

Theoretical-empirical Article

Minimum Price Guarantee for Sociobiodiversity Products in Pará, Brazil

Garantia de Preços Mínimos para Produtos da Sociobiodiversidade no Pará, Brasil



Diego Fonseca Mascarenhas*¹
Alberto de Moraes Papaléo Paes²
Laurimar de Matos Farias¹
Tamara Lima Martins Faria³

ABSTRACT

Objective: to analyze the potentialities and challenges of developing the Policy for Minimum Price Guarantees for Sociobiodiversity Products (PGPM-Bio) within the context of the State Plan for Bioeconomy of Pará (PlanBio). **Theoretical approach:** from the perspective of Amartya Sen and his work *Development as freedom*, the study seeks to examine how PGPM-Bio establishes minimum prices for extractivist products and fosters sustainable development in the region. **Method:** the research employs a qualitative methodology based on the triangulation of data from national and state legislation related to the bioeconomy, as well as socioeconomic and demographic data analyzed through the lens of Amartya Sen's capabilities theory. Data analysis was conducted using three main constructs emerging from the literature: public policies, bioeconomy, and minimum prices. **Results:** the main evidence indicates that the minimum price policy positively impacts the income of extractivist producers and traditional communities, contributing to the conservation of sociobiodiversity and sustainable development in the state of Pará. However, challenges are also anticipated, such as the need for more robust financial resources and policy enhancements to ensure effective implementation. The findings suggest that PGPM-Bio, by guaranteeing minimum prices for extractivist products, contributes to improving the income and quality of life of extractivists, promoting food security and economic inclusion. **Conclusions:** this research will contribute to the development of more effective public policies and the strengthening of the bioeconomy in the region, fostering social inclusion and environmental conservation.

Keywords: bioeconomy; sustainable development; State Bioeconomy Plan; sustainability.

* Corresponding Author.

1. Universidade da Amazônia, Programa de Pós-Graduação em Administração, Belém, PA, Brazil.
2. Universidade da Amazônia, Programa de Pós-Graduação em Gestão do Conhecimento para o Sócio-desenvolvimento da Amazônia, Belém, PA, Brazil.
3. Universidade Federal do Pará, Instituto de Ciências Sociais Aplicadas, Belém, PA, Brazil.

Cite as: Mascarenhas, D. F., Paes, A. M. P., Farias, L. M., & Faria, T. L. M. (2024). Governance and Value Appropriation in the Cocoa Bioeconomy at Amazonas. *Revista de Administração Contemporânea*, 28(6), e240186. <https://doi.org/10.1590/1982-7849rac2024240186>

RESUMO

Objetivo: analisar as potencialidades e os desafios do desenvolvimento da Política de Garantia de Preços Mínimos para os Produtos da Sociobiodiversidade (PGPM-Bio) no contexto do Plano Estadual de Bioeconomia do Pará (PlanBio). **Marco teórico:** sob a perspectiva de Amartya Sen e sua obra *Liberdade como desenvolvimento*, busca-se analisar como a PGPM-Bio estabelece preços mínimos para produtos extrativistas e o desenvolvimento sustentável da região. **Método:** a pesquisa utiliza uma metodologia qualitativa, com base na triangulação de dados provenientes das legislações nacional e estadual relacionadas à bioeconomia, bem como de dados socioeconômicos e demográficos analisados à luz da teoria das capacidades de Amartya Sen. A análise dos dados foi realizada a partir de três construtos principais que emergiram da literatura: 'políticas públicas', 'bioeconomia' e 'preços mínimos'. **Resultados:** a principal evidência aponta que a política de preços mínimos tem um impacto positivo na renda dos produtores extrativistas e comunidades tradicionais, contribuindo para a conservação da sociobiodiversidade e o desenvolvimento sustentável no estado do Pará. No entanto, também se antecipam desafios, como a necessidade de recursos financeiros mais robustos e o aprimoramento da política para garantir a efetividade das ações. Os resultados indicam que a PGPM-Bio, ao garantir preços mínimos para produtos extrativistas, contribui para a melhoria da renda e da qualidade de vida dos extrativistas, promovendo a segurança alimentar e a inclusão econômica. **Conclusões:** a pesquisa contribuirá para o desenvolvimento de políticas públicas mais eficazes e para o fortalecimento da bioeconomia na região, promovendo a inclusão social e a conservação ambiental.

Palavras-chave: bioeconomia; desenvolvimento sustentável; Plano Estadual de Bioeconomia; sustentabilidade.

JEL Code: Q110, Q570

- Editor-in-chief:** Paula Chimenti (Universidade Federal do Rio de Janeiro, COPPEAD, Brazil)
Guest Editors: Mário Vasconcelos Sobrinho (Universidade Federal do Pará, Brazil)
Mariluce Paes-de-Souza (Universidade Federal de Rondônia, Brazil)
Ana Maria de Albuquerque Vasconcelos (Universidade da Amazônia, Brazil)
Irma Garcia-Serrano (Universidad Central Del Ecuador, Ecuador)
Emilio F. Moran (Michigan State University, Estados Unidos; Universidade de Campinas, Brazil)
Reviewers: Guilherme Lobo (Universidade Estadual de Campinas, Brazil)
Jean Marcos Silva (Instituto Federal de Educação, Ciência e Tecnologia Sul-rio-grandense, Brazil)
One reviewer did not authorize the disclosure of his/her identity.

Peer Review Report: The Peer Review Report is available at this [external URL](#).

Received: July 15, 2024

Last version received: November 4, 2024

Accepted: December 16, 2024

Published: January 27, 2025

of invited reviewers until the decision:

	1	2	3	4	5	6	7	8	9	10	11	12
1 st round		(X)	(X)									
2 nd round	(X)											

INTRODUCTION

Sustainable and inclusive development has become a central theme in contemporary political discourse (Queiroz et al., 2022). In this context, Sen's (2018) pioneering framework encapsulated by his capability approach has gained recognition for emphasizing the enhancement of substantive freedoms and individual well-being. As nations grapple with the complexities of fostering economic growth while ensuring social equity and environmental sustainability, the application of Sen's (2018) concept of development becomes particularly relevant.

Within the framework of sustainable and inclusive development, the concept of bioeconomy — which is in continuous development — integrates three main approaches: biotechnology, bioresources, and bioecology. While each approach has distinct objectives, they share the common goal of using bio-based raw materials as alternatives within the institutional and political frameworks that threaten Amazonian sociobiodiversity (Bugge et al., 2016; Garrett et al., 2024). This research adopts the bioresources approach, highlighting the need for forest conservation, sustainable resource management, and innovative value chains for the production of goods and services to advance sociobiodiversity in the Amazon.

According to Simões et al. (2021), preserving regional ecosystems requires "ecological management, capable of, at the same time, keeping the forest standing and guaranteeing the production and social reproduction of traditional populations" (p. 155). The implementation of this model of progress by small rural properties in the Brazilian state of Pará depends on addressing the opportunities and challenges associated with the minimum price policy for regional products within the production chain. To this end, the state government introduced the Pará State Plan for Bioeconomy (PlanBio), an innovative public policy framework integrating economic growth, social inclusion, and biodiversity conservation.

Small producers have an artisanal production model that differs from a mass-scale, homogeneous, and standardized product (Peralta, 2016). They adhere to a different production rhythm that values the harmony between traditional communities and forest preservation. Imposing standardized, factory-scale production undermines the ethos of sustainable development and environmental protection.

The Minimum Price Guarantee Policy for Sociobiodiversity Products (PGPMBio) plays a crucial role in ensuring a minimum income for products derived from sociobiodiversity, particularly those produced by traditional populations and family farmers. This policy aims to provide economic stability while enhancing the value of products with environmental, cultural, and economic significance, which are often vulnerable to market fluctuations (Silva et al., 2022). In Pará, PGPMBio is especially significant as it contributes to forest conservation, promotes sustainable practices, and supports

income generation within local communities (Machado, 2019). Consequently, it serves as a strategy to preserve the forest while fostering the social reproduction of its inhabitants.

Despite its benefits and relevance, the PGPMBio faces challenges related to the pricing of sociobiodiversity products. Products rooted in the traditional knowledge of communities and produced by small farmers often struggle to compete with goods from industrial production models (Ministério do Desenvolvimento Agrário, 2009). Addressing this issue requires redefining value across the production chain to align with the sociobiodiversity paradigm (Cavalcante, 2024).

Pará's vast territory, partially covered by the Amazon rainforest, is rich in natural resources and biodiversity. As such, bioeconomy-focused guidelines and programs are vital to ensuring the sustainable use of these resources, promoting economic development, and safeguarding the environment. With a population of 8.78 million, Pará is the most populous state in Brazil's North Region (IBGE, 2024).

The challenges posed by Pará's vast territory become evident when analyzing its social and economic indicators. The state ranks 24th among Brazil's 27 federation units (26 states and the Federal District) in the Human Development Index (HDI), with an HDI-Income value of 0.646, compared to the national average of 0.739. In 2021, Pará's average monthly household income was BRL 847.00, significantly lower than the national average of BRL 1,353.00, placing it 21st among the federation units (IBGE, 2021).

Against this backdrop, this study addresses the following question: What are the opportunities and challenges of the minimum price policy in the context of the Pará State Plan for Bioeconomy (PlanBio)? The objective is to analyze the economic policy of guaranteeing minimum prices through the PlanBio, considering regional specificities and the knowledge of Amazonian traditional peoples.

The research contributes to understanding the foundational principles of public bioeconomy policies in Pará, aiming to guide the sustainable use of natural resources effectively. It also seeks to promote economic and social development among native and settled communities, while ensuring comprehensive environmental conservation.

PlanBio positions the bioeconomy as a strategic axis for sustainable development in Pará by integrating innovation, environmental preservation, and social inclusion. However, the successful implementation of this model relies on robust public policies such as PGPMBio, which reveal both opportunities and challenges. Understanding these dynamics requires exploring the normative guidelines that underpin and direct such efforts within the state.

NORMATIVE GUIDELINES FOR PUBLIC POLICIES ON BIOECONOMY DEVELOPMENT

The bioeconomy encompasses the sustainable production and use of biological resources, generating economic value while fostering the development of sectors such as agriculture, aquaculture, forestry, biotechnology, and natural products. It also drives new business and investment opportunities, stimulating innovation and the establishment of sustainable production chains (Bugge et al., 2016).

In the Brazilian state of Pará, bioeconomy-focused policies and guidelines contribute to job creation and the strengthening of the local economy, while playing a crucial role in combating deforestation and environmental degradation. However, the state faces significant challenges, including pressures on natural resources, deforestation, land grabbing, land conflicts, and various social issues. Consequently, policies that promote the sustainable use of natural resources, biodiversity conservation, and the socioeconomic development of the region are essential.

From this perspective, the legal framework guiding bioeconomy-related public policies in Pará is critical to ensuring the region's sustainable development. The enactment of *Lei n. 9.781 (2022)* (Law no. 9.791/2022) which established the state's climate change policy, marked an important initial step. However, further legal instruments are necessary to strengthen bioeconomy governance and promote policies that advance this economic activity (Cabral et al., 2023).

The general legal regime applies to both state and government policies but must account for distinctions in decision-making models, institutional arrangements, and public policy objective (Bitencourt & Reck, 2021). Moreover, the formulation and analysis of public policies should incorporate factors beyond mere rationality, including the influence of elections, bureaucracies, political parties, and interest groups (Souza, 2006).

Advancing the discourse on legal methodologies within the fields of law and public policy also requires addressing gaps in traditional legal approaches (Vick, 2021). Public policies, as essential instruments for ensuring social rights and development, should be firmly grounded in the framework of social rights (Carvalho, 2019).

In this context, the sustainable development of Pará — emphasizing governance, social participation, and the protection of human rights — depends on the establishment of a robust political and legal framework tailored to the state's reality (Bitencourt & Reck, 2021; Cabral et al., 2023; Carvalho, 2019; Vick, 2021).

The urgency of regulations ensuring the effectiveness of government actions requires the creation of a legal corpus addressing the peculiarities of the bioeconomy at both micro and macro aspects and across state and federal levels. Brazilian bioeconomy legislation encompasses a comprehensive set

of laws and standards that govern the sustainable use of natural resources, biodiversity protection, scientific research, technological innovation, and the development of economic sectors reliant on biological resources.

Since the 1988 Federal Constitution, Brazilian legislation has established fundamental principles regarding environmental protection in the context of natural resource use as a production base. These laws emphasize sustainability and balanced economic development, providing clear rules for the sustainable use of resources.

Key legal frameworks include *Law no. 6.938 (1981)*, the national environmental policy law, which defines principles and guidelines for environmental protection and sustainable resource use, and *Law no. 13.123 (2015)*, the biodiversity law, which regulates access to genetic heritage, traditional knowledge, and benefit-sharing mechanisms.

Integrating state policies with national regulations is essential to strengthen and promote the sustainable and balanced development of the bioeconomy. The state of Pará has developed a regulatory framework aligned with Brazilian legislation, playing a crucial role in regulating and promoting sustainable economic activities based on biological resources.

Notable laws include *Lei n. 9.781 (1999)* (Law no. 9.048/2020), which establishes the state's climate change policy (PEMC/PA) and PlanBio, and *Lei n. 9.781 (2022)*, (Law no. 9.781/2022) which amends and complements.

PlanBio represents a significant milestone in advancing a development model that balances economic growth with environmental protection. By promoting the sustainable use of Pará's biological resources and fostering innovation, PlanBio has the potential to boost the regional economy, create jobs, and enhance social well-being while safeguarding Amazonian biodiversity for future generations.

However, its success depends on sustained commitment from public and private stakeholders, alongside policies and practices that adopt a holistic and inclusive approach to socioeconomic and environmental development.

Despite this progress, the implementation of the bioeconomy in Pará faces several challenges. These include the need to strengthen research and innovation infrastructure, improve regulatory and incentive frameworks, and promote the socioeconomic inclusion of traditional communities and indigenous peoples. These challenges, however, also present opportunities for Pará to position itself as a regional leader in the bioeconomy, leveraging its rich natural and cultural heritage sustainably and equitably.

THEORETICAL FRAMEWORK

The Pará State Plan for Bioeconomy (PlanBio) and Amartya Sen's capability approach

The Brazilian Amazon faces a troubling paradox. While it is home to 25 million Brazilians, constitutes approximately 60% of Brazil's territory, and is central to global debates on climate, environmental protection, and biodiversity, it is often regarded as peripheral to Brazil's national interests. Despite its vast wealth of natural resources, the region continues to lack solutions for human development that reflect its social and environmental significance, hindered by persistent and conflicting economic and political interests (Garrett et al., 2024; Mello, 2015).

From this perspective, the economic exploitation of the Amazon's resources contrasts with the poverty and low human development indices prevalent in Brazil's North and Northeast Regions (IBGE, 2024). This discrepancy requires exploring development alternatives that move away from the prevailing extractivist, consumerist, and neoliberal paradigms in the Amazon.

Thus, this research seeks to evaluate the extent to which the Pará State Plan for Bioeconomy can be reinterpreted through the lens of Amartya Sen's capability approach, as outlined in his work *Development as freedom* Sen (2018).

This section will delve into three central themes of Sen's (2018): work: (a) the capability approach, (b) critiques of gross domestic product (GNP) as a measure of development, and (c) hunger and deprivation as manifestations of injustice.

Development as freedom and the capability approach

Amartya Sen (2018) proposes a transformative vision of human development centered on expanding people's real freedoms. He argues that freedom is both the means and the end of development, enabling individuals to choose their life paths and determine how they live. For instance, freedom allows a person to choose to work as a farmer (Sen, 2018).

Sen's (2018) concept of 'freedom' transcends the mere absence of coercion, encompassing the capabilities necessary for individuals to live a valued life. According to Comim (2021), Sen highlights that individual freedom is the main end and the main means of development, emphasizing the role of active participation in political and social decision-making to overcome poverty and deprivation, expanding real freedom.

Comim (2021) further notes Sen's argument that development transcends economic growth and should be assessed for its ability to expand individual freedoms. Sen's critique of GNP as a development measure highlights the importance of indicators that reflect people's capabilities and freedoms (Comim, 2021). By promoting social inclusion

and environmental justice and valuing traditional knowledge, initiatives like PlanBio align with Sen's (2018) perspective on development.

Processes that deprive individuals of general freedoms contribute to poverty. Sen (2018) asserts that freedom serves two crucial roles, (a) enabling people to live the lives they value and (b) enhancing their capability to participate effectively in public policies (Sen, 2018).

Freedom, therefore, plays both an evaluative role — measuring societal success by the substantive freedoms its members enjoy — and a role related to efficacy — people enjoying freedom can take care of themselves and others, i.e., with freedom, individuals are agents of their own development (Sen, 2018). Freitas et al. (2016) emphasize that “the results of development improve not only the quality of life but also people's productive abilities and shared economic growth.” (p. 54).

Sen's (2018) approach extends beyond the Aristotelian concept of eudaimonia (happiness or human flourishing), emphasizing substantive freedoms, needs, and living conditions as essential elements of a good life. Máximo (2018): observes, “Promoting human well-being involves developing rational capacities, encouraging reflection in human activities, and, consequently, building a good life (p. 60).”

Regarding Sen's (2018) critique of GNP, he argues that this metric fails to capture quality of life, as development should be measured by freedoms and capabilities. Sen (2018) argues that labor and the conception of markets influence the general ideology where GNP and per capita income are criteria to assess development. For the author, replacing bonded and forced labor with wage labor rooted in freedom is a cornerstone of the modern economy (Sen, 2018). Máximo (2018). highlights this, noting, “By contrasting bonded labor and salaried labor, Sen emphasizes the libertarian nature of markets, framing work relationships as truly free. (p. 59).”

Hunger and deprivation are violations of freedom and justice (Sen, 2018). preventing individuals from achieving their capabilities. A starving person lacks the capability to be a productive worker or active citizen. Therefore, public policies that eliminate hunger and deprivation are essential (Sen, 2018). Freitas et al. (2016) emphasize that capabilities encompass a range of alternatives that collectively aim to achieve social goals.

Mueller (1999) introduces the 'economics of survival,' which focuses on preserving opportunities for future generations by addressing the interconnections between the economy and the environment, focusing on physical dimensions rather than monetary flows. Mueller highlights the relevance of the second law of thermodynamics, arguing that material and energy degradation imposes limits on sustainable economic growth and produces substantial and permanent damages to the economic system. He advocates for integrating environmental considerations into economic analysis to ensure long-term sustainability.

Mueller (1999) introduces the ‘economics of survival,’ which focuses on preserving opportunities for future generations by addressing the interconnections between the economy and the environment, focusing on physical dimensions rather than monetary flows. Mueller (1999) highlights the relevance of the second law of thermodynamics, arguing that material and energy degradation imposes limits on sustainable economic growth and produces substantial and permanent damages to the economic system. He advocates for integrating environmental considerations into economic analysis to ensure long-term sustainability.

Finally, it is crucial to emphasize the importance of cultural diversity for development, as it enriches people’s options and opportunities (Sen, 2018). Cultural diversity fosters a broader range of products and services and should be prioritized in the formulation of public policies.

Sen (2018) identifies hunger and deprivation as central issues in development, arguing that they hinder individuals from realizing their full potential. Hunger and deprivation undermine a person’s ability to be a productive worker or an active citizen. Therefore, the eradication of these conditions should be a primary focus of public policies aimed at human development.

In the context of Pará State Plan for Bioeconomy (PlanBio), the Minimum Price Guarantee Policy for Sociobiodiversity Products (PGPMBio) program is a vital tool to combat hunger and deprivation. By establishing minimum prices for extractive products, PGPMBio enhances food security and generates income for traditional communities that often rely on sociobiodiversity for their livelihoods.

Ensuring minimum prices is not merely an economic concern but also a matter of social justice and freedom. By guaranteeing fair remuneration for extractivists, PGPMBio enables these communities to lead dignified lives, achieve food security, and develop their capabilities.

Moreover, by valuing products derived from sociobiodiversity, PGPMBio strengthens traditional cultures and ways of life, which are essential to the identity and well-being of these communities. Through economic and social inclusion, the policy helps reduce inequalities and supports the development of a more equitable and sustainable model of growth.

PGPMBio aligns with the second Sustainable Development Goal (SDG2) of the United Nations, which seeks to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture. By guaranteeing minimum prices for extractive products, PGPMBio contributes to food security and poverty reduction among extractive producers. This initiative fosters social justice, promotes economic inclusion, combats hunger and poverty, and supports the creation of more resilient and sustainable food systems.

Pará State Plan for Bioeconomy: A coordination for sustainable development

The Pará State Plan for Bioeconomy (PlanBio)¹ emphasizes that a significant portion of the Amazon rainforest is located within Pará, recognizing the region’s extraordinary potential for “a sustainable and inclusive socioeconomic development model based on standing forests and guaranteeing the rights of Indigenous peoples, *quilombolas*, and traditional communities” (Governo do Estado do Pará, 2022, p. 15).

The introduction to the plan highlights that, according to quantitative research, 78% of Pará’s territory is covered by native vegetation, including forests, grasslands, and savanna formations. This highlights the central goal of leveraging the bioeconomy to position Pará as a leader in Brazil and globally in sustainable development (Governo do Estado do Pará, 2022).

It is important to note that PlanBio is the culmination of systematic efforts initiated with the State Policy on Climate Change (PEMC, Law no. 9,781/2022 - Lei n. 9.781, 2022)² and the State Plan Amazônia Agora (PEAA, Decree no. 941/2020 - Decreto n. 941, 2020)³.

PlanBio aims to transform Pará’s economic and social matrix by promoting sustainable development grounded in forest preservation and the protection of traditional populations’ rights. The plan is structured around three core axes: (a) research, development, and innovation, which is focused on translating theoretical and scientific knowledge into practice by developing new methods, mechanisms, and interventions; (b) cultural heritage and genetic knowledge, centered on recognizing and safeguarding traditional practices, integrating intangible heritage, and promoting socio-environmental integrity and capacity building; and (c) sustainable production chains and businesses, dedicated to valuing the region’s biodiversity products and chains, and creating an attractive environment for foreign investment (Governo do Estado do Pará, 2022).

Among these, the third axis (sustainable production chains and businesses) is particularly critical for advancing Pará’s bioeconomy. It focuses on adding value to biodiversity products, fostering new sustainable production chains and businesses, and attracting investments.

The specific objectives of this axis include (a) valuing bioproducts, adding value to biodiversity products through certifications, cultivar protection, and geographical indications to highlight the unique qualities of the region, and (b) promoting investments, which means attracting resources to strengthen production chains and sociobiodiversity businesses, thereby generating employment and income equitably.

The strategic goals of PlanBio encompass (a) marketing and communication, developing strategies to promote new bioeconomy markets and strengthen Amazon’s identity; (b) investment environment, through creating conditions that attract investments in bioeconomy production chains, fostering

local development, and ensuring equitable benefit distribution; (c) mapping and promotion, identifying and showcasing the potential of bioeconomy production chains, attracting private investments, and supporting pre-competitive arrangements; and (d) regulatory framework, preparing a formal document to encourage bioeconomy production and drive the development of innovative technologies.

The expected results of the initiatives include significant opportunities for expanding forest areas through increased preservation, promoting agroforestry and regenerative systems to enhance production systems, diversifying the production matrix with more bioeconomy products, and adding value to these products by facilitating access to credit and expanding their commercialization.

The plan also outlines the desired impacts, which include (a) biodiversity conservation, (b) reduction of deforestation in pursuit of climate neutrality, (c) food security for traditional and local communities, (d) improved quality of life for the population of Pará, and (e) employment and income generation for the local population.

Sen's (2018), work, while not directly addressing sustainable production chains and businesses, provides valuable insights through his capability approach and perspective on human development. Sen emphasizes that human development should be measured by the expansion of people's capabilities to live the lives they value. This shifts the focus toward the freedoms and opportunities available to individuals. In the context of sustainable productive chains and business, Sen's (2018) capability approach can be applied in many forms, such as :

1. Analysis of working conditions: ensuring decent working conditions across the production chain, including fair wages, reasonable working hours, and safe, healthy environments.
2. Social and environmental impact: considering the social and environmental impacts of production activities, from raw material sourcing to product disposal. This includes measures to reduce pollution, conserve natural resources, and promote local development.
3. Fair income distribution: advocating for equitable income distribution along the production chain, ensuring fair compensation for all contributors.
4. Community empowerment: investing in education, healthcare, and infrastructure to empower local communities, thereby enhancing their capabilities and fostering sustainable human development.

Although Sen (2018) did not explicitly address these topics, his ideas are highly relevant. By focusing on expanding people's capabilities and promoting human development, the capability approach contributes to building a fairer and more sustainable future for all.

In the context of Pará's socioeconomic development, Sen's approach offers a robust theoretical framework for evaluating public policies like the PGPMBio.

Sen (2018) argues that development should not be measured solely by economic growth but by the expansion of real freedoms that people enjoy. By ensuring fair prices for extractive products, the PGPMBio enhances the ability of producers to achieve their life goals, whether through increased income, food security, or the preservation of traditional ways of life.

Sen's (2018) critique of GNP as a sole measure of development also aligns with PGPMBio's approach. By focusing on extractive producers' income and quality of life, the policy reflects Sen's view that development should be assessed through indicators that capture people's capabilities and freedoms rather than aggregate economic growth alone.

Hunger and deprivation, which Sen (2018) identifies as violations of freedom and justice, are directly addressed by the PGPMBio. By guaranteeing minimum prices for sociobiodiversity products, the policy contributes to food security, poverty reduction, social justice, and economic inclusion.

Finally, Sen's (2018) defense of cultural diversity resonates with PGPMBio's commitment to valuing traditional knowledge and the wisdom of extractive communities. By recognizing the importance of sociobiodiversity and including traditional peoples in the economy, the policy helps preserve local cultures while fostering a more equitable bioeconomy model.

The PGPMBio and PlanBio are interconnected in pursuing a sustainable development model for Pará. By guaranteeing a minimum income for extractive workers, the PGPMBio supports the continuity of their activities and the conservation of biomes. This directly complements PlanBio's goal of strengthening the state's bioeconomy by developing sustainable production chains. The assurance of minimum prices promotes extractive production, generates income, and advances the bioeconomy in an inclusive and equitable manner.

Both initiatives recognize the importance of sociobiodiversity, seeking to add value to extractive products while considering their economic and environmental benefits. Together, they contribute to achieving the United Nations Sustainable Development Goals (SDGs), particularly SDG 2, which aims to eradicate hunger and promote sustainable agriculture.

METHODOLOGY

Data triangulation is justified by the need to understand the topic comprehensively and in-depth by comparing different sources of information (Gil, 2019; Yin, 2014). Figure 1 illustrates the national and state legislation on bioeconomy, along with sociodemographic

data from Brazil and Pará, analyzed through the lens of Sen's (2018) capability approach. This procedure allowed for a more assertive analysis and discussion of the trajectory, construction process, and implementation of the Minimum Price Guarantee Policy for Sociobiodiversity Products (PGPMBio) and Pará State Plan for Bioeconomy (PlanBio).

The bibliographic research included a literature review using the Scielo and Scopus databases, with the keywords 'bioeconomy,' 'sustainable development,' 'public policies,' and 'Amartya Sen's capability approach.' This phase was essential

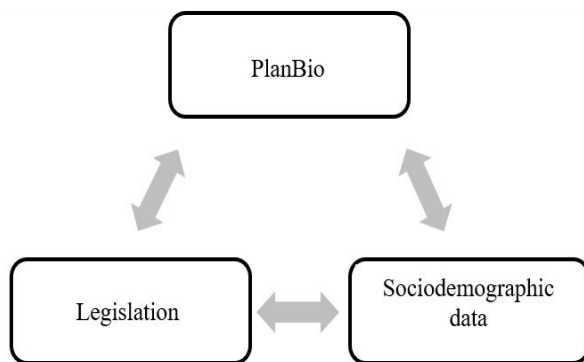


Figure 1. Data triangulation.

Source: Elaborated by the authors.

for contextualizing the discussions and served as a starting point for critically analyzing Pará State Plan for Bioeconomy, considering the state's social, environmental, and economic specificities.

The documentary research involved analyzing laws, decrees, ordinances, plans, and programs related to the minimum price policy, as well as bioeconomy and climate strategies. The ordinances issued by the Ministry of Agrarian Development and Family Farming (MDA) were examined to provide a comprehensive understanding of the national strategy for applying minimum prices to sociobiodiversity products. Additionally, the analysis of state ordinances clarified how Pará applies these minimum prices. The PlanBio of the state was also evaluated within this legislative framework.

Socioeconomic and demographic data were sourced from research institutions, such as IBGE, and from the Brazilian National Supply Company (Conab) (Portaria n. 41, 2023). These data supported the identification of regional characteristics and the key challenges faced by PlanBio, offering insights into the population, human development index, income levels, and the sale prices of extractive products.

The constructs used in data analysis were public policies, bioeconomy, and minimum prices. 'Public policies' emerged as a construct based on the understanding that policies shape

individual behaviors and can be influenced by effectively leveraging individuals' capabilities (Cabral et al., 2023; Carvalho, 2019; Souza, 2006). The 'bioeconomy' construct was relevant due to its role in combating food insecurity, promoting sustainable local development, and fostering new businesses (Bugge et al., 2016; Cabral et al., 2023). Finally, 'minimum prices' were tied to the 'public policies' construct, emphasizing their dual role in environmental conservation and local development (Cader & Villac, 2023; Diniz & Cerdan, 2017; Governo do Estado do Pará, 2022).

Based on data analysis, this research highlights the opportunities and challenges of the minimum price policy in promoting socioeconomic development and protecting sociobiodiversity in Pará, considering the state's unique characteristics. This evaluation of PGPMBio within the context of PlanBio seeks to understand its impact on the income and quality of life of extractive producers and traditional communities, as well as its contribution to the conservation of sociobiodiversity and sustainable development in Pará.

PGPMBio is designed to conserve Brazilian biomes by establishing minimum prices for 17 extractive products. Simultaneously, it aims to make extractive activities economically viable, fostering sustainable development and promoting social inclusion.

RESULTS

The Pará State Plan for Bioeconomy: Coordination of strategies for sustainable development

Recognizing the unique challenges within the sustainability context requires developing public policies that promote a fair and equitable economic valuation of extractive products in order to encourage engagement and ensure the continuity of extractive activities.

In response, the federal government established the PGPMBio, a policy that sets minimum prices for 17 extractive products. This initiative contributes to the conservation of Brazilian biomes and provides subsidies to producers when market prices fall below the established minimum.

The products currently covered by this policy include: açaí, andiroba, babassu, baru, natural rubber, buriti, extractive cocoa, Brazil nut, juçara, macaúba, mangaba, murumuru, pequi, piassava, pine nut, managed pirarucu (fish), and umbu (Governo do Estado do Pará, 2022). Table 1 presents the products from Pará included in PlanBio 2022 and the amount paid by the PGPMBio to producers:

Table 1. Produtos extrativistas do estado do Pará no PlanBio 2022.

Products	Investment
Açaí	BRL 96,800
Natural rubber	BRL 45,900
Murumuru	BRL 42,400
Andiroba (nut)	BRL 23,900
Buriti	BRL 8,000
Extractive cocoa	BRL 5,600

Note. Elaborated by the authors.

PlanBio 2022 reports that, in 2021, PGPMBio disbursed a net amount of BRL 222,700 to extractive producers in the state of Pará, distributed as follows: BRL 96,800 to açaí producers, BRL 45,900 to natural rubber producers, BRL 42,400 to murumuru producers, BRL 23,900 to andiroba nut producers, BRL 8,000 to buriti producers, and BRL 5,600 to extractive cocoa producers. For example, in May 2022, the price of andiroba nuts in Pará was BRL 0.77/kg, while the minimum price defined by PGPMBio was BRL 1.42/kg, representing an 84% increase (Governo do Estado do Pará, 2022).

The remuneration provided by Conab (Brazilian National Supply Company) to extractivists is calculated based on the difference between the minimum price set by PGPMBio and the market price at which the extractive products are sold.

For the 2024 harvest, the minimum pricing for extractive products in the state of Pará was established by Portaria n. 41 (2023), issued on December 29, 2023, by the Ministry of Agrarian Development and Family Farming (MDA). Table 2 shows the updated values, applicable between January and December 2024:

Table 2. Minimum value pricing for extractive products in the state of Pará by MDA ordinance 41, published on December 29, 2023 (Portaria n. 41, 2023).

Products	Minimum prices (BRL/kg)		
	2023	2024	%
Açaí (fruit)	1.81	1.98	9.39%
Andiroba (nut)	2.36	2.37	0.42%
Natural rubber (Cernambi)	7.18	7.41	3.20%
Buriti (fruit)	1.92	2.63	36.98%
Cocoa (bean)	9.33	9.75	4.50%
Brazil nut (in shell)	1.21	3.66	202.48%
Macaúba (fruit)	0.56	0.54	-3.57%
Murumuru (fruit)	2.69	2.68	-0.37%
Pequi (fruit)	0.46	0.53	15.22%
Piassava (fiber)	3.21	2.98	-7.17%
Umbu (fruit)	1.26	1.09	-13.49%

Note. Elaborated by the authors.

It is important to highlight that the state of Pará benefited from the minimum price policy for several products. However, it was not included in the single-price policy for extractive producers concerning babassu, baru, juçara, mangaba, pine nut, and pirarucu. As a result, these products are not represented in Table 2.

When establishing guidelines for setting minimum prices, it is crucial to recognize the sociobiodiversity role that extractive activities play within traditional communities. These activities sustain local economies while providing invaluable environmental benefits (Diniz & Cerdan, 2017).

DISCUSSION

Public policies for sociobiodiversity: Challenges and opportunities

According to data from the Brazilian National Supply Company (Companhia Nacional de Abastecimento [Conab]) (Souza, 2022), additional values related to positive externalities⁴ aimed at protecting forests are included in product valuations. These elements must be considered to significantly increase the monetary value of sociobiodiversity products (Lopes & Chiavari, 2022).

Data released by the Brazilian National Institute for Space Research (INPE) in November 2023 provide insights from the Satellite Monitoring Program for Deforestation of the Brazilian Amazon Rainforest (Prodes). INPE (2023), reports that deforestation, primarily driven by agriculture, livestock, logging, and mining, has shown consistently declining rates in Pará since 2020. This trend is observable in both Prodes data and the Real-Time Deforestation Detection System (Deter), which publishes monthly deforestation alert rates.

Since its inception in 1988, Prodes has monitored clear-cut deforestation in the Legal Amazon region using satellite images. The annual deforestation rates derived from this monitoring are crucial for formulating public policies, as noted by (INPE, 2023). Between January and October 2023, Pará recorded a 48% reduction in the area with deforestation alerts compared to the same period in 2022, dropping from 3,272 km² to 1,711 km² (INPE, 2023).

Studies have highlighted the effectiveness of specific regional public policies, such as the ecological state tax (called ICMS, similar to the VAT in the US), which incentivizes environmental conservation by redistributing tax revenues to municipalities that maintain protected areas and reduce deforestation.

Research by Brito et al. (2024), indicates that while the 'green' ICMS serves as an incentive for municipalities with significant green areas, further improvements are needed to enhance its effectiveness in environmental preservation and sustainability.

Since March 2023, Pará has reported consecutive declines in deforestation alert rates. Across the Legal Amazon, the area under deforestation alerts between January and October 2023 was 4,750 km², representing a 50% reduction compared to the same period in 2022, when the total was 9,493 km². This reflects an absolute decrease of 4,744 km² (INPE, 2023). These data highlight significant progress in reducing deforestation in the Amazon region, demonstrating the impact of conservation policies and environmental monitoring efforts.

Environmental benefits include climate stability, sustainable water resource management, mitigation of soil siltation, and preservation of habitats for diverse flora and fauna. Current market practices often undervalue these components of sustainable local development. To address this disparity, it is essential to highlight the economic and ecological relevance of incorporating ecosystem characteristics into the pricing of sustainable products.

The Minimum Price Guarantee Policy for Sociobiodiversity Products (PGPMBio) aligns with Amartya Sen's capability approach by promoting the expansion of real freedoms for extractivists, granting them greater autonomy to achieve their life goals. The minimum price guarantee directly enhances extractivists' ability to live with dignity, secure food, and develop their capabilities, as emphasized by Sen (2018).

PGPMBio works as an instrument of social justice, contributing to reducing inequalities and fostering economic and social inclusion in Pará. By ensuring minimum prices for extractive products, the policy helps overcome poverty and deprivation, promoting equal opportunities and individual freedoms, in line with Sen's (2018) perspective.

The policy also aligns with Sen's (2018) critique of gross domestic product (GNP) as the primary measure of development by focusing on the income and quality of life of extractivists. PGPMBio recognizes the importance of indicators that reflect people's capabilities and freedoms, advancing a more inclusive and comprehensive vision of development Sen (2018).

Additionally, PGPMBio addresses hunger and deprivation by ensuring minimum prices that contribute to food security and the eradication of hunger in extractivist communities. By fostering food security and reducing poverty, the policy aligns with Sen's (2018) perspective on combating hunger and deprivation as essential to expanding human freedoms.

The bioeconomy in Pará: Innovation and sustainability

Based on the definition of minimum prices for extractive products, sustainable development aims to stimulate increased productivity and income for family farmers, traditional peoples, and communities, both in terms of self-consumption production and socioeconomic development.

Therefore, the minimum price policy aligns with United Nations (UN) Sustainable Development Goal (SDG) number 2, which aims to end hunger and promote sustainable agriculture (Cader & Villac, 2023).

Guaranteed minimum prices for extractive products, such as Brazil nuts and açai, improve extractive workers' income and quality of life, expanding their freedom of choice and well-being (Governo do Estado do Pará, 2022). This positive impact is in line with Amartya Sen's (2018), approach, which emphasizes the importance of individual freedom for human development. Sen (2018) argues that freedom is essential for people to live the kind of life they value and to actively participate in the construction of public policies.

Minimum prices and sustainable development

The PGPMBio stands out for not focusing solely on economic growth but also on improving the quality of life and food security of extractive producers (Governo do Estado do Pará, 2022). This approach reflects Sen's (2018) criticism of using gross domestic product (GNP) as the sole measure of development, advocating for the inclusion of indicators that capture individual capabilities and freedoms. For Sen (2018), development should be assessed by its ability to expand people's real freedoms, enabling them to achieve their life goals.

By guaranteeing minimum prices for sociobiodiversity products, the PGPMBio contributes to food security and poverty reduction among extractive producers, promoting social justice and economic

inclusion (Governo do Estado do Pará, 2022). This action aligns with Sen's (2018) view on the importance of combating hunger and deprivation, which he considers violations of freedom and justice. For Sen (2018), eradicating hunger and deprivation should be a central focus of public policies aimed at human development.

Euler et al. (2023) and Lopes and Chiavari (2022) highlight that minimum price guarantee policies positively impact the income and quality of life of extractive producers, promoting social inclusion and sustainable development. Simões et al. (2021) and Diniz and Cerdan (2017) corroborate this perspective, noting that the PGPMBio and other policies to encourage sustainable extractivism also contribute to conserving sociobiodiversity and Brazilian biomes. On the other hand, Brito et al. (2024) and Cader and Villac (2023) point out challenges in implementing these policies, such as the need for greater financial investment and improvements to ensure the effectiveness of the actions.

In this context, the valorization of sociobiodiversity products and traditional knowledge by the PGPMBio promotes cultural diversity and expands opportunities for extractive communities (Governo do Estado do Pará, 2022). This perspective aligns with Sen's (2018) defense of cultural diversity as an important development component. Sen (2018) argues that cultural diversity enriches people's options and opportunities and should be considered when developing public policies.

The PGPMBio contributes to food security and sustainability, which Sen (2018) considers crucial for human development. By guaranteeing minimum prices for extractive products, the policy encourages sustainable production and contributes to the food security of extractive communities, promoting social justice and economic inclusion.

Implementing the PGPMBio and PlanBio in the state of Pará faces challenges, such as insufficient financial resources and the need to strengthen research and innovation infrastructure (Governo do Estado do Pará, 2022). These challenges can limit the expansion of people's capabilities and the achievement of full development, according to Sen (2018). However, overcoming these challenges will ensure a fairer, more inclusive, and sustainable development model.

FINAL CONSIDERATIONS AND THEORETICAL IMPLICATIONS

The research revealed that the PGPMBio, aligned with Amartya Sen's capability approach, positively impacts the economy of small producers in Pará, making extractive activities more economically viable. This drives sustainable development and social inclusion in the region by guaranteeing income and stimulating the responsible production of forest products.

Despite the progress, the study identified that the financial resources allocated to the PGPMBio are still limited and insufficient to significantly impact extractive activities. It is crucial to increase investment in more robust public policies that enable the creation of new strategies and the improvement of existing ones to strengthen the sector.

In this context, based on the minimum price policy for extractive products, sustainable development seeks to increase the productivity and income of family farmers, peoples, and traditional communities. This strategy is aligned with the UN's Sustainable Development Goal (SDG) number 2, which aims to eradicate hunger and promote sustainable agriculture.

The study concludes that the bioeconomy in Pará, driven by PlanBio and PGPMBio, represents a promising path for the state's sustainable development. However, for the bioeconomy to generate effective and lasting results, it is essential to overcome existing challenges with public policies, such as the lack of robust infrastructure and adequate investments. Only then will it be possible to ensure that the benefits of the bioeconomy reach the entire population fairly and equitably, promoting social inclusion and environmental conservation.

Thus, the originality of this research lies in the combination of Amartya Sen's theory of capabilities with the constructs of public policies, bioeconomy, and PGPMBio, which intertwine in the search for sustainable and inclusive socio-economic development in the state of Pará. This triad is based on valorizing the standing forest, guaranteeing the rights of indigenous peoples, *quilombolas*, and traditional communities, and promoting extractive activities as central elements to boost the regional bioeconomy.

This positive impact is related to Amartya Sen's approach, which emphasizes the importance of individual freedom for human development. By guaranteeing a minimum income to extractivists, PGPMBio increases their

freedom of choice and well-being, allowing them greater autonomy to make life decisions and actively participate in the local economy.

PGPMBio stands out for focusing not only on economic growth but also on improving extractive producers' quality of life and food security. This approach reflects Sen's criticism of using GNP as the sole measure of development, advocating for the inclusion of indicators that capture individual capabilities and freedoms. For Sen, development should be assessed by its ability to expand people's real freedoms, enabling them to achieve their life goals. Therefore, by promoting food security and poverty reduction among extractive producers, PGPMBio contributes to more inclusive development, which goes beyond economic growth and considers the needs and aspirations of local communities.

By guaranteeing minimum prices for sociobiodiversity products, PGPMBio contributes to food security and poverty reduction among extractive producers, promoting social justice and economic inclusion. For Sen, eradicating hunger and deprivation should be a central focus of public policies aimed at human development. PGPMBio contributes to social justice and the construction of a more humane and egalitarian development model by guaranteeing basic freedoms such as access to food and a decent income.

PGPMBio's appreciation of sociobiodiversity products and traditional knowledge promotes cultural diversity and expands opportunities for extractive communities. This perspective aligns with Sen's defense of cultural diversity as an important development component. Sen argues that cultural diversity enriches people's options and opportunities and should be considered when developing public policies. By promoting extractive workers' economic and social inclusion, PGPMBio contributes to preserving local culture and developing a more just and equitable bioeconomy model.

By guaranteeing minimum prices for extractive products, the policy encourages sustainable production and contributes to the food security of extractive communities, promoting social justice and economic inclusion. Applying the capability approach to the analysis of the PGPMBio reveals that the policy transcends the mere economic dimension, directly impacting the ability of extractivists to achieve their life goals and actively participate in society.

The implementation of the PGPMBio and PlanBio faces challenges, such as insufficient financial resources and the need to strengthen the research and innovation infrastructure, which hinder a more expressive impact of the proposed public policies. These challenges can limit the expansion of people's capabilities and the achievement of

full development, according to Sen. However, overcoming these challenges will ensure a fairer, more inclusive, and sustainable development model. The effectiveness of the policy depends on an in-depth analysis of its results and challenges, seeking to understand how it relates to the reality of producers and the objectives of PlanBio. From Sen's perspective, the PGPMBio catalyzes human development, promoting social justice and economic inclusion.

The research presents some limitations and weaknesses. Although the qualitative nature of the research allows for an in-depth analysis of the topic, it may present challenges in terms of generalizing the results. Additionally, data triangulation, despite strengthening the robustness of the analysis, may be complex and require additional effort to integrate the different sources of information cohesively.

The research also focuses on the analysis of legislation and socioeconomic data and does not explore in depth the perceptions and experiences of the extractivists themselves regarding the PGPMBio. Including qualitative research methods, such as interviews and focus groups, could enrich the analysis and provide a more comprehensive understanding of the impacts of the policy on the lives of extractivists.

Another point to be considered is the need to deepen the analysis of the challenges and potential of the PGPMBio concerning its implementation and effectiveness. The research identifies some challenges, such as the need for more robust financial resources. However, it could deepen the analysis of the policy implementation mechanisms, bureaucratic obstacles, and the challenges of ensuring its effectiveness among extractive communities.

NOTES

1. According to the plan, the "bioeconomy vision goes beyond sustainable production and climate resilience. It encompasses actions of green infrastructure, job creation, and the potential for low-carbon socioeconomic growth. It aims to promote nature-based solutions (NbS) to facilitate the transition to a diversified economy, capable of creating and enhancing local production processes and sociobiodiversity. Furthermore, it seeks to safeguard genetic heritage while protecting and valuing the knowledge and culture of traditional peoples" ([Governo do Estado do Pará, 2022](#), p. 15).
2. PEMC aims to integrate global efforts to promote measures to achieve the necessary conditions to adapt to and mitigate the impacts of climate change ([Governo do Estado do Pará, 2022](#)).

3. This legislation established goals to make Pará a state with zero net emissions (ELZ), or carbon neutral, in the 'land use and forests' sector from 2036. These goals were distributed across four axes of the PEAA, among which is 'low-carbon socio-economic development,' in which the bioeconomy plan is anchored as one of the socioeconomic development models capable of promoting a transition to a carbon-neutral state ([Governo do Estado do Pará, 2022](#)).
4. A positive externality occurs when an action or activity generates additional benefits for other people or society as a whole, beyond those directly involved in the activity. These additional benefits are not directly compensated by those engaged in the action. For example, sustainable extractive activities, such as the collection of non-timber products (açai, andiroba, cocoa, among others), contribute to the conservation of the Amazon rainforest and the valorization of sociobiodiversity products through minimum price policies, which promote the sustainable enhancement of the economy in traditional communities.

REFERENCES

- Bitencourt, C., & Reck, J. (2021). Políticas públicas de governo e de estado - uma distinção pouco complexa: necessidade de diferenciação entre modelos decisórios, arranjos institucionais e objetivos de políticas públicas de governo e estado. *Revista de Direito Econômico e Socioambiental*, 12(3), 631-667. <https://doi.org/10.7213/rev.dir.econ.soc.v12i3.28105>
- Brito, K. C. B., Santos, F. M. dos Filho, & Moura, T. (2024). O ICMS Verde como instrumento de gestão ambiental no estado do Pará. *Contribuciones a Las Ciencias Sociales*, 17(3), 1-15. <https://doi.org/10.55905/revconv.17n.3-283>
- Bugge, M. M., Hansen, T., & Klitkou, A. (2016). What is the bioeconomy? A review of the literature. *Sustainability*, 8(7), 691. <https://doi.org/10.3390/su8070691>
- Cabral, B., Mafra, R. Z., & Lasmar, D. J. (2023). Diretrizes normativas à bioeconomia no estado do Amazonas. *Revista Contemporânea*, 3(7), 8286-8307. <https://doi.org/10.56083/rcv3n7-049>
- Cader, R., & Villac, T. (2023). *Governança e Sustentabilidade: Um elo necessário no Brasil*. Fórum. <https://digital.editoraforum.com.br/livro/governanca-e-sustentabilidade-44111>
- Carvalho, O. (2019). As políticas públicas como concretização dos direitos sociais. *Revista de Investigações Constitucionais*, 6(3), 773. <https://doi.org/10.5380/rinc.v6i3.59730>
- Cavalcante, R. L. S. (2024). Integração de design biofilico e sociobiodiversidade amazônica: Estratégias para o desenvolvimento sustentável e inovação ambiental. *Contribuciones a Las Ciencias Sociales*, 17(1), 2826-2838. <https://ojs.revistacontribuciones.com/ojs/index.php/clcs/article/view/3288/2793>
- Comim, F. (2021). Além da liberdade: Anotações críticas do desenvolvimento como liberdade de Amartya Sen. *Independently Published*.
- Decreto n. 941, de 3 de agosto de 2020. (2020). Institui o Plano Estadual Amazônia Agora (PEAA), cria o Comitê Científico do Plano e o Núcleo Permanente de Acompanhamento do Plano e dá outras providências. <https://www.semam.pa.gov.br/legislacao/files/pdf/192188.pdf>
- Diniz, J. D. A. S., & Cerdan, C. (2017). Produtos da sociobiodiversidade e cadeias curtas: aproximação socioespacial para uma valorização cultural e econômica. In M. Gazolla, & S. Schneider. *Cadeias curtas e redes agroalimentares alternativas: Negócios e mercados da agricultura familiar*. (pp. 259-280). EdUFRGS.
- Euler, A. M. C., Aubertin, C., & Cialdella, N. (2023). A sociobiodiversidade amazônica em busca de mercados internacionais. *Estudos de Sociologia*, 28(2), e023013. <https://doi.org/10.52780/res.v28iesp.2.18868>
- Freitas, T. D., Cassol, A., Conceição, A. F., & Nierdele, P. A. (2016). Sem e o desenvolvimento como liberdade (pp. 50-62). In *Introdução às teorias do desenvolvimento*. Editora da UFRGS.
- Garrett, R., Ferreira, J., Abramovay, R., Brandão, J., Brondizio, E., Euler, A., Pinedo, D., Porro, R., Emiliano Cabrera Rocha, Sampaio, O., Schmink, M., Torres, B., & Varese, M. (2024). Transformative changes are needed to support socio-bioeconomies for people and ecosystems in the Amazon. *Nature Ecology & Evolution*, 8, 1815-1825. <https://doi.org/10.1038/s41559-024-02467-9>
- Gil, A. C. (2019). Métodos e Técnicas de Pesquisa Social (7th ed). Atlas.
- Governo do Estado do Pará. (2022). Plano Estadual de Bioeconomia do Pará: Planbio do Pará. Portaria SEMAS n° 651/2022. https://www.semam.pa.gov.br/wp-content/uploads/2023/01/Plano-Estadual-V9_pg-simple-2-1.pdf
- Instituto Brasileiro de Geografia e Estatística (2021). *IDH do estado do Pará IBGE | Cidades@ | Pará | Pesquisa | Índice de Desenvolvimento Humano | IDH*. <http://cidades.ibge.gov.br/brasil/pa/pesquisa/37/0>
- Instituto Brasileiro de Geografia e Estatística. (2024). *Pesquisa Nacional por Amostra de Domicílios Contínua (PNAD)*. <https://www.ibge.gov.br/estatisticas/sociais/populacao/9171-pesquisa-nacional-por-amostra-de-domicilios-continua-mensal.html>
- Instituto Nacional de Pesquisas Espaciais. (2023). Pará registra queda de 21% no desmatamento, segundo o INPE. <https://www.semam.pa.gov.br/2023/11/10/para-registra-queda-de-21-no-desmatamento-segundo-o-inpe/>

- Lei n. 6.938, de 31 de agosto de 1981. (1981). Dispõe sobre a Política Nacional do Meio Ambiente, seus fins e mecanismos de formulação e aplicação, e dá outras providências. https://www.planalto.gov.br/ccivil_03/Leis/L6938.htm
- Lei n. 9.781, de 19 de janeiro de 1999. (1999). Institui a Taxa Processual sobre os processos de competência do Conselho Administrativo de Defesa Econômica - CADE, e dá outras providências. https://www.planalto.gov.br/ccivil_03/LEIS/L9781.htm
- Lei n. 9.781, de 27 de dezembro de 2022. (2022). Altera a Lei Estadual nº 9.048, de 29 de abril de 2020, que institui a Política Estadual sobre Mudanças Climáticas do Pará (PEMC/PA). <https://www.semhas.pa.gov.br/legislacao/files/pdf/212496.pdf>
- Lei n. 13.123, de 20 de maio de 2015. (2015). Regulamenta o inciso II do § 1º e o § 4º do art. 225 da Constituição Federal, o Artigo 1, a alínea j do Artigo 8, a alínea c do Artigo 10, o Artigo 15 e os §§ 3º e 4º do Artigo 16 da Convenção sobre Diversidade Biológica, promulgada pelo Decreto nº 2.519, de 16 de março de 1998; dispõe sobre o acesso ao patrimônio genético, sobre a proteção e o acesso ao conhecimento tradicional associado e sobre a repartição de benefícios para conservação e uso sustentável da biodiversidade; revoga a Medida Provisória nº 2.186-16, de 23 de agosto de 2001; e dá outras providências. https://www.planalto.gov.br/ccivil_03/ Ato2015-2018/2015/Lei/L13123.htm
- Lopes, C. L., & Chiavari, J. (2022). *Bioeconomia na Amazônia: análise conceitual, regulatória e institucional*. Climate Policy Initiative. <https://acervo.socioambiental.org/acervo/documentos/bioeconomia-na-amazonia-analise-conceitual-regulatoria-e-institucional>
- Machado, U. P. (2019). *Políticas públicas de fomento à cadeia do açaí: Subvenções estatais e a distribuição de renda em uma dinâmica econômica de fronteira* [Dissertação de mestrado]. Universidade Federal do Amapá.
- Máximo, M. (2018). Desenvolvimento sem liberdade: Uma análise crítica do pensamento de Amartya Sen. *Cadernos do Desenvolvimento*, 8(13), 57-67. <http://www.cadernosdodesenvolvimento.org.br/ojs-2.4.8/index.php/cdes/article/view/137>
- Mueller, C. C. (1999). Economia, entropia e sustentabilidade: Abordagem e visões de futuro da economia da sobrevivência. *Estudos Econômicos (São Paulo)*, 29(4), 513-550.
- Mello, A. F. (2015). Dilemas e desafios do desenvolvimento sustentável da Amazônia: O caso brasileiro. *Revista Crítica de Ciências Sociais*, (107), 91-108. <https://doi.org/10.4000/rccs.6025>
- Ministério do Desenvolvimento Agrário (2009). *Plano nacional de promoção das cadeias de produtos da sociobiodiversidade*. <https://bibliotecadigital.economia.gov.br/handle/123456789/1024>
- Peralta, P. P. (2016). Necessidade de políticas institucionais para a aplicação de indicações geográficas como instrumento de proteção e valorização do patrimônio cultural. *Anais do 7º Seminário Internacional de Políticas Culturais*. Rio de Janeiro, Brasil. <https://rubi.casaruibarbosa.gov.br/handle/20.500.11997/8769>
- Portaria n. 41, de 29 de dezembro de 2023. (2023). *Diário Oficial da União*. <https://www.in.gov.br/en/web/dou/-/portaria-mda-n-41-de-29-de-dezembro-de-2023-535311884>
- Queiroz, L. F. P., Flores, M. do S. A., & Vasconcellos M., Sobrinho. (2022). Políticas públicas de promoção da bioeconomia: Perspectivas globais e locais com ênfase na amazônia paraense e suas relações com o estado e o mercado. *Open Science Research: Científica Digital*, 8, 971-983.
- Sen, A. (2018). *Desenvolvimento como liberdade*. Companhia das Letras.
- Silva, J. M., Souza, M. P. de, Souza, T. A. de Filho, Riva, F. R., & Barbosa, C. da S. (2022). Políticas públicas de garantia de preços mínimos para produtos da sociobiodiversidade (PGPMBio): Composição do custo de extração da castanha amazônica em Rondônia e Acre. *Revista de Administração UFSM*, 15(1), 62-82. <https://doi.org/10.5902/1983465965906>
- Simões, J., Almeida, J. S. & Costa, F. A. (Coords.) (2021). Bioeconomia da sociobiodiversidade no estado do Pará. The Nature Conservancy (TNC Brasil), Banco Interamericano de Desenvolvimento (BID), *Natura*. https://www.tnc.org.br/content/dam/tnc/nature/en/documents/brasil/projeto_amazonia_bioeconomia.pdf
- Souza, C. (2006). Políticas públicas: Uma revisão da literatura. *Sociologias*, (16), 20-45. <https://doi.org/10.1590/s1517-45222006000200003>
- Souza, E. C. M. (2022). Bioeconomia e Sociobiodiversidade: Uma abordagem conceitual. *Boletim da Sociobiodiversidade*, 6(2). <https://www.conab.gov.br/info-agro/analises-do-mercado-agropecuario-e-extrativista/boletim-da-sociobiodiversidade>
- Vick, F. (2021). A dogmática em debate: Franz Neumann e as possibilidades emancipatórias no método jurídico. *Rei - Revista Estudos Institucionais*, 7(3), 1014-1032. <https://doi.org/10.21783/rei.v7i3.690>
- Yin, R. K. (2014). *Case Study research: Design and methods* (5th ed). Sage.


Authorship

Diego Fonseca Mascarenhas*

Universidade da Amazônia, Programa de Pós-Graduação em Administração

Av. Alcindo Cacela, n. 287, Umarizal, CEP 66060-000, Belém, PA, Brazil

E-mail: diegof.mascarenhas@gmail.com

 <https://orcid.org/0000-0002-3667-7924>

Alberto de Moraes Papaleo Paes

Universidade da Amazônia, Programa de Pós-Graduação em Gestão do Conhecimento para o Sócio-desenvolvimento da Amazônia

Av. Alcindo Cacela, n. 287, Umarizal, CEP 66060-000, Belém, PA, Brazil

E-mail: alberto.papaleo@unama.br

 <https://orcid.org/0000-0003-0248-1226>

Laurimar de Matos Farias

Universidade da Amazônia, Programa de Pós-Graduação em Administração

Av. Alcindo Cacela, n. 287, Umarizal, CEP 66060-000, Belém, PA, Brazil

E-mail: laurimatos73@gmail.com

 <https://orcid.org/0000-0002-4503-0380>

Tamara Lima Martins Faria

Universidade Federal do Pará, Instituto de Ciências Sociais Aplicadas

Rua Augusto Corrêa, n. 01, Guamá, CEP 66075-110, Belém, PA, Brazil

E-mail: tamarafaria@ufpa.br

 <https://orcid.org/0000-0001-5882-8271>

* Corresponding Author

Copyrights

The authors retain the copyright relating to their article and grant the journal RAC, from ANPAD, the right of first publication, with the work simultaneously licensed under the Creative Commons Attribution 4.0 International license (CC BY 4.0).

Conflict of Interests

The author informed that there is no conflict of interests.

Authors' Contributions

1st author: project administration (lead), conceptualization (lead), methodology (equal), writing - original draft (lead), writing - review & editing (equal), supervision (lead), validation (support).

2nd author: conceptualization (equal), methodology (equal), writing - original draft (equal), writing - review & editing (lead), validation (support).

3rd author: conceptualization (equal), methodology (equal), writing - original draft (equal), writing - review & editing (equal), validation (support).

4th author: methodology (lead), writing - original draft (equal), writing - review & editing (equal), validation (equal), visualization (equal).

Funding

The authors thank to the National Coordination for the Improvement of Higher Education Personnel (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior [CAPES]), for the support received in carrying out the research.

Plagiarism Check

RAC maintains the practice of submitting all documents approved for publication to the plagiarism check, using specific tools, e.g.: iThenticate.

Peer Review Method

This content was evaluated using the double-blind peer review process. The disclosure of the reviewers' information on the first page, as well as the Peer Review Report, is made only after concluding the evaluation process, and with the voluntary consent of the respective reviewers and authors.

Data Availability

RAC encourages data sharing but, in compliance with ethical principles, it does not demand the disclosure of any means of identifying research subjects, preserving the privacy of research subjects. The practice of open data is to enable the reproducibility of results, and to ensure the unrestricted transparency of the results of the published research, without requiring the identity of research subjects.