The Jus Semper Global Alliance

In Pursuit of the People and Planet Paradigm

Sustainable Human Development

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The Defence of Nature: Resisting the Financialisation of the Earth

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On October 28, 2021, political leaders in the Malaysian state of Sabah on the island of Borneo signed an agreement with the Singapore shell company Hoch Standard, without the knowledge of Indigenous communities, giving the company title to the management and marketing of "natural capital/ecosystem services" on two million hectares of a forest ecosystem for one hundred to two hundred years. Although the full nature of the agreement has not been disclosed, journalistic investigations and a lawsuit filed by Adrian Lasimbang, an Indigenous leader in Malaysian Borneo, have revealed that the Nature Conservation Agreement allowed Hoch Standard—a holding company with two officers and a paid-up capital provided by shareholders of a mere $1,000 U.S. dollars, but backed by undisclosed multibillion dollar private-equity investors—to acquire commercial rights to the natural capital in Sabah's forest ecosystem. The revenue from the rights to ecosystem services, such as water provisioning, carbon sequestration, sustainable forestry, and biodiversity conservation, over the next century was estimated at some $80 billion, with 30 percent, or $24 billion, to go to Hoch Standard. It was stipulated that the Sabah government could not withdraw from the agreement, while Hoch Standard could sell its rights to the natural capital in the Sabah Forest to other investors without government consent. Singaporean Ho Choon Hou, who allegedly misrepresented himself as director of Hoch Standard (he was not listed

Panoramic view from 'Tower of Heaven' (Menara Kayangan) on Mount Silam over Darvel Bay, Lahad Datu District, Sabah, Malaysia. Photo by CEphoto, Uwe Aranas, CC BY-SA 3.0, Link

CEO of Tierra Australia, has defended the exclusion of Indigenous peoples from the agreement on the neocolonial, racist basis that if it were necessary to "sit around every campfire" talking to Indigenous peoples about the "jungles" they happen to live in, nothing at all would be accomplished.

among its officers but is said to be Hoch Standard's project director and strategic funder), is the managing director of the private equity firm Southern Capital Group, which focuses on corporate buyouts. Financial documents revealed that Hoch Standard, as a shell company, lists a single shareholder, Lionsgate Ltd., a company registered in the British Virgin Islands, where, as a tax haven and a financial base for "dark money," it is illegal to disclose the name of company shareholders.[1]

The Natural Conservation Agreement between the Sabah government and Hoch Standard was brokered by the Australian consulting firm Tierra Australia, specialising in the financialisation of natural capital. Peter Burgess, CEO of Tierra Australia, has defended the exclusion of Indigenous peoples from the agreement on the neocolonial, racist basis that if it were necessary to "sit around every campfire" talking to Indigenous peoples about the "jungles" they happen to live in, nothing at all would be accomplished. According to Burgess, the Indigenous communities—there are thirty-nine Indigenous ethnic groups in the forest reserves in Sabah, making up a population of more than twenty-five thousand—"actually don't know that their jungles…are going to be conserved for 200 years" by the agreement, which is aimed at "restoring [their] jungles," providing benefits so as to "uplift" them, "bringing them back into normal society." Tierra Australia is closely connected to major multinational banks in the capitalist core, such as Credit Suisse and HSBC, along with major Singapore Banks, all of which have been heavily involved in investments in natural capital. It has partnered with Hoch Standard, along with Harvard, the Massachusetts Institute of Technology, and Cornell, in devising natural capital platforms for private investment.[2]

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The two chief promoters of the Sabah-Hoch Standard deal were Stan Lassa Golokin, signing for Hoch Standard, and Jeffrey Kitingan, representing the Sabah government. Golokin is a business partner of Burgess at Tierra Australia and is linked to eleven companies registered in the British Virgin Islands. He was listed as an associate of four companies included in the Panama Papers, a leaked database on global elite financial dealings. Kitingan is second deputy chief minister and state agricultural and fisheries minister in Sabah and was a witness to the signing of the agreement by Frederick Kugan, Sabah's chief conservator of forests. Kitingan has emerged as the main defender of the deal within the Sabah government. In the 1980s and '90s, both Kitingan and Golokin were involved in the Sabah Foundation, which was given a century-long concession to a million hectares of forest, to be managed on a sustained yield basis. Kitingan was director of the Sabah Foundation while Golokin was group general manager of a holding company for the Sabah Foundation's commercial assets. As evidence of the extraordinary corruption at the time, some $1.6 billion in timber rent

[1] ↩ John C. Cannon, "Indigenous Leader Sues Over Borneo Natural Capital Deal," *Mongabay*, December 17, 2021; John C. Cannon, "Malaysian Officials Dampen Prospects for Giant Secret Carbon Deal in Sabah," *Mongabay*, February 10, 2022; Chris Lang, "Sabah's Nature Conservation Agreement: A Two Million Hectare Carbon Deal Involving a Fake Director, an Inequitable Agreement, a History of Destructive Logging, Massive Corruption, a Series of Offshore Companies, and a Sprinkling of Neocolonial Racism," REDD-Monitor, December 5, 2021; "'Very Hush-Hush': Borneo's $80bn Carbon Deal Stokes Controversy," *Al Jazeera*, February 2, 2022; Jason Santos, "Not Just US$1000: Hoch Standard Clarifies Involvement with Sabah NCA," *The Vibes*, February 6, 2022.

[2] ↩ John C. Cannon, "Bornean Community Locked into 2 Million Hectare Deal They Don't Know About," *Mongabay*, November 9, 2021; Lang, "Sabah's Nature Conservation Agreement"; "'Very Hush-Hush.'"

went missing under their management, while Kitingan's personal wealth during his nine years as director of the foundation rose suddenly to $1 billion. During the same period, Kitingan's brother was chief minister of Sabah.[3]

As of February 2022, the Nature Conservation Agreement between the Sabah government and Hoch Standard is in a kind of legal limbo, according to Sabah's attorney general, since key aspects of the agreement are not binding or enforceable.[4] Yet, while the Sabah-Hoch Standard Nature Conservation Agreement is presently on hold, it can be seen as part of the massive "gold rush" to secure rights to the world's "natural capital" that is now taking place globally.[5] It is no mere accident that the October 28 signing of the Sabah multibillion dollar natural capital deal occurred only a month after the New York Stock Exchange and the Intrinsic Exchange Group announced the creation of a new asset category in the form of Natural Asset Companies, stipulated as financial vehicles for the ownership, management, and control of the world's natural capital assets.

At the International Heart of Borneo Conference, aimed at attracting investment in natural capital to Borneo. He depicted Borneo's natural environment as a prime target for the global movement directed at the "monetisation of the world's Natural Capital Assets."

Only three days after the Hoch Standard agreement was made, the Glasgow United Nations Conference on climate negotiations began. This coincided with the consolidation and rise to global prominence of the Glasgow Financial Alliance for Net Zero, advertising itself as representing multinational banking and money managements adding up to $130 trillion dollars in financial assets, and led by some of the very same multinational banks, such as Credit Suisse and HSBC, with which Tierra Australia was connected.[6] Golokin was present at the Glasgow UN climate negotiations seeking to drum up global finance for the Hoch Standard-Sabah Nature Conservation Agreement, which he claims is designed to draw out the potential of Sabah forest's "lazy assets," a term referring to ecosystem services not incorporated into the market. Burgess gave a presentation at the International Heart of Borneo Conference in November 2021, aimed at attracting investment in natural capital to Borneo. He depicted Borneo's natural environment as a prime target for the global movement directed at the "monetisation of the world's Natural Capital Assets."[7]

The report emphasised the enormous debt "leverage" opportunities represented by "emerging natural capital markets such as water-quality trading, wetland banking and threatened species banking, and natural carbon sequestration"... The future of the capitalist economy lay in ensuring that the market pay "for once-free ecosystem services," which could thereby generate new economic value for those corporations able to convert titles to natural capital into financial assets.

It is impossible to exaggerate the extent of this natural-capital rush, now being promoted by global speculative finance, which since the Great Financial Crisis of 2007–10 has sought to acquire real assets in the physical environment to

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3 ↩ Chris Lang, "Whistleblower on Sabah's Nature Conservation Agreement: 'An Obvious Con,'" REDD-Monitor, February 7, 2022; "'Very Hush-Hush.'"

4 ↩ Cannon, "Malaysian Officials Dampen Prospects for Giant Secret Carbon Deal in Sabah"; Lang, "Whistleblower on Sabah's Nature Conservation Agreement."

5 ↩ As Herman Daly notes, "the term 'natural capital' was introduced in opposition to 'financial capital,' not as an extension of it, or advocacy for 'monetizing nature.'" Herman Daly, "Contribution to GTI Roundtable "Monetizing Nature,'" Great Transition Initiative, August 2014. For a historically based critique of the concept of *natural capital*, see John Bellamy Foster, "Nature as a Mode of Accumulation," The Jus Semper Global Alliance, May 2022.

6 ↩ Jill Baker, "Mark Carney's Ambitious $130 Trillion Glasgow Financial Alliance for Net-Zero," *Forbes*, November 8, 2021.

7 ↩ Lang, "Whistleblower on Sabah's Nature Conservation Agreement"; Santos, "Not Just US$1000."

underpin continuing debt expansion.[8] The transmutation of so-called natural capital into tradable exchange value over the last decade is seen as opening up almost unlimited opportunities for corporations and money managers. In 2012, the Corporate EcoForum, a group of twenty-four multinational corporations including Alcoa, Coca-Cola, Dell, Disney, Dow, Duke Energy, Nike, Unilever, and Weyerhaeuser, published The New Business Imperative: Valuing Natural Capital in conjunction with the Nature Conservancy, insisting that the then "estimated $72 trillion of 'free' goods and services" associated with global natural capital and ecosystem services be monetised for the purpose of more sustainable growth." The report emphasised the enormous debt "leverage" opportunities represented by "emerging natural capital markets such as water-quality trading, wetland banking and threatened species banking, and natural carbon sequestration." As a result, it was imperative to "put a price on nature's value," or, stated differently, "a monetary value on what nature does for…businesses." The future of the capitalist economy lay in ensuring that the market pay "for once-free ecosystem services," which could thereby generate new economic value for those corporations able to convert titles to natural capital into financial assets.[9]

In 2016, more than fifty multinationals, joined to design a framework for the monetisation of the world ecology, using fabricated shadow pricing systems based on the capitalist market system.

Water as [a natural] asset class will...become eventually the single most important physical-commodity based asset class dwarfing oil, copper, agricultural commodities and precious metals." In this perspective, the world's sources of fresh water, representing one of the planetary boundaries designated by natural science, will be monopolised as natural capital by relatively few companies who will be able to charge market rents for the ecosystem services.

In 2016, more than fifty multinationals, led by firms such as Dow, Coca-Cola, Nestle, and Shell, joined with Conservation International in the Natural Capital Coalition (now known as the Capitals Coalition) to develop the Natural Capital Protocol. This was directed at designing a framework for the monetisation of the world ecology, using fabricated shadow pricing systems based on the capitalist market system.[10] The Natural Capital Protocol was soon accompanied by other initiatives like the Natural Capital Charter, introduced the same year by the International Union for the Conservation of Nature.[11]

Economist Robert Costanza and his associates valued the world's "seventeen" ecosystems in 2011 at $145 trillion annually (in 2007 dollars). The net present value of these ecosystem services, discounted at 1 percent over the remainder of this century, is estimated to be worth over $4 quadrillion (4,000 trillion).[12] This last figure has been promoted by the Intrinsic Exchange Group as representing a virtually unlimited set of metaphorical gold mines for the taking by natural asset corporations. Economist Wilhelm Buiter of Citigroup expects "to see a globally integrated market for fresh water within 25 to 30 years. Once the spot markets for water are integrated, future markets and other derivative water-based

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8 ↩ "The Growing Case for Conservation Finance," *Environmental Finance*, April 6, 2017; World Rainforest Movement, "Growing Speculation: From the Appropriation and Commodification to the Financialization of Nature," *Monthly Bulletin* 181, August 30, 2012; Philip Seufert, Roman Herre, Sofia Monsalva, and Shalmali Guttal, eds., *Rogue Capitalism and the Financialization of Territories and Nature* (Fian International, Transnational Institute, and Focus on the Global South, 2020). On the Great Financial Crisis, see John Bellamy Foster and Fred Magdoff, *The Great Financial Crisis* (New York: Monthly Review Press, 2009). On the failure of the 2009 climate negotiations in Copenhagen, see Naomi Klein, *This Changes Everything* (New York: Simon and Schuster, 2014), 8–15.

9 ↩ Corporate Eco Forum and the Nature Conservancy, *The New Business Imperative: Valuing Natural Capital* (Corporate Eco Forum, the Nature Conservancy, 2012).

10 ↩ "Valuing Natural Capital: Accounting for the Benefits that Nature Provides," Conservation International, accessed February 16, 2022.

11 ↩ Sian Sullivan, "Nature Is Being Renamed 'Natural Capital'—But Is It Really the Planet That Will Profit?" *Conversation*, September 13, 2016.

12 ↩ Robert Costanza et al., "Changes in the Global Value of Ecosystem Services," *Global Environmental Change* 26 (2014): 152–58; Robert Costanza, Ida Kubiszewski, Natalie Stoekl, and Tom Kompas, "Pluralistic Discounting Recognizing Different Capital Contributions: An Example Estimating the Net Present Value of Global Ecosystem Services," *Ecological Economics* 183 (2021): 1–8.

Plans for the expropriation and accumulation of natural capital by global finance are primarily directed today at the Global South.... Indigenous territories cover some 24 percent of the earth's land surface and "contain 80% of the earth's remaining healthy ecosystems and global biodiversity priority areas," making these primary targets for expropriation and conversion into marketable natural capital.

financial instruments…will follow.… Water as [a natural] asset class will…become eventually the single most important physical-commodity based asset class dwarfing oil, copper, agricultural commodities and precious metals." In this perspective, the world's sources of fresh water, representing one of the planetary boundaries designated by natural science, will be monopolised as natural capital by relatively few companies who will be able to charge market rents for the ecosystem services.[13]

Plans for the expropriation and accumulation of natural capital by global finance are primarily directed today at the Global South. According to the UN Environment Programme, spatial mapping of natural capital indicates there is "a high concentration of terrestrial ecosystem assets in the equatorial regions, particularly in the Brazilian Amazon and the Congo Basin." Marine ecosystem assets are highest in Southeast Asia (the South China Sea) and along coastlines.[14] Indigenous territories cover some 24 percent of the earth's land surface and "contain 80% of the earth's remaining healthy ecosystems and global biodiversity priority areas," making these primary targets for expropriation and conversion into marketable natural capital. Sub-Saharan Africa is a target since "it's estimated that around 90% of land is untitled," with the result that many Indigenous communities that have lived in these areas for untold years lack official land titles, and their land is therefore open to land grabbing.[15] The African Forum on Green Economy, working with the Natural Capital Coalition and the World Wildlife Fund, stated in 2020 that "natural capital is part of a wider economic system," implying that Africa's ecosystems can be completely subsumed within the capitalist economy.[16]

Not only is the logic behind this fallacious, but it is also likely to widen the associated colossal financial bubbles, while accelerating destruction of planetary ecosystems and of the earth as a safe home for humanity.

The implications of this rapid financialisation of nature, which is promoting a Great Expropriation of the global commons and the dispossession of humanity on a scale exceeding all previous human history, are vast. This Great Expropriation is being justified on the grounds of saving nature by turning it into a market, thereby replacing the laws of nature with the laws of commodity value. Yet, not only is the logic behind this fallacious, but it is also likely to widen the associated colossal financial bubbles, while accelerating destruction of planetary ecosystems and of the earth as a safe home for humanity.

In order to understand the monumental folly of the monetisation of the earth, it is necessary to take a theoretical excursion into the classical critique of the "fetish character of capital" and the confusion of real wealth and debt as developed in the work of thinkers such Karl Marx and Frederick Soddy.[17] This will allow us to comprehend the necessary conditions for the defence of the earth in the face of the current financialisation juggernaut, requiring the greatest alliance of workers, peoples, and movements in the history of humanity.

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13 ↩ World Rainforest Movement, "Growing Speculation."

14 ↩ Barney Dickson et al., Towards a Global Map of Natural Capital: Key Ecosystem Assets (Cambridge: UN Environment Programme, 2014), 30–31.

15 ↩ Dario Kenner, *Who Should Value Nature? Sustainable Business Initiative—Outside Insights* (London: Institute of Chartered Accountants in England and Wales, 2014), 9, 12; Mark Bowman, "Land Rights, Not Land Grabs, Can Help Africa Feed Itself," CNN, June 18, 2013.

16 ↩ African Forum on Green Economy, "Investing in Natural Capital for a Resilient Africa: 2020 Event Summary," Natural Capital Coalition, June 3, 2020.

17 ↩ Karl Marx, *Capital*, vol. 3 (London: Penguin, 1981), 516.

The Myth of the Innate Power of Capital: Marx and Soddy

In his critique of "the fetish character of capital," in the Grundrisse and Capital, Marx highlighted the views—far exceeding "the fantasies of the alchemists"—of the late-eighteenth-century British political-economic writer and nonconformist minister Richard Price, a friend of Benjamin Franklin and Joseph Priestley. Price claimed that, through the magic of compound interest, a universe of riches could be obtained. In his 1772 Appeal to the Public on the Subject of Public Debt, Price went so far as to state: "ONE PENNY, put out at our Saviour's birth to 5 per cent. compound interest, would, before this time, have increased to a greater sum, than would be contained in A HUNDRED AND FIFTY MILLIONS OF EARTHS, All solid gold."[18]

For Marx, Price's "150 millions of earths all solid gold" was a cosmic fantasy of "the innate power capital," in which capital becomes "a self-reproducing being…a value perennating and increasing by virtue of an innate quality," without any reference to real material and historical conditions. "The good Price was simply dazzled by the enormous quantities resulting from geometrical progression of numbers.… He regards capital as a self-acting thing, without any regard to the conditions of reproduction or of labour," or—as Marx was also to insist—the material conditions and limits imposed by the earth itself. With capital thus conceived, in Marx's words, "as a mere self-increasing number," Price "was able to believe that he had found the laws of growth in that formula." Indeed, for Price, according to Marx, capital was "a self-acting automation," embodying "an innate property as ever persisting and growing value." How capital accumulation actually occurred, together with its limits and contradictions, were "quite immaterial to him," since all of this was superseded by "the innate quality of interest-bearing capital." Hence, for Price and those he influenced, Marx wrote, "Adam Smith's theory of accumulation" as the basis of the wealth of nations is turned "into the enrichment of a nation by accumulation of debts." It is here that "the fetish character of capital" is complete.[19]

In Marx's critique of political economy, all human production has a real basis in a "material substratum…furnished by nature without human intervention," while the labour process "mediates the metabolism between man and nature."[20] A commodity has a dual aspect as both a natural-material use value, meeting social needs, and as exchange value, generating surplus value for capitalists. Use values, constituting real wealth, were the product of both nature and human labour. A particular use value "does not dangle in mid-air. It is conditioned by the physical properties of the commodity and has no existence apart from the latter." Human labour itself had a dual character as both a material-biophysical force, transforming natural-material use values through production, and as a generator of exchange value/value under capitalism. It was the conflict between production of commodities as use values, on the one hand, and exchange value, on the other, that lay at the core of all capitalist contradictions.[21] What nature itself provided, apart from labour time, was in the capitalist system a mere "free gift…to capital" and not incorporated directly in its accounting of value

What nature itself provided, apart from labour time, was in the capitalist system a mere "free gift...to capital" and not incorporated directly in its accounting of value production, where it was treated as a mere externality.

[18] ↩ Richard Price, An Appeal to the Public on the Subject of the National Debt (London: T. Cadell, 1772), 18–19.

[19] ↩ Karl Marx, *Grundrisse* (London: Penguin, 1973), 375, 842–43; Marx, *Capital*, vol. 3, 516, 519–24; Karl Marx and Frederick Engels, *Collected Works* (New York: International Publishers, 1975), vol. 15, 512. It was Price's perspective, Marx argued, that led William Pitt the Younger, prime minister of Great Britain from 1804 to 1806, to establish his famous sinking fund to pay off the national debt, in which he "transformed Adam Smith's theory of accumulation into the enrichment of a nation by the accumulation of debts." Marx, *Capital*, vol. 3, 521.

[20] ↩ Karl Marx, *Capital*, vol. 1 (London: Penguin, 1976), 133.

[21] ↩ Marx, *Capital*, vol. 1, 126, 131–32; Karl Marx and Frederick Engels, *Selected Correspondence* (Moscow: Progress Publishers, 1975), 180; Elmar Altvater, *The Future of the Market* (London: Verso, 1993), 189–90.

production, where it was treated as a mere externality.[22] Nevertheless, the monopolisation of elements of scarce land/nature gave rise to monopoly rents, which were withdrawn from total surplus value feeding the coffers of owners of natural resources.

Capitalism's exclusive focus on production for exchange value rather than use value, and its treatment of nature as a free gift, led in Marx's analysis to the robbing of nature of the elementary constituents of production, and thus the creation of the metabolic rift between nature and society, exemplified by the nineteenth-century soil crisis in which essential soil nutrients were shipped to the new urban centres of industrial production, where they contributed to pollution and were lost to the soil.[23] In Marx and Frederick Engels's political-economic critique, the material conditions of production were integrated with the developing science of thermodynamics of their time, which emphasised the environmental/energetic limits on production.[24] In accordance with ancient Epicurean materialism, nothing came from nothing, and nothing being destroyed was reduced to nothing.[25] Marx quoted Pietro Verri's statement that, "All the phenomena of the universe, whether produced by the hand of man or indeed the universal laws of physics, are not to be conceived as acts of creation but solely as a reordering of matter."[26]

[In neoclassical economics], all necessary relations of capital to nature were extinguished, together with any conception of material production being dependent on the laws of thermodynamics. The idea that the growth of capital was in any way limited by the natural environment was also eliminated.

In neoclassical economics, as it emerged in the late nineteenth and twentieth centuries, distinct from classical political economy, the concept of natural-material use values was removed from the fundamental framework in economics, leaving only exchange value in the conception of wealth. Land as a factor of production, since it was assumed that human-made capital could substitute for it, was eventually excluded altogether from the neoclassical production function, consisting of simply labour and capital. Hence, all necessary relations of capital to nature were extinguished, together with any conception of material production being dependent on the laws of thermodynamics. The idea that the growth of capital was in any way limited by the natural environment was also eliminated.[27]

If money can grow forever at compound interest, then presumably, so can [real] wealth," as if there were no physical limitations.

All of this fed the myth of the innate power of capital. As ecological economist Herman Daly has written, "Perhaps the standard example of misplaced concreteness [reification] in economics is 'money fetishism,' applying the characteristics of money, the token and measure of wealth, to concrete wealth itself. Thus, if money can grow forever at compound interest, then presumably, so can [real] wealth," as if there were no physical limitations.[28]

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22 ↩ Marx and Engels, *Collected Works*, vol. 37, 732–33.

23 ↩ On the metabolic rift, see John Bellamy Foster, *Marx's Ecology* (New York: Monthly Review Press, 2000), 141–77; Kohei Saito, *Karl Marx's Ecosocialism* (New York: Monthly Review Press, 2017); John Bellamy Foster and Brett Clark, *The Robbery of Nature* (New York: Monthly Review Press, 2000), 12–34.

24 ↩ On Marx and thermodynamics, see John Bellamy Foster and Paul Burkett, *Marx and the Earth* (Chicago: Haymarket, 2016), 137–64.

25 ↩ Lucretius, *On the Nature of the Universe* (Oxford: Oxford University Press, 1997), 7–9 (I.145–220).

26 ↩ *Capital*, vol. 1, 133.

27 ↩ John Ryan-Collins, "How Land Disappeared from Economic Theory," *Evonomics*, April 4, 2017; Nicholas Georgescu-Roegen, *The Entropy Law and the Economic Process* (Cambridge, MA: Harvard University Press, 1971), 2–3. Georgescu-Roegen's notion that Marx too fell prey to the same fallacy confused Marx's depiction of the laws of motion of capital in his critique of political economy, with his wider *critique*, devoted to the limitations of those laws of motion.

28 ↩ Herman Daly, "The Circular Flow of Exchange Value and the Linear Throughput of Matter-Energy," *Review of Social Economy* 43, no. 3 (1985): 282.

The ecological/energetic critique of the innate power of money, introduced by Marx, was taken still further a century ago by Frederick Soddy, the winner of the Nobel Prize in Chemistry in 1921 and a pioneer in ecological economics, beginning with the 1922 publication of his Cartesian Economics: The Bearing of Physical Science upon State Stewardship. Soddy was one of the pioneers in the study of radiation, introducing the concept of isotopes.[29] He was concerned early on about the destructive potential of harnessing atomic energy, indicating in 1926 in his Wealth, Virtual Wealth, and Debt: "If the discovery [of how to release atomic energy] were made tomorrow, there is not a nation that would not throw itself heart and soul into the task of applying it to war, just as they are now doing in the case of the newly developed chemical weapons of poison-gas warfare.… If [atomic energy] were to come under existing economic conditions, it would mean the reductio ad absurdum of scientific civilisation, a swift annihilation instead of a none too lingering collapse."[30]

Soddy saw the capitalist economic system, and particularly the debt economy it fostered, as the greatest danger to world stability. In the early twentieth century, during his most productive period as a chemist in Glasgow, he became acquainted with socialist ideas, principally the Romantic-radical tradition, in which the main sources of inspiration at the time were figures such as Percy Bysshe Shelley, Thomas Carlyle, John Ruskin, Walt Whitman, and William Morris. This was a critical milieu that had been influenced by Morris's Socialist League and by the development of municipal socialism. The miner's strike in 1911–12 paralysed British industry and highlighted the dependence of production on fossil fuel energy, with Soddy pointing out at the time that the contemporary economic world found its basis in this particular form of low-entropy matter/energy.[31]

Soddy was associated for a number of years with the Independent Labour Party. In 1918, he joined the newly created National Union of Scientific Workers, through which he became closely acquainted with the zoologist, Marxist, ultra-materialist, and author of An Outline of Psychology, Henry Lyster Jameson, with whom Soddy carried out an extensive correspondence.[32] In the context of his correspondence with Jameson, Soddy entered into studies of Marx and Ruskin, as well as the work of the late nineteenth-century theorist of banking and credit Henry Dunning Macleod.[33] The result of these studies was Cartesian Economics (originally two lectures presented to the Student Unions of Birkbeck College and the London School of Economics), in which Soddy challenged the innate power of money. Cartesian Economics was published the same year as the presentation of Soddy's 1922 Nobel Lecture and marked a decisive shift in his work from research in chemistry to the criticism of economics and the role of money emanating from the energetic standpoint of thermodynamics.

The Lauderdale Paradox stated that the destruction of public wealth increased private riches. In illustrating it, Mill had pointed to the calamity represented by a situation in which clean air became so scarce and monopolisable that it could be turned into a commodity, thereby enhancing private riches at the expense of the community through the monetisation of the "free gifts" of nature.

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29 ↩ "Frederick Soddy Facts: The Nobel Prize in Chemistry 1921," Nobel Prize, accessed February 28, 2022.

30 ↩ Soddy quoted in Herman Daly, *Beyond Growth* (Boston: Beacon, 1996), 174.

31 ↩ Linda Merricks, The World Made New: Frederick Soddy, Science, Politics, and Environment (Oxford: Oxford University Press, 1996), 54–55.

32 ↩ Merricks, *The World Made New*, 53–54, 78, 86–88; Frederick Soddy, *Cartesian Economics: The Bearing of Physical Science upon State Stewardship* (New York: Cosimo Classics, 2012), 43; John W. Evans, President, H. Lyster Jameson, Member of the Executive, A.G. Church, Secretary, National Union of Scientific Workers, "The British Association," *Nature* 106, no. 2664 (November 18, 1920), 373; H. Lyster Jameson, *An Outline of Psychology* (N.C.L.C. Publishing Society, 1938); Stephen A. Craven, "Henry Paul William Lyster Jameson, MA, DSc, PhD (1875–1922)—a Polymath: Zoologist, Transvaal Educationist, Entrepreneur, Civil Servant and Marxist," *Transactions of the Royal Society of South Africa* 67, no. 3 (2022): 127–34. (Note: Article is incorrectly dated 2012).

33 ↩ Merricks, The World Made New, 115

Soddy, like Ruskin, entered the economic discussion as an outsider with only a cursory knowledge of economics itself, coupled with a radical perspective. Hence, his views have generally been ignored by the economics profession. In approaching economics from the standpoint of natural science, he brought back the notion of real wealth as the useful embodiment of matter/energy, thereby questioning the exchange-value orientation of the capitalist economy. Like Ruskin, he saw wealth as life, or as metabolism, associated with the rational utilisation of energy flows, ultimately derived from the sun. Wealth was "the humanly useful forms of matter and energy."[34] All human production was rooted in energy flows, and it was of this that real wealth was composed.

In this context, Soddy resurrected the use-value perspective of classical political economy, seeing real wealth as consisting of natural-material use values and distinguishing this from exchange value and mere financial claims to wealth. Via John Stuart Mill, Soddy highlighted the Lauderdale Paradox, named after James Maitland, the eighth Earl of Lauderdale, whereby the destruction of public wealth increased private riches. In illustrating the Lauderdale Paradox, Mill had pointed to the calamity represented by a situation in which clean air became so scarce and monopolisable that it could be turned into a commodity, thereby enhancing private riches at the expense of the community through the monetisation of the "free gifts" of nature.[35]

The main error of capitalist economics, for Soddy, was the confusion of real wealth, which was governed by physics, with money/debt, which was a mathematical quantity. Money itself was primarily to be viewed a lien on future production and thus a debt of the public (the issuer of currency) to the holder of money.[36] All "debts" in a commodity economy, he argued, "are subject to the laws of mathematics rather than physics," and thus are divorced from physical processes and limits. In the case of money/debt, the entropy law—the tendency of physical systems to greater disorder—did not apply, replaced by the magic of compound interest.[37] Real wealth, in contrast, emanated from solar energy and photosynthesis, and was inherently limited and subject to the entropy law—if nonetheless capable of further development in terms of utilisation of energy flows. Following Aristotle and Ruskin, Soddy argued that economics as practiced by capitalism had taken the form of chrematistics or the mere art of acquisition, rather than oikonomia, or household management (from which the words economy and ecology were derived).[38] The economic successes of Britain and the other developed economies, he contended, mainly emanated from the harnessing of fossil fuel energy and exercise of contemporary imperialism, as opposed to the fantasy of the innate power of capital.[39]

Soddy highlighted a number of times Marx's insistence that real wealth in the form of use values was rooted in both nature and material labour (the latter itself a force of nature). If, in Marx's critique of political economy, as Soddy explained, the exploitation of socially necessary labour power was the sole source of "exchange-value or money-price"

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[34] ↩ Soddy quoted in Daly, *Beyond Growth*, 177; John Ruskin, *Unto This Last/The Political Economy of Art/Essays on Political Economy* (New York: Dutton, 1968), 171, 185, 189–90, 216. For a treatment of Ruskin's ecological views, see John Bellamy Foster, *The Return of Nature* (New York: Monthly Review Press, 2000), 75–80.

[35] ↩ Frederick Soddy, *Wealth, Virtual Wealth and Debt* (1933; repr. Ground Floor, Ireland, 2021), 88; John Stuart Mill, *Principles of Political Economy with Some of Their Applications to Political Economy* (New York: Longmans, Green, and Co., 1920), 4, 6. On the Lauderdale Paradox, see Foster and Clark, *The Robbery of Nature*, 152–72.

[36] ↩ Money is defined by Keynes as "that by delivery of which debt contracts and price contracts are *discharged*, and in the shape of which a store of general purchasing power *is held*." It "derives its character from its relationship to the money of account" brought "into existence along with debts, which are contracts for deferred payment.… Money proper in the full sense of the term can only exist in relation to a money of account." Money and debt are therefore inextricably connected, with debt increasingly playing the determining role. John Maynard Keynes, *A Treatise on Money*, in *Collected Writings*, vol. 5 (London: Macmillan, 1971), 3–4.

[37] ↩ Soddy, Wealth, Virtual Wealth and Debt, 94.

[38] ↩ Soddy, Cartesian Economics, 24, 34; Soddy, Wealth, Virtual Wealth and Debt, 117.

[39] ↩ Soddy, *Cartesian Economics*, 12. Soddy's position on imperialism, though seemingly related to a left critique, was left undeveloped. In one sentence in *Cartesian Economics*, he identified finance and usury categorically with "Jews," reflecting a reactionary, anti-Semitic strain in his thought, though this was seldom in evidence. Soddy, Cartesian Economics, 31.

"The great modern discovery is to make the debts themselves saleable commodities" and to build up a whole supreme credit and financial system based on that, which would increasingly rule the capitalist world.

[The fact that]Banks under capitalism internally created credit money out of nothing, coupled with the explosive character of compound interest divorced from all relations to the physical world, expressed the modern money fetish deeply embodied in the capitalist economy, which, in its irrational financial explosion, was imperilling all of existence.

under capitalism, this was to be distinguished from real wealth, where nature and labour together constituted the fundamental bases—something that many of Marx's own followers had failed to understand. Marx therefore had underscored the natural-physical basis of wealth.[40] Yet, while indicating his admiration at various points for Marx's analysis and learning from Marxist thinkers such as his friend Jameson, Soddy was himself far from a Marxist. Moreover, by the time he wrote The Role of Money in the 1930s, he had moved away altogether from the socialist critique of capitalism and toward schemes for radical monetary reform.[41] As distinguished from Marx, Soddy was not at all interested in the social basis of value and capital—partly because, from a physicist's perspective, he took the view that plants engaged in photosynthesis were the ultimate sources of wealth—but rather in the narrower issue of the conflict between the monetary world and the world of physics.[42]

Marx had sharply criticised Macleod for his supposed "discovery," in The Theory and Practice of Banking, that "currency…is capital," discounting the question of value.[43] Soddy, likewise, was to see Macleod as standing for the fetish of money capital in his advancement of the argument that debt should not be treated as a "negative" quantity, but rather as a positive economic value in itself. Indeed, for Macleod, "the great modern discovery is to make the debts themselves saleable commodities" and to build up a whole supreme credit and financial system based on that, which would increasingly rule the capitalist world.[44] Banks, in Macleod's terms, were "shops for the express purpose of buying and selling debts" or for "the Manufactory of Credit."[45] Macleod's emphasis on how banks under capitalism internally (or endogenously) created credit money out of nothing, coupled with the explosive character of compound interest divorced from all relations to the physical world, expressed for Soddy

the mythological view that compound interest had a real basis in material reality, in defiance of the entropy law, was generating a set of unstable economic relations that further threatened human self-sufficiency... Science "should speak the truth though the heavens fall."

40 ↩ Soddy, Wealth, Virtual Wealth and Debt, 97, 121.

41 ↩ Frederick Soddy, *The Role of Money* (London: Routledge, 2003).

42 ↩ Soddy, Wealth, Virtual Wealth, and Debt, 58.

43 ↩ Marx, *Capital*, vol. 1, 255; Karl Marx, *A Contribution to a Critique of Political Economy* (Moscow: Progress Publishers, 1970), 143; Marx and Engels, *Collected Works*, vol. 42, 543.

44 ↩ Henry Dunning Macleod, *The Theory and Practice of Banking* (London: Longmans, Green, Reader, and Dyer, 1866), 73, 91.

45 ↩ Macleod, *The Theory and Practice of Banking*, 19–20; Henry Dunning Macleod, *The Theory of Credit*, vol. 2, part 1 (London: Longmans, Green, and Co., 1894), 594.

the modern money fetish deeply embodied in the capitalist economy, which, in its irrational financial explosion, was imperilling all of existence.[46]

Indeed, the extreme fantasies of capital, money, and finance were, in Soddy's view, pointing the world toward final catastrophe. The illusory pursuit of a perpetual motion machine was propelling the globe toward another world war, as country after country sought unlimited competitive expansion and devil take the hindmost. Moreover, the mythological view that compound interest had a real basis in material reality, in defiance of the entropy law, was generating a set of unstable economic relations that further threatened human self-sufficiency. If economics were not put on a solid, physical basis, the growth of the debt economy would propel humankind to disaster.[47] In his 1935 foreword to The Frustration of Science, a work whose contributors included leading British left scientists such as J. D. Bernal and Patrick M. S. Blackett, Soddy referred to the loss of productivity of the soil and the general waste in the economy, arguing that society should be ruled by the productive elements of society concerned with "the creation of its wealth rather than of its debts," and who retained a connection to the earth. Science "should speak the truth though the heavens fall."[48]

The year 2009 will be remembered in world history for two globally destabilising events: the Great Financial Crisis and the extraordinary failure of the climate negotiations in Copenhagen.

As Daly, commenting on Soddy, explains in "Capital, Debt, and Alchemy," capital, when defined in financial terms, is an expected "perennial net revenue stream" derived from an underlying asset "divided by the assumed rate of interest and multiplied by 100." It becomes in the current money form the calculation of a "permanent lien on the future real production of the economy." Hence, the capitalist growth economy, while continuing to profit in the course of its creative destruction, is ultimately faced with physical limits of an Earth System, which does not, like compound interest, increase exponentially. Real physical wealth emanating from nature and ultimately derived from solar energy is subject to the entropy law and cannot generate endless rapid growth as in the case of "symbolic monetary debt!" The conflict between finance-based economic expansion and the ecological basis of society is thus inevitable.[49]

The Financialisation of Nature as a New Ecological Regime

The year 2009 will be remembered in world history for two globally destabilising events, each of which represented a major turning point. Not only did 2009 constitute the peak of the Great Financial Crisis, which began in 2007 in the United States, but it also marked the extraordinary failure of the climate negotiations in Copenhagen. Perversely, when

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[46] ↩ Soddy, *Wealth, Virtual Wealth and Debt*, 97–100; Ansel Renner, Herman Daly, and Kozo Mayumi, "The Dual Nature of Money: Why Money Systems Matter for an Equitable Bioeconomy," *Environmental Economics and Policy Studies* (2021): 1–12; Kozo Mayumi, *Sustainable Energy and Economics in an Aging Population* (Springer, 2020), 118. There are three major theories on the question of whether banks can create money: (1) the credit creation theory of banking, (2) the fractional reserve theory of banking, and (3) the financial intermediation theory of banking. Macleod was the foremost nineteenth-century representative of the credit creation theory of banking by individual banks, or the endogenous theory of money later made famous in Joseph Schumpeter's *The Theory of Economic Development*. The later fractional reserve theory of banking suggested that banks created money not individually through provision of credit, but rather systematically, through the fractional reserve system. The financial intermediation theory of banking, dominant in neoclassical thought but challenged by heterodox thinkers, claims that banks are mere intermediaries like other financial institutions and do not create money, which is exogenous rather than endogenous. Richard A. Werner, "Can Banks Individually Create Money Out of Nothing? The Theories and the Empirical Evidence," *International Review of Financial Analysis* 36 (2014): 1–19; *The Theory of Economic Development* (Oxford; Oxford University Press, 1934), 97. See also Schumpeter, *A History of Economic Analysis* (Oxford: Oxford University Press, 1954), 1115–16. For Soddy, there was no question as to the endogenous creation of money, which lay behind capitalism's financial excesses. Marx too challenged the orthodox quantity theory of money and suggested that credit money was created endogenously. See Costas Lapavitsas, *Marxist Monetary Theory* (Chicago: Haymarket, 2016). Keynes advanced the credit creation theory of money as early as 1924 in his *Tract on Monetary Reform*. See Werner, "Can Banks Individually Create Money Out of Nothing?," 18.

[47] ↩ Frederick Soddy, *Money versus Man* (London: Elkin Matthews and Marrot, 1931), 15; Daly, *Beyond Growth*, 187.

[48] ↩ Frederick Soddy, foreword to *The Frustration of Science* (New York: W. W. Norton, 1935), 7–9.

[49] ↩ Herman Daly, "Capital, Debt, and Alchemy," Center for the Advancement of the Steady State Economy, April 9, 2012.

The concept of natural capital was introduced in the early nineteenth century, prior to the term capitalism itself... but in the last three decades has given way to a notion of natural capital in exchange-value terms... This is "the Natural Capital Agenda: the pricing, valuation, monetisation, financialisation of nature in the name of saving it."

the financial explosion that has characterised modern monopoly-finance capital resumed soon after, it was to be coupled with a search for new real asset bases from which to further leverage global finance. This search immediately came to focus on the financialisation of ecosystem services, not previously incorporated within the economy, building on global carbon markets and conservation finance, offering as the solution to the global ecological crisis the monetisation of earth, constituting a new financialised ecological regime.[50]

The concept of natural capital, it is well to remember, was introduced in the early nineteenth century, prior to the term capitalism itself, in an attempt to defend land and natural resources from the developing logic of industrial capitalism and the dominance of exchange value. In this original context, it was argued that natural capital or the earth's capital stock—a term that arose at the same time—needed to be defended against the artificial capital being generated by the system of cash nexus.[51] This usage of the concept of natural capital, as embodying natural-material use values underlying production, persisted into the twentieth century, but in the last three decades has given way to a notion of natural capital in exchange-value terms, and thus a tradable asset that can be internalised within the capitalist economy.[52] This is what George Monbiot, in a 2014 talk to the Sheffield Political Economy Research Institute, termed "the Natural Capital Agenda: the pricing, valuation, monetisation, financialisation of nature in the name of saving it."[53]

A turning point in this respect was an article aimed at pricing the planet.... In the wildlife fish user days calculus, the various forms of wildlife are valued by the average amount of money an individual sportsperson is willing to pay in pursuit of particular type of wildlife with the expectation of killing it, thus establishing its value.

A turning point in this respect was the initial 1997 article on "The Value of the World's Ecosystem Services and Natural Capital" by Costanza and his associates, aimed at pricing the planet. This relied on a reductive approach that applied a system of artificially fabricated prices derived from capitalist market relations to significant parts of a given "ecosystem service" or function, such as the production of atmospheric oxygen or the synthesis of carbohydrates by plants. Each ecosystem service was then given a single dollar price, followed by the aggregation of all "seventeen" of the world's ecosystem services.[54] Such a system of imposed tradable values is based on treating incommensurable natural processes as commensurable. In such costing of the earth, demand curves are constructed by determining the consumers' willingness to pay. However, since actual markets for ecosystem services do not exist—that is, they are not commodity products, which are actually bought—consumers' willingness to pay is imputed by various methods, known as hedonic pricing and contingent valuation. In hedonic pricing, valuation is made by drawing parallels with closely associated marketed services. Thus, in the United States, a category known as wildlife fish user days has been utilised to calculate the worth of various species of wildlife in cost-benefit analyses—for example, in determining whether it is economical to

50 ↩ On the financialization of nature as a response to the Great Financial Crisis and the search for real assets in nature as a basis for the further expansion of the debt economy, see Jenny Simon and Anne Tittor, "The Financialization of Food, Land, and Nature," *Journal für Entwicklungspolitik* 33, no. 2 (2014): 16–45; "The Growing Case for Conservation Finance," *Environmental Finance*, April 6, 2017.

51 ↩ See Foster, "Nature as a Mode of Accumulation," 2–7.

52 ↩ The notion that the natural environment, as the commons, in property terms, needs to be internalized within the capitalist economy has its modern expression in Garrett Hardin, "The Tragedy of the Commons," *Science* 162, no. 3859 (1968): 1243–48. For a critique, see Stefano Longo, Rebecca Clausen, and Brett Clark, *The Tragedy of the Commodity: Oceans, Fisheries, and Aquaculture* (New Brunswick: Rutgers University Press, 2015), 27–38.

53 ↩ George Monbiot, "Put a Price on Nature? We Must Stop This Neoliberal Road to Ruin," *Guardian*, July 24, 2014.

54 ↩ Robert Costanza et al., "The Value of the World's Ecosystem Services and Natural Capital," *Nature* 387 (1997): 253–60.

eliminate wildlife by constructing a dam. In the wildlife fish user days calculus, the various forms of wildlife are valued by the average amount of money an individual sportsperson is willing to pay in pursuit of particular type of wildlife with the expectation of killing it, thus establishing its value. Similarly, the worth of a particular wilderness area is determined in hedonic pricing by the willingness of consumers to pay for parking to visit it. Contingent valuation, in contrast, takes the form of the creation of hypothetical markets on the basis of which consumers are asked to determine what they would hypothetically pay for a particular environmental service and what compensation they would have to receive for losing it.[55]

Based on such studies of inferred consumer preferences, Costanza and his associates apply a "benefit transfer" (or value transfer) method, extrapolating the imputed value for a particular ecosystem service in one localised context, such as the water purifying role of a particular river system, where consumer preferences have been established, and then extending that to entirely different ecological contexts, in which studies have not taken place. The results are then aggregated to determine the price/value of the ecosystem service on a planetary basis. This same method is applied to all "seventeen" of the designated global ecosystem services in order to price the planet as a whole.[56]

The object of these elaborate exercises is to impute a value to ecosystem services or natural assets that currently lie outside the market. The justification offered for this is that, unless an economic value is placed on nature's services, they will continue to be treated as a free gift or externality, to be robbed.[57] Yet, in the words of heterodox economist Guy Standing, while it is claimed that "unless a price is placed on every bit of nature, it will not be treated as having value," it is nonetheless true that "a price only comes when something is for sale, when it becomes a commodity." The UK government is now arguing that landowners by virtue of simply owning and monopolising land are "providers of ecosystem services" who deserve to be paid financial compensation for offering these "services" associated with the land, previously viewed as free gifts of nature, such as ecosystem services of water purification, pollination of crops, biodiversity, and carbon sequestration.[58] (Of course, in many situations, especially on conventional farms, current practices commonly generate ecosystem "disservices" such as water pollution and loss of biodiversity.) The monetisation of the environment thus allows for an enormous expansion of the circuit of exchange value and monopoly rent in the name of ecological sustainability. In Monbiot's words, it means that "you are effectively pushing the natural world even further into the system that is eating it alive.… All the things which have been so damaging to the living planet are now being

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To monetise the environment is ultimately to draw it into the market and to subject it to the uncontrollable dynamic of accumulation, for which a rational, sustainable relation to the environment is by definition impossible.

[55] ↩ This paragraph has been adapted from John Bellamy Foster, "The Ecological Tyranny of the Bottom Line," in *Reclaiming the Environmental Debate*, ed. Richard Hofrichter (Cambridge, MA: MIT Press, 2000), 137–39. See also Michael Jacobs, "The Limits to Neoclassicism," in *Social Theory and the Environment*, ed. Michael Redclift and Ted Benton (New York: Routledge, 1994), 69; Barry Commoner, *Making Peace with the Planet* (New York: New Press, 1992), 64–66; Marilyn Waring, *Counting for Nothing* (Toronto: University of Toronto Press, 1999), 216; *National Wildlife* (April–May 1986), 12; Robert Costanza et al., "Twenty Years of Ecosystem Services," *Ecosystem Services* 28 (2017): 55.

[56] ↩ Costanza et al., "Changes in the Global Value of Ecosystem Services," 154.

[57] ↩ Jonathan Hughes, "The Natural Capital Debt Bubble," Natural Capital Forum, June 1, 2015.

[58] ↩ Guy Standing, *Plunder of the Commons* (London: Penguin, 2019), 121.

sold us as its salvation; commodification, economic growth, financialisation, abstraction. Now, we are told, these devastating processes will protect it."[59]

The laws of motion of capital are governed by the accumulation process. To monetise the environment is ultimately to draw it into the market and to subject it to the uncontrollable dynamic of accumulation, for which a rational, sustainable relation to the environment is by definition impossible. For example, according to the standard principles of forest management under capitalism, a forest consists of so many millions of board feet of standing timber. Such timber services, according to the market rule, should be "harvested" whenever the interest rate exceeds the rate of growth in value of timber, determined by the natural growth rate of the trees. Since an old growth forest, in which trees are sometimes a century or more old, means that the growth rate of the mature trees is much reduced, falling below the rate of interest, the market demands that such old growth be liquidated on the spot, to be replaced by younger, faster growing trees. These are to be harvested within twenty to thirty years, with chemicals increasingly applied during the processing of the wood into lumber in order to make up for the lower quality.[60]

the monetisation of the earth's complex biological-physical-chemical web goes against the sustainable requirements of ecosystems, and indeed the Earth System.

In general, the monetisation of the earth's complex biological-physical-chemical web, even in the name of conservation, will tend to replace systems of natural reproduction and evolution with reductionist, market-based criteria, for which profitable expansion is the goal. Following market rules, ecosystem services are analytically embedded within commodity markets dominated by a given accumulation of private riches. Yet, this goes against the sustainable requirements of ecosystems, and indeed the Earth System. In the process of being capitalised, the global commons will be cut up and monopolised by a few private interests, who will turn them into revenue streams to be bundled together as financial assets, including various kinds of derivatives.

Where actual conservation of natural assets is concerned, a "blended" financial arrangement is typically adopted in which governments take on most of the costs, owning and investing in the forests, and private firms reap the benefits, receiving a disproportionate share of the resulting revenue. Today, alternative sources of finance like carbon credits and debt financing, piled onto the already excessive debt loads of developing countries, are making investments in forests, tradable on the market, more profitable for international capital. In the voluntary carbon market, carbon credits, offered for already standing forests (taken from Indigenous inhabitants) can be purchased or financially managed so as to supposedly constitute offsets for carbon emissions elsewhere in the global economy, thereby making real emission reductions unnecessary, within a net-zero scheme. Carbon credits can be received by simply liquidating a natural capital asset less rapidly than would supposedly have been the case otherwise, relying on fabricated baselines.[61] However, some of the problems associated with using carbon offsets—aside from not actually requiring polluters to reduce their level of pollution—can be seen in those cases where the very forests that were traded as offsets for emissions elsewhere have already burned up in the massive global forest fires induced by climate change, thus increasing carbon dioxide emissions.[62]

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59 ↩ Monbiot, "Put a Price on Nature?"

60 ↩ Foster, Ecology Against Capitalism, 33.

61 ↩ See Business and Sustainable Development Commission, *Unlocking Business Opportunities in Sustainable Land Use with Blended Finance*, January 2018; Larry Lohmann, "The Problem Is Not 'Bad Baselines' but the Concept of Counterfactual Baselines Itself," REDD-Monitor, October 18, 2016.

62 ↩ Winston Choi-Schagrin, "Wildfires Are Ravaging Forests Set Aside to Soak Up Greenhouse Gases," *New York Times*, August 24, 2021.

In 2012, the UK Ecosystems Market Task Force referred to the need for "harnessing City financial expertise to assess the ways these blended revenue streams and securitisation [of natural capital assets] enhance the return on investment of an environmental bond."[63] Commenting on this and on the overall logic of the Natural Capital Agenda, Monbiot wrote:

> *What we are talking about is giving the natural world to the City of London, the financial centre, to look after. What could possibly go wrong? Here we have a sector whose wealth is built on the creation of debt. That's how it works, on stacking up future liabilities. Shafting the future in order to serve the present: that is the model. And then that debt is sliced up into collateralised debt obligations and all the other marvellous devices that worked so well last time around. Now nature is to be captured and placed in the care of the financial sector.… The same Task force says we need to "unbundle" ecosystem services [from the rest of the Earth System] so they can be individually traded.*[64]

Once unbundled from the rest of nature, these ecosystem services can then be rebundled as financial assets to promote financial gains. In today's carbon market, focusing on offsets, financial interests purchase credits in large numbers from suppliers so as to "bundle" them, combining various tranches of derivatives and gathering these together in portfolios, consisting of carbon and offsets associated with widely different forms of natural capital.[65] The financialisation of biodiversity within conservation finance now involves mechanisms for "stacking and bundling," referring to the "different ways of packaging multiple ecosystem goods and services including biodiversity for sale in environmental compensation schemes or to attract [monetised] incentive-based conservation funding."[66]

As indicated in Credit Suisse's 2016 report, Levering Ecosystems, conservation finance is becoming increasingly reliant on debt financing, based on expectations of rapidly growing revenue from natural capital.[67] Such approaches rely, in the first place, on the notion of the "innate power of capital" (what Marx called "the fetish character of capital"), coupled with a recognition of the increasing scarcity of natural capital, allowing for the widening of the circuit of exchange value to all ecosystem services. The financial goal in these circumstances is to "monetise ecological credits," generating a "blended return" from natural capital management "that can be astronomical."[68] The ultimate result, however, is to impose a system geared to economic growth and debt expansion on top of natural systems, which are physically limited, and where the crucial conditions are those of reproduction and sustainability. For Burgess of Tierra Australia, in a paper on capitalising the world's ecosystems, beginning with the natural capital of Indigenous populations in Australia and Malaysia's Sabah state in Borneo, the monetisation of the world's ecosystem services can underwrite a whole new global financial system,

The ultimate result, however, is to impose a system geared to economic growth and debt expansion on top of natural systems, which are physically limited, and where the crucial conditions are those of reproduction and sustainability... what is meant is the leveraging up of the credit/debt system worldwide through the financialisation of the earth, with the expropriation of Indigenous lands as its basis.

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63 ↩ Duke et al., *Opportunities for UK Business that Value and/or Protect Nature's Services*, attachment 1 to final report to the Ecosystem Markets Task Force and Valuing Nature Network (London: GHK, 2012), 32.

64 ↩ Monbiot, "Put a Price on Nature?"

65 ↩ Silvia Favasuli and Vandana Sebastian, "Voluntary Carbon Markets: How They Work, How They're Priced and Who's Involved?," S&P Global, June 10, 2021.

66 ↩ Amrei von Hasse and Jan Cassin, *Theory and Practice of "Stacking" and "Bundling" Ecosystem Goods and Services*, Business and Biodiversity Offsets Programme (Washington DC: Forest Trends, 2018), 5.

67 ↩ Credit Suisse, *Levering Ecosystems* (Zürich: Credit Suisse, 2016).

68 ↩ "The Growing Case for Conservation Finance."

providing through "its productive value…the underlying asset for a stable universal medium of exchange."[69] In reality, what is meant is the leveraging up of the credit/debt system worldwide through the financialisation of the earth, with the expropriation of Indigenous lands as its basis.

The negative consequences to be expected from extending the capital fetish to nature as a whole are planetary in scale. According to one critical study by ecological economists,

> *High-debt dependent production systems exert negative effects on the capacity of the economic system to enhance the sustainable use of natural resource stocks.… The model of debt-fuelled growth requires ever-faster growth rates to allow the repayment of the ever-increasing debt.… Thus, the profit-seeking behavior of firms and speculative agents…drives the inappropriate use of credits (debt), which consequently brings about systemic instability.… Debt-bearing economic systems can result in a complete collapse of both natural and economic systems.*[70]

As John Maynard Keynes observed in The General Theory of Employment, Interest, and Money in 1936, in the midst of the Great Depression: "Speculators may do no harm as bubbles on a steady stream of enterprise. But the position is serious when enterprise becomes the bubble on a whirlpool of speculation."[71] Today, this has become more serious still, at a time when the "enterprise" that is being turned into a "bubble on a whirlpool of speculation" is the metabolism of the Earth System itself.

The first published estimates of the global value of natural capital/ecosystem services led to a celebration in financial circles of this new "asset class" and the huge market it portended, consisting of hundreds, if not thousands of trillions of dollars, now potentially open to expropriation and exploitation by capital. In this view, the pricing of the planet had resulted in a huge increase in global wealth. Yet, operating on the principle of thinkers such as Marx, Ruskin, Soddy, and Daly, in which real wealth consists of natural-material use values, and indeed the earth itself, what was being measured in the pricing of ecosystem services was not real wealth, but rather the increased drain on the world's resources, their growing scarcity.[72] Based on this, the realm of commodity exchange was being enhanced—not for purposes of conservation, but as a further basis of capital accumulation, representing the acceleration of processes that had created metabolic rifts in nature's ecosystem processes in the first place. The trajectory, at present, unless stopped through global collective action, is toward a world of widening catastrophe capitalism marked by interconnected financial and ecological crises, based on the myth that nature can be transformed into a new speculative asset class.

The trajectory, at present, unless stopped through global collective action, is toward a world of widening catastrophe capitalism.

Ecological Capital and the Environmental Proletariat

Beginning with The Poverty of Philosophy in 1846, Marx—who like other social and radical critics had at first referred to "natural capital" in use-value terms, counterpoising this to exchange value and artificial human-made capital—was to

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69 ↩ Peter Burgess, "Building a Platform and Economic Model to Actualize the Value of Natural Capital to Incentivize Preservation and Conservation over Exploitation of Aboriginal Cultural [*sic*] Their Nature Capital Assets and the Nature Capital Assets of the State of Western Australia, Northern Territory, and Sabah Malaysia" (briefing paper, Nature-Capital-Paper 180921, Tierra Australia, February 2022, REDD-Monitor).

70 ↩ Julien Gonzalez-Redin, J. Gareth Polhill, Terence P. Dawson, Rosemary Hill, and Iain J. Gordon, "It's Not the 'What,' but the 'How': Exploring the Role of Debt in Natural Resource (Un)Sustainability," *Plos One* 13, no. 7 (2018): 1–19.

71 ↩ John Maynard Keynes, The General Theory of Money, Interest, and Employment (London: Macmillan, 1973), 159.

72 ↩ Herman Daly, "The Return of the Lauderdale Paradox," *Ecological Economics* 25 (1988): 21–23.

abandon this approach since it tended to naturalise capital itself. Instead, he drew a distinction between earth matter, that is, material existence, and earth capital; between natural-material conditions and processes and the capitalisation of the earth. Nature, or earth matter, was eternal (in the sense of the first and second laws of thermodynamics), while earth capital was not.[73] The creation of earth capital, as a distinct social form, required the creation of private-property titles, and thus original expropriation of the land/earth, transforming what was previously the commons into a realm of private commodity value.[74] Monopolisation of the land gave rise to a system of rents, imposed by the landlords on society as a whole, paid out of the total surplus product.

The creation of earth capital, as a distinct social form, required the creation of private-property titles, and thus original expropriation of the land/earth, transforming what was previously the commons into a realm of private commodity value.

Ralph Waldo Emerson observed that "nature is inexhaustibly significant," since as material beings, we must return to it again in every action we take. Historical materialists have traditionally referred to the "indissoluble unity" of humanity with the "universal metabolism of nature."[75] Today, however, nature is alienated along with labour, forming the basis of the capitalist system of exploitation. The concept of natural capital as it is now employed today is nothing other than an attempt to extend this alienation to nature and humanity as a whole, monetising ecosystem services so as to generate a new financial ecological regime: a social and historical relation in which the entire earth is for sale. For Paul Hawken, Amory Lovins, and L. Hunter Lovins, capitalism cannot be said to exist unless it is "natural capitalism" bringing the entirety of nature within its logic.[76]

All of existence is thus capital. "If ecosystems are...considered capital assets," then they are by definition, he tells us, "ecological capital" to be conceived in exchange-value terms.

The playing out of the logic of the expropriation of the earth can be seen in the attempts of neoclassical environmental economist Edward Barbier to promote the idea that ecosystems, extending to the Earth System itself, are nothing but capital, conceived in exchange-value terms. All of existence is thus capital. "If ecosystems are…considered capital assets," then they are by definition, he tells us, "ecological capital" to be conceived in exchange-value terms. Ecological capital as a whole thus stands for the totality of the world's ecosystems, seen as constituting mere "forms of capital." All ecological problems for Barbier have a single solution: "capitalising on nature."[77] In this view, nature, the earth, the basis of all life and existence, presumably stretching to the universe itself, is capital, measured in money. This dwarfs even Price's notion of compound interest leading to wealth equal to "150 millions of earths all solid gold," since Price was

The system of original expropriation, which was the basis of the creation of the industrial proletariat and the modern system of labour exploitation, has metamorphosed into a planetary juggernaut, a robbery system encompassing the entire earth, leading to a more universal dispossession and destruction. The result is the creation of a global environmental reserve army of the dispossessed, the product of capital's drive to monopolise the biogeochemical processes of the planet, at the expense of humanity as a whole.

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73 ↩ Karl Marx, *The Poverty of Philosophy* (New York: International Publishers, 1963), 164; Marx, *Capital*, vol. 3, 755–56.

74 ↩ Marx, *Capital*, vol. 3, 910–11. On the establishing of titles as the key to "unlocking natural capital assets," see Jake Rostron, "Capitalising on Nature: The Legal Practicalities of Unlocking Natural Capital Assets," Michelmores, November 10, 2018.

75 ↩ Ralph Waldo Emerson, *Essays* (London: Arthur L. Humphreys, 1899), 243; Georg Lukács, *The Ontology of Social Being: Marx* (London: Merlin, 1978), 10; Karl Marx and Frederick Engels, *Collected Works*, vol. 30 (New York: International Publishers, 195), 62–63.

76 ↩ Paul Hawken, Amory Lovins, and L. Hunter Lovins, *Natural Capitalism* (Boston: Little, Brown & Co., 1999).

77 ↩ Edward B. Barbier, "Natural Capital," in *Nature in the Balance: The Economics of Biodiversity*, ed. Dieter Helm and Cameron Hepburn (Oxford: Oxford University Press, 2014),153–76; Barbier, *Nature and Wealth* (New York: Palgrave Macmillan, 2015), 12, 85–87, 98; Barbier, *Capitalizing on Nature* (Cambridge: Cambridge University Press, 2011).

referring to a mathematical process of compound interest—not to the notion that the earth itself and the universe was nothing but solid capital.[78] Here, we see the capital fetish highlighted by Marx and Soddy in its most extreme form. Not only is capital seen as an innate power; it has now, in the fantasies of contemporary economists, effectively replaced matter itself, generating what Marx called a "cosmic confusion."[79]

The historical reality of capital as a system of social relations is hidden behind this fetishised notion of natural capital as an innate power with a potential cash value, stemming from the earth itself, even replacing the earth/nature/matter as the most fundamental element of existence. The monetisation and financialisation of the earth's ecosystems, re-envisioned as "ecological capital" without limit, is at the same time a Great Expropriation, leading to a wider environmental proletariat (and ecological peasantry).[80] The system of original expropriation, which was the basis of the creation of the industrial proletariat and the modern system of labour exploitation, has metamorphosed into a planetary juggernaut, a robbery system encompassing the entire earth, leading to a more universal dispossession and destruction.[81] The result is the creation of a global environmental reserve army of the dispossessed, the product of capital's drive to monopolise the biogeochemical processes of the planet, at the expense of humanity as a whole.[82]

The onslaught on nature/natural capital today is principally directed at the Global South where the financial gains from the expropriation of the earth in the name of the management of natural capital and offsets are the greatest... Everywhere, the class struggle of production is converging with class-based environmental justice struggles over food, air, water, and the conditions of social and ecological reproduction.

The effects of this rift in the earth's metabolism, and in humanity's social metabolism with the earth, are to be seen everywhere, including in the most developed capitalist states, as witnessed by carbon markets and water privatisation. Yet, the onslaught on nature/natural capital today is principally directed at the Global South where the financial gains from the expropriation of the earth in the name of the management of natural capital and offsets are the greatest. And it is here too that an increasingly dispossessed environmental proletariat is most in evidence. Everywhere, the class struggle of production is converging with class-based environmental justice struggles over food, air, water, and the conditions of social and ecological reproduction.

The global resistance of Indigenous communities, together with peasant subsistence producers, to increasing land grabs associated with the accelerating capitalisation of nature is one of the most important developments of our time.

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78 ↩ Barbier's term, *ecological capital*, which he then identifies with the world's ecosystems, is related to the view of Costanza and his associates who have defined *natural capital* as meaning ecosystems, insofar as they underly ecosystem services to the economy. Costanza et al., "Twenty Years of Ecosystem Services," 3. Yet, in referring specifically to *ecological capital*, Barbier goes even further, encompassing under this category every aspect of the earth's ecosystems. Although allowing for the existence of various sub-forms of capital, such as *human capital*, *reproducible capital*, and *natural capital*, his concept of *ecological capital* appears to embrace the Earth System as a whole, such that the planet itself becomes nothing but capital. Barbier, *Nature and Wealth*, 9–13. In Marx's terms, this amounts to the alchemy of the subsumption of "earth matter" by "earth capital." Marx, *Capital*,

79 ↩ Marx, *Capital*, vol. 3, 522.

80 ↩ The environmental proletariat, in this sense, is not to be identified primarily with the industrial proletariat, but rather with Marx's conception that the proletariat stands for the dispossessed in general, the "focal point of all inhuman conditions" and thus embodies within itself the irrepressible struggles for humanity. See Paul M. Sweezy, *Modern Capitalism and Other Essays* (New York: Monthly Review Press, 1972), 148–49; Karl Marx and Frederick Engels, *The Holy Family* (Moscow: Foreign Languages Publishing House, 1956)

81 ↩ Foster and Clark, The Robbery of Nature, 46.

82 ↩ John Bellamy Foster, *Capitalism in the Anthropocene* (New York: Monthly Review Press, 2022), 483–92.

case of the attempt of Hoch Standard and the Sabah government to seize the natural capital of Malaysia's Borneo forests, it is the Indigenous communities, threatened with expropriation and removal, who are at the forefront of the ecological and cultural resistance movement, defending the indissoluble unity with nature. This struggle is occurring on all three continents of the Global South, and in regions of the Global North, an indication of how close the ties are between neocolonialism and the natural capital juggernaut. In Kenya, for example, members of the Sengwer community—who over the last decade and a half have faced forced mass evictions at gunpoint and the burning down and destruction of their villages by the Kenyan Forest Service in alignment with international capital—are waging a struggle to defend the forest and water towers (rainfall in mountains and highlands that becomes water sources for lowland irrigation and human consumption).

Given growing scarcity of resources and the incessant drive for natural capital, Indigenous and smallholders are fighting to defend their lives, communities, and lands.

Many African states inherited a dual land system from the earlier colonial era, which has continued in the postcolonial period. In Zambia, for instance, 94 per cent of the land, until early this century, was held on the basis of customary rights, while all land was also formally held by the state. Now, with corporate induced land grabs, frequently supported by governments, Indigenous and peasant communities are having their lands seized by large private, foreign-based interests. In Zambia, peasants have been fighting a battle against the financial expropriation of their land by Agrivision Africa, which has as one of its investors the World Bank's International Finance Corporation.[83] Some countries, such as Ghana and Botswana, have promoted laws that give customarily held lands the legal clout of private property.[84] But in most of sub-Saharan Africa, Indigenous land rights are tenuous in private property terms. Given growing scarcity of resources and the incessant drive for natural capital, Indigenous and smallholders are fighting to defend their lives, communities, and lands. In this context, the fact that such populations are generally the best stewards of the earth are frequently shunted aside by corporations in the drive for turning nature into gold.

When you take control of a natural resource and turn it into a product, like water, for example, you have profits of over 700%. That's what they are after."

A key basis for resistance to natural-capital colonialism is agroecology, presented as a more rational ecological alternative. La Via Campesina initiated its Global Campaign for Agrarian Reform in 1999.[85] The Landless Workers Movement (MST) in Brazil has also played a leading role in fighting against the capitalisation of nature. In the words of João Pedro Stedile, the national coordinator of the MST, "When you set up a car factory, you expect to obtain a 13% per year profit. When you take control of a natural resource and turn it into a product, like water, for example, you have profits of over 700%. That's what they are after."[86] India's massive farmers' movement in 2020–21 represented an enormous mobilisation of small farmers against the growing agribusiness domination of Indian agriculture, and

In all of these struggles and numerous others, the goal is ultimately one of sustainable human development, necessarily coupled with resistance to capitalism, racism, colonialism, imperialism, and ecological devastation... Behind this lies the recognition that an exploitative system that puts its faith in "the fetish character of capital" at the expense of all human existence and life on the planet can only lead, if not checked, to ultimate catastrophe.

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83 ↩ Roman Herre, Fast Track Agribusiness Expansion, Land Grabs and the Role of European Private and Public Financing in Zambia (Hands off the Land Alliance, 2013), 7; Suefert et al., Rogue Capitalism, 25.

84 ↩ Bowman, "Land Rights, Not Land Grabs, Can Help Africa Feed Itself," CNN, June 18, 2013.

85 ↩ See "Global Campaign for Global Reform," La Via Campesina, accessed February 28, 2022, viacampesina.org.

86 ↩ Brasil de Fato, "Brazil's Natural Resources Are a Target for a Capitalism in Crisis," *Peoples Dispatch*, June 10, 2019.

the attempts to turn the earth and food into capital.[87] In the United States, the massive 2020 solidarity/George Floyd protests emanating largely from the working class and youth in support of a Black-led movement can be seen an indication of the level of resistance to racial capitalism only waiting to burst out as material conditions, particularly in urban built environments, polarise.

In all of these struggles and numerous others, the goal is ultimately one of sustainable human development, necessarily coupled with resistance to capitalism, racism, colonialism, imperialism, and ecological devastation. Within this wider collective perspective, in agreement with natural science, human production is properly viewed as complementary with natural-material systems and cannot be reduced to a universal system of commodity value—based on the fallacious notion that all of existence is commensurate with and can be measured in terms of money. The goals governing the struggle for a viable future are necessarily those of substantive equality and ecological sustainability, together defining socialism in our time. Scientific and human development criteria are complementary elements in creating an integrated path to an ecological future. Behind this lies the recognition that an exploitative system that puts its faith in "the fetish character of capital" at the expense of all human existence and life on the planet can only lead, if not checked, to ultimate catastrophe.

"The global ecological revolution still to come" means "returning to our humanity and our origins as good relatives" of the earth. It means rationally regulating the metabolism of human society with the universal nature of which we are inextricably a part.

As the Red Nation declared in The Red Deal, it is the philosophy of money that drives contemporary society and "its primary method of relationality is destruction. There is another word for a money-driven system that expresses its existence through destruction: capitalism. Capitalism destroys life. It pollutes the rivers. It scars mountains. It starves moose, wolves, and salmon. It alienates our bonds with each other and with the Earth. Its very existence demands our disappearance." The only response to such a destructive system raised to a planetary level is a universal struggle for nature and humanity, demanding a peoples' sovereignty of the earth and of production. "The global ecological revolution still to come" means "returning to our humanity and our origins as good relatives" of the earth. It means rationally regulating the metabolism of human society with the universal nature of which we are inextricably a part.[88]

[87] ↩ Mayank Aggarwal and S. Gopikrishina Warrier, "Environmental Issues in Agriculture a Silent Reason Behind Farmers' Protests," *Mongabay*, December 8

[88] ↩ The Red Nation, *The Red Deal* (Brooklyn: Common Notions, 2021), 141–47; Marx, *Capital*, vol. 3, 949.

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