Chapter 1
Introduction

In 1856, Alexis de Tocqueville opens his reflections on the French Revolution with a warning: “Philosophers and statesmen may learn a valuable lesson of modesty from the history of our Revolution, for there never were greater events, better prepared, longer matured, and yet so little foreseen.”\(^1\) Since Tocqueville, the very principle of historical predictability, dear to the eighteenth and nineteenth centuries,\(^2\) was gradually undermined. In 1928, before Karl Popper, Paul Valéry signed its death certificate: “Nothing was more destroyed by the last war than the pretension of foresight.”\(^3\)

Since unpredictability is embedded in history, it comes as no surprise that the most decisive historical processes and events of the past century were not predicted: the carnage of the World War I and the rise of modern chemical and nuclear warfare, the 1929 crisis, totalitarianism, racism and its genocides, the Cold War, the 1968 protests that raged throughout the world, the 1973 oil crisis, the Berlin Wall and its fall, the disintegration of the Soviet Union, the implosion of the Western Communist Parties, China’s emergence as an imperialist power, the advent of computers and of the Internet, the resurgence of modern fundamentalism (which is now deeply imbedded in all of the three main monotheistic religions), the creationist assault on science

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\(^1\) Cf. A. de Tocqueville (1856, p. 13): “Il n’y a rien de plus propre à rappeler les philosophes et les hommes d’État à la modestie que l’histoire de notre Révolution; car il n’y eut jamais d’événements plus grands, conduits de plus loin, mieux préparés et moins prévus.”

\(^2\) See, for example, Condorcet (1793/1993, p. 189): “man can predict almost with total certainty those phenomenon which he knows the laws of; (...) even when these are unknown he can, based on past experience, foresee the events of the future with great probability [that they will occur].”

\(^3\) “Rien n’a été plus ruiné par la dernière guerre que la prétention de prévoir.” De l’Histoire (1928), Cf. Popper (1936/1957) and (1963), Chapter 16: Prediction and Prophecy in Social Sciences. In his Prison notebooks (1929–1935), Gramsci distanced himself from the Marxism of manuals, such as that of Bukharin, regarding the idea of historical predictability. As pointed out by Ives (2004, p. 141): “Gramsci contends that it is absurd to speak of objective prediction if one means that the one making such predictions is impartial or does not connect the predicted outcome with his or her own political desire and conception of the world.”
education, the rise in public debt in industrialized countries, the Asian financial crisis of 1997, civil wars and the waves of migration from Afghanistan and Arab countries (triggered, in part, by the chaos that Western invasions sowed in these countries), the financial crises of 2007–2009, and finally, the pandemic of Covid-19, with its unpredictable developments. Among the most relevant and equally unpredictable events in the last years are the instability of oil prices and the indecipherable incognito of their future prices; the rise of extreme right-wing parties and movements in the United States, Brazil, Germany, Hungary, Poland, Austria, Italy, and other European countries; the revival of nationalisms; and the rejection of immigrants, fundamental ingredients in the rapid ideological disintegration of the European project, reaching its climax with Britain’s final decision to leave the EU. All this was fueled by the emergence of a new type of interaction between technology and politics, with the use of virtual reality, tweets, and fake and hate news (disseminated through social media networks by replicating algorithms) as weapons for disinformation and mass emotional and intellectual debasement. The few scholars who did predict these vicissitudes of the historical drama did not win a general audience except ex post facto and precisely because of such exploits.

One aspect of history, once considered peripheral, has, however, proven to be less unpredictable: the impacts of industrial societies on nature and its backlashes, the object of this book. Since 1820, Lamarck (1744–1829), one of the first naturalists to introduce the term “biology,” foresaw the causal link between industrial civilization and environmental collapse:

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4The opening words of the World Economic Outlook published by the IMF in April 2007 sound today rather comical: “Notwithstanding the recent bout of financial volatility, the world economy still looks well set for continued robust growth in 2007 and 2008.”

5Although the use of such weapons has become commonplace among political rulers, Donald Trump occupies a prominent position here. The systematic use of lies by the US president has raised concerns that his behavior patterns are typical of a psychopath. Cf. Baynes (2017); Blow (2017); Kessler et al. (2017); Lee (2017); Kentish (2017). The same diagnosis applies to the current president of Brazil, Jair Bolsonaro (Lichterbeck 2020).

6Some works were celebrated for predicting these great historical catastrophes: in Impossibilités techniques et économiques d’une guerre entre grandes puissances. Paris, Paul Dupont, 1899, Jan de Bloch warned of the dire consequences of a war between industrialized countries (“Les guerres ne pourront donc se terminer,” he concluded, “autrement que par l’épuisement entier des deux adversaries ou par un cataclisme social”). Concerning the end of the Soviet Union, cf. Todd (1976). David Levy and Nouriel Roubini, among very few other economists, warned about the coming of the 2007–2008 financial crisis. Cf. “8 who saw the crisis coming...” CNNMoney/Fortune, August 2008.

7Cf. Lamarck (1820, p. 154). English translation by Burkhardt (1977/1995, p. 214): “L’homme, par son égoïsme trop peu clairvoyant pour ses propres intérêts, par son penchant à jouir de tout ce qui est à disposition, en un mot, par son insouciance pour l’avenir et pour ses semblables, semble travailler à l’anéantissement de ses moyens de conservation et à la destruction même de sa propre espèce. Em détruisant partout les grands végétaux qui protégeaient le sol, pour des objets qui satisfont son avidité de moment, il amène rapidement à la stérilité ce sol qu’il habite, donne lieu au tarissement des sources, en écarte les animaux qui y trouvaient leur subsistance et fait que de grandes parties du globe, autrefois très fertiles et très peuplées à tous égards, sont maintenant nues, stériles, inhabilitables et desertes [...] On dirait que l’homme est destine à s’exterminer lui-même
By his egoism too short-sighted for his own good, by his tendency to revel in all that is at his disposal, in short, by his lack of concern for the future and for his fellow man, man seems to work for the annihilation of his means of conservation and for the destruction of his own species. In destroying everywhere the large plants that protect the soil in order to secure things to satisfy his greediness of the moment, man rapidly brings about the sterility of the ground on which he leaves, dries up the springs, and chases away the animals that once found their subsistence there. He causes large parts of the globe that were once very fertile and well-populated in all respects to become dead, sterile, uninhabitable, and deserted. (...) One could say that he is destined to exterminate himself, after having rendered the globe uninhabitable.

The terms under which the famous French naturalist formulates the problem, that of the “human egoism,” belong more to his century than to ours. But Lamarck and other philosophers and naturalists of the nineteenth century—Alexander von Humboldt (Wulf 2015), Ernst Haeckel, George Perkins Marsh, and John Muir, to name only the most celebrated—accurately foresaw the tendency for environmental collapse caused by the increasing anthropogenic interference in the Earth system, and their perception of this process does not substantially differ from that of the current scientific consensus. Matthias Aengenheyster and colleagues (2018) echo this consensus when they remind us that “the Earth system is currently in a state of rapid warming that is unprecedented even in geological records.” This rapidity manifests itself distinguishably in the absence, in the last half century, of decennial oscillations in the rhythm of global warming, oscillations that had been occurring until the seventh decade of the twentieth century. In its 2018 Special Report, the IPCC showed that (1) the impacts of a warming of 1.5 °C put mankind clearly beyond the safe zone and (2) any warming above this threshold is terribly threatening to the elementary functioning of contemporary societies. According to this report, to stick to 1.5 °C, however, would require reducing GHG emissions by 2030 to the levels of 1977, that is, reduce the emissions of GHG per capita to the levels of 1955 (Marland et al. 2019), something implausible if we maintain the existing socioeconomic and political structures.

The chances of not exceeding an average global warming of 1.5 °C above the pre-industrial period have, therefore, become insignificant, if not to say nil, and in the second quarter of this century, the Earth will see an average temperature never faced by our species. In other words, the future predicted by Lamarck in 1820 coincides roughly with what was proposed by Erik M. Conway and Naomi Oreskes in their remarkable book manifest, The Collapse of Western Civilization (2014). Actually, current environmental imbalances as a whole—not only climate change but the so-called nine planetary boundaries as a whole (Rockström et al. 2009; L纳斯 2007, 2011; Rockström and Wijkman 2012; Steffen et al. 2015; Raworth 2017), eight of which have already been exceeded—are already producing a radical change in the coordinates that enable life on this planet as we know it.

après avoir rendu le globe inhabitable.”

8 See also the editorial of Nature, “Earth’s boundaries?”, 461, 24/9/2009, pp. 447–448.

9 The four limits are land use change (mainly deforestation), biodiversity loss, high atmospheric
Science and politics are much more intertwined than we have portrayed them in the past. In his speech at the Rio+20 in 2012, José Mujica, former President of Uruguay, affirmed: “The big crisis is not ecological; it is political.” Without misunderstanding the specific environmental nature of these crises, Mujica stresses that societies and other ecosystems now share a common fate. What will decide the evolution of the environmental crises will be, above all, the ability of societies, informed by the scientific consensuses, to take on radically democratic forms of government, without which it will not be possible to significantly attenuate the ongoing environmental collapse. In the conclusion, I return briefly to the crucial issue of these new forms of democracy; their analysis, however, is beyond the scope of this book.

1.1 The Great Inversion and the Limits of Environmental Awareness

Throughout millenniums, the security of societies in the face of scarcity and other adversities depended fundamentally on the capacity to accumulate surplus from the continuous increase in soil use, technology, work productivity, production, and consumer goods. The historical situation today suddenly became not only diverse but also inverse in its relationship to this long past: the environmental crises of our time, unleashed precisely by the success of industrial societies in the endless multiplication of surplus, not only imposes new forms of scarcity but also systemic threats to our security. The aim of this book is to demonstrate that the equation “more surplus = more security,” which throughout millenniums was made part of our forma mentis, has today been converted into the equation “more surplus = less security.”

The difficulty in understanding this inversion, its seriousness, and the extent of its implications is the main cognitive obstacle to widespread awareness of the environmental deadlock that threatens us. Next to the totem of GDP growth, which has taken the shape of a religious dogma and of a “social pathology” (Boyd 2013), the destruction of ecosystems (when recognized) is still considered a “cost” or an inevitable collateral effect, and a problem that can be bypassed, thanks to continuous technological innovation, gains in efficiency, improvement in security protocols, and better risk management. Although illusionary, this belief in the possibility of continuous economic growth is easy to understand for 90% of the worldwide population, those in need of a minimum amount of material comfort. But certainly, the main problem does not lie here: satisfying the basic needs of 90% of humanity would not increase, and might even decrease, the human impact over the ecosystems. “Some 3 in 10 people worldwide, or 2.1 billion, lack access to safe, readily available water at home, and 6 in 10, or 4.45 billion, lack safely managed concentrations of CO₂ (above 350 ppm), and water eutrophication due to sewage and input of agricultural nutrients (phosphorous and nitrogen).
sanitation.” Providing them with this infrastructure would bring a decrease, not an increase, in the extent of human environmental impact. Figure 1.1 captures, therefore, where the problem lies.

In 2019, the wealth of the adult human population (5090 million people) reached 360.5 trillion dollars. At the apex of the pyramid, 47 million people (0.9% of the adult population), with assets of more than US$ 1 million, owned 43.9% of the global wealth (US$ 158.3 trillion). Altogether, the two upper strata of the pyramid—546 million individuals, or 10.7% of the adult population—owned about 82.8% of the world’s wealth (US$ 298.5 trillion out of a total of US$ 360.5 trillion in 2019). At the bottom of the pyramid, 56.6% of adult individuals owned only 1.8% (US$ 6.3 trillion) of global wealth, with assets of less than US$ 10,000 each.

In Chap. 13, I discuss the anatomy of the small pyramid formed by the vertex of this pyramid. It is only important to note here that this unequal concentration of global wealth has been deepening in the last 9 years. Table 1.1 compares the global wealth pyramids published by the Crédit Suisse Research Institute in 2010 and 2019:

In 2010, the wealth of the world adult population (4400 million people) amounted to US$ 194.5 trillion. In 2019, this wealth jumped to US$ 360.5 trillion (5090 million people). To whom did the US$ 166 trillion, accrued in these 9 years, go to?

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10 Cf. World Health Organization, “2.1 billion people lack safe drinking water at home, more than twice as many lack safe sanitation.” Public Health, Environmental and Social Determinants of Health ((PHE), 93, June–July 2017.

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Fig. 1.1 The Global Wealth Pyramid in 2019. Based on A. Shorrocks, J. Davies & R. Lluberas, The Crédit Suisse Global Wealth Report 2019: The year in review. The Crédit Suisse Research Institute. Observation: Wealth here is understood as the combined assets of an adult individual.
Mostly, to the owners of more than US$ one million located at the apex of the global wealth pyramid. They pocketed US$ 89.1 trillion or 53.7% of the accrued world wealth during these 9 years. The wealthiest have nearly doubled in number in these 9 years, going from 24.2 million in 2010 to 47 million people in 2019. They represented 0.5% of the adult world population in 2010 and 0.9% in 2019. Their wealth increased nearly 128%, going from US$ 69.2 trillion in 2010 to US$ 158.3 trillion. Most importantly, in 2010, they accumulated 35% of the global wealth; in 2019, this percentage reached 43.9%.

In 2010 the second upper segment of the pyramid (individual assets in the range US$ 100,000 – US$ one million) owned US$ 85 trillion or 43.7% of the world wealth. In 2019, this figure jumped to US$ 140.2 trillion, which represented 38.9% of the world wealth. So they pocketed US$ 55.2 trillion or 34% of the increase in this wealth (US$ 166 trillion) during these 9 years. In 2019, the wealth of this second group of 499 million people was four times their share of the adult population. The middle class in developed nations typically belongs to this group (Shorrocks et al. 2019). Together, the two upper brackets of the world wealth pyramid appropriated US$ 144.3 trillion or nearly 87% of the increase in the world wealth during this period.

In the last 9 years, their share in the world wealth fell from 4.2% to 1.8%.

| Population (millions of adults = m.a.) | <10 thousands (US$) | 10 th.–100 th. (US$) | 100 th.–1 million (US$) | >1 mil. (US$) |
|----------------------------------------|---------------------|----------------------|------------------------|-------------|
| 2010 4400                              | 3038 m.a. (68.4%/4.2%) | 1045 m.a. (23.5%/16.5%) | 334 m.a. (7.5%/43.7%) | 24.2 m.a. (0.5%/35.6%) |
| 2019 5090                              | 2883 m.a. (56.6%/1.8%) | 1661 m.a. (32.6%/15.5%) | 499 m.a. (9.8%/38.9%) | 47 m.a. (0.9%/43.9%) |

Source: A. Shorrocks & J. Davies, *The Crédit Suisse Global Wealth Report 2010* and A. Shorrocks, J. Davies & R. Lluberas, *The Crédit Suisse Global Wealth Report 2019: The year in review*. Observation: m.a. = millions of adults. The percentages in parenthesis represent the percentage of the total adult population, to the left; the percentage of global wealth owned by each extract of the pyramid, to the right.

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Thus, only US$ 21.7 trillion or 13% of the global wealth accrued between 2010 and 2019 went to the pockets of the 4554 million people, or 89.2% of the 2019 world adult population, representing the two bottom strata of the wealth pyramid. In the bottom bracket of the global wealth pyramid (2883 million people, or 56.6%, with wealth below US$ 10,000), there has been impoverishment in every sense of the word. In 2010, these 3038 million people (68.4% of the adult population) owned US$ 8.2 trillion. In 2019, they were 2883 million people. The poorest people of the world have only marginally decreased since 2010 (155 million people) but owned only US$ 6.3 trillion in 2019. They lost US$ 1.9 trillion in 9 years! In 2010, their per capita wealth was US$ 2699; in 2019, it declined to US$ 2185, an impoverishment of US$ 514. In the last 9 years, their share in the world wealth fell from 4.2% to 1.8%.
In 2018 and 2019, this global inequality widened further. According to Oxfam (Lawson et al. 2019), “between 2017 and 2018, a new billionaire was created every two days.” In 2018 alone, “the wealth of the world’s billionaires increased by US$ 900 billion, or US$ 2.5 billion a day. Meanwhile the wealth of the poorest half of humanity, 3.8 billion people, fell by 11%.” Also, according to Oxfam (Coffey et al. 2020), “in 2019, the world’s billionaires, only 2,153 people, had more wealth than 4.6 billion people.”

It is important to note here that there is increasing inequality not only in assets but also in income. Today, 46% of the world, or 3.4 billion people, live on less than US$ 5.50 a day (World Bank 2018). In the United States, for instance, according to Paul Krugman (2014), “since the late 1970s real wages for the bottom half of the work force have stagnated or fallen, while the incomes of the top 1% have nearly quadrupled (and the incomes of the top 0.1% have risen even more)” (see also Lauer 2014). The 2013 Survey of Consumer Finances (SCF), a triennial cross-sectional survey of US families conducted by the Federal Reserve Board, indicates that 30.5% of the total income in the United States was concentrated in the hands of the 3% richest North Americans in 2013, compared to 27.7% in 2010. According to the same survey, in 2013, 90% of those in the base of the income pyramid had their economic participation reduced to 24.7%, against 33.2% in 2010. This phenomenon is generalized. Oxfam (Working for the Few 2014) showed that in 2014 seven in ten people lived in countries where the inequality of income increased.

The economy of the planet is propelled to satisfy the appetite of 546 million people (the 10.7% of the world’s adult population who owned US$ 298.5 trillion, or 82.8% of the world wealth in 2019), leading to environmental crises, starting with climate change caused by anthropogenic carbon emissions. In a paper titled “Carbon and Inequality: From Kyoto to Paris,” Lucas Chancel and Thomas Piketty (2015) showed that income and CO₂e emissions inequalities increased within countries over the 1998–2013 period: “Global CO₂e emissions remain highly concentrated today: the top 10% emitters contribute to 45% of global emissions, while the bottom 50% contribute to 13% of global emissions.” According to the authors, in 2015, among the top 10% global emitters, 40% of CO₂e emissions come from the United States, 20% from the EU, and 10% from China. More recently, Nicholas Beuret (2019) endorses the same conclusion:

Most of the world’s population produces very little in the way of either carbon emissions or broader environmental impacts. We can go further here by also looking at imported carbon emissions – that is, the emissions that come from the production of goods and services in countries such as China that are then consumed in the wealthy countries of the global north. (…) When we approach carbon emissions this way, it’s clear the problem isn’t overpopulation or China, but the richest people on earth. After all, being rich, especially ultra-rich, means being directly responsible, either through consumption or control, for the majority of the world’s carbon emissions.

This structure of wealth and income and the tendency for its concentration manifest a mechanism that is at the heart of the economic system and that propels a tiny parcel of the population to control the investment decisions and to accumulate
wealth as an end in itself. This mechanism, which is nothing other than the accumulation of capital, is self-renewing, not only in action but also ideologically. The belief that societies’ security and prosperity depend on the accumulation of capital is, as stated above, a great cognitive obstacle to the understanding that this accumulative mechanism is actually pushing us toward a social and environmental collapse.

In Antiquity, the absence of limits is discussed in a saying attributed to Epicurus: “wealth, if limits are not set for it, is great poverty.” In our days, the truth of this motto has not only reached a new extreme—never was the economic system conceived so perfectly so as to satisfy the anxieties of the rich to become richer—but it also assumes a new dimension: although it is a fact that environmental crises affect the poor most severely, the intensification of these crises will end up throwing the rich and the poor in the same precarious situation. Contrary to the hidden garden that protected the onesta brigata of ten youth from the Black Plague in Boccaccio’s Decameron, there is no wall capable of sheltering the rich from the effects of environmental crises, given their systemic character: global warming, decline of biodiversity, droughts, water shortage, desertification, devastating fires, more extreme meteorological events, floods, heat and cold waves capable of threatening our lives and energy security, rising sea levels, air, soil and water pollution, food poisoning, cities obstructed by cars and trash, and with increasing levels of insalubrious sanitary conditions.

Of course, this perspective is not of great concern to those who control flows of investments. In 2017 alone, the top five US banks—JPMorgan, Morgan Stanley, Goldman Sachs, Bank of America, and Citi Group—lent $1.5 billion to the major coal corporations, Peabody Energy, Arch Coal, and Alpha Natural Resources (Flitter 2018). The Davos 2018 Global Risk Report shows a bleak picture of corporate leaders’ disinterest in environmental crises. The survey, titled Global Risk of Highest Concern for Doing Business, interviewed 14,375 executives from 148 economies and received 12,775 responses from 133 economies. It classifies risks into five categories: (a) economic (eight risks); (b) geopolitical (five risks); (c) environmental (five risks); (d) social (six risks); and (e) technological (five risks). Among the 29 proposed risks pertaining to these five categories, the Davos respondents were asked to select the five global risks that are of greatest concern for doing business in their country in the next 10 years. The first environmental risk selected by the interviewees (extreme weather events) appears only in 18th place, since only 12.9% of respondents mentioned it among their top concerns. The risk of climate change appears in 21st place, since only 11.4% of managers included it among their top

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11 Porphyrius ad Marcellam, 27, p. 207, 31 Nauck, in Hermann Usener, Epicurea, p. 161, translated/ed. Ilaria Ramelli, Milan, Bompiani, 2002, p. 367. Seneca also attributes the sentence to Epicurus and writes in the Ep. II to Lucilius: non qui param habet, sed qui plus cupit, pauper est (poor is not the one who has little, but the one who desires more). In modern times, see, for example, Leonardo da Vinci, Scritti letterati, Milan, Rizzoli, 1987, p. 222: “De’ non m’avere a vil ch’i non son povero; povero è quel che assai cose desidera” (Don’t take me for a village man, as I am not poor; poor is the one who desires many things).
concerns, and the risk of a collapse of biodiversity appears in 26th place, indicated by only 6.6% of respondents as being one of their top concerns. Let’s not be fooled: for those who control the levers of the world economy, environmental crises remain among the last of their concerns, despite their verbiage on “sustainability.”

Moreover, as stressed by Ilona Otto et al. (2019), “any form of policy targeted at the superrich is bound to meet with strong resistance. The rich are over-represented in national governments and there are strong ties between the wealthy and the political elites.”

What do we say, however, of the near indifference of the majority of the world’s population, those most immediately vulnerable to the global environmental crises? Political, economic, and social marginalization, as well as the excruciating fight for survival, explains this near indifference. But one cannot underestimate the explanatory power of another factor: the promises of consumer society. As Ivan Illich (1973/2003) wrote almost 50 years ago, the consumer society is comprised of “two types of slaves: those intoxicated and those who want to become intoxicated; the initiated and the neophytes.” Since Ivan Illich, many have meditated on this voluntary new servitude to consumerism; yet, it is necessary to return to this issue, even at the risk of redundancy.

Capitalism presents its legitimacy in tangible, and previously unimaginable, comforts that were brought to important sectors of industrialized and “emerging” contemporary societies. But even these countries are now finding themselves in a process of impoverishment. This process does not restrict itself only to the generation born between 1980 and 2000, the “unlucky millennials” (Davies et al. 2017, p. 27). It reaches significant segments of the population of all age brackets in OECD countries. In 2018, the World Bank included high-income countries in its global estimates of people living in poverty and deep poverty. There were then 13.8 million deeply poor people, living on US$ 4 a day or less, in the United States (5.3 million people), in selected countries of the European Union (6.9 million people), in Canada, Japan, and Australia (Deaton 2018). Among white non-Hispanic Americans with no more than a high school education, life expectancy is falling, and mortality rates from drugs, alcohol, and suicide are rising (Case and Deaton 2015). Philip Alston (2017), UN special rapporteur on extreme poverty and human rights, affirmed that one in four young people in the United States lived below the poverty line. Furthermore, the United States occupies 36th position in the world in terms of access to drinkable water and sanitation infrastructure, and it has the highest demographic incarceration rate on the planet: 2.16 million people, or 655 out of every 100 thousand people in 2016, a rate much above that of Cuba, China, Turkmenistan, Thailand, the Philippines, Russia, and Brazil (Kaeble and Cowhig 2016; Kann 2018). One political consequence of these levels of poverty and social exclusion is the further limiting of social representation in US democracy: only 70% of US citizens of voting age were registered to vote and only 55.7% of these took part in the 2016 presidential election (Alston 2017).
This consensus on continuous economic growth being a condition for a secure and prosperous society obviously caters to corporations and to their “classical” political spectrum. But leftist groups, with few exceptions, not only endorse this consensus but also claim they are better equipped than the right-wing political parties at guaranteeing robust economic growth. They remain anchored in an ideological automatism: a historical conception, taken from Marx, centered on the protagonism of productive forces, almost identifying the development of these productive forces with historical “progress.” The *locus classicus* of this idea in Marx’s thought is the passage from the *A Contribution to the Critique of Political Economy*:

> At a certain stage of development, the material productive forces of society come into conflict with the existing relations of production or – this merely expresses the same thing in legal terms – with the property relations within the framework of which they have operated hitherto. From forms of development of the productive forces these relations turn into their fetters. Then begins an era of social revolution.

The left’s resistance to relegate this type of Mechanics of history “without nature” to the nineteenth century has blinded them from noticing that, throughout the twentieth century, capitalist relations of production did not hinder the development of productive forces (in fact, the contrary happened) and that, *precisely because of this*, the distinctive trait of global capitalism in the twenty-first century is the tendency for environmental collapse. Faced with this defining tendency of our century, conserving what is left of the biosphere has become the first condition not only for any possibility of social advance (which will be increasingly unlikely and ephemeral if we keep the religion of economic growth) but also for the maintenance of any organized society. Not realizing the radical novelty of our current situation, and especially its gravity, almost all leftist groups dissociate the social agenda from the ecological agenda, reserving the latter to a secondary status in their ideals and programs. Seeing the planet as a stock of resources (and even more grave, as an infinite stock of resources), the left subscribes to the premise that takes the capitalist point of view as universal, one that deems the continuous accumulation of surplus and energy as positive and even as necessary. The left doesn’t notice that the only criticism to reach the root of the capitalist system is the criticism of this premise and of the suicidal type of society that it implies. As stated by Cornelius Castoriadis (2005): “Ecology is subversive since it puts into question the capitalist imagination that dominates the planet. It refuses [capitalism’s] central motive which states that it is our destiny to continuously increase production and consumption.” They do not notice, therefore, that this dismissal—tragic like their previous contempt for “bourgeois” freedoms—allows conservative sectors to mollify and neutralize the environmental movement’s potential for criticism. The delaying of an *aggiornamento*—svecchiamento might be a better word—by the majority of those in the

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12 The historical error of the left, tolerating tyranny in the name of socialism, is being repeated, giving the right the opportunity to sell itself as the guardians of civil liberties, in itself an absurdity.
political left has led to the current paucity of political alternatives to the socioenvironmental crises.

Reinforcing this cognitive obstacle, common across the ideological spectrum, there are at least three psychological mechanisms that keep people from becoming aware of the seriousness of these environmental crises and, a fortiori, from taking political action.

(1) The first, as stated by George Marshall (2014), is loss aversion which, in decision-making theory, is a tendency to strongly prefer avoiding losses to acquiring gains. The problem with environmental crises is their perfect formula for inaction, even among those who do not deny their reality. Let us take the conclusion of the 2006 Stern Report, reinforced by Nicholas Stern in 2010, and transformed today into the mantra of ecological economists: “ignoring climate change is not a viable option – inaction will be far more costly than adaptation” (p. 616). Similarly, Simon Dietz et al. (2016) state that:

The expected ‘climate value at risk’ (climate VaR) of global financial assets today is 1.8% along a business-as-usual emissions path. Taking a representative estimate of global financial assets, this amounts to US$ 2.5 trillion. However, much of the risk is in the tail. For example, the 99th percentile climate VaR is 16.9%, or US$ 24.2 trillion.

According to UNEP’s Green Economy Report (2008/2012), it would be necessary to invest 1.3 trillion dollars per year until 2050 to finance the transition to a “green” economy. The same document mentions a similar estimate made by IEA: it would be necessary to invest 750 billion dollars every year from 2030 to 2050 to reduce by half only those CO₂ emissions linked to the production of energy. More recently, the Global Commission on Adaptation (2019), chaired by Ban Ki-moon, Bill Gates, and Kristalina Georgieva, estimates that investing US$ 1.8 trillion globally in five areas from 2020 to 2030 could generate US$ 7.1 trillion in total net benefits. Even if the future costs of inaction are admittedly much greater, mitigating emissions and adapting to climate change require accepting loss here and now: renouncing fossil fuels and major investments in low-carbon renewables and in climate-resilient infrastructure, in addition to other sacrifices for the upper- and middle-income classes which should be concrete and quantifiable. In this context, it is easy to understand the inefficiency of the environmental community’s appeals to an immediate and vigorous reaction to these crises and the relative success of denialists and “merchants of doubt” (Oreskes and Conway 2010), since their rhetoric reinforces what everyone wants to hear. According to Marshall, the information that veers away from this consensus is unconsciously selected or framed in a way that distorts it so that it does not seriously conflict with the worldview of the receiver. These mechanisms of aversion to loss and neutralization of dissonance led Daniel Kahneman, Noble Prize in Economic Sciences for his research on the psychological biases that distort decision-making, to affirm: “I am very sorry, but I am deeply pessimistic.

See also “Hear no climate evil.” New Scientist, 16/VIII/2014, p. 24.
I really see no path to success on climate change” (quoted in Marshall 2014, p. 56). Similarly, referring to this collective resistance in making rational decisions, even when faced with mounting evidence of the acceleration of environmental crises, Daniel Gilbert, a specialist in cognitive psychology at Harvard, made the following affirmation: “It really has everything going against it. A psychologist could barely dream up a better scenario for paralysis” (quoted in Marshall (2014, p. 91).

(2) The second psychological mechanism in action is the process of habituation, a type of adaptive behavior that consists of a reduction in the response to a repetitive stimulus, but without immediate consequences. Aesop’s fable of the wolf that never comes is a good illustration of this process. The reiteration of scientific prognosis about the aggravation of the environmental crisis tends to have a decreasing impact on people’s consciousness, as these crises are not manifested in the form of an immediate risk. As Clive Hamilton (2010) mentions, natural selection has reinforced our capacity to react in a visceral and instantaneous way to immediate risks. But “we are at a loss when confronted with global warming which requires us to rely heavily on cognitive processing.” The repetition of warnings without these being followed by immediate consequences leads to a progressive decrease in the notion of risk and in the energy needed to respond to it. Decades of living with the threat of nuclear war and of catastrophes in nuclear plants has had an anesthetic function. This explains, in part, our inertia toward the threats inherent in the environmental crises. Inspired by the catastrophe of Union Carbide in Bhopal, in 1984, and by the impact of the Chernobyl disaster in 1986, Ulrich Beck wrote *Risk Society: Towards a New Modernity*. Jean-Pierre Dupuy published *Pour un catastrophisme éclairé. Quand l’impossible est certain* (or “Enlightened Doomsaying”) in 2002, inspired by Hans Jonas’ criticism that we do not attribute a sufficient *weight of reality* to the future catastrophe: “We are neither cognitively nor emotionally affected by the anticipation of the misfortune to come” (p. 199). Since the warnings issued by Jonas, Beck, and Dupuy, the aging of nuclear plants14 and the revival of the military nuclear threat (Krepon 2019) have become two among many environmental catastrophes waiting to happen, while the emotional perception of these risks tends to not correspond to what is at stake.

(3) The third psychological mechanism that reinforces this cognitive obstacle is dissociation (Worthy 2013; Humes 2013) between structural causes and specific effects. The difficulty to recognize the wolf persists, even when the signs of his arrival are multiplying. Tendencies evolve in spatial and temporal scales that are not accessible to everyday radars, which are much more sensitive to events. Events do not come, however, with a label of the tendency that they

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14 The 15 nuclear reactors in Ukraine were built over 40 years ago by the Soviet Union but conceived to last only 30 years. Cf. Le Hir (2014). The accident in February 2014 in the US Air Force Waste Isolation Pilot Plant received very little media attention, despite its catastrophic potential. See Nature editorial 7500, 509, 15/V/2014, p. 259: “An accident waiting to happen.”
express. It is true that a new body of research, known as Probabilistic Event Attribution (PEA), is now examining to what extent wildfires or extreme weather events can be associated with past anthropogenic emissions and long-term climate tendencies. According to Schiermeier (2018) and a Nature editorial of July 2018, climate science “has finally generated the tools to attribute heatwaves and downpours to global warming.” In short, we can affirm that the intensity of certain events would be extremely unlikely in the absence of the ongoing anthropogenic climate change (Herring et al. 2019). The relative uncertainty between isolated facts and structural causes is being reduced. Nevertheless, an extreme meteorological event, a heatwave, an exceptional drought, or a new plague are still perceived by the public in an fragmented way, only as one more piece of “news” that the press puts out like instant shots of a clip, aligned with other news bits and diluted next to sports chronicles, criminal reports, corruption scandals, as if “environmental” were just one more adjective among other adjectives—economic, financial, moral, educational, etc.—linked to the noun “crisis.”

Outside the realm of psychology, the most important factor to reinforce this cognitive obstacle may be the belief that our governments are capable of “saving” us from environmental collapse, or at least of assuming a bigger share of responsibility in implementing policies to revert the environmental degradation of the biosphere. This belief does not take into account the new and deep relationship that is being formed between the state and corporations, as we will demonstrate next.

1.2 An Ongoing Change in the Nature of the State: The “State-Corporation”

As we will see in detail in Chap. 7, between 1990 (the reference year of the Kyoto Protocol) and 2017, global CO₂ emissions increased by 63% (GCP, Global Carbon Budget 2018). And they will continue to increase in the foreseeable future (although probably at lower rates), given the ongoing increases in deforestation and wildfires, mostly in Brazil, Australia, Russia, and the United States, as well as new investments in thermoelectric power plants. It seems, therefore, more and more remote that the policies advocated by the IPCC to contain global warming will be implemented. The verdicts of the Climate Change Performance Index 2020 (CCPI) are peremptory in this respect:

None of the countries assessed is already on a path compatible with the Paris climate targets. (…) Eight G20 countries are remaining in the worst category of the index (“very low”). Australia (56th out of 61), Saudi Arabia and above all the USA perform particularly

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15 Cf. “Pinning extreme weather on climate change is now routine and reliable Science.” Nature, editorial, 560, 5, 30/VII/2018. But see some caveats by Rowan Sutton (2018).
poor – the USA is the worst performer for the first time. Under the Trump administration, the USA is rated “low” or “very low” in almost all categories; in the category climate policy only Australia performed worse, which received 0 out of 100 possible points based on the assessment of climate experts in the country. ‘This science based assessment shows again that in particular the large climate polluters do hardly anything for the transformational shift we need to deep emissions reductions to curtail the run to potentially irreversible climate change’ (Stephan Singer).

The CCPI 2020 only reiterated the previous CCPI reports. Two years ago, for instance, its authors wrote: “we still see a huge ambition gap in the countries’ greenhouse gas reduction targets and their progress regarding a sufficient implementation of the Paris Agreement in national legislation” (Burck et al. 2018).

The CCPI measures countries’ efforts in terms of state initiatives, which, however, many are unable to take on. This incapacity lies in what we consider the central tendency in economic and political history of our time: the ongoing change in the nature of the state. In fact, a difference between the nature of the twenty-first century state and the state generated by the so-called Second Industrial Revolution begins to take shape. The latter was characterized by the emergence of financial and industrial conglomerates with much greater technological and capital density, one that—as is well known—implied a new interaction between capital and the state. This second phase of the Industrial Revolution, the prototype of which is seen in the cohabitation between the German state and industrial conglomerates such as Krupp and IG Farben (which in 1945 split, leading to Agfa, BASF, Hoechst and Bayer), gave rise to what we refer to as state capitalism, a term apparently coined by Wilhelm Liebknecht (1896), one of the founders of the Social Democratic Party (SPD) of Germany.

Throughout the twentieth century, the complementary relations between national states and corporations deepened and became more widespread. From the end of the century, they have acquired forms sufficiently typical to justify the hypothesis of a new phase of state capitalism, or even, as I suggest here, of a true change in the nature of the state, with the emergence of what might be called the “state-corporation,” a new model of symbioses between the state and corporations. This new model is brought about by the conversion to capitalism of China, the former Soviet Union, and Eastern European countries but also by state leverage of the economies of the “Asian tigers” and of less industrialized countries, such as India and Brazil (at least until 2016).

Everyone knows that the Thatcher and Reagan administrations meant the beginning of the dismantling of social democracy, the globalization of commerce, the deregulation of the financial market, and privatization of state assets. But the privatizations that hit countries like Brazil (1995–2002), Russia (1991–1999), and India after the abolition of the Licence Raj in 1990 (Sibal 2012) did not necessarily involve state retreat from the energy and financial sectors and meant, moreover, greater state involvement in other sectors of corporate capital. According to the MSCI World Index,16 state-owned enterprises (SOE) account for 80% of the value

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16 The MSCI World Index (formerly Morgan Stanley Capital International) is a stock market index
of the stock market in China, 62% in Russia, and 38% in Brazil. The proportion of SOE among the Fortune Global 500 (which ranks the largest companies in the world by revenue) has grown from 9% in 2005 to 23% in 2014. Also according to the OECD’s report, *Ownership and Governance of State-Owned Enterprises* (2018), “they account for over a fifth of the world’s largest enterprises as opposed to ten years ago where only one or two SOEs could be found at the top of the league table.” In Russia, the state’s share in GDP expanded from about 40% in 2006 to 46% in 2016 (Di Bella et al. 2019). In 2019, for the first time since the first Fortune Global 500 (1990), there were more Chinese companies than American ones. Only 15% of China’s 109 corporations listed on the Fortune Global 500 are privately owned (Guluzae 2019). In fact, the top 12 Chinese companies are all state-owned. They include massive banks and oil companies that the central government controls through the State-Owned Assets Supervision and Administration Commission of the State Council (SASAC) (Cendrowski 2015). Furthermore, of the ten most valuable corporations in the world, four are state-owned, three in China and one in Japan.

Consider now another fact, revealed by Richard Heede (2014): the historical records of global CO₂ and methane gas released into the atmosphere (914 GtCO₂-eq) between 1854 and 2010 show that 63% of the global emissions that occurred between 1751 and 2010 originated from the activities of 90 corporations in the fossil fuel and cement industries and that half of these emissions were released into the atmosphere after 1986. Of these 90 carbon majors, 50 are private corporations (investor-owned) and 40 are state-owned or nation-state. In terms of numbers, state and private companies are almost equal (40–50), but in terms of the quantity of gigatons of CO₂ released, the responsibility of the 40 state-owned or nation-state companies (600 GtCO₂-e) is much greater—almost double—than that of the 50 private companies (315 GtCO₂-e). In addition, the state-owned companies are the biggest from this group: the ten biggest gas and petroleum companies in the world, measured by their reserves, are nation-state corporations, while the thirteen biggest ones, which together account for three-fourths of the world petroleum reserves, have some form of state participation. The International Energy Agency (IEA) estimates that 74% of all the coal, petroleum, and gas reserves are state-owned companies, while Exxon and Shell, the two first private petroleum majors, measured by profit, own less than 10% of the world’s reserves (Carrington 2015; Bezat 2015).

These two facts—the increasing participation of state capital in key sectors of the economy and its decisive weight in the fossil fuel industry—explain why states are reluctant to reduce greenhouse gas emissions. Despite solemn declarations about greenhouse gas reduction strategies, their policies, investments, and subsidies are being slowly shaped by the interests of their own assets, following the logic of

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17 See the PwC Report, *State-Owned Enterprises. Catalysts for Public Value Creation?* 2015.
18 See “The Visible Hand.” *The Economist*, 26/I/2013.
19 See “The Rise of State Capitalism” and “The Visible Hand.” *The Economist*, 26/I/2013.
profitability through which the state promotes selective support, participates in shareholders’ agreements, and encourages or inhibits market trends, following a reasoning that is not essentially different from that of a large corporation.

These two facts are linked to two others: (1) the financial survival of a good number of states depends on the dividends of state-owned enterprises; (2) states are becoming—in general—more dependent on corporations. In Development in an Era of Capital Control (2017), Clara Hackett rightly observes that “the government of more dependent states may be resigned to the whim of the corporation and, as such, can be described as being as a hostage to capital.” This second point is of crucial importance. In the previous political order, the state legitimized itself to the extent that it was able to put itself, or appear to put itself, above the social conflicts at stake. Its relative financial autonomy made it more capable of assuming environmental and social responsibilities, which sometimes contradicted the immediate interests of corporations. All the labor and environmental legislation imposed on businesses in the nineteenth and twentieth centuries, thanks to the pressure of environmental and social movements, but also to the “notion of the state” in public power, gives proof to the mediation capacity that the state once exercised in the conflicting dynamics of society. In short, there was an irreducible difference of identity between the state and corporations until the 1980s.

From the 1980s on, this difference in identity begins to disappear as a result of the factors mentioned above, but also due to two other trends: (1) the great transnational mobility of goods and capital makes the environmental and social movements less able to interfere in public policy; (2) states’ fiscal deficit and growing public debt stall their investment capacity and force them to subordinate their environmental and social policies to the logic of the market.

The entire more or less democratic framework of political representation created by a long history of nation states thus loses its relative effectiveness. Increasingly destitute of real sovereignty, while also functioning as creditors and debtors, partners, and competitors of big capital, states are absorbed in a logic of national or transnational corporate networks; they tend to function and, above all, to think of themselves, as constituent of this dynamic. This new condition of the state calls for an update of the historical constant formulated by Marx, according to which, in a capitalist system, the state ultimately represents the interests of capital. The contemporary state does not represent capital because representation supposes a relationship between two distinct entities, while what happens today is a continuum between both, always functioning, of course, according to the logic of capital. It would often be more accurate today to replace the term “corporate network” with “corporate-state network” and to assert that in contemporary capitalism the state not only represents corporations but also intertwines its assets with theirs while at the same time depending existentially on them to manage its structural debt. It is both these conditions—of partner and of debtor—that lead the state to no longer distinguish the raison d’être of public management from that of private management. A concept such as “crony capitalism” (Zingales 2012) tries to capture these new forms of overlap between the state and corporations, which no longer only affect economic policy, but, again, the very identity of the state itself. The phenomenon was well
described by Sheldon Wolin (2008), who coined the terms “democracy incorporated” and “inverted totalitarianism.” According to Wolin, in the “classic” totalitarianism:

The state was conceived as the main center of power (...) Inverted totalitarianism, by contrast, while exploiting the authority and resources of the state, gains its dynamic by combining with other forms of power, such as evangelical religions, and most notably by encouraging a symbiotic relationship between traditional government and the system of ‘private’ governance represented by the modern business corporation. The result is not a system of codetermination by equal partners who retain their distinctive identities, but rather a system that represents the political coming-of-age of corporate power.

This does not mean that there is no longer any tension between the state and corporations. But the nature of this tension has changed. Previously, the state was the mirror of a given relationship between forces, that is, the ability of each class to be present and to have an impact—through social struggle, unions, parties, parliamentary representations, etc.—on state socioeconomic policies and fundamental political directives. Today, other factors predominate in the tension between the state and corporations. Among them are (1) fiscal legislation, its implementation and monitoring, manipulating accounts and tax evasion in fiscal paradises (see Chap. 13); (2) importing into the state conflicts from different groups in the corporate world due to an alignment of interests and alliances of the state with this or that entrepreneurial group; (3) dysfunctional interactions between the state and corporations, such as corruption and bureaucracy; and (4) finally, but less importantly, civil society pressures so that the state assumes its historical identity as a promoter of environmental policies and social well-being, less importantly because social movements are very weak and fragmented, at least hitherto, and because the capacity and availability of states to meet these pressures are increasingly conditioned by the corporate pact which governs this emerging nature of the state. In summary, the tensions between the state and corporations result from the metabolizing, in fieri, of one organism into another in symbiotic digestion, a metabolizing that should remain imperfect, as it is only through conserving a residue of identity and autonomy in relation to corporations that this new hybrid entity, the state-corporation, can legitimize itself in the eyes of society and perceive itself as functional.

Therefore, when we asked above, why, according to the Climate Change Performance Index 2020 (CCPI), “none of the countries assessed is already on a path compatible with the Paris climate targets,” the answer begins to take shape. States no longer have the power, interest, or even the perception that they should act, as a public power, in the name of preserving the most universal of goods—their natural heritage. The interests of states and of corporations now fundamentally coincide: to increase production and consumption and guarantee the international flow of natural resources at prices that guarantee the maximum rate of profit for private and state companies, in short, for the state-corporation.
1.3 The Regression of Multilateralism

In the 4 years after the military victory over Nazi-fascism and the Bretton-Woods agreement (1944), the allied countries, under US hegemony, remodeled the international institutional framework, still partially in force today, to their image and likeness with the creation of the IMF (1944), IBRD (1944), the World Bank (1945), GATT (1947, WTO since 1995), OAS (1948), NATO (1949), and the Marshall Plan, which resulted in the 1948 Organisation for European Economic Co-operation (and later OECD), among others.

But alongside this new instrument designed to consolidate and legitimize the Pax Americana, other institutions, movements, agreements, and treaties emerged whose vocation was to strengthen an embryo of multilateralism. In this way, together with the decolonization process, a series of initiatives came forth in the 45 years after the war, which, taken altogether, can be considered a cornerstone of global governance building. Let us remember a few of them: the UN (1945), the International Court of Justice (1946), the Antarctic Treaty System (ATS, 1959–1961), the Movement of Non-Aligned Countries (1961–1963), the Organization of African Unity (1963), the International Covenant on Civil and Political Rights (1966), the Stockholm Conference on the Human Environment (1972), the Convention on International Trade in Endangered Species of Wild Fauna and Flora—CITES (1973), the UN Convention on the Law of the Sea (UNCLOS) of 1982, the Summit of Reykjavik and Washington on nuclear disarmament (1986–1987),20 the creation of the Brundtland Committee (1983–1987), the Montreal Protocol on Substances that Deplete the Ozone Layer (1987), the IPCC (1988), the Basel Convention on Motion Control of Transboundary Hazardous Waste (1989), and the formation of regional blocs, such as the European Union, which was born as an ingenious and generous political project. In 1987, at the opening of the Brundtland Committee, Our Common Future, Gro Harlem Brundtland wrote: “Perhaps our most urgent task today is to persuade nations of the need to return to multilateralism.”

Still in the 1990s, the hope of a slow evolution in the direction of effective international governance was fueled by the fall of the Berlin Wall (1989), the first IPCC Assessment Report (1990), aimed at governments, and by the Earth Summit, or ECO-92, which led to seven major agreements,21 as well as to important documents and protocols, such as the Agenda 21, the Rio Declaration on Environment and Development, and the Earth Charter (2000). Throughout the decade, there were other important meetings: in 1993, the Vienna Conference on Human Rights, which resulted in the Vienna Declaration and Program of Action (VDPA) and the Office of the United Nations High Commissioner for Human Rights (OHCHR); in 1994, the

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20 As a result of this treaty, the number of nuclear weapons in the world is actually down from 70,000 in 1986 to around 14,000 in 2020 (see “Nuclear Weapons.” BBC, 14/I/2020). But a new nuclear arms race is now being sparked by Trump, Putin, and Xi Jinping.

21 Cf. Ronald B. Mitchell, 2002–2012, International Environmental Database Project. University of Oregon.
Cairo Conference on Population and Development; in 1995, the accession of 38 nations to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT-UNODA); and in 1996, the World Food Summit (WFS) and the Fourth Beijing Conference on Equality of the Sexes. Outside the official circuits, there was, in 1998, the creation of ATTAC (Association pour la taxation des transactions financières et pour l’action citoyenne) in Paris, present today in 28 countries, and, in 1999, the Battle of Seattle against the corporate establishment which showed the momentum of several socio-environmental movements in favor of a then emerging alter-globalization. These movements have tried to consolidate themselves, since 2001, in the World Social Forum.

But already at the end of the 1990s, diplomatic multilateralism had lost the momentum that the ECO-92 had given it, and was reduced, with the G8 (1997) and G20 (1999), to mere concerted efforts to manage crises in the financial markets. And with the invasion of Afghanistan and Iraq by a heteroclite military commission forged by the US in 2001 and 2003, the very principle of international law was definitely invalidated. In this way, the Rio+10 in Johannesburg remained incapable of implementing the agreements set in 1992, and this inability confirmed itself in the Rio+20. In addition, the goal set in Rio+10 of restoring fish stocks by 2015 remained absolutely ineffective. Today, beyond the unilateralism of the Trump “doctrine,” it is the degradation of natural resources, the prospect of scarcity, or the complete transformation of these resources into commodities that make state-corporations less inclined to respect multilateral bodies, to include clauses of environmental sustainability in their trade agreements, and to enter into binding international agreements or to ratify them and stick to them.

The Kyoto Protocol (1997–2012) offers an emblematic example of non-compliance with multilateral agreements. It compelled signatories to reduce, by 2012, greenhouse gas emissions (GHG) by 5.2% in relation to 1990 levels. Figure 1.2 shows what has happened between 1997 and 2012.

![CO2 Global Emissions between 1970 and 2012 (in Gt). Based on Jeff Tollefson, Nature, 503, 14/XI/2013, p. 175, from PBL Netherlands Environ. Assessment Agency/UNEP](attachment:graph.png)
Instead of falling 5.2%, CO₂ atmospheric emissions increased by more than 50% between 1992 and 2012, causing an 11% increase in its atmospheric concentration. According to Jeff Tollefson and Natasha Gilbert (2012):

The climate numbers are downright discouraging. The world pumped 22.7 billion tonnes of carbon dioxide into the atmosphere in 1990 (...). By 2010 that amount had increased roughly 45% to 33 billion tonnes. Carbon dioxide emissions skyrocketed by more than 5% in 2010 alone, marking the fastest growth in more than two decades as the global economy recovered from its slump.

The Global Carbon Project (GCP) calculates an increase of 61% in greenhouse gas emissions between 1990 and 2013. These estimates only account for CO₂ emissions from both industrial activity and the burning of fossil fuels and do not include fuels used in maritime and air transport (or bunker fuels), as well as emissions from deforestation, fires, melting of the permafrost, agriculture and livestock, hydroelectric dams, etc.

1.4 From Rio+20 to the Present

Kumi Naidoo, Executive Director of Greenpeace, dubbed the UN Conference Rio+20 “an epic failure.” Ban Ki-moon, former UN Secretary-General, admirably summed up its results: “Let me be frank. Our efforts have not lived up to the measure of the challenge. Nature does not wait. Nature does not negotiate with human beings.” An important reason for the regression of multilateralism is the loss of the surprise factor. In 1992, the corporate universe was neutralized by immense media exposure and by general enthusiasm. Twenty years later, company lobbies and state-corporations no longer had the surprise factor against them. They returned to Rio committed to obstruct any agreement on global governance. This resistance, already evident in the Copenhagen Summit failure (2009), continued in Lima, in December 2013 (COP 20). An International Monetary Fund Working Paper, uploaded in May 2015, puts the cost of subsidizing fossil fuels at US$ 5.3 trillion a year, which is more than double the projected 2014 estimate that the IMF released in April 2014 (Coady et al. 2014; Vorrath 2014). According to Nicholas Stern:

This very important analysis shatters the myth that fossil fuels are cheap by showing just how huge their real costs are. There is no justification for these enormous subsidies for fossil fuels, which distort markets and damages economies, particularly in poorer countries.

The Paris Agreement was hailed by former President Barack Obama with these words: “Today, we can be more confident that this planet is going to be in better shape for the next generation.” But this Agreement does not even mention the issue of such huge subsidies to fossil fuels. Not even the most foolish optimist expects

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22 Cf. “Rio+20 Has Become the Summit of Futility.” Der Spiegel, 21/VI/2012.
23 Quoted by Damian Carrington, “Fossil fuel subsidised by $10 m a minute, says IMF.” The Guardian, 18/V/2015.
that our governments will go far enough as to phase out these subsidies. Legally non-binding and without any clauses on penalties in case of non-compliance, the Paris Agreement has all the ingredients to prove what James Hansen stated (Milman 2015):

It’s a fraud really, a fake. It’s just bullshit for them to say: ‘We’ll have a 2°C warming target and then try to do a little better every five years.’ It’s just worthless words. There is no action, just promises. As long as fossil fuels appear to be the cheapest fuels out there, they will be continued to be burned.

The facts confirm James Hansen’s perception: in the fourth quarter of 2015, the world consumed 96 million barrels of oil per day, and in the fourth quarter of 2019, the world increased its daily consumption to almost 101 million barrels of oil (EIA, Short-Term Energy Outlook, 14/I/2020). Despite the United Kingdom signing up to the Paris agreement, its government (through overseas aid and lines of credit) gave 4.6 billion pounds to overseas fossil fuel projects between 2010 and 2017, and there is no downward trend in the fossil fuel funding. When we know that JSW, a coal corporation, sponsored the COP24 in 2018, that the United States already gave a formal notice of intention to withdraw from the Paris Agreement, and that Brazil withdrew its offer to stage the COP25, deemed by the way the worst climate summit ever (Harvey 2019), what remains of the credibility of this “historic” climate agreement?

1.5 Natural Reserves and Horror Vacui

The increase in GHG emissions is only one example of a greater context of regression. The Convention on Biological Diversity and the UN Convention to Combat Desertification (UNCCD), two agreements made by the ECO-92, present an equally negative balance. The 2010–2020 UN Decade for Deserts and the Fight against Desertification did not meet its goals: today, “land degradation and desertification affect one third of the land used for agriculture” (FAO 2019). Multilateralism has also struck a negative balance with respect to stemming the collapse of biodiversity, deforestation, pollution of the soil, atmosphere, and hydrosphere, overfishing, the increase in waste and international trafficking of waste, wood, and animals, eutrophication of water by industrial fertilizers, intoxication from pesticides and other substances, etc. The conclusion is that in the last 20 years, there has not been a reduction in the rate of degradation of ecosystems. Vandana Shiva, Director of the Research Foundation for Science, Technology and Natural Resource Policy, stated in 2010:24

When we think of wars in our times, our minds turn to Iraq and Afghanistan. But the bigger war is the war against the planet. This war has its roots in an economy that fails to respect

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24 See *Time to End War Against the Earth*. Speech upon receiving the Sydney Peace Prize (4/ XI/2010).
ecological and ethical limits - limits to inequality, limits to injustice, limits to greed and economic concentration. A handful of corporations and of powerful countries seeks to control the earth’s resources and transform the planet into a supermarket in which everything is for sale. They want to sell our water, genes, cells, organs, knowledge, cultures and future.

The idea of establishing natural “reserves” is symptomatic of this war, because reserves are thought of as demilitarized zones. Nevertheless, just as in the physics of Aristotle, \emph{natura abhorret a vacuo},\footnote{Cf. Aristotle, \textit{Physics}, IV, section 8. The expression \textit{natura abhorret vacum} was apparently introduced by Rabelais in \textit{Gargantua et Pantagruel} (1534), book I, chapter 5.} so too the logic that sees nature as a raw material is characterized by the horror vacui. Nature reserves themselves do not escape this logic. The data is unequivocal. In 2013, the vast majority of the 621 biosphere reserves recognized by UNESCO in 117 countries\footnote{See the program, “Man and the Biosphere” (MAB), in cooperation with UNEP and IUCN.} were in a process of degradation.\footnote{On reserves in Africa, see Amadou Boureima, \textit{Réserves de la biosphère en Afrique de l’Ouest}, 2008.} In Brazil, according to Manuela Carneiro da Cunha, “indigenous lands and conservation units, lands that are kept outside of the market, are being threatened more than ever before.” This statement dates back to 2014.\footnote{Cf. D. Chiaretti, “Cresce disputa pelas terras dos índios no país.” \textit{Valor econômico}, 17/IV/2014, p. 4.} Today, Brazilian indigenous and their lands are the targets of a tragic \textit{Blitzkrieg}. On an international scale, 10\% of the 183 UNESCO natural heritage sites, strongholds and symbols of the concept of ecological sanctuaries, are already at risk or in the process of being degraded (Landrin 2012). Global marine reserves (marine protected areas or MPA) do not surpass 3\% of oceans, and MPAs “are ineffective or only partially effective” (Toropova et al. 2010). The destruction of 50\% of the Great Barrier Reef in Australia, protected by UNESCO since 1981, presents an exemplary case of the vulnerability of the planet’s most important nature “reserves.” In November 2014, the World Parks Congress of the IUCN took place in Sydney; it was their decennial meeting which establishes the protection agenda for “natural reserves” for the next 10 years. Commenting on this event, which is at the top of the conservationist calendar, the editorial of \textit{Nature} (6/XII/2014) posits: “At the next World Parks Congress, around 2024, what will attendees discuss? Will there be any truly wild rhinos left? Will the Great Barrier Reef be in terminal decline?” On March 19, 2018, the last male Northern White Rhino died. Indeed, the Great Barrier Reef decline is now probably terminal because, according to Terry Hughes and colleagues (2019), “as a consequence of mass mortality of adult brood stock in 2016 and 2017 owing to heat stress, the amount of larval recruitment declined in 2018 by 89\% compared to historical levels.” How do we not fear also for mangrove biodiversity, as more than 35\% of these tropical ecosystems have already been destroyed worldwide?
1.6 Unsustainability and the Increasing Severity of Environmental Crises

Given this brief assessment of societies’ inability—subject to alleged economic Diktats and, above all, victims of their own mental blocks—to respond in a concerted way to the degradation of the biosphere, it is easy to understand the growing appeal of the idea of “sustainable development.” Coined about 30 years ago, this idea has become, over time, a blah-blah-blah, an advertising slogan, and a synonym for “green” economic growth. In the final text of Rio+20, “The Future We Want,” for example, the word “sustainable” is repeated 115 times, without being linked to a single concrete action to make it effective. To restore its significance, it is necessary to look at what the term denotes. A socioeconomic system is sustainable if and only if: (1) the economic activity does not destroy biodiversity and does not change the environmental parameters in a faster rate than their ability for restoration and adaptation; (2) the economic activity “meets the needs of the present without compromising the ability of future generations to meet their own needs” (see the 1987 Brundtland Report, Our Common Future). The words of Herman Daly (1990a/1993) on this topic are enlightening: “the term ‘sustainable development’ (…) makes sense for the economy, but only if it is understood as ‘development without growth.’” Also emblematic is the verdict of James Lovelock (2006):

The error that they [the acolytes of market laissez-faire and those who desire the so-called sustainable development] share is the belief that further development is possible and that the Earth will continue, more or less as now, for at least the first half of the century.

At this advanced stage of environmental crises, all growth clashes with a physical impossibility: the entropy generated by growth itself, as was described almost half a century ago by the opus magnum of Nicholas Georgescu-Roegen (1971). It also clashes with a basic principle of economic theory, that is, Herman Daly’s theorem of impossibility, discussed in Chap. 13. In short, the current scale of economic activities and the steady increase in industries and agribusiness with high environmental impact have come to be incompatible not only with the available supply of natural resources but also with the equilibrium of the Earth’s system itself which has allowed for the rapid development of civilizations since the end of the last glacial period about 11.7 millennia ago. Kevin Anderson (2015) rightly maintains that: “A 2°C emission pathway cannot be reconciled with the repeated high-level claims that in transitioning to a low-carbon energy system ‘global economic growth would not be strongly affected’ [IPCC].”

We can test this hypothesis on the incompatibility between increased economic growth and the planet’s limits by examining two questions: (1) To what extent can the difficulty in resuming the average economic growth rates of 1945–1973 be attributed to the already unsustainable economic system? (2) What will the impact of this economic unsustainability be on future economic crises?

29 For the IPCC quote, see “The Concluding Instalment of the Fifth Assessment Report,” 2/XI/2014.
The crisis of 2008 broke out by the culmination of the bursting of a housing bubble, an excessive expansion of credit, and a resale of subprime derivatives, which generated a domino effect of defaults, a liquidity crisis, and a violent contraction of credit. Economists claim that this mechanism, itself a part of the financial system, bears some similarities with other previous credit crises and other speculative and real-estate bubbles, such as the long crisis that began with the “Panic of 1873” and the one that has affected Japan’s economy since the 1990s.

More than 10 years after the financial panic of 2008, its effects remain so persistently that the global economy has not yet completely overcome them. Almost certainly it will never regain its previous performance (and all the more so because of the long-lasting effects of the Covid-19 pandemic). Furthermore, according to the former Bank of England governor Lord Mervyn King and to Kristalina Georgieva, managing director of the IMF, the global economy is sleepwalking toward a new massive financial disaster (Elliot 2019; Inman 2020). Joe Davis, head of investment strategy at Vanguard, believes there is 50% chance that a new epic stock market crash could come as early as 2020 (Hoy 2019). Financial cyclical crises are part of the game in a capitalist economy. But on a deeper level, the next crises may be different from the previous ones. It may not be simply another “classical” crisis of capitalism because environmental difficulties can override its perennial cycle. As put by Patrick Bolton et al. (2020) in a book report published by the Bank for International Settlements in Basel (BIS) and the European Central Bank (ECB), climate change could lead to “green swan” events and be the cause of the next systemic financial crisis:

Climate-related physical and transition risks involve interacting, nonlinear and fundamentally unpredictable environmental, social, economic, and geopolitical dynamics that are irreversibly transformed by the growing concentration of greenhouse gases in the atmosphere.

This conjunction of cyclical capitalist crises with environmental crises will produce “eco-crises” in the near future which are much more profound, prolonged, and difficult to resolve than the previous ones. In fact, the weight of environmental conditions on the performance of the world economy is already considerable (see Chap. 7, Sect. 7.4 Suffering and Greater Lethality Due to the Current Warming). A report by the United Nations Office for Disaster Risk Reduction (UNISDR) warns that:30

In 1998–2017 disaster-hit countries …) reported direct economic losses valued at US$ 2,908 billion, of which climate-related disasters caused US$ 2,245 billion or 77% of the total. (…) Overall, reported losses from extreme weather events rose by 151% between these two 20-year periods” (1978–1997 vs. 1998–2017).

Ultimately and above all, we must take into account the economic losses caused by the destruction of natural resources that must be valued for their non-use, this “invisible” value consisting of the essential services that the existence of forests and

30 Cf. UNISDR, Economic Losses, Poverty & Disasters, 1998–2017, based on the Centre for Research on the Epidemiology of Disasters (CRED) data from the Université Catholique de Louvain.
biodiversity provides to life and, therefore, to man’s survival. According to Pavan Sukhdev (2010) and his Economics of Ecosystems and Biodiversity (TEEB) report, in 2050 the value of destroyed ecosystems will correspond to 18% of total world production. This projection is modest when compared to the US$ 60 trillion loss caused by a possible massive release of methane from the Arctic in the coming decades, as calculated by Gail Whiteman, Chris Hope, and Peter Wadhams (2013).

As we can see, in the next crises, the relative weight of economic and environmental factors in the cause of crises will tend to be reversed, relegating the classic cycle of capitalism to a supporting role, while the rising costs of environmental crises will increasingly take on a protagonist role. This is what James Leape, International Director-General of WWF, affirmed in the foreword to the World Wildlife Fund’s Living Planet 2008 Report: “The world is currently struggling with the consequences of over-valuing its financial assets. However, a more fundamental crisis looms ahead – an ecological credit crunch caused by under-valuing the environmental assets that are the basis of all life and prosperity.” Environmental degradation is becoming, in short, the structural component of the crisis of global capitalism.

1.7 The Phoenix That Turned into a Chicken

Discussions about how to heal the anemia that has pervaded economic activity on a global scale since 2008 will prolong themselves ad nauseam (or *ad bellum*) until we recognize the exhaustion of the capitalist pharmacopoeia. Deficits, default on loan payments, and declining economic growth are chronic and structural problems. Gone indeed are the times of the elegant mathematical models of long-term growth, such as Robert Solow’s famous “Contribution to the Theory of Economic Growth” (1956). These theories flourished in the postwar period and worked well in a vacuum when environmental deficits were still manageable, the climate still stable, and cheap oil and other natural resources still abundant. The defenders of capitalism will continue to insist on the same two things: the salvific prowess of technological innovation and the exceptional resilience of this economic system. To a certain extent, they are right: the couplet written by Mayakovsky in 1917 now has an archaeological flavor:

Eat pineapples, chew grouse
Your last day is approaching, bourgeois!

The Dies irae of the *bourgeois* did not arrive. The prediction did not take place neither in Russia nor elsewhere. Capitalism was able to provide institutional legality, to manage social pressure, or, when pressured, to eliminate it by Nazi-fascism and similar regimes. Its worst economic crises and most extreme near-death experiences spurred mechanisms of partial autophagy, as well as the survival of the fittest, the re-concentration of capital, and technological innovation. These reactions allowed
the system to be successively reset, thus being reborn stronger and more vigorous from its ashes.

Since the 2008 crisis, the phoenix, however, is slow to be reborn, or rather, it is being reborn with the flight range of a chicken, not because it has unlearned how to fly, but because the height of its roof is constantly being lowered: the limits of nature. These limits form an iron ring that begins to close itself around the global economy and no economic policy seems capable of breaking it. In fact, doping the economy with steroids (subsidies, facilitation of credit, monetary easing, technological innovation for greater productivity, etc.) in view of reestablishing its past performance will only increase the pressure on natural resources and further erode what remains of the pillars that sustain life on this planet. And, in the same proportion, it will further decrease the chances that the accumulation paradigm will function. What seems to be just another crisis in capitalism is, in reality, a crisis of capitalism, or, more precisely, of the relations between the economic system and its physical boundaries. Thus, although the business cycle of capitalism continues to repeat itself, Fig. 1.3, elaborated by Gail Tverberg, shows how growth in each of these cycles is decreasing:

![Fig. 1.3](image.png)

*Fig. 1.3* World GDP. % change between 1970 and 2011 (year by year and average by time period). (Source: Based on Gail Tverberg, *Our Finite World*, 18/VII/2012)

The average growth of real-world GDP (discounted for inflation) from 1970 to 1973 was almost 5%; from 1976 to 1979 it was just over 4%; from 1984 to 1990 it was less than 4%; from 1994 to 2007 it was just over 3%; and from 2008 to 2011 it was about 1.5%, with a moment of negative growth for the first time since 1945. According to the unfailingly optimistic IMF (WEO, January 2020), “across
advanced economies, growth is projected to stabilize at 1.6% in 2020–2021”. Euro area GDP is forecast to expand by 1.2% in 2020 and 2021. These projections of anemic growth were proposed on the eve of the outbreak of the current pandemic, which will condemn the global economy to a depression of unpredictable duration. Reversing this downward trend would require stability in the climate system and an abundance of energy and natural resources at low cost, things that no longer exist.

This is the trap that ensnares the global economic system: the higher the scale of exploration of energy, minerals, soil, water, etc., the scarcer these resources become and, hence, the more polluting is their exploitation and the more intense the technological innovation required to maintain this scale. This leads the economic system to resort to more invasive, costly, and destructive activities, which, in turn, cause the economy to generate higher entropy in itself and in the environment, unbalancing the biophysical parameters that prevailed in the mild Holocene. In this context, a new law arises in contemporary global capitalism: scarcity and/or pollution of natural resources, climate change, biodiversity loss, and other environmental imbalances are now increasingly the decisive factors in determining the profit rate of capital.

1.8 “What Were We Thinking?”, Denial, and Self-Deception

Echoing Paul Gilding’s book, The Great Disruption, in his The New York Times column, Thomas L. Friedman (2011) wrote:

You really do have to wonder whether a few years from now we’ll look back at the first decade of the 21st century — when food prices spiked, energy prices soared, world population surged, tornados plowed through cities, floods and droughts set records, populations were displaced and governments were threatened by the confluence of it all — and ask ourselves: What were we thinking? How did we not panic when the evidence was so obvious that we’d crossed some growth/climate/natural resource/population redlines all at once?

Ten years later, how can we continue to fool ourselves with cultivated and useless discussions on the 17 Sustainable Development Goals and the Paris Agreement? What are we thinking of in 2020 as “the world now faces climate-change existential crisis which may result in ‘outright chaos’ and an end to human civilization as we know it”? (Dunlop and Spratt 2017). In other words, we find ourselves in the ante-room of an environmental collapse of global dimensions, triggered, to start with, by the inevitability of an average global warming of 1.5 °C or more above the pre-industrial period by 2030. “Human kind cannot bear very much reality,” wrote T.S. Eliot around 1935. Today, this verdict applies with all the more force. With the intensification of environmental crises in these final years of the second decade of this century, the transgression of all the red lines alluded to by Thomas Friedman becomes even more evident. This intensification also makes the efficiency of the three psychological mechanisms analyzed above (loss aversion, habituation, and dissociation) even more apparent. They result in a behavior of paralysis that is
similar to panic. Animals run in the face of danger. But when danger is upon them, they tend to freeze, in the hope that they will go unnoticed by the predator. This animal behavior takes, in us, the form of a fourth psychological mechanism: that fear will not reach us if we are capable of creating a tranquilizing auto-narrative.

This type of narrative, also called self-deception, or more precisely “straight self-deception” (Mele 2001), consists in accepting as real information that at another level of consciousness we admit being dubious or false. It should not be confused with denial, which is characterized by a childish refusal of evidence. Both behaviors were well examined by Clive Hamilton (2010). Self-deception does not deny the evidence of the anthropogenic environmental crises. Although we admit, simply through reading the newspapers, that what we are doing or promising to do for sustainability is not enough to deter the ongoing environmental collapse, self-deception induces us to see reality through transfigured lenses which magnify the positive factors and minimize the negative ones. This is how self-deception blocks the perception of reality: when evaluating positive and negative factors, one does not take into account the fact that the negative factors exceed the positive ones in scale, speed, and acceleration. This is shown in all areas: greater concentrations of greenhouse gases in the atmosphere; climate change; deforestation; quick decline in water resources; more severe and prolonged droughts; soil erosion and desertification; stronger and more frequent wildfires; destruction of habitats; biodiversity loss; pollution of the soil and ocean by sewage, municipal, and industrial waste; chemical intoxication of organisms; increased risk of pandemics from the abuse of antibiotics and from more intense contact with other species; heating, acidification, and deoxygenation of the oceans; increase in dead zones in rivers, lakes, and oceans; bleaching and demise of coral reefs; increasing concentrations of ozone and other toxic particles in the troposphere; melting of sea ice in the Arctic, increased melting in Greenland, in Antarctica, in the so-called Third Pole, and in the permafrost; increased and potentially catastrophic liberation of CO₂ and methane into the atmosphere; rising of sea levels; and intensification of extreme meteorological events: bigger hurricanes, torrential rains, flooding, torrid summers, rigorous winters with more intense snowstorms, paradoxically in a hotter world. The list is far from complete.

These are facts that are cumulative, synergetic, and convergent. But there are still a few who, as Tacitus says, fingunt simul credunque (Ann., V, 10), that is, who believe in what they fantasize. Some believe, in fact, against all the evidence that the advance of “clean” energy will soon imply a reduction in the consumption of fossil fuels, GHG emissions, and other anthropic impacts on the Earth system; others that people in advanced economies are starting to consume less; still others think that decisions made at COPs will be enforced. And they all disqualify—as catastrophic and apocalyptic—the views of those who doubt that market forces will, ultimately, end up prioritizing global sustainability in detriment to their own priorities, or that both priorities will end up coinciding.

No silver bullet technology will arrive to our rescue at the last minute and solve even the problems that technology itself created or intensified, as in the deus ex machina of classical theater. The problem of technology is not its greater or lesser
advance. The problem is its appropriation by a logic that converts it into an amplifier of the crisis. Self-deception is, in reality, the most seductive and insidious case of denial of capitalism’s unsustainability. Without it, it would be impossible for us to stay in our precarious zones of material and psychological comfort and lull our belief that, as bad as the everyday environmental news is, in the end “all will be well.”

1.9 The Goal and the Two Central Arguments of This Book

Every line of this book has the objective of arguing for the opposite (of the “all will be well” vision). It argues that, if we are not able to react now and act appropriately to the challenges that confront us, everything will end badly—and soon—for an uncountable number of species, including our own.

The book is divided into two parts. The first (The Convergence of Environmental Crises) has the goal of gathering and analyzing what science has put forth, not as hypotheses, but as findings: a global warming of more than 2 °C compared to the pre-industrial period during the second quarter of the century already seems inevitable and the increasing anthropic interference on the Earth system is producing ruptures in the physical, chemical, and biological equilibrium on which the web of life is based on. This web of life, therefore, is falling apart. We do not know how close we are from tipping points, and even if we have already crossed some of them (see Chap. 8). But we know that, if the same trajectory is kept, the chances of not crossing these thresholds become smaller and smaller.

We also know what the nature of our agenda is. In the late 1960s, when the growth paradigm began to be questioned, the precautionary principle developed by Hans Jonas’ made sense, as it was still possible to prevent the outbreak of destructive dynamics that characterize our present-day situation. In 2020, the time of prophylaxis is far behind us. The aggravation of all the environmental crises mentioned above is no longer a possibility; it is a reality whose effects are already being felt in virtually all parts of the globe. Today, in short, the agenda is not precaution, but mitigation of the ongoing environmental collapse, because the sooner we act, the more we will be able to attenuate its destructive impacts. This is exactly what Erik M. Conway and Naomi Oreskes posit (2014, p. 78):

The precautionary principle deals with what one should do when there is evidence that something may be a problem, but we’re not quite sure, or not sure of the extent of it. We are sure that climate change is happening – we already see damage – and we know beyond a reasonable doubt that business as usual will lead to more damage, possibly devastating damage. (…) It’s way too late for precaution. Now we are talking about damage control.

The definite characteristic of this moment is, therefore, a race against the clock, a race that we are undoubtedly losing.

The second part of the book (Three Concentric Illusions) continues through the last three chapters. Its ambition is to contribute to the recognition of the fact that all
contemporary environmental crises, due to their scale, ubiquity, and acceleration, redefine the themes and priorities of the socioeconomic and political debates that polarize our societies today. Maybe it is not within his power for Homo sapiens to disassemble the trap that his ingenuity made him fall into. But the first condition to face the present environmental crises is to see it, without subterfuge, as the central and unavoidable issue of humanity. In his much-quoted Preface to A Contribution to the Critique of Political Economy (1859), Marx hypothesized that “mankind inevitably sets itself only such tasks as it is able to solve.” This hypothesis is as encouraging as it is “unfalsifiable.” But there is a prior point worthy of attention: humanity is incapable of solving a problem if it does not recognize it as such. What needs to be recognized is expressed in the two central arguments discussed in the second part of this book.

Thesis 1. Capitalism is environmentally unsustainable and the hope to make it sustainable can be considered the most misleading illusion in contemporary political, social, and economic thought. The global socioeconomic system that we call capitalism is defined by two characteristics: (1) an institutional order granting capital owners or state managers the right to make investment decisions based solely on economic grounds and (2) an economic logic according to which the natural resources and the productive forces in society are allocated and organized in order to increase production and maximize profit. If capitalism cannot envision the mythical stationary state described by John Stuart Mill in his Principles of Political Economy, it cannot, a fortiori, conceive of itself as a system of monitored degrowth, a key point discussed in Chap. 13. In 1844 John Stuart Mill himself admitted that expansion was a goal of the capitalist system itself, rooting it in human nature, since “man is a being who is determined, by the necessity of his nature, to prefer a greater portion of wealth to a smaller.” The discussion about the existence of a human nature or about the final cause of human actions is fruitless, but it is a widely acknowledged fact that the final cause of the cycle of capital in the capitalist system is its own amplified reproduction. No one has analyzed this final cause of capitalism better than Marx (1867/1887, I, Part 4, section V, chapter 14, p. 251):

Political Economy, which, as an independent science, first sprang into being during the period of manufacture, views the social division of labour only from the standpoint of manufacture, and sees in it only the means of producing more commodities with a given quantity of labour, and, consequently, of cheapening commodities and hurrying the accumulation of capital. In a most striking contrast to this accentuation of quantity and exchange-value, is the attitude of the writers of classical antiquity, who hold exclusively to quality and use-value.

In capitalism, to be is to expand. Being and expanding are the same thing in the cellular metabolism of this system. In a biosphere that is being annihilated and in a planet with increasing thermal energy imbalance and with finite natural resources, the expression “sustainable capitalism” therefore expresses a contradiction in terms. Capitalism’s environmental unsustainability, far from being a “childhood illness,” is a congenital, chronic, and degenerative disease of the socioeconomic system. Herman Daly (1990b) famously maintained that “since the human economy is a subsystem of a finite global ecosystem which does not grow, even though it does
develop, it is clear that growth of the economy cannot be sustainable over long periods of time. The term sustainable growth should be rejected as a bad oxymoron.” In more blunt terms, one can, thus, formulate the first central thesis of this book: capitalism is an intrinsically expansive system and the more difficult it is to expand, the more environmentally destructive it becomes. Under such a socioeconomic system, mankind will no longer “fit” into the biosphere, implying that society in the future will be post-capitalist or will not be a complex society, and there might even be no society at all.

Thesis 2. The second central thesis of this book, discussed in Chaps. 14 and 15, is that this first illusion of capitalism becoming sustainable emerges from a second and third illusion, both deeply rooted in European history, the matrix of contemporary hegemonic societies. The second illusion is that the more excess material and energy we can produce, the more secure will be our existence as a species in the face of scarcity and the adversity of nature. In physics, energy is often defined as the ability of a physical system to do work on other physical systems or everything that allows the alteration of a given state of a system. From the human point of view, energy is everything that allows for greater appropriation of environmental resources. Until the eighteenth century, the equation “more surplus = more security” was anything but illusory since man’s ability to enhance energy in an exosomatic way allowed him to capture only energy flows and recent energy stocks: domesticated animal work, mechanical systems, forces from wind, water, and fire, as well as solar radiation, mainly through photosynthesis. The various stages of the industrial revolution gave us access not only to these physical flows and recent stocks of energy but also to the immense primary energy stocks stored in other geological eras through fossil fuels, and, since the postwar period, to energy trapped in the nucleus of the atom. The industrial use of these new energy sources which allowed for an explosive increase not only in population but also in production and consumption of per capita goods increased the impact of human action on all ecosystems—forests and other native vegetation coverings, soil, water, minerals, etc. Today, we begin to realize that the more surplus and energy we accumulate, the less secure we become. The ability to multiply surplus, a supreme good until the eighteenth century, has become, with the global capitalism of the twentieth century, an evil that threatens to disrupt the climate system, to kill the biosphere and, not least, the human species.

The third illusion—from which these first two and, indeed, all other illusions of consumer society are anchored—is the anthropocentric illusion of metaphysical and religious nature that Lucretius, in the first half of the first century BC, already called by its real name when he exclaimed: “to say that for the sake of men they [the gods] willed to prepare this world’s magnificence, (…), Memmius, is madness.” This madness is the belief that the biosphere is a means to an end and that the right to reduce it to an energy apparatus for human benefit is rooted in the singularity of our

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31 Lucrécio, *De rerum natura*, V, 156–165: *Dicere porro hominum causa voluisse parare/praeclaram mundi naturam (...), Memmi, desiperest.*
species or in a radical discontinuity between us and the web of life. The flight of Icarus is a good image of this anthropocentric illusion, one that will be discussed in the last chapter of this book.

These two central theses of the book can be summarized into one. We cannot avoid environmental collapse if we fail to overcome capitalism, but capitalism will not be overcome until we overcome both these illusions that nourish, naturalize, and even sacralize it: the illusion that the growth of surplus is still an asset to our societies and the anthropocentric illusion.

Without breaking the mental frame which confines us into these three illusions—the illusion of a sustainable capitalism, of unlimited growth, and of our exceptionality in the web of life—man will not depart from capitalism. The state appropriation of economic surplus does not eliminate capitalism, as the various revolutions of the twentieth century believed in. We will only overcome capitalism—assuming that it is possible to overcome it—when it is no longer conceivable to destroy habitats for money, when accumulation of surplus ceases to be an end in itself to become a variable dependent on the possibilities of the biosphere, and when the biosphere is conceived as a subject with rights or, if we refuse to give it such status, as an insurmountable physical limit at the risk of collapse.

The strength of capitalism lies in the fact that it projects into our conscience an inverted image of itself so that the disorder that is produced emerges as the natural order of things. This naturalization of a historical social order impedes the perception that it is possible, at least in theory, to transcend these fossilized behavior patterns. If we are not capable of becoming, socioeconomically and politically, more than what these patterns have made us, if capitalism is the best that our global society, and ultimately our species—also endowed with reason, prudence, aesthetic sense, and morals—can do, then we deserve a somber future, or maybe the non-future to which we are condemning ourselves.

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This book will have achieved its objective if the arguments in favor of the aforementioned theses are convincing. It is not within the scope of this work—quite far from it actually—to attack the bigger problem which we point to, namely, the collective creation of a post-capitalist society after the failure of the socialist experiment of the twentieth century.

We cannot, however, ignore this greater problem. In the conclusion we will suggest, without pretense of offering any political prescription, the conditions for the possibility of an environmentally sustainable society. There is no reason to articulate them here, but it is prudent to lay out the three cornerstones of my argument. The first is that, even though environmental sustainability requires an alternative society to capitalism, this does not exclude gradualisms and political mediations that are part of our contemporary reality: all the actions of the state, of political parties, of NGOs, of companies, of different civil society institutions, and of individuals in the direction of environmental sustainability, even if this sustainability is unattainable under capitalism, are precious. Aiming to address climate change and
economic inequality, initiatives such as the Green New Deal Group in United Kingdom (2008) and the Green New Deal, sponsored by Rep. Alexandria Ocasio-Cortez and Sen. Ed Markey in the United States (2018), are highly valuable attempts to radically transform the UK and the US economies, and ultimately our global economy, away from fossil fuels and from the corporate food system.

The second cornerstone is that, if it is not possible to imagine effective solutions to sustainability without overcoming the logic of economic growth, this is not conceivable without a strengthening of democracy. Science and technology are fundamental allies in making these solutions viable, but the solutions are in the hands of society through strategic policy decisions. The third one is that a post-capitalist society will also be a post-socialist society, since, environmentally speaking, socialism was as catastrophic as is capitalism. Socialism is in itself a failed experience, and even more so if evaluated by its program to overcome capitalism. The book, Écosocialisme. L’alternative radicale à la catastrophe écologique capitaliste (2013), by Michael Löwy, offers a flawless diagnosis of capitalism, which implies the necessity, in the words of the author, for “a new society and a new mode of production, but also a new paradigm of civilization” (p. 101). Exactly. But it is impossible to reconcile this new paradigm of civilization with socialism, even the socialism imagined by Marx and Engels. As Löwy himself states (p. 98): “Marx and Engels lack a full ecological perspective.” We owe to Marx nothing less than the understanding of the genesis and the logic of the world in which we live in. But we do not owe to him the understanding of its final developments and of its end. After all, why should the tendency for socioenvironmental collapse—a historical problem that has increased in magnitude and reached our awareness only in the 1960s—be a topic of discussion in the middle of the nineteenth century? The problem only became fully visible much later, as pointed out, in extremis, by Arnold Toynbee, in 1976 (p. 566):

It was not till the Industrial Revolution had been in progress for two centuries that mankind realized that the effects of mechanization were threatening to make the biosphere uninhabitable for all species of life by polluting it, not locally, but globally, and uninhabitable for Man in particular by using non-replaceable natural resources that had become indispensable for him.

Michael Löwy is also right when he perceives Marx’s contradictions: “The first of these contradictions is, of course, that between the productivist creed of certain texts and the intuition that progress can be a source of irreversible destruction of the natural environment.” Well formulated: Marx and Engels came to intuit the possibility of the devastation of ecosystems by the productive forces, but their fundamental creed was productivity and, as such, it inclined them to imagine a future flatly denied by current evidence. It is necessary, therefore, to differentiate socialism—a system whose accumulative metabolism, similar to that of capitalism, secreted insoluble environmental crises—from eco-socialism, a term that refers to a “new paradigm of civilization” or, similarly, to a “revolution of degrowth,” as Serge Latouche (2014) proposes:

In short, we somehow arrived at the ‘moment of truth’, at a historical turning point, a real ‘crisis of civilization’. It is the crisis of Western civilization, from which a revolution will
come in the true sense of the word (that is, a total change, even on a cultural level, which I call the ‘degrowth revolution’ or even ‘eco-socialism’), or barbarism. For the moment, it seems to me that we are rather well on the road to barbarism.

Despite the current fervor about post-capitalist ideas, a concrete political path to overcome capitalism still does not exist. Stéphane Hessel and Edgar Morin (2011) are on point in affirming that “those who denounce capitalism are unable to articulate any credible alternative to it.” But they are even more on point when they criticize the opposite attitude: “those who consider capitalism immortal resign themselves to it.” If overcoming capitalism seems like an unrealistic political program, the environmental collapse that this system is leading us toward has shown that it is unrealistic for us not to overcome it. Those who prefer “realism,” remembering the sinister dystopias generated by the socialism of the twentieth century, do not notice that this resignation is the open door through which we see new dystopias emerging, more sinister than the ones which we lived or imagined.

Cornered by its environmental unsustainability, the contemporary world finds itself in the contingency of choosing between two unrealistic agendas: the unrealism of self-deception according to which capitalism would have the power to metamorphose—like a caterpillar into a butterfly—into an environmentally sustainable system and the unrealism that consists of affirming the possibility of redefining the position of Homo sapiens in the biosphere, an unprecedented redefinition in which, certainly, there would be no place for societies entrenched in nation-states and subject to the imperative of continuous increase in power, production, and consumption. Given that environmental catastrophe is increasingly inescapable and that the ideas of the new generation are different from that of the old one, it is possible to imagine an “unrealistic” mutation of youth in time to mitigate the ultimate consequences of the current storm. Aware of the ongoing environmental collapse, the global ecological movement is now growing exponentially and requires radical changes in humanity’s relationship with the Earth system. If there is room for hope that the worst will be avoided, it is because hope is born from the certainty that the future of societies is not known in the present and is, therefore, uncertain. More than ever we need to understand the words of Tocqueville and Valéry that open the Introduction to this book, about the unpredictability of history.

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