

## **COVID-19 and Amazonia: Sustainable alternatives for an economic collapse**

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## Highlights

- The severity of the ongoing COVID-19 outbreak demand from countries to adopt extreme measurements of social isolation to stop the spread.
- Amazonia biome will have an important role to Brazilian economy during the post-pandemic recession.
- Forest bonds, REDD+ and the Amazon Fund are good strategies to burst Brazilian economy in a sustainable way, but depends on government commitment
- Amazonia preservation is paramount to avoid a climate crisis, which will occur if we reach the climatic tipping point of 1.5°C
- We should apply the lessons learn with this pandemic and focus on change our economy towards a sustainable direction to avoid another global crisis

## Abstract

The severity of the ongoing COVID-19 outbreak demand from countries to adopt extreme measurements of social isolation to stop the spread and flatten the curve of contamination. Although social isolation measures may have negative impacts on economy, historically it has been showed to be more effective in saving lives and less damaging to economy than not adopting these measurements during a viral pandemic. In Brazil, despite the positioning of the president against social isolation due to the consequent economic recession, the rapid spread of the virus has worried the governors of the Brazilian states, which are thus managing stringent social isolation measurements to avoid the advance of the virus. Since one of the main strategies to guarantee progress and economic growth in Brazil has been the exploitation of natural resources from the Amazonia biome, here we discuss the importance of this biome to Brazilian economy during the post-pandemic recession and highlights potential strategies to burst the economy without promoting Amazonia destruction. We show that, together with the REDD+ and the Amazon Fund, the Forest bonds represents good strategies to burst Brazilian economy in a sustainable way, showing that it is possible to improve the commodities without increasing Amazonia deforestation or the greenhouse gases emissions. Amazonia is a biome of global importance for the avoidance of another global crisis, which will occur if we reach the climatic tipping point of 1.5°C. Thus, governmental actions should go towards its preservation, not exploitation and depletion. The commitment of the government with environmental conservation is paramount so that these economic strategies have positive results, especially in a post-pandemic scenario, where the economy will be extremely weakened. The COVID-19 brings us a lesson regarding how our attitudes can impact the world, and what we can expect from a global crisis. Perhaps we can apply these lessons and focus on change our economy towards a sustainable direction to avoid another global crisis in the years to come.

**Keywords:** Economic recession, SARS-CoV-2, Deforestation, Climate Change, Amazonia Integrity, Green Bonds

## Introduction

The novel Coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has been spreading all over the world since its first outbreak in Hubei province, China, in December 2019 (Wang et al., 2020). The World Health Organization attributed to COVID-19 the status of public health emergency of international concern after a month since it was first reported (World Health Organization, 2020), when there were 9826 confirmed cases distributed in 19 countries. After four months, over 2,4 million people from 185 countries and regions have become infected, and the numbers are still growing with no forecast of stop (Dong et al., 2020).

To stop the spread and flatten the curve of contamination, many countries adopted social isolation measures by closing borders and trades and asking people from non-essential services to work from home (Kraemer et al., 2020). From an economic perspective, this can lead to a 3 to 5% GDP drop in some countries, reaching up to 10% in others (Fernandes, 2020). This is the greatest economic crisis since the Subprime Mortgage Crisis, in 2008, where the rapid growth of the subprime mortgage market was not accompanied by an increase in the subprime mark-up and became unsustainable (Demyanyk & Van Hemert, 2009).

Although social isolation measures may have negative impacts on economy, historically it has been showed to be more effective in saving lives and less damaging to economy than not adopting these measurements during a viral pandemic, as in the case of the Spanish Flu in 1918 (Correia et al., 2020). However, the economic impacts of the COVID-19 pandemic have become one of the main arguments of the authorities that does not support the social isolation as a viable measurement to stop the virus (Silva et al., 2020). In Brazil, this group is led by the President, Jair Bolsonaro, and is followed

by some businessmen, religious leaders and their supporters, which argues that the country must make the social isolation stringency more flexible to avoid unemployment and a worse recession (Silva et al., 2020). Brazil is the 12<sup>o</sup> country with the highest number of confirmed cases, being the second in the Americas, behind only the United States (Dong et al., 2020). Despite the positioning of the president, which encourages and participates in public agglomerations in protest against social isolation (Borges, 2020), the rapid spread of the virus has worried the governors of the Brazilian states, since it can overwhelm the health system and lead to an increase in the number of deaths due to inadequate medical resources and care (Anderson et al., 2020). Thus, although the economic perspectives are worrisome, the maintenance of a stringent social isolation is paramount to avoid the advance of the virus (Anderson et al., 2020).

### ***Brazilian Economy and the role of Amazonia***

Historically, one of the main strategies to guarantee progress and economic growth in Brazil has been the exploitation of natural resources from the Amazonia biome (Hecht, 2011). During the dictatorship period, from 1964 to 1985, the biome was seen as a “largely empty” area that must be filled by profitable activities to guarantee the State legibility (Hecht, 2011). Although this view has slightly changed during the 2000s, when the Brazilian established a participatory systematic conservation planning for this and other biomes (Fonseca & Venticinque, 2018), after 2007 this system began to be weakened, with some provisional measures being implemented to downgrading or downsizing protected areas to generate and transmit electricity or explore Amazonian’s economic potential (Azevedo-Santos et al., 2017; Bernard et al., 2014).

Currently, the major threat to the biome is climate change and deforestation due to the agrobusiness and mining activities (Malhi et al., 2008; Swann et al., 2015), and

together this may represent an impending collapse of the Amazonian ecosystem, having drastic implications for human maintenance if this scenario is not reversed (Lovejoy & Nobre, 2018). The impacts of climate change on the biome may lead to a decrease in its biomass, net primary, and carbon uptake, leading to a replacement of the forest for degraded savanna-like vegetation (Esquivel-Muelbert et al., 2018, p.; Yang et al., 2018). These effects are likely to be potentialized by deforestation, which is predicted to lead to a great forest fragmentation by 2050 considering its current rates (Soares-Filho et al., 2006). Livestock is responsible for 65% of these rates (Cerri et al., 2009), being also responsible for near half of Brazilian greenhouse gases emissions, considering deforestation, pasture burning and bovine enteric fermentation (Pereira et al., 2019).

Amazonia hosts a quarter of the world's terrestrial species and accounts for 15% of global terrestrial photosynthesis, being its ecosystem services of global importance (Dirzo & Raven, 2003). It plays a major role in global carbon budget, and, thus, in mitigating the effects of climate change by stocking nearly half of the tropical forest carbon (Yang et al., 2018). Thus, the increase of forest loss contributes to rise regional and global environmental temperatures, besides intensifying extreme weather events (Esquivel-Muelbert et al., 2018; Malhi et al., 2008). The world is reaching the tipping point of an 1.5°C increase in environmental temperature, which will lead the climate system to long-term irreversible changes if no emergency response occurs in time (Lenton et al., 2019). Among the consequences of this threat are the biodiversity loss and the emergence and spread of new viral, helminthic and fungal diseases, by favoring the replication of pathogens in vectors and vectoral capacity (Ellwanger et al., 2020). Since Brazil hosts almost 60% of total Amazonia, it is mandatory that the federal government focus on its preservation, considering not only its economic importance but also its relevance for the world climate system and public health.

In 2004, the Brazilian government committed itself to decrease deforestation through government policies and changes in commodity and land prices, cutting up to 78% of the biome deforestation and reaching the lowest historical level by 2012 (West et al., 2019). As a consequence, Brazil was able to reduce 54% of its greenhouse gases emissions between 2005 and 2012 (Rochedo et al., 2018). Among the main factors for the reduction of forest loss were the Action Plan for Prevention and Control of Deforestation in the Legal Amazon (PPDCAm) and the Soy Moratorium. The first was a government measurement aiming land and territorial planning, environmental monitoring and control and promotion of sustainable production activities to tackle and reduce deforestation rates in the Amazon (Bidone & Kovacic, 2018). The second was a good example of an environmental pact between government, agribusiness entrepreneurs, and non-governmental environmental organizations to adopt measurements against Amazonia deforestation without harm the economy (Montibeller et al., 2020). It lasted from 2006 to 2010 and contributed to the decrease of forest loss by maintaining soybean cultivation in areas not originated from deforestation (Gibbs et al., 2015).

Between 2014 and 2017, Brazil experienced one of the worst economic crises in its history (Barbosa Filho, 2017). Since then, the commitment with the Amazonia conservation was compromised by the incentive for improving agribusiness and mining activities in the biome (Diele-Viegas & Rocha, 2019; Ferrante & Fearnside, 2019), and the deforestation rates started to increase again, reaching 8000 km<sup>2</sup> per year between 2016 and 2018 (Pereira et al., 2019; West et al., 2019). This incentive arises from the strong presence of a “rural stand” in the Brazilian parliament, where the agribusiness entrepreneurs represent 50% of the parliamentarians, with 257 from 513 seats, and 39.5% of the senators, with 32 from 81 seats (Pereira et al., 2019).

Together with Bolsonaro, and considering their strong stand in Brazilian legislative, the agribusiness entrepreneurs are focusing on cutting funding from environmental regulatory agencies, such as the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) and the Chico Mendes Institute for Biodiversity Conservation (ICMBio), besides passing laws to benefit the agribusiness instead of promoting forest conservation, leading to a dismantling of Brazilian environmental legislation and facilitating the Amazon deforestation (Pereira et al., 2019). Besides, they are also approving laws going against the maintenance and establishment of new indigenous lands, which may have direct effects on climate and forest conservation, since these areas are important to buffer deforestation and local effects of climate changes (Ferrante & Fearnside, 2019).

With the economic crisis predicted as a consequence of the COVID-19 pandemic, it is expected a decrease of up to 5.3% in Brazilian GDP, being 2020 potentially one of the worst years for the country's economy in recent history (International Monetary Fund, 2019; Porsse et al., 2020). Thus, the argument that places the Amazonia as the main strategy for the Brazilian economic restructuring is expected to be reinforced by Bolsonaro and the rural stand, which can further accelerate the forest deforestation process (Pereira et al., 2020). The tendency is for the government to cut the resources of inspection agencies even further than has already been cut, facilitating the action of loggers, miners, and agribusiness entrepreneurs in the biome. However, this is probably not the best strategy to take, considering that Brazil's largest agriculture importers, Europe and China, are among the most affected regions by the COVID-19 pandemic (Baldwin & di Mauro, 2020; Bozorgmehr et al., 2020). Thus, the expected recession after the outbreak is likely to harm trade negotiations, directly impacting the Brazilian agrobusiness sector.



### ***COVID-19, Amazonia deforestation and illegal mining activities***

Since the beginning of the COVID-19 crisis in Brazil, there have been an increase of 5.2% in deforestation and 17.7% in mining activities, in comparison with the same period in 2019 (February to April; Assis et al., 2019). The lack of inspection during the outbreak is an opportunity for loggers and golden miners to advance their invasions in indigenous lands and protected areas without being noticed by the general public (Butler, 2020). Besides the environmental issues resulted from these activities, these recent invasions are also leading to the spread of COVID-19 among traditional populations, such as those from the Yanomani Reserve, in Roraima state, for which was reported the first death of an indigenous person caused by the virus (Butler, 2020).

Indigenous are among the most vulnerable groups to the virus spread due to their spatial distancing from big urban centers and medical care, language barriers with the healthcare providers, and differences in immune profile in comparison with the people living in big cities, which can lead to unexpected physiological responses to the virus (Mesa Vieira et al., 2020). However, the lack of commitment of the Brazilian authorities with this issue has become evident after the exoneration of the IBAMA's director of environmental protection, led by the Brazilian Ministry of Environment, Ricardo Salles (Folha de São Paulo, 2020). The main reason for the exoneration pointed out by Brazilian information vehicles was an operation against illegal miners on indigenous lands, which involved the expulsion of invaders and the breaking of their machinery (Folha de São Paulo, 2020). This also reflects the government intentions on releasing mining inside these areas, which is likely to have negative impacts on local biodiversity, ecosystem services supporting traditional populations and the climate system, since these areas are pointed as crucial to mitigate the local effects of climate change (Diele-Viegas & Rocha, 2019).

### *Strategies to burst Brazilian economy without promoting Amazonia destruction*

Greenhouse gases emissions are amongst the main causes of the climate change, so the transition to a sustainable lifestyle is pointed as the main strategy to limit global warming to below the tipping point of 1.5°C. Seven of the main CO<sub>2</sub> emitters, including China, United States, and Brazil, are among the 20 most affected countries by the pandemic to date, accounting for over 72% of the COVID-19 cases (Dong et al., 2020) and 61% of the CO<sub>2</sub> emissions (Gilfillan et al., 2019). In China, the pandemic led to a decrease of 25% of carbon emissions in February 2020 compared with 2019, as a result of the reduction of economic activities and human displacements (International Energy Agency, 2020). If the other leaders in CO<sub>2</sub> emissions, including Brazil, follow China's example to stop the pandemic, this is likely to reach the lowest emissions levels in years, improving our chances to avoid a climate crisis in a near future. However, actions are needed to maintain these levels after the pandemic is over.

Developing countries are encouraged to reduce greenhouse gases emissions through the Results-Based Funding (RBF) known as Reducing Emissions from Deforestation and forest Degradation (REDD+), which aim to pay money to a country or company upon a measurable emission decrease (van der Hoff et al., 2015). In Brazil, the Amazon Fund was created in 2008 as an RBF focused on achievements in deforestation reductions (Correa et al., 2019). In 2015, the government launched the National strategy for Reducing Emissions from Deforestation and forest Degradation (ENREDD+), aiming to eliminate illegal deforestation, conserving and restoring forest ecosystems, developing a low-carbon sustainable forest economy, and generating economic, social and environmental benefits (Bidone & Kovacic, 2018). Since then, to receive money from the Amazon Fund, projects must adhere to PPDCAm and ENREDD+ (Bidone & Kovacic, 2018).

The government's disengagement with the Amazonia conservation and consequent increase in deforestation rates since 2016 led Norway, one of the major donors to the Amazon Fund, to halve the stock financing in the region (Pereira et al., 2019). Three years later, in 2019, Norway and Germany decided to suspend their contributions to the fund as a retaliation to the unusual increase in fire activity in the Amazon biome attributed to the advance of agrobusiness (Escobar, 2019). Together with the recession caused by the COVID-19, potential retaliations due to divergences in environmental policies can negatively impact Brazil's economy (Bozorgmehr et al., 2020; Kehoe et al., 2019).

Another RBF strategy to attract financial resources and preserve the forest is through the emission of Green Bonds, which are debt securities that can only be used to finance investments considered sustainable (Berensmann et al., 2018). Such investments includes clean and renewable energy infrastructure, reforestation and projects aiming reducing greenhouse gases emissions and water, energy and feedstock consumption (Berensmann et al., 2018). The Forest bonds are a subtype of green bonds aiming to finance reforestation projects and is one of the most promisors bonds in the market, since it is still starting to be acknowledge (Climate Bonds Initiative, 2017). Thus, it represents a great opportunity for Brazil to become a leader in this segment, since only 1% of the total bonds is currently focusing on this issue (Climate Bonds Initiative, 2017).

## Concluding remarks

Since the exploitation of the Amazonia natural resources by the agrobusiness and mining sectors is historically used as the main strategy to guarantee progress and economic growth in Brazil, it is expected that this also occurs during the recession caused by the COVID-19 pandemic. However, this is probably not the best strategy to take under this crisis, considering that Brazil's largest agriculture importers, Europe and China, are among the most affected regions by the COVID-19 pandemic, which is likely to harm trade negotiations. Besides, Amazonia is of global importance to avoid another global crisis, which will occur if we reach the climatic tipping point of 1.5°C. Thus, governmental actions should go towards its preservation, not exploitation and depletion.

Together with the REDD+ and the Amazon Fund, the Forest bonds represents good strategies to burst Brazilian economy in a sustainable way, showing that it is possible to improve the commodities without increasing Amazonia deforestation or the greenhouse gases emissions. This could be a good strategy for economic stabilization (and potential growth) during the COVID-19 crisis, since, as the country conserves its forest, it also obtains sustainable financial resources, even at a time when capital liquidity has become scarce due to the global recession. However, the commitment of the government with environmental conservation is paramount so that these strategies have positive results, especially in a post-pandemic scenario, where the economy will be extremely weakened. The COVID-19 brings us a lesson regarding how our attitudes can impact the world, and what we can expect from a global crisis. Perhaps we can apply these lessons and focus on change our economy towards a sustainable direction to avoid another global crisis in the years to come.

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Authors declare no competing interests.

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