Capitalism in the Web of Life

Ecology and the Accumulation of Capital

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The Double Internality: History as if Nature Matters

> *We must recognize in materialism the enthusiastic effort to transcend the dualism which postulates two different worlds as equally substantial and true, [and] to nullify this tearing asunder of what is originally One.* (Hegel, 1971)

The human prospect in the twenty-first century is not an altogether happy one. From the outset, our future can be specified at two levels of abstraction. The first is humanity-in-nature. Human engagement with the rest of nature has, over the past decade, reached the point "where abrupt global environmental change can no longer be excluded."[1] The second is capitalism-in-nature. The unfolding crisis of neoliberal capitalism—now in between the *signal* crisis of 2008 and the unpredictable but inevitable onset of terminal crisis—suggests we may be seeing something very different from the familiar pattern. That pattern is one in which new technologies and new organizations of power and production emerged after great systemic crises, and resolved the older crises by putting nature to work in powerful new ways. The neoliberal revolution after the 1970s is only the most recent example. Today, however, it is increasingly difficult to get nature—including human nature—to yield its "free gifts" on the cheap. This indicates we may be experiencing not merely a transition from one phase of capitalism to another, but something more epochal: the breakdown of the strategies and relations that have sustained capital accumulation over the past five centuries. *Capitalism in the Web of Life* is about how the mosaic of relations that we call capitalism work *through* nature; and how nature works *through* that more limited zone, capitalism. This double movement—of capitalism through nature, of nature through capitalism—is what I call the "Double Internality."

Since 2008, the flood of instability and change manifest in the allegedly separate domains of "Nature" and "Society" has become impossible to ignore. This poses problems—often unrecognized—of conceptual language, with the proliferation of crisis language (energy, finance, employment, austerity, climate, food, etc.) creating more, rather than less, uncertainty about the present historical moment. For critical scholars, the rush of world events has overwhelmed many. No new synthesis—*yet*—has emerged. Instead, a broad consensus has taken

1 J. Rockström et al., "Planetary Boundaries," *Ecology and Society* 14, no. 2 (2009).

shape. The turbulence of the twenty-first century derives from "converging crises."[2] This convergence's most salient expression is the "triple crisis" of food, energy, and finance.[3] While many prefer a different, or longer, list of crisis categories—surely climate must be included!—the import of environmental factors, conditions, and relations has registered in critical political economy as never before. This is an advance over the crisis discourse of the 1970s, when political ecology and political economy rarely overlapped. The converging crises argument is the highest stage of "Green Arithmetic": political economy plus Nature equals converging crises.

Or does it? My sense of Green Arithmetic is that it appears to work because we assume Society plus Nature add up. But does this assumption hold up under closer examination? *Capitalism in the Web of Life* opens an alternative path. I argue that "Society" and "Nature" are part of the problem, intellectually and politically; the binary Nature/Society is directly implicated in the colossal violence, inequality, and oppression of the modern world; and that the view of Nature as external is a fundamental condition of capital accumulation. Efforts to transcend capitalism in any egalitarian and broadly sustainable fashion will be stymied so long as the political imagination is captive to capitalism's either/or organization of reality. And relatedly, efforts to discern the limits of capitalism today—such discernment is crucial to any anti-systemic strategy—cannot advance much further by encasing reality in dualisms that are immanent to capitalist development.

Green Arithmetic and its language of converging crises does more than misrecognize nature and capitalism. It is unable to grasp the specific working-out of the present turning point. "*The* economy" and "*the* environment" are not independent of each other. Capitalism is not an economic system; it is not a social system; it is *a way of organizing nature.*

We can begin with a guiding distinction about this phrase: "a way of organizing nature." Capitalism's governing conceit is that it may do with Nature as it pleases, that Nature is external and may be coded, quantified, and rationalized to serve economic growth, social development, or some other higher good. This is capitalism *as a project.* The reality—the *historical process*—is radically different. While the manifold projects of capital, empire, and science are busy making Nature with a capital 'N'—external, controllable, reducible—the web of life is busy shuffling about the biological and geological conditions

2 Cf. S. George, "Converging Crises," *Globalizations* 7, no. 1–2 (2010): 17–22; J.B. Foster, "Marx and the Rift in the Universal Metabolism of Nature," *Monthly Review* 65, no. 7 (2013): 1–19.

3 P. McMichael, "The Land Grab and Corporate Food Regime Restructuring," *Journal of Peasant Studies* 39, nos. 3–4 (2012): 681–701.

of capitalism's process. The "web of life" is nature as a whole: *nature* with an emphatically lowercase *n*. This is nature as us, as inside us, as around us. It is nature as a flow of flows. Put simply, humans make environments and environments make humans—and human organization.

There is no widely accepted term for the process through which civilizations, themselves forces of nature, are caught up in the co-production of life. And so Green thinkers, even those who pioneered new ways of seeing and thinking humanity's place in nature, have tended to default to an older vocabulary: Society with a capital 'S'.[4] This is observation more than critique: we are products of our times. And those times are today different, different even from two decades ago. A new paradigm is now possible—it is breaking out all over, especially among younger scholars. I will call that new paradigm *world-ecology*. This book is a contribution to it, though far from an encompassing definition. World-ecology— or whatever name we end up attaching to this paradigm—is not only intellectually, but politically, necessary if we are to meet the challenges of the twenty-first century.

World-ecology makes one old argument, and one new one. On the one hand, the new paradigm unfolds from a rich mosaic of relational thinking about capitalism, nature, power, and history. On the other hand, world-ecology says that the relationality of nature implies a new method that grasps humanity-in-nature as a world-historical process. In this respect, Capra's insistence that the world's crises—debt, biodiversity, poverty, climate—are unified through a "crisis of perception" is correct.[5] But we can take this insistence further. Modernity's structures of knowledge, its dominant relations of power, re/production, and wealth, its patterns of environment-making: these form an organic whole. Power, production, and perception entwine; they cannot be disentangled because they are unified, albeit unevenly and in evolving fashion. World-ecology asks us to put our post-Cartesian worldview to work on the crucible of world-historical transformation—understood not as history from above but as the fundamental co-production of earth-moving, idea-making, and power-creating across the geographical layers of human experience. Our task is to see how these moments fit together, and how their combinations change, quantitatively and qualitatively. From this perspective, I ask the reader to consider capitalism as a *world-ecology*, joining the accumulation of capital, the pursuit of power, and the co-production of nature in dialectical unity. Far from asserting the unfettered

4 Cf. D. Harvey, "The Nature of Environment," in *Socialist Register 1993*, (1993), 1–51; F. Capra, *The Turning Point* (New York: Bantam, 1982); C. Merchant, *The Death of Nature* (New York: Harper & Row, 1980).

5 F. Capra, *The Web of Life* (New York: Anchor, 1996), 4.

primacy of capitalism's capacity to remake planetary natures, capitalism as world-ecology opens up a way of understanding capitalism as already co-produced by manifold species, extending even to our planet's geo-biological shifts, relations, and cycles.

The crisis today is therefore not multiple but singular and manifold. It is a not a crisis of capitalism *and* nature but of modernity-*in*-nature. That modernity is a capitalist world-ecology. Rather than collapse distinctions—the danger of Green holism—this perspective allows for the multiplication of questions that turn on the *oikeios*: the creative, generative, and multi-layered relation of species and environment. The *oikeios* names the relation through which humans act—and are acted upon by the whole of nature—in our environment-making. Through the *oikeios*, premised on the dialectic of life-making, we may open new pathways for investigating how capitalism's historical geographies—past and present—are premised on specific configurations of humanity-in-nature. Such a perspective allows us to move beyond the "What?" and the "Why?" of today's crises and towards a deeper understanding of *how* the crisis is likely to unfold in coming decades.

Key to realizing such a deeper understanding is developing a language, a method, and a narrative strategy that puts the *oikeios* at the center. Although the challenge cannot be reduced to conceptual language, neither can we make headway without confronting the problem of language. We must "name the system," to borrow a phrase from the generation of Sixties radicals. If naming can be a first step to seeing, it is also more than a discursive act. In the circumstances of civilizational crisis, as the old structures of knowledge come unraveled without yet being interred, the imperative and the power of fresh conceptual language can become a "material force," as Marx might say.[6] Radicals have been good at this for a long time. The languages of gendered and racial domination have been significantly discredited, if as yet inadequately transcended. But I think the violence of the Nature/Society dualism has been given a pass. By this I mean something different from the Green critique of capitalism's "war on the earth."[7] Rather, I am arguing that the dualism of Nature/Society—with a capital 'N' and a capital 'S'—is complicit in the violence of modernity at its core. Just as we have been learning to move beyond the dualisms of race, gender, sexuality, and Eurocentrism over the past four decades, it is now time to deal with the source of them all: the Nature/Society binary. For this dualism drips with blood and dirt, from its sixteenth-century origins to capitalism in its twilight, every bit as much as the others. Perhaps even more.

6 K. Marx, *Critique of Hegel's 'Philosophy of Right'* (Cambridge, UK: Cambridge University Press, 1970 [1843]), 137.

7 J.B. Foster, B. Clark, and R. York, *The Ecological Rift* (New York: Monthly Review Press, 2010).

If the politics of the present conjuncture demand a new vocabulary, the problems run much deeper. The old language—Nature/Society—has become obsolete. Reality has overwhelmed the binary's capacity to help us track the real changes unfolding, accelerating, amplifying before our eyes. And yet, a new language—one that comprehends the irreducibly dialectical relation between human and extra-human natures in the web of life—has yet to emerge. Not for want of trying, I know: cyborgs, assemblages, networks, hybrids, and many more have been offered as a way forward. They *have* pointed the way forward. They have not, however, directly challenged the dualist framing of world history. For those concerned about the earth, its people, and the web of life, the great patterns and processes of modern world history have remained firmly encaged within the prison house of the Cartesian binary. No theoretical critique will open the cage. Such opening requires that we build an alternative to the logic of dualism, and this requires new methodological procedures, narrative strategies, and conceptual language *all at the same time.*

The Cartesian narrative unfolds like this. Capitalism—or if one prefers, modernity or industrial civilization—emerged *out of* Nature. It drew wealth *from* Nature. It disrupted, degraded, or defiled *Nature.* And now, or sometime very soon, Nature will exact its revenge. Catastrophe is coming. Collapse is on the horizon.

How we tell stories of our past, and how we respond to the challenges of the present, are intimately connected. For many environmentalists and Green scholars, the separation of humanity and nature has encouraged a way of thinking about history that privileges what humanity *does to* nature. This way of thinking lends itself quite readily to the catastrophist and collapse narratives that have gained such traction in Green Thought, and among wider scholarly and popular audiences.[8] An alternative begins neither with "humans" nor with "nature" but with the *relations* that co-produce manifold configurations of humanity-in-nature, organisms and environments, life and land, water and air. "History," in this sense, is the history of a "double internality": humanity-in-nature/nature-in-humanity. (And yes, there is a longer history of earth and all the rest that precedes humans.) In this double internality, everything that humans do is *already* joined with extra-human nature *and* the web of life: nature as a whole that includes humans.

This argument is—and at the same time is not—a commonplace. *Capitalism in the Web of Life* builds on the groundbreaking contributions of what I will call Green Thought (an imprudent but necessary generalization). Green Thought, broadly conceived, is that diverse tradition in the humanities and

8 Cf. J. Diamond, *Collapse* (New York: Viking, 2004).

social sciences concerned with environmental change, past and present. It comprises some elements of the physical sciences, especially those scholars concerned with planetary change.[9] This book highlights three of Green Thought's defining features: the reduction of humanity to a unified actor; the reduction of market, production, political, and cultural relations to "social" relations; and the conceptualization of Nature as independent of humans, even when the evidence suggests the contrary.

Today, more than forty years after the first Earth Day, there is broad agreement among many environmentally oriented scholars, and most environmentalists, that humans are a part of nature. This is the perspective of humanity-in-nature. What to do with this awareness has been a vexing problem. It is one thing to say that humans are natural forces, and quite another to say that human organizations—families, empires, corporations, markets, and all the rest—are natural forces. Green Thought has embraced the former and resisted the latter. To say that humans are a part of nature feels good. To say that human organization is a part of nature feels wrong to most environmentalists, inside and outside the universities. For critical scholars—Red, Green, and many blends in between—the consensus is clear: capitalism acts upon a nature that operates independently of humanity. (And vice versa.) For a broader public concerned about climate and sustainability, a cognate consensus now reigns: humanity makes a "footprint" on the earth, which must be reduced.

Is the image of nature as passive mud and dirt—a place where one leaves a footprint—really the best metaphor to capture the vitality of the web of life? I think we can do better. This book tries to show that the hardened dualism of Nature/Society is not the only possible distinction. It is not even the best. To say that humans are a part of nature is to highlight the *specificity* of humanity within the web of life—its specific forms of *sociality*,[10] its capacities for collective memory and symbolic production, and much more.

It has been a rocky road indeed to travel from humanity-in-nature to capitalism-*in*-nature. Does not such a journey deprive us of our ability to distinguish between "good" and "bad" human interactions with the rest of nature? Does it not leave us powerless to explain the specifically human, and the specifically natural, in the contemporary plunge into global crisis?

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9 Cf. W. Steffen, P.J. Crutzen and J.R. McNeill, "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?" *Ambio* 36, no. 8 (2007): 614–21.

10 We may "distinguish between 'sociality' and 'society'. The latter, as contrasted with the 'sensuous' (sensible) immediateness of the particular individuals, is an abstraction: to grasp it one must transcend this immediateness of the individuals. 'Sociality', however, is actually inherent in every single individual. This is why a society may never be justifiably called 'natural', whereas sociality is rightly defined as man's second nature.' (I. Mészáros, *Marx's Theory of Alienation* [London: Merlin Press, 1970], 175).

I do not think so. This book is an effort to explain why. And it is an attempt to show that a view of humanity as natural force allows us to see new connections between human nature, global power and production, and the web of life. In an era of tightly linked transformations of energy, climate, food and agriculture, labor markets, urbanization, financialization, and resource extraction, the imperative is to grasp the inner connections that conduct flows of power, capital, and energy through the grid of capital accumulation—and in so doing, to shed new light on the limits of that very grid.

So the question bears repeating: If not Nature/Society, then *what*? The alternative, long outlined by Green Thought but rarely (*rarely*) practiced, inverts the Cartesian privileging of substances over relations. Instead of a contemporary world produced by two discrete, interacting, substances—Society and Nature—we might instead look at the history of modernity as co-produced, *all the way down and through*. One substance, Humanity, does not co-produce historical change with another substance, Nature. Rather, the species-specificity of humans is already co-produced within the web of life. Everything that humans do is a flow of flows, in which the rest of nature is always moving through us. The forms of sociality that we evolve reflect a species-specificity that is unusually plastic. In this, "consciousness" is not outside but inside. Consciousness itself is a "state of matter."[11] The stories of human organization are co-produced by *bundles* of human and extra-human nature. Humans build empires on their own as much as beavers build dams on their own. Both are "ecosystem engineers."[12] Neither exists in a vacuum.

To "bundle," however, does not carry us nearly far enough. Even this metaphor inadequately grasps the intimacy, porosity, and permeability of humans and human organizations within the web of life. Absent a conceptual vocabulary that names the relations—rather than the end-points of Nature/Society—we will tend to default to a binary that reasserts the independence of human and extra-human natures. We must have a way of naming—and building the conversation through—the relation of life-making. In this relation, species make environments, and environments make species. It is a relation open to inorganic phenomena as well: plate tectonics, orbital variation, meteors, and much more "make" environments too. So we begin with an open conception of life-making, one that views the boundaries of the organic and inorganic as ever-shifting.[13] It is a multi-layered relation

11 M. Tegmark, "Consciousness as a State of Matter," *arXiv* 1401, no. 1219v2 (2014).

12 J. Wright and C. Jones, "The Concept of Organisms as Ecosystem Engineers Ten Years On," *BioScience* 56, no. 3 (2006): 203–9.

13 C. Birch, and J.B. Cobb, *The Liberation of Life* (Cambridge: Cambridge University Press, 1981).

through which there are no basic units, only webs within webs of relations: "worlds within worlds."[14]

THE *OIKEIOS*: TOWARDS ENVIRONMENT-MAKING

Capitalism in the Web of Life takes flight by naming this relation of life-making: the *oikeios*. From this relation—as much methodological orientation as ontological claim—we can see manifold species-environment configurations emerge, evolve, and ultimately become something else entirely. In what follows, ecology, nature, and all manner of cognate phrases derive from the *oikeios*. To be clear, the *oikeios* is a relation that includes humans, and one through which human organization evolves, adapts, and transforms. Human organization is at once product and producer of the *oikeios*: it is the shifting configuration of this relation that merits our attention. In this spirit I understand "capital" and "capitalism" as producers and products of the *oikeios*. Capitalism as *world-ecology* is therefore not the ecology of the world, but a patterned history of power, capital, and nature, dialectically joined.[15]

As we see in Chapter One, the concept of the *oikeios* goes back to Theophrastus. My usage extends the concept, drawing on trailblazing insights, from scholars

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14 R.E. Ley et al., "Worlds within Worlds: Evolution of the Vertebrate Gut Microbiota," *Nature Reviews Microbiology* 6, no.10 (2008): 776–88.

15 The original formulation of capitalism as world-ecology dates back more than a decade (Moore, "Capitalism as World-Ecology," 2003), but the present argument is possible only because the world-ecology perspective has taken on a life of its own. The contributions of this book have been facilitated by a community of world-ecology scholars whose distinctive elaborations, powerful insights, and comradely encouragements have given this book a richness that would have been otherwise impossible: G. Avallone, "Tra finanziarizzazione e processi ecologici," *Sociologia Urbana e Rurale*, no. 101 (2013): 85–99; S. Deckard, "Mapping the World-Ecology," *Ecologies Technics and Civilizations*, (forthcoming); M. Niblett, "World-Economy, World-Ecology, World Literature," *Green Letters*, 16, no. 1 (2012): 15–30; C.R. Cox, *Synthesizing the Vertical and the Horizontal: A World-Ecological Analysis of 'the' Industrial Revolution* (M.Sc. thesis, Portland State University, 2014); A.G. Jakes, *State of the Field: Agrarian Transformation, Colonial Rule, and the Politics of Material Wealth in Egypt, 1882–1914* (PhD Diss., New York University, 2015); B. Marley, "The Coal Crisis in Appalachia: Agrarian Transformation, Commodity Frontiers, and the Geographies of Capital," *Journal of Agrarian Change* (2015, early view); Roberto José Ortiz, "Latin American Agro-Industrialization, Petrodollar Recycling, and the Transformation of World Capitalism in the Long 1970s," *Critical Sociology* (2014) online first; C. Parenti, "Environment Making State," *Antipode* (early view); Tony Weis, *The Ecological Hoofprint: The Global Burden of Industrial Livestock* (London: Zed, 2013).

across the Two Cultures, on dialectical method.[16] Naming the relation through which the mosaic of species-environment configurations form and re-form—above all those swirling around (and within) humanity—is indispensable. To go forward without naming the relation is to end up where we began: re-labeling Society and Nature as human and extra-human nature.

The *oikeios* lets us ask two important questions from the beginning. Both invert Green Thought's most basic questions: How did humanity become separated from nature? And how do humans disrupt nature, causing environmental degradation? (And eventually, crisis?) From the perspective of the *oikeios*, we are led to very different questions. First, how is humanity *unified* with the rest of nature within the web of life? Second, how is human history a *co-produced* history, through which humans have put nature to work—including other humans—in accumulating wealth and power?

The first question—how is humanity *unified* with and within nature?—encourages us to ask how specific human organizations are premised on internal variation realized through the web of life. There is a widespread conviction among critical scholars that Nature/Society is the best way to highlight the specificity of "social" relations. Holism seems to obscure this. But holism only obscures specificity when severed from a dialectical method. Dualism is a blunt instrument for discerning specificity. The most elementary forms of differentiation—let us say, class, race, and gender, although this hardly exhausts matters—unfold as bundles of human and extra-human natures, interweaving biophysical and symbolic natures at every scale. The relations of class, race, and gender unfold through the *oikeios*; they are irreducible to the aggregation of their so-called social and ecological dimensions. And if I have framed the point through the *oikeios*—which permits an alternate way of seeing differentiation—the elements of the argument have been with us for a long time. Modern class relations emerge through early capitalism's primitive accumulation—an audacious movement of environment-making if there ever was one. Modern gender relations were forged through this same process of capitalist agrarian transformation—on both sides of the Atlantic—and symbolically encoded, not least through the era's successive scientific revolutions.[17] Modern racism was born of the transatlantic slave trade, the human pivot of the sugar commodity frontier: among the era's decisive motors of capital accumulation and greatest commodity-centered force for landscape transformation that humanity had ever seen.[18]

16 Cf. B. Ollman, *Alienation* (Cambridge: Cambridge University Press, 1971); R. Levins and R. Lewontin, *The Dialectical Biologist* (Cambridge, MA: Harvard University Press, 1985).

17 Cf. Merchant, *The Death of Nature* (1980).

18 Moore, "Ecology and the Rise of Capitalism," Ph.D. dissertation (Department of Geography, University of California, Berkeley, 2007).

I write these words because some may be tempted to read this argument as another case of *big history* and *big theory*. In my view, there is no such thing as big history or big theory, only history and theory that informs our knowledge of historical-geographical patterns. These may be patterns that obtain over large and small space, long or short *durées*. Patterns of class, race, and gender—and of course, others—can be made more sensible through a method that seeks to pinpoint the rules and patterns of reproducing power and wealth, production and reproduction, in specific historical systems . . . and specific historical natures. (Such systems are, to be sure, multi-layered and uneven.) And if these rules have often been called structural, I prefer a different metaphor: civilizations as "coral reefs of human existence," but not only of human existence.[19] Their physical structures, ways of seeing, and methods of producing are born of trillions of creatures reproducing daily and intergenerational life.

My focus in this book is trained upon capitalist civilization—a co-produced world-ecology of capital, power, and nature. And if the capitalist world-ecology "as a whole" is more than the sum of its parts, it is also surely less. One cannot do everything at once. Whatever insights I have gained stem from a world-ecology perspective—pivoting the *oikeios*—that has allowed me to grapple with the problem of capital accumulation and the transformation of the earth in new ways.

The *oikeios* enables—but on its own does not accomplish—a theory of capital accumulation in the web of life. For me, the *oikeios* is compelling because it allows me to name the relational process implicit in two of the most frequently quoted passages in geographical thought since the 1970s. The first is that capital incessantly drives towards the "annihilation of space by time."[20] Capital seeks to create a world in which the speed of capital flows—its turnover time—constantly accelerates. The privileging of time over space in capital's project is not passive but active: every effort to accelerate turnover time implies a simultaneous restructuring of space. The second is Lefebvre's powerful observation that capital not only occupies, but also *produces*, space.[21] Space is not incidental; the accumulation of capital *is* the production of space. Accumulation crises do not only produce spatial restructuring after the fact; they are, *in themselves*, products and producers of spatial configurations whose contradictions have reached a boiling point. From these two observations, the signal contribution of nearly a half-century of radical geographical thought goes something like this: all social relations

19 I. Wallerstein, *The Modern World-System I* (New York: Academic Press, 1974), 3.

20 K. Marx, *Grundrisse: Introduction to the Critique of Political Economy*, trans. M. Nicolaus (New York: Vintage, 1973), 424.

21 H. Lefebvre, *The Production of Space*, trans. D. Nicholson-Smith (Oxford: Blackwell, 1991).

are spatial relations; social relations develop through, and actively co-produce, space; spatial configurations are always in motion, but are also "fixed" for definite periods of time. Space is, then, not simply "out there" but joins in specific complexes of social relations and "built environments" that shape the possibilities for contingency, but not infinitely so.[22]

When geographers say *space*, may we not also say *nature*? All social relations are spatial relations, relations within the web of life. Socio-spatial relations develop through nature. All species "build" environments—they are "ecosystem engineers." But some engineers are more powerful than others. Humans have been especially powerful. This is not simply because of thought and language—which are of course central—but also because hominid evolution favored distinctive extroversions: a smaller digestive system and the use of fire as an external stomach; a narrower birth canal and community as external womb; less hair and the production of clothing and shelter as external fur. That list could be extended. The point is to highlight the ways in which evolutionary processes were powerfully co-produced: humanity is a species-environment relation.

It is, clearly, also historical. Capitalism's dynamism owes much to a specific, and absurd, way of dealing with this relation: by severing it symbolically, and then acting accordingly. (Thus, what was "natural" became a crucible of legitimation.) This specific and absurd mode of environment-making is revealed in today's biocidal wreckage. For five centuries it has served to liberate, then fetter, then restructure and renew capital accumulation. The attendant accumulation crises have been cyclical—making possible contingent outcomes through crisis—but also cumulative. Importantly, the cumulative trend shapes the possibilities for the cyclical resolution of accumulation crises: a point underscored by contemporary resource depletion and the accumulation of greenhouse gases in the atmosphere.

Like many readers, I suspect, I have little patience with grand theory. No one theory can answer the questions I pose in this book. Only a relational method and made of theorizing will suffice. My intention is to elaborate a method that carries the core insights of Marxism and environmental historiography into a new synthesis. This synthesis says that environment-making is much more than a story of environmental consequences. It is a story of how power and re/production in its quotidian, civilizational, and commercial forms are, *already*, environmental history. Power and production—and so much more—*are* "environmental." This allows us to move from environmental histories *of* modernity

22 D. Harvey, *The Limits to Capital* (Chicago: University of Chicago Press, 1982); M. Storper and R. Walker, *The Capitalist Imperative* (New York: Basil Blackwell, 1989); N. Smith, *Uneven Development* (Oxford: Basil Blackwell, 1984); E. Soja, *Postmodern Geographies* (London: Verso, 1989).

to modernity's projects and processes *as* environmental history—as environment-making processes. My point of departure therefore privileges the patterned and the specific. Specificities emerge within world-historical patterns, what I call *historical natures*[23]—even and especially when the topic seems removed from these concerns (e.g. labor, financialization).

Dualism does not allow for greater specificity in our understanding of "social" relations for a very good reason: it takes human differentiation as forming outside the *oikeios*. This comprises not only the accumulation of capital but also enduring patterns of class, gender, race, and nation. Are these not better understood as products and producers of the *oikeios*? From here we may ask, How do humans *fit* into the web of life, understood as a totality of distinctive and interpenetrating evolutionary trajectories? And how are the cycles and trends of human organization subjected to recurrent moments of chaos and restabilization? For me, the implications of privileging the differentiated unities of humanity-in-nature/nature-in-humanity have made it impossible to go back to the dualist view. Rather than separate humans from nature, capitalist civilization has enmeshed individual life-activity into a web of life whose interconnections are much denser, more geographically expansive, and more intimate than ever before. And far from being a recent development, the processes that have turned our breakfasts, our cars, and our working days into world-historical activity find their origins in the "long" sixteenth century (1451–1648).

The unity of humans with the rest of nature gets us part of the way towards a world-ecological reading of human history. And yet, this kind of philosophical statement—humans are a part of nature, and so on—has been around for a long time. The *oikeios* is offered as a bridge between philosophical claim and historical method. The bridge works by inverting the premise of most environmental thought in the humanities and social sciences. Rather than presume humanity's separation, in the recent or distant past, the *oikeios* presumes that humanity has always been unified with the rest of nature in a flow of flows. What changes are the ways in which specific aspects of humanity, such as civilizations, "fit" within nature.

In this book, nature assumes three major forms: human organization; extra-human flows, relations, and substances; and the web of life. These are not independent; rather, they are interpenetrating, and their boundaries and configurations shift in successive historical-geographical eras. This last is pivotal: nature is not "just there." It is *historical*. This way of seeing leads us to a second major inversion. Instead of asking what capitalism *does to* nature, we may begin to ask how nature *works for* capitalism? If the former question implies

23 Following Marx and Engels; *The German Ideology* (New York: International Publishers, 1970), 41.

separation, the latter implicates unification: capitalism-in-nature/nature-in-capitalism. It allows us to grapple with a new set of relations, hitherto obscured by the dualism of Nature/Society.

How is nature's work/energy transformed into value? This is the crux of the problem faced by capitalism today. The question shifts our thinking away from too much of one thing (humans, or capitalism) and too little of another thing (Nature), and towards the *longue durée* relations and strategies that have allowed capitalism-in-nature to survive. And capitalism has survived not by destroying nature (whatever this might mean), but through projects that compel nature-as-*oikeios* to work harder and harder—for free, or at a very low cost. Today, it is becoming increasingly difficult to get nature—of any kind—to work harder. Inverting the problem of degradation shifts our initial premise from working *on* to working *through* nature. (And, in turn, to being worked *through* by the web of life.) This opens a new set of questions about how this limit—the limit of putting nature to work—may be a fundamental barrier to capital accumulation in the twenty-first century.

These inversions—of humanity-in-nature, of nature working for capitalism—are dialectical, not mechanical. Hence, the double internality. Capitalism does, of course, impose real and violent transformations on planetary life. But the unilateral model—doing *to* rather than acting *through*—cannot get us where we need to go. It cannot move us towards a deeper, *and more practical*, understanding of capitalism's manifold crisis today. These two inversions open a new vista through which we can explore and reconstruct how capitalism produces new conditions for its recurrent booms, and through which the contradictions that follow have been resolved. By situating these dynamics within the *longue durée* of historical capitalism, we can throw into sharp relief the relation between cyclical movements (phases of capitalism) and the accumulation of socio-ecological contradictions in life, capital, and power over the past five centuries.

Taking the double internality of human organization as our guiding thread, we can begin to reconstruct narratives of two *simultaneous* movements. the first is capitalism's internalization of planetary life and processes, through which new life activity is continually brought into the orbit of capital and capitalist power. The second is the biosphere's internalization of capitalism, through which human-initiated projects and processes influence and shape the web of life. This guiding thread—framed as a double internality—allows us to move beyond a kind of "soft" dualism that re-presents the dialectic of human and extra-human natures as an alternative to Nature/Society.

My focus in this book is capitalism as project and process: the logic of capital and the history of capitalism. This capitalism is not, as we have seen, a narrow set of economic or social relations, since these categories are part of

the problem. Capitalism is, rather, best understood as a *world-ecology* of capital, power, and re/production in the web of life. The point of view of capitalism as a whole—and the decisive conditions and contradictions of the accumulation process—is but one possible vantage point. Without a world-historical reconstruction, however, the critique of Nature/Society dualism will remain theoretical when it needs to be methodological and *historical*. My central thesis is that capitalism is historically coherent—if "vast but weak"—from the long sixteenth century; co-produced by human and extra-human natures in the web of life; and cohered by a "law of value" that is a "law" of Cheap Nature. At the core of this law is the ongoing, radically expansive, and relentlessly innovative quest to turn the work/energy of the biosphere into capital (value-in-motion).

The concept of work/energy looms large in this argument. It allows us to pierce the Cartesian fog that surrounds the unity of human and extra-human work.[24] Marx's observation that large-scale industry is a mechanism for turning "blood into capital" was no mere polemic. It was a means of highlighting the ways that the capital-relation transforms the work/energy of *all* natures into a frankly weird crystallization of wealth and power: value (Chapter Two).

Work/energy helps us to rethink capitalism as a set of relations through which the "capacity to do work"—by human and extra-human natures—is transformed into value, understood as socially necessary labor-time (abstract social labor). "Work/energy" (or *potential* work/energy) may be capitalized—as in commodified labor-power via the cash nexus—or it may be appropriated via non-economic means, as in the work of a river, waterfall, forest, or some forms of social reproduction. My conceptualization follows White's view of

> energy as the capacity to do work. Work, in turn, is the product of a force acting on a body and the distance the body is moved in the direction of that force. Push a large rock and you are expending energy and doing work; the amount of each depends on how large the rock and how far you push it. The weight and flow of water produce the energy that allows rivers to do the work

24 The origins of this concept and its typography—work/energy—come from Caffentzis, who situates the "energy" and "work" crises of the 1970s within a unified field. Caffentzis' insight was to link "capital's control over work across the planet . . . [to] how energy commodities were . . . used to impose once again the control that capital once had over the work process" (G. Caffentzis, *In Letters of Blood and Fire* [Oakland: PM Press, 2013], 2–3). This points strongly in the right direction. My use of work/energy extends it to capitalism's unified logic of appropriating human and extra-human "work" that is transformed into value.

> of moving rock and soil: the greater the volume of water in the river and the steeper the gradient of its bed, the greater its potential energy.[25]

White's sketch is focused on the geophysical work/energy implied in the historical geography of a river (the Columbia, in this instance). But work/energy is also about organic life: from photosynthesis to hunting prey to bearing children. What bears emphasis is *how* the work/energy of the web of life is incorporated into the relations of power and re/production. Food—in capitalism as for all civilizations—is a crucial nexus of all these (see Chapter Ten). The work/energy concept allows us to transcend the metabolic fetish of Green materialism, in which living flows are narrowly biophysical, can be disrupted, and can be subsequently repaired to some Edenic, pristine state. The work/energy alternative sees metabolism through the double internality: flows of power and capital in nature, flows of nature in capital and power. In this, the issue is not "metabolic rift" but *metabolic shift* (Chapter Three).

To this conception of work/energy we may add an outline of labor productivity. Labor productivity is understood in terms of the rate of exploitation and the production of surplus value. The usual Marxist model turns on the relation of machinery and labor-power: more powerful machines allow the average worker to produce more average commodities. Many wrinkles have been added to the model: organizational innovation, labor process rationalization, the impact of transportation, information, and communications technologies. Within this model, the rate of exploitation (surplus value production) increases when the average worker produces a rising mass of value (often, a rising physical volume of commodities), so long as wages increase more slowly than productivity. Alternatively, exploitation may advance when the worker produces a static mass of value, so long as wages decrease. Thus, accumulation may advance on the basis of rising wages and rapidly advancing productivity, as during Fordism, or on the basis of falling (or static) wages and very slow productivity growth, as during the neoliberal era. Part of this dynamic is captured in the classic distinction between relative and absolute surplus value. In this, a twentieth century auto plant would embody relative surplus value (rising labor productivity per hour) whereas textile production in the sixteenth century typifies absolute surplus value, in which the production of surplus value was determined by the number of hours worked, not by rising output per hour.

I worry that this distinction between absolute and relative surplus value has too often been hardened into categorical difference. For one, the usual Marxist thinking on the subject presumes early capitalism as static, certainly not a system characterized by the production of relative surplus value. The great advances of

25 R. White, *The Organic Machine* (New York: Hill & Wang), 6.

the nineteenth century obscured the *equally* significant advance in labor productivity after 1450 (see Chapters Seven and Eight). My point, however, extends beyond the historical observation. The reason both Reds and Greens see "real" capitalism emerging after 1800 turns on a reluctance to look at how capital, science, and empire appropriated nature—including the unpaid work/energy of humans—in service to surplus value production. In metals and mining, shipbuilding, agriculture, textiles, and many other strategic sectors of early capitalism, labor productivity advanced dramatically through new techniques and procedures of harnessing nature's bounty. Early capitalism mobilized technical innovation, systemic violence, and symbolic innovation to lengthen the working day *as well as* to produce and appropriate Cheap Nature so as to reduce *de facto* unit labor costs. In such situations—here I think of Norwegian forests or Polish grain or even African slaves—the appropriation of "natural fertility" (Marx) may act like an increase in relative surplus value. Appropriated nature becomes a productive force. If one includes the conquest of the Americas, the direct and indirect implications for labor productivity growth were gigantic. The appropriation of global natures and the accumulation of capital are closely joined through the production of surplus value. From this perspective, we may reasonably ask: Does the ongoing closure of frontiers today signal an exhaustion of capitalism's Cheap Nature strategy, with its prodigious history of appropriating uncommodified nature as a way to advance labor productivity?

These questions suggest a rethinking of value. Value operates through a dialectic of exploitation and appropriation that illuminates capitalism's peculiar relation with, and within, nature. The relations of exploitation produce abstract social labor. The relations of appropriation, producing abstract social nature, enabled the expanded accumulation of abstract social labor. On the one hand, the system turns on a weird coding of what is valuable, installing human work within the commodity system as the decisive metric of wealth. This work is usually conceptualized as wage-labor: a term that I will treat expansively, and not limited to the ideo-typical figure of the proletarian.[26] In this domain, the exploitation of labor-power is the pivot upon which all else turns. On the other hand, the exploitation of wage-labor works only to the degree that its reproduction costs can be checked. The mistake is to see capitalism as defined by wage-labor, any more than it is defined by the world market. Rather, the crucial question turns on the historical-geographical connections between wage-work and its necessary conditions of expanded reproduction. These conditions depend on massive contributions of unpaid work, outside the commodity

26 We are justifiably cautious in defining the proletarian relation too narrowly. Modern slavery, for instance, was a form that entwined relations of exploitation and appropriation (S. Mintz, "Was the Plantation Slave a Proletarian?" *Review* 2, no. 1 [1978]: 81–98).

system but necessary to its generalization. Sometimes this is called the domain of social reproduction,[27] although the adjective "social" here seems especially unsuitable—where does the "social" moment of raising children end, and the "biological" moment begin? Clearly, we are dealing with a zone of reproduction that transcends any neat and tidy separation of sociality and biology, which are better viewed as internal to each other. Neither is this zone of reproduction—the domain where unpaid work is produced for capital—a narrowly human affair. For unpaid work not only makes possible the production of potential—or the reproduction of actual—labor-power as "cheap" labor; it also involves the unpaid work of extra-human natures. In this domain of reproduction, the *appropriation* of unpaid work is central (Chapters Two and Nine).

My use of *appropriation* therefore differs from that of Marx, who deployed the term more or less interchangeably with the exploitation of wage-labor. Appropriation, in what follows, names those extra-economic processes that identify, secure, and channel unpaid work outside the commodity system into the circuit of capital. Scientific, cartographic, and botanical revolutions, broadly conceived, are good examples, themes we explore in Chapter Eight. Movements of appropriation, in this sense, are distinct from movements of the exploitation of wage-labor, whose tendential generalization is premised on the generalization of appropriative practices. So important is the appropriation of unpaid work that the rising rate of exploitation depends upon the fruits of appropriation derived from Cheap Natures, understood primarily as the "Four Cheaps" of labor-power, food, energy, and raw materials.

This Cheap Nature project—appropriating uncapitalized nature as the pedestal of labor productivity— cannot be understood as a narrowly economic process. At the heart of modernity's co-productions is the incessant reworking of the boundaries between the human and the extra-human. Yes, the distinction between humans and the rest of nature is longstanding. Never before, however, had a civilization organized around a *praxis* of external nature: a world-praxis in which representations, rationality, and empirical investigation found common cause with capital accumulation in creating Nature as external. The boundary setting between what was, and what was not, "natural" was intellectually arbitrary—and often deeply racist and patriarchal. It was not, however, *historically* arbitrary, but patterned strongly on capital's law of value as a law of Cheap Nature. Consider the tightly bound connection between science and gender across the early modern era;[28] the early sixteenth-century debates between Las Casas and Sepúlveda over

27 Cf. I. Bakker and S. Gill, eds., *Power, Production, and Social Reproduction* (New York: Palgrave Macmillan, 2003).

28 Merchant, *The Death of Nature* (1980).

"natural slaves";[29] or the colonial designation of indigenous peoples in the later sixteenth-century Andes and elsewhere as *naturales*.[30] Of course, early capitalism's boundary-setting procedures were more than representational and ideological; they were also bound up with new modes of knowledge production. Bookended by Copernicus and Newton (c. 1470s-1720s) we see "irreversible and fundamental changes . . . [in] Western regimes for the *discovery, development and diffusion of such knowledge . . . radically transformed in scope and scale.*"[31]

But there was more to this than the accelerating "comprehension of the natural world."[32] Such comprehension unfolded within a historical project that aimed at rendering nature external—Nature with a capital 'N'—the better that it could be subordinated and rationalized, its bounty extracted, in service to capital and empire.

As capitalism evolves and restructures, so do the terms of the double internality. Every phase of capitalism has woven together new *and* old strands of the *oikeios*: thus do new historical capitalisms and new historical natures flow together. These historical natures take shape out of modernity's manifold revolutions—scientific, industrial, bourgeois, agricultural, financial, demographic, and all the rest. They unfold through, while creating anew, the *oikeios*.

Historical Nature and the Cartesian Revolution

The *oikeios* points us towards an alternative. Capitalism makes nature. Nature makes capitalism. Both are true, provided we take these as interpenetrated realities in which "capitalism" is co-produced. This is not—emphatically not—the co-production of two separate entities: Humanity and Nature. Capitalism is a co-produced history of human-initiated projects and processes bundled with (and within) specific natures. Historical-geographical specificity is called for at every step. The web of life itself evolves historically. In this, "nature" (and its cognates) is a way of conceptualizing not merely the objects of capitalist activity. For the web of life is more than "taps" and "sinks." It is the field upon which capitalism unfolds. And we can go still further. Nature is no static field,

29 B. Tierney, *The Idea of Natural Rights* (Atlanta: Scholars Press, 1997).

30 Stavig, "Ambiguous Visions," *Hispanic American Historical Review* 80, no. 1 (2000): 77–111.

31 P. O'Brien, "Historical Foundations for a Global Perspective on the Emergence of a Western European Regime for the Discovery, Development and Diffusion of Useful and Reliable Knowledge," *Journal of Global History* 8, no. 1 (2013): 15. Emphasis added.

32 Ibid.

but is itself renewing and evolving in cyclical and cumulative fashion. Nature is, above all, *historical.*

This means two things. First, capitalism does not "produce" nature in a linear fashion, but is an evolving whole that joins the accumulation of capital, the pursuit of power, and the co-production of nature. Second, capitalism is not a structurally invariant, monolithic Society, acting upon a structurally invariant, external Nature. Rather, the history of capitalism is one of successive *historical natures,* which are both producers *and* products of capitalist development. The point is elementary but underappreciated. At a time when no serious critical scholar would undertake a study of neoliberal capitalism by using "production in general,"[33] much of Green Thought continues to embrace a notion of "nature in general." This point may seem far removed from contemporary political questions. I wish to suggest that it is anything but. For the concept of "nature in general" has made it easy for many scholars and activists to embrace the apocalyptic imaginaries of catastrophe and collapse. Absent the specification of historical natures that encompass humanity, nature-in-general has driven Green politics into an "either/or" position: sustainability or collapse.[34]

Although the distinction between humans and the rest of nature has a long history that predates capitalism, the construct of Nature/Society is thoroughly modern. The notion that social relations (humans without nature) can be analyzed separately from ecological relations (nature without humans) is the ontological counterpoint to the real and concrete separation of the direct producers from the means of production. From this perspective, revolutions in ideas of nature and their allied scientific practices are closely bound to great waves of primitive accumulation, from early modernity's Scientific Revolution to neoliberalism's genomic revolutions (Chapter Eight, "Abstract Social Nature").

I have called this Nature/Society dualism Cartesian. The term *Cartesian* derives from René Descartes' famous argument about the separation of mind and body. I use it to name philosophical and analytical worldviews—and modes of enquiry—that conceptualize society and nature as ontologically discrete. These worldviews emerged during an era of "scientific revolution." We might also call it a Cartesian revolution. This revolution did three major things. It "imposed an ontological status upon entities (substance) as opposed to relationships (that is to say energy, matter, people, ideas and so on became things)." Second, "it imposed . . . a line in which a logic of either/or (rather than both/

33 Marx, *Grundrisse* (1973), 85.

34 Cf. R. Costanza et al, "Sustainability or Collapse," *Ambio* 36, no. 7 (2007): 522–7.

and) predominated.[35] And finally, it strongly favored the "idea of a purposive control over nature through applied science."[36]

Descartes hardly stands alone; he represents a broader historical movement towards the dualisms at the core of bourgeois thought. The emergence of Nature—*the* environment—was a symbolic-material process that began at least a century before Descartes, and continues to this day. One can quibble about names, but Descartes' biography is instructive: he wrote most of his major works between 1629 and 1649 while living in the Dutch Republic, the "model capitalist nation of the seventeenth century," and the epicenter of a world-ecological revolution that stretched from Southeast Asia to the north Atlantic.[37]

The relation between Descartes and Dutch capitalism is worth emphasizing, since new ideas of nature and the material transformations of capitalism are closely joined. The example of Descartes illustrates how different phases of capitalism—*as* environmental history—entail not only massive deforestation, pollution, food insecurity, and resource exhaustion, but also implicate new ways of seeing the world. Viewed in this light, the systematizing thrust of Descartes' intellectual endeavors—his concern for the "systematic rationality of the universe"[38]—can be viewed as both symptomatic of, and contributing to, the seventeenth century's massive reorganization of power, capital, and nature. If the accumulation of capital is the proletarianization of labor,[39] it is also the production of knowledges aimed at controlling, mapping, and quantifying the worlds of commodification and appropriation. For early modern materialism, the point was not only to interpret the world but to control it: "to make ourselves as it were the masters and possessors of nature."[40] In the history of capitalism, the "material" and the "symbolic" form an organic whole.

Cartesian dualism is a peculiar creature. These abstractions of Nature/Society separate symbolically what is unified practically in the history of capitalism: the life activity of the human species in the web of life. On the one hand, the binary is clearly falsifying and confused. It presumes an ontological separation that animates

35 M.J. Watts, "Nature: Culture," in *Spaces of Geographical Thought*, eds. P. Cloke and R. Johnston (London, Sage, 2005), 150–1.

36 C. Glacken, *Traces on the Rhodian Shore* (Berkeley: University of California Press, 1967), 427.

37 Marx, *Capital*, Vol. I, trans. B. Fowkes (New York: Vintage, 1977), 916; J. W. Moore, "'Amsterdam Is Standing on Norway' Part II: The Global North Atlantic in the Ecological Revolution of the Long Seventeenth Century," *Journal of Agrarian Change* 10, no. 2 (2010).

38 W.J. Bouwsma, *A Usable Past* (Berkeley: University of California Press, 1990), 123.

39 Marx, *Capital*, Vol. I (1977), 763–4.

40 R. Descartes, *A Discourse on the Method of Correctly Conducting One's Reason and Seeking Truth in the Sciences* (Oxford: Oxford University Press, 2006 [1637 orig.]), 51.

historical narratives in which relations between human ("social" relations) are theoretically independent of relations between humans and the rest of nature. The binary, moreover, confuses particular natures that are objects of capitalist development with nature as the matrix within which capitalism develops. Nature/Society forms a binary of violent abstractions in Sayer's sense of the term[41]—removing constitutive relations from the historical phenomena under investigation. One can no more extract "nature" from the constitution of capitalism than one could remove law, class struggle, the modern state, science, or culture.

On the other hand, a binary that is empirically falsifying does not deprive it of real historical force. Here the Cartesian binary is an "abstraction not as a mere mask, fantasy, or diversion, but as a force operative in the world."[42] The Cartesian binary is a curious sort of real abstraction, created out of the dialectic of value formation as abstract social labor and abstract social nature. It is an abstraction born of—and immanent to—capitalist development, with deep roots in early modern materialist and scientific revolutions, even as the "household concepts" of society, economy, and ecology assumed familiar form only after the nineteenth-century triumph of British capitalism.[43] Thus, an unorthodox value-relational approach regards the modernist cognition of the world—which I shorthand as the Cartesian binary—as constitutive of the bizarre disciplines and environment-making patterns inherent in regimes of abstract social labor. Cognition, too, must be grasped as a "material force" under conditions of bourgeois hegemony. Such a value approach does not dissolve the differences between symbolic and material, human and extra-human re/production—nor between the "economic" moment of abstract social labor and the "symbolic" moment of abstract social nature. Instead, I take such cohered differences as my starting point, without however collapsing the tension between the abstract and the concrete in human environment-making.

World-ecology: *what's in a name?*

If, as Marx proposes, humans are themselves "natural forces" and "natural beings"; if humans linked to nature as "nature is linked to itself"; if humans, in our life-activity, transform "external nature" through work, in so doing

41 D. Sayer, *The Violence of Abstraction* (Oxford: Blackwell, 1987).

42 A. Toscano, "The Open Secret of Real Abstraction," *Rethinking Marxism* 20, no. 2 (2008): 274.

43 Cf. E. Wolf, "Inventing Society," *American Ethnologist* 15, no. 4 (1988): 752–761; T. Mitchell, *Rule of Experts* (Berkeley: University of California Press, 2002); J.B. Foster and B. Clark, "The Sociology of Ecology," *Organization and Environment* 21, no.3 (2008): 311–352.

transform our "own nature" . . . If all these hold, *philosophically*, then they ought to hold theoretically and methodologically. If they are plausible, the relations of humanity-in-nature ought to be fundamental to the stories we tell about our past, and about our possible futures. To follow through on Marx's philosophy of internal relations is to grasp historical change as co-produced by humans and the rest of nature—but not as two interacting boxes, or even overlapping circles in the well-worn style of a Venn Diagram. The dialectical thrust of Marx's philosophy is to see humanity/nature as a flow of flows: as humans internalizing the whole of nature, and the whole of nature internalizing humanity's mosaic of difference and coherence.

This is a challenge to the conceit of Cartesian dualism.

This conceit does not hold up well under close examination. Do a Google search. Get on an airplane. Shop for groceries. Pick up your child from school. Everything humans do, in our everyday lives, and in the major political, economic, and cultural events of our times, is bound up with the earth. Everything that we "do" is bound up with our ideas of this relation. "Nature" and "Society" were useful, for a time, in producing a rough-and-ready picture of global nature and humanity's place within it. We may be One with nature, but the web of life is also extraordinarily diverse, and diversifying. Distinctions are clearly necessary.

If new distinctions are needed—and they clearly are—they cannot be made in the old ways. *A new mode of distinguishing* is necessary. And this is not easy, because etched in our socio-cultural DNA is a pre-conceptualization of what is and what is not Nature; what is and what is not Society. Worse, Cartesian dualism as a mode of distinguishing confuses the difference between ontological dualism and analytical distinction within evolving wholes. Our scholarly vocabularies, even after four decades of Green Thought, are still contained within—and constrained by—an essentially Cartesian notion of nature-society interaction. Nature goes into one box; Society goes into another. The two interact and shape each other, but the messily bundled and interpenetrating relations of manifold human and extra-human natures are abstracted from the movements of the parts, and the constitution of the Whole. The dualist construction of Nature and Society—Green Arithmetic—poses a question it cannot answer: the question of the Whole. Why? Because Nature plus Society does not add up. Something is missing.

Just what that *something* is can be summed up in two words: vocabulary and method. It is on this basis that I ask the reader to evaluate *Capitalism in the Web of Life*. The origins of this book can be located in two series of discussions that bookended the first decade of the twenty-first century. In one, at the turn of the new millennium, my fellow graduate students in the Department of Geography at UC Berkeley made our way towards a powerful conclusion: "physical" and

"social" geography were in fact one, and ought to be brought together in a new synthesis.[44] A second series of conversations took shape with a wonderful group of graduate students at Lund University in 2009. In these conversations, we posed a question that was hardly new, but seemed to assume a new urgency after the near-meltdown of the world-economy in 2008. To what degree do we need, and to what degree is it possible, to construct a unified vocabulary that joins humanity-in-nature and nature-in-humanity? The call for such a unified vocabulary had been sounded many times before. Birch and Cobb had done so in their magnificent *Liberation of Life*.[45] Harvey did the same in his seminal essay on "The Nature of Environment."[46] But to no avail. Such calls found some resonance in theory, and even here the most famous metaphors—Haraway's cyborgs, Actor-Network Theory's hybrids—found little resonance in the theory of historical change.

New conceptual languages cannot be invented; they can only emerge. Such emergence, in turn, can only be facilitated or obstructed. It has been one thing to call for a conceptual vocabulary that unifies the apparently independent ontological domains of the natural and the social. It is quite a different task to collaboratively develop such a conceptual language in a way that can be, first, legible, and second, readily put to work.

The barrier, it turned out, was methodological: not in terms of accumulating data, but in the ways that we go about bounding, or configuring, human and extra-human natures. The objects Nature/Society were so useful because they were pre-fabricated, legible, and fit easily with a popular imagination of Nature as "out there." The bounding of time, space, and nature was already done. Sophisticated analyses taking shape out of political ecology and critical geography problematized this, but almost without exception they did so on a regional-scale. In so doing, they reproduced another dualism: of regional change as "real" and global change as "theoretical."[47] A method that unfolded the world-historical implications of both political ecology and critical geography awaited, one that would comprehend social relations as spatial relations as relations within the web of life.

To make this argument "work"—to practice what one preaches—is disorienting. Why? Because we are asked to give up the sacred distinction of Nature/Society, and to reconstruct historical objects—such as neoliberalism or Fordism or capitalism—as co-produced by human and extra-human natures. This

44 See especially R. Lave, et al., "Intervention: Critical Physical Geography," *The Canadian Geographer* 58, no. 1 (2014): 1–10.

45 Birch and Cobb, *The Liberation of Life* (1981).

46 Harvey, "The Nature of Environment.".

47 R. Peet, et al., eds., *Global Political Ecology* (London: Routledge, 2011).

challenge is all the more vexing because it entails new narrative strategies that go beyond the commonplace invocation of local-global connections and the theoretical assertion of capitalist dynamics in general. Such narrative strategies must transcend regionalism *and* globalism in order to see that capitalism, too, is a real *place*—every bit as much as Paris or the American Midwest or the Punjab. And it requires an approach that is willing to "tack" back and forth in an ongoing way—between the apparently "social" and the apparently "ecological" in search of the durable relations that co-produce wealth, power, and re/production across successive historical natures.[48]

Forging a new synthesis that crystallizes our two levels of abstraction—humanity-in-nature, capitalism-in-nature—has so far eluded critical scholars. But the elements of such a synthesis are not lacking. Since the 1970s, we have frequently glimpsed the outlines of a unified theory of capital accumulation in its double internality: as capital's internalization of nature, and as nature's internalization of capital. Its philosophical basis is found in the relational holism implicit—however unevenly practiced—in both Red and Green Thought.[49] By the 1980s, the philosophical perspective joined—again, unevenly and implicitly—with a conceptualization of capitalism as *already* a relation of humans with the rest of nature.[50]

However frequently we have glimpsed the possibilities, there has been too little movement in translating the philosophical position (humanity-in-nature) into historical method (capitalism-in-nature). There are many good—and some bad—reasons for the slow pace of transition from philosophy to method. Chief among the good reasons is this: it was, practically speaking, impossible to construct methods and narratives of historical change as co-produced when most nature was invisible—as was the case in world social science until the 1990s. In other words, the accumulation of knowledge about humanity *and* nature had to reach critical mass. Until it did—and it *has*—it was impractical to develop modes of analysis that pivoted, ontologically *and* methodologically, on the *oikeios*. For this reason, philosophy and meta-theory were ahead of their times. These contributions, especially those unfolding across the long 1970s,

48 Geographical scale as co-produced by human and extra-human natures is provocatively explored by N. Sayre in "Ecological and Geographical Scale," *Progress in Human Geography* 29, no. 3 (2005): 276–90.

49 Cf. B. Ollmann, *Alienation* (1971); R. Williams, "Ideas of Nature," in *Ecology*, ed. J. Benthall (1972); D. Harvey, "Population, Resources, and the Ideology of Science," *Economic Geography* 50, no. 3 (1974); A. Naess, "The shallow and the deep, long-range ecology movement," *Inquiry* 16, no. 1 (1973): 95–100.

50 N. Smith, *Uneven Development* (1984); J. O'Connor, *Natural Causes* (New York: Guilford Press, 1998); J.B. Foster, *Marx's Ecology* (New York: Monthly Review Press, 2000); P. Burkett, *Marx and Nature* (New York: St. Martin's Press, 1999).

were deeply prefigurative, and often celebrated.[51] But they were rarely embraced in the study of historical change. Historical change remained *social* change. Environmental consequences were added. Green Arithmetic thrived.

We have now reached a different moment. The proposition that historical change can be contained with the containers of "Nature" and "Society" is no longer tenable. The accumulation of knowledge about humanity and nature has reached critical mass. Our planetary knowledge continues to grow, and rapidly. At the same time, the growth of our understanding of how humans are made by the rest of nature, and of how nature is made by humanity has stalled. Nowhere is this clearer than in the popularity and influence of the dominant Anthropocene argument.[52] In this framework, humans constitute a set of vectors—propelling the "Great Acceleration"[53]—which threaten planetary crisis. Humans are placed in one category, Nature in another, and the feedbacks between them identified. The evidence amassed by the scholars working in the Anthropocene and cognate perspectives is indispensable. Such evidence helps us outline the problem, and descriptively answer the first key question, "What is occurring?" But such perspectives pose a deeper question they cannot answer: *How do humans co-produce patterns and relations of power and production within nature?* The question cannot be answered in a dualist frame. And this dualist frame constrains our vision of the possible contours and deepening contradictions of the century ahead. For key to understanding the unfolding systemic crisis of the twenty-first century is a historical method—which implies a new radical *praxis*—in which human and extra-human natures co-produce historical change.

In the pursuit of such a method, Marx's philosophy of internal relations[54] guides us towards unifying humanity and nature not only epistemically, but ontologically; unified (if non-equivalent) on the terrain of modern world history. Here too, we find important prefigurative arguments that, like Green Thought, date from the 1970s. The translation of dialectics into historical method has always been fraught—everything is connected to everything, but always unevenly, always in motion, always with new points of fracture and new levers of change. It has been easier to assert a dialectical method than to practice it. The world-historical tradition learned this in the 1970s and '80s. The relationality of historical capitalism was celebrated, but developing world-historical narratives

51 Cf. Smith, *Uneven Development* (1984).

52 Cf. W. Steffen et al., "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?" (2007); "The Anthropocene: Conceptual and Historical Perspectives," (2011); "The Anthropocene: From Global Change to Planetary Stewardship," (2011).

53 Costanza et al., "Sustainability or Collapse" (2007).

54 Ollman, *Alienation* (1971); K. Kosík, *Dialectics of the Concrete* (Boston: D. Reidel Publishing, 1976).

that revealed this relationality turned out to be exceedingly arduous.[55] In this, world-historical scholars discovered that it was one thing to pursue regional history imbricated in "world process"[56] and another thing entirely to relationally construct world-historical process as the object of investigation.

To treat the history of capitalism in and through a double internality that sees the ceaseless transformation of the earth in the endless accumulation of capital—and vice versa—was more vexing still. This was the project of integrating world accumulation with everyday life that Wallerstein and Arrighi[57] suggested, in distinct registers. Such a synthesis involves an ongoing movement between bodies and environment, production and reproduction, on the "ground floor" of everyday life and the dynamics of world accumulation, world power, and world knowledge. This means that capital and power do not act *upon* nature but develop *through* the web of life. They operate across geographical scales and they move in relation to the whole. That whole is neither world-scale process nor the aggregation of regional units but a dynamic totality with properties distinct from its scalar moments.

I have done my best to pursue this synthesis from the standpoint of work and the worker, though more expansively than conventional renderings of these terms. The transition from capitalism *and* nature to capitalism-*in*-nature asks us to place human bodies as sites of environmental history, as bodies engaged in producing "real" commodities and reproducing the "false" commodity, labor-power. From here, we can reconceptualize capitalism: as a system whose chief contradictions turn on the antagonism and interdependence of commodity-relations and the totality of the conditions of reproduction. The human body, in this frame, becomes a crucial site of the contradictions of world accumulation. Marx's great observation that capitalism "simultaneously undermine[s] . . . the soil and the worker" applies well beyond the era of large-scale industry . . . and well beyond the wage-worker.[58] The exploitation of labor-power and the appropriation of nature are interwoven in the system's drive towards endless commodification. From here, it follows that *all* relations between humans are always—already—relations at once "*of* nature" and "*to* the rest of nature." (There is a deep Cartesian bias to our conceptual language, such that we speak of

55 See T. Hopkins, "World-Systems Analysis," in *World-Systems Analysis*, ed. T.K. Hopkins, et al. (Beverly Hills: Sage, 1982), 145–58; Wallerstein, *The Modern World-System I* (1974); P. McMichael, "Incorporating Comparison Within a World-Historical Perspective," *American Sociological Review* 55, no. 2 (1990): 385–97.

56 D. Tomich, *Slavery in the Circuit of Sugar* (Baltimore: Johns Hopkins University Press, 1990).

57 Wallerstein, *The Modern World-System I* (1974); G. Arrighi, *The Long Twentieth Century* (London: Verso, 1994).

58 Marx, *Capital*, Vol. I (1977), 638.

humanity's relation *to* nature as if relations between humans were not, already, relations *of* nature.) To organize a historical analysis around such a relational and holistic perspective necessitates transcending an epistemic rift through which nature becomes Nature: a violent abstraction, an object, an ontologically separate "base" upon which the "superstructure" of Society develops.

Capitalism/nature/crisis

At stake is an interpretation of global crisis appropriate to our times, and relevant to our era's movements for liberation. It is an open question as to whether we are facing a *developmental crisis* of capitalism—one open to resolution through new rounds of primitive accumulation and commodification—or an *epochal crisis*, one marked by an irreversible decline in capital's capacity to restructure its way out of great crises. From the twin crises of global urbanization and industrialization signified by "surplus humanity," to the faltering productivist behemoth of industrial agriculture, to the seemingly endless commodity boom in food, metals, and energy, there are good reasons for considering that an epochal crisis may well be on the horizon.

This is a book about crisis, but not about "social" and "ecological" crisis as conventionally understood. As I will make clear, I do not believe "Society" and "Nature" exist, at least not in their dominant usage: humans without nature and nature without humans. Nor do I believe these are mere "social constructions." They are, rather, abstractions at once violent and real. They are *violent*, in the sense that they abstract too much reality in the interests of conceptual clarity.[59] And they are *real*, in the sense that Society and Nature are in fact operative forces,[60] both in our knowledge structures and in capitalism's actually existing relations of power and production. Eschewing this, modernity's most sacred binary, I understand *all* forms of crisis—understood as turning points in the systemic organization of power and production—as bundles of human and extra-human nature. This is a big statement that implies manifold processes, the key point of which turns the conventional wisdom on its head: The crises of capitalism-in-nature are crises of what nature *does for* capitalism, rather more than what capitalism *does to* nature. This point of entry offers not only a fresh perspective—one that includes, centrally, the work of *human* natures—but also provides an opportunity for synthesizing two great streams of radical thought since the 1970s: the theory of accumulation crisis and the study of environmental crisis. For all the extraordinary work in both fields, the accounts of "how

59 Sayer, *The Violence of Abstraction* (1987).

60 Toscano, "The Open Secret of Real Abstraction" (2008).

capitalism works" and "how capitalism creates planetary crisis" have not been synthesized, even by our most insightful theorists.[61]

Capitalism in the Web of Life is animated by the desire to translate the philosophy of humanity-in-nature into workable methodological frames, conceptual vocabularies, and narrative strategies for world-historical change. This is the core of the world-ecology perspective, which is just that—a *perspective*, not a theory. And certainly not a theory of everything. World-ecology is a *method* of bounding and bundling the human/extra-human/web of life relation—a manifold and multi-layered relation that encompasses everything from the micro-biome to the biosphere. And it is a *framework* for theorizing manifold forms of the human experience, past and present. No perspective can be the work of an individual; its development must be collective and cooperative. I encourage readers to consider this book not as a series of closed formulations—as is too often the case (for readers and authors like). Rather, I have written this book as a series of proposals and reflections on how to move beyond the Cartesian dualism that has so deeply fragmented our understanding of power, exploitation, work, and liberation. Some of these proposals will surely work better than others. As best I can, I have presented the historically grounded theorizations in this book—clustered around capital accumulation, global value-relations, and agro-ecological change—to demonstrate the kinds of questions that world-ecology can open up. To see "Wall Street as a way of organizing nature," for instance, opens up questions that are prematurely—and unnecessarily—foreclosed by the dualisms of contemporary economic and ecological thought.

The argument can now be reprised. If humans are a part of nature, historical change—including the present as history—must be understood through dialectical movements of humans making environments, and environments making humans. The two acting units—humanity/environments—are not independent but interpenetrated at every level, from the body to the biosphere. Perhaps most of all, it means that relations that seemingly occur purely between humans—say, culture, or political power—are already "natural" relations, and they are always *bundled* with the rest of nature, flowing inside, outside, and through human bodies and histories. And in this flow of flows, we are dealing with much more than microbes and metals and the rest of "material life"; we are dealing as well with ideas as material forces. In this, human history is understood as an "unbroken circle" of being, knowing, and doing.[62]

Many environmental scholars worry that, in abandoning "the" environment as a singular rather than manifold object, we risk giving up the powerful insights of environmental studies. I think the opposite rings truer: the real relational

61 J.B. Foster et al., *The Ecological Rift* (2010).

62 H. Maturana and F. Varela, *The Tree of Knowledge* (Berkeley: Shambhala, 1987).

movements of nature as a whole are obscured by the *a priori* fragmentation of Nature/Society. This breaks with the Green convention of tacking factors of an external Nature—what I will call "nature in general"—onto modern social relations. Nature is not a variable. Instead, we can begin by demonstrating that particular historical processes—in this book, world accumulation—are bundles of human and extra-human nature. These bundles are symbolically and materially enacted. And the limits that emerge are limits not of Nature or Society but limits of the *oikeios* in particular historical-geographical circumstances.

Conclusion

What if to say *historical* capitalism implies—*necessitates*—historical nature? And what if to say *historical nature*—since the long sixteenth century—implies and necessitates historical capitalism? These are the fundamental questions posed by the double internality. This line of questioning encourages, even compels, us to go beyond the now-commonplace and rarely specified invocation of Nature as one of several crises facing Humanity today. It asks us to examine how the web of life reshapes human organization—*as* a force of nature—and how civilizations forge power, production and reproduction as ways of organizing nature. It asks us to reflect upon our well-worn conceptualizations of capitalism: as economic system, as social system, as commodity system. For if the production of capital has been the strategic pivot of capitalism, to an even greater extent accumulation has unfolded through the appropriation of planetary work/energy. Such appropriation—of cheap resources, yes ("taps"), but also of cheap garbage ("sinks")—does not produce capital as "value"; but it does produce the relations, spaces, and work/energy that make value possible. Capitalism *does* generalize commodity relations, but the actual extent of such generalization depends on an even greater generalization: the appropriation of unpaid work/energy.

This even greater generalization has today reached a boiling point. For the appropriation of Cheap Nature has not only compelled capital to seek out new sources of cheap labor-power, food, energy, and raw materials, but to enclose the atmosphere as a gigantic dumping ground for greenhouse gases. This enclosure—a relation of capital-in-nature—is today generating barriers to capital accumulation that are unprecedented, especially in agriculture. And at the risk of putting too fine a point on matters, this enclosure of the atmosphere is a *class* relation: not only as cause-effect sequence ("the capitalists did it!") but as a necessary condition of world class relations over the past two centuries.

This way of thinking through the relations of capital-in-nature gives us an alternative to the "nature as external limit" model that dominates Red and Green thinking about ecological crisis, and about climate change in particular. The

problem with such thinking is that it has closed down, rather than opened up, the big questions about the geographical flexibility and historical evolution of capitalism as world-ecology. The limits are real enough. But what is the best way to identify, to narrate, and to explain the emergence of these limits?

The choice is between a Cartesian paradigm that locates capitalism outside of nature, acting upon it, and a way of seeing capitalism as project and process within the web of life. If the destructive character of capitalism's world-ecological revolutions has widely registered—the "what" and the "why" of capitalism-in-nature—there has been far too little investigation of *how* humans have made modernity through successive, radical reconfigurations of all nature. *How* capitalism has worked *through*, rather than *upon* nature, makes all the difference. We have, I believe, arrived at a powerful educative moment. It is one that allows us to erase old boundaries and open new vistas, one where we can reconstitute each of these processes on the basis of the historically evolving *oikeios*. It allows for an understanding of modernity's historically specific natures as webs of liberation and limitation for the accumulation of capital, itself a way of organizing nature. The point can scarcely be overemphasized if we are to take seriously the idea that all limits to capital emerge historically, out of the relations of humans with the rest of nature. And in equal measure, so do all projects for the liberation of humanity and our neighbors on planet earth.