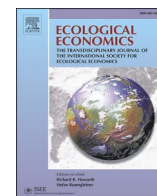




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NEWS AND VIEWS

The Amazon bioeconomy: Beyond the use of forest products

ABSTRACT

In 2021, the World Bioeconomy Forum and the Amazon Socio-Biodiversity Meeting placed the Amazon rainforest at the center of the global bioeconomy debate, as part of a planetary roadmap towards a sustainable and prosperous future. Albeit a wide breadth of definitions, the current debate in the Amazon is mainly based on a forest-product-based bioeconomy and has raised concern over sustainability and equity of the benefits among its population. We argue that an Amazon bioeconomy must transcend the mainstream forest-based products approach by assuring: (i) zero deforestation, (ii) strengthening the Amazonian millennial cultural and economic practices of traditional population, (iii) diversification of methods, and production valuing biodiversity as a response to widespread monoculture plantations, and (iv) equitable benefit sharing with local communities. Ongoing and future bioeconomy projects that genuinely aim to conserve the remaining Amazon Forest and promote socio-ecological benefits must consider these guiding principles.

1. Introduction

The bioeconomy has emerged as a roadmap to a globally sustainable future and environmental conservation (European Commission, 2020). The importance of the Amazon Forest to global climate regulation and its high biological diversity places the region at the center of the global bioeconomy debate (Abramovay et al., 2021). In October 2021, the city of Belém in the Brazilian Amazon held two different events on the same day: the World Bioeconomy Forum and the Amazon Socio-Biodiversity Meeting. The first is a Finish initiative co-organized by Brazilian agribusiness associations, local government, and the Organization for Economic Co-operation and Development (OECD) that focused on the bioeconomic potential of the region (World Bioeconomy Forum, 2021). The second was led by indigenous organizations, smallholder associations, and other grassroots movements raising concerns on the current views on bioeconomy that may not be compatible with their interests (Amazonian Socio-Biodiversity Meeting, 2021). This apparent antagonism between the two simultaneous events illustrates the high complexity of the Amazon bioeconomy debate. Also, it casts light on the urgency to conceptualize a bioeconomy for the Amazon that guarantees environmental protection, green income generation, and social justice in the region.

The Amazon bioeconomy, however, will not be fully achieved, only by adopting one of the dominant views on bioeconomy (Vivien et al., 2019). The mainstream approaches such as ‘biotechnology’ and the ‘bioresource’ promoted by the OECD and the European Union respectively, advocate for high technologies on natural resources products (Dieken et al., 2021; Peltomaa, 2018). A common thread on these narratives is their market-oriented approach based on non-fossil material and industrial-scale technological innovation to maximize productivity for economic growth (Bugge et al., 2016; Hausknot et al., 2017). Also, these dominant bioeconomy narratives arise mainly from scientific articles and policy instruments from the Global North (Berto et al., 2020). Although relevant, the focus on industrial and biotechnology solutions (El-Chichakli et al., 2016) is likely insufficient to address the multiple

socio-ecological challenges in the Amazon. The challenge is to address intersectional inequalities and high poverty levels (Santos et al., 2021) while protecting the rainforest and ensuring the rights of the Amazonian peoples that promote its conservation (Calaboni et al., 2021).

In Brazil, bioeconomic discussions primarily reproduce the bio-resource narrative, usually associated with large industries such as bioethanol (Scheiterle et al., 2018). Only recently, a ‘forest-product-based bioeconomy’ approach involving wood and non-wood forest products (Teitelbaum et al., 2020) has emerged in the context of the Brazilian Amazon. Indeed, the manufacturing of Amazon Forest products has been considered highly attractive for businesses with enormous economic potential. For instance, it is expected that by 2040 the Pará State alone can generate up to USD 35 billion in revenues associated with bioeconomy (Costa et al., 2021). There is evidence, however, that the current forest-product-based bioeconomy approach has not yet transformed the status quo of a predatory economic development agenda for the region (Santos et al., 2021). Indeed, the business-as-usual paradigm in the Amazon is linked to colonial practices (Larrea-Alcázar et al., 2021) and occurs at the expense of replacing biodiversity with monocultures (Fearnside, 2017), altering and alienating the cultural and ecological knowledge of Indigenous People and traditional population, also contributing to widening the multiple forms of inequalities (Bastos Lima, 2022).

Moreover, it is urgent to set up guidelines for an Amazonian bioeconomy considering the boom of overlapping private and public financial and policy initiatives to testing bioeconomy approaches in the region. For instance, the Inter-American Development Bank USD 600 million Amazon Fund (IDB, 2021), the World Economic Forum stakeholder consultations, (WEF, 2021), the Pará State bioeconomic strategies for public policies (Diário Oficial, 2021) and several other private bioeconomy initiatives promoted by multinational corporations (Eneva, n.d.; JBS, 2021; Natura, 2021). All these initiatives, however, lack a deep conceptual discussion for an Amazon bioeconomy that respects the forest while promoting economic prosperity and social equity.

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2. The four guiding principles for an Amazon bioeconomy

Achieving Sustainable Development Goals will require an Amazon bioeconomy that transcends the forest-product-based bioeconomy approach. Thus, we suggest that all sectors involved with the bioeconomy in the region should commit, at least, to the four guiding principles below.

2.1. Zero deforestation

An Amazon bioeconomy must commit to zero deforestation, including ‘legal deforestation’ (Stabile et al., 2020), curbing forest degradation as a result of illegal gold mining (Siqueira-Gay and Sánchez, 2021) and land grabbing that currently threatens the ecological integrity of the Amazon Ecosystem (Azevedo-Ramos et al., 2020). Furthermore, any illegal economic activity related to deforestation and forest degradation impoverish the Amazon region (Santos et al., 2021), increase rural conflicts and violence mainly to traditional communities, smallholders, and Indigenous People (RAISG, 2020). Moreover, Amazon deforestation contributes to increasing greenhouse emissions and global temperature warming (Birkmann et al., 2022), affecting forest resilience (Boulton et al., 2022) and moving the biome towards its tipping point (Lovejoy and Nobre, 2019). Also, deforestation hurts the economy due to agricultural losses caused by reduced rainfall (Rattis et al., 2021). Thus, without the standing forest, it is unlikely that bioeconomy will prosper in the Amazon.

2.2. Diversification of production methods

An emblematic example that illustrates the potential traps of the forest-product bioeconomy (Ranacher et al., 2020; Valli et al., 2018; Wohlgemuth, 2021) approach in the Amazon is the ‘Açaí berry commoditization’ – or ‘açaização’ – case. The Açaí is an endemic fruit vastly consumed in the region and entangled with the Amazonian culture, as the traditional knowledge is intrinsic to the social organization of picking and processing (Abreu et al., 2021). The global Açaí market could reach US\$ 2.5 billion by 2025 (Smeraldi and Santos, 2021), with a considerable export potential if structural issues related to infrastructure, internet connection, technical support are overcome (Coslovsky, 2021). Though impressive economic results – exports have risen 15000% in a decade (Abrafrutas, 2021) –, the Açaí boom, usually seen as a successful case of the Amazonian bioeconomy, has negative impacts on the local ecosystem and on local traditional culture. For instance, the new higher-density cultivation threatens pollination services (Campbell et al., 2018), reduces the richness of native forest and disturbs the social and economic dynamics of local extractivists’ communities (Freitas et al., 2021).

Two historical examples suggest that meeting the global appetite for products is likely not suitable for the Amazon biome and its inhabitants. Firstly, the failure of the Fordland’s massive rubber-tree monoculture plantation evidenced the risks of disregarding ecosystem functioning and local cultural aspects (Russell, 1942). More recently, the large-scale production of soybeans cultivation in the Amazon biome resulted in cropland expansion, pushing cattle ranching to opening new areas, clearing native vegetation (Stabile et al., 2020) and threatening the sovereignty of Indigenous People’s territories (RAISG, 2020). Although it is premature to assess the correlation of Açaí cultivation with deforestation, the history of large-scale production in the region raises concerns over the path dependence economy (Hecht et al., 2021).

The *açaização* case evidences the downsides inherent to the commodification of forest goods through monoculture schemes. Thus, we argue that a genuine sustainable Amazon bioeconomy entails the diversification of production methods that value biodiversity as a response to widespread monoculture plantations. In this sense, traditional manufacturing plays a key role in avoiding the losses of biological diversity (Cabalar et al., 2021) and soil degradation potentially caused

by monoculture (Soltangheisi et al., 2019). It also provides multiple ecosystem services across diverse spatial-and-temporal scales, including food, water, energy security, human health, and wellbeing (Endo et al., 2017; Pedersen et al., 2020). In short, the example above exposes the risk of a greenwashed bioeconomy: reproducing production methods of agricultural commodities that are neither ecological and economically sustainable, nor socially fair.

2.3. Strengthening the Amazonian millennial practices

The Amazon bioeconomy must foster the millennial socioeconomic practices and cultural pluralities of Amazonian people in different contexts (Furuie, 2020). It must consider the territorial and cultural complexities such as the history of occupation, local skills, and vocations (Cabalar et al., 2021). We understand that these elements are as essential as income generation, and should be equally valued. As exemplified by the Açaí case, higher profitability of socio-biodiversity products might not translate directly into better living standards for local actors. In that regard, bioeconomic strategies must consider the structural dimension of marginalized traditional communities within market-oriented economies, which is a unique opportunity to overcome the colonial legacy in the region (Mignolo, 2012). Engaging and working with the local traditional communities to elaborate and implement an Amazonian bioeconomy might bring opportunity for a participatory and collective bottom-up process. The ‘Amazon citizenship’ could emerge as a key element to foster a bioeconomy through an intercultural education that combines mainstream science with local traditional knowledge (Nobre et al., 2021).

2.4. Equitable benefit sharing

A bioeconomy for the Amazon must be grounded on equitable benefit sharing with local communities (Bastos Lima, 2021). Under the business-as-usual paradigm, the profitable agribusiness in the region benefits few farmers (Sant’anna, 2017). In contrast, the majority of the population pay for the negative externalities of a predatory development model (Martinez-Alier, 2014; Santos et al., 2021), to cite water contamination and human poisoning for the excessive use of pesticides (Bombardi, 2021). To guarantee sustainable use of forests, the Amazon bioeconomy must guarantee equality in the economic opportunities that arise. In that regard, Indigenous and traditional knowledges must be recognized and valued according to the Convention on Biological Diversity, as their marginalization constrain both the regional economic potential and the integrity of local ecosystems and biodiversity (CBD, 2020).

3. Conclusion

We consider that the four guiding principles for a bioeconomy in the Amazon proposed here co-benefit both Indigenous and traditional people and local ecosystem integrity. We expect that these principles will contribute to the global debate on bioeconomy (Wohlgemuth et al., 2021), but priorly to the regional definition of an Amazonian bioeconomy that promotes an equitable development. Specific criteria are yet to be defined by consulting local populations and their plural perspectives from forest, rural and urban contexts. The construction of this bioeconomy must adopt a bottom-up approach and acknowledge socio-biodiversity initiatives, strengthening the existing regional synergies.

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Declaration of competing interest

Authors declare that they have no competing interests.

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