

# Nature as a Mode of Accumulation

## *Capitalism and the Financialisation of the Earth*

John Bellamy Foster

**T**he expropriation of the commons, its simplification, division, violent seizure, and transformation into private property constituted the fundamental precondition for the historical origin of industrial capitalism. What Karl Marx referred to as the original expropriation of the commons in England and in much of the world (often involving

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the expropriation of the labourers themselves in various forms of slavery and forced labour) generated the concentrations in wealth and power that propelled the late eighteenth- and early nineteenth-century Industrial Revolution.<sup>1</sup> In the process, the entire human relation to nature was alienated and upended. As Karl Polanyi wrote in *The*

<sup>1</sup> ↪ The term *original expropriation* here is used in place of what is often mistakenly referred to as Karl Marx’s notion of *primitive accumulation*. Karl Marx, *Capital*, vol. 1 (London: Penguin, 1976), 871. Marx carefully distanced himself from this concept of classical-liberal political economy by referring to “so-called primitive accumulation,” since, as he insisted, this was not the case of the accumulation of capital, but rather “expropriation” of property. Moreover, the *primitive* in *primitive accumulation* was itself a mistranslation of what Marx, following classical political economy, referred to as *original* or *primary*. Capitalism prior to the British Industrial Revolution required such original expropriation to monopolise the means of production, amass start-up capital, and generate a proletarianised labour force. Yet, expropriation of land/nature and thus of the means of production of the workers, as Marx himself indicated, does not stop there, and is continually replicated in the history of capitalism, colonialism, and imperialism, now taking on new dimensions in the twenty-first century. For a more detailed discussion, see John Bellamy Foster, Brett Clark, and Hannah Holleman, “Capitalism and Robbery,” *Monthly Review* 71, no. 7 (December 2019): 1–23. On the expropriation of the English commons, see John Bellamy Foster, Brett Clark, and Hannah Holleman, “Marx and the Commons,” *Social Research* 88, no. 1 (2021): 1–30; Ian Angus, “Against Enclosure: The Commoners Fight Back,” *Climate and Capitalism*, January 15, 2022.

Great Transformation, “What we call land is an element of nature inextricably interwoven with man’s institutions. To isolate it and form a market for it was perhaps the weirdest of all the undertakings of our ancestors.”<sup>2</sup>

It is hardly surprising in this context that the first references to “natural capital” and to the “earth’s capital stock” arose in

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this same period in the work of radical and socialist political economists, who sought to defend nature and the commons against the intrusions of the market. Here, the notion of “natural capital” was viewed in terms of the stock of physical properties and natural-material use values constituting real wealth and was seen as opposed to the growing “sense of capitalism” as a

system of mere exchange value or cash nexus.<sup>3</sup>

This nineteenth-century notion of “natural capital,” conceived in physical, use-value terms, was to be revived in the 1970s and ’80s as part of an emerging ecological critique. In more recent decades, however, mainstream neoclassical economics (sometimes with the help of ecological economists), together with corporate finance, have completely separated the concept of natural capital from its original use-value-based critique, the memory of which has long receded, conceiving natural capital instead entirely in exchange-value terms, as just another form of financialised capital. This is then used to reinforce the view that the solution to the current ecological crisis of the planet is to make a market out of it.

A turning point in the financial expropriation of the earth occurred from September to November 2021, overlapping with the 2021 UN Climate Change Conference negotiations in Glasgow. Three major interrelated developments occurred at this time: (1) the creation of the Glasgow Financial Alliance for Net Zero embracing most of global capitalist finance; (2)

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approval of key elements of Article 6 of the Paris Agreement, creating the unified financial rules for global carbon trading markets; and (3) the announcement that the New York Stock Exchange together with the Intrinsic Exchange Group (IEG)—whose investors include the Inter-American Development Bank and the Rockefeller

Foundation—was launching a new class of securities associated with natural asset companies (NACs). As the IEG told its investors, while the asset value of the world economy is \$512 trillion, the asset value of the earth’s natural capital is estimated at \$4 quadrillion (\$4,000 trillion), all potentially for the taking.<sup>4</sup>

Together these developments represent a sea change in the capitalisation of nature, such that all-natural processes that involve ecosystem services to the economy are now increasingly seen to be subject to exchange on the market for profit—all in the name of conservation and climate change. This represents the culmination of a theoretical shift in the dominant economic paradigm aimed at the unlimited accumulation of total capital, now seen as including “natural

<sup>2</sup> ↪ Karl Polanyi, *The Great Transformation* (Boston: Beacon, 1944), 178.

<sup>3</sup> ↪ William Makepeace Thackeray, *The Newcomes* (London: Penguin, 1996), 488.

<sup>4</sup> ↪ “The Solution,” Intrinsic Exchange Group, accessed January 13, 2022.

capital.” The result is to reinforce the Great Expropriation occurring in this century aimed at what Charles Darwin called the earth’s “web of complex relations.”<sup>5</sup>

In order to develop a critical analysis of the current capitalist expropriation of world ecology, it is necessary to explore the concept of natural capital in the work of Marx and other early radical critics within classical political economy. It will then be possible to contrast this to current approaches in neoclassical economics, which views natural capital in

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purely exchange-value terms, offering this as a solution to the environmental problem. If, in Marx’s analysis, the human economy existed within what he called “the universal metabolism of nature,” in today’s dominant neoclassical economics, according to Dieter Helm, Chairman of the UK

Natural Capital Committee, “the environment is part of the economy and needs to be properly integrated into it so that growth opportunities will not be missed. Integrating the environment into the economy is hampered by the almost complete absence of proper accounting for natural assets.”<sup>6</sup> Here, the whole of the Earth System is conceived as a largely unincorporated “part” of the capitalist economy. In Helm’s conception, the capitalist economy faces no outer boundaries but is capable of subsuming all of nature, which then simply becomes part of the overall capitalist system.

## Classical Political Economy and Natural Capital as Use Value

Most accounts of the origin of the term natural capital trace it to economist E. F. Schumacher’s book *Small Is Beautiful* in 1973.<sup>7</sup> However, the notion of natural capital and the related concept of the earth’s capital stock were, in fact, widely used in nineteenth-century classical political economy, particularly among radical and socialist critics, appearing in the works of thinkers as various as Victor P. Considerant, Marx, Frederick Engels, Ebenezer Jones, George Waring, Henry Carey, and Justus von Liebig.<sup>8</sup>

Considerant was a utopian socialist, Charles Fourier’s leading disciple, who did much to establish the Fourierist tradition. In his *Theory of the Right to Property and the Right to Work* (1840), Considerant insisted that there were two forms of capital: (1) land, which in classical political economy stood for all forms of nature, and which he referred to as natural capital, and (2) created capital, produced by human labour (utilising natural capital).<sup>9</sup> Property rights to nature and natural resources according to Considerant are mere rights to usufruct or to the temporary use of that which belongs to

<sup>5</sup> ↪ Charles Darwin, *On the Origin of Species* (London: John Murray, 1859), 73. The term ecosystem services is usually credited to Paul Ehrlich and Ann Ehrlich, *Extinction: The Causes and Consequences of the Disappearance of Species* (New York: Random House, 1981).

<sup>6</sup> ↪ [The State of Natural Capital: Restoring Our Natural Assets](#) (London: Natural Capital Committee, 2014).

<sup>7</sup> ↪ See Erik Gomez-Baggethun, Rudolf de Groot, Pedro L. Lomas, and Carlos Montes, “The History of Ecosystem Services in Economic Theory and Practice: From Early Notions to Markets and Payment Schemes,” *Ecological Economics* 69 (2010): 1213. They write, in what purports to be a definitive analysis: “Schumacher [in *Small Is Beautiful*] was probably the first author that used the concept of natural capital.”

<sup>8</sup> ↪ The names here are listed in chronological order in accordance with when they are known to have used the term *natural capital* or the notion of the *earth’s capital stock*. A good preliminary treatment of the origins of the term is provided in Antoine Missemer, “Natural Capital as an Economic Concept, History, and Contemporary Issues,” *Ecological Economics* 143 (2018): 90–96. However, Missemer misses the roles of Marx, Engels, Waring, Carey, and Liebig in this respect. He also privileges the neoclassical concept of natural capital focusing on exchange value, seeing earlier references to natural capital to be of little significance simply because they did not conform to present usage. Thus, despite referring to numerous thinkers who used the term in the nineteenth century, Missemer claims, by sleight of hand, that “the natural capital concept was indeed coined in the 1900s,” thereby privileging the neoclassical conception of natural capital as the *only valid concept*. Missemer, “Natural Capital,” 93–94. Besides the names mentioned above, a number of other thinkers used the notion of *natural capital* prior to the 1860s. Jean-Baptiste Say’s use of the term, where it stood for natural human capital, is highlighted in Pierre-Joseph Proudhon, *What Is Property?* (Cambridge: Cambridge University Press, 1993), 109.

<sup>9</sup> ↪ The early reference to “natural capital” by Considerant and others was not simply a metaphor, related to commodity capital, but reflected in part the classical recognition that the concept of capital itself had arisen out of a consideration of natural use values and only took on the primary meaning of capital as accumulated exchange value with the rise of capitalism. The word *capital* thus arose from *capita*, meaning *heads*, referring to heads of cattle, the entire herd of which was regarded as a *stock*. All of this was in physical or use-value terms. Herman Daly, “[The Use and Abuse of the ‘Natural Capital’ Concept](#),” Center for the Advancement of the Steady State Economy, November 13, 2014.



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the chain of human generations. Thus, natural capital was to be redistributed to each generation on an equal basis. However, under bourgeois civilisation, natural capital had been usurped by a minority of private landholders, who had established land monopolies violating the principles of usufruct applying to all of humanity.<sup>10</sup>

Later in the same decade, the British poet and radical political economist Ebenezer Jones in *The Land Monopoly* provided a similar argument to that of Considerant. For Jones, the principal evil affecting the welfare of the population of

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England and Ireland was the land monopoly exercised by landlords, who appropriated “natural capital, God’s gift to all men.” In the next century (the twentieth), Jones indicated, the inhabitants of the land may have difficulty understanding “how the land they have come to live on [and its natural capital] could have been thus sold, not only (to use an expressive phrase) over their heads, but actually over their cradles, or even before they were born.” In these terms, natural capital was treated as the annual “produce of the land” (nature), or, in today’s terms, ecosystem services. Jones

provided estimates of what the land was capable of generating in terms of the number of people it could support.<sup>11</sup> He punctuated his argument on the land monopoly by pointing to the English colonial exportation of the proceeds of the land from Ireland during the Great Famine of only a few years before, amounting to sufficient food to have fed half the Irish people.<sup>12</sup> With great acuity, he queried: “Suppose a body of men should consider the air of London to be in need of cultivation, and should unsolicitedly establish round the metropolis a circle of aerial purification—what would be conceived of their sanity, if they should in consequence consider themselves air-lords, with the air of London for their private property, for them to do what they like with, even to the exclusion of people from the use of it...?”<sup>13</sup>

Marx studied Considerant’s political-economic work in October 1842.<sup>14</sup> In *The German Ideology* of 1845, Marx and Engels employed the term natural capital to refer to capital as it emerged in the towns of the Middle Ages, and then in the Mercantilist putting-out system, tied to estates, and to natural resources, such as the cotton and wool fibres used, for example, in textile production. The growth of textile production, they wrote, required the “mobilisation of natural capital through accelerated circulation.” They contrasted “natural capital,” rooted in the land, estates, and concrete use values to “movable capital” associated with the “beginning of money trade, banks, national debts, paper money, speculation in stock and shares, stockjobbing in all articles and the development of finance in general,” resulting in capital losing “a great part of the natural character that still clung to it.”<sup>15</sup>

<sup>10</sup> ↪ Rondel Van Davidson, “Victor Considerant: Fourierist Legislator, and Humanitarian” (PhD dissertation, Texas Tech University, December 1970), 68–69; John Cunliffe and Guido Erreygers, “The Enigmatic Legacy of Charles Fourier,” *History of Political Economy* 33, no. 3 (2001): 467; Missemmer, “Natural Capital,” 91–92.

<sup>11</sup> ↪ Ebenezer Jones, *The Land Monopoly, the Suffering and Demoralisation Caused by It, and the Justice and Expediency of Its Abolition* (London: Charles Fox, 1849), 6, 18–21, 27.

<sup>12</sup> ↪ Jones, *The Land Monopoly*, 10.

<sup>13</sup> ↪ Jones, *The Land Monopoly*, 19. The complexity of Jones’s analysis, which focused on natural capital as the proceeds of nature, defies Missemmer’s claim that the notion of natural capital was used by Jones simply as a “synonym for land,” particularly as land, in classical political economy, was a category that stood for all of nature. Missemmer, “Natural Capital,” 91.

<sup>14</sup> ↪ Hal Draper, *The Marx-Engels Chronicle* (New York: Schocken, 1985), 12.

<sup>15</sup> ↪ Karl Marx and Frederick Engels, *Collected Works*, vol. 5 (New York: International Publishers, 1975), 66–73.

The natural capital concept, as used by Marx and Engels in *The German Ideology*, was thus tied to the natural-material use-value structure of the economy and to landed capital and estates, as opposed to the greater mobility and fungibility of capital as pure exchange value or finance, which evolved under mercantilism and became dominant in industrial capitalism. If capital could originally be seen primarily in physical terms, it increasingly became measured in exchange-value forms. Marx and Engels's overall emphasis here corresponded to the classical political-economic conception that real wealth consisted of natural-material use values while private riches were based on exchange value, that is, purely monetary claims to wealth. Yet, since reference to natural capital seemed to naturalise capital, Marx was to drop all direct reference to the term in his subsequent work.<sup>16</sup> Nevertheless, the basic distinction was reflected in his contrast between the “natural form” of the commodity, related to natural-material use values, and the “value form” associated with exchange value, as well as his distinction, as we shall see, between earth matter and earth capital.<sup>17</sup>

For classical political economists in general, including such figures as Adam Smith, Thomas Malthus, David Ricardo, and John Stuart Mill, nature, as distinct from labour, created no value, and was treated as a “free gift” to capital—long before Marx pointed to the ecological contradictions that this entailed for the capitalist economy.<sup>18</sup> As the Ricardian John Ramsay McCulloch put it, “in its natural state, matter is always destitute of [exchange] value.”<sup>19</sup> Or, as Marx wrote, “value is labour, so surplus-value cannot be earth.”<sup>20</sup>

Nevertheless, the notion of natural-material use values, if no longer referred to as natural capital, remained integral to Marx's conception of the capitalist economy and its ecological basis, including conceptions of the expropriation of nature and of natural processes turned into capital. The decisive shift in his analysis, in this respect, was already evident in *The Poverty of Philosophy* in 1846. Here in his critique of Pierre-Joseph Proudhon's *System of Economic Contradictions: Or the Philosophy of Misery*, written earlier in the same year, Marx, as he later recounted in volume three of *Capital*, introduced “the distinction between terre-matière and terre-capital,” or between earth matter and earth capital:<sup>21</sup>

*Land, so long as it is not exploited as a means of production, is not capital. Land as capital [terre-capital] can be increased just as much as all the other instruments of production. Nothing is added to its matter, to use M. Proudhon's language, but the lands which serve as the instruments of production are multiplied. The very fact of applying further outlays of capital to land already transformed into means of production increases land as capital without adding anything to land as matter [terre-matière], that is, to the extent of the land. M. Proudhon's land as*

<sup>16</sup> ↪ On Marx's critique of the naturalisation of capital and the treatment of nature divorced from labor as a source of value, see Karl Marx, *Capital*, vol. 3 (London: Penguin, 1981), 953–57. All subsequent references to *Capital*, vol. 3, except as indicated in endnote 22 are to this edition.

<sup>17</sup> ↪ Karl Marx, “The Value-Form,” *Capital & Class* 4 (1978): 134; Karl Marx, “The Commodity,” chap. 1 in *Capital*, vol. 1, libcom.org; Karl Marx, *Texts on Method* (Oxford: Blackwell, 1975), 198, 200, 207.

<sup>18</sup> ↪ John Bellamy Foster, Brett Clark, and Richard York, *The Ecological Rift* (New York: Monthly Review Press, 2010), 53–64; Marx and Engels, *Collected Works*, vol. 37, 732–33.

<sup>19</sup> ↪ McCulloch, quoted in Marx and Engels, *Collected Works*, vol. 29, 224.

<sup>20</sup> ↪ Marx, *Capital*, vol. 3, 954.

<sup>21</sup> ↪ Marx, *Capital*, vol. 3, 756.

*matter is the earth in its limitation. As for the eternity he attributes to land, we grant readily it has this virtue as matter. Land as capital is no more eternal than any other capital.*<sup>22</sup>

In this passage, Marx draws a distinction between land, viewed on the one hand as eternal earth matter (terre-matière, or mere matter), and, on the other, as historically generated earth capital (terre-capital). He is already pointing to the contradiction between capitalism and its natural conditions of production, a historical and materialist view that will govern his developing ecological critique, leading eventually to his metabolic rift concept. Although natural capital, now called earth capital, exists, it is seen as an alienated product of capitalism and by no means eternal. In

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Capital, Marx writes: “Capital may be fixed in the earth, incorporated into it, both in a more transient way, as is the case with improvements of a chemical kind, application of fertiliser, etc., and more permanently, as with drainage ditches, the provision of irrigation, levelling of land, farm buildings, etc.” This is connected to “ground-rent...paid for agricultural land, building land, mines, fisheries, forests, etc.... Ground rent is...the form in which landed property is economically

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realised, valorised.”<sup>23</sup> By incorporating capital into the earth, Marx explained, capitalists “transform the earth from mere matter into earth-capital.”<sup>24</sup> In this conception, the earth as matter (terre-matière) remained the basis of all life and production, while the valorisation of portions of the earth as earth capital represented a fundamental contradiction between the eternal laws of nature and the law of value of

capitalism.

In some cases, Marx noted, the monopolisation of a “force of Nature” could be enormously profitable, as in the case of ownership of a waterfall, providing waterpower to industry. Here, “a monopolisable force of Nature, which, like the waterfall, is only at the command of those who have at their disposal particular portions of the earth and its appurtenances,” generates surplus profit potential. This then allows those who own the waterfall or other forces of Nature to impose rents on their use. The rent is not a product of the waterfall itself—that is, does not derive from its

<sup>22</sup> ↪ Karl Marx, *The Poverty of Philosophy* (New York: International Publishers, 1963), 164. *Terre-matière* and *terre-capital* have been inserted here in square brackets to better convey Marx’s meaning, as indicated in Marx, *Capital*, vol. 3, 756.

<sup>23</sup> ↪ Marx, *Capital*, vol. 3, 755–56. In this sentence, Marx uses the term *valorise* to refer to the landlord’s realisation in exchange-value terms of monopoly rents. It should be noted that the concept of *valorisation* (*Verwertung*) is used in two senses in Marx, to refer to: (1) the whole capitalist process of surplus value production, and (2) (more often) the realisation of surplus value at the end of the circulation process. Traditionally, *Verwertung* was translated as *realisation*, which corresponds to the latter, more limited meaning. However, the 1976 Penguin edition of *Capital* introduced the word *valorisation* (which did not at that time exist in the English language) to capture the broader meaning. Here, we are using it in today’s more commonplace sense (looser than Marx’s second meaning) of conferring value or prices on goods and services. This should not be taken as indicating that land in itself is a *source* of commodity value, which is a product of socially necessary labour and production. Rather, the exchange value is received by the owner of the land in the form of rent. Valorisation is thus used here simply in the sense of conferring titles and exchange value to land and resources, which generate rents, and are connected to financial markets. Ultimately, this is dependent on the labour and production system. Ernest Mandel, introduction to *Capital*, vol. 1, 36; translator’s note in Marx, *Capital*, vol. 1, 252.

<sup>24</sup> ↪ Karl Marx, *Das Kapital* (Hamburg: Verlag von Otto Meissner, 1894) (*Verwandlung von Surplusprofit in Guldrente*), 158. Translation slightly altered from Marx, *Capital*, vol. 3, 756–57, changing *raw material* to *mere matter*. The correction is in conformity with the 1894 German edition, which literally translates *blosser materie* as *mere matter* rather than *raw material*, and with the French translation, which, in line with the distinction first developed in *The Poverty of Philosophy*, refers to “la terre-matière une terre-capital.” Marx, chap. 37 in *Capital*, [French translation](#) available at marxists.org. In Marx and Engel’s *Collected Works*, vol. 3, 613–614, the entire phrase is unaccountably missing. The Ernest Untermann translation incorporates the phrase but translates the terms as *material land* and *land capital*. See Karl Marx, *Capital*, vol. 3 (Chicago: Charles H. Kerr, 1909), 725–26. This then misses the full significance between the earth/land as *mere matter* and the formation of earth-capital. As his references to James Anderson and Henry Carey make clear in the same passage, Marx was concerned here with the ecological issue of the circulation of matter, particularly soil nutrients.

“natural value”—nor does it derive directly from labour, but rather emanates from the owner’s private monopoly of a limited natural force (with the rent ultimately coming out of total surplus value).<sup>25</sup> Marx argued that it was only the title to a particular natural resource that allowed monopoly rent to be applied, despite the fact that owners believed they

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were entitled to rent simply by purchasing the land or natural resource, particularly as the price of the land contained this capitalised tribute. But it was not the purchase or transfer of title that created the rent, but rather the title itself, which was a product of social relations that created the monopoly position and the power to enact rent—whether it was the title to a

waterfall, a coal deposit, or other natural resources, the common inheritance of all humanity. Such rents, he argued, were being imposed “in ever greater measure” as capitalism developed.<sup>26</sup>

It is worth noting that the works of classical political economics in general, and Marx’s analysis of production in particular, were permeated with the treatment of environmental services, or what in ecosocialist theory are known as the eco-regulatory aspects, which supersede human labour. Such a view was inherent in Marx’s conception of the “universal metabolism of nature” as underwriting the “social metabolism” of the labour and production process. Thus, we find innumerable discussions in his work of the soil metabolism and of other “physical, chemical, and physiological processes” and “organic laws” associated with natural reproduction, operating on different time scales from human production. “The economic process of reproduction, whatever may be its specific social character,” he writes, “is in this area (agriculture) always intertwined...with a process of natural reproduction.”<sup>27</sup>

In 1855, a 22-year-old George Waring, already recognised as an eminent agriculturalist in the United States, later to be seen as one of the great ecological figures in U.S. history for his contributions in fighting urban waste and disease, presented an extensive address, entitled “Agricultural Features of the Census of the United States for 1850,” to a meeting of the Geographical Society in New York, subsequently published in the Bulletin of the American Geographical Society in 1857. Waring, who like other progressive agriculturalists had been influenced by the German chemist Justus von Liebig’s Organic Chemistry in its Application to Agriculture and Physiology (1840, better known as Agricultural Chemistry), used census figures for agriculture to estimate the loss of fertiliser agents within the U.S. economy. This was at a time when the capital invested in agriculture in the U.S. economy was seven times the amount invested in manufacturing, mining, the mechanic arts, and fisheries. In depicting the enormous losses of nutrients to the soil, he wrote:

*What with our earth-butchery and prodigality, we are losing the intrinsic essence of our vitality.... The question of economy should be, not how much do we annually produce, but how much of our annual production is saved to the soil. Labour employed in robbing the earth of its capital stock of fertilising matter, is worse than labour thrown away. In the latter case it is a loss to the present generation; in the former it becomes an inheritance of poverty for*

<sup>25</sup> ↪ Marx, *Capital*, vol. 3, 637–40; Andreas Malm, *Fossil Capital* (London: Verso, 2016), 309–14.

<sup>26</sup> ↪ Marx, *Capital*, vol. 3, 910–11.

<sup>27</sup> ↪ Karl Marx, *Capital*, vol. 2 (London: Penguin, 1978), 435; Marx, *Capital*, vol. 3, 213–14; Marx and Engels, *Collected Works*, vol. 30, 63; Paul Burkett, *Marx and Nature* (Chicago: Haymarket, 2014), 141–47; Gómez-Baggethun, Groot, Lomas, and Montes, “The History of Ecosystem Services in Economic Theory and Practice,” 1211.



*our successors. Man is but a tenant of the soil, and he is guilty of a crime when he reduces its value for other tenants who are to come after him.*<sup>28</sup>

Waring's statement was taken up by Henry Carey, the foremost U.S. economist of the day, who had previously sent Marx *The Slave Trade, Domestic and Foreign*, a work that at one point characterised "man as a mere borrower from the

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earth."<sup>29</sup> Carey quoted extensively from Waring on "the robbing of the earth of its capital stock" in both his *Letters to the President: On the Foreign and Domestic Policy of the Union* (1858) and *Principles of Social Science* (1858). This was, in turn, to influence Liebig, who drew on Waring via Carey in his own *Letters on*

*Modern Agriculture* (1859), which marked the beginning of his major attack on industrialised capitalist agriculture as a "robbery system." Liebig's critique in this respect was to culminate in the famous introduction to the 1862 edition of his *Agricultural Chemistry* that inspired Marx's theory of metabolic rift. Significantly, in the same paragraph in which Marx made the crucial distinction between land as earth matter and as earth capital in volume 3 of *Capital*, he also referred to the classic criticisms of the degradation of the soil by James Anderson and Carey, pointing to the ecological contradictions of capital.<sup>30</sup>

In classical political economy, the logic of which in this respect was brought out most fully by Marx, nature and labour (itself a natural force) were the sources of real wealth as use values, while exploited labour power under capitalist production was the source of (commodity) value.<sup>31</sup> It was the conflict that this set up between natural-material use values, treated as free gifts to be expropriated by capital, and the system of exchange value, that generated the fundamental ecological contradiction of capitalist production, associated with the robbing of nature.<sup>32</sup> As James Maitland, the eighth Earl of Lauderdale, declared in *An Inquiry into the Nature and Origin of Public Wealth and into the Means and Causes of Its Increase* (1804), the system of commodity production destroyed public wealth (natural-material use values), generating scarcity and monopoly, thereby enhancing private riches (exchange value), with negative consequences for human society as a whole.<sup>33</sup>

## Neoclassical Environmental Economics and the Valorisation of Natural Capital

In sharp contrast to classical political economy, neoclassical economics beginning in the late nineteenth and early twentieth centuries has sought to exclude nature and use-value altogether from its analysis, reducing everything to exchange value and denying the distinctiveness of the natural world (as well as of human labour). It has defined capital in nonsocial, transhistorical terms, as any asset of any kind producing a stream of income over time—a definition that

<sup>28</sup> ↪ George E. Waring Jr., "The Agricultural Features of the Census of the United States for 1850," *Bulletin of the American Geological Association* 2 (1857): 189–202.

<sup>29</sup> ↪ C. Carey, *The Slave Trade, Domestic and Foreign* (Philadelphia: A. Hart, 1853), 199; Karl Marx and Frederick Engels, *Selected Correspondence* (Moscow: Progress Publishers, 1955), 78.

<sup>30</sup> ↪ Marx, *Capital*, vol. 3, 756–57; John Bellamy Foster, *Marx's Ecology* (New York: Monthly Review Press, 2000), 144–54.

<sup>31</sup> ↪ Karl Marx, Critique of the Gotha Programme (New York: International Publishers, 1938), 1. In *Capital*, Marx wrote of "the dull and tedious dispute over the part played by nature in the formation of exchange-value. Since exchange-value is a definite social manner of expressing the labour bestowed on a thing, it can have no more natural content [separate from labour] than has, for example, the rate of exchange." This did not, however, prevent Marx from constantly insisting that all real wealth, as opposed to value, stems from nature. Marx, *Capital*, vol. 1, 134, 176.

<sup>32</sup> ↪ See John Bellamy Foster and Brett Clark, *The Robbery of Nature* (New York: Monthly Review Press, 2020), 12–34.

<sup>33</sup> ↪ James Maitland, Earl of Lauderdale, *An Inquiry into the Nature and Origin of Public Wealth and into the Means and Causes of Its Increase* (Edinburgh: Archibald Constable and Co., 1819), 37–59; Foster, Clark, and York, *The Ecological Rift*, 54–58.



leads to an endless series of contradictions, derived from the fact that it sees capital as a kind of “social black box.”<sup>34</sup> Nature and land were thus lumped together with other forms of “capital” and were, in effect, eliminated from the

*A “weak-sustainability” postulate, representing the dominant neoclassical view, contends that all-natural resources can be economically substituted by human-made or renewable resources—that is, there are no irreplaceable natural resources or processes that have to be maintained.*

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analysis, with the neoclassical production function reduced to two abstract factors of production: capital and labour. Inherent in this view was the postulate that natural resources were entirely reproducible or substitutable by human-made capital. A “weak-sustainability” postulate, representing the dominant neoclassical view, contends that all-natural resources can be economically substituted by human-made or renewable resources—that is, there are no

irreplaceable natural resources or processes that have to be maintained. This is counterposed by a “strong-sustainability” postulate, associated with ecological economics, arguing that certain “critical natural capitals” are irreplaceable and cannot be replaced by human-manufactured capital.<sup>35</sup>

The dominant weak-sustainability conception is well captured by economic growth theorist Robert Solow’s claim: “If it is very easy to substitute other factors for natural resources, then there is in principle no ‘problem.’ The world can, in effect, get along without natural resources, so exhaustion is just an event, not a catastrophe.... At some finite cost, production can be freed of dependence on exhaustible resources altogether.”<sup>36</sup> Based on such assumptions, the liquidation of natural assets with the development of capitalism is not “an obstacle to further progress,” since such natural resources and processes are simply substituted for by the human economy with a zero net loss of capital overall.

The concept of natural capital was reintroduced into the economic discussion in the 1970s and ’80s, beginning with Schumacher’s *Small Is Beautiful*, to highlight the “liquidation” of “natural capital” stock as a failure of the first order of

*Ecological economists—initially inspired by Georgescu-Roegen’s *The Entropy Law and the Economic Process*, which emphasised the importance of the second law of thermodynamics in any realistic economics—embraced the notion of natural capital as a key concept, while wedding it to the notion of “critical natural capital” in conformity with the strong-sustainability postulate. Critical to the notion of strong sustainability were the three principles of sustainability introduced by Daly.*

the modern economic system, representing the view of ecological economics.<sup>37</sup> Thus, the use of the concept up through the 1980s was directed mainly at the idea of maintaining a constant biophysical stock of natural capital. It was at this point that the notion of weak sustainability was formally introduced by some of the same figures, such as British economist David W. Pearce, who had first insisted on maintaining a constant stock of natural capital, but then argued, in line with neoclassical economics generally, that such

natural capital could be easily replaced in the human economy and thus that no strict natural constraints on the economy existed. According to the weak-sustainability postulate, the notion of natural capital became largely

<sup>34</sup> ↪ Irving Fisher, *The Nature of Capital and Income* (New York: Macmillan, 1919), 76; Paul Burkett, *Marxism and Ecological Economics* (Chicago: Haymarket, 2006), 112; Alejandro Nadal, “The Natural Capital Metaphor and Economic Theory,” *Real-World Economics Review* 74 (2016): 64–84.

<sup>35</sup> ↪ Joshua Farley, “Natural Capital,” in *Berkshire Encyclopedia of Sustainability*, vol. 5 (Great Barrington, MA: Berkshire, 2012), 264–67; Burkett, *Marxism and Ecological Economics*, 95–101.

<sup>36</sup> ↪ Robert M. Solow, “The Economics of Resources or the Resources of Economics,” *American Economic Review* 64, no. 2 (1974): 146–49.

<sup>37</sup> ↪ Schumacher, *Small Is Beautiful*, 15–16.

indistinguishable from the neoclassical category of capital in general, insofar as it could be viewed as constituting productive assets providing an income stream.<sup>38</sup>

In response to the neoclassical weak-sustainability argument, ecological economists—initially inspired by Nicholas Georgescu-Roegen’s *The Entropy Law and the Economic Process* (1971), which emphasised the importance of the second law of thermodynamics in any realistic economics—embraced the notion of natural capital as a key concept, while wedding it to the notion of “critical natural capital” in conformity with the strong-sustainability postulate.<sup>39</sup> Critical

*It was economists associated with the International Society of Ecological Economics and the journal Ecological Economics who were to do the most to expand the notion of natural capital as a monetised economic category.*

to the notion of strong sustainability were the three principles of sustainability introduced by Herman Daly: (1) “For a renewable source—soil, water, forest, fish—the sustainable rate of use can be no greater than the rate of regeneration.” (2) “For a nonrenewable resource—fossil fuel, high-grade mineral ore, fossil groundwater—the sustainable rate of use can be no

greater than the rate at which a renewable resource, used sustainably, can substitute for it.” (3) “For a pollutant, the sustainable rate of use can be no greater than the rate at which the pollutant can be recycled, absorbed, and rendered harmless by the environment.”<sup>40</sup> This approach established limits to growth and determined sustainability in biophysical/use-value terms, rather than in terms of exchange value. The whole issue of natural capital, from the standpoint of the strong-sustainability postulate, thus became one of maintaining a net zero decrease in natural capital, viewed in biophysical terms, in which reductions in the stock of nonrenewable forms of natural capital, like fossil fuels, were offset by corresponding increases in renewable natural capital, such as the harnessing of solar energy and biomass.<sup>41</sup>

Ironically, it was economists associated with the International Society of Ecological Economics and the journal *Ecological Economics* who were to do the most to expand the notion of natural capital as a monetised economic

*Outside the relative few who stuck to the thermodynamic-based analysis of Georgescu-Roegen, or who were associated with the Marxist tradition, ecological economists found it difficult to resist the almost total dominance of the neoclassical tradition and the closely aligned corporate world.*

category. Although ecological economists defended the notion of strong sustainability and some, such as Daly, continued to insist on treating natural capital simply in use-value terms, the majority yielded to the temptation of putting a price on the world’s ecosystem services—if only for pedagogical purposes, with the intent of establishing their importance from the standpoint of the economy.

From there, it was a slippery slope toward the actual financialisation of the world ecology. Moreover, the conception of what constituted critical natural capital was often watered down, while the principles of sustainability came to include the substitutability of human-made products for nature. Hence, the distinction between the weak- and strong-sustainability approaches tended to fade.

In this general slippage within ecological economics, in which much of the tradition was brought back into the dominant neoclassical fold, natural capitals/ecosystem services were increasingly reduced to a strictly economic or imputed “commodity” value basis, to the point that there emerged what Marxian ecological economist Paul Burkett

<sup>38</sup> ↪ Burkett, *Marxism and Ecological Economics*, 95–101, 108–9.

<sup>39</sup> ↪ Nicholas Georgescu-Roegen, *The Entropy Law and the Economic Process* (Cambridge, MA: Harvard University Press, 1971).

<sup>40</sup> ↪ Herman Daly, “Toward Some Operational Principles of Sustainable Development,” *Ecological Economics* 2 (1990): 1–6.

<sup>41</sup> ↪ Burkett, *Marxism and Ecological Economics*, 95–101, 108–9.

called an “artificial ecumenicism” between ecological economics and the hegemonic neoclassical economic tradition.<sup>42</sup> Outside the relative few who stuck to the thermodynamic-based analysis of Georgescu-Roegen, or who were associated with the Marxist tradition, ecological economists found it difficult to resist the almost total dominance of the neoclassical tradition and the closely aligned corporate world.<sup>43</sup>

Once the natural capital concept was generally affixed to neoclassical economics—on the basis of the recognition in some way of weak/strong sustainability, with critical natural capital representing an exception and subject to change under the force of technology—it was quite possible to water down the environmental analysis altogether, to the point that the potential threat such ideas posed to capitalist accumulation could be downplayed. In practice, this meant reducing the conception of strong sustainability to the extent that it simply constituted a footnote to weak sustainability. Here, the treatment of natural capital was no longer seen as an actual limit on the expansion of the system. Thus, as the World Bank stated in its 2003 World Development Report:

*Limits-to-growth type arguments focus on strong sustainability, while arguments in favour of indefinite growth focus on weak sustainability. So far the former arguments have not been very convincing because the substitutability among assets has been high for most inputs used in production at a small scale. There is now, however, a growing recognition that different thresholds apply at different scales—local to global. Technology can be expected to continue to increase the potential substitutability among assets over time, but for many essential environmental services—especially global life support systems—there are no alternatives now, and potential technological solutions cannot be taken for granted.*<sup>44</sup>

The World Bank statement subtly suggested that substitutability was high for all natural-resource inputs, except in the case of production at higher thresholds, particularly where this affected “global life support systems” (downplaying that

*The notion of critical natural capital, that is, a strong-sustainability argument, was thus carefully discounted. Entirely ignored was any consideration of the specific socioeconomic conditions governing capitalist production and the contradictions these inherently pose for the Earth System metabolism.*

this was precisely the issue in a globalising economy within a limited planetary environment), while technological solutions to such scale effects, if not available now, were seen as potentially available in the future. The relation of the economy to natural resources should thus be one of promoting the “mix of assets that supports improvements in human well-being,” which was

expected to change over time, thereby posing no clear limits to “indefinite growth.” The notion of critical natural capital, that is, a strong-sustainability argument, was thus carefully discounted. Entirely ignored was any consideration of the specific socioeconomic conditions governing capitalist production and the contradictions these inherently pose for the Earth System metabolism.

In 1992, the International Society of Ecological Economics held a conference in Stockholm dedicated to the full operationalisation of natural capital as a concept of ecological economics. In 2003, Ecological Economics published an

<sup>42</sup> ↪ Burkett, *Marxism and Ecological Economics*, 113.

<sup>43</sup> ↪ The basic elements of Nicholas Georgescu-Roegen’s thermodynamic critique of neoclassical economics were accepted from the start by Marxian economists, and viewed as consistent with the classical Marxian tradition, though lacking a social critique. See Paul M. Sweezy, “Ecology and Revolution: A Letter to Nicholas Georgescu-Roegen, July 31, 1974,” *Monthly Review* 68, no. 9 (February 2017): 55–57; Elmar Altvater, *The Future of the Market* (London: Verso, 1993); John Bellamy Foster and Paul Burkett, *Marx and the Earth* (Chicago: Haymarket, 2016), 137–64.

<sup>44</sup> ↪ World Bank, *World Development Report 2003: Sustainable Development in a Dynamic World* (Washington DC/New York: World Bank/Oxford University Press, 2003), 14–15; Burkett, *Marxism and Ecological Economics*, 100.

introduction to a special issue that stated: “Natural capital is a key concept in ecological economics.”<sup>45</sup> This shift coincided with a struggle within the journal itself, in which Robert Costanza, the chief editor and leading proponent of the hybrid neoclassical/ecological economic notion of natural capital, managed to remove leading systems ecologist Howard Odum and a number of other natural scientists associated with the journal from the editorial board. In opposition to the natural-capital concept with its attempted valuing of nature on capitalist terms, Odum had promoted a way of accounting for the embodied energy inputs in the natural economy using the notion of emergy (spelled with an m), directly related to the use-value category of classical economics. This was aimed at challenging attempts to play down the opposition between the capitalist economy and natural systems and providing a comprehensive theory of ecological imperialism. Following Odum’s ouster from the journal, the concept of emergy was effectively banned from the publication.<sup>46</sup>

These shifts in ecological economics opened the way to measuring the “natural income” or “welfare” flows to the human economy from natural capital stock in the form of ecosystem goods and services (shortened for convenience

*Natural capital was redefined in market terms as the natural resource stock that provided ecosystem services to the human economy. Ecosystem services did not refer to ecosystem processes as a whole, but only to those services that could be seen as subsidising the human economy, and thus could be separated in this way from the rest of nature.*

simply to services), thus providing putative market values for nature’s contribution to economic growth.<sup>47</sup> Natural capital was, in effect, redefined in market terms as the natural resource stock that provided ecosystem services to the human economy. Ecosystem services did not refer to ecosystem processes as a whole, but only to those services that could be seen as subsidising the human economy, and thus could be separated in this way from

the rest of nature.<sup>48</sup> The implicit goal was accounting for and eventually, to some extent, “internalising” discernible free gifts to the capitalist market economy on the basis of imputed consumer preferences. Nature, where such benefits to the capitalist economy were absent, in effect remained devoid of imputed economic value and external to this wider natural-capital conception, as if it could be sliced and diced in economic asset terms. In this respect, ecosystem services as a natural-income category displaced the category of natural capital itself.<sup>49</sup>

Costanza, who did the most to expand the notion of ecosystem services, proceeded to lead a study entitled “The Value of

*This constituted, in effect, a system of “shadow prices” based on an economist’s best estimate of what price a function or thing would obtain in the capitalist market economy, rooted in what were assumed to be individual preferences.*

the World’s Ecosystem Services and Natural Capital,” published in *Nature* in 1997, that provided estimates of seventeen ecosystem services across sixteen biomes based on a “simple benefit transfer [or value transfer] method.” The study assumed a constant per unit dollar value per hectare of a given ecosystem type, which was then multiplied by the total area of

<sup>45</sup> ↪ See Burkett, *Marxism and Ecological Economics*, 101–2.

<sup>46</sup> ↪ See John Bellamy Foster and Hannah Holleman, “The Theory of Unequal Ecological Exchange: A Marx-Odum Dialectic,” *Journal of Peasant Studies* 41, no. 1–2 (2014): 223–28.

<sup>47</sup> ↪ Robert Costanza and Herman E. Daly, “Natural Capital and Sustainable Development,” *Conservation Biology* 6, no. 1 (1992): 38.

<sup>48</sup> ↪ Gómez-Baggethun, Groot, Lomas, and Montes, “The History of Ecosystem Services in Economic Theory and Practice,” 1213.

<sup>49</sup> ↪ Costanza and his coauthors argue: “It is not very meaningful to ask the total value of natural capital to human welfare, nor to ask the value of massive, particular forms of natural capital. It is trivial to ask what is the value of the atmosphere to humankind, or what is the value of rocks and soil infrastructure as support systems. Their value is infinite in total. However, it is meaningful to ask how changes in the quantity and quality of various types of natural capital and ecosystems services may have an impact on human welfare.” In practice, then, the analysis is shifted almost entirely to ecosystem services, rather than natural capital. Robert Costanza et al., “The Value of the World’s Ecosystem Services and Natural Capital,” *Nat*



each type to obtain aggregate values.<sup>50</sup> Values were obtained by relating benefits in the human economy to analogous benefits provided by ecosystem services. This constituted, in effect, a system of “shadow prices” based on an economist’s best estimate of what price a function or thing would obtain in the capitalist market economy, rooted in what were assumed to be individual preferences.<sup>51</sup> Carrying out such an analysis requires, as does capitalist expropriation as a whole, what has been called “the division of nature,” that is, its simplification into putatively commodifiable elements.<sup>52</sup> Natural, heterogeneous, and qualitatively distinct processes are “disaggregated into discrete and homogeneous value units,” reducing widely incommensurable entities and processes—Darwin’s “complex web of relations”—to monetary terms, allowing them to be aggregated to stand for global ecosystem services as a whole, while valued/priced in terms of capitalist commodity relations.<sup>53</sup>

The 1997 Costanza study was widely acclaimed among environmentalists, if only because it gave what seemed to be hard numbers to the notion that the world economy was dependent on the world ecology—now itself reduced in terms

*Current attempts to place values on nature are increasingly being integrated with goals of capital accumulation.... in The Financialisation of Nature, “promoting ecosystem markets involves the same methodologies and institutions for pricing and trading which were developed for economic evaluation.”... “the history of ecosystems services research” has been accompanied by “a parallel history of ecosystem function commodification,” operating through universities, governments, and businesses, further extending the analysis to the creation of actual natural-capital markets.*

of ecosystem services to dollars. In that study, Costanza and his coauthors depicted the value of annual world ecosystem services in 1995 as \$33 trillion in current dollars, slightly less than double the \$18 trillion world GDP.<sup>54</sup> The notion of natural capital valuation was further advanced in the Millennium Economic Assessment in 2005, which took as its main message the dangers of the “running down of natural capital assets” and neglect of environmental services across the globe. The United Nations was to launch a System of Environmental-Economic Accounting, utilising the natural capital/ecosystems services approach.<sup>55</sup> In 2014, in an updated analysis entitled “Changes in the Value of Global

Ecosystem Values,” Costanza and his colleagues estimated that world ecosystem services in 2011 were equal to \$145 trillion annually (in 2007 dollars), compared to a world GDP of approximately \$73.6 trillion.<sup>56</sup>

Yet, while current attempts to place values on nature can serve useful pedagogical roles and help enhance strategic planning, they are increasingly being integrated with goals of capital accumulation. As Friends of the Earth noted in *The Financialisation of Nature*, “promoting ecosystem markets involves the same methodologies and institutions for pricing and trading which were developed for economic evaluation.”<sup>57</sup> Thus, over the last three decades, “the history of ecosystems services research” has been accompanied by “a parallel history of ecosystem function commodification,”

<sup>50</sup> ↪ Robert Costanza et al., “Changes in the Global Value of Ecosystem Services,” *Global Environmental Change* 26 (2014): 154; Costanza et al., “The Value of the World’s Ecosystem Services and Natural Capital.”

<sup>51</sup> ↪ Herman Daly, “*Integrating Ecology and Economics*,” Center for the Advancement of the Steady State Economy, June 5, 2014.

<sup>52</sup> ↪ Commodifying ecosystem services—whether in the form of parts of the contemporary economy based directly on the exploitation of natural resources, or through imputing value to ecosystem services—requires “an extreme division (simplification) of nature” antithetical to ecological systems. John Bellamy Foster, *Ecology Against Capitalism* (New York: Monthly Review Press, 2002), 33.

<sup>53</sup> ↪ Enrique Leff, “Marxism and the Environmental Question,” in *The Greening of Marxism*, ed. Ted Benton (New York: Guilford, 1996), 146.

<sup>54</sup> ↪ Costanza et al., “The Value of the World’s Ecosystem Services and Natural Capital.”

<sup>55</sup> ↪ “*Methodology: Ecosystem Accounting*,” UN System of Environmental and Economic Accounting, accessed January 17, 2022.

<sup>56</sup> ↪ Costanza et al., “Changes in the Global Value of Ecosystem Services.”

<sup>57</sup> ↪ Jutta Kill, *The Financialization of Nature* (Amsterdam: Friends of the Earth International, 2015), 3.

operating through universities, governments, and businesses, using the same language and methods of ecosystems services accounting, but further extending the analysis to the creation of actual natural-capital markets. This occurs through three steps: (1) designating an ecological process as an ecosystem service to the human economy, (2) imputing to it a single “exchange value,” and (3) establishing ownership and managerial rights so as to link users and providers of the service in a market exchange, permitting financial investment and accumulation.<sup>58</sup>

For the IEG (now teamed up with the New York Stock Exchange, a minority investor in the former), the significance of the 2014 Costanza-led study of global ecosystem values is that it shows that ecosystem services have a value far exceeding that of world GDP—one that, in the context of environmental concerns, can be opened to accumulation and financial exploitation via ecosystem function commodification.<sup>59</sup> “Nature’s economy is larger than our current industrial economy

*The last decade has seen an explosion of natural capital initiatives aimed at the accumulation and financialisation of nature as a means of addressing environmental constraints.*

and we can tap this store of wealth” based “on natural assets and the mechanism to convert them into financial assets,” thereby transforming the economy into “one that is more equitable, resilient and sustainable.” In this perspective, “intrinsic value” is used as the umbrella term for potential economic values of the natural environment that have “not yet been identified or quantified,” representing vast new openings for financial

investment and wealth as the boundaries between the capitalist economy and unpriced nature erode.<sup>60</sup>

## Accumulation of Natural Capital and the Financialisation of Nature

The last decade has seen an explosion of natural capital initiatives aimed at the accumulation and financialisation of nature as a means of addressing environmental constraints. In 2011, the UK Environment Bank, a private institution devoted to the financialisation of nature, received £175,000 from the Shell Foundation to aid it in the development of markets for ecosystem services.<sup>61</sup> Since 2012, the Natural Capital Committee of the UK government and the UK Department for Environment, Food, and Rural Affairs have been promoting a natural capital “aggregate rule” based on the notion of net-zero losses in natural capital in economic value terms. This has involved the development of mechanisms for treating various elements of nature as commensurate not only with each other, but also with commodity markets. A methodology for managing natural capital has been introduced in which the destruction of biodiversity or the climate would be balanced by offsets that increase (or protect) natural assets by an equal value amount elsewhere. This has required the reduction of nature/natural capital to monetary units that can then be integrated into consolidated national accounts, incorporating changes in UK natural capital, valued in 2015 at £1.6 trillion. This process has been facilitated internationally by the formation of a host of entities dedicated to natural capital accounting, including the World Forum for Natural Capital, the Natural Capital Declaration, and the Natural Capital Financing Facility of the European Investment Bank and European Commission.<sup>62</sup>

Although carbon trading markets were behind much of this, of near-equal importance have been initiatives associated with biodiversity and conservation. In September 2016, the World Conservation Congress of the International Union for

<sup>58</sup> ↪ Gómez-Baggethun et al., “The History of Ecosystem Services,” 1214.

<sup>59</sup> ↪ Nature itself is not strictly a commodity, since it is not produced by human labour. However, it is turned into an economic asset and provides a stream of exchange value that is valorised or realised by the landlord through rent, constituting one of the forms in which total surplus value is divided. In this way, it becomes part of the general commodity exchange process.

<sup>60</sup> ↪ “An Inclusive Economy,” Intrinsic Exchange Group, accessed January 26, 2022.

<sup>61</sup> ↪ Sian Sullivan, Financialisation, Biodiversity Conservation and Equity (Penang, Malaysia: Third World Network, 2012), 17.

<sup>62</sup> ↪ Sian Sullivan, “Noting Some Effects of Fabricating ‘Nature’ as ‘Natural Capital,’” *Ecological Citizen* 1, no. 1 (2017): 65–67.

Conservation of Nature introduced its “natural capital charter” (Motion 63) as a framework for treating all biodiversity as natural capital values. This was preceded by the global Natural Capital Protocol of multinational corporate business initiated in July 2016 by the Natural Capital Coalition (now renamed the Capitals Coalition).<sup>63</sup> The Economics of Ecosystems and Biodiversity, published in 2010 and 2011, initiated under the auspices of the Natural Capital Coalition with the support of the United Nation Environment Programme and the European Commission, was to be a heavy promoter of the valuation of natural capital.<sup>64</sup>

A watershed initiative with respect to the accumulation of nature was launched by the Swiss-based global investment bank Credit Suisse, which in 2016 introduced a report on Conservation Finance: Moving Beyond Donor Funding to an Investor-Driven Approach, followed by a report that same year on Levering Ecosystems: A Business-Focused Perspective on How Debt Supports Investment in Ecosystems Services. The Credit Suisse scheme is to move beyond donor capital in conservation to construct a “conservation finance space.” The key here is to reorganise conservation finance to create in

*Government-owned natural capital assets, often expropriated from Indigenous populations and subsistence farmers, could be sold in the form of debt for nature swaps or leveraged via international financial capital.*

each case a definite “financial vehicle” or company, controlling the natural capital/ecosystem services, which would generate major financial returns to investors. The goal is to turn ecosystem services into “an asset treasured by the mainstream investment market.”<sup>65</sup> This was the basis for the NACs listing on the New York Stock Exchange, which used the same methodology of

creating a “financial vehicle” or “natural assets company” as an intermediary in the conversion of a “natural asset” into “financial capital” consecrated by the launch of an Initial Public Offering of the natural asset company.<sup>66</sup>

Various means would be developed in this respect for the Payments for Ecosystem Services and trading of natural capital, involving nonfinancial corporations, banks, governments, and NGOs. Government-owned natural capital assets, often expropriated from Indigenous populations and subsistence farmers, could be sold in the form of debt for nature swaps or leveraged via international financial capital. More important, however, is the role envisioned by the IEG in which NACs managing ecosystems services would operate essentially like businesses that have acquired “mining rights,” thus allowing them to exploit the resources and accumulate monetised assets—in this case though in the name of sustaining nature.<sup>67</sup> Although a given state would normally continue to have sovereign ownership of the land, the financial vehicle managing and disposing of the ecosystem services would profit directly off the income streams associated with these “tradable” assets. According to the Credit Suisse Conservation Finance report, in order for firms to profit through investment in natural capital, it will be necessary to combine “heterogeneous” natural assets, “bundling them into a single product with a tailored risk and return sharing vehicle.” In this way, it is possible to “provide a market-rate return and leverage multiple sources of finance to reduce risk,” thereby maximising value for investors.<sup>68</sup>

Carbon trading, which is now being fully globalised through Article 6 of the 2021 UN Climate Change Conference, is designed to promote a world market in offsets, allowing a firm to avoid actual carbon emission reductions by financing

<sup>63</sup> ↪ Sian Sullivan, “[Nature Is Being Renamed ‘Natural Capital’—But Is It Really the Planet That Will Profit?](#)” *Conversation*, September 13, 2016; Natural Capital Coalition, *Natural Capital Protocol* (The Hague: Natural Capital Protocol, 2016).

<sup>64</sup> ↪ “[Natural Capital Accounting: In a Nutshell](#),” *Economics of Ecosystems and Biodiversity*, accessed January 19, 2022.

<sup>65</sup> ↪ Sullivan, “Nature Is Being Renamed Natural Capital,” 69–71; Tanja Havemann et al., *Levering Ecosystems* (Zürich: Credit Suisse, 2016), 3, 24.

<sup>66</sup> ↪ Chart on “Creating Natural Asset Companies,” in “The Solution,” Intrinsic Exchange Group.

<sup>67</sup> ↪ “The Solution,” Intrinsic Exchange Group.

<sup>68</sup> ↪ Fabian Huwyler, Jürg Käppeli, and John Tobin, *Conservation Finance: From Niche to Mainstream* (Zürich/New York: Credit Suisse/McKinsey Center for Business and Environment, 2016), 16, 22.

*Carbon trading is designed to promote a world market in offsets, allowing a firm to avoid actual carbon emission reductions by financing (and frequently capitalising) an offset, usually in the Global South, involving carbon sequestration.... the accumulation and financialisation of nature involve the creation of titles to environmental services of various kinds, previously within the commons as the inheritance of the world's people, after which these titles can be traded and leveraged.*

(and frequently capitalising) an offset, usually in the Global South, involving carbon sequestration. The \$100 billion that the developed capitalist countries have promised to direct at the Global South for climate finance is seen as subject to debt leverage by multinational monopoly-finance capital. This lies behind the 2021 Glasgow Financial Alliance for Net Zero initiative of global finance, which has declared at the outset that carbon-mitigation financing to developing countries will be dependent on whether

they fully open up their economies to global capital. Credit Suisse sees “ecological footprints” as moving “closer to being recognised as assets and liabilities by companies allowing debt to fund natural capital investment and the creation of new profitable markets with “net-positive financial outcomes” in the Global South.<sup>69</sup> In general, the accumulation and financialisation of nature involve the creation of titles to environmental services of various kinds, previously within the commons as the inheritance of the world's people, after which these titles can be traded and leveraged.

In the case of valorised natural capital, monopoly rights to environmental services can be established with the cooperation of governments, through the creation of NACs, which then will be free to accumulate based on the “management” of this service, including trading in all sorts of offsets. As the New York Stock Exchange indicated, NACs

*The fine print soon makes it clear that natural capital is primarily viewed today in exchange-value, not use-value, terms. Only “a tiny fraction” of these carbon offsets, according to Bloomberg in January 2022, actually remove carbon from the air.*

would “hold the [economic] rights to ecosystem services produced on a given chunk of land.”<sup>70</sup> The logic, as far as capital and finance are concerned, is not that far removed from how extractive industries themselves developed, but, in this case, it is putatively about sustaining natural assets by maintaining net-zero losses. In analogy with standing

timber as a concept in forestry, these assets are now referred to as standing natural capitals.<sup>71</sup> Profiting off the extraction of environmental services is conflated with the notion of sustainable forestry, marketing the service while maintaining the overall asset. It, however, runs into the same contradictions.<sup>72</sup>

Governments, intergovernmental organisations, financial institutions, nonfinancial corporations, and nongovernmental organisations, in introducing the notion of natural capital in their various reports, often begin by referring to it in broad material use-value terms as consisting of nature's resource stock—a view of natural capital that goes back to the nineteenth century. Yet, the fine print soon makes it clear that natural capital is primarily viewed today in exchange-value, not use-value, terms. One such market is the global voluntary carbon market, which is projected to reach \$180 billion by the end of this decade. Only “a tiny fraction” of these carbon offsets, according to Bloomberg in January 2022, actually remove carbon from the air, while 90 per cent of firms employing certified carbon offsets were found in a survey to have inflated their claims on carbon savings. In line with this, the term carbon neutral is now being used as a marketing tool with no basis in net-zero carbon accounting, in much the same way as the term natural, lacking any clear

<sup>69</sup> ↪ Sullivan, “Noting Some Effects of Fabricating ‘Nature’ as ‘Natural Capital,’” 69–70; Havemann et al., *Le*

<sup>70</sup> ↪ Whitney Webb, “[New Asset-Class Launch Advances Wall Street's Nature Takeover](#),” *River Cities' Reader*, December 6, 2021.

<sup>71</sup> ↪ Sullivan, “Nature Is Being Renamed ‘Natural Capital.’”

<sup>72</sup> ↪ On the contradictions of capitalist forestry, see Foster, *Ecology Against Capitalism*, 104–36.



*Indigenous people constitute less than 5 per cent of the world's population but protect 80 per cent of the world's biodiversity.... Ironically, in the name of ecology and combating the capitalist destruction of the earth as a safe home for humanity and innumerable other species, we are seeing an enormous expansion of the domain of what Marx called earth capital... This constitutes the great tragedy of the commodification of the commons, a new Great Expropriation, pointing to the destruction of the earth.*

designation, is adopted in place of organic in marketing to fool the unwary consumer.<sup>73</sup> In this context, the Reducing Emissions from Deforestation and Forest Degradation (REDD) market has become the leading vehicle for voluntary carbon offsets. Such projects, however, have been associated with the expropriation of Indigenous lands and the removal of Indigenous peoples.<sup>74</sup> It is significant in this respect that the Terra Bella Fund of Terra Global Capital, which is a private investment fund specialising in environmental assets, is specifically directed at "voluntary markets where

regulations are uncertain or non-existent" in emerging and developing economies and is focused on buying up "undervalued derivative instruments on environmental assets."<sup>75</sup>

According to Kanyinke Sena, director of the Indigenous Peoples of Africa Coordinating Committee, Indigenous people constitute less than 5 per cent of the world's population but protect 80 per cent of the world's biodiversity.<sup>76</sup> The world's peasantry also plays a vital ecosystem role, employing traditional practices. Ironically, in the name of ecology and combating the capitalist destruction of the earth as a safe home for humanity and innumerable other species, we are seeing an enormous expansion of the domain of what Marx called earth capital. This is occurring by means of the expropriation of Indigenous and peasant populations, along with the expropriation of the human natural inheritance altogether, including that of future generations. This constitutes the great tragedy of the commodification of the commons, a new Great Expropriation, pointing to the destruction of the earth, involving vast land (and ocean) grabs, particularly in the Global South.<sup>77</sup>

The famous Lauderdale Paradox, the destruction of public wealth (principally the commons) in order to generate private riches, introduced by the Earl of Lauderdale at the beginning of the nineteenth century, has a direct application in our time. The expropriation and degradation of the ecological commons is generating the conditions of scarcity crucial to the

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creation of exchange value, private property monopolies, and monopoly rents. It is hardly surprising, therefore, that multinational capital is playing both sides of this game of the destruction and accumulation of nature. According to Portfolio Earth, the world's fifty largest banks provided \$2.6 trillion in 2019 to companies linked to deforestation and biodiversity destruction, especially in Southeast Asia and the Amazon. The

top three offenders are Bank of America, Citigroup, and JPMorgan Chase.<sup>78</sup> The Financial Times carried a report in October 2021 indicating that global banks and asset managers had extended \$119 billion since 2016 to agribusiness

<sup>73</sup> ↪ ["Crazy Carbon Offsets Market Prompts Calls for Regulation," Bloomberg](#), January 6, 2022.

<sup>74</sup> ↪ Martin Crook, ["Conservation as a Genocide: REDD versus Indigenous Rights in Kenya," Climate and Capitalism](#), March 15, 2018.

<sup>75</sup> ↪ Sullivan, *Financialisation, Biodiversity Conservation and Equity*, 17.

<sup>76</sup> ↪ Kanyinke Sena, "Recognising Indigenous Peoples' Land Interests Is Critical for People and Nature," World Wildlife Fund, October 22, 2020.

<sup>77</sup> ↪ Stefano B. Longo, Rebecca Clausen, and Brett Clark, *The Tragedy of the Commodity: Oceans, Fisheries and Aquaculture* (New Brunswick: Rutgers University Press, 2015).

<sup>78</sup> ↪ Declan Foraise, ["Banks Bankrolling Extinction to Tune of \\$2.6 Trillion," Ecosystem Marketplace](#), October 29, 2020.

companies involved in deforestation.<sup>79</sup> Over 70 per cent of global carbon emissions can be traced to just one hundred corporations (military emissions excluded).<sup>80</sup> The same capitalist firms that are destroying the Earth System as a home for humanity are now supporting the financialisation of the world's natural capital/ecosystem services, aimed at profiting off attempts to safeguard the earth from their own continuing destruction of it. In this conception, profits can be made on both sides of the ledger, by contributing to the creative destruction of nature as part of the accumulation of capital and by profitably investing so as to ensure a zero net loss in total human and natural assets. It would be an understatement to refer to this as a planetary-level protection racket raised to the level of the capitalist economic system as a whole.<sup>81</sup>

## Against the Accumulation of Nature

The concept of natural capital, including the earth as a capital stock, was introduced in nineteenth-century political economy and environmental discussions, primarily within the socialist and radical traditions, as a way of emphasising that real wealth consisted of natural-material use values as opposed to the commodified exchange values of the capitalist

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economy. Those figures within classical political economy who initially focused on the conservation and common human ownership of material use values as constituting real wealth, opposed land monopolies and the confiscation, commodification, and destruction of nature in the interest of capital accumulation. Such arguments with regard to natural capital could already

be seen in the writings of Considerant, Jones, Marx, Waring, Carey, and Liebig, among others.

When Schumacher revived the concept of natural capital in 1973 in *Small Is Beautiful*, he was operating, as he was well aware, in this same basic tradition, seeing natural capital as constituting use values or natural resources that could not be quantified, but represented a stock of real wealth that was being liquified by capitalist production. As he wrote there: "To

*The accumulation of earth capital, though indispensable to capital accumulation, led in Marx's view to the disruption of the universal metabolism of nature in favour of capitalism's alienated social metabolism, thus developing an "irreparable rift" in the metabolism of nature and society (or the metabolic rift).*

measure the immeasurable is absurd and constitutes [on the part of the economist] but an elaborate method of moving from preconceived notions to foregone conclusions: all that one has to do to obtain the desired results is to impute suitable values to the immeasurable costs and benefits" of nature. The only real result of such an endeavour was to perpetuate the myth that "everything has a price, or, in other words, that money is the highest of all values."<sup>82</sup>

As we have noted, Marx and Engels in *The German Ideology* initially used the concept of natural capital to refer to the "natural form" of the commodity tied to use value and its concrete, physical form. In its initial development, coming out of the Middle Ages, they argued, capital was tied to physical space, in the sense of land/space, involving definite material inputs, and in this sense could be regarded as a form of "natural capital." This was contrasted to the subsequent development of "mobile capital" based on an exchange value and the circulation of financial claims to wealth.

<sup>79</sup> ↪ ["Global Finance Industry Sinks \\$119bn into Companies Linked to Deforestation,"](#) *Financial Times*, October 20, 2021.

<sup>80</sup> ↪ "Just 100 Companies Responsible for 71% of Global Emissions, Study Says," *Guardian*, July 10, 2017.

<sup>81</sup> ↪ On the potential negative role of nature derivatives in this respect, see Sullivan, *Financialisation, Biodiversity Conservation and Equity*, 21–23.

<sup>82</sup> ↪ Schumacher, *Small Is Beautiful*, 46.

However, the term natural capital itself was dropped by Marx by the time he wrote *The Poverty of Philosophy* only a year later, given his critique of the naturalisation of capitalism. In its place, he introduced a more ecological distinction

*Capitalism was to be conceived as a form of creative destruction in which the destructiveness of the system would overwhelm its creative side.*

between the earth or land as a natural-material entity—earth matter—and the category of earth capital, the latter representing nature (for example, the soil or a waterfall) turned into capital.<sup>83</sup> The accumulation of earth capital, though indispensable to capital accumulation, led in Marx's view to the disruption of the universal metabolism of nature in favour of

capitalism's alienated social metabolism, thus developing an "irreparable rift" in the metabolism of nature and society (or the metabolic rift).<sup>84</sup>

Here, Marx's analysis was much influenced by the work of Waring, Carey, and Liebig, who wrote of the robbing of the earth's capital stock, a notion that Marx was to make central to his notion of metabolic rift. In Marx's own terms, what was being "robbed" through the accumulation of "earth capital" was the material metabolism and reproductive basis of the earth as matter (material nature) itself. Capitalism was to be conceived as a form of creative destruction in which the destructiveness of the system would overwhelm its creative side. As he observed, "capital...is in practice moved as much and as little by the sight of the coming degradation and final depopulation of the human race, as by the probable fall of the earth into the sun."<sup>85</sup> A rational, sustainable relation to the earth was impossible under the regime of capital, since it saw the earth either as a mere free gift to capital accumulation or as transformed into earth capital. In either case, the ecological system was robbed. There was nothing eternal about terre-capital, which existed on the basis of the capitalisation of nature; only terre-matière, constituting the realm of natural-material existence, the universal metabolism of nature, was eternal.

"Natural capital," Daly insists, should be seen in use-value terms, "based on the relations of physical stocks and flows,

*capitalism is a system of accumulation geared to exponential expansion, hence leading to the drawing down of natural resources. It represents the very opposite of conservation. It therefore cannot accept material limits or boundaries.*

not prices and monetary valuation."<sup>86</sup> Yet, the notion of natural capital has to be seen as a dangerous one altogether in a capitalist society. Rather than embodying a distinction, as in Marx's analysis, between the earth matter and earth capital, it is easily incorporated into an all-inclusive, ahistorical notion of capital, which is

treated as homogeneous and to be measured in terms of the single yardstick of exchange value. In this respect, it is crucial to remember that capitalism is a system of accumulation geared to exponential expansion, hence leading to the drawing down of natural resources. It represents the very

*New financialised ecosystems can help support the entire system. If nature is itself capital, the argument goes, there is simply no problem. The destruction of one species or of a whole ecosystem can be compensated for by natural capital that provides ecosystem services for the economy elsewhere.*

opposite of conservation. It therefore cannot accept material limits or boundaries, which are viewed simply as barriers to be surmounted.<sup>87</sup> Faced with environmental constraints, the dominant economic approach is, therefore, to incorporate ecosystem services into the economy by placing capital values on it and selectively

<sup>83</sup> ↪ Marx, *The Poverty of Philosophy*, 164; Marx, *Capital*, vol. 3, 756–57.

<sup>84</sup> ↪ John Bellamy Foster, *The Ecological Revolution* (New York: Monthly Review Press, 2009), 161–200.

<sup>85</sup> ↪ Marx, *Capital*, vol. 1, 381.

<sup>86</sup> ↪ Daly, "The Use and Abuse of the 'Natural Capital' Concept."

<sup>87</sup> ↪ Foster, Clark, and York, *The Ecological Rift*, 284–87.

integrating it with capital accumulation itself—a process made easier by the fact that capital makes nature scarcer and more marketable by destroying it. Valuing nature simply by its ecosystem services to a capitalist economy is inevitably destructive of nature itself, with the concept of ecosystem services inviting the extreme division of nature in capitalist terms, since it has as its initial basis the “cutting” of nature into discrete pieces to be valorised.<sup>88</sup>

In the context of the overall financialisation of the world economy, vast amounts of surplus “free cash,” the growth of financial bubbles, and the promotion of debt peonage in the Global South, the financialisation of nature is likely to intensify the volatility of the capitalist economy itself.<sup>89</sup> Nevertheless, it is the environmental bubble generated by the financialisation of nature that is most dangerous.<sup>90</sup>

In what amounts to a victory of notions of weak sustainability, it is often contended that the continual destruction of nature required by capital accumulation can be offset by the valorisation of nature and its internalisation within the logic of capital itself, so that there is no net loss of natural capital in economic value terms and the exponential increase of capital accumulation in a limited environment is allowed to proceed. New financialised ecosystems can help support the entire system. If nature is itself capital, the argument goes, there is simply no problem. The destruction of one species or of a whole ecosystem can be compensated for by natural capital that provides ecosystem services for the economy elsewhere. In the words of Solow, representing the neoclassical view of sustainability,

*Species and ecosystems may be treated as commensurable and substitutable in the economic value terms of the capitalist economy, but in reality they are incommensurable and irreplaceable. Their individual demise represents real ecological consequences. To think otherwise is to fall prey to what Marxist geographer David Harvey called “the madness of economic reason.”*

nature required by capital accumulation can be offset by the valorisation of nature and its internalisation within the logic of capital itself, so that there is no net loss of natural capital in economic value terms and the exponential increase of capital accumulation in a limited environment is allowed to proceed. New financialised ecosystems can help support the entire system. If nature is itself capital, the argument goes,

*History tells us an important fact, namely that goods and services can be substituted for one another. If you don't eat one species of fish, you can eat another species of fish. Resources are, to use a favourite word of economists, fungible in a certain sense. They can take the place of each other. That is extremely important because it suggests that we do not owe to the future any particular thing. There is no specific object that the goal of sustainability, the obligation of sustainability, requires us to leave untouched.... Sustainability doesn't require that any particular species of fish or any particular tract of forest be preserved.<sup>91</sup>*

Like most capitalist economists, Solow fails to recognise that each species and each ecosystem is unique, and that extinction is irreversible, affecting the whole complex evolution of the Earth System. For Credit Suisse, conservation finance is about turning nature into “fungible” cash flow and products in precisely Solow's sense.<sup>92</sup> Species and ecosystems may be treated as commensurable and substitutable in the economic value terms of the capitalist economy, but in reality they are incommensurable and irreplaceable. Their individual demise represents real ecological consequences. To think otherwise is to fall prey to what Marxist geographer David Harvey called “the madness of

<sup>88</sup> ↪ Sullivan, Financialisation, Biodiversity Conservation and Equity, 18.

<sup>89</sup> ↪ On monopoly-finance capital and the current financial crisis tendencies, see John Bellamy Foster, R. Jamil Jonna, and Brett Clark, “The Contagion of Capital,” *Monthly Review* 72, no. 8 (January 2021): 1–19.

<sup>90</sup> ↪ Herman Daly, “Capital, Debt, and Alchemy,” Center for the Advancement of the Steady State Economy, April 8, 2012.

<sup>91</sup> ↪ Robert Solow, “Sustainability: An Economist's Perspective,” in *Economics of the Environment*, ed. Robert Dorfman and Nancy S. Dorfman (New York: Norton, 1993), 181.

<sup>92</sup> ↪ Huwyler, Käppeli, and Tobin, *Conservation Finance*, 17.



economic reason,” in which there are no limits—quantitative or qualitative—to the valorisation and financialisation of capital, conceived as value in motion, absorbing all of reality, including nature itself.<sup>93</sup>

As ecological economist John Gowdy declared, the concept of natural capital as it is now employed “contains two contradictory concepts: ‘natural’ indicating a world governed by biophysical laws and ‘capital’ indicating a world governed by the laws of market capitalism.”<sup>94</sup> Attempts to overcome this contradiction by subsuming material nature within capital run into the contradiction that Marx expressed between the earth as natural-material and the earth as

*human beings “belong to nature and exist in its midst, and...all our mastery of it consists in the fact that we have the advantage of all other creatures of being able to learn its laws and apply them correctly.”*

capital. For Marx, human production and extra-human nature had to be seen as complementary and co-evolutionary, requiring that natural systems be maintained in terms of their material flows and complex web of relations, preserving the metabolism of humanity and nature for the entire chain of human generations and for the sake of life on earth itself, in accord with the principle of acting as good heads of the household.<sup>95</sup> In the classical Marxian view, as

emphasised by Ernst Bloch in *The Principle of Hope*, nature and humanity are “co-productive,” in the sense that “the creations slumbering in the womb of nature” are the material basis of all human productivity.<sup>96</sup>

What this means is that other, wider ecological principles, applicable to both natural and human systems, need to displace current attempts to solve the planetary crisis generated by capitalism by simply absorbing the earth itself within

*Only an ecological and social revolution that would allow humanity as a whole, the associated producers, to regulate the human social metabolism with the earth in a rational and sustainable way, in accord with a broad scientific understanding and with the aim of promoting genuine, free human development, can offer a way out of the current planetary crisis.*

the logic of the system, in an extension of commodity fetishism to the realm of nature itself.<sup>97</sup> Ecology has generated new bases for promoting sustainable human development and the overcoming of economic and ecological imperialism.<sup>98</sup> Within Marxism, there is a long, if disputed, tradition of the dialectics of nature, which stands strongly opposed to reductionist approaches to nature and its evolution, exposing the

dangers of all attempts to commodify the natural world and insisting that human beings “belong to nature and exist in its midst, and...all our mastery of it consists in the fact that we have the advantage of all other creatures of being able to learn its laws and apply them correctly.”<sup>99</sup>

<sup>93</sup> ↪ David Harvey, *Marx, Capital, and the Madness of Economic Reason* (Oxford: Oxford University Press, 2018), 92.

<sup>94</sup> ↪ John M. Gowdy, “The Social Context of Natural Capital,” *International Journal of Social Economics* 21, no. 8 (1994): 43.

<sup>95</sup> ↪ Marx, *Capital*, vol. 3, 911. On the human economy and nature as complementary, see Herman Daly, “The Return of the Lauderdale Paradox,” *Ecological Economics* 25 (1988): 23.

<sup>96</sup> ↪ Ernst Bloch, *The Principle of Hope*, vol. 2 (Cambridge, MA: Massachusetts Institute of Technology Press, 1995), 686, 695.

<sup>97</sup> ↪ Nicolás Kosoy and Esteve Cobera, “Payments for Ecosystem Services as Commodity Fetishism,” *Ecological Economics* 69 (2010): 1228–36.

<sup>98</sup> ↪ In any rational path of sustainable human development, ecosystems need to be comprehended in their full complexity in terms of natural science, particularly in its more dialectical forms, as in Richard Levins and Richard Lewontin, *The Dialectical Biologist* (Cambridge, MA: Harvard University Press, 1985). Such a rational path requires moving away from the capitalist commodity market and toward social control. For a comprehensive approach based in natural science and political-economic critique, see Fred Magdoff and Chris Williams, *Creating an Ecological Society* (New York: Monthly Review Press, 2017). Material flow analysis and comprehensive energy approaches offer superior alternatives to the natural capital/ecosystem analysis in understanding the changing human relation to nature. Howard Odum’s analysis, in particular, provides the basis of a deep critique of ecological imperialism. See Friedrich Hinterberg, Fred Luks, and Friedrich Schmidt-Bleek, “Material Flows vs. ‘Natural Capital’: What Makes an Economy Sustainable?,” *Ecological Economics* 23 (1997): 1–14; Howard Odum, *Environment, Power, and Society* (New York: Columbia University Press, 2007), 276–78, 303–5.

<sup>99</sup> ↪ Marx and Engels, *Collected Works*, vol. 25, 461.

Such a critical, dialectical, and materialist perspective requires the abandonment of both the naturalisation of capital and the capitalisation of nature, as well as the recognition of the inescapable social character of capital, associated with a particular historical system: capitalism. Only an ecological and social revolution that would allow humanity as a whole, the associated producers, to regulate the human social metabolism with the earth in a rational and sustainable way, in accord with a broad scientific understanding and with the aim of promoting genuine, free human development, can offer a way out of the current planetary crisis.<sup>100</sup>

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<sup>100</sup> ↪ Marx, *Capital*, vol. 3, 959.

❖ **About Jus Semper:** The Jus Semper Global Alliance aims to contribute to achieving a sustainable ethos of social justice in the world, where all communities live in truly democratic environments that provide full enjoyment of human rights and sustainable living standards in accordance with human dignity. To accomplish this, it contributes to the liberalisation of the democratic institutions of society that have been captured by the owners of the market. With that purpose, it is devoted to research and analysis to provoke the awareness and critical thinking to generate ideas for a transformative vision to materialise the truly democratic and sustainable paradigm of People and Planet and NOT of the market.

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