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Brazilian Agribusiness and the Ongoing Planetary Ecocider

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Abstract The agro-export system of commodities is responsible for one-third of global greenhouse gas (GHG) emissions. Besides being a major source of organism intoxication through the increasing use of pesticides, this system is primarily responsible for the ongoing annihilation of biomass and biodiversity. This article examines Brazil's insertion into this highly globalized system. As the world's largest consumer of pesticides, Brazilian agribusiness has been committing the greatest ecocide against our planet's biosphere since 1970. The ongoing destruction of the biosphere deepens national and international inequalities, accelerates imbalances in the Earth system, and increases climate, water, food, and health insecurity on a global scale. The article proposes four programmatic points for a political agenda capable of confronting the imminent existential threats looming over our societies.

Keywords North-South inequalities. Biodiversity loss. Wildfires. Ecocide. Food insecurity. Pesticides. European Union-Mercosur Agreement.

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1 Introduction

The globalized agro-export system is primarily responsible for the growing anthropogenic interference in the planet's biota. It is, in fact, the main driver of tropical forest destruction, soil erosion and biological impoverishment, pollution and unsustainable use of water resources, desertification, imbalances in hydrological cycles, the poisoning of organisms through the increasing use of pesticides, and the increased risk of new pandemics. It is also the second largest factor, after the burning of fossil fuels, in disrupting the climate system and accelerating global warming. The Emission Database for Global Atmospheric Research (EDGAR) states that "food systems are responsible for a third of global anthropogenic GHG emissions" (Crippa et al. 2021). Francesco Tubiello and his colleagues corroborated these estimates:

> Total GHG emissions from the food system were about 16 CO2eq yr−1 in 2018, or one-third of the global anthropogenic total. Three quarters of these emissions, 13 Gt CO2eq yr−1, were generated either within the farm gate or in pre- and post-production activities, such as manufacturing, transport, processing, and waste disposal. (Tubiello et al. 2021)

The globalized agro-export system and the energy system based on fossil fuel consumption are inseparable (not least because nitrogen fertilizers are produced from petroleum). The list of growing consequences of this system is long: global warming, increased food insecurity,[1] eutrophication and deoxygenation of aquatic environments, illness from exposure to pesticides and aerosols resulting from forest fires and sandstorms in parched soils, and a greater likelihood of zoonoses and epidemics or pandemics (Quammen 2012; Wallace 2020; Pontes 2020; Marques 2020), in addition to systematic violence against human groups attempting to defend their lands from the expansion of the agricultural frontier. The immense weight of the agro-export system in the deterioration of Earth's habitability conditions throughout this century is, therefore, undeniable. Containing this deterioration at levels that do not exceed the possibilities of human adaptation requires discontinuing this system with as much urgency as discontinuing the use and burning of fossil fuels. The contemporary utopia is the survival of our societies

1 According to FAO (2025): "It is now estimated that around 2.3 billion people in the world were in a situation of moderate or severe food insecurity in 2024, 335 million more than in 2019, before the pandemic, and 683 million more than in 2015, when the 2030 Agenda was launched".

throughout this pivotal century, and this utopia has become absolutely dependent on two intimately interdependent conditions: containing global warming and defending millions of species, on which we are existentially dependent, threatened with extinction above all by the globalized agro-export system. More than ever, the question Henri David Thoreau posed to his friend Harrison Gray Blake on the distant 20th of May 1860 is relevant: "What is the use of a fine house if you haven't got a tolerable planet to put it on? – if you cannot tolerate the planet it is on?" (Thoreau 1860, 111).

2 Unequal and Combined Precarization

Within this global process of deteriorating the planet's habitability, inequalities are accentuated as the aforementioned consequences intensify, with disproportionately different responsibilities. Regarding imbalances in the climate system, Jayati Ghosh and Joseph E. Stiglitz report that:

> The richest 10% of individuals account for 77% of the carbon emissions associated with private capital and 47% of consumption-related emissions, while the poorest half contribute just 3% (and 10% of consumption-based (emissions). Climate change also hits the poor hardest: measured relative to their income, the bottom 50% bear about 75% of global climate-driven income losses. (Ghosh, Stiglitz 2026)

Obviously, in economic terms, the richest countries (or the richest of the poor countries) tend to lose more in absolute terms, precisely because they have more wealth to lose. But in relative terms, the economic losses of poor countries (or the poorest of the richest countries) are much greater. As the World Inequality Report 2026 notes:

> While absolute losses are higher in richer households, simply because they earn and own more, the relative impact on income and assets is vastly greater for poorer groups. A single flood, drought, or storm can erase years of accumulated savings, while for the wealthy, such shocks typically represent temporary financial setbacks. (Chancel et al. 2026)

But there is also the other side of the coin. The richest countries, located predominantly in the northern latitudes where the continental landmasses are concentrated, are warming faster than the global average. North America is warming in the twenty-first century (2001-24) at a rate of 0.37°C per decade, that is, almost 50% faster

than the global average (NOAA 2024), and Europe is warming twice as fast as the global average, as shown in Figure 1.

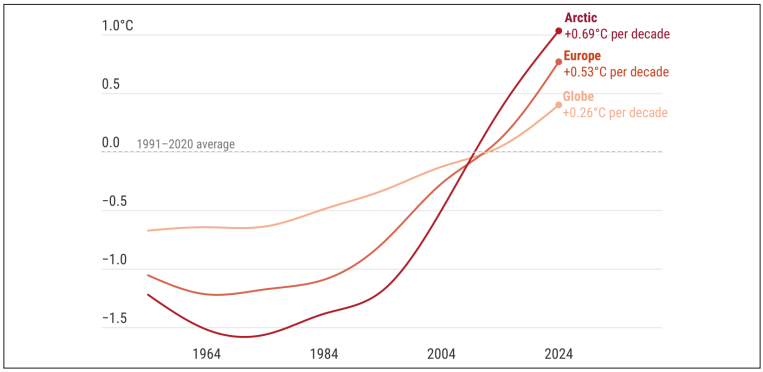

Figure 1 Average global warming in Europe and the Arctic for the period 1991-2020 and warming rates per decade for the period 1995-2024. In each decade during these thirty years, the average global warming rates per decade were +0.26°C (global). In Europe, however, it was +0.53°C and +0.69°C per decade in the Arctic. Source: Copernicus 2025a

In 2024, Europe temperature was 1.47°C above the average for the 1991-2020 reference period, and 2.92°C above the 1850-1900 level (Copernicus 2025b). If the current rate of warming on that continent is maintained per decade (+0.53°C), its population will have to endure the unprecedented impacts of warming of about 3.5°C on average annually by around 2035. The same can be said of North America (+0.37°C/decade between 2001 and 2024), where the increased impacts of current warming – hurricanes, floods, droughts, colossal fires, and heat waves – are already causing unprecedented deaths and suffering. Even though the economic resources of rich countries are considerable, their possibilities for adapting to regional warming are very limited, given the narrow capacity of human organisms to regulate their body heat. Therefore, in this second quarter of the century, the impacts of global warming will be felt more violently in the northern hemisphere than in the southern hemisphere. This is all the more true because European countries are now sacrificing crucial investments in social welfare and climate adaptation in favor of an unprecedented escalation in their military budgets.[2]

2 According to the SIPRI (2025): "Several countries in Central and Western Europe saw unprecedented rises in their military expenditure in 2024. […] Germany's military expenditure increased by 28% to reach $88.5 billion, making it the biggest spender in Central and Western Europe and the fourth biggest in the world. Poland's military spending grew by 31% to $38.0 billion in 2024, representing 4.2% of Poland's GDP".

3 Inequality in the Loss of Socio-Environmental Heritage

On the other hand, it is undeniable that, in terms of losses to socio-environmental heritage, tropical countries are already suffering and will suffer much more than northern countries. Three factors of inequality can be mentioned here. The first is obvious: in absolute terms, tropical countries have much more to lose in terms of biodiversity simply because they concentrate much more biodiversity. Just to give an example of the richness of this biological heritage, "as many tree species can be found in a single hectare of tropical forest as in the entire native Western European tree flora" (Cooper et al. 2024).

The second factor contributing to inequality between North and South, in terms of socio-environmental assets, is caused by the increasing globalization of the agro-export system. In fact, by importing agricultural commodities from tropical countries (especially soybeans, palm oil, beef and timber), rich countries export their species extinction rates to the agricultural exporting countries of the Global South. As pointed out by Alex Wiebe and David Wilcove, "globalization increasingly allows countries to externalize the environmental costs of land use, including biodiversity loss". The authors quantified the loss of wildlife habitat in agricultural commodity-exporting countries caused by imports from 24 wealthy countries that imported these commodities between 2000 and 2015:

> On average, the 24 countries caused 15.2 times greater international biodiversity losses than domestic biodiversity losses over the study period, although there was considerable variation between countries, spanning five orders of magnitude. Outside their borders, the 24 countries together were responsible for an average of 13.3% of the total range loss experienced by any forest-dependent vertebrate species globally during the study period, in addition to the biodiversity loss they each caused domestically. (Wiebe, Wilcove 2025, 390)

Since 1961, the authors further state, the areas of agricultural commodities predominantly destined for export have more than doubled the areas of crops for domestic consumption. In the case of Brazil, since at least the 1970s, the production of agricultural commodities for export has been by far the main driver of environmental destruction, followed by logging, also largely destined for export. In 2022, Josep Borrell, then High Representative of the European Union for Foreign Affairs and Security Policy, stated in a speech at the European Diplomatic Academy in Bruges:

> Yes, Europe is a garden. We have built a garden. Everything works. It is the best combination of political freedom, economic prosperity and social cohesion that the humankind has been able to build – the three things together. […] The rest of the world […] is not exactly a garden. Most of the rest of the world is a jungle, and the jungle could invade the garden. (EEAS 2022)

The metaphor used by Borrell can be read in reverse and more literally. Due to its insatiable demand for commodities from agricultural exporting countries, the European garden is invading and destroying the world's tropical forests, including the largest of them all, the Amazon rainforest.

The third factor contributing to inequality between rich and poor countries, regarding the loss of socio-environmental heritage, is equally quantifiable and has an unequivocal implication for increased socioeconomic inequality. Given that the populations of agricultural exporting countries are poorer and more self-sufficient in terms of food, they will suffer more from the impacts of the combination of declining biodiversity and increased climate risks on their food crops, directly affecting their prices. In 2024, the vast majority of the Brazilian population with family incomes of up to 1.5 minimum wages (R$ 2,280.00 or about 360 euros per month) spent almost a quarter (22.6%) of their family budget on food. This is a worsening trend because, even with the recent increase in the minimum wage above inflation rates, in 2018 food represented 18% of that budget for this majority income group. This is due to food inflation caused, at least in part, by agricultural losses resulting from the intensification of extreme weather events (Almeida, Vista 2025). In Brazil, a huge increase in these extreme weather events has been observed in recent years, with an alternation of floods, droughts and fires, a phenomenon known as Hydroclimate Whiplash. This is not solely, nor primarily, due to global warming, but basically to the destruction of forests, the main regulator of the climate in the South American continent and especially in Brazil.

4 Threats to the Exceptional Richness of Brazilian Biodiversity

The Conservation International classified 17 countries on the planet as biologically megadiverse. A megadiverse country must have at least five thousand endemic species of vertebrates (non-fish) and marine ecosystems. These countries are home to at least 70% of the world's species, as reaffirmed in the Declaration of this Group of 17 Countries, drawn up at COP15 on Biodiversity in 2022 in Canada (LMMC 2022). Brazil leads this list. Figure 2 shows that, of these 17

countries, five are Amazonian (Bolivia would be the sixth megadiverse Amazonian country if it had marine ecosystems).

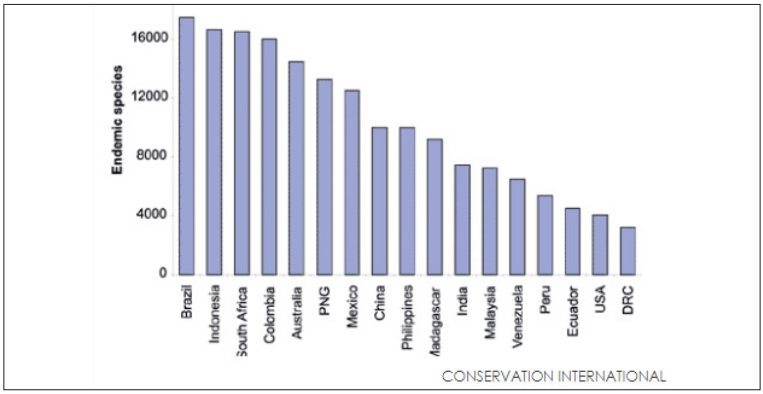

Figure 2 Number of endemic vertebrate species (non-fish) in the 17 megadiverse countries. Source: Purton 2024

Brazil's immense biological diversity goes hand in hand with its exceptional civilizational diversity, because, just to give an example, among the indigenous peoples of the Amazon are found at least 50 of the 125 isolated languages in the world (SPA 2021). But this biological and civilizational richness is increasingly threatened by Brazilian agribusiness and its integration into the international agro-export system. Regarding biological richness, according to the Brazilian Biodiversity Information System (SiBBr), Brazil harbors approximately 15% to 20% of the world's biodiversity. Data from 2023 from the Brazilian Institute of Geography and Statistics (IBGE) estimate the existence of 50,313 known plant species and 125,521 known animal species, totaling 175,564 described species (IBGE 2023). That being said, according to assessments from the Red Lists of endangered species of the Chico Mendes Institute for Biodiversity Conservation (ICMBio) and the Rio de Janeiro Botanical Garden (CNCFlora/JBRJ), the deterioration of biodiversity in Brazil is nothing short of catastrophic. In 2022, CNCFlora/JBRJ assessed 7,524 plant species (6,071 endemic to Brazil). This assessment classified 3,213 plant species as threatened with extinction, with 684 critically endangered. Therefore, approximately 43% of the assessed species of Brazilian flora are threatened with extinction. In total, if we add the animal and plant species assessed by the two institutions (ICMBio and CNCFlora/JBRJ), 4,467 species are threatened with extinction in Brazil, with 1,044 critically endangered.

5 The Expansion of the Agricultural Export Frontier is the Main Driver of Brazil's Destruction

Until 1970, five of the six Brazilian biomes (the Amazon, the Cerrado, the Pantanal, the Caatinga, and the Pampas) were still largely intact. Only the Atlantic Forest had suffered systemic destruction, especially since 1850, but even in this biome, destruction accelerated significantly after 1970. Since the 1970s, with the progressive globalization of the food system, the overwhelming impact of the agricultural export economy in tropical countries has been devastating this socio-environmental heritage at breakneck speed. During the years of the dictatorship (1964-85), especially as a result of the opening of the Trans-Amazonian Highway from 1970 onwards, the Amazon rainforest and the peoples who had inhabited it for millennia were victims of unprecedented ecocide and an attempted genocide, to make way for commodity production for the international market, especially minerals, soybeans, and cattle. The Brazilian military dictatorship was never tried for the documented massacre of more than eight thousand indigenous people, although estimates suggest a much higher number. The National Truth Commission (Comissão da Verdade) on the crimes of the dictatorship, whose work concluded in 2014, warned that the real number of indigenous people killed during the dictatorial period "must be exponentially higher, since only a very restricted portion of the affected indigenous peoples were analyzed and there are cases where the number of deaths is high enough to discourage estimates" (Brasil, Farias 2014). The dictatorship's attempt to perpetrate an indigenous genocide – resumed, moreover, during the years of Jair Bolsonaro's presidential term (2019-22) – was then proudly proclaimed as a sign of progress. In 1976, for example, Maurício Rangel Reis, Minister of the Interior under General Ernesto Geisel, declared: "The Indians cannot impede the passage of progress. […] Within 10 to 20 years there will be no more Indians in Brazil" (MPF 2017).

With the end of the dictatorship in 1985, however, the destruction of the country did not diminish. Data from MapBiomas shows that in the last 40 years alone (1985-2024), Brazil lost, mainly to the expansion of the agricultural frontier, more than 1,117,000 km² of natural areas (an average of more than 28,000 km² per year). This is approximately equivalent to the combined areas of metropolitan France (543,940 km²), Germany (357,022 km²), and Italy (302,073 km²). In those 40 years alone, 702 municipalities in the country ceased to have predominantly native vegetation (MapBiomas 2025). Also according to MapBiomas, between 1985 and 2023, more than 90% of the deforested areas in the Brazilian Amazon were initially used for the opening of pastures for cattle. Here are the numbers for this expansion of pastures. In 1985, at the end of the dictatorship,

they had already replaced 127,000 km² of forests in the Brazilian Amazon. By 2023, they had jumped to 590,000 km², an area larger than the combined areas of metropolitan France (543,940 km²) and Belgium (30,688 km²) (MapBiomas 2024).

6 Forest Destruction by Fire and Loss of Water Surface Area in Brazil

The interaction between deforestation, droughts, fires, and loss of water surface area is well known. On the one hand, fires are the final stage of forest destruction by agribusiness, and on the other hand, droughts and fires increase tree mortality and make remaining tropical forests more vulnerable to new fires, which, in turn, will become even more destructive. As a consequence, Brazil is drying out, the level of many of its rivers is decreasing, and its soils are becoming more arid. As MapBiomas shows, between 1985 and 2024, "all biomes lost water surface area, with the exception of the Atlantic Forest, due to the creation of reservoirs and hydroelectric dams" (MapBiomas 2025). Antonio Donato Nobre explains the direct relationship between deforestation and increased aridity:

> Forests function as the beating heart of the hydrological cycle. Trees transpire vast volumes of water vapor, which rises and rapidly condenses into clouds, aided by hygroscopic cloud-seeds also emitted by the plants. This intense condensation causes an abrupt drop in atmospheric pressure, which creates a powerful, natural suction force that pulls humid air from the oceans deep into continental interiors. (Nobre 2025)

A study on the evolution of 81 river basins in the Cerrado biome between 1985 and 2018 proves that direct impacts by large-scale deforestation oriented to the production of irrigated agricultural commodities have more significantly impacted river flows than climate changes:

> We estimated an average decrease of 8.7% and 6.7% in the streamflow due to deforestation and climate changes, respectively. Most of the observed changes (56.7%) were due to land use and land cover changes and occurred in recent decades. […] By assuming the current deforestation rates, we predicted […] a decrease of 33.9% of the river flows in the study region. It will cause severe streamflow discontinuity in many rivers and strongly affect agricultural, electrical power production, biodiversity, and water supply, especially during dry seasons in that region. (Salmona et al. 2023)

Figure 3 shows the evolution of primary forest losses in Brazil between 2002 and 2024.

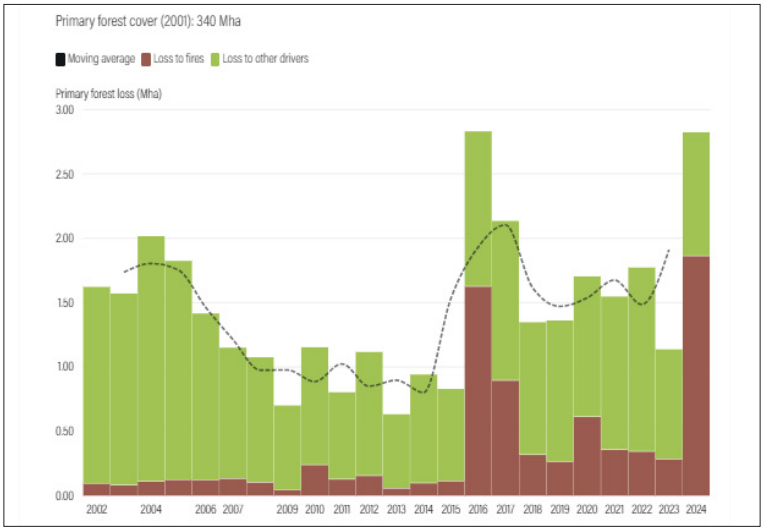

Figure 3 Loss of primary forest cover in Brazil between 2002 and 2024 in millions of hectares (Mha). In each column, the lower segment represents loss due to fire. Source: Weisse, Goldman 2025

In 2024, fire was responsible for 67% of the loss of primary forests in Brazil. In 2023, this loss was 11,400 km² and in 2024, 28,200 km². Thus, in just this two-year period, Brazil lost 39,600 km² of primary forests, an area almost equivalent to that of the Netherlands (41,865 km²). The destruction of these forests and the contribution of fires (99% of which are criminal) to this destruction increased significantly from 2016 onwards. This is due to the dismantling of environmental governance by the advance of the far-right in the executive and legislative branches of the country (Gatti et al. 2023). In 2025, MapBiomas Fogo revealed that 2.06 million km², about 24% of Brazilian territory, burned at least once between 1985 and 2024, and this year, for the first time, forests were the main victims of fires, with a record value of about 77,000 km² of forests affected by fire, or 287% above the historical average for this 40-year period (Alencar et al. 2025). Meanwhile, satellites from the National Institute for Space Research's (INPE) detected a total of almost six million (5,931,368) fire outbreaks in the country between 1998 and 2024 (INPE 2024).

The Pantanal biome is being destroyed by the agro-export system. The world's largest wetland, the Pantanal was classified by the United Nations in 2000 as a World Heritage Patrimony of Humanity (World Heritage) and Biosphere Reserve. In 2020 alone, the fires in this biome, demonstrably criminal in origin, killed at least 17 million

animals. On average, the fire killed more than 217 vertebrates per square kilometer (Tomas, Berlinck, Chiaravalloti et al. 2021). A huge number of photos of charred or severely injured animals visually document one of the greatest ecocide crimes in the entire history of Brazil. The particulate matter released by the burning of biomass has also been a significant cause of death and illness in human and non-human organisms, even in regions far from the fire outbreaks.

7 The Increased Use of Pesticides

Another key factor in biodiversity loss, death, and illness of organisms is the increasing use of pesticides by agribusiness. According to the FAO, pesticide consumption in Brazil more than quintupled between 2000 and 2021. In 2000, Brazil consumed 141,130 metric tonnes (t) of pesticides, placing it as the third largest consumer of pesticides in the world, well behind the consumption of the United States (430,005 t) and China (250,632 t). In 2021, Brazil became the world's largest consumer of pesticides, with a consumption of 719,507 metric tonnes. In 2021, Brazil's population represented about 2.5% of the world's population, but its pesticide consumption represented about 20% of global poison consumption (3,535,375 t). This consumption is greater than the combined consumption of pesticides in Europe (505,157 t) and Africa (203,580 t) (FAO 2023, 136). Figure 4 shows that from 2017 onwards, the release of new pesticides took a leap in scale from 2016 and has since increased steadily, with the sole exception of 2023, reaching 725 new products in 2025.

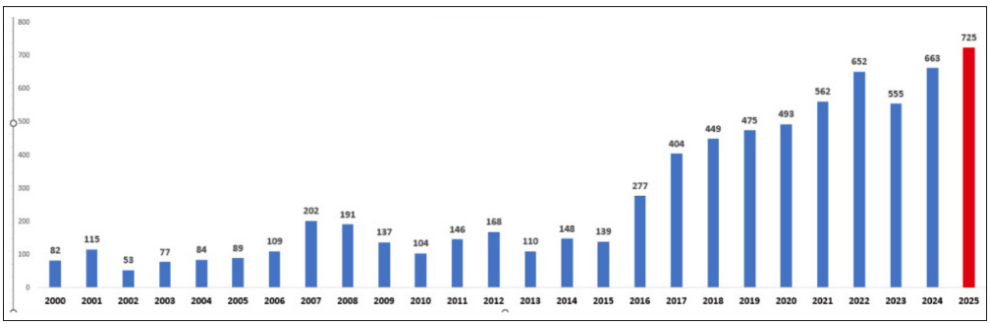

Figure 4 Pesticides released annually in Brazil between 2000 and 2025 (in the latter year with data from February to December 2). Source: Fernandes 2025

8 Deforestation and Increased Health Insecurity

The inequality between North and South is also evident from another angle of analysis. By imposing a drastic reduction in global greenhouse gas (GHG) emissions, the Covid-19 pandemic offered the last opportunity to contain average global warming to 1.5° C above the pre-industrial period. However, from 2023 onwards, these emissions have exceeded pre-pandemic levels. Not only have we lost this last chance, but global warming and the destruction of nature caused by the expansive functioning of the globalized agro-export economy raise fears of a veritable epidemic of anthropogenic epidemics or pandemics, including yellow fever, Zika, dengue fever, and Chikungunya. The resurgence of these epidemics is, in fact, anthropogenic, since global warming and the globalization of the economy favor the reproduction and geographic expansion of zoonotic vectors, among which are insects of the genus *Aedes*: "at temperatures above 30°C, for example, females lay three times more eggs than at 20°C. Furthermore, the larvae hatch in half the time when the temperature rises from 20°C to 30°C" (Lopes 2024). Another factor, besides climate, is the destruction of forests. "There is a single species that is responsible for the COVID-19 pandemic – us", warn Josef Settele and colleagues (2020), and continue:

> Rampant deforestation, uncontrolled expansion of agriculture, intensive farming, mining and infrastructure development, as well as the exploitation of wild species have created a 'perfect storm' for the spillover of diseases from wildlife to people. (…) Future pandemics are likely to happen more frequently, spread more quickly, have greater economic impact and kill more people if we are not extremely careful about the possible impacts of the choices we make today. (Settele, Díaz, Brondizio, Daszak 2020)

9 Conclusion

Luciana Gatti and colleagues show that the Amazon rainforest is no longer a carbon sink through photosynthesis, but has become a source of CO_2, indicating that the mortality rate of its trees has exceeded its growth and regeneration rate. The rate of carbon release by the Amazon rainforest in its Brazilian portion more than doubled in the years 2019-20 compared to the period 2010-18 (Gatti et al. 2023). After half a century of destruction, the machinery of disaster is accelerating and will have catastrophic impacts not only on Brazil, but on the habitability conditions of the planet as a whole.

Historically, that is, since 1850, Brazil has been the fourth largest emitter of carbon dioxide, mainly due to the almost complete

destruction of the Atlantic Forest, which originally covered 1,300,000 km², and, since 1970, in other Brazilian biomes (Evans 2021). But, regarding the impoverishment of the planet's biota, Brazil occupies an unrivaled position. It is necessary to bear in mind a central fact in the history of this country, not always properly evaluated. In all of human history, no society in any country or region of the planet has destroyed so much nature in such a short time as the machinery of the Brazilian agro-export economy in the last 55 years (1970-2025). And it is important to note here an aggravating factor. It is not just about the colossal magnitude and lightning speed of the destruction, but about a process of devastation concentrated in a historical period in which the concept of ecocide had already spread internationally and when science had already been loudly warning about the catastrophic consequences of the destruction and degradation of the planet's forests.

But this unprecedented crime of ecocide must be understood within a broader context, namely Brazil's insertion into the global market for agricultural commodities, in which importing countries participate, including the United States, China, the countries of the Middle East, and Europe. Viewed through this wide-angle lens, supply and demand complement each other in the ongoing process of the sixth mass extinction of species. The imminent approval of the European Union-Mercosur Agreement will only accelerate the destruction of what remains of the biosphere. And in this sense, Europe, which exports pesticides to Brazil that it prohibits in its own territory and which sustains the financial machinery of destruction, is a direct accomplice to the crime of ecocide and the growing existential threat to the forest peoples of South America. It is necessary to return for a moment to the aforementioned metaphor of the "garden-jungle" antinomy evoked by Borrell in 2022. The most salient aspect of Western civilization in this third decade of the twenty-first century is its absolute lack of sense of guilt regarding the malignancy of its actions on the non-European world. In individuals, the absence of a guilty conscience is one of the typical traits of a psychopath. In a civilization, it reveals astonishing levels of narcissism and lack of empathy.

That being said, given the global emergency, it would be even more disastrous to waste time on accusations. The current political agenda is absolutely global and requires, above all, a united front in the face of imminent existential danger. This united front can be based, in my view, on four programmatic points:

a. Democracy, understood as participatory popular sovereignty and as effective control of rulers by the ruled, has the power to overcome the corporate and financial oligarchies that control the destinies of our societies. Politics and the deepening of democracy constitute the only valid and possible negation of injustice, anomie, and war;

b. Societies have the capacity to understand their own challenges, however complex they may be, and this understanding is a fundamental step in the process of addressing them. Rational collective decisions can prevail over the aggressive impulses of our species;
c. The social question and the ecological question are inseparable. In the twenty-first century, they have become one and the same issue. In other words, every social problem can only be considered solved if it results, *at the same time*, in a decrease in the anthropogenic impact on the Earth system and in a decrease in inequalities between humans and between them and other species;
d. Solving problems of the magnitude of those that confront us today implies abandoning gradualism and accepting the challenge of undertaking a civilizational rupture, with its high and inevitable risks, given the inherently conflictual nature of the historical process. These ruptures, however, will only be possible and effective if they are political, that is, without the intervention of the military, a primitive and parasitic sector of society that can and must become extinct in the course of this civilizational mutation.

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