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THE AMAZON OF THE FUTURE AND THE FUTURE OF THE AMAZON: IS THE GREEN ECONOMY OUR SILVER BULLET?

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Abstract: The Green Economy meets the demand of the state of Amazonas for an economic model based on the identification of new regional matrices complementary to the Manaus Free Trade Zone model, with the aim of economically internalizing the municipalities in the interior, based on regional development policies. To this end, we aim to identify potential regional economic matrices and present a direction for a "New Regional Development Policy" for the state of Amazonas. As for the methodological approach, this is a descriptive and exploratory qualitative study, based on data and information from primary sources (forms and questionnaires) and secondary sources (bibliography and documents), with the aim of meeting the objectives set out above. Thus, the Amazonian Green Economy must be implemented through policies to identify and strengthen the production chains of forest products linked to the Amazonian Bioeconomy.
Keywords: Amazonia. Green Economy. Decarbonization. Amazon Bioeconomy. Production chains.

INTRODUCTION

The Green Economy responds to the need to identify a new low-carbon economic model, based on better use of natural resources, providing economic balance, social justice, inclusion and environmental responsibility.

Throughout the transition process, "new" jobs will be created that will outweigh the losses of the brown economy. To this end, the process must take place through public policies, with the contribution of private initiative through the promotion of new technologies.

Brazil will only achieve economic development based on the Green Economy if it puts the Amazon and its local communities at the center of its strategy, since the process needs to include nature and people. To this end, it needs to seek elements to bring deforestation to zero by 2030, as well as building environmental valuation instruments.

The most successful regional development model in the Amazon region is the Manaus Industrial Estate, which has exogenous characteristics. It is the result of the integration policy of the 1960s and 1970s and makes little use of raw materials from the forest in its production processes (low regionalization index), despite being the biggest source of employment, income and tax revenue in the state (Silva, 2024).

The ZFM model has contributed to regional development, but we are aware of the need for continuous improvements in productive diversity and adjustments towards an industrial policy with social and environmental responsibility (Silva, Lucas and Oliveira, 2021).

Furthermore, there is a call for the identification of economic matrices that complement the ZFM model in order to repair the economic injustices that have imposed inefficient regional development policies on the municipalities in the interior of the state. We point to the Bioeconomy as a complementary alternative to the PIM so that we can use Amazonian biodiversity and knowledge of the forest to generate jobs and income for the regional population, based on environmental preservation (Silva and Oliveira, 2021).

The regional development of a region or place involves an analysis of the issues raised by regional identity narratives and their implications for so-called cultural identity, the naturalization of identity in the face of globalization (Oliveira, 2021).

To this end, we need to overcome obstacles to development: the lack of qualified and specialized human capital; a confusing and complex regulatory framework; precarious basic infrastructure for the development of a cutting-edge industry; investment by the public authorities in research and development; legal certainty for the private sector wishing to invest in research and development; a lack

of synergy between the private sector, the government and academia (Lopes, Lobato da Cunha and Alegre Ferreira, 2023).

An assertive green growth strategy has the potential for high cost-benefit returns, enabling a significant reduction in emissions by 2030. In addition, the standing forest is the engine of green growth, offering Brazil an unprecedented opportunity to surpass average income.

To this end, we aim to identify potential regional economic matrices and present a direction for a "New Regional Development Policy" for the state of Amazonas.

Methodologically, this is a qualitative, exploratory, descriptive study, using primary (questionnaire and form) and secondary (bibliographic and documentary) sources and content analysis.

Of the 44 economic matrices mapped, 14 will be prioritized (Açaí, Cupuaçu, Cacau, Buriti, Brazil nuts, Tucumã, Pirarucu, Guaraná, Native Bee Honey, Copaíba, Andiroba, Piaçava, Wood and Rubber/Syringa) as part of the construction of the state Bioeconomy plan and will receive financial support to advance in terms of knowledge, training, technology, market and scale.

Finally, we believe that the Green Economy to be implemented through policies to identify and strengthen the production chains of forest products linked to the Amazon Bioeconomy is a driving force behind the implementation of a broad policy to internalize development in the region with a focus on people and environmental conservation.

This article is structured as follows: Introduction, Theoretical Framework, Methodology, Data Analysis and Results, Final Considerations and References.

GREEN ECONOMY: BALANCING ECONOMIC GROWTH, SOCIAL JUSTICE, INCLUSION AND ENVIRONMENTAL RESPONSIBILITY

The concept of the Green Economy emerged in 2008 through the proposed "Green Economy Initiative (GEI)" via the United Nations Environment Programme (UNEP) as a program of global research and country-level assistance designed to motivate policymakers and support environmental investments.

Conceptually, the Green Economy "refers to a set of actions aimed at promoting an economy with full growth, based on social well-being and centered on reducing environmental risks and contributing to the conservation of the natural environment. Therefore, the Green Economy seeks to reconcile the notion of low-carbon production, efficient and sustainable use of natural resources and social inclusion" (UNEP, 2008).

According to Tavares (2011, p.58), the "Green Economy" reflects four decades of dialogue between the governments of developed and developing countries on the environment, economy and development, marked by a sequence of global conferences on the subject, including: the United Nations Conference on the Human Environment at Stockholm in 1972, Rio 92, Rio+10 in 2002 and Rio+20 in an effort to put decisions into practice in favor of life on earth.

According to UNEP (2008), the Green Economy, also known as Ecodevelopment, emerges in opposition to the Brown Economy[1] based on non-environmentally responsible development that does not combine social well-being with the conservation of natural resources.

1. The Brown Economy, a term considered the opposite of the Green Economy, refers to economic development with pollution, deforestation and no environmental protection measures (UNEP, 2011).

To this end, the now green "new economy" will focus on stimulating job creation and income generation for the entire population, while at the same time taking measures to reduce greenhouse gases, increase energy efficiency (through the use of alternative and clean energy sources) and the sustainable use of natural resources (UNEP, 2008).

Based on this initiative, together with the work of other agencies, the Green Economy in the context of sustainable development and poverty eradication was included on the Rio+20 agenda in 2012, being recognized as a key tool for achieving sustainable development (UNEP, 2012).

The Sustainable Development Goals (SDGs) emerged in 2012 and are a universal call from the UN to fight poverty, protect the planet and ensure peace and prosperity for all. In the same year, the most functional definition of the Green Economy was implemented, the "Inclusive Green Economy" being one that results in better human well-being and social equity, while contributing to reducing environmental risks and ecological scarcity (2012).

Therefore, "An Inclusive Green Economy constitutes an alternative to the dominant economic model and an opportunity to promote both sustainability and social equity as functions of a stable and prosperous financial system in the context of a finite and fragile planet".

"According to UNEP (2012), the Green Economy is a path to achieving the 2030 Agenda for Sustainable Development, eradicating poverty and safeguarding the ecological thresholds that sustain human health, well-being and development."

It is up to governments and international organizations to promote an agenda that makes the Green Economy a priority, combining "fiscal incentives and regulations to accelerate the process of change through technological innovations and the creation of green markets". If this procedure is not adopted by government and international bodies and coordinated by the private sector, as has been the case, "economies will be unable to effectively enter a Green Economy" (Zapata, 2011, p.74).

For Keppler (2024), the "Green Economy encompasses all forms of economy that, in some way, aim to achieve improvements in relation to the environment through products and services and add to the sustainable development of humanity", consisting of "a set of practices aimed at promoting an economy with full growth, based on social well-being and focused on reducing environmental risks as well as repairing the natural environment".

For the Brazilian Agricultural Research Corporation (Embrapa), "the Green Economy presents itself as a model for reversing climate trends, changing policies and incentives in order to support growth, social equality and well-being through the conservation and sustainable use of natural resources and vigilant pollution control".

For Nonato (2024), the Green Economy consists of a conciliatory vision between economic development and environmental preservation, responding in a balanced way to contemporary challenges related to sustainability.

In the table below, we can see the main objectives of the Green Economy, which are based on four primary spheres: conservation and recovery of ecosystems, efficiency in the use of resources, innovation and sustainable technologies and the promotion of social justice.

To this end, the Green Economy is based on transforming traditional models of production, distribution and consumption by incorporating principles of efficiency and environmental responsibility, seeking to mitigate the negative impacts of economic activities on the environment while generating sustainable socio-economic benefits in the long term (2024).

Still according to the author (2024), EV covers the entire production chain, stimulating innovation, the development of clean techno-

Conserving and restoring ecosystems	Efficient use of resources	Innovation and sustainable technologies	Promote social justice
The EV therefore promotes practices that avoid environmental degradation and seek to recover impacted areas;	SE proposes a more responsible management of natural resources, reducing waste and minimizing the environmental impact of economic activities.	Innovation is essential for tackling environmental and social challenges, driving sectors that contribute to the transition to a greener economy.	EV is not limited to the environmental dimension; it also seeks to promote social justice.

Box 1 - Objectives of the Green Economy

Source: Nonato (2024)

Mitigation	Adaptation	Sustainability	Clean and Renewable Technologies	Bioeconomy	Environmental Services
Refers to actions aimed at reducing or preventing the negative impacts of human activities on the environment (helping to reduce greenhouse gas emissions, preserve ecosystems and minimize environmental degradation).	Adaptation is the ability to adjust to the already inevitable impacts of climate and environmental change, such as droughts, floods and heat waves.	Sustainability is a central principle in the Green Economy, meeting today's needs without compromising future generations in meeting their own demands (balance between economic, social and environmental aspects).	The incorporation of clean and renewable technologies is a crucial element in the Green Economy.	The Bioeconomy is a fundamental pillar of the Green Economy, introducing an approach that values and sustainably uses biological resources.	Environmental services represent an innovative perspective in the Green Economy, recognizing that ecosystems provide essential benefits to society.

Chart 2 - The Principles of the Green Economy

Source: Nonato (2024)

Journeys Race to Zero: US$150 billion of economic value	Journeys Race to Resilience: 8 million jobs	Journeys of Infrastructure and necessary conditions
Redefine the value of the standing forest by developing a robust Bioeconomy; Sustainable agriculture: Promoting agricultural practices that are positive for nature and people; Decarbonize the energy sector and the major industries responsible for high emissions; Promote technology and innovation to support a thriving bioeconomy;	Develop the workforce for future green technology activities; Ensure the well-being and resilience of the Amazonian people by bridging the gap of social inequality; Promote prosperity by providing Amazonian communities with the tools to build a thriving bioeconomy; Safeguard ancestral knowledge to fuel social, spiritual and economic growth;	Restore the rule of law and strengthen accountable institutions; Develop the financial infrastructure to mobilize global capital for the race to zero and resilience; Global South as epicenter for global collaboration: Promote stakeholder cooperation through coalition building, while positioning the Global South as a system and rule maker.

Chart 3 - Pathways for Brazil's Transformation towards Zero Carbon (2030)

Source: Aya (2022, p. 37)

logies and sustainable practices in different sectors, with a focus on: promoting efficiency in the use of natural resources; reducing carbon emissions; stimulating green innovation; fostering social inclusion and raising awareness about the importance of environmental preservation for collective well-being.

The following table shows the principles of the Green Economy, with emphasis on: mitigation, adaptation, sustainability, clean and renewable technologies, the Bioeconomy and environmental services.

The UNEP report "Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - Synthesis for Decision Makers", (2011), defines ten priority sectors for investment which are directed towards the Green Economy, with emphasis on: industries, renewable energy, water, tourism, agriculture, waste management, forestry, fishing, construction and transportation.

The report indicates that global economic growth in this "greener" scenario would be greater than that recorded in the current economic model, despite the now widespread concept that opposes development to environmental sustainability (Gorgulho, 2011).

BRAZILIAN ASSETS

The Amazon's biodiversity enables Brazil to be a protagonist and leader of the Green Economy in the international context, with the Amazon as its main environmental asset.

The focus of the transition process is the transformation of an economic model that is inefficient in its use of natural resources into one that is nature-based, climate-positive and people-centered (Zero Carbon) (Aya, 2022).

The volume of planned and necessary investments in industrial and natural capital budgeted for the green transition process has been estimated at between US$ 35 billion and US$ 76 billion a year (2% to 4% of Brazil's GDP) with a return on Gross Domestic Product (GDP) of between US$ 100 billion and 150 billion annually by 2030. As can be seen in the figure below:

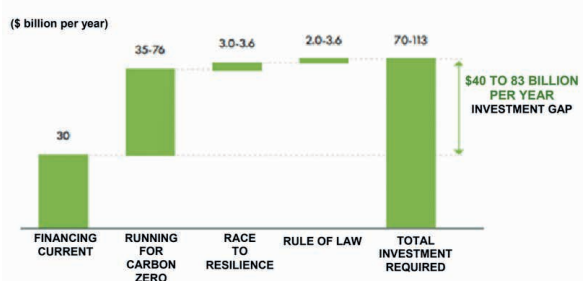

Figure 1 - Planned and necessary investments for Zero Carbon

Source: Aya (2022, p. 78)

Through climate mitigation, Brazil has the potential to achieve carbon neutrality and could go further by 2050. In this way, it will contribute a potential surplus of 1.9 GtCO13 to the global carbon budget, as well as doubling its GDP by 2050.

Such a scenario would allow Brazil to be the leader of a new, more climate-positive economy with the possibility of generating better results for the Amazon and the world, as can be seen in the following figure:

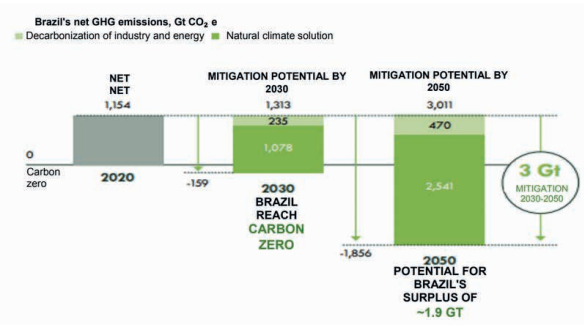

Figure 2 - Brazil's Mitigation Potential (2030-2050)

Source: Aya (2022, p. 32)

According to the report (2022), the low performance in terms of resource productivity and carbon does not prevent Brazil from being an economic, resilient and productive powerhouse focused on reducing emissions,

since the country has five potential green assets: the energy matrix, forest cover, degraded pastures, bioenergy, as well as low-carbon metals and mineral resources. As can be seen in the figure below:

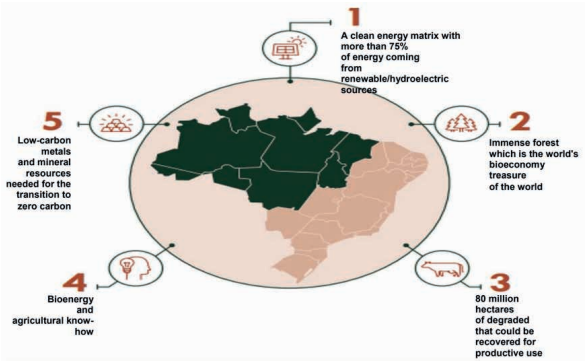

Figure 3 - Brazil's Five Green Assets

Source: Aya (2022)

Thus, according to the report (2022), the volume of investment needed to achieve Zero Carbon in Brazil has the potential to increase productivity in all economic sectors and open up new international markets, with an emphasis on: hydrogen, low carbon metals and mining, and sustainable animal protein.

Thus, the process of transforming the Brazilian economy along eleven pathways aims to: help win the race to zero carbon in Brazil, support the race to resilience for the 28 to 30 million people living in the Amazon and ensure that the right infrastructure and favorable conditions are in place to prevail in both.

To this end, the process is based on three axes and eleven paths, as shown in the table below:

By going through the journeys presented in the table above, Brazil will open up new export markets, attracting foreign direct investment, enabling productivity improvements in the food and land use sectors and decarbonization in the industrial and energy sectors (Aya, 2022, p. 18). As can be seen in the following figure:

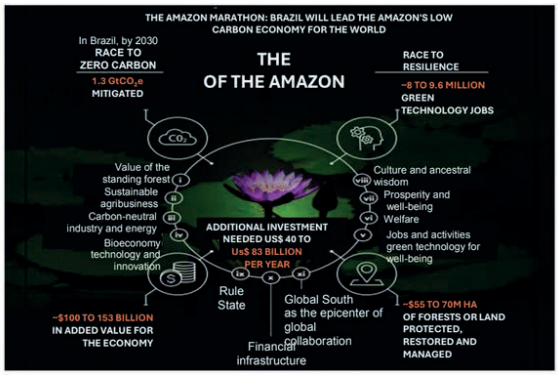

Figure 4 - Brazil to Lead the Amazon Low Carbon Economy for the World

Source: Aya (2022, p.18)

The opportunity to turn Brazil into a green growth engine revolves around the Amazon region, as it represents the country's greatest bioeconomy potential, concentrating at least 10% of the world's known biodiversity and 60% of its land-based climate mitigation potential. It is estimated that savings of 1 GtCO2 e per year can be made by reducing emissions and increasing carbon sequestration in the Amazon. Our biggest challenge is to achieve zero deforestation.

The main beneficiaries of this new economic model will be people and the environment. In the case of the Amazon, the people who live there will finally be able to enjoy basic constitutional rights.

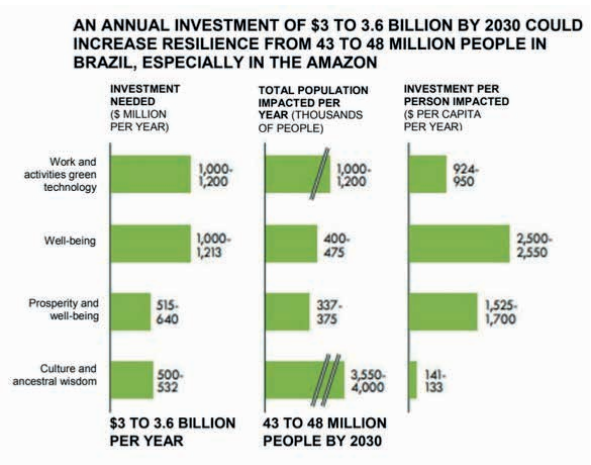

Figure 5 - Cost-Benefit Analysis

Source: Aya (2022, p.33)

Finally, the report (2022) presents essential levers for Brazil to achieve Zero Carbon, such as the value of standing forests, sustainable agribusiness, carbon-neutral industry and energy, and bioeconomy technology and innovation, as can be seen in the following figure:

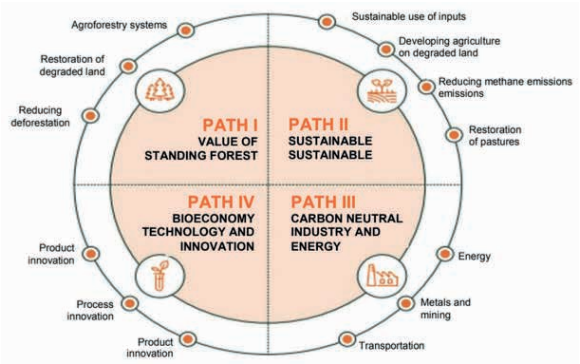

Figure 6 - Levers for Zero Carbon

Source: Aya (2022, p. 44)

BRAZIL'S GREEN GDP

A study carried out by the Getúlio Vargas Foundation (FGV), through the Bioeconomy Observatory, points to the need to include the "green factor" in national accounts. This is an indicator capable of measuring and setting a price for natural wealth, "green GDP", making it possible to connect the economy and the environment (Vargas; Pinto and Lima, 2023).

To this end, the green factor is made up of three stocks: the natural stock (representing natural stocks), the technical stock (based on social technologies consisting of sustainable technology and techniques) and the technological stock (involving cutting-edge knowledge that uses natural resources to produce goods and services) (2023).

According to the authors (2023), the presence of abundant and sustainable natural resources in Brazil is an advantage and helps to attract investments and companies through green premiums, carbon credits and future opportunities to attract credit, labor and technology for more sustainable businesses.

The challenge of the green transition requires the construction of appropriate instruments that are capable of valuing the economic and environmental attributes of the economy in an integrated manner (converting green into value) to be included in the System of National Accounts (2023).

The valuation of economic attributes is already consolidated in the System of National Accounts (SNA), which follows international standards and makes it possible to compare performance from one country to another. The "green" component of GDP, on the other hand, is still a work in progress.

The study therefore draws attention to the international commitments made by Brazil to zero deforestation by 2030. "After 2030, it is not clear whether the environmental services provided by the green stock will be remunerated, we have a scenario of many challenges" (2023).

REGIONAL DEVELOPMENT AND AMAZONIAN PRODUCTION CHAINS

Hirschman (1961) points out that in laggard countries, i.e. those that have not achieved development, it is necessary to create conditions based on their realities for this to happen, since development does not occur spontaneously.

According to Madureira (2012), underdeveloped countries usually start their industrial activity with the second type of industry: assemblers of products that were previously manufactured in developed countries. Once these industries have been set up, many underdeveloped countries start supplying intermediate goods developed nationally, with a view to supplying these foreign assemblers, generating numerous retrospective chain effects.

For Hirschman (1958), development is seen as a chain of imbalances in which economic growth manifests itself initially in leading

sectors and then spreads to satellite sectors in an unbalanced manner "the ideal situation is reached when an imbalance provokes a developmental movement which, in turn, creates a similar imbalance and so on *ad infinitum*".

Rippel (1995) points out that when planning development strategies, sequential measures should be considered that lead to the formation of complementary capital and in line with local learning, but without putting an end to the imbalances that should continue to stimulate the process.

Hirschman (1961) considers that government interventions in terms of lowering tariffs, consumption taxes and consumption subsidies are justified, as long as it can be proven that an increase in consumption patterns will end up promoting significant retrospective chain effects, which would not have happened without such intervention.

The author (1961), when addressing the differences in development in regions of the same country, explains that the development of a locality is responsible for generating pressures on surrounding localities, which results in developed and underdeveloped regions. In addition, investments need to be concentrated at the initial point of development for a certain period of time in order for the local economy to consolidate. Two effects will emanate from this initial point: flow and polarization.

The term "production chain" emerged in the agricultural sector with a broader vision from the inside to before and after the farm gate. It is a concept that is difficult to define, but is very much present in the literature (Prado, *et al.,* 2021).

For Bueno (1996), chain means a chain; a series of something. In the broadest sense, it refers to the idea of sequence or interdependent links.

According to Pedrozo, Estivalete and Begnis (2004), production chains are sets of interactive components similar to agricultural and agroforestry production systems, with the purpose of providing services and inputs, processing and transformation industries, marketing and distribution, as well as consuming the chain's by-products.

According to De Castro; Lima and Cristo (2002), a production chain in conceptual terms was developed as an instrument of a systemic vision, based on the premise that the production of goods could be represented as a system, where the various actors were interconnected by flows of materials, capital and information, with the aim of supplying a final market with products from the system.

With regard to Amazonian production chains, it is worth selecting non-timber forest products that are part of traditional Amazonian extractivism, highlighting products that are already widely known, such as açaí and Brazil nuts, and others that are still being studied, such as camu-camu (2022).

Enríquez (2008, p. 120) points out that the Amazon's production chains reflect the reality of poor regions, with part of the native communities living with extractive models for exploiting biodiversity and a significant part of the population living in systems located in conservation units (Sustainable Development Reserves, FLORA, RESEX, etc.).

The Amazon, due to its geographical characteristics and extremely dispersed social formation, and the absolute lack of consolidated research institutions that add value to the products in production chains, makes it very difficult to think of adapting the traditional concepts of production chains or arrangements that exist in developed countries. It is therefore necessary to gain a better understanding of how the processes of coordinating activities along the production chain take place, how they can be transformed, and how a transition from distant and sparse geographical clusters to more dynamic production systems and arrangements can take place (Enríquez, 2008).

The author (2008, p. 122) points out that one of the biggest challenges for traditional extractive products is to add value to products that are currently only marketed as raw materials. To this end, he points out that products must seek out new market niches and take advantage of new trends in the use of biodiversity products.

There are several buyers encouraging communities to diversify their markets, since the life cycle of biodiversity products is very short, which is why constant innovation is the main requirement, in order to avoid market saturation and falling prices for the products produced. However, this new opportunity must be seized quickly, as consumers tend to diversify their habits and no longer demand the products (Enríquez, 2008).

According to a study carried out by the research institute WRI Brasil in partnership with the Institute for Conservation and Sustainable Development of Amazonas - Idesam (2022), it is estimated that Amazonian production chains have the potential to generate around R$38.6 billion by 2050, based on initiatives that boost income generation with socio-productive inclusion and add value while keeping the forest standing.

According to the study (2022), extraction and management (technical assistance and credit), primary processing (structuring and social organization), transformation (innovation and research, technology), marketing (access to new markets, remuneration and trade agreements), consumption (certification, awareness) are best practices and essential elements for boosting the production chains of forest products.

With regard to the need for innovation and the use of technologies, we believe that setting up Forest Startups is a promising way of promoting innovative activities, strengthening regional knowledge (knowledge of the forest), the participation of the public sector, the private sector, entrepreneurs, investors, educational and research institutions, innovation institutions and environmentalists to foster innovative local businesses aimed at generating employment and income, strengthening the sustainable exploitation of Amazonian resources and qualifying regional human capital (Silva, Lucas and Pinto, 2022).

Santana (1995; 1998; 2002) and Santana and Amin (2002) reinforce the need to strengthen production chains in the Amazon as a way of achieving economies of scale and potentially generating positive externalities backwards and forwards.

METHODOLOGY

Methodologically, this is a qualitative, descriptive and exploratory study based on primary sources (questionnaires and forms) and *stakeholders* and secondary sources (bibliography and documents). The bibliographic selection took place during the first two quarters of 2024, prioritizing the use of recently published works and regional authors in order to strengthen the discussion at the state level. The documentary material consists of studies, surveys and technical notes published by the state government and other secretariats to guide the construction of the Bioeconomy plan.

In a complementary way, this research can also be classified as exploratory, as it has flexible planning, allowing the study of the topic from various angles and aspects, involving a bibliographical survey as well as interviews with people who have had practical experience Prodanov and Freitas (2013). As for the analysis of data and results, content analysis prevails based on observations of the facts and analysis and understanding of the material selected for the construction of the text.

DATA AND RESULTS ANALYSIS

We began this discussion with the aim of identifying potential regional economic matrices and presenting a direction for a "New Regional Development Policy" for the state of Amazonas.

We started with Technical Note 01/2021 from the Government of Amazonas, which defines the Amazonian Bioeconomy as a set of economic activities that use socio-biodiversity resources as a basis for production, fostering production, distribution, consumption of goods and services and innovative solutions in the use of these natural resources, with a view to transitioning to sustainable socio-economic development and strengthening. This concept includes not only native Amazonian products, but also those that have been inserted into local culture and have ended up being incorporated into it. Thus, the Amazon Bioeconomy is based on four guiding principles: Conservation of biodiversity; Science and technology aimed at the sustainable use of socio-biodiversity; Reduction of social and territorial inequalities and; Expansion of biodiverse and sustainable forested areas. Based on these principles, the local Bioeconomy can be classified into the sectors of Bioeconomy of Sociobiodiversity, Forest-based Bioeconomy and Bioeconomy *of Commodities*.

Subsequently, we followed the guidelines and work of the Strategic Steering Committee led by the State Secretariat for Economic Development, Science, Technology and Innovation (SEDECTI) and other secretariats and institutions: State Secretariat for the Environment (SEMA), State Secretariat for Rural Production (SEPROR), Amazonas State Institute for Sustainable Agricultural and Forestry Development (IDAM), State Secretariat for Cities and Territories (SECT), Amazonas State Research Support Foundation (FAPEAM), Amazonas State University (UEA) and the Amazonas State Development Company (CIAMA), which, based on surveys, provided relevant information for directing public policy, defining priority axes (governance, carbon and internationalization, people and culture, renewable energy and business ecosystem) and mapping potential production chains.

A total of 44 production chains were mapped in Amazonas: Açaí, Brazil nuts, Cupuaçu, Cocoa, Guaraná, Natural Rubber, Camu-Camu, Buriti, Copaíba, Andiroba, Murumuru, Babaçu, Tucumã, Piaçaba, Cipó-Titica, Umbu, Maçaranduba, Sorva, Carnaúba, Cumaru, Puxuri, Curuá, Wood, Bee Honey, Pirarucu, Pau-Rosa, Charcoal, Flat Fish, Scale Fish, Sport Fishing, Environmental Services, Handicrafts, Tourism, Cipó-Ambé, Arumã, Unha-De-Gato, Muirapuama, Patauá, Preciosa, Cipó-Tuira, Cipó Timbô-Açu, Pau-Brasil, Morototó and Paxiúba.

Of the 44 surveyed, 14 were identified as priorities (Açaí, Cupuaçu, Cacao, Buriti, Brazil nuts, Tucumã, Pirarucu, Guaraná, Native Bee Honey, Copaíba, Andiroba, Piaçava, Wood and Rubber/Syringe) and will be the subject of public policies based on the Amazonas State Bioeconomy Plan. To this end, they fall into the following sectors: Food and Beverages, Hygiene/Cleaning/Cosmetics, Phytotherapics, Phytopharmaceuticals and Nutraceuticals, Handicrafts and Artifacts, Wood and Furniture, Tyres and Rubber Artifacts and Clothing/Shoes. As can be seen in the table below:

Taking into account the territorial dimension of Amazonas, the implementation of the state plan based on the mapped and prioritized chains will take place based on the division by troughs. As can be seen in the table below:

Based on the research carried out and after analyzing the information, we present in Chart 6 a set of proposals and guidelines that will guide future public policies and serve as beacons for an Amazon of the Future and the Future of the Amazon based on the implementation of a "New Regional Development

Sector	Sub-Sector	Product Category 1	Product Category 2	Individual product
Food, Cosmetics, Pharmaceuticals, NutraceuticalsCrafts	Food, Beverages, Personal hygiene, cosmetics and perfumes	Fruit, Vegetable oil, Seed	Açaí	Frozen pulp 100g, 500g, 1020g, Beverages, Freeze-dried acai (powder), Polished and pierced acai kernel
Food, Cosmetics	Food, Beverages, Personal hygiene, cosmetics and Perfume	Fruit, Vegetable oil,	Cupuaçu	Frozen pulp 100g, 500g, 1020g, Cupuaçu butter, Freeze-dried cupuaçu (powder)
Food, Cosmetics	Food, Beverages, Personal hygiene, cosmetics and Perfume	Fruit, Vegetable oil,	Cocoa	Frozen pulp 100g, 500g, 1020g, seeds/almonds, Cocoa butter
Food, Cosmetics, Crafts	Food, Beverages, Personal hygiene, cosmetics and perfumes, Handicrafts	Fruit, Vegetable oil, Fiber	Buriti	Fruit in natura, Frozen pulp, Oil, Fiber
Food, Cosmetics	Food, Personal hygiene, cosmetics and Perfume	Almond, Vegetable oil	Brazil nuts	Dry chestnut, peeled chestnut, vacuum-packed. Oil
Food, Pharmaceuticals, Handicrafts	Beverages, Phytopharmaceuticals	Fruit	Guarana	Guarana concentrate Roasted fruit. Guarana powder Stick. Guarana paste
Food, Crafts	Food, Crafts	Fruit, Vegetable oil Seed	Tucumã	Fresh fruit. Pulp. Kernel
Cosmetics, pharmaceuticals	Personal hygiene, cosmetics and perfumes, Phytopharmaceutical	Vegetable oil	Copaiba	Filtered oil, Oil in ml, Soaps.
Cosmetics, Pharmaceuticals	Personal hygiene, cosmetics and perfumes, Phytopharmaceuticals	Vegetable oil	Andiroba	Filtered oil. Oil in ml, Soap. Repellent
Food	Food of animal origin	Meat	Pirarucu	Meat. Frozen meat Pirarucu sausage
Food	Food of Food	Honey	Bee honey Native	Propolis honey
Handicrafts	Furniture Brooms Handicrafts	Natural fiber	Piaçaba	Comb. Head. Broom. Basketry. Earrings, bracelets, etc.
Wood Furniture Crafts	Furniture Wooden furniture Crafts	Wooden furniture	Wooden furniture	Boards, Furniture, Wooden articles
Tires Automotive Clothing	Tires and rubber products Footwear	Coagulated latex	Rubber	CVP boards

Table 4 - Categories of Production Chains/Prioritized Products

Source: SEDECTI, (2022) and Research Data

Troughs	Number of production chains	Municipalities
Lower Amazon	12	Barreirinha, Boa Vista do Ramos, Nhamundá, São Sebastião do Uatumã, Urucará and Parintins
Jutaí	12	Alvarães, Fonte Boa, Japurá, Juruá, Jutaí, Maraã, Tefé, Uarini.
Juruá		Carauari, Eirunepé, Envira, Guajará, Ipixuna and Itamarati
Middle Amazonas	11	Itacoatiara, Itapiranga, Maués, Nova Olinda do Norte, Presidente Figueiredo, Silves and Urucurituba.
Rio Negro/ Solimões	11	Anamã, Anori, Autazes, Beruri, Caapiranga, Careiro, Careiro da Várzea, Coari, Codajás, Iranduba, Manacapuru, Manaquiri, Manaus, Novo Airão and Rio Preto da Eva.
Madeira	10	Apuí, Borba, Humaitá, Manicoré, Novo Aripuanã.
Purus	10	Boca do Acre, Camutama, Lábrea, Pauini, Tapauá.
Upper Solimões	8	Tabatinga, Benjamin Constant, São Paulo de Olivença, Santo Antônio do Içá, Atalaia do Norte, Tonantins, Fonte Boa, Jutaí and Amaturá.
Juruá	7	Carauari, Eirunepé, Envira, Guajará, Ipixuna, Itamarati.
Upper Rio Negro	6	Barcelos, Santa Isabel do Rio Negro and São Gabriel da Cachoeira.

Table 5 - Number of Production Chains Prioritized by Trough in Amazonas

Source: SEDECTI, (2022) and Research Data

1) After mapping the chains and identifying the priority ones, we need economic feasibility studies in order to identify bottlenecks and improve knowledge along the chain.	19) Implementing the following hubs: Bioeconomy, Bioinputs, Biotechnology and Biobusiness.
2) Identify raw materials (biomass) and by-products of quality and scale.	20) Implementing a public policy planning platform.
3) Finding and strengthening partnerships to mitigate logistical problems.	21) Improving the integration of actions between *stakeholders* (plans, programs and policies).
4) Strengthening family farming and boosting regional sustainable agriculture.	22) Improving the business environment in order to attract sustainable businesses (Bio-business).
5) Expanding production financing lines (bank branches and credit cooperatives in the municipalities)	23) Implement and strengthen partnerships to boost basic infrastructure (electricity, telecommunications, connectivity, roads, branches, ports, waterways), technology and innovation.
6) Improve access to productive technologies for agroforestry and extractive activities.	24) Increase investment in innovation and technology
7) Improve access to technical assistance.	25) Boost the use of forest products in stages of the production process of products manufactured in the PIM (increasing the regionalization index).
8) Combating deforestation and illegal mining, as well as biopiracy.	26) Expanding and strengthening companies' ESG practices.
9) Reducing and eliminating the drug corridor and drug trafficking.	27) Attracting the necessary funding to guarantee the implementation of social actions in the region.
10) Overcoming the national average income bottleneck.	28) Creating a supply chain that reaches all the regional states and lifts people out of poverty, extreme poverty and misery.
11) Include Amazonian cities in the economic circuit, taking advantage of their potential.	29) Encourage the valorization of ecosystem and environmental services.
12) Encouraging the qualification of human capital from basic, advanced and technical education.	30) Identifying and using metrics and indicators
13) Boosting regional entrepreneurship with a focus on young people and women.	31) Expanding certifications, traceability and geographical identification.
14) Strengthening traditional knowledge to boost social and economic growth.	32) Expanding production financing lines (bank branches and credit cooperatives in the municipalities).
15) Include the GDP of the Bioeconomy in the national accounts and update Amazonas' Input-Output Matrix.	33) Environmental valuation: making the forest worth more standing than felled (developing a robust Bioeconomy).
16) Implementing an Amazon observatory for production chains.	34) Speed up the application and collection of fines.

17) Implement and expand the use of technologies and innovation, observing production cycles,	35) Make use of technologies already available to reduce the absence of the state in the region.
18) Implement a regional development observatory	36) Evaluate and adjust the Bioeconomy and Green Economy Plan for the state of Amazonas on an annual basis.

Chart 6: Proposals and Directions for an Amazonian Green Economy

Source: Research data

Policy" (State Plan for the Green Economy and identification of economic vocation) for the municipalities in the interior of the state of Amazonas:

FINAL CONSIDERATIONS

The Green Economy covers the entire production chain, stimulating innovation, the development of clean technologies and sustainable practices in different sectors, promoting efficiency in the use of natural resources, reducing carbon emissions, stimulating green innovation, fostering social inclusion and raising awareness about the importance of environmental preservation for collective well-being.

To this end, it is based on the following principles: mitigation, adaptation, sustainability, clean and renewable technologies, bioeconomy and environmental services. Its main objectives are the conservation and recovery of ecosystems, efficiency in the use of resources, innovation and sustainable technologies, while at the same time promoting social justice.

The Green Economy is seen as the key to sustainable development in emerging countries, shedding light on Brazil and the Amazon due to its biodiversity and natural potential (it concentrates 10% of the world's known biodiversity and 60% of its land-based climate mitigation potential), prioritizing actions linked to the Bioeconomy. "The opportunity to turn Brazil into an engine of green growth revolves around the Amazon region."

The transition towards the greening of the economy should be based on annual investments budgeted at approximately US$ 1.3 trillion or 2% of the world's Gross Domestic Product (GDP), to be implemented in ten strategic sectors: agriculture, industry, energy, water, buildings, waste management, fishing, forestry, tourism and transportation.

In relation to the Brazilian economy, the volume of investments in industrial and natural capital budgeted for the green transition process is between US$ 35 billion and US$ 76 billion a year (2% to 4% of Brazil's GDP). These investments have the potential to increase productivity in all strategic economic sectors (hydrogen, metals, low-carbon mining and sustainable animal protein), opening up new international markets.

Still in relation to the return on investment in Brazil, they have the potential to increase the Gross Domestic Product (GDP) by between US$ 100 billion and 150 billion annually by 2030, with a focus on transforming the economic model that is inefficient in its use of natural resources into one that is nature-based, climate-positive and people-centered. It will also enable the creation of green jobs, overcoming the losses of the transition process.

Among the most important Brazilian challenges are zero deforestation (by 2030), the green transition and the construction of instruments for valuing and integrating the economic and environmental attributes of the economy (Green Factor) to be included in the System of National Accounts based on studies by the Getúlio Vargas Foundation's Bioeconomy Observatory.

Thus, fostering regional economic development is a challenge for any sphere of government, given that this entity is one of the very economic agents that participates in the process of developing the economic system. Remembering that in the capitalist system, the generation of wealth is an intrinsic factor in economic growth.

In this way, we need an assertive public policy, because the Amazon is a region with a stagnant economy due to its internal inability to reverse situations of abandonment, poverty and lack of government policies.

To this end, we point to the Green Economy as the most promising proposal, which should be implemented through a Public-Private Partnership based on the identification of new economic matrices, key vectors and regional potential based on the primary sector in order to mitigate the socio-economic vulnerabilities and food insecurity of the population living in the municipalities of Amazonas. Thus, innovation is the main requirement in order to avoid market saturation and falling product prices.

Regarding the economic matrices, of the 44 mapped, 14 will be prioritized (Açaí, Cupuaçu, Cacao, Buriti, Brazil nuts, Tucumã, Pirarucu, Guaraná, Native Bee Honey, Copaíba, Andiroba, Piaçava, Wood and Rubber/Syringa) based on the construction of the state Bioeconomy plan and will receive financial support to advance in terms of: knowledge, training, technification, market and scale.

To this end, the prioritized chains will enable the expansion of the following sectors: food and beverages, hygiene/cleaning/cosmetics, phytotherapics, phytopharmaceuticals and nutraceuticals, handicrafts and artifacts, wood and furniture, tires and rubber artifacts and clothing/ footwear.

The Amazon's production chains are a reflection of a region with economic inertia, based on extractivism, implemented through the work of native communities living in protected areas. This reality requires innovation, technology and investment via partnerships with research institutions in order to correctly add value to products, as well as the coordination of activities along the production chain in order for the transformation process to take place.

Throughout the discussion, we noted that the Amazon's production chains have the potential to generate R$38.6 billion by 2050, based on initiatives that boost income generation with socio-productive inclusion and add value while keeping the forest standing.

To this end, we need to overcome bottlenecks that inhibit dynamism, such as: lack of process standardization, scalability, infrastructure and transport routes, lack of knowledge of the chain's stages, market expansion, lack of a niche and the difficulty of adding value to the product.

Among the proposals and directions for a Green Economy in the state of Amazonas, which is the most important aspect of this research, we would highlight: economic feasibility studies of the prioritized production chains, strengthening partnerships to mitigate logistical and infrastructural difficulties (energy, telecommunications, ports, waterways, bank branches and credit cooperatives), strengthening more sustainable family farming, access to production technologies and technical assistance. The fight against deforestation, illegal exploitation, biopiracy and drug trafficking corridors, overcoming the average income bottleneck, including Amazonian cities in the economic circuit, fostering the qualification of human capital and regional entrepreneurship, strengthening traditional knowledge, including the GDP of the Bioeconomy in national accounts, updating the Amazonian Input-Output Matrix.

In addition, to seek resources for the implementation of observatories: Regional development, Bioeconomy, Bioinputs, Biobusiness and biotechnology, implementation of a public policy planning platform, improve integration between *stakeholders* (plans, programs, and policies), improve the business environment to attract sustainable businesses (Biobusiness), expand investments in innovation and technology, improve the regionalization index

of products manufactured in the PIM using regional raw materials, promoting systemic services in the region, identifying metrics and indicators, expanding certification, traceability and geographic identification, implementing environmental valorization actions (making the forest worth more standing than cut down), speeding up the collection of fines and finally, evaluating and adjusting the Amazon Bioeconomy and Green Economy Plan on an annual basis.

Therefore, when asked if the economic model proposed by the Green Economy would result in well-being and social equality in the Amazon while reducing environmental risks, helping to avoid ecological scarcity? We believe so, and reiterate that the proposal has all the prerogatives to be considered the most appropriate for the Amazon because it considers regional specificities and peculiarities, preserves culture, and aligns traditional and scientific knowledge in favor of sustainability.

Finally, we are optimistic that the state of Amazonas, based on its positive externalities, has the potential to lead Green Economy initiatives, becoming a sustainable economic model for the other Amazonian states, thus helping to position Brazil among the world's great green powers.

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