

Climate, Class & the Great Frontier

From Primitive Accumulation to the Great Implosion

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The commodity frontier has become something of a conceptual lodestar for students of commodity history over the past two decades. Many have implicated my early thinking on commodity frontiers and the rise of capitalism as a watershed moment in global environmental history. In a series of essays penned between 1997 and 2002, I outlined a historical geography of capitalism that foregrounded what Walter Prescott Webb once called the Great Frontier. Webb's great insight was to grasp the history of capitalism as shaped fundamentally by a series of "windfall profits" that underpinned modernity's long boom – one that ended, for Webb, during the Great Depression of the 1930s.² That diagnosis was not as absurd as it might seem. To be sure, Webb did not foresee how militarized accumulation and Cold War Developmentalism would produce new and robust "special stimuli" to gin up world accumulation in the postwar golden age.³ But he had grasped the nettle of the problem: world accumulation depends on frontiers of Cheap Nature; the closure of those frontiers ushered in new forms of economic instability and political upheaval. World-historical tendencies and world-historical turning points invariably enjoy a non-linear relation. There's always a crystal ball problem in play. And yet, the bookends of the long twentieth century suggest the intimacy of that non-linear relation. An era that began with a new imperialism and a "second" industrial revolution is closing in a planetary crisis marked by a triple closure: not only of the long twentieth century, but of the Holocene and historical capitalism.

The frontier is a slippery metaphor. These days, it often invokes something called "settler colonialism." In contrast to an earlier literature foregrounding class formation, today's academic vogue proposes a "clash of civilizations" metaphysic that evinces little concern with class formation, even in its colonial and imperialist registers.⁴ There's more than a whiff of this thinking in Webb's Great

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² Walter Prescott Webb, *The Great Frontier* (Boston: Houghton Mifflin, 1952).

³ Paul M. Sweezy and Harry Magdoff, *The Dynamics of US Capitalism* (New York: Monthly Review Press, 1972), 16; Paul A. Baran and Paul M. Sweezy, *Monopoly Capital* (New York: Monthly Review Press, 1966); John Bellamy Foster offers a *tour de force* summary of special stimuli – "self-limiting development factors" – in postwar capitalism, in "Age of Restructuring," in Arthur MacEwan and William K. Tabb, eds., *Instability in the World Economy* (New York: Monthly Review Press, 1989), 281-297.

⁴ Contrast, for instance, Philip McMichael, *Settlers and the agrarian question: Capitalism in Colonial Australia* (Cambridge: Cambridge University Press, 1984) and Walter Hixson, *American settler colonialism: A history* (New York: Palgrave MacMillan, 2013). In frontier studies proper, see Edward Barbier's class-denialist *Nature and wealth: overcoming environmental scarcity and inequality* (New York: Palgrave MacMillan, 2015). Some commodity frontier studies take semi-proletarianization seriously, e.g., Benjamin J. Marley, "The Coal Crisis in Appalachia: Agrarian Transformation, Commodity Frontiers and the Geographies of Capital," *The Journal of Agrarian Change* 16(2, 2016), 225-254.

Frontier. A dialectical reconstruction draws elements from all three partial formulations, grasping the Great Frontier as part and parcel of a Civilizing Project, imperialist landgrabs and racialized class formation, and an environment-making history that transformed planetary life in unprecedented fashion. I wrestled with all these in my original formulations – and have ever since.⁵

It was the frontier concept – rough-and-ready as it was – that helped me see that capitalism did not form within a reified Europe and then expand. Capitalism formed *through* the Great Frontier. Commodity frontiers – above all in sugar planting and silver mining – were the Great Frontier’s most spectacular crystallizations. (Others, like the Great Domestication of so-called women’s work, were also decisive.)⁶ Frontiers, in this rendering, were not about linear boundaries on the edges of a cartographic projection (itself a frontier technology): they were strategies of power, profit and life, and geographical flashpoints of their contradictions. *Commodity frontiers* were, crucially, not regions as such but patterns of inter-regional movement. The *sugar commodity frontier*, in this rendering, was the grand arc of the sugar/slaving complex as it moved across the capitalist Atlantic (see Table 1). Friedrich Engels observation, in an 1873 letter to Marx, readily applies to commodity frontiers: “To identify the different kinds of motion is to identify the bodies themselves.”⁷

Table 1
The Sugar Commodity Frontier, 1450–1800

Region	World Primacy
Cyprus	1350’s–1470’s
Madeira	1480’s–1520’s
São Tomé	1540’s–1570’s
Pernambuco	1570’s–1620’s
Bahia	1620’s–1670’s
Barbados	1670’s–1720’s
Jamaica & St. Domingue	1720’s–1790’s/1820’s

Source: Jason W. Moore, Madeira, Sugar, & the Conquest of Nature in the ‘First’ Sixteenth Century, Part I: From ‘Island of Timber’ to Sugar Revolution, 1420-1506, *Review* 32(4, 2010), 345-390;

⁵ Jason W. Moore, “Environmental Crises and the Metabolic Rift in World-Historical Perspective,” *Organization & Environment* 13(2, 2000), 123-158; idem, “Marx and the Historical Ecology of Capital Accumulation on a World Scale: Comment on Hornborg,” *Journal of World-Systems Research* 6(1, 2000), 134-139; idem, “Sugar and the Expansion of the Early Modern World-Economy: Commodity Frontiers, Ecological Transformation, and Industrialization,” *Review* 23(3), 409-433; idem, “Marx’s Ecology and the Environmental History of World Capitalism,” *Capitalism Nature Socialism* 12(3), 134-139; idem, “The Crisis of Feudalism: An Environmental History,” *Organization & Environment* 15(3, 2002), 301-322; idem, “Nature and the Transition from Feudalism to Capitalism,” *Review: A Journal of the Fernand Braudel Center* 26(2, 2003), 97-172; idem, “Capitalism as World-Ecology: Braudel and Marx on Environmental History,” *Organization & Environment* 16(4, 2003), 431-458; idem, “The Modern World-System as Environmental History? Ecology and the Rise of Capitalism,” *Theory & Society* 32(3, 2003), 307-377; idem, “Ecology & Imperialism,” *Monthly Review* 55 (1, 2003), 58-62; idem, “Conceptualizing World Environmental History: The Contribution of Immanuel Wallerstein,” in *Earth Ways: Framing Geographical Meanings*, Gary Backhouse & John Murungi, eds. (Lanham, MD: Rowman & Littlefield, 2004); idem, “Metabolic Rifts, East and West? Socio-Ecological Crises, from the Rise of the West to the Resurgence of East Asia,” *PEWS News: Newsletter of the Section on the Political Economy of the World-System* (Summer, 2004). Many of these essays can be found in translation at <http://jasonwmoore.com>.

⁶ Raj Patel and Jason W. Moore, *History of the World in Seven Cheap Things* (Berkeley: University of California Press, 2017).

⁷ Engels quoted in Jairus Banaji, *Theory as History* (Leiden: Brill, 2010), 58.

This geographical restlessness was not happenstance. The endless conquest of the Earth and the endless accumulation of capital are two expressions of a singular process: the rise and ongoing demise of the capitalist world-ecology.⁸ Imperialism is the glue that binds the two moments together. The intimate connection between endless conquest and endless accumulation is not, however, well understood – even on the left. Many continue to believe that capitalism will continue “until the last tree is cut.”⁹ But capitalism’s foremost rule of reproduction is not simply *grow or die*; it is in equal measure *conquer or die*. Every great wave of accumulation is premised on a new imperialism, whose chief world-historical task is to create and to Cheapen working classes: the differentiated unity of Proletariat, Femitariat, and Biotariat.¹⁰

Capitalism does not *act upon* an external Nature – notwithstanding the fetishisms of systems theory. Capitalism *develops through* the web of life; it develops “specifically harnessed natural forces” whose contradictions progressively activate, in successive turns, capitalist booms and planetary necrosis.¹¹ The commodity frontier thesis insisted that capitalism emerged through a prodigiously generative nexus of Cheap Labor, imperial power, and the unpaid work/energy of previously uncaptialized soils, forests, streams, and all manner of indigenous flora and fauna. Out of the Great Frontier strategy formed not only modern proletariats but also manifold forms of socially-necessary *unpaid* work – above all, the Biotariat, understood as the quantum of extra-human nature “put to work” by capital and empire, and the Femitariat, the overwhelmingly feminized relations of overwhelmingly unpaid social-reproductive work. This trinity is not an eclectic and chaotic combination; it differentiates and unifies the imperial-bourgeoisie’s *longue durée* effort to “put nature to work” as cheaply as possible. That *longue durée* strategy emerged, and was sustained through the centuries, on the knife-edge of the Great Frontier.

In what follows, I take the Great Frontier – understood as a *project* of imperial-bourgeois rule and a socio-geographical *process* of sustaining capital accumulation – as a guiding thread. At the outset, I want to signal that these arguments may not specifically address the extraordinarily rich and diverse research that has taken shape around diverse renderings of the commodity frontier. Some depart from,

⁸ Jason W. Moore, *Capitalism in the Web of Life* (London: Verso, 2015).

⁹ Jason W. Moore, “[World Accumulation and Planetary Life, or, Why Capitalism will continue until the ‘Last Tree is Cut.’](#)” *IPPR Progressive Review* 24(3, 2017), 175-202.

¹⁰ Biotariat is a term coined by the poet Stephen Collis in 2016, *Once in Blockadia* (Vancouver, BC: Talon Books, 2016). The Biotariat includes all the things we think of when we hear “ecosystem services” but also includes many humans, who are devalued on the grounds of the ruling abstraction Nature: above all through race, nationality, gender, sexuality, and so forth. See especially Claudia von Werlhof: “From the standpoint of the rulers,... ‘nature’ is everything that they do not have to, or are not willing to, pay for,” in “On the concept of nature and society in capitalism,” in M. Mies, et al., eds., *Women: The Last Colony*. London: Zed, 1988), 96-112, quotation: 97. The argument about “putting nature to work” is developed in Jason W. Moore, “Putting Nature to Work: Anthropocene, Capitalocene, and the Challenge of World-Ecology,” in Olaf Arndt, et al., eds., *Supramarket: A micro-toolkit for disobedient consumers, or how to frack the fatal forces of the Capitalocene* (Gothenburg, Sweden: Irene Books, 2015), 69-117. Jason Hribal’s groundbreaking work on the work of non-human animals is fundamental to making world-historical sense of the Biotariat. See Hribal, “Animals are part of the working class: A challenge to labor history,” *Labor History* 44(4, 2003), 435-453; idem, “Animals are part of the working class reviewed,” *Borderlands* 11(2, 2012), 1-37.

¹¹ The quotation is from Karl Marx, *Grundrisse: Introduction to the Critique of Political Economy*, trans. M. Nicolaus (New York: Vintage, 1973), 612. For the activation of negative-value – forms of life that constitute increasingly insuperable barriers to renewed capital accumulation – see Justin McBrien, “Accumulating Extinction,” in *Anthropocene or Capitalocene?*, Jason W. Moore, ed. (Oakland, CA: PM Press, 2016), 116-135; Jason W. Moore, *Capitalism in the Web of Life*, 241-290; idem, “[Nature in the Limits to Capital \(and Vice Versa\): Why Limits Thinking Has Been So Flawed and How to Start Fixing It](#),” *Radical Philosophy* 193 (2015), 9-19; idem, “[Cheap Food & Bad Climate: From Surplus Value in Negative Value in the Capitalist World-Ecology](#),” *Critical Historical Studies* 2(1, 2015), 1-42; idem, “Negative-Value Defined,” *Post-Capitalist Possibilities* (11 July, 2018), <https://www.youtube.com/watch?v=KeE9yzAZEdw&t=9s>.

and others converge with, my intellectual journey. Which is as it should be. It seems to me that conceptual phrases have lives of their own, and that this should be encouraged.

I have been asked to write something that might provoke a generative discussion around a broadly defined commodity frontier perspective. That's a demanding intellectual task. One runs the risk either of hewing too closely to past practice, or breaking too completely with earlier conceptualizations. I'll do my best to thread the needle. Such threading demands something of a rupture with academic convention. I have little interest in the academic point scoring that remains the bread and butter of scholarly exchanges. As I teach my PhD students, critique is not about cataloguing what argument X and approach Y does not do. (Much less does it involve, as seems to be the standard today, cherry-picking phrases to construct straw dogs.) *Dialectical* critique embraces an ethics of synthesis.¹² This approach recognizes that no totality is everything, and that conceptual and empirical blind spots, once recognized and integrated, may change the "movement of the whole." The burden of critique is to reveal how the inclusion of reality A or B changes the interpretation of historical change and leads to new narrative strategies. As I've argued elsewhere, the problem of Green Arithmetic – adding up Nature and Society – is its additive rather than synthetic approach. The attentive reader will note how key elements of what follows are contributions to an auto-critique premised on just such an ethos of synthesis, which demands, as Marx might say, a "ruthless" strategy of philosophical, theoretical, and conceptual-historical reinvention.¹³ This alternative demonstrates how the incorporation (or exclusion) of a given bundle of historical-geographical relations enables or disables an argument about specific turning points and developmental patterns in the history of capitalism.¹⁴

Provoking a generative discussion therefore confronts directly procedures of academic disciplining that enforce neat-and-tidy definitions and clean-cut summaries. These procedures favor academic turf battles and discourage the kinds of conversations necessary to come to grips – intellectually and therefore politically – with the present crisis. This leads to Chomsky's logic of "concision" – a fetish that has nothing to do with clarity. Rather, by preconceptualizing the reasonable bounds of discussion and penalizing those who run against the grain of bourgeois hegemony, the logic of concision imposes a real conceptual violence on dialectical arguments, which operate at multiple levels of abstraction, geographical scale, and intricate webs of tendencies and countertendencies.¹⁵

In this light, I've reworked my contribution to thinking through the Great Frontier as a series of relatively short essays – at least, by scholarly standards! Each of these short essays runs against the grain of the radical consensus on a series of historical-geographical questions. My intention is to share something of my intellectual journey around commodity frontier thinking and to provide at least some

¹² Thanks to John P. Antonacci for this phrase, *ethics of synthesis*, and for permission to deploy it here.

¹³ See Jason W. Moore, "[Capitalism and planetary justice in the web of life: An Interview with Jason W. Moore](#)," *Polygraph* 28 (2020), 161-182.

¹⁴ Jason W. Moore, "Metabolic rift or metabolic shift? Dialectics, nature, and the world-historical method," *Theory & Society* 46(4, 2017), 285-318.

¹⁵ "There's even a name for" this procedure of manufacturing consent. "It's called 'concision.'" In a passage that applies to academia no less than to corporate media, Chomsky reflects on the ideological framing of *concision*: "[*Nightline*'s Jeff Greenfield] was asked in an interview somewhere why they didn't have me on *Nightline*, and his answer was – two answers. First of all, he says, 'Well, he talks Turkish, and nobody understands it.' But the other answer was, 'He lacks concision.' Which is correct, I agree with him. The kinds of things that I would say on *Nightline*, you can't say in one sentence because they depart from standard religion. If you want to repeat the religion, you can get away with it between two commercials. If you want to say something that questions the religion, you're expected to give evidence, and that you can't do between two commercials. So therefore you lack concision, so therefore you can't talk. I think that's a terrific technique of propaganda. To impose concision is a way of virtually guaranteeing that the party line gets repeated over and over again, and that nothing else is heard," Noam Chomsky with Harry Kreisler, "Activism, Anarchism, and Power," University of California, Berkeley (22 March, 2002), <http://globetrotter.berkeley.edu/people2/Chomsky/chomsky-con3.html>.

generative “raw material” for future syntheses. Something of a long and winding road, I want to link these reflections to ways of studying capitalism’s frontiers of Cheap Nature that resist several temptations: commodity reductionism, a neo-Malthusian soil exhaustion thesis, and the class denialism of today’s “settler colonialism” trope. In Part I, I reprise the historical-geographical outlines of the commodity frontier in the rise of capitalism. It’s my premise that the historical figuration of origins, turning points, and developmental patterns is more-or-less directly calibrated with our political assessments of the climate crisis – a matter to which we turn in Part III. I begin by revisiting the core elements of my early commodity frontier argument, which I developed to come to grips with the epochal shift in world environmental history after 1492. Too often, scholars no less than students play fast-and-loose with historical specificity – and world-historical specificity above all. (As if capitalism’s “world history” is a generality that is somehow “less real” or “more theoretical” than regional history.¹⁶) The commodity frontier argument is dialectically-joined to the specification of turning points in the history of capitalism – from the original transition to the developmental crises that marked the transition from one era of capitalism to the next. Whether or not a commodity frontier narrative un-moored from this interpretive priority is useful, I cannot say. It bears emphasizing that the commodity frontier was never intended as a one-size-fits-all concept, an abstracted empirical observation that “generalizes” about capitalism. It took shape to explain the specific dynamics of the rise of capitalism as a world-ecology of power, profit and life.¹⁷ At various moments since the early 2000s, I have come to see that each new era of capitalist development emerges through new frontier strategies, centering on new strategic commodities, embedded within new Civilizing Projects and new world-making hegemony.¹⁸

From this historical-geographical sketch, I unpack a twofold argument. One is that commodity frontiers are not strictly about commodities or commodification, “in breadth or in depth.”¹⁹ They are about imperialism, which is always the world bourgeoisie’s favored mode of class formation.

¹⁶ A position now rendered explicit by the Plantationocene thesis and its alliance with Latour’s “Earthbound” concrete – one whose concrete ideological task is to erase class and capital in the making of the modern world in favor of a blood-and-soil clash of civilizations. See Bruno Latour, *Down to Earth* (Cambridge, UK: Polity, 2018); e.g. Wendy Wolford, “The Plantationocene: A Lusotropical Contribution to the Theory,” *Annals of the American Association of Geographers* (in advance of print, 2021), 1-18.

¹⁷ Jason W. Moore, *Ecology and the Rise of Capitalism*, PhD dissertation, Department of Geography, University of California, Berkeley (2007).

¹⁸ Jason W. Moore, “[Silver, Ecology, and the Origins of the Modern World, 1450-1640](#),” In *Environmental History: World System History and Global Environmental Change*, J.R. McNeill, Joan Martinez-Alier, and Alf Hornborg, eds. (Lanham, MD: AltaMira Press, 2007), 123-142; idem, “[Ecological Crises and the Agrarian Question in World-Historical Perspective](#),” *Monthly Review* 60(6, 2008), 54-63; idem, “[‘This lofty mountain of silver could conquer the whole world’: Potosi in the world-ecological revolution of the long seventeenth century](#),” *Journal of Philosophical Economics* 4(1, 2010), 58-103; idem, “[The End of the Road? Agricultural Revolutions in the Capitalist World-Ecology, 1450-2010](#),” *The Journal of Agrarian Change* 10(3, 2010), 389-413; idem, “[‘Amsterdam is Standing on Norway’, Part I: The Alchemy of Capital, Empire, and Nature in the Diaspora of Silver, 1545-1648](#),” *The Journal of Agrarian Change* 10(1, 2010), 33-68; idem, “[‘Amsterdam is Standing on Norway’, Part II: The Global North Atlantic in the Ecological Revolution of the Seventeenth Century](#),” *The Journal of Agrarian Change* 10(2, 2010), 188-227; idem, “[Madeira, Sugar, & the Conquest of Nature in the ‘First’ Sixteenth Century, Part I: From ‘Island of Timber’ to Sugar Revolution, 1420-1506](#),” *Review* 32(4, 2010), 345-390; idem, “[Madeira, Sugar, & the Conquest of Nature in the ‘First’ Sixteenth Century, Part II: From Local Crisis to Commodity Frontier, 1506-1530](#),” *Review* 33(1, 2011), 1-24; idem, “[Ecology, Capital, and the Nature of Our Times: Accumulation & Crisis in the Capitalist World-Ecology](#),” *Journal of World-Systems Analysis* 17(1, 2011), 108-147; idem, “[Transcending the Metabolic Rift: A Theory of Crises in the Capitalist World-Ecology](#),” *The Journal of Peasant Studies* 38(1, 2011), 1-46.

¹⁹ V.I. Lenin, *Collected Works*, Vol. 3, *The Development of Capitalism in Russia* (Moscow: Progress Publishers, 1960 [1899 original]), 383.

Imperialism is the world politics of the tendency (and countertendency) of the rate of profit to fall.²⁰ It is premised not only on armed force but also the ideological violence of Civilizing Projects. This is the focus of Part II. To be sure, commodification is in play; but to reduce the story to market dynamics replays a neo-Smithian error. It fails to grasp the centrality of imperialism and its mechanisms of class power in forging capitalism's major commodity frontiers. Capitalist relations of Nature – I use the uppercase to underscore the real abstraction – are always politically-mediated by states that pursue the creation and reproduction of a “good business environment.”²¹ The (geo)political project of managing and securing webs of life for capital depends upon a geocultural project that makes possible the practical violence of commodity fetishism on frontiers.²² This is civilizational fetishism. Its expressions are found the successive and overlapping Christianizing, Civilizing, and Developmentalist Projects of great empires, given intellectual expression over the *longue durée* by figures ranging from Francisco de Vitoria to Walt W. Rostow. These projects reproduce and reinvent the *ruling abstractions* of Civilization and Savagery – after 1949, Truman's Point Four divide between the “developed” and “undeveloped world.”²³ Our conceptual language of Society and Nature, one forged in the era of England's first great ethnic-cleansing campaign in Ireland, reproduces discursively these real abstractions.²⁴

A second argument foregrounds the connective tissues binding our historical-geographical assessments of capitalist frontier-making and today's climate crisis. In Part III, I frame the planetary crisis as joining two fundamental moments: an unfolding crisis in life-making, registered widely in the climate and biodiversity literatures; and an unfolding crisis in profit-making, registered widely in the discourse on “secular stagnation.”²⁵ Those two moments are unevenly combined in the geohistorical character of climate crisis, one in which the geophysical turning point finds expression in the destabilization of a trinity born in the seventeenth century: the climate class divide, climate patriarchy, climate apartheid.²⁶ The seventeenth-century's climate crisis hothoused the Great Frontier as accumulation strategy, assuming its modern form between 1550 and 1700 as a *climate fix* to the era's “general crisis”: an era of interminable war, endemic political crisis, and economic instability. The blossoming of the Great Frontier as a full-fledged productivist revolution – the *Plantation Revolution* – inaugurated the Great Cheapening, a long-run secular decline in the price (value composition) of the Big Four inputs: labor-power, food, energy, and raw materials.²⁷ These are the Four Cheaps.²⁸ A specifically capitalist historical nature was born, and its epoch-making service to world accumulation was to allow the systematic reduction of re/production costs for capital. Today we are witnessing that

²⁰ V.I. Lenin, *Imperialism: The Highest Stage of Capitalism*, in *Collected Works*, volume 22 (Moscow: Progress Publishers, 1694 [1916 original]), 185-304; Harry Magdoff, *Imperialism: From the colonial age to the present* (New York: Monthly Review Press, 1978).

²¹ James O'Connor, *Natural Causes* (Thousand Oaks, CA: Sage, 1998); Christian Parenti, “Environment-Making in the Capitalocene: The Political Ecology of the State,” in Jason W. Moore, ed., *Anthropocene or Capitalocene?* (Oakland, CA: PM Press, 2016), 166-183; idem, *Radical Hamilton* (London: Verso, 2020).

²² Jason W. Moore, “[The Capitalocene, Part II: Accumulation by Appropriation and the Centrality of Unpaid Work/Energy](#),” *The Journal of Peasant Studies* 45(2), 237-279.

²³ Arturo Escobar, *Encountering Development* (Princeton, NJ: Princeton University Press, 1995).

²⁴ Patel and Moore, *Seven Cheap Things*.

²⁵ Lawrence H. Summers, “The age of secular stagnation: What it is and what to do about it,” *Foreign Affairs* 95(2, 2016), 2-9; John Bellamy Foster and Michael D. Yates, “Piketty and the crisis of neoclassical economics,” *Monthly Review* 66(6, 2014), 1-24

²⁶ Jason W. Moore, “The Capitalocene and Planetary Justice,” *Maize* 6 (2019), 49-54.

²⁷ Jason W. Moore, “[On the Origins of Climate Apartheid: Climate Class & Colonialism in the Making of Planetary Crisis](#),” public lecture, Department of African and African Diaspora Studies, University of Wisconsin-Milwaukee, 6 November, 2020.

²⁸ To make clear, after several years of encountering the mind-boggling smears conducted by John Bellamy Foster and his colleagues: *price* has always been shorthand in my work for value composition in classically Marxist sense – one that includes the unpaid work of the web of life.

strategy's implosion. The web of life is rapidly moving from a source of Cheapness to an unavoidable vector of rising costs. The Biotariat is in open revolt.

Part I: Commodity Frontiers & the Origins of Planetary Crisis

The Great Frontier is a Transition Debate.²⁹ The long-running conversation over capitalism's origins is one that just won't go away. Geographical questions have been conspicuously salient in this Debate – and studiously avoided. One can search the Transition Debate far and wide for sustained engagements with environmental history, never mind climate history.³⁰ The result is a geography of Transition that owes more to von Thunen than to Marx.³¹ The two moments – the geographies and environmental histories of Transition – come into stark relief in the making of the Great Frontier. We ignore these dynamics at our peril. De-linking the history of modes of production from the co-production of space – which is also the co-production of life – yields a partial narrative with dangerously partial implications for planetary politics. Above all, it leads to fetishized notions of class power and class politics. To paraphrase an old anarchist slogan, *You can't blow up a socio-ecological relationship*. A history of power and profit without a history of life invariably reproduces an environmental history without class and class struggle without webs of life – an epistemic rift that sustains the great divide between labor and environmental movements.

How does one put together capital, class, and webs of life in the history of capitalism? My journey has been powerfully shaped by Marx and Engels' first major outline of historical materialism in *The German Ideology*. Appealing to Marx on historical questions of course solves nothing. Given the flight from geography, however, it may be fruitful to revisit their extraordinary weaving of physical geography, environment-making, and class formation. Moving, as ever, from general to determinate abstractions, the

first fact to be established [in a historical-materialist inquiry] is the physical organisation of these individuals and their consequent relation to the rest of nature. Of course, we cannot here go either into the actual physical nature of man, or into the natural conditions in which man finds himself—geological, oro-hydrographical, climatic and so on. *All historical writing must set out from these natural bases and their modification* in the course of history through the action of men.³²

Marx and Engels were not recommending that one offer a few introductory remarks on the “environmental context” and then move on – as if environments and environment-making were epiphenomenal to class formation, modes of production, and town-country divisions of labor. Rather, each of these latter – more determinate – abstractions embodies and remakes “their consequent

²⁹ Its classic formulation is Rodney Hilton, ed., *The Transition from Feudalism to Capitalism* (London: New Left Books, 1976).

³⁰ The notable exception is Immanuel Wallerstein, *The Modern World-System I* (New York: Academic Press, 1974); Moore, “Nature and the Transition”; idem, “*The Modern World-System as Environmental History?*”

³¹ Ellen Meiksins Wood's formalism is the clearest expression of this tendency, *The Origin of Capitalism* (New York: Monthly Review Press, 1999). Robert Brenner is not too far beyond in accepting the geographical premises of Cold War methodological nationalism under the banner of Marxist orthodoxy, “The origins of capitalist development: a critique of neo-Smithian Marxism,” *New Left Review* 104(1977), 25-92.

³² Karl Marx and Fredrick Engels, *Collected Works*, Vol. 5: *Marx and Engels 1845-1847* (London: Lawrence and Wishart, 2010), 31, emphasis added.

relation to *the rest of nature*.”³³ It’s through the Great Frontier that proto-capitalist agencies – every tributary civilization contained its share of these – confronted a mosaic of “natural conditions” and enacted a series of “modifications.” The historical-geographical *problematique* of the Great Frontier asks how this socio-ecological totality favored a capitalist rather than tributary resolution to the feudal crisis.

What drove the Great Frontier? Not trade, not greed, not a metaphysic of European expansion – as in the adulatory “European miracle” or the declensionist “settler colonialism” arguments. Recall that the dawn of the Little Ice Age (c. 1300-1850) detonated feudalism’s manifold socio-ecological crisis – leading directly to the breakdown of feudal agriculture in the Great Famine (1315-22) and associated epizootic outbreaks, amplifying simmering class contradictions. The following century was defined by a “generalized seignior-peasant class war” whose contours were shaped by Little Ice Age climate and the resurgence of catastrophic disease.³⁴ To be clear, the crisis was not a Malthusian but a Marxist dynamic – as Marxist historians had long emphasized, questions of soil fertility had to be situated within feudalism’s class relations.³⁵ To make a long story short, the seigneurs lost the class war – though not for want of trying. The feudal surplus dramatically contracted in the throes of the climate-class conjuncture. Feudal Europe de-commercialized. The balance of class power on the Continent swung in favor of the peasantry.

Enter the Great Frontier. Here was a mode of conquest that was an ongoing synthesis. It combined premodern strategies of Holy War and armed trade with a novel emphasis: Cheap Labor at any cost. Labor, not land, productivity was – after 1492, but especially after 1550 – what mattered. New working classes had to be created and secured if a new basis of enrichment was to be established. Having lost the class struggle in the European heartland, the Continent’s beleaguered tributary ruling strata – including merchant-bankers in places like Genoa and Flanders – looked to the frontier. But frontiers were worthless without the labor to work them, and modern proletarianization required entirely novel forms of territorial power. After 1492, in the world-historical blink of the eye, the *encomienda*, a land-grant used widely in the *Reconquista*, was reinvented as a labor-grant in the Americas – fierce theological and even political debates ensued, but the die had been cast.

The Great Frontier as a frontier of Cheap Labor – in contrast to western Europe – was pivotal to early capitalism’s greatest innovations. The Transition’s defining moments clustered on the Great Frontier – new productive organizations, credit systems, imperial structures, coercive proletarianization, epoch-making technologies (the shipbuilding/shipping/cartography nexus above all). These allowed imperial, financial, seigneurial, and other actors to overcome their historic class defeat across the long fourteenth century. The new frontiers were not a demographic outlet for a reified Europe full of reified Whiteness – but rather a set of politically-secured opportunities for profit and capital accumulation. (Indeed these opportunities were the very mechanisms of producing these fetishes; let us avoid putting carts before horses!) Older demographic, commercial, and resource frontiers were – along with everything else – turned inside out after 1450. The new commodity frontiers – spearheaded by debt-financed empires – forged not only strategies for expanding “the economic pie” but transforming the character of surplus accumulation itself.³⁶

³³ This reading of Marx’s method is suggested in P. Murray, *Marx’s Theory of Scientific Knowledge* (Atlantic Highlands, NJ: Humanities Press, 1988); and elaborated in Moore, *Capitalism in the Web of Life*; idem, “Metabolic Rift or Metabolic Shift?”

³⁴ Wallerstein, *The Modern World-System I*, 24.

³⁵ See Patel and Moore, *A History of the World in Seven Cheap Things*; e.g., R.H. Hilton, “Y eut-il une crise générale de la féodalité?” *Annales E.S.C.*, 6 (1, 1951), 23-30.

³⁶ See especially Wallerstein, *The Modern World-System I*. A socio-ecological reading of Wallerstein is on offer in Moore, “Nature and the Transition from Feudalism to Capitalism,” and “*The Modern World-System as Environmental History?*” Its implications are deepened in Raj Patel and Jason W. Moore, *A History of Seven Cheap Things* (Berkeley: University of

The exclusion of these new environment-making frontier strategies from the Transition Debate is striking. We shall review the environmental history presently. The Debate assumed its contemporary form in the thick of the Cold War, growing workers' power in the imperialist countries, and anti-imperialist struggles across the Third World. At the time, it was understood that one's strategic orientation towards the struggle for world socialism turned on one's historical vista – hence the striking parallels between socialism and capitalism “in one country” and proletarian and bourgeois “internationalism.”³⁷ The Transition Debate was (and remains) a debate that joins a narrative of capitalism's origins to a political assessment of capitalist crisis. To tweak an old joke about Marx, one can shut the front door on the Transition Debate, but it will always find a way in through the kitchen window. So it is with today's Popular Anthropocene and its Capitalocene alternatives.³⁸ Make no mistake about it, the Anthropocene conversation is a Transition Debate.

Beginning tentatively in the 1470s – in heretofore obscure regions like the Erzgebirge and Madeira – the medieval logic of boom and bust was thoroughly transformed.³⁹ Their profits enriched not merely local potentates but the financiers who made the new productive organizations possible. The new productive revolutions set in motion environmental change and proletarianization at breathtaking speed, one whose class contradictions burst into open insurrection in 1525. The Fuggers and Welsers financed Central Europe's mining boom; Flemish and Genoese merchants financed Madeira's sugar revolution. It was these bourgeois who profited – and in the case of the Fuggers, perished – on the strength of investment in “real capital.” And it was these accumulated profits that financed commodity frontiers across the capitalist Atlantic.

These contradictions reached critical mass by mid-century. Their precondition was the Columbian Invasion launched in 1492. These invasions were marked by the globalization of the “military revolution” and wherever possible the outright plunder of gold and silver. It was not a directly productivist enterprise – nor did it need to be. In the decade after 1549, however, signs of crisis were everywhere. A productivist turn was clearly necessary – and immediately recognized in the Courts of Europe. The Portuguese assumed direct administration of Brazil (1549). The Spanish debated the fate of indigenous peoples at Valladolid (1550-51). Spain's Philip II declared bankruptcy and the French king (Henry II) saw his finances “collapse” in 1557, precipitating modernity's first great financial crisis.⁴⁰ Their fiscal houses burning to the ground, the two great rivals struck a peace at Cateau-Cambrésis in 1559, codifying what the obvious: no great power would resolve the feudal crisis through Charlemagne-like conquests and a new imperium. “Europe” would not become a world-empire.⁴¹ The extraordinary price inflation – the Price Revolution – had cheapened credit and rendered it

California Press, 2017); Jason W. Moore, [“The Capitalocene, Part I: On the Nature and Origins of Our Ecological Crisis,”](#) *The Journal of Peasant Studies* 44(3), 594-630; idem, [“The Capitalocene, Part II.”](#)

³⁷ The classic opposition between Robert Brenner and Wallerstein is not – as often claimed – between “production” and “exchange.” The fundamental difference is over respective framing of class struggle geography – and, crucially, over the mode of constructing “units of observation” with and within “units of analysis.” The claim that Wallerstein's interpretive scheme pivots of the world market is a canard. The pivotal difference between the two is Brenner's class struggle in “one country” and Wallerstein's class struggle in the trans-Atlantic division of labor. See Wallerstein, *The Modern World-System I*; Robert Brenner, “Agrarian class structure and economic development in pre-industrial Europe,” *Past & Present* 70(1976), 30-75. We may observe that Wallerstein foregrounds the Great Frontier, while Brenner's unit of analysis rules out not only frontiers, but even the colonial subordination of Ireland in the transition of capitalism!

³⁸ Jason W. Moore, [“Confronting the Popular Anthropocene: Toward an Ecology of Hope,”](#) *New Geographies* 9 (2017), 186-191; idem, [“Anthropocenes & the Capitalocene Alternative,”](#) *Azimuth* 5 (2017), 71-80.

³⁹ See especially Moore, “Silver, Ecology, and the Origins of the Modern World,” and “Madeira,” Parts I and II. The classic statement on medieval boom-bust patterns is Brenner, “Agrarian Class Structure.”

⁴⁰ Frank C. Spooner, *The international economy and monetary movements in France, 1493-1725* (Cambridge, MA: Harvard University Press, 1972), 148ff; Moore, “Amsterdam is Standing on Norway, Part I.”

⁴¹ Wallerstein, *The Modern World-System I*.

indispensable to cash-crop agriculture across Europe, quickly reaching places like Brazil and Barbados in the century after 1549.⁴² All of which favored a trans-Atlantic productivist turn after 1549, morphing imperial into *commodity* frontiers – no less imperialist for the metamorphosis.

Finally, signs of a climate downturn were evident by the 1550s. Climatic conditions deteriorated rapidly after 1600. For the most part the outcome of natural forcing, the socio-physical conjuncture was amplified by slaving-induced genocides in the New World. The destruction of New World peoples and civilizations led to a dramatic drawdown of atmospheric carbon dioxide – the Orbis Spike (1610) – which in turn aggravated Europe’s climate downturn.⁴³ This was, as we shall see, the geophysical moment inscribed in the origins of the climate class divide, climate apartheid, and climate patriarchy: the capitalogenic trinity that now drives us full throttle towards the planetary inferno.⁴⁴ The result was a “long, cold seventeenth century” of endless war, endemic revolt, and economic turbulence.⁴⁵

What followed was capitalism’s first *climate fix*.⁴⁶ This reinforced the earlier thrusts of empire and capital across the Atlantic, itself a response to the climate-class conjuncture of the long *fourteenth* century. This long, cold seventeenth century was, for an emergent capitalism, the most unfavorable moment of the Little Ice Age. *Unfavorable* is deliciously imprecise. Suffice it to say that it was more than *uncomfortable*. Climate conditions roughly comparable with the long fifth and fourteenth centuries had witnessed the epochal crises of the Roman West and feudal Europe.⁴⁷

How, then, did capitalism survive where previous civilizations did not?

The short answer? The Great Frontier.⁴⁸ That’s a brutal shorthand of course. So let me explain. The entangled climate-class-financial conjuncture of the 1550s contributed mightily to a productivist turn across the Americas and in eastern Europe.⁴⁹ This climate fix formed through a new, productivist-centered political exchange between bankers, empires, and New World commodity producers.⁵⁰ The result was an environment-making revolution without precedent in scale, scope, and speed. Its surficial expression was a landscape revolution but its real content involved an audacious revolutionizing of re/production, rule, and class formation. It rendered necessary the Civilizing Project and its Cartesian-managerial logic (*avant la lettre*) of “thinking” and “extended” substances – the subject of Part II. It

⁴² R.H. Tawney, “The rise of the gentry, 1558-1640,” *The Economic History Review*, first series, 11(1, 1941), 1-38; Stuart B. Schwartz, *Sugar plantations in the formation of Brazilian society: Bahia, 1550-1835* (Cambridge: Cambridge University Press, 1985).

⁴³ Simon L. Lewis and Mark A. Maslin, “Defining the Anthropocene,” *Nature* 519 (2015), 171-80.

⁴⁴ Moore, “The Capitalocene and Planetary Justice”; idem, “[Making Sense of the Planetary Inferno: Planetary Justice in the Web of Life](#),” public lecture, Garage Museum of Contemporary Art, Moscow (2 July).

⁴⁵ Emmanuel Le Roy Ladurie and Valerie Daux, “The climate in Burgundy and elsewhere, from the fourteenth to the twentieth century,” *Interdisciplinary Science Reviews* 33(1, 2008), 10-24. On New World genocides, see Catherine M. Cameron, Paul Kelton, and Alan C. Swedlund, eds. *Beyond Germs: Native Depopulation in North America* (Tucson: University of Arizona Press, 2015); and David S. Jones, “Epidemics in Indian Country,” *Oxford Research Encyclopedia of American History* (2014).

⁴⁶ Moore, “[On the Origins of Climate Apartheid: Climate Class & Colonialism in the Making of Planetary Crisis](#).”

⁴⁷ An outstanding introduction to climate history is John L. Brooke, *Climate change and the course of global history* (Cambridge: Cambridge University Press, 2014); on the climatological severity and social turbulence of the long, cold seventeenth century, there are now many contributions. See Geoffrey Parker, *Global Crisis* (New Haven, CT: Yale University Press, 2017); Sam White, *A Cold Welcome: The Little Ice Age and Europe’s encounter with North America* (Cambridge, MA: Harvard University Press, 2017). A benchmark summary of the Little Ice Age’s geophysical dynamics is Michael E. Mann, “Little Ice Age,” in Michael C. MacCracken and John S. Perry, eds., *Encyclopedia of Global Environmental Change*, Vol. 1: *The Earth system: physical and chemical dimensions of global environmental change* (New York: John Wiley & Sons, 2002), 504-509.

⁴⁸ Walter Prescott Webb, “The great frontier: a disappearing boom,” *The Georgia Review* 8(1, 1954), 17-28. I’ll return to Webb in Part III.

⁴⁹ See especially, Moore, “Amsterdam,” Parts I and II. Those essays do not, however, account for the productivist turn in response to climate changes.

⁵⁰ On political exchange, see Giovanni Arrighi, *The Long Twentieth Century* (London: Verso, 2010 ed. [1994 original]), 122ff; Patel and Moore, *Seven Cheap Things*, 64-90; Jason W. Moore, “[Cheap Food and Bad Money: Food, Frontiers, and Financialization in the Rise and Demise of Neoliberalism](#),” *Review* 33(2-3, 2012), 225-261.

developed novel and violent forms of proletarianization across the Atlantic, including modern slaving and other forms of racialized labor.⁵¹ And it grounded world accumulation within strategies of Cheapening the lives and labor necessary to produce the Four Cheaps: labor and unpaid work, food, energy, and raw materials.

I can do no more than gesture towards the major commodity frontier moments across this long, cold seventeenth century. A representative sample includes: 1) Brazil's sugar revolution starting in the 1570, displacing São Tomé after a momentary boom short-circuited by slave resistance; 2) Potosí's dramatic restructuring after 1571, definitively relocating capitalist silver mining from Central Europe to Peru; 3) the rapid-fire succession of forest product commodity frontiers from Norway to Poland to the northeast Baltic, commencing – again – in the 1570s; 4) aggressive enlargements of the Vistula's cash-crop cereal agriculture (and consequential deforestation) after 1550, providing an indispensable hedge against food insecurity for Dutch capitalism; 5) the rise of the "Potosi of the North," Sweden's Stora Kopparberg, sending copper (the lithium of the seventeenth century) to sugar planters, arms manufacturers, and artisans across the Atlantic; 6) the relocation of Iberian shipbuilding to the Americas, where places like Salvador da Bahia and Havana would boast important shipyards by the early seventeenth century; 7) the remarkable expansion of fishing fleets into the North Atlantic, marking a signal moment of the "Great Hunt"; and 8) the Caribbean sugar revolution, first making landfall in Barbados but rapidly extending to Jamaica and thence French islands like Martinique and St. Domingue. This is hardly an exhaustive list.⁵²

The unprecedented character of this early capitalist environment-making revolution is impossible to overstate. Both scale and scope are impressive. Perhaps most significant, however, was its temporal character. In the long, cold seventeenth century, the "historical process [was] suddenly accelerated in terrifying fashion."⁵³ At this point, the antagonism between capital's drive to reduce socially-necessary turnover time systematically combined with imperialist projects to create the conditions for the appropriation of unpaid work – *accumulation by appropriation*.⁵⁴ This marked the modern formation of the Femtariat and Biotariat – the specifically binarized moments of unpaid human and extra-human reproductive work necessary to capitalism's Cheap Nature regime. These were dialectically bound to an extraordinary (and extraordinarily violent) acceleration of gendered, racialized, and colonial proletarianization.⁵⁵ This Great Proletarianization – understood as the differentiated unity of

⁵¹ "When three centuries ago the slaves came to the West Indies, they entered directly into the large-scale agriculture of the sugar plantation, which was a modern system. It further required that the slaves live together in a social relation far closer than any proletariat of the time. The cane when reaped had to be rapidly transported to what was factory production. The product was shipped abroad for sale. Even the cloth the slaves wore and the food they ate was imported. The Negroes, therefore, from the very start lived a life that was in its essence a modern life," C.L.R James, *Black Jacobins*, second ed. (New York: Vintage, 1989 [1963 original]), 392.

⁵² Detailed references to these and other epochal-transformations can be found in Moore, "Amsterdam is Standing on Norway," Parts I and II; idem, "The Capitalocene," Parts I and II. The "Great Hunt" is John F. Richards' term, *The Unending Frontier* (Berkeley: University of California Press, 2003).

⁵³ Jacob Burkhardt, *Reflections on History*, M.D. Hottinger trans. (Indianapolis: Liberty Fund, 1979), 224.

⁵⁴ Accumulation by appropriation names the ongoing extra-economic relations and forces that combine wage repression, chronic under-reproduction, and the extraction of unpaid work/energy in service of capital accumulation. It overlaps with, but is not reducible, to primitive accumulation and its class- and capital-formation dynamics. Nor is it reducible to accumulation by dispossession and displacement, which identifies one moment of a de-territorialization and re-territorialization fundamental to capitalism's historical geography. Historically, accumulation by appropriation works just as readily re-territorialize and limit the mobility of working classes – as a long-history of villagization from colonial Peru to apartheid South Africa attests. The extra-economic dynamics behind accumulation by appropriation comprise not only direct force, but also all manner of juridical and geocultural forces (e.g. racism, sexism). These arguments are foregrounded in Moore, "The Capitalocene, Part II" and *Capitalism in the Web of Life*, esp. 193-240.

⁵⁵ See, inter alia, Silvia Federici, *Caliban and the Witch* (Brooklyn: Autonomedia, 2004); Peter Linebaugh and Marcus Rediker, *The many-headed hydra: Sailors, slaves, commoners, and the hidden history of the revolutionary Atlantic* (Boston: Beacon, 2000);

Proletariat-Biotariat-Femitarat – depended on the era’s two pivotal frontiers: commodity frontiers across the Americas and eastern Europe, and the Great Domestication, whose guiding thread held that Man stood before Woman as the Bourgeoisie stood before Nature.⁵⁶ Great Proletarianization and Great Domestication were two sides of the world-historical coin, essential to the seventeenth-century climate fix. Without Cheap Labor there were no workers to labor in – or profits to be ripped from – the fields, mines, workshops, forests, and cities of early capitalism. Without these forcibly extracted labor frontiers, moreover, the limits to appropriating extra-human work/energy (and associated environmental change) were insuperable. Every environmental sacrifice zone – then as now – depended on workers, successively cheap and disposable.

It was in this socio-physical conjuncture that capitalism’s climate fix issued a “time-space compression” that degraded not only the soil but the worker. It ushered in epoch-making relations of power, profit and life that accelerated historical change beyond anything known before Columbus.⁵⁷ For millennia prior to 1492, the pace of landscape change was measured in centuries. When peasants in medieval Picardy set about clearing land in the twelfth century, it took two centuries to clear 12,000 hectares. Fast forward now to northeastern Brazil at the apex of its sugar revolution. During the glorious 1650s, Bahia’s sugar mills compelled the destruction of 12,000 hectares of forest... *every year*.

The resulting destruction of the Atlantic rainforest was therefore a class dynamic. Some humans, the possessors of money and power, directed the work of other humans – how easily do we forget that the plantation slave was also a plantation proletarian!⁵⁸ These proletarians were – as ever under conditions of racialized and gendered superexploitation – disposable. The devastation of “the soil” was the product of a regime that devastated the worker, and enriched the bourgeois, in this case the planters and the merchant-bankers that financed them. That regime’s managerial logic, Schwartz observes in his classic study of class conflict in Brazil’s seventeenth-century sugar zones, was simple enough: “extract as much labor at as little cost as possible.”⁵⁹ (Marx intuited as much in the chapter on the Working Day in *Capital*.⁶⁰) The commodity frontier was a demographic black hole; its commodities bled from every pore. A quarter-million African slaves who disembarked in Bahia and Pernambuco between 1600 and 1650. By the latter date, northeastern Brazil struggled to maintain a slave population of just 60,000. (Nor have we considered the Middle Passage’s heartbreaking mortality.)

Charles Tilly, “The demographic origins of the European proletariat,” in David Levine, ed., *Proletarianization and Family History* (Orlando, FL: Academic Press, 1984), 11-55.

⁵⁶ Patel and Moore, *A History of the World in Seven Cheap Things*, 117-125.

⁵⁷ David Harvey, *The Condition of Postmodernity* (Oxford: Basil Blackwell, 1989).

⁵⁸ On plantation proletarianization and the trans-Atlantic class struggles of the long, cold seventeenth century, see Linebaugh and Rediker. *The many-headed hydra*. The debate over the proletarian character of modern slavery goes back to Marx, and I won’t reprise it here. From the standpoint of capital, however, the plantation slave reproduced through the circuit of capital. Juridical unfreedom was necessary to that reproduction. But we must resist the temptations of a slave-exceptionalism in this regard. Juridical limits on proletarians is not limited to racist ideology; the observation applies equally, if distinctively, to the ruling abstraction Woman as necessary to proletarianization. There is a strong tendency to attach undue weight to Eurocentric bourgeois property norms to actually existing proletarianization. The fact that a slave was formal property and could be bought and sold puts the plantation slave at one end of a proletarian spectrum to be sure, but does not make that slave any less proletarian. An important survey of the slavery and proletarianization debate is on offer in Walter Johnson, “The Pedestal and the Veil: Rethinking the Capitalism/Slavery Question,” *Journal of the Early Republic*, 24(2, 2004), 299-308; Sidney Mintz’s contribution is oft-cited but rarely engaged, see “Was the Plantation Slave a Proletarian?” *Review* 2(1, 1978), 81-98.

⁵⁹ Stuart B. Schwartz, “The Mocambo: Slave Resistance in Colonial Bahia,” *The Journal of Social History*, 3 (1970), 313-33, quotation 317.

⁶⁰ Karl Marx, *Capital*, Vol. I (New York: Vintage, 1977), 340-389.

The exhaustion of labor-power in the fields and forests presumed not just terrestrial frontiers of seemingly limitless abundance, but also Africa's labor frontiers. For every landgrab and occupation, "physically uncorrupted" sources of fresh labor-power had to be found, secured, and supplied.⁶¹ Every commodity frontier presumes a new labor frontier. And so it was that the sugar frontier joined with slaving frontiers within Africa, whose autonomous political dynamics increasingly articulated with the newly-racialized "labor market" of the trans-Atlantic slave trade. Brazil's sugar revolution was of a piece with the geographical re-centering of the slave trade southwards towards the Angola. By the dawn of the eighteenth century, the slaving frontier had exhausted coastal Angolan supplies and drove fast towards the interior.⁶²

All of which informs the essential geographical insight of the commodity frontier approach: the very strategies of "ecological hit-and-run" underpinning the rapid creation and appropriation of Proletariat and Biotariat ensured their relative exhaustion. The pattern of socio-ecological exhaustion across commodity frontiers is clear. In one region after another, regional profitability faltered – again relative to potential greenfield sites on the frontiers. Crucially, as Marx observes about the exhaustion of *human* natures in capitalist production, such exhaustion is possible *because* of the frontier strategy itself – hence capital's dependence upon (and its political exchange with) empire. The shift from Brazil to the Caribbean after 1650 is a good example. Commodity frontiers were patterns of geographical movement, producing and produced by their socio-ecological antagonisms. If my original formulations came perilously close to a neo-Malthusian Marxism – essentially retrofitting an older soil exhaustion thesis – successive elaborations since have made clear that this pattern of geographical movement was driven by a complex and multi-layered ecology of power, profit and life. In these studies of socio-ecological exhaustion, one quickly confronts a substantialist temptation – to see exhaustion as the depletion of substances rather than relations that involve substances. The point is anything but metaphysical. *The exhaustion of successive commodity frontiers was tendentially – and on the ground, increasingly – overdetermined by proletarian revolt.* Haiti's sugar revolution was stopped dead by proletarian insurgency, not soil exhaustion.⁶³

The exhaustion of the soil and the worker was indeed pivotal, but cannot be reduced its regional moment. The commodity frontier was at once regional and systemic. Caribbean slaves, sugar, and soils were world-historical figures, and must be situated within worldwide capital flows, geopolitics, and transformations of metropolitan industry – as the Second Slavery after 1793 would demonstrate.⁶⁴ The trail of socio-ecological devastation that followed in the wake of commodity frontiers is therefore most effectively situated within two historical-geographical layers – movements between regions, and movements between successive world hegemonies and the world-ecological regimes in which they are embedded. This allows us to join the imperial-bourgeois class projects of remaking world nature to the opening of specific commodity frontiers, which in one era produce the conditions for new (and expanded) commodity frontiers in the next. Rising demand there was, but this accounts for only part

⁶¹ The phrase comes from the Moore and Aveling translation, Karl Marx, *Capital*, Vol. 1 (New York: International Publishers, 1967), 256.

⁶² See, inter alia, Joseph A. Miller, *The Way of Death* (Madison: University of Wisconsin Press, 1988), and John K. Thornton, *Africa and Africans in the Making of the Modern World, 1400-1800* (Cambridge: Cambridge University Press, 1992).

⁶³ Carolyn Fick, "Emancipation in Haiti: From plantation labour to peasant proprietorship," *Slavery and Abolition*, 21(2, 2000), 11-40; James, *Black Jacobins*. On the *longue durée* of the sugar-slave complex's class struggles see Stuart B. Schwartz, "Rethinking Palmares: Slave Resistance in Colonial Brazil," in *Slaves, Peasants, and Rebels: Reconsidering Brazilian Slavery* (Urbana: University of Illinois Press, 1992), 103-136. On the "turning point" of the Haitian Revolution and the transition towards semi-proletarian revolutionary politics that "foreshadowed the proletarian and anticolonial revolutions of the twentieth century," see Eugene D. Genovese, *From rebellion to revolution: Afro-American Slave Revolts in the Making of the Modern World* (Baton Rouge: Louisiana State University Press, 1979), 82, xx.

⁶⁴ Dale Tomich, *Through the Prism of Slavery* (Lanham, MD: Rowman and Littlefield, 2004).

of the geographical movement. “The commodity” and the “world market” play their roles, but the most prodigious increases in consumption – as cotton and sugar demonstrate – *followed* the most prodigious moments of output expansion.⁶⁵ Commodity frontiers *enabled* metropolitan industrialization – which in turn reinforced pressures to intensify output. This antagonism expressed a powerful contradiction – between the expanded accumulation of capital and the simple reproduction of life – that produced the commodity *frontier*: sequential overappropriation in one region after the next. The movement of primary commodity production into new frontiers implied, and indeed necessitated the advance of primary commodity production into yet newer frontiers whose “natural fertility” could “act like an increase in fixed capital.”⁶⁶

Far from a geophysical dynamic, this movement of putting webs of life to work – the punctuated formation of the Biotariat – was necessarily bound to Civilizing Projects, to which we now turn.

Part II

Commodity Frontiers, Ruling Abstractions & The Civilizing Project

The Great Frontier thesis offers an alternative to prevailing models of capitalist expansion and planetary enclosure. One agrees with the argument that there *is* an economic logic to modernity, and that this logic compels the serialized exhaustion of webs of life. There’s a neoclassical version of this position, which emphasizes market rationality and techno-scientific capacities to substitute one “scarce” resource for another. A radical variant emphasizes the catastrophist narrative: capital accumulation is an unavoidable collision with the web of life. Both have the virtue of insisting that modernity unfolds through a capital accumulation model – albeit from starkly different premises. This is what I’ve called the Green Arithmetic model. The problem? *Economy* plus *Ecology* doesn’t add up. At best, we have a general abstraction that combines “chaotic conceptions” ripped from their historical specificity.⁶⁷

A second model views modernity as a clash of civilizations. In this scheme of things, “the fundamental source of conflict... [is not] primarily ideological or primarily economic. The great divisions among humankind and the dominating source conflict... [are] cultural.”⁶⁸ In its critical expression, the conflict between oppressor and oppressed moves to center stage, and sympathies are clearly aligned with the latter.⁶⁹ In both instances, however, civilization – like racialism more broadly – becomes “a sort of ontological fact of political existence.”⁷⁰ The origins of European civilization and racial formation are rooted somewhere in the distant, and decidedly premodern, past.⁷¹ Today, this tendency expresses itself under the banner of settler colonialism and racial capitalism. It moves beyond Green Arithmetic’s economism by correctly identifying geocultural and political domination in the making of the modern world. It falls behind by erasing the distinction between capital logic –

⁶⁵ Moore, “World Accumulation and Planetary Life.”

⁶⁶ Marx, *Grundrisse*, 748.

⁶⁷ Marx, *Grundrisse*, 100.

⁶⁸ Samuel P. Huntington, “The Clash of Civilizations?,” *Foreign Affairs*, 72(3, 1993), 22-49, quotation, 22.

⁶⁹ Asad Haider’s exploration of this question is indispensable, “In the Shadow of the Plantation,” *Viewpoint Magazine* (13 February, 2017).

⁷⁰ Edward Said, “Clash of Definitions,” in *Reflections on Exile and Other Essays* (Cambridge: Harvard University Press, 2000), 569–592.

⁷¹ See, for example, Cedric Robinson, *Black Marxism* (London: Zed 1983). Robinson is, moreover, explicit that early modern capitalism is not – not *really* – capitalism.

often ignoring this entirely – and the geocultural terrain of class struggles for and against superexploitation. Like Green Arithmetic, it trades in chaotic conceptions. And like neoliberal theory, it tends to abstract or radically minimize class exploitation – and class politics, often in national and racial forms – from the history of capitalism as an ecology of power, profit and life. Its unsavory implications can be found in Latour’s recent “defense” of the “European Homeland.”⁷² The dialectical alternative, specified by figures like Harry Haywood as early as 1933, identified the dialectic of the “national colonial question” and “proletarian revolution.”⁷³

The Great Frontier thesis joins these two moments – the logic of capital and geocultural pivot of domination – with environmental history. It refuses the conceit of “footprint” metaphors to understand the double register of Nature – as web of life and as the ruling abstraction produced through Civilizing Projects and their manifold, highly binarized, oppressions.⁷⁴ Environment-making is, as Marx underlines, an ongoing dialectic of mutual transformation – the worker (“internal nature”) and webs of life (“external nature”) produce each other, but never in the same way, always asymmetrical, always historical.⁷⁵ From this standpoint, we may speak of something called *capitalism* because the expanded reproduction of capital and its definite rules of reproduction are hegemonic – increasingly so over the Great Frontier’s *longue durée*. The “logic of capital” is not a thought abstraction but a *real abstraction*, an operative force remaking planetary life, itself re/produced through primitive accumulation.⁷⁶ This is what Marxists call the law of value.⁷⁷ Its “immanent laws” of capitalist competition reward those compete effectively – and punish those who do not.

The catch? Capital logic is helpless – indeed it cannot mature – without geocultural domination and territorialist power. Capitalists, as economic actors, are not well-suited to create good business environments. The capacity to advance the rate of profit in the worldwide competitive struggle is fundamentally shaped by territorial power and ideologies of domination – above all, racism, sexism, and the Civilizing Projects in which they are embedded. Just as the restoration of Cheap Energy, for instance, can expand opportunities for otherwise overaccumulated capital, so too Civilizing Projects. As Barbara J. Fields quips, “no one stood to make a profit growing [plantation crops]... by democratic methods. Only those who could force large numbers of people to work [the fields] for them stood to get rich.”⁷⁸ The dynamics of world domination were therefore neither metaphysical forces placed alongside world accumulation – nor were they reducible to a narrowly-defined economic logic. The very ideologies of domination – and their imperial structures – that made possible the Cheap Natures at the heart of world accumulation were also reproduced through the logic of capital. When push came to shove, the balance of the dialectic was settled by armed force. Thus our second critique: not only is economism unduly partial, but so too civilizationism and the “chaotic” invocation of oppression and resistance as metaphysic.

⁷² Latour, *Down to Earth*.

⁷³ Harry Haywood, “The Struggle for the Leninist Position on the Negro Question in the United States,” *The Communist*, (September 1933); James W. Ford, *Negro's Struggle Against Imperialism* (New York: Provisional International Trade Union, Committee of Negro Workers, 1930).

⁷⁴ Jason W. Moore, “[Slaveship Earth: The World-Historical Imagination in the Age of Climate Crisis](#), *PEWS News: Newsletter of the Political Economy of the World-System Section, American Sociological Association* (Spring, 2018), 1-4. Ghassan Hage, *Is Racism an Environmental Threat?* (Cambridge, UK: Polity Press, 2017).

⁷⁵ See esp. Marx, *Capital*, 283; the most concise expression of this environment-making dialectic is Richard Lewontin and Richard Levins, “Organism and environment,” *Capitalism Nature Socialism*, 8(2, 1997), 95-98.

⁷⁶ Alfred Sohn-Rethel, *Intellectual and manual labour: A critique of epistemology* (Atlantic Highlands, NJ: Humanities Press, 1978).

⁷⁷ Jason W. Moore, “[The Value of Everything? Work, Capital, and Historical Nature in the Capitalist World-Ecology](#),” *Review: A Journal of the Fernand Braudel Center* 37(3-4, 2017), 245-292.

⁷⁸ Barbara Jeanne Fields, “Slavery, race and ideology in the United States of America,” *New Left Review* 1/181(1, 1990), 95-118, quotation: 102.

In my original formulations, the commodity frontier embraced but also resisted Green Arithmetic. On the one hand, I foregrounded environmental history in a more-or-less conventional frame. On the other, I conceptualized this environmental history as immanent to the law of value – a guiding thread that led me to see environmental degradation extending to the worker alongside the soil. This challenged the anti-worker arguments of “ecologically unequal exchange.”⁷⁹ By internalize the commodity frontier’s class and metabolic contradictions within the law of value, new vistas opened up for me. I was able to see how these metabolic arrangements were strategically articulated with capitalism’s immanent contradictions of world power and world accumulation. The link to Giovanni Arrighi’s groundbreaking account is instructive. Capitalism, Arrighi argued, reinvents itself through successive long waves of accumulation. This implied a reinvention of capitalism’s relation to planetary life.⁸⁰ The restless geography of capitalism dramatized in successive superpowers’ “organizational revolutions” were dialectically joined to the successive revolutions in ways of organizing *historical* natures – revolutions that included the geocultural dimensions of world hegemony no less than new forms of botanical imperialism, agricultural revolutions, and planetary urbanization.⁸¹

This line of march therefore focused on a tight, if uneven, relation between regional boom-and-bust sequences – the commodity frontier’s pattern of “sequential overexploitation” – and capitalism’s rules of reproduction.⁸² Capitalism’s law of value – the specifiable dynamics of endless accumulation – is a differentiated unity of power, profit and life.⁸³ This brings into focus the inner connections between ideological hegemony, geocultural domination, and class exploitation in the web of life. Each moment of power, profit and life contains specific contradictions that favored superexploitation through the creation of a new cosmological domain: Nature.

Nature and its cognates – wild, savage, barbaric, and many more – is the antonym of the Civilizing Project. It is the geocultural hammer of imperial domination, and its priority is to advance the rate of profit against rival imperial (and sometimes, developmentalist) state-capital alliances. The heart of this struggle is the imperial-bourgeoise project to pursue and create opportunities for superprofits through superexploitation⁸⁴ – a novel synthesis of oppressive exploitation that entangles, as we’ve seen, Proletariat, Biotariat, and Femitariat.

Cheap Nature is a strategy of superexploitation. The whole point is to drive down re/production costs to levels below the systemwide average – a dynamic that gives specific bourgeoisies a competitive advantage. The world-historical agent of superexploitation is the imperialist bourgeoisie – a relation

⁷⁹ Moore, “[Marx and the Historical Ecology of Capital Accumulation on a World Scale](#).”

⁸⁰ “The metropolitan domains of each [world hegemony] in this sequence encompass a larger territory and a greater variety of resources than those of its predecessor.” By the early nineteenth century, for example, “Britain was not only a fully developed nation-state and, as such, a larger and more complex organization than the United Provinces had ever been; it was also in the process of conquering a world encompassing *commercial and territorial empire which gave its ruling groups and its capitalist class an unprecedented command over the world’s human and natural resources*,” Arrighi, *The Long Twentieth Century*, 14, 223, emphasis added.

⁸¹ Moore, “Ecology, Capital, and the Nature of Our Times.”

⁸² Madhav Gadgil and Ramachandra Guha, *This Fissured Land: An Ecological History of India* (Berkeley: University of California Press, 1992), 121; for a world- historical conception of sequential overexploitation, see Moore, “Environmental Crises and the Metabolic Rift in World-Historical Perspective.”

⁸³ Moore, “Capitalism as World-Ecology.”

⁸⁴ “[I]t was from this super-exploited and oppressed area [the American South] that the capitalists recruited their ‘cheapest’ workers for northern industry and obtained and continue to obtain from the labor of the Negroes on the cotton plantations some of the surplus profit used in strengthening the power of capital generally,” James S. Allen, *Negro Liberation* (New York: International Publishers, 1938), 28; for superexploitation and surplus profit on a world-scale, see Samir Amin, “The Surplus in Monopoly Capitalism and the Imperialist Rent,” *Monthly Review* 64(3, 2012), 78-83; John Smith, *Imperialism in the Twenty First Century* (New York: Monthly Review Press, 2016); Lenin, *Imperialism*.

of political exchange expressed in imperial geopower and class exploitation.⁸⁵ Its mechanisms are modes of politically- and culturally-enforced class domination – operating through *ruling abstractions* of racialized and gendered Nature. Its geocultural mechanisms not only reduce the wage bill for a significant layer of the new (semi)proletariat (e.g. racial and gendered “pay gaps” and labor market segmentation). They also extend the *unpaid* working day – the “second shift” – and impose “forced underconsumption.”⁸⁶ DuBois called this “the ultimate exploitation” of the plantation proletarian, and it unifies the exhaustion of landscapes and laboring bodies in dialectical tension.⁸⁷ The long history of “disposable workers,” in Melissa Wright’s felicitous phrase, stretches from canefields of the Bahia to the factories of Manchester to the maquiladoras of neoliberal Mexico.⁸⁸

The Disposable Proletarian is the pivot of Cheap Nature and result of superexploitation – then as now, although never quite in the same way. Marx anticipated the argument in his exposition on the Working Day. Why, Marx asks, does the industrial capitalist “produce the premature exhaustion and death of... labour-power”?⁸⁹ For two reasons, he answered. Each was necessary to the other. First, “the immanent laws of capitalist production confront the individual capitalist as a coercive force external to him.”⁹⁰ And yet, the exhaustion of labor-power can only occur insofar as new sources of “physically uncorrupted” labor (latent supplies of labor-power) can be mobilized.⁹¹ It’s the frontier – under conditions of imperial-bourgeois rule – that counter-acts the tendency towards rising costs of reproduction in the relatively capitalized heartlands.⁹²

The vast majority of the world proletariat in the centuries after 1492 was enclosed within Nature, the object of the Civilizing Project, from which issued new, increasingly modern, strategies of racialized and gendered domination. To render these strategies primordial – or independent of the worldwide class struggle – ignores the specificities of *capitalist* racism and sexism in class formation and the superexploitation it made possible. The cosmology of Civilizing and Savagery was the beating of heart of such racialized and gendered proletarianization; it was an instrument of class rule.

Elaborated from 1492, we see that new cosmology at work – and with it, a practical set of orienting assumptions and guidelines for the new seaborne empires. These assumptions and guidelines – Nature, Civilization, Society, Europe/an – are not just real but *ruling abstractions*, invented and re-invented since the long sixteenth century (1450-1648).⁹³ Far from an isolated concern of theologians and *philosophes*, the Civilizing Project became a practical matter of rule for the conquests and commodifications that ensued. Who and what was Civilized, and who and what was un-Civilized and therefore Natural, was a question that preoccupied soldiers and priests, planters and mine owners, bankers and kings, across early capitalism’s *longue durée*.

Early capitalism’s ontological revolution – creating increasingly hard-and-fast boundaries between Civilization and Nature – was an ideological revolution, one that precipitated *ruling abstractions*. These are the building blocks of capitalist ideology. Ruling abstractions are not thought abstractions the precede concrete action; they are, rather, the results of capitalist praxis. The original ruling binary, Civilization and Nature, were actively produced through imperialist-supervised class formation, its

⁸⁵ Arrighi, *The Long Twentieth Century*.

⁸⁶ The phrase is Farshad Araghi’s, see “Accumulation by Displacement,” *Review* 32(1, 2009), 113–46.

⁸⁷ W.E.B. DuBois, *Black Reconstruction in America 1860-1800* (New York: The Free Press, 1998 [1935 original]), 15.

⁸⁸ Melissa W. Wright, *Disposable women and other myths of global capitalism* (New York: Routledge), 2006.

⁸⁹ Marx, *Capital*, 376.

⁹⁰ Marx, *Capital*, 381.

⁹¹ Marx, *Capital* [1967 ed.], 256.

⁹² See, Moore, *Capitalism in the Web of Life*, ch. 9.

⁹³ The classic text on real abstraction is Sohn-Rethel, who is however addressing a dynamic of real abstraction-formation within the capitalist law of value and the abstractions produced through it monetary moments. For Nature as real abstraction, see Moore, “World Accumulation and Planetary Life”; Patel and Moore, *Seven Cheap Things*, 44-63

ethos of planetary management, and its alienation of mental and manual labor on a world-scale.⁹⁴ The emergence of these ruling abstractions in turn shaped capitalist praxis, above all a remarkably supple Civilizing Project.

In this praxis, Civilization and Nature were abstractions treated as real by imperialist bourgeoisies and used practically by territorialist powers to create good business environments. They quickly morphed into bourgeois naturalism's favored binaries of world sexism and racism, ideological pillars of capitalist superexploitation. Naturalized racism and sexism were, in other words, necessary to extending the working day, enforcing underconsumption, and appropriating unpaid work. Such ruling abstractions – like today's Humanity and Nature – describe the world in order to reproduce capitalism's business as usual. (Or create new conditions of profitability.) They are, as Marx and Engels underscore, “ruling ideas.” They invite the working class “to *share the illusion of [their] epoch*” – insofar as they do so, we make speak of *ruling abstractions*.⁹⁵

Their taproot is a bourgeois naturalism that explains oppression and inequality – and therefore the subordination of the re/producing classes – in terms of natural law rather than class relations. While we associate this today with the legacy of Malthus and eugenicism, its roots go back to the metaphysical instrumentalism of early Spanish imperialism.⁹⁶ Between Columbus' “I conquer therefore I am,” and Descartes “I think, therefore I am” was the Spanish Christianizing Project. Its motto might well have been “I conquer, therefore *you* work.” The emergent theological position of the early sixteenth century was metaphysical instrumentalism, which held that Spaniards stood before indigenous peoples in the same way that God stood before the Christian Spaniards.⁹⁷ The “imperfect” character of indigenous peoples might be remedied through hard work. *Arbeit macht frei* haunts capitalism's origins, its genocidal thrust of superexploitation forming through the Great Frontier.

This was the *Civilizing Project*, the geocultural logic of the new imperialism. All commodity frontiers were enabled by some variant of this Project, each with specific inflections of racialized and gendered class formation and class rule. The old xenophobia was progressively displaced by a new logic of modern domination, pitting the Civilized against the Savage. Every new commodity frontier was enabled by empires that “discovered” the inhabitants of the new land were lazy, irrational, barbaric.⁹⁸ (One reason why slogans like “eco-socialism or barbarism” leave a bad taste in my mouth.) The geocultural logic was one of “radical exclusion,” through which properties of the Civilized were evacuated as totally as possible from the Savage – of White from Black, of Man from Woman, of Thinker and Manager from Worker.⁹⁹ Commodity frontiers were hothouses of such radical exclusions and formation of the Cartesian binary as cultural logic of superexploitation – which shaped in turn a managerial logic of workplace rationalization with its multi-layered separation of mental and manual labor.¹⁰⁰

Every commodity frontier yielded new expressions of the Civilized and Savage: seventeenth-century Andeans became *naturales*; sixteen-century Irish, *wild*; late seventeenth-century indigenous

⁹⁴ This formulation is of course influenced by Sohn-Rethel, *Intellectual and manual labour*. Sohn-Rethel's formulation focuses on the dynamics of capital accumulation proper, whereas ruling abstraction foregrounds the emergence of ruling ideas treated as real in capitalist praxis on a world-scale. The two – real and ruling abstractions – find common ground in the ideological production of managerial ethos premised on the alienation of mental and manual labor.

⁹⁵ Marx and Engels, *Collected Works*, Vol. 5, 55.

⁹⁶ David McNally, *the Market* (London: Verso, 1993), 62-103; Thomas Robertson, *The Malthusian Moment* (New Brunswick, NJ: Rutgers University Press, 2012); Orlando Betancor, *The Matter of Empire: Metaphysics and Mining in Colonial Peru* (Pittsburgh: University of Pittsburgh Press, 2017).

⁹⁷ Betancor, *The Matter of Empire*.

⁹⁸ The classic text is Hussein Alatas, *The Myth of the Lazy Native: A Study of the Image of the Malays, Filipinos and Javanese from the 16th to the 20th Century and Its Function in the Ideology of Colonial Capitalism* (New York: Frank Cass and Company, 1977).

⁹⁹ Val Plumwood, *Feminism and the Mastery of Nature* (New York: Routledge, 1993).

¹⁰⁰ Harry Braverman, *Labor and Monopoly Capital* (New York: Monthly Review Press, 1974).

peoples in the Carolinas were, Locke told us, living in a state of nature. And everywhere, living breathing human beings who resided in the new frontiers were stripped of their Humanity, variously defined as lazy, un-Christian, un-Civilized, un-Developed.¹⁰¹ The commodity frontier, to paraphrase Ynestra King, was a zone of “human sacrifice.”¹⁰²

What can the commodity frontier tell us about this world history? It orients us to how capitalism’s geocultural logic of domination was explicitly and intimately connected to capitalism’s drive to turn humans and the rest of nature into profit-making opportunities – and how both produced and were produced by capitalist environment-making. Severing this trinity – power, profit and life – has been the accomplishment of the neoliberal turn in the academy, everywhere insisting on these fragments and their particularities. But on the ground of *real* historical specificity, I think of sugar/slaving frontiers in Bahia and Barbados, no such fracturing occurred. Racist domination, ruthless class exploitation, a ceaseless drive for profit, extraordinary deforestations – all were entangled in a capitalist world-ecology that rewarded competitive fitness and punished those who failed to advance the rate of profit. Frontiers were places where riches beckoned, precisely because frontiers were places where the possibilities for effective resistance were lowest, and varied forms of “natural fertility” (soils, ores, forests, etc.) were highest.

Frontiers were zones of Nature, one whose “wildness” and “savagery” might be Civilized through Work. Work itself was epochally redefined in ways that favored the pursuit of power and the accumulation of capital. Famously, so-called women’s work was redefined as Natural, as “non-work” (Federici).¹⁰³ The Great Domestication was fundamental to the Great Frontier.¹⁰⁴ Racialization was equally, yet differentially, fundamental to licensing all manner of oppression to extract paid and unpaid work.¹⁰⁵ Especially after 1550, we begin to see the decisive crystallizations of a new mode of frontier-making, one entirely different from pre-capitalist civilizations. Refigured as the zone of Savagery (Nature), commodity frontiers became free-fire zones for militarized accumulation. Through the Civilizing Project, the commodity frontier strategy

provides the structural basis of an apartheid-like tendency, a tendency to have at least two very different types of development and two different types of capitalist sociality at the very core of exploitative capitalism. One is defined by a civilized, cosmopolitan, state-regulated, lawful, welfare-supported, ecologically concerned exploitation. The other is defined by a savage, anarchic capitalism, spatially or socially peripheral to the cosmopolitan center (this center-periphery logic can be international or intra-national, it can even be intra-urban between two forms of social inhabitation of the same cosmopolitan city), and dominated by unchecked exploitation, theft, and pillage. One is regulated with a policing logic. The other is a space of war.¹⁰⁶

This “apartheid-like” strategy was – like South African apartheid – a developmentalist strategy premised on superexploitation. It was a *class* politics; its racialization was fundamental to “divide and

¹⁰¹ Patel and Moore, *Seven Cheap Things*.

¹⁰² Ynestra King, “Healing the wounds,” in A.M. Jaggar and S.R. Bordo, eds., *Gender/body/knowledge* (New Brunswick, NJ: Rutgers University Press, 1989), 115-141.

¹⁰³ Federici, *Caliban and the Witch*.

¹⁰⁴ Patel and Moore, *Seven Cheap Things*, 111-137.

¹⁰⁵ Jason W. Moore, “On the Origins of Climate Apartheid.”

¹⁰⁶ Hage, *Is Racism and Environmental Threat?*, 60.

rule” and “define and rule.”¹⁰⁷ And it was an *imperialist* strategy, laid bare by South Africa’s decades-long occupations and invasions of Namibia and Angola. South African apartheid was an accumulation strategy that promised the riches of Development – which was nothing more than the re-branding of the Civilizing Project after 1949. Thus the link between “civilization” and “savagery” is reproduced through world accumulation, itself sustained by frontier movements premised on the geopolitical and geocultural logic of the Civilizing Project. This is what I call – much to the chagrin of my Brennerian comrades – *a political Marxism on a world-scale*.¹⁰⁸ It is at the heart of the world-ecology conversation, which insists that capitalism’s relations with Nature (the ruling abstraction) and the web of life and the *oikeios* (its pulse of life-making) are always culturally-instantiated and politically-mediated.

What happens when capitalism’s logic of superexploitation in the web of life approaches the end of the frontiers prized opened in the great climate fix of the long, cold seventeenth century? What can we expect of the capitalogenic trinity – the climate class divide, climate apartheid, climate patriarchy – in the era of the planetary inferno and total enclosure of the atmospheric commons?

To these questions we can now turn.

Part III

The Great Implosion, From Climate Fix to Climate Crisis

Today, the same strategies of power, profit and life behind the seventeenth century’s climate fix are propelling the climate crisis. That crisis is at once geophysical, marking the end of the Holocene, and geohistorical, an epochal crisis of the capitalist world-ecology. The two are often separated, analytically and in our politics. But this is a mistake. Climate conditions are fundamental to class society, and class society has been – until recently! – fundamental to Holocene stability. Indeed, the stabilization of atmospheric CO₂ around 270-280 ppm by 4000 BCE was the product of an Afro-Eurasian agricultural-urban revolution.¹⁰⁹ Class society became an Archimedean lever of Holocene stabilization, counter-acting the tendency towards decarbonization and renewed glaciation that characterized the previous nineteen inter-glacial periods. Climate, in this reading, is certainly not everything. But it’s impossible explain *anything* about the *longue durée* of class society without it.

The seventeenth-century’s climate fix, premised on the Great Frontier, stumbled upon a thoroughly modern expression of this dynamic. The drive for Cheap Labor, as we’ve seen, magnified disease impacts in the Americas beyond anything humankind had experience. The ensuing decarbonization – the Orbis Spike (1610) – reinforced “natural forcing” that was driving the worst weather of the Little Ice Age. As we’ve seen, financial and fiscal crises joined war and political unrest to force European empires and capitalist into making a productivist turn, one with earth-shaking ramifications, felt from the South Atlantic to southeast Asia. This was the world-ecological revolution of the long, cold

¹⁰⁷ Patrick Bond, “Introduction: two economies – or one system of superexploitation?” *Africanus* 37(2007), 1-21; Raymond Lotta, “The Political Economy of Apartheid and the Strategic Stakes of Imperialism,” *Race & Class* 27(2,1985), 17-34; M Mamdani, *Define and Rule* (Cambridge, MA: Harvard University Press, 2012).

¹⁰⁸ Moore, “The Capitalocene,” Part II.

¹⁰⁹ William F. Ruddiman, *Plows, plagues, and petroleum: how humans took control of climate* (Princeton: Princeton University Press, 2005); V.G. Childe, *Man Makes Himself* (New York: Mentor, 1951).

seventeenth century.¹¹⁰ Like the urban-agricultural revolution some 8,000 years earlier, early capitalism's climate fix was a carbonization machine – this time on steroids. Its Archimedean lever, organizationally speaking, was the plantation-extractive revolution. Its class basis was an emergent polarity of imperialist bourgeoisies (riven by geopolitical rivalries) and the Planetary Proletariat, understood as our differentiated unity of proletariat, biotariat, and femitariat. Thus took shape our capitalogenic trinity: the climate class divide, climate patriarchy, climate apartheid.

This trinity was pivotal to early capitalism's climate fix – and is inescapable in today's climate crisis. It is not the result – but the *cause* – of today's Great Implosion.

The Great Implosion is something more than the “disappearance of the frontier.”¹¹¹ To amend Frederick Jackson Turner's classic formulation (1893), we are witnessing not the “closing” – but rather the *implosion* – of “a great historic movement.”¹¹² The geohistorical transition now underway is an epochal inversion of capitalism's defining relation with and within the web of life. This is the transition from the web of life as a cost-reducing and productivity-advancing dynamic to a cost-maximizing and productivity-reducing one. Its early signs are now widely grasped, by ruling class and Marxist economists, as the Great Stagnation.¹¹³ But this is only the beginning; we might call it a signaling crisis.¹¹⁴ The Great Stagnation signals the first moments of the Great Implosion.

The Great Implosion is an epochal inversion of the Great Cheapening that opened the capitalist era. Like the Great Cheapening, the Great Implosion is a non-linear event in which *capitalism* has become *new* kind of “geological force” – to paraphrase Vernadsky. It's worth remembering that capitalism was, from the beginning, a geological force. Its crowning achievement in the two centuries after 1492 was the creation of a modern Pangea, unifying planetary life for the first time in 175 million years. Critics might object that this modern Pangea was accidental; it was anything but. The trans-oceanic flotillas of guns, slaves, and capital had no precedent in the history of class society. Today's Great Implosion is the quantity/quality transformation of that modern Pangea – a geohistorical accomplishment that leads in a direct line to the biosphere's “state shift,” at once producing and produced by capitalism's unfolding crisis.

Earth system scientists use the state shift concept to track fundamental tipping points – like climate change – in the biosphere. These state shifts move “abruptly and irreversibly... when [‘ecological systems’] are forced across critical thresholds.”¹¹⁵ The incorporation of non-linearity into biological thinking is not of course new, and enjoys a contentious relationship with catastrophism.¹¹⁶ But the principle of quantity/quality transformation is entirely compatible with dialectical thinking.¹¹⁷ Despite this, most Marxists have resisted the idea that modes of production are ontologically connected to the web of life – which are inside, outside, and in between modes of production and (to borrow from

¹¹⁰ Moore, “The Capitalocene, Parts I and II”; idem, “Amsterdam is Standing on Norway, Parts I and II.”

¹¹¹ Frederick Jackson Turner, *The Frontier in American History* (New York: Henry Holt and Company, 1921), Preface.

¹¹² Frederick Jackson Turner, “The Significance of the Frontier in American History,” in *The Frontier in American History*, 1-38, quotation, 1.

¹¹³ The usual language is secular stagnation, but see Tyler Cowen, *The Great Stagnation* (New York: Penguin, 2011). For Roberts, it is the “long depression,” see idem, *The Long Depression*.

¹¹⁴ After Arrighi, *The Long Twentieth Century*.

¹¹⁵ Anthony D. Barnosky, et al., “Approaching a state shift in Earth's biosphere,” *Nature* 486(7401, 2012), 52-58, quotation, 52; Will Steffen, et al., “Planetary boundaries: Guiding human development on a changing planet,” *Science*, 347(6223, 2015), 1259855.

¹¹⁶ N. Eldredge and S.J. Gould, “Punctuated equilibria: an alternative to phyletic gradualism,” in T.J.M Schopf, ed., *Models in Paleobiology* (San Francisco: Freeman, Cooper & Co, 1972), 82-115; Justin McBrien, “Accumulating Extinction,” in Jason W. Moore, ed., *Anthropocene or Capitalocene?* (Oakland, CA: PM Press, 2016), 116-137.

¹¹⁷ The best concise introduction is Bertell Ollman's *Dialectical Investigations* (New York: Routledge, 1993).

Marx) “the rest of nature.”¹¹⁸ This has left historical materialism ill-equipped to see the dialectics of the double internality – capitalism in the web of life and the web of life in capitalism. Notwithstanding Marx’s relentless emphasis on the mutual interpenetration of capital, class, and labor in the web of life – and the dialectical rule of interchangeable subject-object relations – Marxists by and large refrain from seeing the webs of life as variably products *and* producers of class society. The methodological emphasis is bound to a practical question: In what ways does the non-linear “capital-forcing” of climate change induce the linear “climate-forcing” of capitalist crisis? In other words, What is the historical-dialectical relation of “earth formation” and “social formation”?

The opening and closing of the Great Frontier takes us from the Great Cheapening to the Great Implosion. What happens to world accumulation once the closure – and thence implosion – of frontiers begins? To underscore the matter precisely: we are looking at the contraction of unpaid work/energy (the Four Cheaps) relative to the rising mass of capital seeking profitable investment outlets.¹¹⁹ Capitalist dynamism creates more capital than can be invested profitably. That’s a Marxist truism. While precise formulations vary, all Marxist political economy wrestles with one or another version of the surplus capital absorption problem. The chief counter-tendency derives from the opening of frontiers that deliver Cheap labor, food, energy and raw materials at well-below the prevailing cost (again, understood in value terms). The Great Frontier is crucial to fixing overaccumulation crises because successive industrial revolutions and their “operational landscapes” rely on one or another strategic primary commodity: Dutch fluitschips were assembled with cheap timber from Norway; Manchester textile factories with cheap cotton from the American South; Henry Ford’s Model T’s were profitable to manufacture only because of cheap oil.¹²⁰

The Great Implosion does not mean there are absolutely no frontiers of Cheap Nature, only that such frontiers as do exist today (e.g. Amazonia) cannot restore the Four Cheaps sufficiently to absorb surplus capital. That there exists a wildly inflated surplus capital problem today is hardly in doubt. This is at once symptom and cause of the Great Stagnation of profit and productivity, to which we now turn.

The Great Stagnation of Profit and Productivity: Prelude to the Great Implosion

The Great Stagnation is the exhaustion of Cheap Nature. The signs are everywhere, but three are expressive, turning on overaccumulated capital and faltering labor productivity. They prefigure

¹¹⁸ Harvey’s astute observation from the late Nineties remains relevant: “Marxism has shared with much of bourgeois social science a general abhorrence of the idea that ‘nature’ can control, determine, or even limit any kind of human endeavor. But in so doing it has either avoided any foundational view of nature or resorted to a rather too simplistic rhetoric about “the humanization of nature” backed by a dialectical and historical materialism that somehow absorbed the problem by appeal to a set of epistemological ontological principles... [T]he armory of Marxism/ socialism to counter the rhetoric and politics of a rising tide of ecological movements has not been well stocked... [T]he response within the Left to rising ecological concerns has been either to reject environmental/ecological politics as a bourgeois diversion (as, indeed, much of it patently is) *or to make partial concessions to environmental ecological rhetoric and try to rebuild Marxism/ socialism on rather different theoretical and practical foundations from those traditionally chosen as a grounding for working-class politics*,” David Harvey, “What’s green and makes the environment go round?” in Frederic Jameson and Masao Miyoshi, eds., *The Cultures of Globalization* (Raleigh, NC: Duke University Press, 1998), 327-355, quotation: 327-28.

¹¹⁹ Moore, *Capitalism in the Web of Life*; idem., “Transcending the Metabolic Rift”; idem., “World Accumulation and Planetary Life.”

¹²⁰ For the history of Cheap Nature and industrializations, see Moore, *Capitalism in the Web of Life*; Patel and Moore, *Seven Cheap Things*. On operational landscapes, see Neil Brenner, *New Urban Spaces* (Oxford: Oxford University Press, 2019); Nikos Katsikis, *From Hinterland to Hinterlobe: Urbanization as Geographical Organization*, Doctor of Design (DDes) thesis, Graduate School of Design (GSD), Harvard University, 2016; Neil Brenner, and Nikos Katsikis, “Operational landscapes: Hinterlands of the Capitalocene,” *Architectural Design* 90(1, 2020), 22-31.

dramatic contractions on the horizon. First is the secular decline of profitability. The world rate of profit has been falling since the 1870s – temporarily counter-acted at various junctures, especially between 1947 and 1966, and again between 1983 and 2003.¹²¹ The mass of accumulated capital continues to grow without a corresponding expansion of profitable investment opportunities. The turn is towards a kind of rentier capitalism increasingly – necessarily – reliant on state power to secure its reproduction.¹²² Capitalists “look for unproductive investments like property to replace investment in production when profitability in productive assets falls.”¹²³ One indicator of the enormity of such overaccumulated capital is found in 2019 reports identifying 17 *trillion* dollars in government bonds with “below-zero yields.”¹²⁴ Meanwhile, capitalist real estate investment – “property owned for the express purpose of achieving investment returns” – skyrocketed, growing 50 percent between 2013 and 2019, when it reached \$9.8 trillion.¹²⁵ American financial corporations, whose rising share of corporate profits defined Euro-American neoliberal capitalism, saw that share decline sharply after 2002 and then stagnate.¹²⁶ Nonfinancial investment in the USA – and across the global core – collapsed in the early 2000s and has yet to recover.¹²⁷ China, whose aggressive Keynesianism in the midst of the Great Recession (c. 2008-10) “rescued” global capitalism,¹²⁸ is of course a counter-tendency. But it should not be overemphasized. In China too, labor costs have been rising and with it, the organic composition of capital. After a momentary rise during the Great Recession, profitability has fallen and remains well below pre-2008 levels.¹²⁹ This certainly explains some measure of China’s savvy resource acquisition strategy. In the absence of vast frontiers of Cheap Nature – sufficient to revive the world rate of profit – China does not appear poised to lead capitalism into a new golden age.

¹²¹ Michael Roberts, *The Long Depression* (Chicago: Haymarket, 2016), esp. 9-30; Esteban Ezequiel Maito, “The Tendency of the Rate of Profit to Fall since the Nineteenth Century and a World Rate of Profit,” in Guglielmo Carchedi and Michael Roberts, eds., *World in Crisis: A Global Analysis of Marx's Law of Profitability* (Chicago: Haymarket, 2018); Guglielmo Carchedi and Michael Roberts, “The Long Roots of the Present Crisis: Keynesians, Austerians, and Marx’s Law,” in Carchedi and Roberts, eds., *World in Crisis*.

¹²² Brett Christophers, *Rentier Capitalism: Who Owns the Economy, and Who Pays for It?* (London: Verso, 2020).

¹²³ Roberts, *The Long Depression*, 226.

¹²⁴ Bond yields have modestly revived since the pandemic’s “historic” government borrowing spree, reaching \$15 trillion in 2020, see Marc Jones, “Rising yields still ‘a world away’ from impacting sovereign ratings - S&P Global,” *yahool/finance* (3 March, 2021), <https://finance.yahoo.com/news/rising-yields-still-world-away-180715448.html>; also Joy Wiltermuth, “That near-\$17 trillion pile of negative-yielding global debt? It’s a cash cow for some bond investors,” *MarketWatch* (22 August, 2019), <https://www.marketwatch.com/story/that-near-17-trillion-pile-of-negative-yielding-global-debt-its-a-cash-cow-for-some-bond-investors-2019-08-22>; quotation from Adam Haigh, “The World Now Has \$13 Trillion of Debt With Below-Zero Yields,” *Bloomberg.com* (20 June, 2019), <https://www.bloomberg.com/news/articles/2019-06-21/the-world-now-has-13-trillion-of-debt-with-below-zero-yields>.

¹²⁵ Kyle Campbell, “Growth of the \$9trn Global Real Estate Market in Six Charts,” *PERE News* (27 July, 2020), <https://www.perenews.com/the-growth-of-the-9trn-global-real-estate-market-in-six-charts/>.

¹²⁶ Rune Skarstein, “Overaccumulation of productive capital or of finance capital? A view from the outskirts of a Marxist debate,” *Investigación económica* 70(2011), 51-87; Jacob Assa, “Great Moderation or Financialization of Volatility?” Paper presented to the conference, 10 Years After The Crash: What Have We Learned?, Berlin (2018), https://www.researchgate.net/publication/328318741_Great_Moderation_or_Financialization_of_Volatility_An_Integrated_Macroeconomic_Approach.

¹²⁷ Rex Nutting, “Shareholder primacy is ruining America,” *MarketWatch* (22 May, 2019), <https://www.marketwatch.com/story/capitalism-is-failing-america-says-a-conservative-republican-2019-05-20>; Michael Roberts, “The Debt Dilemma,” *The Next Recession* (10 May, 2020), <https://thenextrecession.wordpress.com/2020/05/10/the-debt-dilemma/>; idem, *The Long Depression* (Chicago: Haymarket, 2016), esp. 235-272.

¹²⁸ David Harvey, “Abstract from the concrete: Capitalism spiralling out of control,” in Alberta Andreotti, David Benassi, and Yuri Kazepov, eds., *Western Capitalism in Transition* (Manchester: Manchester University Press, 2018).

¹²⁹ Editors, “Measuring the Profitability of Chinese Industry,” *Chuāng* (21 June, 2020), <https://chuangcn.org/2020/06/measuring-profitability/>.

Our next two indicators of the Great Implosion turn on what is often called the “real basis” of capital accumulation: labor productivity. We can underscore two principal forms of labor productivity. One is in agriculture, and relates to the Cheap Food question, which in turn decisively influences the cost of labor-power. The second concerns the so-called “secondary” and “tertiary” sectors. We may consider these in their respective turns.

In the heartlands of capitalist agriculture, productivity growth has slowed dramatically since the Eighties. In American agriculture, labor productivity growth over the past four decades has declined by more than a third relative to the postwar average (1948-1980/1981-2014); in the European Union, agricultural labor productivity growth struggled to reach one percent annually in the 2010s.¹³⁰ American yield growth in such critical commodity crops as maize and wheat fell sharply in the 2000s against the postwar average. Relative to 1936-90, American corn yield growth fell 39 percent and wheat, 70 percent.¹³¹ For Indian wheat, at the center of the Green Revolution, yield growth collapsed in the same period, tumbling from 3.4 percent annually in the 1980s to just 0.6 percent in the 1990s.¹³²

Climate change explains a critical increment of this agricultural slump. There’s a broad consensus among researchers that agriculture has become more – not less – “climate sensitive.”¹³³ That’s a fairly anodyne description with fundamental implications for capitalism. Let’s remember that capitalism is premised on a simple model: produce more and more food with less and less labor-power. So far, the model is working, albeit slower than previously. But the climate crisis portends an epochal reversal.¹³⁴ A sobering 2017 report sees climate change pushing agricultural productivity back to “pre-1980 levels by 2050 even when accounting for present rates of innovation.”¹³⁵ Nor should we imagine climate’s suppression of agriculture productivity as only speculative. By 2008, global maize and wheat output was 3.8 percent and 5.5 percent lower than it would have been in a world without climate change.¹³⁶ By 2021, Ortiz-Bobea and her colleagues found capitalogenic climate change responsible for a “loss of the past 7 years of productivity growth.” In other words, were it not for climate change, the productivity gains realized in 2020 would have been achieved in 2013.¹³⁷ Like everything about climate change, the global mean obscures considerable unevenness. While climate change suppressed world productivity growth by 20 percent since 1961, that figure was 30 percent greater for the Caribbean and a whopping 70 percent higher for sub-Saharan Africa.¹³⁸

If climate change is suppressing the Biotariat’s productivity, so too the Proletariat’s. A 2019 investigation by the International Labour Office found that rising heat stress “is a serious problem for

¹³⁰ K.O. Fuglie, et al., “Productivity Growth in U.S. Agriculture,” *Economic Brief* 9 (Washington, D.C.: US Department of Agriculture, Sep. 2007), 5; For the EU, see European Commission, “Agricultural labour productivity on the rise again,” *Eurostat* 16 December (2021), <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20191216-1>

¹³¹ Calculated from Matthew A. Andersen, et al., “A century of US farm productivity growth: A surge then a slowdown,” *American Journal of Agricultural Economics* 100(4, 2018), 1072-1090, quotation: 1085.

¹³² I. Matuschke and M. Qaim, “Adoption and Impact of Hybrid Wheat in India” (Paper presented to the International Association of Agricultural Economists Conference, Gold Coast, Australia, August 12–18, 2006), 2.

¹³³ See, for example, Ariel Ortiz-Bobea, Erwin Knippenberg, and Robert G. Chambers, “Growing climatic sensitivity of US agriculture linked to technological change and regional specialization,” *Science Advances* 4(12, 2018), eaat4343.

¹³⁴ On agricultural revolutions and the Cheap Food model, from the origins of capitalism to the climate crisis, see Moore, “Cheap Food and Bad Money” and “Cheap Food and Bad Climate.”

¹³⁵ Xin-Zhong Liang, et al., “Determining climate effects on US total agricultural productivity,” *Proceedings of the National Academy of Sciences* 114(12, 2017), E2285-E2292.

¹³⁶ D.B. Lobell, et al., “Climate Trends and Global Crop Production since 1980,” *Science* 333(6042, 2011), 616-620.

¹³⁷ Ariel Ortiz-Bobea, et al., “Anthropogenic climate change has slowed global agricultural productivity growth,” *Nature Climate Change* 11(4, 2021): 306-312, quotation: 309.

¹³⁸ Ortiz-Bobea, et al., “Anthropogenic Climate Change,” 310.

a large proportion of the world's 1 billion agricultural workers."¹³⁹ As heat stress intensifies, by 2030, 2.2 percent of "total working hours worldwide is projected to be lost every year, either because it is too hot to work or because workers have to work at a slower pace." Obviously, those projected losses will increase in a non-linear way, as heat stress and other moments of climate change intensify, also in non-linear fashion. In regions such as South Asia and West Africa, the ILO underscores, productivity losses will more than double the global average.¹⁴⁰ Viewed in this light, it comes as little surprise that by the 2030, world agriculture will bear one-third of global costs issuing from climate change – and two-thirds by 2060.¹⁴¹

Finally, since the early 1970s, labor productivity growth in manufacturing and services has also slowed dramatically. In the U.S., labor productivity surged between 1920 and 1970, advancing at an annual clip of 2.84 percent. Between 1970 and 2014, that rate was cut by more than a third, to 1.62 percent. Robert Gordon projects continued decline, to just 1.2 percent annually between now and 2040.¹⁴² That may be optimistic. In American manufacturing, labor productivity – real output per hour – was "was lower in 2017 than at its peak in 2010." Benanav sees comparable, even more dramatic, declines for France and Germany – the latter's productivity growth tumbled from 6.3 percent in the 1950s and 1960s to just 2.4 percent after 2000.¹⁴³ Service sector productivity growth is still weaker – and in most of the Global South, probably negative.¹⁴⁴ Even China's spectacular labor productivity growth – some 7.2 percent a year between the 1993 and 2013 – does not offset the systemic tendency.¹⁴⁵ Labor productivity in the Global North is still four times greater, and China's productivity advances have been counter-acted by rising unit labor costs – 85 percent between 2000 and 2011.¹⁴⁶

The paradox of course is that "productivity growth rates in manufacturing collapsed precisely when they were supposed to be rising rapidly due to industrial automation."¹⁴⁷ Arguably the greatest *non-event* of the neoliberal era is the non-appearance of a new "industrial revolution" premised on automation and its promise of significant productivity advances.¹⁴⁸ In the Seventies, social critics as diverse in their politics as Alvin Toffler and Ernest Mandel breathlessly anticipated an automated world.¹⁴⁹ But it did not come. That non-appearance has everything to do with enclosure of the Great Frontier and the corresponding exhaustion of Cheap Nature. Simply put, capitalism's epoch-making technological revolutions are geographically conditioned by frontier appropriations. The ICT

¹³⁹ International Labour Office, *Working on a warmer planet: The impact of heat stress on labour productivity and decent work* (Geneva: International Labour Office, 2019), 3. A brilliant – if heartbreaking – account of agricultural labor, heat stress, and the devastation of workers' health is on offer in Alex Nading, "The Heat of Work: Dissipation, Solidarity, and Kidney Disease in Nicaragua," in Sarah Besky and Alex Blanchette, eds., *How Nature Works: Retinking Labor on a Troubled Planet* (Santa Fe, NM: University of New Mexico Press, 2019), 97-114.

¹⁴⁰ ILO, *Working on a Warmer Planet*, 3, 13; also Kerstin K. Zander, et al., "Heat stress causes substantial labour productivity loss in Australia," *Nature Climate Change* 5(7, 2015), 647-651

¹⁴¹ H. Braconier, et al., "Policy Challenges for the Next 50 Years," *OECD Economic Policy Paper No. 9* (Paris: Organization for Economic Cooperation and Development, 2014).

¹⁴² Robert J. Gordon, *The rise and fall of American growth: The US standard of living since the civil war* (Princeton: Princeton University Press, 2016).

¹⁴³ Aaron Benanav, "Automation and the Future of Work – I," *New Left Review* II/119 (2019), 5-38, quotation: 19.

¹⁴⁴ Aaron Benanav, "Automation and the Future of Work – II," *New Left Review* II/120 (2019), 117-146, "negative growth": 128.

¹⁴⁵ International Labour Office, *Global Employment Trends 2014: Risk of a Jobless Recovery?* (Geneva: International Labour Office, 2014), 52.

¹⁴⁶ Midnight Notes Collective, *Promissory Notes: From Crisis to Commons* (Jamaica Plains, NY: Midnight Notes), 4; USDC [United States Department of Commerce] (2013). "Assess Costs Everywhere," <http://acetoool.commerce.gov/labor-costs>.

¹⁴⁷ Benanav, "Automation and the Future of Work – I," 19.

¹⁴⁸ Moore, *Capitalism in the Web of Life*.

¹⁴⁹ Alvin Toffler, *Future Shock* (New York: Bantam, 1970); Ernest Mandel, *Late Capitalism* (London: New Left Books, 1975/1972 original), 184-222.

revolution, while appearing to be a moment of prodigious technological advance, has had little impact on labor productivity growth. Neither “high-tech” nor “green” technology has reversed the downward trend.¹⁵⁰ In the Seventies, were promised robot factories – instead, capital delivered the global sweatshop.

The Great Implosion: From the Accumulation of Capital to the Activation of Negative-Value

The non-linear Cheapening and devaluation of Proletariat, Biotariat, and Femitarat that enabled capitalism’s survival in the seventeenth century is today activating its non-linear negation. This is the mobilization of *negative-value*: relations that initially become resistant, then intractable, in the face of capitalism’s business-as-usual.¹⁵¹ (These include especially its technological fixes.) Whereas “limits to growth” thinking privileges substances, dialectical critique emphasizes relations that enfold substances, which in turn materially condition the relations. The faces of negative-value are manifold – they encompass everything from superweeds to the proliferation of “justice” movements (food, climate, energy, etc.) to climate change. These cannot be “fixed” in the ways first established during the long, cold seventeenth century. Indeed, despite lip-service to the contrary, the more the Great Frontier closes, the greater the desperation and force of the climate class divide, climate apartheid, and climate patriarchy. The Great Implosion is also a Great Involution – capital’s contradictions turn inwards on itself, yielding an unprecedented onslaught of toxification and violence. Why this should be so is straightforward: capitalism’s business as usual, its ensemble of technical innovation, militarized accumulation, and Cheap Nature flowed through the Great Frontier. Those successive frontier movements enabled imperial bourgeoisies to check the tendency towards the rising costs of production in Marx’s sense, and to contain the dangerous classes set in motion by industrialization and imperialist superexploitation. Its closure represents a quantity-quality tipping point: an *epochal* crisis of capitalism.

The Great Implosion is tightly connected with the long twentieth century’s greatest frontier movement: the enclosure of the atmospheric commons as a dumping ground for capital’s greenhouse gas emissions. What Andreas Malm calls fossil capital is one vector of this enclosure – itself a product of the seventeenth-century’s climate fix.¹⁵² That era’s peat and coal extractive revolutions were of a piece with the Great Frontier’s productivist turn after 1550, fundamental to proletarianization and the advance of the productive forces.

Frontiers come in manifold geographical forms: terrestrial, subterranean, maritime, atmospheric, even human bodies! They are not always about direct production – the gendered primitive accumulation that turned women into the “savages of Europe” is a case in point.¹⁵³ Proletarianization required Feminitarianization as its dialectical condition. Bourgeoisies had to secure a “monopoly” over the forces of *reproduction* as the condition for mass proletarianization and the spread of factory-like conditions in Europe.¹⁵⁴ Arguably, this was the turning point in a bourgeois naturalism – redefining,

¹⁵⁰ On the antagonism between “clean technology” and neoliberal rent-seeking, see Jesse L. Goldstein’s important *Planetary Improvement* (Cambridge, MA: MIT Press, 2018).

¹⁵¹ Jason W. Moore, *Capitalism in the Web of Life*, 274-289; Gerardo Otero and Pablo Lapegna, “Transgenic crops in Latin America: Expropriation, negative value and the state,” *Journal of Agrarian Change* 16(4, 2016), 665-674; James Graham, “A country with land but no habitat: Women, violent accumulation and negative-value in Yvonne Vera’s *The Stone Virgins*,” *Journal of Postcolonial Writing* 53(3, 2017), 355-366; Treasa De Loughry, “Polymeric chains and petrolic imaginaries: world literature, plastic, and negative value,” *Green Letters* 23(2, 2019), 179-193

¹⁵² Andreas Malm, *Fossil Capital* (London: Verso, 2016).

¹⁵³ Federici, *Caliban and the Witch*, 100.

¹⁵⁴ Stefania Barca, *Forces of Reproduction* (Cambridge: Cambridge University Press, 2020).

on biological grounds, women's activity as "non-work."¹⁵⁵ From 1492, primitive accumulation formed, fused and differentiated Femitariat and Biotariat through the geocultural crucible of Nature – itself developing through the geographical crucible of the Great Frontier. This was the ruling abstraction that legitimated the subordination of the direct reproducers of socially necessary unpaid work/energy. Non-reducible yet dialectically joined, Femitariat and Biotariat produced the conditions of expanded proletarianization and the circuit of capital. The "sexual question" of the Great Domestication was a "general class question."¹⁵⁶

So too the advance of the waste frontier. It has been a hallmark of neoliberalism to fully enclose not only the skies but our bodies – now mobilized as walking toxic waste dumps for capitalist pollution and causing all manner of cancers, auto-immune disorders, and, ominously, collapsing fertility. This latter reveals a different configuration of Biotariat and Femitariat in the Great Implosion. Worldwide fertility declined 50 percent between 1960 and 2015 for many reasons, including what the *Economist* called a "baby strike" on the part of female professional workers.¹⁵⁷ But a rising share of that decline is, in Shanna Swann's view, driven by plastics and other pollution, causes rising miscarriage rates and declining sperm counts. So severe is this latter that sperm counts among men in the "western countries" – men's fertility is apparently simpler to measure – have dropped more than half since the late Seventies. By 2045, "we will have a median sperm count of zero."¹⁵⁸ Demography meets the Great Implosion.

The Great Implosion vexes established orthodoxies. In a striking instance of the power of the Two Cultures and the cognitive dissonance it produces, that non-linearity has – so far – been enclosed within the ruling abstraction Nature. Hence the thrust of eco-Marxist catastrophism: capitalism will survive "until the last tree is cut."¹⁵⁹ This drastically overstates capitalism's resilience. To think that capitalism can survive the end of the Holocene and restructure itself in the midst of extraordinary climate instability is, truly, to endow capitalism with supernatural powers.

Magical thinking aside, many factors undergird the radical faith in capitalism's resilience. Foremost among them is the inability to reckon with capitalism as a system of accumulation, rule and class struggle premised on the Great Frontier. The Great Frontier was first elaborated by Walter Prescott Webb in 1952.¹⁶⁰ While many of Webb's specific formulations were partial, even incorrect, the concept illuminated something fundamental about what he called capitalism's "frontier boom."¹⁶¹ This great economic expansion of the centuries between 1492 and 1914 was not the result of superior European technological, civilizational, or political know-how. It resulted, rather, from great territorial expansions that delivered "windfall profits" on an unimaginable scale. These windfall profits were epochal moments of the Great Cheapening. Webb did not deny that technological, civilizational, or political innovations occurred; he argued that windfall profits made possible these innovations. In this light, capitalism did not form within a reified Europe, but rather emerged in and through the Great Frontier. It was, needless to say, a bloody movement through which economic wealth grew from the barrel of

¹⁵⁵ Federici, *Caliban and the Witch*, 92; von Werlhof, "On the Concept of Nature and Society in Capitalism."

¹⁵⁶ von Werlhof, "On the Concept of Nature and Society in Capitalism," 102-103.

¹⁵⁷ Shanna H. Swan with Stacey Colino, *Count Down: How Our Modern World Is Threatening Sperm Counts, Altering Male and Female Reproductive Development, and Imperiling the Future of the Human Race* (New York: Simon and Schuster, 2021), chapter three.

¹⁵⁸ Zoë Corbyn, "Interview: Shanna Swan: 'Most couples may have to use assisted reproduction by 2045,'" *The Guardian* (28 March, 2021).

¹⁵⁹ John Bellamy Foster, *The Ecological Revolution* (New York: Monthly Review Press, 2009), 206; see Moore, "World Accumulation and Planetary Life."

¹⁶⁰ Webb, *The Great Frontier*.

¹⁶¹ Walter Prescott Webb, "The great frontier: A disappearing boom," *The Georgia Review* 8(1, 1954), 17-28, quotation: 19.

a gun, and political power justified in the name of Civilizing Projects. Too easily do we forget that frontiers were always created and conquered by soldiers with guns, priests with Bibles, accountants with ledgers.¹⁶²

Today the Great Frontier's implosion is understood widely in its geophysical moment. But that understanding is indirect. This is the work of the Geological Anthropocene, an outpouring of extraordinary research across the earth-system sciences. Geohistorically, however, the Great Implosion is poorly understood – even for the minority who *wants* to speak of capitalism and the Capitalocene. The epochal inversion I emphasized at the beginning of Part III entails not only a transition away from the web of life as profit-making opportunity but a transition towards an epochal resistance to capitalism's Promethean drive. The "taming cycle" through which capital, empire and science realized control over limited spheres of life is coming to an end.¹⁶³ Superweeds, superpests, super-diseases are altering the geographies of capitalism and everyday life in ways that are frustrating the disciplines of capital. This is destabilizing the profit calculus of world accumulation as we have known it for five centuries. The Great Stagnation is what happens when a civilization hard-wired for endless accumulation and endless geographical expansion confronts a biospheric reality that will not cooperate. Call it the revolt of the Biotariat.

Will other layers of the Planetary Proletariat follow? We are back again at the crystal ball problem. Neither prediction nor retrodiction offers up easy answers. But surely one necessary point of departure is the immanent critique of capitalism in the web of life – pivoting on the expansion and ongoing implosion of Great Frontiers. Foregrounding the dialectics of class struggle within capitalism's planetary mobilization of Biotariat, Femitariat, and Proletariat opens one means of sustaining dialogue – and praxis? – around planetary justice at the end of the Great Frontier.

¹⁶² Patel and Moore, *A history of the world in seven cheap things*.

¹⁶³ Victor Wallis, "Species Questions," *Organization and Environment* 13(4, 2000), 500-507.

Conclusions: Revolt of the Planetary Proletariat? From Planetary Management to Planetary Justice

Capitalism is drawing the curtains on that long era of unusual climate stability we call the Holocene. That's bad news for all of us. If however the past four millennia of climate history and class society tells us anything, it also signals something hopeful. That history suggests dramatic climate change as the great destabilizer of class rule.

Historically, dramatically unfavorable climate shifts have blown up well-established boundaries of settlement and rule, and dramatically altered the character of prevailing frontiers. The epochal crisis of the Roman West after 376 illustrates the pattern. Rome's ascent was underwritten by climate conditions so favorable that historians call it the Roman Climatic Optimum. When it came to an end sometime in the late second century, the Empire's contradictions deepened. The "third-century crisis" of civil war ensued, entangled with resurgent disease – the Cyprian Plague. It was accompanied by stunning military defeats. In 251, the Gothic king Cniva destroyed the Roman legions led by the Emperor Decius at Atritus in present-day Bulgaria. The entire Roman frontier from the Rhine to the Danube "imploded."¹⁶⁴

Order was of course restored, but it signaled an epochal crisis to come. Beginning in the 330s, the Eurasian steppe experienced one of the most severe droughts of the past 2,000 years. It would persist for the next four decades.¹⁶⁵

This magnified an earlier connection between drought and migration.¹⁶⁶ The severity of the fourth-century drought contributed to the audacious westward thrust of Hunnic peoples, who in turn drove the Goths across the Danube in 376. What began as a conventional and regulated border crossing quickly escalated into open conflict, provoked by Roman trickery and profiteering. The chronicler Ammianus tells us about Romans selling dog meat to the Goths in exchange for their children.¹⁶⁷ Other chroniclers "lament[ed] the frenzy of Roman commanders racing to acquire [Gothic] sex slaves and agricultural laborers on the cheap."¹⁶⁸ Climate migration, then as now, was a class struggle. Such behavior was Roman "business as usual." This time, however, it backfired.

The Goths revolted. They were quickly joined not only by Goths who had to this point remained on the far side of the Danube, but by Gothic military commanders in Roman service, who mutinied and seized the armory at Adrianople. Finally, key elements of the Gothic proletariat – miners especially – revolted, lending the whole affair the flavor of an armed general strike.¹⁶⁹ Meeting Rome's fearsome legions at Adrianople in 378, the Goths destroyed the imperial army and burned the Emperor Valens alive. Not since Hannibal at Cannae in 216 B.C.E had Rome suffered such a devastating loss. Only now, neither order nor frontier security was not restored – at least in the West. Barbarian migrations into west-central Europe were complemented by restive peasantries – the Bagaudae – in Spain and

¹⁶⁴ Kyle Harper, *The Fate of Rome: Climate, Disease, and the End of an Empire* (Princeton: Princeton University Press, 2017).

¹⁶⁵ David Harms Holt, "Germania and Climate Variability in 3rd and 4th Centuries AD: A Methodological Approach to Dendroclimatology and Human Migration." *Physical Geography* 32.3 (2011): 241-268; Michael McCormick, Michael, et al, "Climate change during and after the Roman Empire: reconstructing the past from scientific and historical evidence," *Journal of Interdisciplinary History* 43(2, 2012), 169-220, esp 190-191.

¹⁶⁶ B. Lee Drake, "Changes in North Atlantic oscillation drove population migrations and the collapse of the Western Roman empire," *Nature Scientific Reports* 7(1, 2017), 1-7; also Holt, "Germania," and McCormick, et al., "Climate Change." On the events leading to the Battle of Adrianople in 378, see Guy Halsall, *Barbarian Migrations and the Roman West, 376–568* (Cambridge: Cambridge University Press, 2007).

¹⁶⁷ G.E.M de Ste. Croix, *The Class Struggle in the Ancient Greek World* (Ithaca, NY: Cornell University Press, 1981), 258

¹⁶⁸ Noel Lenski, *Failure of empire: Valens and the Roman state in the fourth century AD* (Berkeley: University of California Press, 2014), 326.

¹⁶⁹ de Ste. Croix, *The Class Struggle in the Ancient Greek World*.

especially Gaul. Brewing since the third-century crisis, these rebellions “reached such a climax in the first half of the fifth-century as to be almost continuous.”¹⁷⁰ At this point that Rome itself was sacked by Visigothic forces in 410. The gates of the Eternal City had not been breached since Brennus in 387 B.C.E, *before* the onset of the Roman Climatic Optimum. Finally, the Vandals conquered Carthage in 439, breaking the back of the Roman fiscal state.¹⁷¹ It was a mortal blow.

The story of climate, class, and epochal crisis was dramatic – but not exceptional. What bears attention is the link between unfavorable climate shifts and civilizational crisis. *Crisis*. Not “collapse” – a neo-Malthusian discourse that combines populationist arguments with an apocalyptic imaginary.¹⁷² What happened in the crisis of the Roman West, and again during the crisis of feudalism, was neither a Malthusian nor a neo-Hobbesian nightmare. In both instances, there followed a “dark age” – for the ruling classes. For the producing classes, however, the aftermath of epochal crisis was something of a golden age. How easy it is to forget – at a time when the left promotes slogans like “eco-socialism or barbarism”¹⁷³ – that the “barbarian” invasions contributed mightily to the destruction of the greatest slave society the world had ever known.¹⁷⁴ (And how easy it is to forget that the slogan owes more to the authoritarian political philosophy of Hobbes than to Marx’s revolutionary socialism.) Between the fifth and seventh centuries, a more-or-less egalitarian peasantry – Wickham calls it a “peasant mode of production” – reorganized power, settlement and life across west-central Europe.¹⁷⁵ The oligarchs’ villas were occupied and re-purposed, and their centrality in the countryside rapidly displaced by a new settlement form: the village.¹⁷⁶ Peasant egalitarianism coincided, to be sure, with a reduction of “social complexity” – to borrow a phrase from collapsologists.¹⁷⁷ (Social complexity is more or less a euphemism for class society.) Liberated from the Roman oligarchs – the tyranny of grain and other commercial crops – peasants pursued creative and diverse livelihood strategies.¹⁷⁸ As a consequence, they were healthier than their Roman-era predecessors.¹⁷⁹ Nor did population collapse.¹⁸⁰ Instead, there was a protracted decline. That decline was not reversed until the late seventh century in France and later in other regions – corresponding with the first tentative moves towards a feudal mode of production and the thawing of the Late Antique Little Ice Age c. 650. The late antique collapse of

¹⁷⁰ Edward Arthur Thompson, “Peasant revolts in late Roman Gaul and Spain,” *Past & Present* 2(1952), 11-23, quotation: 20; Christopher Wickham, *Framing the Early Middle Ages* (Oxford: Oxford University Press, 2004), 473, 530-533.

¹⁷¹ Wickham, *Framing*, 709-712.

¹⁷² The most popular version of the collapse thesis is Jared Diamond, *Collapse* (New York: Viking Penguin, 2005); its most sophisticated exponent is Joseph Tainter, *The collapse of complex societies* (Cambridge: Cambridge University Press, 1988).

¹⁷³ Michael Löwy, *Ecosocialism: A radical alternative to capitalist catastrophe* (Chicago: Haymarket Books, 2015).

¹⁷⁴ “Five centuries, three continents, tens of millions of souls: Roman slavery stands as the true ancient predecessor to the systems of mass-scale slavery in the New World... A slave population on the order of 5 million souls would have required hundreds of thousands of new bodies per annum to maintain replacement levels. Natural reproduction was the main source of new slaves, but child exposure, self-sale, kidnapping, and cross-border importation were major supplements,” Kyle Harper, *Slavery in the late Roman world, AD 275–425* (Cambridge: Cambridge University Press, 2011), 3, 25.

¹⁷⁵ Wickham, *Framing*, 535-547.

¹⁷⁶ Wickham, *Framing*, 473-481; Tamara Lewit’s research on the peasant occupation and re-purposing of villas is extraordinary. See, *inter alios*, Lewit, “Bones in the Bathhouse: Re-evaluating the Notion of ‘Squatter Occupation’ in 5th–7th Century Villas,” in Gian Pietro Brogiolo, Alexandra Chavarria Arnau, Marco Valenti, eds., *Dopo la fi ne delle ville: le campagne dal VI al IX secolo* (Mantova, 2005), 251-62.

¹⁷⁷ Diamond, *Collapse*; Tainter, *The collapse of complex societies*.

¹⁷⁸ On the peasantry’s agro-ecological creativity, see Tamara Lewit, “Pigs, presses and pastoralism: farming in the fifth to sixth centuries AD,” *Early Medieval Europe* 17(1, 2009), 77-91, quotations: 83, 77; Matthew Innes, *Introduction to Early Medieval Europe, 300-900: The Sword, The Plough and the Book* (New York: Routledge, 2007), 449.

¹⁷⁹ Nikola Koepke and J. Baten, “Agricultural specialization and height in ancient and medieval Europe,” *Explorations in Economic History* 45(2008) 127-146, esp. 137

¹⁸⁰ Although the Justinian Plague (c. 541-549) was consequential, the era’s decommercialization afforded peasants beyond the Mediterranean littoral some measure of epidemiological protection.

Roman class structure roughly corresponded to a move towards relative gender equality.¹⁸¹ As women enjoyed comparatively greater freedom to regulate fertility in the absence of class rule, peasantries adjusted their demographic regimes to the climate conditions of the Dark Ages Cold Period.

A similar story unfolded in feudalism's climate-class crisis.¹⁸² While the Great Famine (1315-22) and the Black Death (1347-53) was experienced as a millenarian event, the feudal crisis was not in fact "the end of world," but the *crisis* of a particular kind of class society. As we saw in Part I, the opening of the Great Frontier was a conscious strategic re-orientation of Europe's ruling strata, who had lost the class struggle in the western European countryside.¹⁸³ What happened a result was, like the Roman West's epochal crisis a thousand years earlier, a golden age for workers and peasants. The century and a half after the Black Death may have been a dark age for the rulers, but for everyone else, it was a golden age. For two centuries after the Black Death, Braudel observes, the producing classes experienced extremely "favourable... living standards":

Real salaries have never been as high as they were then. In 1388, canons in Normandy complained that they could not find anyone to cultivate their land 'who did not demand more than six servants would have been paid at the beginning of the century.' The paradox must be emphasized since it is often thought that hardship increases the farther back towards the middle ages one goes. In fact the opposite is true of the standard of living of the common people – the majority. Before 1520-40, peasants and craftsmen in Languedoc (still little populated) ate white bread, a tell-tale detail. But with the passage of time, after the 'waning' of the middle ages, the deterioration becomes progressively worse, lasting well into the nineteenth century.¹⁸⁴

Retrodiction and prediction are dialectically joined. Past is not prologue. But neither is it over.

One rightly asks, Is not today's planetary crisis different from these earlier episodes? Yes and no – and both responses are grounds for an ecology of hope.

There are instructive parallels between today's planetary crisis and the crisis of feudalism. Feudal agriculture, after centuries of productivity advance, stagnated. The era's great commercial expansion, following upon these agricultural revolutions, created an Afro-Eurasian "disease pool" that enabled devastating pandemics.¹⁸⁵ The feudal state's fiscal penetration of the countryside transformed peasant struggles from merely local to regional and even "national" affairs.¹⁸⁶ Ruling classes meanwhile grew

¹⁸¹ Marilyn French, *From Eve to Dawn: A History of Women*, vol. 2: *The Masculine Mystique* (New York: The Feminist Press, 2008), 21-22; Guy Halsall, *Settlement and social organization: the Merovingian region of Metz* (Cambridge: Cambridge University Press, 1995), esp. 269. To be sure, early medieval peasant formations hardly constituted a feminist paradise, see Wickham, *Framing*, 554-557.

¹⁸² Signal contributions include Federici, *Caliban and the Witch*, and Wally Seccombe, *A Millennium of Family Change* (London: Verso, 1992).

¹⁸³ Following the Black Death, "the pattern of retreat from precarious villages revealed not only a desperate flight from plague infestation and a search for greener pastures in an ecological sense, but also a defiant repudiation of the worst landlords in favour of their more adaptable brethren who demonstrated a willingness to lighten rents and forgo the most noxious dues of servile tenure. On a local scale, resistance could take many forms: rent strikes; withdrawal of labour services; refusal to pay amercements or to heed manorial injunctions to repair dilapidated buildings, torn-down fences and clogged ditches; rejection of orders to take up vacant land under the old servile terms; and intimidation of Royal tax collectors. Such defiance spread like wildfire in the last decades of the fourteenth century," Seccombe, *A Millennium of Family Change*, 138

¹⁸⁴ Fernand Braudel, *The Structures of Everyday Life* (New York: Harper & Row, 1981), 193-194, italics added. There is of course a vast literature on – and contentious debates over – this golden age of living standards, and relative institutional, demographic, and class factors involved. Braudel himself tends towards a demographic interpretation. For a class struggle account, see Federici, *Caliban and the Witch*, 76-82.

¹⁸⁵ W.H. McNeill, *Plagues and Peoples* (Garden City, NY: Doubleday, 1976).

¹⁸⁶ Moore, "Nature and the Transition from Feudalism to Capitalism."

increasingly decadent, struggling to capture a greater share of the surplus even as the “real economy” stagnated. And, of course, the climate changed. The rise and efflorescence of feudalism was entangled with the Medieval Climate Anomaly; its crisis inseparable from the dawn of the Little Ice Age.¹⁸⁷ A class society that develops and thrives in one climate era is unlikely to persist in the next.

But capitalism did persist. It thrived under Little Ice Age conditions that had plunged the Roman West and feudal Europe into epochal crises. Those Little Ice Age conditions deteriorated still further in the 1550s, when contemporary observers recorded a series of unfavorable winters. It was the beginning of the long, cold seventeenth century, the worst stretch of “bad climate” in the Little Ice Age. Like earlier moments of climate change in late Antiquity and late feudalism, it was an era of endless war, social revolt, and economic crisis. The New World genocides, by devastating indigenous populations, led to an unprecedented drawdown of atmospheric carbon dioxide – as forests advanced and soils were left undisturbed by agriculture. There was the Orbis Spike (1610). It was the first episode of capitalogenic climate change. Amplifying contemporary shifts in the North Atlantic Oscillation, solar intensity, and volcanism, the Orbis Spike contributed to the era’s severe cold – and to its unprecedented social and political volatility. Capitalism as we know it might have been stopped dead in its tracks.

This was not unthinkable. Indeed, it was the most likely outcome. From the standpoint of the previous four millennia, climate shifts and class crises were tightly bound. The crises of the Roman West in the long fifth century and feudal Europe in the long fourteenth century point to the intimate dialectics of climate, class, and governance. We can also include the Bronze Age Crisis in the twelfth century B.C.E., during which migrations, war and popular revolt unfolded in the midst of drought and famine.¹⁸⁸

How the capitalist world-ecology survived climate conditions roughly comparable to the earlier crises of the Roman West and feudalism matters deeply to climate politics today. Capitalism survived through three great revolutions, each turning on the Great Frontier, each contributing to the emergence of the Planetary Proletariat. These three revolutions were at the core of a *climate fix* to the long seventeenth century climate crisis – one exacerbated, as we’ve seen, by the capitalogenic forcing of the Orbis Spike. One was the military revolution.¹⁸⁹ In motion from late fifteenth century, a turning point was reached after 1550. Armies grew larger, more capital-intensive, and more lethal – more or less by an order of magnitude, certainly in respect to cost and labor-power. The new militaries were at once engines of proletarianization and levers of debt-driven accumulation, as Kings borrowed money to finance their wars, which spurred them to favor a productivist turn throughout the Americas. Nowhere were these contradictions more evident than in the new colonies, where the possibilities of appropriating Cheap Nature and the power of Civilizing Projects were greatest. In the colonies, “the development of the productive forces... proceeds very rapidly.”¹⁹⁰ As we’ve seen, every great industrialization relies on the development of the “productive forces” – pivoting on the logic of accumulation by appropriation – the emerge through the Great Frontier. For it was the *political establishment* by military means of the conditions for appropriation, and therefore superexploitation, that most directly enabled the formation of the Planetary Proletariat. This entailed an ensemble of interrelated class formations. These comprised not only the enclosure and appropriation of extra-

¹⁸⁷ For a review of the climate history and the transition from the Medieval Climate Anomaly to the Little Ice Age, see Brooke, *Climate change and the course of global history*. The scientific and historical literature on this transition is voluminous.

¹⁸⁸ David Kaniewski, et al., “Environmental roots of the Late Bronze Age crisis,” *PloS one* 8.8 (8, 2013), e71004; David Kaniewski, et al., “300-year drought frames Late Bronze Age to Early Iron Age transition in the Near East: new palaeoecological data from Cyprus and Syria,” *Regional Environmental Change* 19(8, 2019), 2287-2297.

¹⁸⁹ Geoffrey Parker, “The ‘Military Revolution,’ 1560-1660 – A Myth?,” *The Journal of Modern History* 48(2, 1976), 196-214; Patel and Moore, *Seven Cheap Things*, 64-90.

¹⁹⁰ Marx and Engels, *Collective Works*, Vol. 5, 82-83.

human life and fertility – Biotarianization – but the creation of the human labor requirements (including fertility) necessary for rapid accumulation: Proletarianization and Femitarianization.

A second revolution was the Great Domestication. This was the formation of the Femitarian. The mid-sixteenth century marks, as Federici demonstrates, an epochal turning point in the gendered-class structure of early capitalism.¹⁹¹ It's no secret that the climate downturn and the upsurge in "witch hunts" were tightly connected.¹⁹² The subordination of Woman – formed through the ruling abstraction Nature which made women the "savages of Europe" – was a class struggle. The redefinition of women's work as Natural and therefore *not* Social (and therefore not requiring remuneration) was fundamental to the great wave of proletarianization over the next two centuries. The superexploitative Great Domestication made possible the Great Proletarianization. European peasants became workers at least two and half times faster than population growth between 1550 and 1750.¹⁹³

In the Americas, the early modern heartland of the commodity frontier, imperialist bourgeoisies forged one of the most audacious productivist revolutions in human history. We may call this the Plantation Revolution, although its extractive, manufacturing, and stockraising moments were indispensable.¹⁹⁴ Its world-historical pivot was the sugar plantation. In a rapid-fire sequence of frontier movements – beginning in Brazil during the 1560s – the riches of King Sugar greased the wheels of world accumulation in the seventeenth century; in the next, it provided the crucial increments of capital formation for the Industrial Revolution.¹⁹⁵ Racism and sexism intensified the female slave's "second shift" in the most brutal fashion.¹⁹⁶ Prometheanism imposed a similar logic on the Biotariat; indeed, the murderous exhaustion of the soil and the plantation proletariat were intimately bound on plantation frontiers.¹⁹⁷ The Plantation Revolution's crystallization of the climate class divide and climate apartheid would, in turn, provide the essential apparatus of power and profit for the Industrial Revolution's pivotal techno-resource combination: not coal and the steam engine, but cotton and the cotton gin in a superexploited labor regime.¹⁹⁸ Manchester "stood" upon the Mississippi Delta's superexploited working classes.¹⁹⁹ Nor was it coincidence that King Cotton appeared on the scene during the last great cold snap of the Little Ice Age – much as King Sugar had done two centuries before. Taken as a whole, this era marked the birth of the capitalogenic trinity: the climate class divide, climate apartheid, climate patriarchy.

Today's world bourgeoisie is not exempt from this pattern. Indeed, the drive towards superexploitation characteristic of these previous moments replays itself (as farce?) in the ongoing resurgence of ethno-nationalism and the weaponization of borders. But it's not enough to re-assert Eurocentric verities of the class struggle, or to combine these with reified notions of race, or fossil fuels, or waste, or growth. To make sense of the Capitalocene we'll need to conceptualize and map these and other dynamics in what Marx and Engels call the "real movement" of their "world-

¹⁹¹ Federici, *Caliban and the Witch*.

¹⁹² Emily Oster, "Witchcraft, weather and economic growth in Renaissance Europe," *Journal of Economic Perspectives* 18(1, 2004), 215-228

¹⁹³ Calculated from Tilly, "The demographic origins of the European proletariat."

¹⁹⁴ The term was coined by Richard B. Sheridan in 1969, "The Plantation Revolution and the Industrial Revolution, 1625-1775," *Caribbean Studies* 9(3, 1969), 5-25

¹⁹⁵ Robin Blackburn, *The Making of New World Slavery* (London: Verso, 1997), 511-580

¹⁹⁶ Jennifer L. Morgan, *Laboring Women: Reproduction and Gender in New World Slavery* (Philadelphia: University of Pennsylvania Press, 2004), esp. 144-165.

¹⁹⁷ Moore, "Sugar and the Expansion of the Early Modern World-Economy"; idem, *Ecology and the Rise of Capitalism*, esp. chs. 5-6.

¹⁹⁸ See esp. Moore, "World Accumulation and Planetary Life."

¹⁹⁹ Moore, "Amsterdam is Standing on Norway, Parts I and II."

historical” relations.²⁰⁰ Fundamental is a multi-layered dialectic, in which two moments loom large. One is the connection between capitalism’s pivotal oppressive ideologies, the practices they enable, the endless accumulation of capital, and formation of the Planetary Proletariat. Racism, sexism, and Prometheism have been fundamental to capitalism’s DNA because – in their successive reinventions since 1492 – they have advanced the rate of profit and eased the tendency towards overaccumulation. Another is the connection between capitalism as a *project* and the ecohistorical *process* of webs of life that include class society and class struggle. The Great Frontier, its rise and ongoing demise, has been pivotal to both.

What way forward? The distinctiveness of the twenty-first century climate crisis is not only in the magnitude of the geophysical moment. It is also found in the non-linearity of geohistorical change. This the transition from the Great Frontier to the Great Stagnation and the Great Implosion – a dynamic not only of economic and technical stagnation, and not only geophysical instability, but also of intensifying class struggle. To be sure, since the 1970s, the worldwide class struggle has favored the imperialist bourgeoisies. The non-appearance of a new, productivity-advancing revolution in the midst of the Great Implosion has rendered capitalism vulnerable to a powerful critique. That critique powerfully underscores late capitalism’s rentier and predatory character, breaking with capitalism’s longstanding “productivity-plunder” dialectic.²⁰¹ This marks a “major reversal of strategy by the privileged classes,... a return to the pre-1848 strategy of handling workers’ discontent by indifference plus repression. After 1848 and up to 1968, roughly, the privileged classes tried the road of appeasing the working classes by the institution of a liberal state combined with doses of economic concessions.”²⁰² Of course those “economic concessions,” limited as they were, owed everything to successive productivity-advancing industrializations – and in the twentieth century, to the specter of “actually existing” communism. Today that historic reversal manifests in a sharp intensification of surveillance and militarized forms of social and geographical discipline. It also expresses itself in the exhaustion of the bourgeoisie’s imagination – not least the exhaustion of the world’s bourgeoisie’s capacity to do anything to slow runaway global warming. Its world-historical counter-tendency is found buried deep in the origins of capitalism and the Great Frontier: the tendency of Planetary Proletarianization as the “organic whole” of proletariat-biotariat-femariat. In this alternative, the Biosphere Question become a question of revolutionary transformation, not planetary management.²⁰³

Today’s planetary crisis is therefore different in the degree of interdependence realized through capitalism’s world-historical drive to colonize everyday life in service to the accumulation of capital. This involves, as we’ve seen, Civilizing Projects, class dynamics, and Cheap Nature strategies of every kind as an “absolutely necessary practical premise.”²⁰⁴ The double register of Cheap Nature – of valorization and devaluation – creates the conditions for the “empirical existence of men in their *world-historical*, instead of local, being.”²⁰⁵ This unprecedented transformation – enabled by the spatialized class dynamics of the Great Frontier – marked the epochal triumph of the world bourgeoisie and the (temporary) defeat of the world proletariat, who “become more and more enslaved under a power alien to them.”²⁰⁶ The more, however, that capitalism transforms the forces of production into “world-

²⁰⁰ Marx and Engels, *Collected Works*, Vol. 5, 49.

²⁰¹ Saskia Sassen, *Expulsions* (Cambridge, MA: Harvard University Press); Naomi Klein, *The Shock Doctrine* (New York: Macmillan, 2007); David Harvey, *The New Imperialism* (Oxford: Oxford University Press, 2004).

²⁰² Immanuel Wallerstein, “Response: declining states, declining rights?” *International Labor and Working-Class History* 47(1995), 24-27, quotation: 26.

²⁰³ On planetary managerialism, see Fernando Elichirigoity *Planet management: Limits to growth, computer simulation, and the emergence of global spaces* (Evanston, IL: Northwestern University Press, 1999).

²⁰⁴ Marx and Engels, *Collected Works*, Vol. 5, 49.

²⁰⁵ Marx and Engels, *Collected Works*, Vol. 5, 49.

²⁰⁶ Marx and Engels, *Collected Works*, Vol. 5, 51.

historical facts” – and surely this must include the Promethean drive to turn Nature into a source of unpaid work (Biotarianization) – the more it established the possibilities for “communism” as a “*world-historical... movement* which abolishes the present state of things.”²⁰⁷ Marx and Engels are not saying this is inevitable – indeed, such Hegelianism is precisely what they were arguing *against*. They are instead positing the worldwide tendency towards the destruction of the “soil and the worker” and the counter-tendency towards their (necessarily) mutual emancipation within capitalism’s world-historicity.

What I have called the revolt of the Biotariat is, from this standpoint, an internal relation of capitalism and its class dynamics – it is part of the world-historical movement that Marx calls *communism*. It prefigures Planetary Justice as the politics of the Planetary Proletariat. Of course we are dealing with a tendency in the “Hegelian sense of the ‘abstract,’ one constituted through its counter-tendencies.”²⁰⁸ And of course we are dealing with a differentiated unity. There is no need – I can hear the objections even as I type these words! – to posit a flattening of Biotariat, Femitarian and Proletariat. Indeed, from a dialectical perspective such flattening is anathema. Proletarian revolution abstracted from a continuous struggle to abolish the Biotarian relation – the alienation, fragmentation and work-centered disciplining of the “rest of nature” – is a recipe for planetary necrosis. And as socialist feminists have argued for well over a century, working class emancipation cannot be abstracted from the dynamics of oppression and appropriation in varied zones of social reproduction, home to the Femitarian nexus.

In place of the “limits to growth,” the world-ecological alternative offers an alternative: Not only is “Another world possible” – the unofficial slogan of the World Social Form – but: *Another class struggle is possible*. We have in the Great Stagnation the revolt of the Biotariat – whose contribution to the revolutionary destabilization of capitalism has been underestimated by Environmentalists and Marxists alike. Too often the left has viewed the webs of life from the standpoint of the planetary manager rather than as comrades in the struggle for planetary justice – for Biotarian Socialism against the Biospheric dictatorship of capital. Although easily romanticized, grasping the web of life through the *oikeios*, the creative, generative, and multilayered pulse of life-making, asks us to reexamine human solidarity with the rest of nature in ways that challenge the Promethean domination of life and that explore the communist possibilities for liberation: “the creatures too should become free.”²⁰⁹ Foregrounding the oppressive and exploitative dynamics of work, life, and power, Planetary Justice prioritizes the abolition of the Proletarian-Biotarian-Femitarian relation created through the Great Frontier after 1492. This is the challenge of the planetary class struggle in the last days of the Holocene – and the first days of the Great Implosion.

²⁰⁷ Marx and Engels, *Collected Works*, Vol. 5, 49.

²⁰⁸ Paul M. Sweezy, *The Theory of Capitalist Development* (New York: Monthly Review Press, 1970), 19.

²⁰⁹ Thomas Münzer quoted in Karl Marx, “On the Jewish Question,” in Robert C. Tucker, ed., *The Marx-Engels Reader*, second ed. (New York: W.W. Norton, 1978), 26-52, quotation: 51.