chris Hann and Don Kalb, 86–111. New York: Berghahn Books.
- Choy, Timothy, Lieba Faier, Michael Hathaway, Miyako Inoue, Shiho Satsuka, and Anna Tsing. 2009. "Strong collaboration as a method for multi-sited ethnography: On mycorrhizal relations." In *Multi-sited ethnography: Theory, praxis, and locality in contemporary research*, ed. Mark Anthony Falzon, 197–214. Farnham: Ashgate.
- China Council for International Cooperation on Environment and Development. 2012. *Ecosystems and China's green development*. Annual General Meeting Report.
- Dardot, Pierre, and Christian Laval. [2009] 2013. *The new way of the world: On neoliberal society*. London: Verso.
- Duménil, Gérard, and Dominique Lévy. [2000] 2004. *Capital resurgent: Roots of the neoliberal revolution*. Cambridge, MA: Harvard University Press.
- Descola, Philippe. [2005] 2013. *Beyond nature and culture*. Chicago: Chicago University Press.
- Foucault, Michel [1976] 1978. *The history of sexuality. Volume I: The will to knowledge*. New York: Random House, Inc.
- Foucault, Michel [2004] 2008. *The birth of biopolitics: Lectures at the Collège de France, 1978–1979*. New York: Palgrave MacMillan.
- Gluckman, Max. ed. 1964. *Closed systems and open minds: The limits of naivety in social anthropology*. Chicago: Aldine Publishing Co.
- Greenhalgh, Susan, and Edwin Winckler. 2005. *Governing China's population: From Leninist to neoliberal biopolitics*. Stanford, CA: Stanford University Press.
- Hann, Chris, and Don Kalb, eds. 2020. *Relational approaches to financialization*. New York: Berghahn Books.

- Harvey, David. 2010. *The enigma of capital and the crises of capitalism*. Oxford: Oxford University Press.
- Huang, Philip. 2016. "China's hidden agricultural revolution, 1980–2010, in historical and comparative perspective." *Modern China* 42 (4): 339–376.
- Kalb, Don. 2013. "Financialization and the capitalist moment: Marx versus Weber in the anthropology of global systems." *American Ethnologist* 40 (2): 258–266.
- Kalb, Don. 2020. "Introduction: Transitions to what? On the social relations of financialization in anthropology and history." In Hann and Kalb, *Financialization: Relational approaches*, 1–42.
- Kant, Immanuel [1781] 2018. *The critique of pure reason*. Digireads.com Publishing.
- Moore, Jason. W. 2015. *Capitalism in the web of life: Ecology and the accumulation of capital*. London: Verso.
- Moore, Jason W. 2017. "The Capitalocene. Part I: On the nature and origins of our ecological crisis." *Journal of Peasant Studies* 44 (3): 594–630.
- Ong, Aihwa, and Li Zhang, eds. 2008. *Privatizing China: Socialism from afar*. Ithaca, NY: Cornell University Press.
- René, Elodie. 2019. "La 'civilisation écologique' contrôlée par le numérique en Chine" [China's digitally controlled ecological civilization]. *Multitudes* 76 (3): 86–93.
- Robertson, Morgan. 2007. "The neoliberalization of ecosystem services: wetland mitigation banking and the problem of measurement". In *Neoliberal environments: False promises and unnatural consequences*, ed. Nik Heinen, James McCarthy, Scott Prudham, and Paul Robbins, 114–125. London: Routledge.
- Rockström, Johan, et al. 2009. "Planetary Boundaries: Exploring the Safe Operating Space for Humanity." *Ecology and Society* 14 (2): 32.
- Smil, Vaclav. 2004. *China's past, China's future: Energy, food, environment*. London: Routledge.
- Tsing, Anna. L. 2015. *The mushroom at the end of the world: On the possibility of life in capitalist ruins*. Princeton, NJ: Princeton University Press.
- Van Dijk, Meine Pieter, ed. 2009. *The new presence of China in Africa*. Amsterdam: Amsterdam University Press.
- Xingliang, Pan, Linyu Xu, Zhifeng Yang, and Bing Yu. 2017. "Payments for ecosystem services in China: Policy, practice, and progress." *Journal of Cleaner Production* 158: 200–208.
- Zhang, Biao, Wenhua Li, and Gaodi Xie. 2010. "Ecosystem services research in China: Progress and perspective." *Ecological Economics* 69 (7): 1389–1395.
- Zhongxin, Chen, and Zhang Xinshi. 2000. "Value of ecosystem services in China." *Chinese Science Bulletin* 45 (10): 870–876.