

Capitalizing on Green Debt¹

A World-Ecology Analysis of Green Bonds in the Brazilian Forestry Sector

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Abstract

Green bonds represent an increasingly popular way to match “environmental sustainability,” growth, and the aspirations of global financial capital. In this article, we leverage a world-ecology approach to unpack and make sense of green bonds as public/private constructions that shape and subordinate the complex ecologies of territories to the needs of finance and reproduce the global patterns of uneven development and capitalist accumulation. Through the study of recent green bond issuances realized by private companies active in the forestry sector in Brazil, we discuss how green bonds as a “new” form of “green” debt put nature at work and transform the territories and natural elements in the global south into “temporal and spatial fixes” for the needs of global financial capital.

Keywords: Green Economy, Green Bonds, Financialization of Nature, Forestry Industry, World-Ecology

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The 2008 financial crisis opened the doors of green capitalism as a financially sound approach to saving the planet from the worst effects of the climate emergency. Several years later, the idea of “financing green growth” has permeated mainstream political, academic, and business approaches to climate change adaptation and mitigation. This trend assumes multiple forms: the carbon market promoted in the Paris Agreement; international declarations that combines private finance, development and the green transition (from the 2002 Monterrey Consensus to the 2020 EU Green Deal), the Environmental, Social, and Governance taxonomy for “green” investments recently proposed by the European Commission (EU 2020); and the proliferation of sustainable labels and commitments released by corporations active in any sector of the economy, from mining to food, among others.

All these mechanisms share the recognition of the urgency and inevitability of saving the planet from decades of “human development,”² but in the context of continuous growth and economic expansion (Escobar 1994). They internalize (some of) the critiques to the past decades of capitalist expansion and promote solutions that are fully embedded in the capitalist framework. Of all the ways in which finance aspires to contribute to climate change adaptation and mitigation, green bonds are currently considered one of the most prominent (Park 2018). Green bonds are debt instruments whose proceeds are earmarked to fund projects with supposedly climate and/or environmental benefit,³ and increasingly occupy a central place in the green economy narrative and political framework. Governments, cities, corporations, certifiers, institutional investors, international financial institutions, and banks alike point to the potential of green bonds as a means to foster investment in sustainable activities (CBI 2020b). At the same time that these actors promote the expansion of green bonds as an opportunity to raise funds for sustainable investments, they also highlight the possibility for investors of accessing a future flow of sound financial returns. This is particularly evident in the current phase of Covid-19 worldwide ecological/disaster capitalism, where green bonds are one of the pillars of the worldwide attempt to promote a green and expansionist recovery.⁴

The “green bonds boom” has not gone unnoticed in academic and policy-oriented writing. However, mainstream approaches towards green bonds have been predominantly laudatory, emphasizing the potential of this financial instrument to channel investments toward “green projects” and to contribute to the capital mobilization necessary to fund the transition to a “sustainable economy” (Flammer 2018; Sachs et al. 2019; Weber and Saravade 2019). Some

² It is worth noticing that most of the accounts around green finance adopt an anthropocentric and mechanized perspective towards climate change as a matter of ‘humans’ emitting greenhouse gases and of carbon dioxide particles in the atmosphere. As we discuss in the second part of this paper, what is totally missing are accounts of ‘capitalocene’ as an era that is the product of uneven and differentiated contributions and of capitalism as inherently ecological (Moore 2015a; 2015b).

³ This broad definition seems to be adopted by most of practitioners and academics that work with the topic. For example, see the definition of Jones et al. (2020).

⁴ A good example of this reasoning is on a recent publication by the United Nations Environment Program (2021) in partnership with the World Economic Forum. See especially the overview of financial instruments presented in the report on page 35.

contributions do point to the need for improvements, while still defending the potential of green bonds. In this sense, Paraque and Revelli (2019) argue that in order to re-embed finance, green bonds must be part of a broader social project of collective governance; and Tolliver, Keeley, and Managi (2019) argue for the broadening of the criteria spectrum so that it is possible to identify the role of green bonds in advancing to compliance with the Sustainable Development Goals and National Determined Contributions (NDCs). Nonetheless, by adopting such functionalist perspectives, scholarship on green bonds has often naturalized them as an eminently technical solution to reconcile economic growth and sustainability, losing sight of the crucial questions of value creation and the inherently political nature of capitalism (Jessop 2004).

A more critical literature is, however, emerging. For instance, Bigger and Millington (2019) assess municipal green bonds in financing urban adaptation processes in contexts of austerity, pointing that they are largely associated with the re-inscription of existing inequalities as well as with the intensification of risk born by poor people of color. Also dealing with municipal green bonds, Hilbrandt and Grubbauer (2020) investigate the “background work” required in order to globalize green bonds markets, a process related to the financialization of Southern cities. Jones and their colleagues (2020) offer a multidisciplinary review of these and other contributions, questioning the premise and implications of treating our ecological deficit with debt and pointing to some concerns that should accompany the assessment of green bonds.

Sparse references to green bonds can also be found in the broader literature on green finance (Antal and Van der Bergh 2016; Zhang, Zhang, and Managi 2019; Reyes 2020), and in some critical accounts on the financialization of nature (Jessop 2012; Aglietta et al. 2015; Bracking 2019).

What is still missing is the production of a comprehensive understanding of the significance of this relatively new financial phenomenon within the broader picture of the capitalist political economy and the expansion of its ecological frontier through space and time (Harvey 1982, 2001a, 2001b, 2003). In reaction to this gap, the present article leverages a world-ecology approach (Moore 2003, 2011, 2014a, 2014b, 2015a, 2015b) to unpack and make sense of green bonds as part of the ideological and material construction of “global green capitalism” and an active component of the way in which states and capital co-participate in value creation, circulation, and accumulation and in the overall reproduction of capital (Jessop 2002).

One of the tenets of the world-ecology approach developed by Moore and others is that capitalism should be grasped as the “dialectical unity” of “the accumulation of capital, the pursuit of power, and the co-production of nature” (Moore 2015a: 3). In a simpler form, capitalism represents a “specific configuration of wealth, power, and nature” that is both path dependent and contextually defined (Moore 2014a: 290). Wealth, power, and nature are not “independent boxes,” Moore suggests, but three “mutually relational moments in the cumulative and cyclical development of the modern world-system” that “interpenetrate each other in the making of historical capitalism—and in its unraveling today” (Moore 2014a: 290).

This “interpretative frame” (Moore 2015a: 48) is often deployed—following the structuralist tradition—to analyze empirical and historical phenomena on a large scale, both temporally (the

longue durée) and geographically (the world-system). Moore's (2015b) own deployment of this approach to the food and agricultural framework and his reflection on capitalism's continuous need to produce, locate, and occupy cheap natures external to what has already been commodified are particularly illustrative. In this article, we mobilize this approach to interpret a much more circumscribed phenomenon both in historical and spatial terms—that of green bonds in the forestry sector in Brazil. For that purpose, we take Moore's conception of capitalism as world-ecology integrated by "three moments" of wealth, power, and nature as a *heuristic model* (Wacquant 1985) to make sense of the "micro cosmos" of green bonds.⁵ In resorting to these "moments" as heuristic tools, the article positions green bonds within both political economy and world-ecology, and seeks to use empirical studies of grassroots struggles to interpret how green debt enables capital accumulation, how nature is co-produced in this process and what new power relations are shaped by the issuance of green bonds.⁶

In Section 1, we provide a brief introduction to green bonds as one of the trendiest financial topics of the moment. Our aim is to describe the promises around green bonds and the trends in the issuance of these debt instruments, both in the global north and south, with a specific focus on the case of Brazil. This overview allows us to better understand how this financial instrument territorializes into material activities and provides a summary of the political and economic reasons behind the recent success of green bonds to finance the Brazilian forestry sector. In Section 2, we present the concrete case of "private" green bonds in the Brazilian forestry sector to show how capital accumulation is inextricably associated with the co-production of nature in ways that are functional to the logic of financial capital but socially and environmentally contentious. Debt generated through green bonds in the forestry sector, we argue, is not "purely" financial, but social and ecological. In Section 3, we enter into the details of the state-capital nexus behind private green bonds (Jessop 2002; Van Apeldoorn, de Graaff, and Overbeek 2012) and explain how, for accumulation to take place on such terms, green bonds in the forestry sector demand an institutional arrangement that combines state support and private governance to uphold their financial, social, and ecological dimensions. We conclude the article by reassembling these findings as part of the capitalist world-ecology dialectical unity of capital accumulation, the co-production of nature, and power. Although not universal, we suggest that the case of green bonds in the forestry sector in Brazil, as a novel financial and ecological phenomenon, sheds light on the

⁵ According to Wacquant, a heuristic model "provides a notional ensemble, a perspective that permits an ordered perception of the empirical world; it is a directing scheme for theory construction and further investigations" (Wacquant 1985: 19). In defining our deployment of the world-ecology approach as a heuristic model, we do not suggest that it is not a "theoretical venture." Rather, we only seek to avoid the methodological pitfall of directly applying a theoretical approach that operates on a large scale to a highly circumscribed empirical phenomenon both in historical and geographical terms. This connection, in our view, must be mediated, and the idea of a "heuristic model" can be useful for that purpose.

⁶ In so doing, we further move the quest posed by O'Neill when indicating that "research could usefully integrate the macro-theoretical framework of world-ecology and the Capitalocene with more focused and empirical studies of grassroots struggle" (O'Neill 2020: 338).

puzzle of capitalism in the web of life and the analysis of the new frontiers of planned misery (Marks 2011).

1. Green Bonds: Origins and Trends, North and South

From a legal standpoint, green bonds are no different from regular bonds (“plain vanilla,” in the financial jargon). They are fixed income instruments that represent a loan made by an investor to a borrower with the promise of the latter to repay the sum received (principal) to the bond owner (creditor) along with an extra sum of money that can be variable or fixed (coupon or interest). The practical difference between vanilla and green bonds lays in the commitment by the issuer (debtor) to use an amount equal to the funds received to finance specific “green” projects, or achieve “green” goals that are defined and/or accepted by the parties as green, but not necessarily pre-defined as such in the debt agreement.

The definition of an activity as “green” is crucial to the existence of the “green bonds” and inherently controversial. Although different guidelines are being developed (IFC and CBI 2018), labeling and the selection of eligible green projects are only produced by public entities exceptionally. With some (non-binding) exceptions, such as the 2016 Green Bond Catalogue regulating corporate bonds issued by the Chinese Planning Ministry and the recent EU Green Bonds taxonomy, the identification of green investments and green projects is mostly performed by the parties involved in the issuance of the bonds or following standards produced by third private parties. The latter provide a central role in the green bonds infrastructure as they offer a standardized and universal definition of “green” that is supposed to be easily accessible by debtors, creditors, and the broader financial market.

In order to legitimize the labelling of a bond as green, issuers may also seek to obtain an accreditation by private external verifiers that assure the bond’s compliance with a particular standard. That is often done through a Second Party Opinion consisting in an independent review of the bond from a specialized consulting firm that is not involved in the issuance of the standards but only in assessing the bond’s framework and its conformity with a particular standard.⁷ Alternatively, the “green certification” can also be obtained through a certification scheme that involves a standard-setting entity assessing the compliance of the bonds with its own standards, authorizing the use of their label, and monitoring post-issuance compliance (Park 2018).

Among the standards that have become more prominent at the global level two are the most diffused, both of which were created and are managed by private entities. The first one is the Green Bond Principles (GBP), a set of procedural standards created by the International Capital Market Association (ICMA). This is an organization whose members are active agents in the capital markets, such as banks, securities houses, central banks, asset managers, and law firms, among others.⁸ According to the GBP, bonds may be considered green if the issuers comply to certain

⁷ This is the most common way of assessing the “greenness” of green bonds, comprising 60 percent of issuances according to the CBI (2020a).

⁸ ICMA’s institutional website is available at <https://www.icmagroup.org>.

transparency criteria, describing (1) their use of proceeds, (2) the process for project evaluation, (3) the management of proceeds, and (4) publicly reporting the use of proceeds.

The other influential set of standards is the Climate Bond Standard and Certification Scheme (CBS), governed by the Climate Bonds Initiative (CBI), “an investor-focused not-for-profit” that works “to mobilize the largest capital market of all, the \$100 trillion bond market, for climate change solutions.”⁹ Rather than generic standards, CBS offers a set of comprehensive substantive standards for different areas of the economy (from agriculture to housing), expressly providing metrics and details for what it considers as “green” assets and activities that can thus be funded through a bond and then be classified as green.

Although a recent phenomenon, green bonds have already gained global relevance and morphed into one of the most attractive financial instruments for the “green transition.” The first green bonds were issued by multilateral banks—first the European Investment Bank in 2007, shortly followed by the World Bank in 2008 (World Bank 2017). Since then, the market for green bonds has experienced a significant boom, with the diversification of issuers represented by the entrance of private corporate entities (Flammer 2020), countries, and sub-national entities (i.e., cities and regions). In addition, green bonds are part of the financial backbone for the post-Covid-19 relaunch of the global economy, with 30 percent of the European Union Next Generation EU recovery plan being funded by the issuance of green debt, as a recent presentation by Commissioner Hahn made clear.¹⁰

In 2020, the global green bond market reached \$290.1 billion (up from \$258.9 billion in 2019) (CBI 2021).¹¹ The main destinations of the funding obtained through green bonds have been investments in clean energy (35 percent), “carbon buildings” (26 percent), low carbon transportation (23 percent), and sustainable management of water resources (6 percent).¹²

The global north plays a central role in promoting green bonds as a win-win-win product for issuers, investors, and the planet; thus attracting capital with the promise of green debt as a financially and environmentally sustainable form of rent seeking. With the exception of China (one of the leaders in issuance and purchase of bonds with a green connotation), almost all of the green debt is issued and traded in the global north,¹³ with the Luxembourg stock exchange and the city of London representing the main hubs and competing for the world leadership in this new market. The centrality of the global north in the green bonds issuance market is no coincidence, as it reflects and reproduces the North-South hierarchical character of the global financial system and the

⁹ Definition available at the CBI institutional website: <https://www.climatebonds.net/about>.

¹⁰ Presentation available at: https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_21_1743.

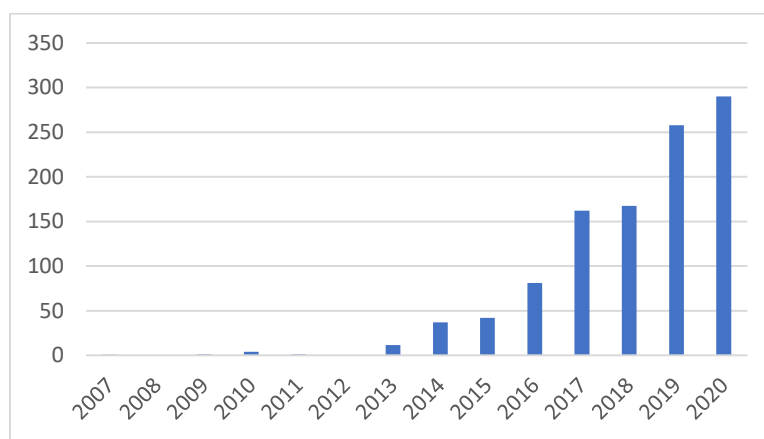
¹¹ The numbers reflect CBI’s own criteria, as a labelled green bond may not be included in their listing if it is not compatible with CBS’s Sector Eligibility Criteria (see <https://www.climatebonds.net/2020/01/market-blog-38-230120-2019-annual-gbs-record-usd255bn-strong-em-issuance-banco-pichincha>).

¹² The data is available in CBI’s database: <https://data-platform.climatebonds.net>.

¹³ According to CBI, the 10 countries that mostly issued green bonds in 2019 were: the United States, China, France, Germany, Netherlands, Sweden, Japan, Italy, Canada, and Spain (see <https://www.climatebonds.net/2020/01/record-2019-gb-issuance-255bn-eu-largest-market-us-china-france-lead-top-20-national>)

dominance of northern financial hubs (Pistor 2013). This is reflected in the cost of issuing a financial product, that like other debt products depends on the combination between the prestige of the issuer, its credit scoring, the legal protection that the jurisdiction provides to the creditor in case of default of the borrower, the prestige of the financial centers where the bonds are issued, and the strength of the currency in which debt is denominated. All these components, that clearly favor the issuance of debt in the north and in U.S. dollars or euros, operate as the oiled machine that guarantees efficiency and visibility while reproducing the historical dynamics of financial and epistemic superiority.¹⁴

Graph 1: Global Volume of Green Bonds Emissions in Billions (USD) (2007-2020)



Source: data from KPMG (2015) and annual CBI reports¹⁵

However, only part of the green projects that are financed with these bonds is actually realized in the north. Corporate and public actors in the south are thus accessing these markets to raise funds that are used to finance activities and projects that are located elsewhere, and then use the revenues generated locally to remunerate investors operating in other places. For public and private issuers located in the global south, it is not enough to leverage “green” narratives to increase their debt and obligations vis-à-vis global capital. They have to reproduce the symbolism and hierarchies of a multi-tiered world where predictability and low risk belong elsewhere and come at a price.¹⁶

At the same time, it is noteworthy that the global south represents the new frontier that “must be opened”, its “free gifts” identified and mapped, secured, and appropriated” (Moore 2015b:

¹⁴ In 2019, more than 70 percent of total monetary value linked to green bonds issuance was in euros and dollars (CBI 2020a: 10).

¹⁵ From 2007-2011, the data were taken from KPMG (2015), from 2012-2019, the data was taken from the annual reports of CBI (see the repository at <https://www.climatebonds.net/resources/reports>).

¹⁶ As the enthusiastic literature about green bonds argues “[a] key challenge for growing green bonds is enhancing local market access for an emerging class of global green investors” (OECD 2017).

14), and green bonds act as a doorway to their financialization and the global circulation of appropriated nature as a high-value market product. After all, the issuance of green bonds connected to projects in territories in the global south certainly imply that these specific geographic spaces will have to produce value through these projects to repay whoever financed them (in an empirical example of what Harvey calls a “spatial fix” [Harvey 1982, 2001a, 2001b] as we will argue in the next section). It is not by coincidence that the global south has been witnessing a trend of expansion in terms of green bonds issuance and project financing. In 2020, Latin American entities (public and private) issued the equivalence of \$7.9 billion (65 percent growth compared to 2019, which was already 216 percent more than 2018), while African actors issued the equivalence of \$1.2 billion (the strongest year yet, overcoming 2019 which had already seen a 495 percent growth compared to 2018)¹⁷: private and public actors alike are using green bonds to attract international capital and, with that, they are contributing to the proliferation of green projects and green activities taking place on the ground.

Brazil represents an illustrative example of the expansion of the frontiers of financial capitalism through the issuance and purchase of green debt linked with territories in the global south.¹⁸ Feeding the narratives around the country’s natural resources (Borges 2019), lobbying actors are pressing the government to promote the expansion and institutionalization of the market for green bonds, a process that has been intensified in parallel with the wrecking of the environmental institutional apparatus being promoted by the ultra-liberal and authoritarian Bolsonaro government (Prol et al 2020).

Since the first issuance in 2015, the Brazilian green bond market has experienced an exponential growth (with a slight break in 2018), significantly contributing to the overall expansion of this market in Latin America (CBI 2020a). Between 2015 and September 2020, Brazil had seen 40 green bond issuances associated with projects developed within the country’s territory. Although most bonds have been issued with regards to the renewable energy sector, the financial value of the emissions (i.e., absolute amount rather than number of bonds) indicates that it is the forestry sector to occupy a central space in attracting capital into green projects.

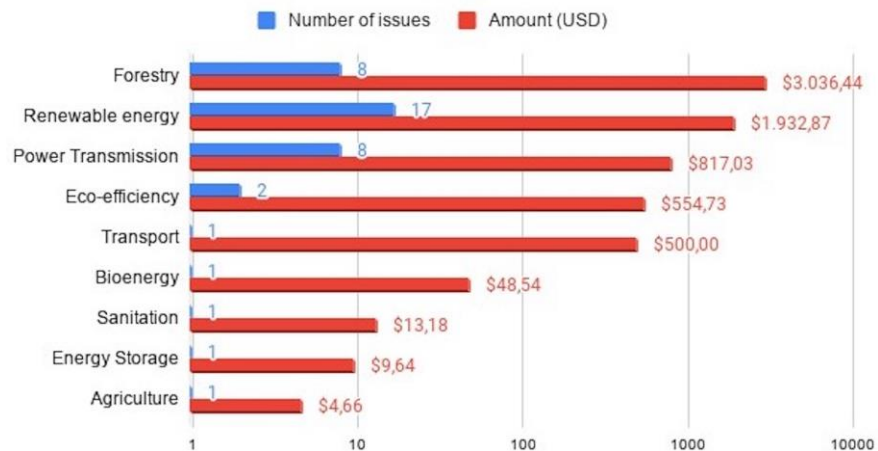
In this sense, Brazil differs from the pattern observed in the global market, where the majority of capital raised through green debt goes to energy, construction, and transport. In Brazil, the geographical and political context are such that it is the forestry sector (i.e. the use of large tracts of land for production of paper and biomass, or for conservation) to be at the forefront. This fact should not come as a surprise if we consider that the Brazilian forestry sector—an extractive industry that is globally integrated and feeds the world with wooden products—is one of the pillars

¹⁷ The data is available on CBI’s latest report (2021).

¹⁸ It is interesting to notice that not all green bonds that finance projects in the global south are issued in the South. In some cases, the place of issuance is a financial hotspot in the North (London, Luxembourg) or a fiscal heaven like the Cayman Islands. The place of issuance is often associated with the currency that is chosen. The geography of the bond and the selected currency are thus closely linked with the process of production, distribution and accumulation of value. See Table 1 below for more details.

of the Brazilian economy, currently representing 6.9 percent of the country's gross domestic product (IBA 2019).

Graph 2: Number and Volume (USD) of Issuances of Green Bonds in Brazil, by Sector



Source: elaborated by the authors based on Sitawi's online database (2020)¹⁹

In Brazil, therefore, green bonds have been largely used to foster, among other projects, the financing of a global supply chain that is deeply embedded in past and present dynamics around land and territories, making this sector an ideal place to analyze how states, financial capitalism, and nature are intertwined in the creation of value and expansionist reproduction of capitalism. To better understand how accumulation takes place through green bonds, however, we must look at it on the ground. For that purpose, the case of the forestry sector offers a fruitful entry point.

2. Green Bonds Hit the Ground in the Brazilian Forestry Sector: Global Finance, New Frontiers and More Subordination of Nature

Of the eight significant issuances of green bonds in the Brazilian forestry sector up to 2020,²⁰ the almost totality was realized by large multinational companies that are actively present on the global market for paper and pulp (see Table 1). Among these, Suzano Pulp and Paper, Fibria, and Klabin play a central role in both the financial arenas and in the international market for forest-related commodities. In particular, Suzano Pulp and Paper and Fibria merged in 2018 and created Suzano, the world's leading producer of eucalyptus pulp and one of the largest Latin American paper

¹⁹ Sitawi's database lists "sustainable credit operations in Brazil" comprising green bonds, but also other forms of "sustainable" financial instruments. We only considered green bonds specifically labelled as such and only after verifying them online (cutoff date: 30/09/2020).

²⁰ One being the reopening in January 2020 of a bond originally issued in March 2019 by Klabin.

manufacturers with sales to over 80 countries and shares listed both on the São Paulo Stock Exchange and on the New York Stock Exchange (Suzano 2019).

Table 1: Green bonds emissions in the Brazilian forestry sector

Issuer	Date of emission	Place of emission	Value
Suzano P&P	July/2016	International	US\$500 m
Suzano P&P	November/2016	Brazil	R\$1 bn
Fibria	January/2017	Cayman Islands	US\$700 mi
Klabin	September/2017	Luxemburg	US\$500 mi
Klabin	March/2019	Singapore	US\$500 mi + 200 mi (Jan/2020)
Celulose Irani	July/2019	Brazil	R\$505 mi
The Forest Company	September/2019	Brazil	R\$39.4 mi

Source: elaborated by the authors based on Sitawi's online database (2020)

The prominence of the forestry sector in the Brazilian green bond market cannot be fully grasped without understanding the role that the Brazilian territory plays in that global extractive industry, nor without a focus on the great efforts deployed by both the public authority and the private sector in constructing an image of forestry as a key player in the emergent “bioeconomy.”²¹ In that regard, the expansion in Brazil is part of a broader growth of the global forestry sector between 1990 and 2010 that was driven by a combination between state policies and corporate interest, and fueled by an increasing global demand in biomass and paper products. The consequence was an expansion of the “plantations frontier” in the global south and the creation of an international division of labor within forestry capitalism (Kröger 2014) between spaces of dispossession and spaces of accumulation. In this context, Brazil features as a commodity exporter (Kröger 2008) and its territory as a space of dispossession.

Kröger (2013) describes how the accumulation of biophysical limits that this industry faced in the global north, what Moore (2015b) would call “negative value,” were overcome by its expansion towards the global south, marking a new cycle of accumulation by dispossession and provoking socio-ecological transformations. Characterized by large-scale dispossessions of land and a high level of concentration in few hands, the texture of the Brazilian agrarian political economy attracted forestry with the possibility of cheap and easy appropriation of land, these factors being “key explainers of where expansion takes place” (Kröger 2014: 246).

²¹ The European Commission (2012) defines the bioeconomy as “the production of renewable biological resources and the conversion of these resources and waste streams into value added products, such as food, feed, bio-based products and bioenergy.” The idea of “bioeconomy” is thus closely connected with the notion of de-coupling, that is with the idea that it possible to establish a competitive and expanding capitalist economy that is respectful of the planetary limits. In this framework, forests are constructed as never-ending sources of biomass that can be grown and burned for the generation of “renewable” energy and the production of commodities like paper and pulp.

The expansion in the global south can be read through Harvey's renowned concept of "spatial-fix" as the attempt by capital to overcome its inherent limits by looking for other territories to convert into its rationalized and value producing narrative (Harvey 1982, 2001, 2001b). However, the contemporary expansion of forestry capitalism must also be read through the historical lenses of colonial capitalism. Brazil is not only one of the leading countries in terms of forestry production (e.g., pulp and paper, charcoal, pellets), it is the world leader in production turnover time in eucalyptus (i.e., the time needed for growing trees before they can be cut) (Perpetua, Kröger, and Thomaz Jr. 2017). Interestingly, high productivity in this sector is explained by the historical expansion of plantations as the main form of integrating land into the global colonial system, in the multiple shifts in legislation that accepted plantations as forms of forest regeneration that fulfils the productive needs of capital, and the acceptance of the intense use of pesticides in order to favor global competitiveness to the detriment of the regenerative capacity of nature.

However, green bonds as a form of green debt can also be described as a "temporal fix," as a long-term investment in fixed, immobile capital to facilitate the mobility of other capitals and the generation of a guaranteed future return on the present investment (Harvey 1982, 2003). Through green debt and long-term obligations to repay, global capital is "buying time" by absorbing ongoing surplus capital and increasing future productivity, profitability, and the promise of environmental restoration based on flexible and ill constantly changed environmental legislation. As already described, the issuance of a green debt means that the proceeds from those issuances, for example, the money raised from creditors, must be invested in activities and projects with a green objective.

The analysis of the reports on the use of proceeds raised with green bonds in the forestry sector shows that more than 90 percent of the funds raised were committed to implement forms of "sustainable management of forests,"²² in other words, the maintenance and enlargement of the areas certified with forestry certifications and the purchase of certified wood to be transformed into a final product to place on the market.²³ Millions of hectares in the global south provide a spatial and temporal fix for global capital in search for green investments and green projects while public and private actors permanently transform the underlying ecological interactions and put "nature at work."

Figures are impressive. Tree plantations associated with the forestry supply chain currently account for over 7.83 million hectares within the Brazilian territory, mainly constituted of pine and eucalyptus. In this context, the role of green bonds goes beyond the material financing of forestry projects. As instruments at the crossroad between finance, planted forests, and imaginary sustainability, they are functional to reproducing public discourses around forests and the green

²² The Use of Proceeds Reports were retrieved from the issuing companies' webpages.

²³ Certifications are non-governmental regimes that aim to solve collective problems regarding the forestry resources through a governance structure that involves different stakeholders (Ahrens and Oliveira 2017). They form an arena for political confrontation (analyzing the Forest Stewardship Council, see Voivodic and Beduschi Filho 2011).

transition that are promoted with public policies and embraced by private actors. For example, in 2018 the Minister of Agriculture launched the Brazilian “National Plan for the Development of Planted Forests”²⁴ with the aim to increase the total planted area to 2 million hectares by 2030.²⁵ In the Plan, the forestry sector is considered an economic activity “based on sustainable grounds” and “highly committed to environmental preservation” (MAPA 2018: 5). In this context, forest plantation and the forestry sector are praised as key components in the Brazilian National Policy on Climate Change as well as in the country’s compliance to its Nationally Determined Contributions (NDC) submitted to the first monitoring period of the Paris Agreement (2015-2020).

The private sector is moving in the same direction. The Brazilian Tree Industry (IBA), an association responsible for the institutional representation of the forestry sector in Brazil, has had a leading role in actively promoting the sector’s qualities, especially its sustainable attributes. In its 2019 institutional report, it was highlighted that among IBA’s associates, for every planted hectare for industrial aims, another 0.7 hectare was dedicated to conservation (IBA 2019). IBA also stated that the sector “is one of the most apt to strengthen Brazil’s goals in the Paris Agreement” (IBA 2019: 5), and has highlighted the sector as a key player in the bioeconomy.

For Kröger (2014), this sustainability potential of the sector is often overestimated in order to build the desired symbolic capital, especially in regard to tree plantations as “carbon sinks” (an attribute particularly emphasized in green bond emissions), whose effectiveness is subject to great debate (Kröger 2016). In this context, when capital raised through green debt fuels the large-scale implementation of “sustainable management of forests,” green bonds end up contributing to the legitimation of the tree industry as a strong contributor to climate change mitigation and adaptation, framing it as a pillar for the future of global green economy. Nevertheless, the idea that tree plantations and the forestry sector equal with a sustainable economy is far from uncontroversial.

The financial, economic, and territorial mechanisms behind green bonds in the forestry sector as a form of mitigating the effects of climate provide an opportunity to reflect upon the mechanistic approach to promote its mitigation. Frequently, climate change mitigation is understood as a matter of reducing the overall presence of carbon dioxide in the atmosphere and this is the same metrics used to project the future performance of a green bond for a sustainable project. The immediate consequence of such approach is the obliteration of the ecological complexity of climate change as a socio-environmental issue and the silencing of any other impact that the forestry industry may have on the ground. Even when other sustainability metrics are deployed (such of water or energy consumption), projects and investments tend to be analyzed in isolation from the territories in which they are embedded.

²⁴as the implementation of the Agrarian Policy of Planted Forests (article 7)

²⁵ The Plan was created as the implementation of the Agrarian Policy of Planted Forests (article 7, National Decree no 8.375/2014). This Policy, own its turn, must be comprehended along with another one, the National Policy for the Restoration of Native Vegetation (National Decree 8.972/2017), which gave rise to the National Plan for the Restoration of Native Vegetation, that has structured the regulation of the Forestry Code, and has been decisive for the expansion of planted forests and the related markets.

As a matter of fact, there is a vast literature on the forestry sector that has openly criticized the socio-ecological impact that it has on the Brazilian territory as a complex interaction between people and nature (Toledo 2012; Marques 2016; Pantoja and Pereira 2016; Alves da Silva 2018; Oliveira, Pereira, and Nascimento 2018). Regarding the environmental impact, the excessive use of pesticides, the depletion and pollution of water resources, and reduction of biodiversity have also been constantly emphasized as problematic implications (Kröger 2012, 2014) that would require more than making forestry sustainable.

But criticism goes beyond and has also highlighted the social impacts of the forestry sector, with particular emphasis on the cheapness of lives and the cheapness of labor along with those of energy and nature (Moore and Patel 2018). Violent conflicts over land and territories are said to accompany the expansion of tree plantations (Kröger 2012). Furthermore, people “in TP [Tree Plantations] investment areas tend to suffer from precarious working conditions” (Kröger 2014: 248) along with the negative effects of direct and indirect exposure to pesticides and other chemical products (Dalbó et al 2019). Moreover, the use of pesticides and herbicides, sometimes aerial, has also been associated with communities being forced to leave their homes; thus leaving the land “free” for expansion (Toledo 2012). When people are forced away from their territories, it becomes impossible to socially reproduce nature by the modes of being of indigenous and traditional communities.

An episode involving Aracruz Celulose (later Fibria and now part of Suzano) that took place a few years before the issuing of the first green bond is illustrative of the broader socio-ecological conflicts involving tree plantations. The company appropriated a large tract of land that the National Indian Authority (FUNAI) had recognized as Indigenous Territory belonging to the Pataxó people; the company then planted 30,000 hectares of eucalyptus in the area. After a long and expensive confrontation before national courts, only half the Indigenous Territory was re-assigned to the communities, while the rest continued being used to realize a monoculture of eucalyptus (Kuhlmann, Van der Mark, and Baffoni 2019). Similar episodes of socio-environmental conflicts involving eucalyptus monocultures in Brazil are compiled by Barbosa and their colleagues (2019), who describe the tense and violent relationships between *quilombola* and indigenous communities, on the one hand, and pulp sector companies operating in the states of Bahia and Espírito Santo, on the other.

The first-person account provided by Silva Neta (2018) on Suzano’s activities in the surroundings of Imperatriz, a town in the state of Maranhão (northeast Brazil), is a vivid picture of the sector’s impact in its process of territorialization. She translates into words the feelings of watching the ecological transformation promoted by Suzano, the elimination of the conditions underpinning the traditional modes of existence, and offers rich information regarding the social (such as the dispossession of entire villages) and environmental impacts (questioning why “the rice doesn’t grow anymore”) that characterize the conversion of land and territories into spaces of global production (Ferrando 2017). She also stresses the co-optation of the public sector in imposing new rigid boundaries that favor exploitative practices and exercising its authority in a

way that shapes “regional class alliances through various mechanisms of government and governance” that leave communities with “no one to rely on” (Neta 2018: 69).²⁶

These narratives and experiences from the ground reveal that behind the sustainable management of forests that is fueled by green bonds, there is a much more complex and messier backstage. For productivity and finance to get locked in the terms of repayment of a green bond, territories, communities, and their modes of existences have to be shaped and disciplined. At the outset of financial debt there is the inception of social and ecological debt that feeds into the metabolic rift impinged on many communities, also imposing a territorial shift on people’s bodies and livelihoods by means of expulsions and dispossession. The shift is profound in the sense that it may abruptly compromise the continuity of traditional and indigenous communities and small-hold farmers’ livelihoods while changing the future, ontologically speaking, of land, territories and nature. As indigenous people and traditional communities’ social reproduction is not disconnected from the materiality of nature as both a structure for interaction and a result of it (Polanyi 1944; Gibson-Graham 2008), shifts in nature mean displacements of their live(lihood)s that are collectively shaped in and through nature.

Hence, the expansion of the forestry frontier (whether or not sustainably managed) generates a social and ecological debt that is left with the communities who inhabit the space where tree plantations and their related forestry developments for pulp and paper are implemented, and that have socially built it across centuries of interactions. This debt, in turn, is not accounted for by the expected profits coming from debt liquidity through the scaling up of production and finance. On the contrary, it is required to construct competitive, productive and appealing investments that remunerate capital while shifting costs and creating green sacrifice zones located beyond the boundaries of the global north (Zografos and Robbins 2020).

The tension between financial and ecological approaches to territories is inevitable. This is because the values at stake are completely different and based on departing expectations about the kind of development that green bonds-led projects can and shall bring. By building on this differentiation and hierarchizing it, companies operating within the territories (and legitimized by investors) dispossess, appropriate, and accumulate from and over them by producing an allegedly more efficient nature; a rift that shifts communities’ territories into a territory of capital (Moore 2015a: 54).

There may therefore be a grounded and immediate effect provoked by the issuing of green bonds by companies in the forestry sector. Because the bonds will only finance activities that must be considered green, an activity, a space, or a territory have to be defined as “green,” organized as such, and put at the disposal of financial returns announced at the moment of borrowing and lending through the green bond. This leads us back to an important part of our argument: the role of green bonds in shifting and shaping nature and society to the benefit of its global finance operations. Because the shift printed on nature is not separated from society, as it is the material

²⁶ Translation by the authors.

basis for environment-making in capitalism, any alternative way of organizing natures and societies is displaced.

For dispossession and accumulation through green bonds and the correlate co-production of nature in the forestry sector to happen on those terms, therefore, a specific institutional apparatus must be in operation. As we discuss in the next section, forestry green bonds in Brazil are an expression of the political nature of capitalism, of the constitutive role of the state in the organization of the circuits of capital, and the continuous attempt to utilize the basic economic forms of the state (taxes, the national money, state credit, state spending, etc.) and legitimate violence to maintain social cohesion in a class-divided society (Jessop 2004; Harvey 2003; Poulantzas 1979).

3. Private Power with Public Support: the Creation and Governance of Green Bonds in the Brazilian Forestry Sector

Rather than the result of an idealized spontaneous market, capital accumulation through green bonds in the forestry sector demands the support of the state, norms, and institutions (Parenti 2016). While the expansion of the plantation in Brazil dates back centuries, the connection between the state and the forestry sector is historically characterized and goes back decades. Firstly, the expansion of the sector was sponsored by the military technocrats during the Brazilian dictatorship (1964-1985) (Kröger 2008) and continues to be supported by the Brazilian state through incentives, inaction and the promotion of ad hoc “land regularization” schemes that favor the appropriation and financialization of indigenous territories.²⁷

The attempt to forge a “new developmentalist state” by subsequent governments of the *Partido dos Trabalhadores* (Workers Party) between 2002 and 2016 was conceived around a strong reliance on the primary sector and extractivist industries as a way to promote trade balance surplus. The push towards commodity production and export were a decisive point in the vertiginous growth of production and power of pulp companies in Brazil (Perpetua et al 2017). Between 2010 and 2014, the total area of eucalyptus plantations in the Brazilian territory increased 88 percent, from 2,956,000 hectares to 5,558,653 hectares. This was largely fueled by the support of the Brazilian Development Bank (BNDES) and its promotion of “national champions”: between 2010 and 2015 the bank granted R\$17.6 billion to companies in the forestry sector (Perpetua et al 2017).

State support to the forestry sector transcends ideologies in the Brazilian political economy. In 2018, during the liberal economic policy of Michel Temer, the federal government enacted relevant plans that were decisive for further expansion and competitiveness of the forestry industry. In this sense, it is worth pointing not only the aforementioned National Plan for the Development of Planted Forests, but also the National Plan for the Restoration of Native Vegetation. The former devised several strategies to support the forestry industry sector, including

²⁷ For a detailed account of the role of the Brazilian State in the expansion of the sector, see Kröger (2015).

the creation of a policy creating lines of public credit and to attract direct investment by the government. Such policy also targeted public investments in research and development to the forestry industry sector and its related products (MAPA 2018). The National Plan for the Restoration of Native Vegetation also framed planted forests at the center of restoration policy (MMA, MAPA, ME 2017).

In this sense, green bonds in the forestry sector do not operate in a legislative vacuum, but intervene in a context that is clearly defined by the public objective to promote the forestry industry and Brazil global competitiveness as a commodity exporter. At the same time, green bonds are not neutral to this process, but may be another source of direct state support. For example, market agents interested in the promotion of green bonds (as well as part of the functionalist scholarship mentioned above) often point to tax incentives as a means to foster the issuance of green bonds. If the state were to provide fiscal incentives for companies issuing green bonds they were to make these instruments cheaper and thus more attractive for issuers and investors. Directly public support, in the form of a reduced fiscal imposition, would thus support forestry and other “sustainable activities.” In Brazil, a bill creating tax incentives for green bonds was presented in Congress in 2020²⁸. It is likely that activities in the forestry sector would be covered by this new legislation aimed at socialize part of the costs of remunerating capital through the issuance of green debt.

As mentioned above, the role of the state in the expansion and consolidation of the forestry sector in Brazil is marked by active support as well as by (willful or negligent) disengagement. For example, the withdrawal of state agencies from the communities surrounding the plantations and the dismantling of public policies to provide essential services creates a void that is quickly filled by pulp companies through corporate social responsibility (CSR) actions (Perpetua et al 2017). According to Silva and de Almeida (2014), CSR is not a matter of redistribution but rather a cost that is undertaken in order to obtain the certifications needed for the commercialization of production. This replacement and substitution have been defined by Kudavicz and de Almeida (2014) as the “privatization of the agrarian reform” and has been reported in communities in the state of Mato Grosso do Sul, one of the new frontiers of tree plantations.

In addition to incentives and omissions, the development of the forestry sector in Brazil has also been dependent on the active transformation of the Brazilian environmental legislation and regulations concerning the demarcation, access, and the use of land. In this process, a milestone is represented by the new Brazilian Forestry Code, approved in 2012 after many debates and long-term disputes on how to use and occupy land (Vecchione-Gonçalves 2018; Hazeu, Vecchione-Gonçalves, and Costa 2020). In the Code, we find the discipline concerning (1) the authorization of specific cultivations for forest restoration and compensation, and (2) the creation of Legal Reserves (LR) within private properties alongside changes in land tenure and regularization in the country. Article 41 of the Code deals with programs for sustainable forest management in order to implement the Environmental Regularization Programs (ERP).

²⁸ Bill number 2646 of 2020.

The paradigm of nature that is adopted in Article 41 is one according to which pine and eucalyptus plantations play a role both as areas to regularize and manage to restore environmental passives, and as Legal Reserves of private agribusiness enterprises that integrate cattle, soy, and tree plantations. Through Article 41's construction of nature and focus on value, ecosystem services, and value production, tree plantations—the profit-led activity that contributed to the environmental passive—is legally and institutionally identified as one of the possibilities for restoring nature. In the context of a very powerful *Bancada Ruralista* (agri-business component of the Brazilian Congress), political and legislative processes have thus been instrumental in defining the boundaries of appropriable nature by making capital accumulation in the forestry sector compatible with environmental protection.²⁹

The spatial and temporal fix represented by green bonds adds a new institutional layer to the process of creating and validating specific forms of nature for the purpose of stabilizing revenues and remunerating investors. As indicated above, for a debt instrument to be qualified as green, it must comply to certain standards, which have been mostly produced and enforced by private agents. Therefore, when certified and non-certified green bonds are issued in the forestry sector, issuers have to make the claim that the funded activities have a positive impact on climate change adaptation and mitigation or on the environment. However, value generation and accumulation in the forestry sector is inherently associated with the translation of ecological processes into mechanistic processes (i.e., capturing CO₂ or the production of ecosystem services) and flows of capital (i.e., return on the investment). Short and long-term social and environmental debt are overlooked and externalized, because they are functional to the repayment of the financial debt. A clear tension is therefore identified: for value generation and accumulation to be financed with a green bond, the activity must be considered environmentally beneficial or climate friendly; at the same time, the plantation scheme is inevitably associated with ecological harms that are made invisible by regulatory changes that cannot be grasped by a superficial analysis of territorial complexity in terms of risks, harms, and legality.

This tension—characteristic of the green economy (Perez 2016)—is diluted by mechanisms of private governance which only superficially touch on those socio-environmental controversies and challenge the productivist and mechanistic understanding of nature as provider of free gifts. In particular, notwithstanding the promises of raising environmental standards carried by green bonds, a close analysis of the documents that are produced during the issuance processes reveals a strategy of “management of controversies.” That is, even when these are identified, the controversies do not compromise the labeling of the bond as green. Moreover, the structural reasons behind these conflicts are not addressed, because this enquiry would highlight the incompatibility between the capitalist construction and definition of a territory, and the already existing forms of reproduction of nature and modes of living socially.

Second Party Opinions (SPOs)—assessments of the “greenness” of the bond undertaken by private firms other than the issuer—are illustrative of how the green bond governance structure

²⁹ On the political formation and performance of Brazilian agribusiness see Pompeia (2021).

dilutes environmental and social conflicts. In the cases we analyzed, SPOs acknowledged the hydro and biodiversity impacts of forestry activities. However, not only negative impacts do not emerge as a relevant concern, but they become an opportunity of improvement through more plantations. In the case of Suzano, for example, the SPO states that an Environmental Management System would “alleviate these impacts” (Sustainalytics 2016a); in the case of Fibria, that the company’s mitigation plan would “alleviate the negative impacts” (Sustainalytics 2016b); in the case of Klabin, the “strong sustainability practices” of the company are emphasized to claim that they would be able to “mitigate” potential impacts (Sustainalytics 2017); and in the case of Irani, the SPO states that “forestry operations...respect the criteria established by CBI in its Forestry Criteria, an eligibility criterion for green bonds of projects in the forestry sector, more specifically in the subset of planted forestry” (Sitawi 2019: 10).

In addition, all SPOs for green bonds issued in the forestry sector in Brazil relied on the presence of forestry certification to refrain from engaging with the historical, present, and future socio-environmental controversies. According to the SPOs, the reference to private governance structures specific to the forestry sector grants the adequacy of the green label in the bond issuance. The SPO referral to a private label acts as a sort of private governance compounded. Kuhlmann and their colleagues (2019) recently analyzed one of the emissions that we presented above and concluded that “green bonds are used to finance those parts of Fibria’s normal business operations that are deemed less environmentally destructive *because they are FSC [Forest Stewardship Council]-certified.*” (Kuhlmann et al 2019: 11, emphasis added).

These voluntary certification schemes are said to reflect negotiation processes within the organizations, based on which they claim to alleviate the negative impacts of the forestry sectors. Thus, they can be adopted by SPOs as legitimate terms of reference for their assessment. However, forestry labels as mechanisms of self-regulation have been subject to criticism; for instance, for not enabling a substantive participation of impacted communities and for not being effective in following-up complaints of violations by corporations (see, for example, WRM 2013). To a different degree, but also reflecting this self-referentiality logic, SPOs point at IBA’s own data to justify the eligibility of forestry projects to be financed through the proceeds of green bonds (Sitawi 2019).

Together with direct state support and legislative measures to the creation of the green bonds’ market and the generation of private value through appropriation of nature and social practices, the public/private mechanism of governance contributes to construct green debt emissions as environmentally sound and desirable. As capital cannot reproduce itself (Harvey 1982, 2001a, 2001b, 2003), it is thus the combination and collaboration between public and private interventions that creates the conditions for green debt to be issued, capital to circulate, accumulation to take place and for the “code of capitalism” (Pistor 2019) to unfold and produce nature as a commodity, so that it can be appropriated and be put at the origin of these new financial chains.

Through public regulation and private legal arrangements (e.g., debt, consultancies, certifications, etc.), natural elements and territories are mobilized, adapted, and put at the core of green bond as a temporal and spatial fix. By linking local territories to the expectations and future

expectations of finance, green bonds as a green debt authorize the consolidation of an extractivist approach to land and de-authorize the recognition of collective rights and of any other vision of the web of life. Green bonds are not just another form of raising finance. They are ecological shocks whose issuance further accelerates the conversion of territories (symbolical), nature (ecological), and land (legal) into assets, and the silencing of the ecological pluriversity of the world.

Conclusions

This article has offered a critical perspective on the meanings and implications of green bonds as a relatively recent and increasingly relevant way of financing the “green transition.” So far, green bonds have been mostly analyzed through functionalist perspectives that celebrate them as a win-win-win technical fix to combine economic growth and sustainability. We suggest that by deploying the world-ecology approach to the concrete case of green bonds in the forestry sector in Brazil, this form of debt can be seen as a new phase of subordinating the territories in the global south to the needs of global capitalism. Green bonds are not (only) contracts, they are socio-legal-political tools that open up new frontiers of accumulation and expand existing ones (spatial fix), and lock-ins a commodified construction of nature for the future remuneration of investors (temporal fix).

As with other manifestations of financialized capitalism, green bonds must not be understood in isolation from their material basis, since it is through that basis—and its social and environmental conditions and contradictions—that projects funded via green bonds can create and appropriate value that is then needed to repay the debt. As the examples of the Brazilian forestry sector illuminate, the “greenness” of the financial debt inscribed in green bonds may be associated to and come into existence at the same time of social and environmental debt that is put on the shoulders of indigenous peoples, local communities and—when the bond is issued by a public authority—of future generations. It is to say: capital accumulation and the co-production of nature are inseparable in the green bonds model, as in any financial instrument that aims at being remunerated with growth, productivity, and the privatization of nature as free gifts. Green bonds provide, in this sense, a revealing empirical example for the idea that “Wall Street is a way of organizing nature, differently but no less directly than a farm, a managed forest, or a factory” (Moore 2011: 43).

Our analysis confirms that the dialectical unity of the capitalist world-ecology inscribed in a green bond can only be fully understood if we add a third element to the equation and consider the political and institutional elements that enable accumulation to take place while co-producing nature—the dimension of power. As Moore explains, the “successive eras of capitalist development are ‘governed’...by world-ecological regimes that establish definite relations and rules of reproduction” (Moore 2015a: 113). Although the idea of a “world-ecological regime” is clearly interesting for large scale analysis, it is an insightful notion to grasp how accumulation also takes place in the micro-cosmos of green bonds.

The pattern of governance that sustains and promotes accumulation through green bonds is one that demands both public support through policy, norms, institutions, and socialization of costs, and private spaces of self-regulation and accumulation. For accumulation to take place on these terms and for capitalism to reproduce itself, green bonds need fiscal incentives, the recognition of property rights, corporate land reforms, the enforcement of contracts, and the level of repression needed to maintain social cohesion in a class-divided society.

At the same time, green bonds are based on criteria that foster a specific “abstract social nature” (Moore 2015a) so that financial debt becomes *green* debt and can circulate as such. At the moment, these standards are mostly private and characterized by conflict of interests, reductionist understandings of the complexity of the web of life and by the lack of clear public accountability. However, private systems of governance are based on public institutions and regulatory interventions that create spaces for co-construction of nature, local dispossession and global accumulation. Whether public, private, or mix, a pattern of governance based on the investment of capital to “make nature work” inevitably organizes the web of life as co-producing nature in a very specific way: one of planted forests that deems individual ownership of land valuable, while often cheapening collective and alternative ways of protecting nature.

Although the explicit incorporation of environmental concerns into financial considerations has been praised as a step towards the recognition that finance has a material impact on the planet, this article wants to bring attention to the typical green arithmetic move that is put forward by green bonds proponents (and by most of the green economy proposals and literature). That is, finance is, once again, not recognizing its ecological nature and that all social relationships are spatial relationships and intertwined in the web of life (Moore 2015a). On the contrary, promoters of green bonds often adopt a discourse that encloses nature and the environment as external objects and then incorporates them into their conventional way of accounting, making provisions, and discounting future risks (Cerrato and Ferrando 2020).

By adding “green” before “bonds,” lawyers, financiers, and investors do not necessarily recognize that finance is part of the dialectical making of lives and nature—the *oikeios*, as defined by Moore (2015a). Rather, they may reinforce the idea that there is a clear distinction between nature, society, and economy, and that green bonds are doing something exceptional and positively transformative for nature and society. Green bonds as legal, political, and financial tools are therefore co-producing nature and social relationships, but in a way that emphasizes capital accumulation and that does not necessarily protect the environment (even within its own standards). Much to the contrary, green bonds may come into being at the expense of (i.e., indebting) other ways of living well and sustainably. Even in their name, green bonds encapsulate the inseparable and mutually constitutive connection between nature (green) and the economy (bonds).

The overall process described in the article resonates with what Caio Prado Jr. has called the “meaning of colonization” behind the social formation of Brazil (Prado Jr. 2011). Since the colonial era, the territory and the people of Brazil have been central to the construction of the capitalist world economy. The present is just a continuation of the past in a different form. In recent

years, the ensemble of nature-society relationships as shaped by the financial architecture of green bonds has worked to expand the ecological frontiers of capitalism into the Brazilian territory and to perpetuate Brazil's role in the world-ecology, as a subordinated source of "ecological surplus" (Moore 2014a). The transition towards a "green future" may be a new manifestation of this trend.

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