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Amazonia Bioeconomy Country Profiles

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Inter-American Development Bank
Amazon Coordination Unit

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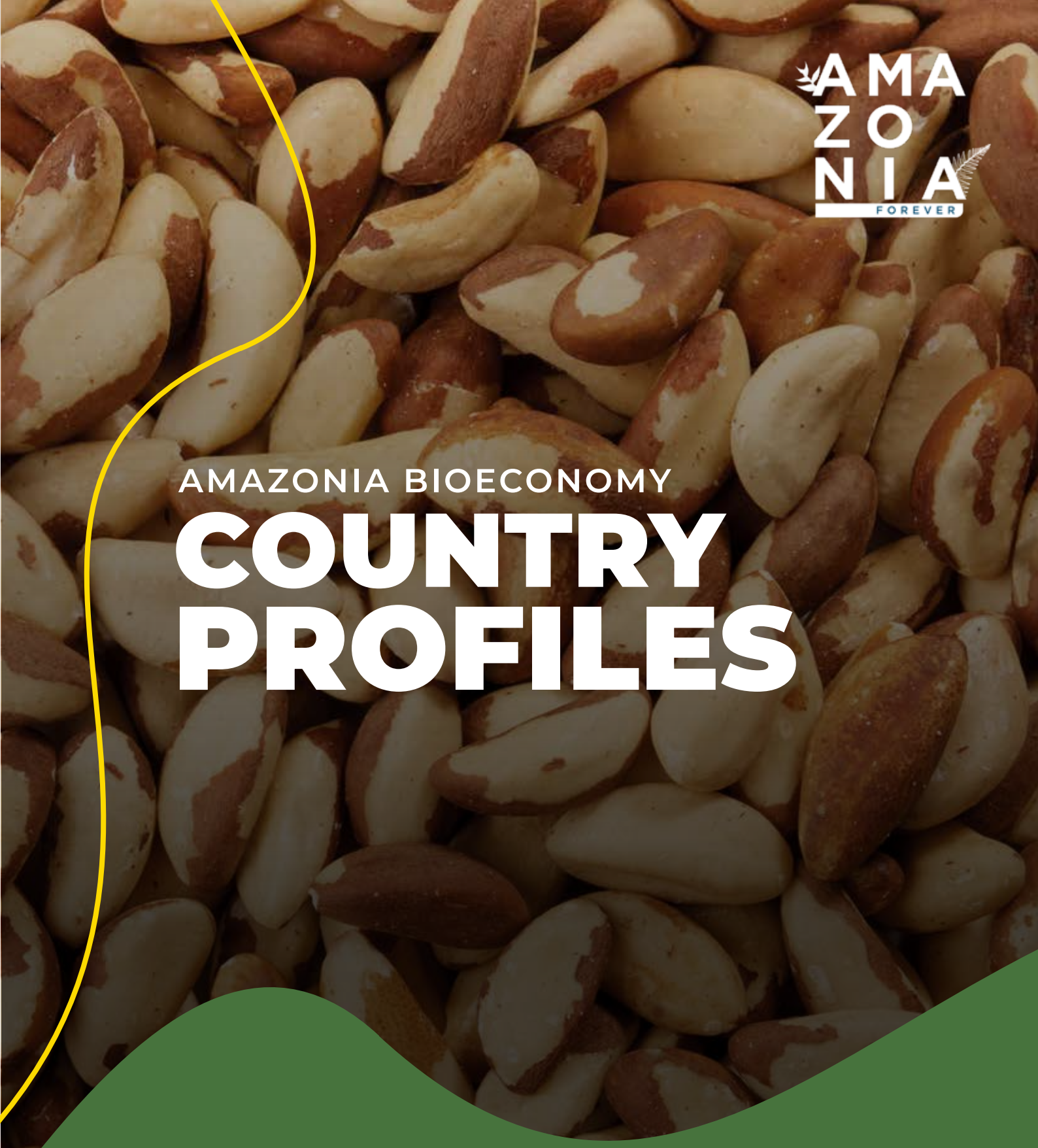

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AMAZONIA BIOECONOMY

COUNTRY PROFILES

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INTRODUCTION

As we continue the exploration of bioeconomy possibilities that began with the publication "Re-Imagining Bioeconomy for Amazonia", this report serves as an essential continuation, spotlighting the specific bioeconomy landscapes of each of the eight Amazonian countries. Building on the insights and frameworks discussed in the original publication, this document provides a focused analysis of the sector's current state, main challenges and future potential in each country.

The original study underscored the transformative power of bioeconomy in harmonizing economic growth with environmental stewardship. This countries' profile takes that foundational work a step further by presenting a detailed examination of how countries are engaging with bioeconomy principles, adopting a territorial approach.

In the pages that follow, we will explore national strategic initiatives and sectoral advancements within the bioeconomy, as well as local perceptions from private and public actors. Key findings will be presented, including the nation's approach to leveraging its natural resources, such as its rich biodiversity, agricultural prowess, and innovative biotechnological developments. Each section will provide insights into how the country is capitalizing on these resources to drive sustainable economic growth while addressing cultural, environmental and social considerations.

The publication will offer a concise overview of bioeconomic landscape in each country, including:

- **Political Sphere:** This section examines the role of governmental and political institutions in shaping the bioeconomy landscape, highlighting key political actors, their influence on bioeconomic policies, and the alignment of national priorities with bioeconomic goals.

- **Bioeconomy Principles:** Here, we outline the core bioeconomy principles adopted, focusing on how these principles guide the sustainable use of biological resources, innovation in biotechnology, and integration of environmental and economic objectives. Timeline of Selected Public Policies: This section provides a chronological overview of significant public policies related to the bioeconomy, tracking their development, implementation, and impact over time to illustrate the evolution of the country's bioeconomic strategy.

- **Interview Findings:** Based on interviews with key stakeholders, including policymakers, industry leaders, and researchers, this section presents qualitative insights into the challenges, opportunities, and perceptions surrounding the bioeconomy.

- **Selected Survey Results:** This section highlights key quantitative findings from recent surveys conducted on bioeconomic practices and attitudes, offering a statistical perspective on sectoral trends, stakeholder opinions, and public awareness.

By synthesizing these findings, this report aims to provide valuable insights for policymakers, industry stakeholders, and researchers. It will facilitate a deeper territorial understanding of bioeconomic landscape and its alignment with broader regional and global bioeconomy trends.

As we move forward, the goal of this publication is to foster a greater dialogue on how Amazonia, locally and regionally, can enhance its bioeconomy strategies to achieve sustainable development goals. By building on the lessons learned from the Amazonian context, other territories can also harness its bioeconomic potential to create a resilient, innovative, and inclusive future.

We invite you to explore the detailed findings and recommendations presented in this report, and to engage with the ongoing efforts to advance Amazonian bioeconomy, contributing to a global movement towards a more sustainable and thriving world.

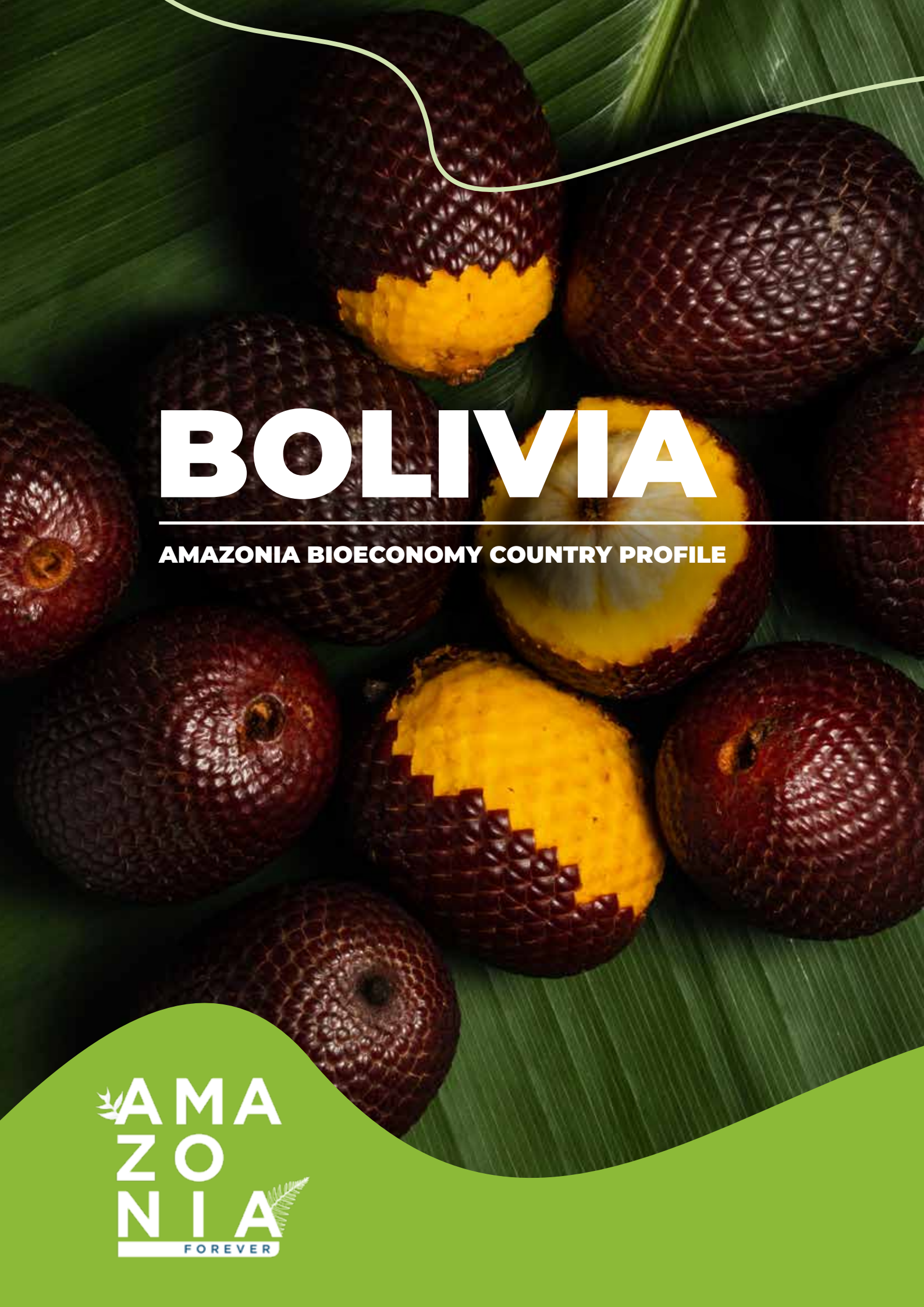
METHOLOGY

The study adopted a multi-method approach, integrating both qualitative and quantitative research techniques to illuminate the complexities surrounding the conceptualization and operationalization of the bioeconomy within Amazonia. The investigation began with an extensive review of existing literature, which provided a global context and honed in on the specificities of knowledge production in the eight Amazonian countries.

A rapid scoping review was conducted, encompassing sources in English, Spanish, and Portuguese to ensure a comprehensive capture of relevant studies. This process helped to develop key questions and laid a solid foundation for subsequent phases of the research. Online interviews were then conducted from May to October 2023 with a diverse group of key informants from Amazonia, including academics, government officials, entrepreneurs, and civilsociety representatives. Informants were identified through the literature review and expanded via snowball sampling, where initial interviewees recommended additional points of contact.

Subsequently, a two-stage survey was created using the ArcGIS Survey123 platform. The first questionnaire collected basic information from researchers, such as name, title, expertise, location, and research focus. The second questionnaire inquired into their specific bioeconomy- related activities and perspectives on the concept. Survey invitations were sent to individuals and organizations identified during the research process, with additional outreach conducted Through public LinkedIn groups and pre-existing IDB mailing lists.

The methodological approach was designed to be comprehensive and flexible, aiming to capture the multi-sector and interdisciplinary nature of the bioeconomy in the Amazonia. By combining literature reviews, interviews, and surveys, the study sought to arrive at a detailed understanding of the bioeconomy's current state and future possibilities in the region.



BOLIVIA

AMAZONIA BIOECONOMY COUNTRY PROFILE

AMAZONIA FOREVER

POLITICAL SPHERE

The Living Well framework, ratified in 2012, lays the groundwork for conversations about bioeconomy and sustainable development in Bolivia. Also known as Vivir Bien or Suma qamaña, this approach emphasizes living in harmony with nature and safeguarding the environment, opposing the commercialization or financial exploitation of the earth. As a result, the Bolivian government has been critical of the green economy models pushed by developed nations, arguing that they promote a cookie-cutter approach that "opens the door for private capital to legitimately enter the ecosystem services market." Additionally, the country has been outspoken against carbon markets, claiming they harm the integrity of nature.

Bolivia has also advanced several biotrade initiatives under supervision by the Ministry of Environment and Water. Moreover, in 2020, the Vice Ministry of Micro and Small Enterprises (MDPyEP) rolled out strategic guidelines that do not use the term "bioeconomy," but still reflect a similar vision.[1] For instance, these directives aim to "promote and bolster value-added production by either repurposing or recycling biomass from agricultural processing or by transforming biodiversity into various bioproducts, including bio-inputs, biofuels, biopharmaceuticals, and biocosmetics."

The latest industrial and environmental sector plans up to 2022 have maintained a steady emphasis on "sustainable use of biodiversity" rather than branching into the bioeconomy or adopting buzzwords like "biotrade" and "bioentrepreneurship," which are gaining traction in other Amazonian nations. This approach is clearly reflected in the MDPyEP's Comprehensive Development Plan for Living Well – Industry (2022), which outlines initiatives to further the pharmaceutical, biofuel, and essential oil industries by adding more value to natural resources during the industrialization process.[2] It also sets a targeted objective to boost the production of Amazonian fruits and encourages both public and private sectors to invest in research and technological advancements.

In 2023, the Bolivian government announced seven key initiatives aimed at safeguarding the Amazon rainforest.[3] Of particular relevance to this research, the president expressed a commitment to fostering sustainable development pathways that benefit the Amazon, its diverse ecosystems, and the indigenous communities that call it home. Recognizing that the active involvement of these communities is vital, the president emphasized that their engagement is essential in shaping proposals and policies that truly reflect the needs of those residing in the Amazon.

[1] Ministerio de Desarrollo Productivo y Economía Plural. (2022). Plan Sectorial de Desarrollo Integral para Vivir Bien – Sector Industrial 2021-2025. https://produccion.gob.bo/wp-content/uploads/2023/10/RM-137.2022-DICTAMEN-23-PSDI-SECTOR-INDUSTRIAL-2021-2025.pdf
[2] Ibid.
[3] Agencia Boliviana de Información. (2023, August 8). En la cumbre en Brasil, Bolivia plantea siete líneas de acción para proteger y preservar la Amazonía. https://abi.bo/index.php/gobierno2/40364-en-la-cumbre-en-brasil-bolivia-plantea-siete-lineas-de-accion-para-proteger-y-preservar-la-amazonia

BIOECONOMY PRINCIPLES

Principle	Analysis
Utilization of biological resources and processes	References to the utilization of renewable natural resources. [4]
Integration of science, technology, and innovation	The development of a science and innovation system focused on bioprospecting and the development of bioproducts or bioservices is not yet well established in Bolivia.[5] The state promotes the development of prioritized territorial production complexes, involving the participation of Public Companies and Productive Innovation Technological Centers (CETIP).[6]
Inclusion of ancestral and traditional knowledge	High appreciation for local knowledge. Bolivia has ratified the Convention for Biodiversity and the Cartagena Protocol (2003), but it is not a part of the Nagoya Protocol. It is one of the few countries that opposes treating biodiversity as a commodity, and its role has been highlighted in various global forums. [7]
Investments that enhance value addition through improved processing and supply chain efficiencies	In the case of the transformation of raw materials (such as quinoa) into value-added products the government has focused on supporting agricultural production rather than its industrial transformation.[8] Many value-added processes occur through certification procedures, which include involvement from the Bolivian Institute of Standardization and Quality (IBNORCA) and the Northeast Bolivian Exporters Chamber CADEXNOR (for instance, for the implementation of the Health Certification System for Brazil nut exports). The efforts to produce value-added products are carried out through two public companies: EBA (Bolivian Food and Derivatives Company) and EMAPA (Food Production Support Company).
Environmental sustainability, decarbonization, and the provision of environmental services, alongside the substitution of fossil fuel-based products with more sustainable alternatives	Guided by the constitutional principle of sustainably utilizing natural resources and biodiversity, as well as maintaining environmental balance.

[4] Estado Plurinacional de Bolivia. (2012). Ley Marco de la Madre Tierra y Desarrollo Integral para Vivir Bien. http://www.planificacion.gob.bo/uploads/marco-legal/Ley%20N%C2%B0%20300%20MARCO%20DE%20LA%20MADRE%20TIERRA.pdf

[5] Sánchez, J. I. P., & González, G. C. (2017). Identificación del potencial de los países de América Latina para transitar hacia una bioeconomía basada en el conocimiento. XVII Congreso Latino-Iberoamericano de Gestión Tecnológica. Gestión de la innovación para la competitividad: Sectores estratégicos, tecnologías emergentes y emprendimientos, Mexico City. https://www.uam.mx/altec2017/pdfs/ALTEC_2017_paper_510.pdf

[6] Ministerio de Desarrollo Productivo y Economía Plural. (2022). Plan Sectorial de Desarrollo Integral para Vivir Bien – Sector Industrial 2021-2025. https://produccion.gob.bo/wp-content/uploads/2023/10/RM-137.2022-DICTAMEN-23-PSDI-SECTOR-INDUSTRIAL-2021-2025.pdf

[7] Pacheco, D. et al. (2013). Bolivia en el Convenio sobre Diversidad Biológica. Viceministerio de Relaciones Exteriores Dirección General de Relaciones Exteriores. https://www.cancilleria.gob.bo/webmre/sites/default/files/libros/10%20Bolivia%20en%20el%20convenio%20sobre%20diversidad%20biologica.pdf

[8] Canales, N. et al. (2020). Potencial de la quinua en la bioeconomía de Bolivia (p. 16). Stockholm Environment Institute. https://www.sei.org/wp-content/uploads/2020/04/200331ortiz-canales-quinoa-bolivia-wp-spanishvf.pdf

TIMELINE OF KEY PUBLIC POLICIES

Year	Policy	Description
2003	Programa Nacional de Biocomercio Sostenible (PNBS)	Promote sustainable development through the production and trade of bio-based goods and services, in order to generate wealth and opportunities, especially for the rural and forestry populations.
2009	Plurinational State of Bolivia Constitution	· Article 8: Sumak kawsay (Living well): Alternative to capitalism and modernity, shaped by indigenous, mestizo, and Afro-Bolivian perspectives.
2011	Law 144	Law of the Agricultural Community Productive Revolution: covers various aspects of the agricultural sector, including policies for achieving food sovereignty, recognition of indigenous communities as economic organizations, and the creation of technical institutes for rural education.
2012	Law 300/2012	Framework Law for Mother Earth and Integral Development for Living Well: refers to the balance and equilibrium between biodiversity conservation, social and economic development, within the framework of sustainable development.
2015	Law 650 (Patriotic Agenda 2025)	Pillars include the eradication of extreme poverty, the socialization and universalization of quality basic services, education, science, technology and medicine for all, access to decent and sustainable housing, among others.
2016	Social and Economic Development Plan 2016-2020 (PDES)	Development is linked to the concepts of food security and sovereignty. Guidelines for the achievement of food sovereignty based on agroecological principles
2020	Strategic Guidelines for Bolivia's Productive Development Policy	These guidelines are based on eight strategic axes, which include aspects such as decent entrepreneurship, investment promotion, productivity, markets for growth, new ideas (innovation), information for development, pending challenges, and circular economy and environment.
2021	Economic and Social Development Plan (PDES) 2021-2025	"Rebuilding the Economy to Live Well, Towards Industrialization with Import Substitution." · Objective 3.3: Establish action plans for the protection, conservation and sustainable use of biodiversity for the maintenance of environmental functions and life systems, focusing on keystone species and prioritized umbrella species. · Objective 3.4: Generate programs for the strengthening, conservation, protection, use and sustainable exploitation of wildlife.

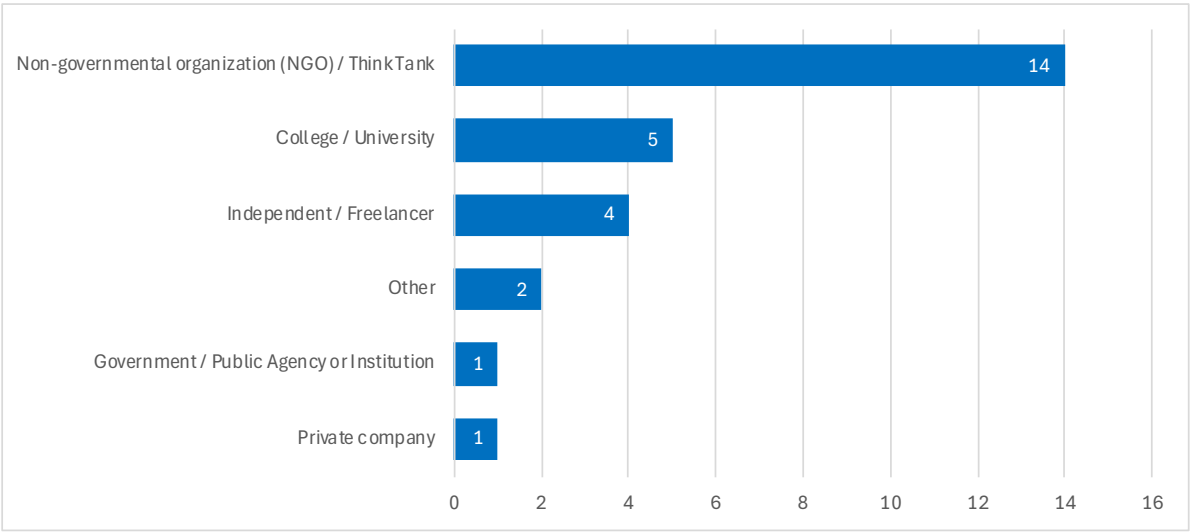
INTERVIEW FINDINGS

Experts interviewed for this study agreed that the term "bioeconomy" is generally absent from the language used by government bodies and in society more broadly. Instead, the concept of "bioeconomy" is often perceived as an ideologically-charged term that originates from institutions of the developed world and which is potentially at odds with an economy by and for the people (Cándido Pastor). Despite this, the government has not yet articulated a definitive position on the bioeconomy, refraining from either supporting or rejecting it. This hesitation could stem from ongoing uncertainties regarding the use of natural resources, as well as the limited sustainable development options available to the government, especially considering the resistance to worldwide initiatives like carbon markets (Pamela Cartagena). At the same time, home-grown concepts like "Vivir Bien" are not without their contentious aspects, particularly when the enforcement of policies from higher authorities fails to honor the autonomy of indigenous groups in determining their own interpretation of what it means to "live well."

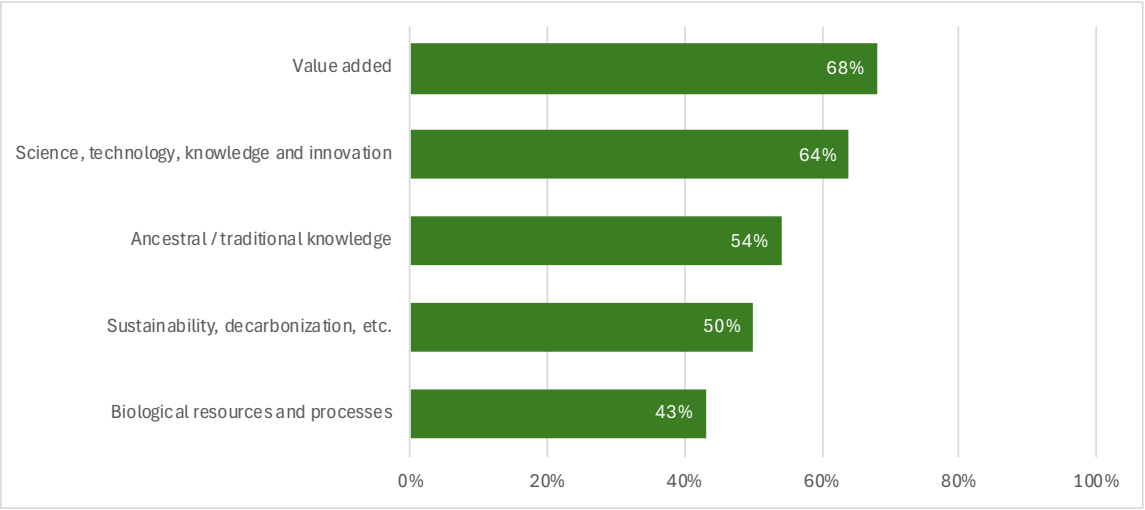
Feedback from interviewees suggested that, regardless of terminology, bioeconomy principles could inform a framework for sustainable and inclusive economic development in the Bolivian Amazon. In this way, bioeconomy initiatives could help to promote sustainable resource use while also respecting indigenous cultures, traditional knowledge and communities' intellectual property. This holistic approach could also foster market connections and invest in both production and capacity building. In this way, economic advancement could be achieved without compromising environmental integrity or indigenous rights.

SELECT KEY SURVEY RESULT

ORGANIZATION TYPE



PRINCIPLES UNDERLYING BIOECONOMY-RELATED ACTIVITIES



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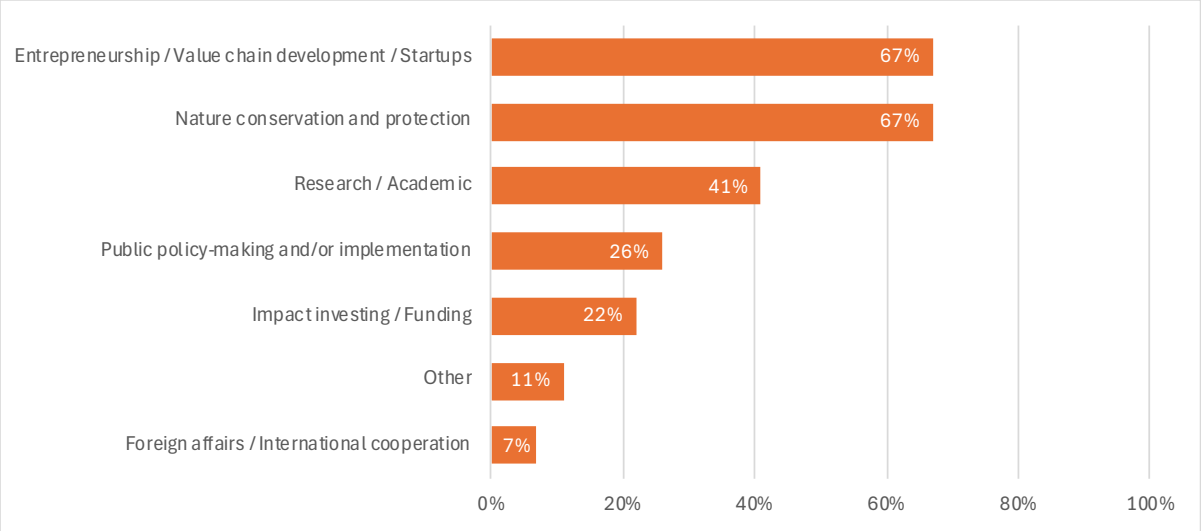

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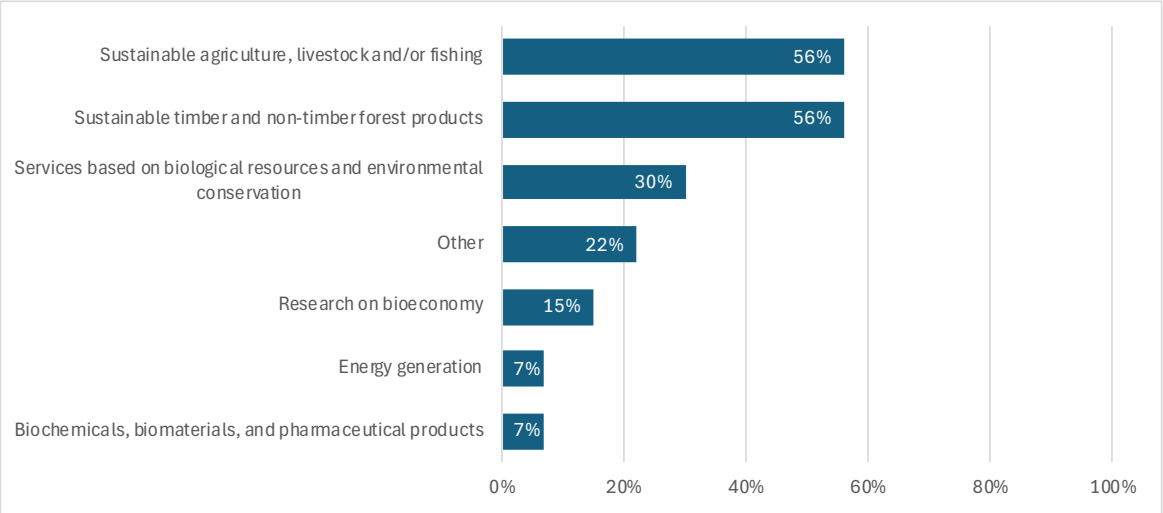


BRAZIL

AMAZONIA BIOECONOMY COUNTRY PROFILE

AMAZONIA FOREVER

POLITICAL SPHERE

Several strategies have been developed to direct and shape the growth of the bioeconomy within Brazil's Legal Amazon. In 2019, the Ministry of Agriculture and Livestock Farming (MAPA) unveiled the Brazil Bioeconomy-Sociobiodiversity program.[9] This primary goal was to encourage production systems that sustainably use social, biological, and extractive resources, with an emphasis on enhancing the earnings and living standards of smallholder farmers, as well as indigenous and traditional populations. In 2020, the Secretariat for Research and Scientific Training (SEPEF/MCTI) launched the Bioeconomy Production Chains program to stimulate the use of innovative products and raw materials to foster sustainable development across the country, including in Amazonia.

In 2023, the Lula administration enacted Decree 11349, which created a National Bioeconomy Secretary. This agency encompasses three distinct departments, each with a dedicated focus: the first aims to promote the bioeconomy, the second seeks to improve the shared management of fisheries resources, and the third is charged with the advancement of genetic heritage. Central to its mission is the development of a comprehensive national bioeconomy policy and a governance framework that integrates with ongoing decarbonization and circular economy efforts.

Currently, a number of government ministries are working on the bioeconomy from their respective vantage points.[10] This situation presents challenges for coordinated action, but it also creates an opportunity for legislative proposals like the National Bioeconomy Policy (PLP 150/2022) and the National Policy to Develop the Biodiversity Economy (PL 1855/2022). These bills will be pivotal in advancing a cohesive governance structure for the bioeconomy.

In 2023, Embrapa published an overview of three visions for a thriving bioeconomy in Amazonia.[11] The first, termed "agrobioeconomy," aims to utilize the combined strengths of agribusiness and biotechnology to rehabilitate lands that were once part of the rainforest ecosystem. The second, "forest-based bioeconomy," concentrates on regions of the Amazon that are currently experiencing environmental strain and aims to improve the management of both forests and agroforestry systems, as well as to bolster ecosystem services. Lastly, "sociobioeconomy" emphasizes the conservation of the rainforest's vast biodiversity and native ecosystems, as well as cultural preservation and social equity.[12] This approach diverges from European and American models in that it is deeply ingrained in the lived experiences of communities in mega-biodiverse regions.

[9] Ministério da Agricultura, Pecuária e Abastecimento. (2019). Portaria No 121, de 18 de Junho de 2019. https://www.in.gov.br/web/dou/-/portaria-n-121-de-18-de-junho-de-2019-164325642

[10] For example, Ministry of Agriculture and Livestock (MAPA), Ministry of Agrarian Development (MDA), Ministry of Science, Technology, and Innovation (MCTI), Ministry of Development, Industry, and Commerce (MDIC), Ministry of Regional Development (MIDR), Ministry of Indigenous Peoples, Ministry of Foreign Affairs (MRE) and Ministry of Finance

[11] Biaggioni Lopes, D. (2023). Visões sobre bioeconomia na Amazônia : oportunidades e desafios para a atuação da Embrapa (p. 36). Embrapa. https://www.embrapa.br/documents/10180/26187851/Visoes+sobre+bioeconomia+na+Amazonia+-+ed01+2023.pdf

[12] Garrett, R. et al. (2023). Supporting sociobioeconomies of healthy standing forests and flowing rivers in the Amazon. Science Panel for the Amazon. https://www.theamazonwewant.org/wp-content/uploads/2023/08/PB-Bioeconomy-en_approved.pdf

BIOECONOMY PRINCIPLES

Principle	Analysis
Utilization of biological resources and processes	Brazil's National Bioeconomy and Sustainable Regional Development Strategy (BioRegio) centers on biodiversity and innovative solutions for the use of natural resources.[13]
Integration of science, technology, and innovation	Extensive efforts to drive innovation in sectors like biofuels, pharmaceuticals, and agribusiness.[14]
Inclusion of ancestral and traditional knowledge	There is a focus on ensuring equitable distribution of Amazon resource benefits to local communities, acknowledging and respecting their contributions and knowledge within these value chains.[15]
Investments that enhance value addition through improved processing and supply chain efficiencies	Coordinated efforts to convert biomass into bioproducts with high added value.[16]
Environmental sustainability, decarbonization, and the provision of environmental services, alongside the substitution of fossil fuel-based products with more sustainable alternatives	Emphasis on environmental sustainability and decarbonization by offering environmental services and promoting the replacement of fossil fuel-derived products.[17]

[13] Ministro de Estado da Integração e do Desenvolvimento Regional. (2023). Portaria no 3.717, de 30 de novembro de 2023. https://pesquisa.in.gov.br/imprensa/servlet/INPDFViewer?jornal=515&pagina=116&data=04/12/2023&captchafield=firstAccess
[14] Embrapa. (n.d.). Bioeconomy. https://www.embrapa.br/en/tema-bioeconomia
[15] Uma Concertação pela Amazônia. (2021). Uma agenda pelo desenvolvimento da Amazônia. https://arapyau.org.br/wp-content/uploads/2021/10/uma-agenda-pelo-desenvolvimento-da-amazonia.pdf
[16] Embrapa. (n.d.). Bioeconomy. https://www.embrapa.br/en/tema-bioeconomia
[17] Brazilian Bioinnovation Association (ABBI). (2022). Identificação das Oportunidades e o Potencial do Impacto da Bioeconomia para a Descarbonização do Brasil (p. 52). Brazilian Bioinnovation Association (ABBI). https://ainfo.cnptia.embrapa.br/digital/bitstream/doc/1148694/1/Bioeconomia-Descarbonizacao.pdf

TIMELINE OF KEY PUBLIC POLICIES

Year	Policy	Description
2006	Biotechnology Strategy	Seeks to foster and implement measures that create a favorable setting for the growth of cutting-edge biotechnological goods and methods, thereby boosting the productivity of Brazil's economic framework, enhancing the innovation prowess of its enterprises, embracing technological advancements, spurring commercial activity, and broadening the scope of exports.
2007	National Biotechnology Development Policy	Aims to elevate Brazil to a top biotechnology player, enhance the competitiveness of its industry, expand its global trade footprint, and hasten economic expansion.
2007	National Energy Plan 2030	Plans the country's energy sector's long-term development, guiding trends and identifying expansion alternatives for the coming decades.
2007	National Policy for the Sustainable Development of Traditional Peoples and Communities	Promote sustainable development for traditional communities by acknowledging and reinforcing their territorial, social, environmental, economic, and cultural rights, while respecting and valuing their identity, organizational structures, and institutions.
2009	National Plan for the Promotion of Sociobiodiversity Product Chains	Enhance the production networks of sociobiodiversity goods to promote sustainable resource use and community development.
2012	Joint Action Plan PAISS Agriculture	Promote the advancement of agricultural technologies as well as the integration of industrial systems with supply chains of sugarcane or other compatible energy crops.
2015	Biodiversity Legal Framework	Regulates access to genetic resources, the protection and access to associated traditional knowledge, and the sharing of benefits for the conservation and sustainable use of biodiversity.
2018	Ministry of Science, Technology and Innovation (MCTI) Action Plan for Science, Technology and Innovation in the Bioeconomy	Establishes guidelines and actions for the development of the bioeconomy in Brazil.
2019	Bioeconomy Brazil - Sociobiodiversity of the Ministry of Agriculture and Livestock (MAPA)	Strengthen supply chains that sustainably use natural resources, boosting income for small and medium-sized farmers and traditional communities.
2020	Bioeconomy Production Chains Program	Focuses on enhancing production chains and creating new products, inputs, and materials within these chains to support sustainable development across all Brazilian biomes.
2022	Pará State Bioeconomy Plan (PlanBio)	Develop sustainable supply chains, knowledge centers, a forest knowledge school, and other initiatives.
2023	Decree No. 11.349, of January 1, 2023	Reorganizes the organizational structure of Brazil's Ministry of the Environment and Climate Change (MMA) to now incorporate the National Secretariat of Bioeconomy.
2023	National Bioeconomy and Sustainable Regional Development Strategy (BioRegio)	Boost innovation, investment, job creation, and income in the regional bioeconomy through diversified production chains, support for local industries and innovation, and sustainable management of natural resources.
In progress	National Bioeconomy Policy (PLP 150/2022)	Bill that aims to establish a national policy for bioeconomy development in Brazil.
In progress	National Policy for the Development of the Biodiversity Economy (PL 1855/2022)	Bill aimed at establishing a national sustainable investment strategy to foster a beneficial cycle of economic growth, biodiversity conservation, job and income creation, and the reduction of inequalities and structural gaps.

INTERVIEW FINDINGS

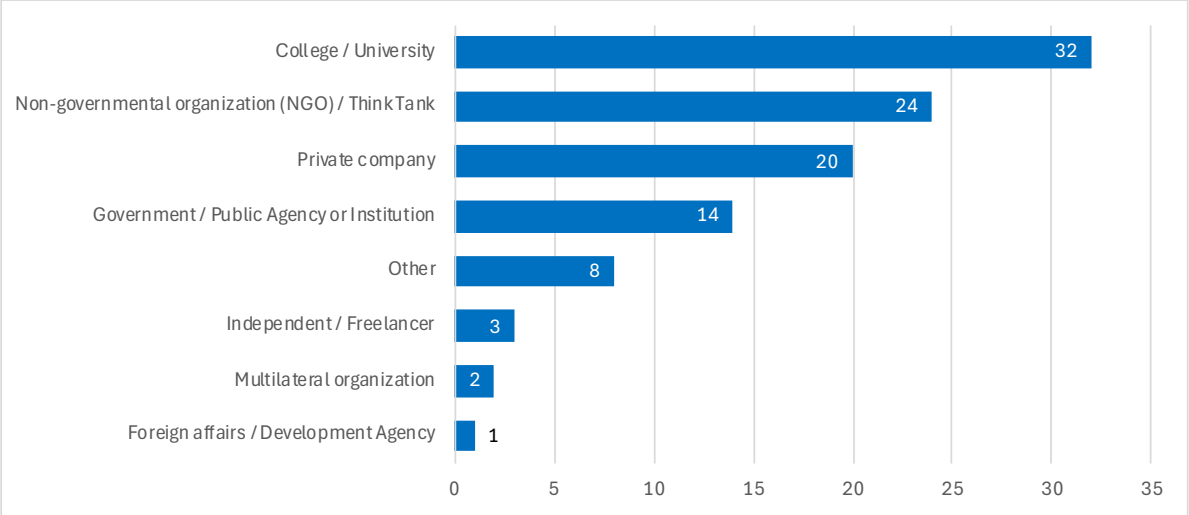
As evidenced by the previous section, a well-developed and sophisticated debate about the bioeconomy is underway in Brazil.. Experts interviewed for this study emphasized the bioeconomy's potential as a force for social inclusion, which may be even more valuable than the innovation it promotes. Interviewees expressed that the proceeds from Amazon resources ought to be shared equitably with the local communities that play vital roles in these value chains, and that traditional knowledge and expertise must also be both acknowledged and integrated into production methods.
Experts also agreed that an expanded bioeconomy could help to bridge rural and urban areas. With over 80% of the Legal Amazon population living in urban areas, there is great potential to boost startups and strengthen their connections with providers of sustainably-sourced raw materials.

Interviewees also argued that bioeconomy value chains must respect ecological limits and avoid increasing stress on plant and animal life. Consequently, it may be more prudent to focus the bioeconomy on niche and high value-added products, rather than attempting to meet the insatiable global demand that leads to over-exploitation of natural resources.
Amidst growing attention and investment, it is important to note that divisions exist regarding the best way to grow the Brazilian bioeconomy. For instance, some experts harbor reservations about whether "sociobiodiversity" can achieve the necessary scale and impact to effectively safeguard the rainforest, halt deforestation, and reduce greenhouse gas emissions. In their view, an outsized emphasis on sociobiodiversity could divert economic resources and political commitment away from promising technological solutions like the genetic sequencing of Amazonian biodiversity. At the same time, other practitioners regard this strategy as utopic and impractical, highlighting the underlying tensions that persist even within nations.

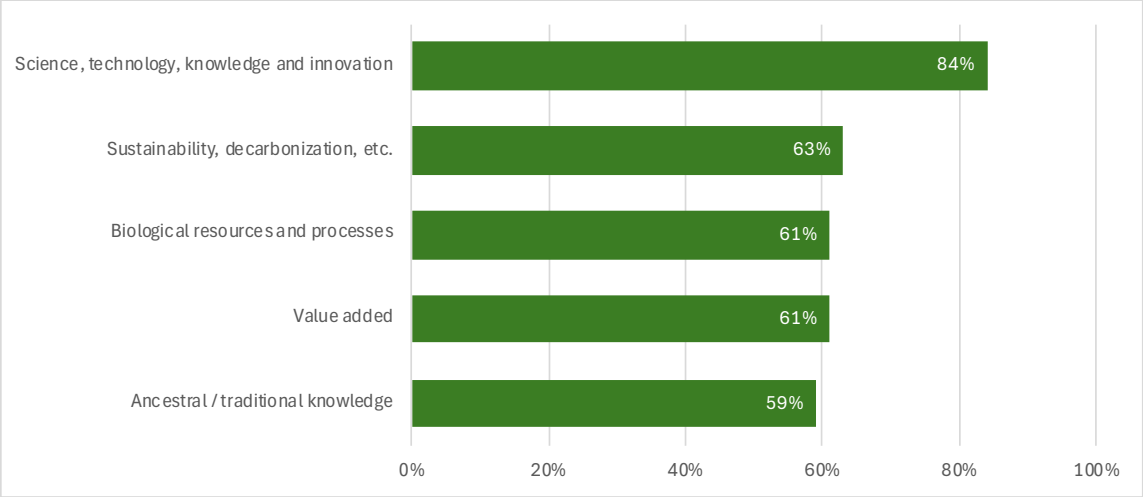
Finally, even though the term "bioeconomy" has gained widespread acceptance in Brazil, there are lingering concerns regarding its scope. Specifically, some worry that the concept might feasibly encompass large-scale, monoculture plantations of açaí and palma, even though such production methods may represent a threat to the Amazon rainforest. Consequently, some prominent experts have adopted the term "forest-compatible products" whereby no product is assumed to be sustainable, and the seal of approval depends on verifications as to the source and method of production.

SELECT KEY SURVEY RESULT

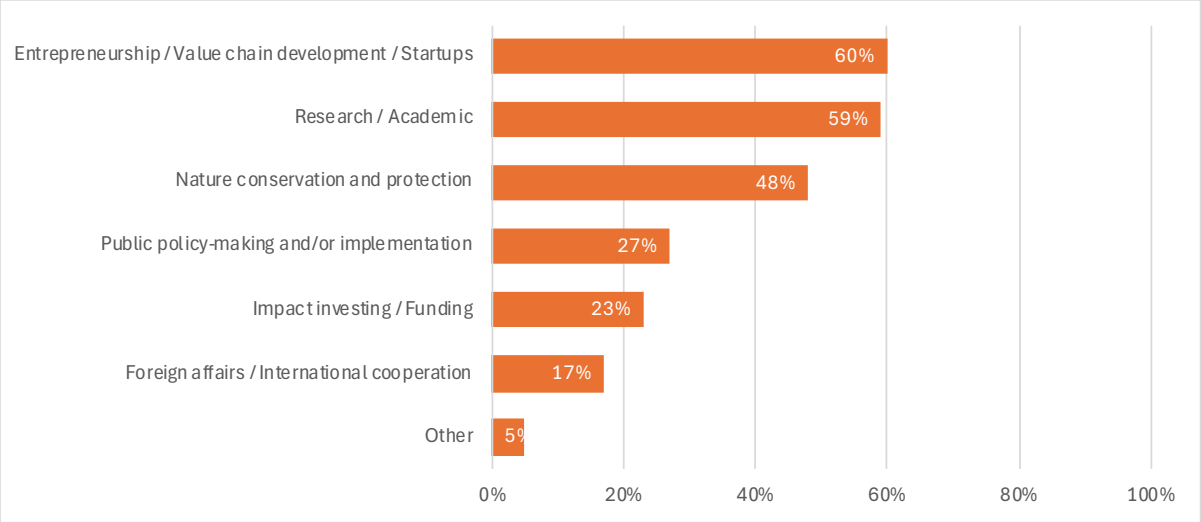
ORGANIZATION TYPE



PRINCIPLES UNDERLYING BIOECONOMY-RELATED ACTIVITIES



SECTOR



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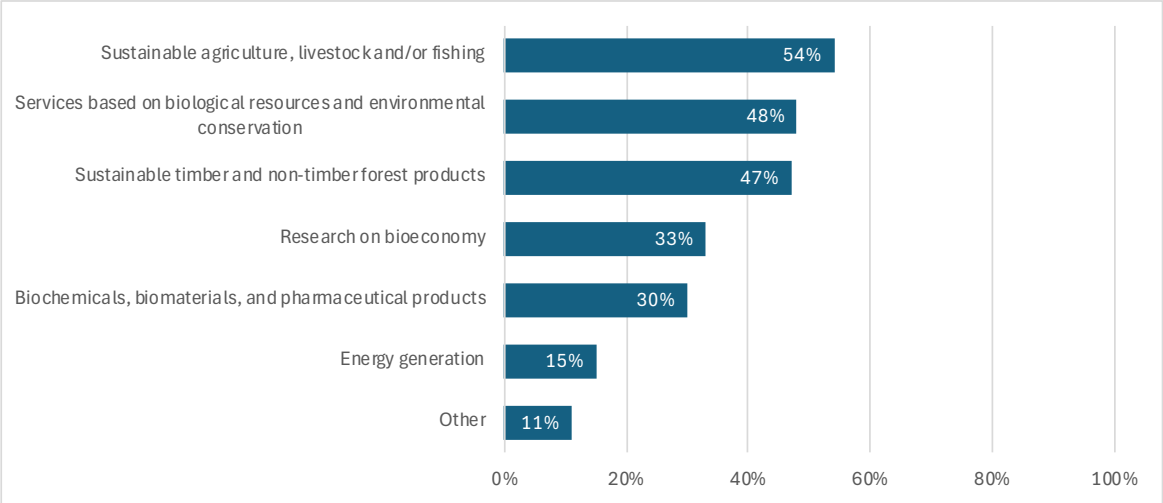
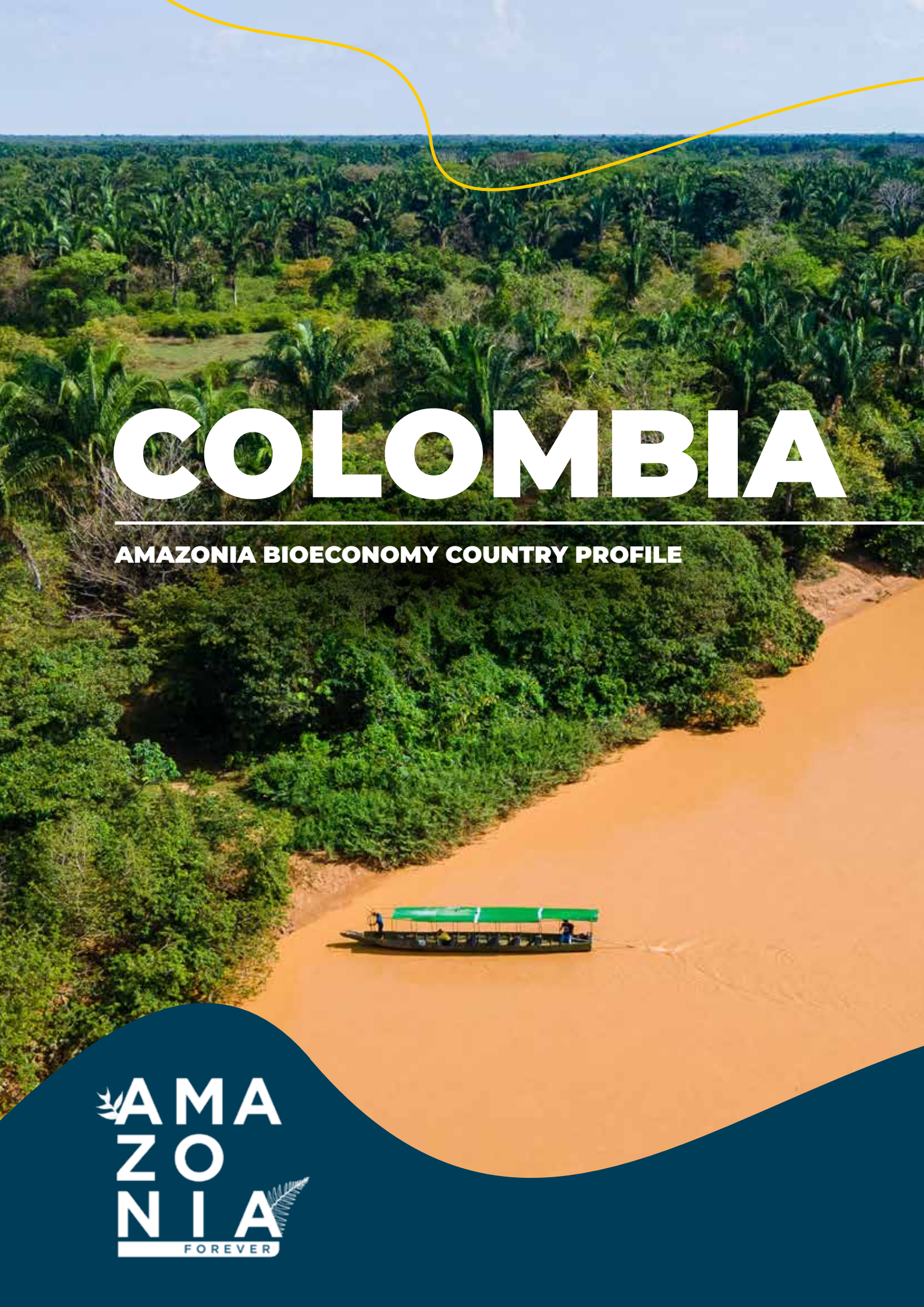


COLOMBIA

AMAZONIA BIOECONOMY COUNTRY PROFILE



AMAZONIA FOREVER

POLITICAL SPHERE

As the second most biodiverse country on the planet, it comes as no surprise that Colombia is increasingly focused on growing its bioeconomy. According to the Ministry of Science, Technology and Innovation (MinCiencias), there are currently over 200 bio-products initiatives underway, and the goal is to have the bioeconomy account for at least 10% of GDP by 2030.

Colombia's commitment to environmental stewardship was enshrined in its 1991 Constitution, which established the right to a healthy environment and introduced the principle of sustainable development. In 2018, the government officially defined the term "bioeconomy", characterizing it as economic systems that utilize biodiversity and biomass in an efficient and sustainable manner to create innovative and value-added products, processes, and services.[18]

That same year, Colombian officials convened the Misión Internacional de Sabios (MIS), a global panel of experts that offered guidance on topics such as biodiversity and ecosystem services, productive and sustainable agriculture, the utilization of biomass and advancements in green chemistry, as well as issues of health and well-being.[19]

In 2021, MIS refined the definition of bioeconomy as: "the production, use, and conservation of biological resources, including knowledge, science, technology, and innovation related to them, to provide information, products, processes, and services across all economic sectors, with the aim of advancing towards a sustainable economy". This definition aligns closely with the framework established by the 2018 Global Bioeconomy Summit. On the one hand, this reformulation positions Colombia to align with international funders who support the bioeconomy. On the other hand, it fails to capture the unique attributes of Colombia's Amazon region, which include its rich biodiversity and the knowledge held by traditional communities.

The integration of various policies, each with their own thematic emphasis, has resulted in Colombia boasting one of the most comprehensive and well-documented bioeconomy strategies in Amazonia. Key among these initiatives is the National Green Business Plan, unveiled in 2014 by the Ministry of Environment and Sustainable Development in partnership with the Autonomous Regional Corporations (CAR). Green businesses are characterized as commercial activities that produce goods or services with beneficial environmental impacts. These businesses integrate sound practices across environmental, social, and economic spheres, adopting a life cycle perspective to aid in the preservation of the environment as essential natural capital for regional development.[20]

In 2022, the National Development Plan highlighted the commitment to sustainable development and reinforced bioeconomy as a key component of an economic transformation that reduces carbon emissions and enhances resilience to climate shocks. For instance, the plan advocates for diversified productive activities that leverage natural resources and leverage knowledge and innovation.

Furthermore, in 2023 the Ministry of Commerce, Industry, and Tourism (Colombia Productiva) launched a campaign to promote "green productivity" and increase the resilience of Colombian businesses to the effects of climate change. Other key institutions for the Colombian bioeconomy include the Amazonian Institute of Scientific Research (SINCHI) and the Colombian Corporation for Agricultural Research (AGROSAVIA).

[18] Consejo Nacional de Política y Economía Social (CONPES). (2018). Política de Crecimiento Verde. Departamento Nacional de Planeación. https://colaboracion.dnp.gov.co/cdt/conpes/econ%C3%B3micos/3934.pdf
[19] Gobierno de Colombia. (2020). Bioeconomía para una Colombia Potencia viva y diversa: Hacia una sociedad impulsada por el Conocimiento. https://minciencias.gov.co/sites/default/files/upload/paginas/bioeconomia_para_un_crecimiento_sostenible-qm_print.pdf
[20] Ministerio de Ambiente y Desarrollo Sostenible, Colombia. (2022). Plan Nacional de Negocios Verdes 2022-2030. Banco Interamericano de Desarrollo, Biointropic y Corporación Biocomercio Sostenible. https://www.minambiente.gov.co/wp-content/uploads/2022/11/Actualizacion-Plan-Nacional-Negocios-verdes-2022-2030-VF2-2.pdf

BIOECONOMY PRINCIPLES

Principle	Analysis
Utilization of biological resources and processes	Biodiversity serves as the foundation for Colombia's bioeconomy, along with the necessity to maintain the sustainability of genetic material for the growth of the bioenergy sector.[21]
Integration of science, technology, and innovation	The primary focus of the Bio Colombia and MinCiencias I+D+i (Research, Technological Development, or Innovation),[22] incorporates elements found in other sectoral policies, universities, and research centers (such as the Amazon Institute of Scientific Research-SINCHI),[23] with the support of international cooperation.
Inclusion of ancestral and traditional knowledge	Organizations like SINCHI are working with local communities in the Amazon to strengthen entrepreneurial efforts.[24] On the other hand, there is a positive outlook on the ratification of the Nagoya Protocol to reinforce state sovereignty over its genetic resources, strengthen the governance of indigenous peoples and local communities over their traditional knowledge associated with these resources, and the benefits derived from their use.[25]
Investments that enhance value addition through improved processing and supply chain efficiencies	The Colombia BiO program defines bioproducts[26] as "high-value products created from the sustainable use of biodiversity or biomass. These products are backed by research and technological development." It supports the strengthening of value chains through sectoral policies, universities, research entities (such as the Alexander von Humboldt Biological Resources Research Institute), and international cooperation.
Environmental sustainability, decarbonization, and the provision of environmental services, alongside the substitution of fossil fuel-based products with more sustainable alternatives	The Colombia BIO strategy revolves around Green Businesses (activities that generate positive environmental impacts and also incorporate good environmental, social, and economic practices), and Green Productivity (transition towards a knowledge-based, productive, and sustainable economy).

[21] Canales, N., & Gómez González, J. (2020). Policy dialogue on a bioeconomy for sustainable development in Colombia (p. 18). Stockholm Environment Institute. https://www.sei.org/wp-content/uploads/2020/04/sei-pr-bioeconomy-colombia-apr-2020-canales-.pdf

[22] In Colombia, Minciencias places a significant emphasis on research and development within the sphere of the bioeconomy. This includes initiatives aimed at the advancement and both pre-commercial and commercial validation of functional prototypes that carry a high level of technological risk along with substantial commercial promise. Furthermore, there has been a concerted effort to support National Scientific Expeditions, as well as to enhance Biological Collections and the management of genetic resources.
Source: Ministério de Ciencia, Tecnología e Innovación. (2020). Convocatoria para el apoyo a programas y proyectos de I+D+I que contribuyan a resolver los desafíos establecidos en la Misión "Bioeconomía para una Colombia potencia viva y diversa hacia una sociedad impulsada por el conocimiento". https://minciencias.gov.co/sites/default/files/upload/convocatoria/tdr_convocatoria_mision_bioeoconoma_firmados.pdf

[23] As 2022, the SINCHI Institute maintains a comprehensive database that details 51 indigenous plant species from the Amazon and 95 microbial strains that have been isolated from Amazonian ecosystems. These entries are noted for their potential applications within the bioeconomy sector. Furthermore, the institute actively engages in research endeavors aimed at the bioprospecting of Colombia's Amazonian biodiversity. This research is directed towards the sustainable utilization and conservation of these precious natural resources. Source: Ibid.

[24] Hernández Gómez, M. S. (Ed.). (2019). Emprendimientos Amazónicos (p. 102). Instituto Amazónico de Investigaciones Científicas SINCHI. https://sinchi.org.co/files/publicaciones/novedades%20editoriales/pdf/GEF_Publicacio%CC%81n_Emprendimientos%20Amazo%CC%81nicos_2020.pdf

[25] Ministerio de Ambiente y Desarrollo Sostenible. (2022, December 16). En Cumbre COP 15 Colombia dice sí a la Gobernanza del conocimiento tradicional con la ratificación del Protocolo de Nagoya. https://www.minambiente.gov.co/en-cumbre-cop-15-colombia-dice-si-a-la-gobernanza-del-conocimiento-tradicional-con-la-ratificacion-del-protocolo-de-nagoya/

[26] Biointropic. (2021). Portafolio Bio Minciencias. https://mundobiotec.com/portafolio-bio-minciencias/

TIMELINE OF KEY PUBLIC POLICIES

Year	Policy	Description
1973	Law 23 of 1973	Renewable Resources Code, driven largely by the initiative of the Human Environment Conference at the United Nations and the Stockholm Declaration of 1972.
1991	Political Constitution	Gives special protection to the environment, acknowledges the right to a healthy environment and incorporates the definition of sustainable development.
2010	Sustainable Consumption and Production Policy	Aims to guide the change in production and consumption patterns towards environmental sustainability.
2011	Policy for the Commercial Development of Biotechnology based on the Sustainable Use of Biodiversity (CONPES 3697)	Policy for the commercial development of biotechnology based on the sustainable use of biodiversity was formulated, aiming to create economic, technical, institutional and legal conditions for the development of companies and commercial products based on the sustainable use of biodiversity.
2012	National Biodiversity Policy	Incorporated new concepts and a new approach aimed to generate greater inter-sectoral articulation and more social and community participation.
2012	National Program for Sustainable BioTrade (PNBS) 2014-2018	Contribute to wealth generation and opportunities (poverty reduction), especially for the rural population, while also contributing to the conservation of Colombian biodiversity through sustainable commercial use.
2014	National Green Business Plan	A joint effort involving the Ministry of Environment and Sustainable Development, Regional Autonomous Corporations, Research Institutes, producers, and public and private entities.
2018	Green growth policy 2018-2030 (CONPES 3934)	Official definition of bioeconomy as an “economy that efficiently and sustainably manages biodiversity and biomass to generate new value-added products, processes and services based on knowledge and innovation.”
2018	National Circular Economy Strategy (ENEC) (CONPES 4004)	Maximizing the added value of industrial and agricultural systems and sustainable cities in economic, environmental, and social terms through circularity, technological innovation, and collaboration with new business models.
2019	Misión Internacional de Sabios	47 national and international experts of diverse disciplines to provide policy recommendations in eight topic areas that were deemed key for the sustainable technological, social and economic, including Biotechnology, Bioeconomy and Environment.
2020	Colombia BIO National Project	Led by the Administrative Department of Science, Technology, and Innovation (Colciencias), aimed at creating a bioeconomy by 2025.
2020	Conpes for Science, Technology and Innovation 2021-2030 (CONPES 4069)	Aims to increase the contribution of Science, Technology, and Innovation (STI) to the social, economic, environmental, and sustainable development of the country.
2021	Policy for Reactivation, Repowering and Sustainable and Inclusive Growth (CONPES 4023)	Includes a directive for advancing the bioeconomy and eco-friendly enterprises.
2022	National Development Plan - Colombia, a Global Power for Life	The bioeconomy is presented as key for sustainable production and climate action. The Plan promotes responsible use of natural resources and innovation, reducing carbon emissions and increasing climate resilience.

INTERVIEW FINDINGS

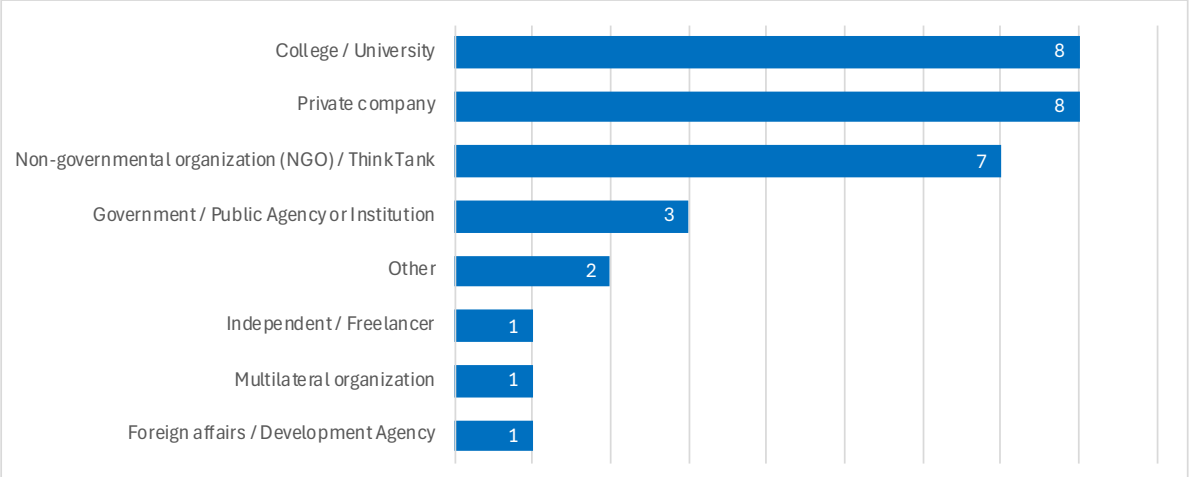
Experts interviewed for this study expressed that the Colombian bioeconomy represents a "neotropical" approach that not only addresses global environmental challenges and the imperative to industrialize biomass but also deeply integrates the concept of "sociobiodiversity." This term captures the rich biodiversity and intricate biocultural landscapes that define the country. The diverse interactions between traditional communities, such as small-scale farmers, Afro-Colombians, and indigenous peoples, with their environment, play a pivotal role in shaping the Colombian bioeconomy. This stands in contrast to the European model, which some perceive to be more focused on economic growth alone.

As Colombia continues to refine its vision of the bioeconomy, there is a growing concern among some experts regarding the potential for an excessively expansive definition that could result in the inclusion of activities with undesirable environmental impacts. Instead, they advocate for public policies that favor environmental conservation and enhance the well-being of communities, even if it means foregoing some financial profits. The change in perspective suggests that the bioeconomy should be less about "what you produce" and more about "what you protect." This mindset not only encourages innovation but also honors the ancestral wisdom surrounding the use of rainforest resources.

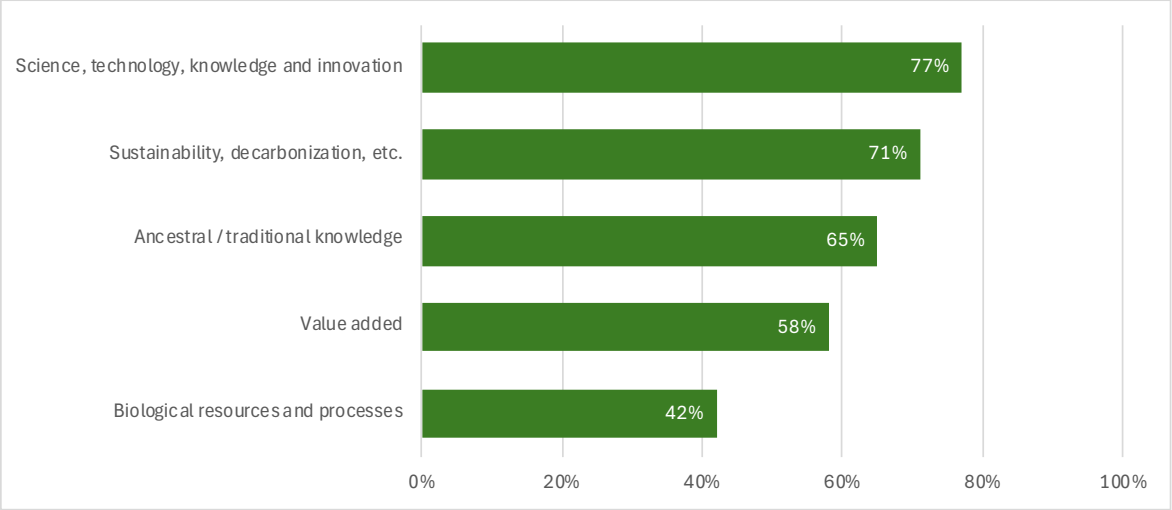
Above all, it is important to recognize that Colombia's bioeconomy is still in its early stages. Experts have pointed out that, although it is a significant source of employment, the bioeconomy is still marked by a lack of added value and sophistication. There is an ongoing need to forge connections with larger urban centers to create sustainable value chains. Such networks are crucial to ensure that the value created by these communities can reach and impact broader markets effectively.

SELECT KEY SURVEY RESULT

ORGANIZATION TYPE



PRINCIPLES UNDERLYING BIOECONOMY-RELATED ACTIVITIES



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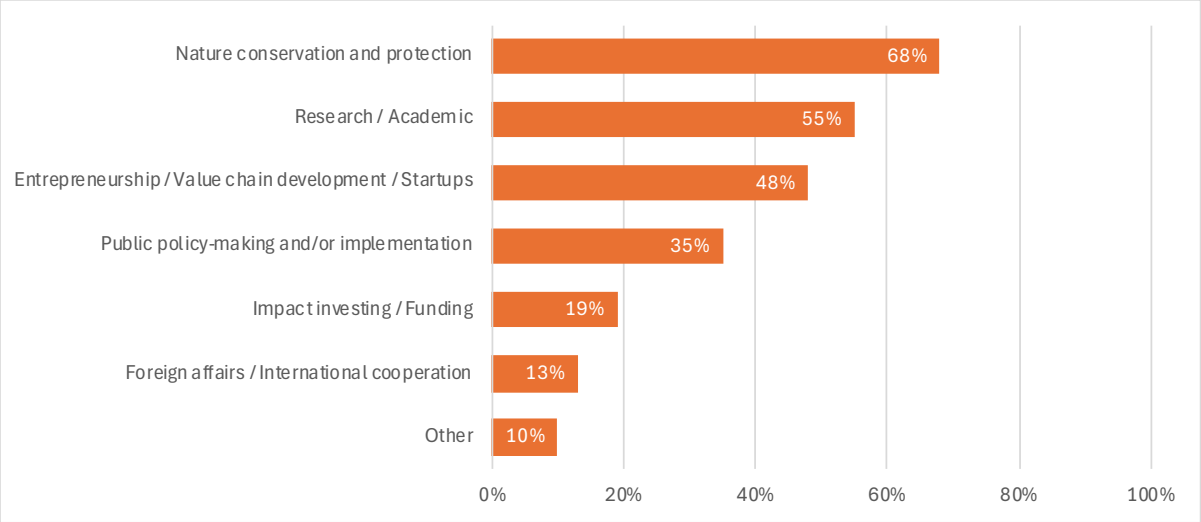

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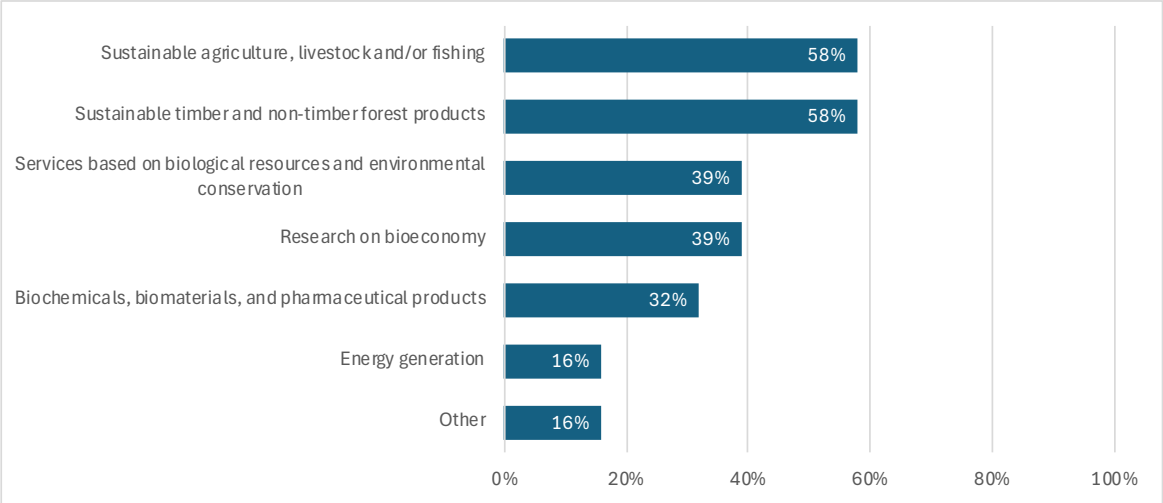
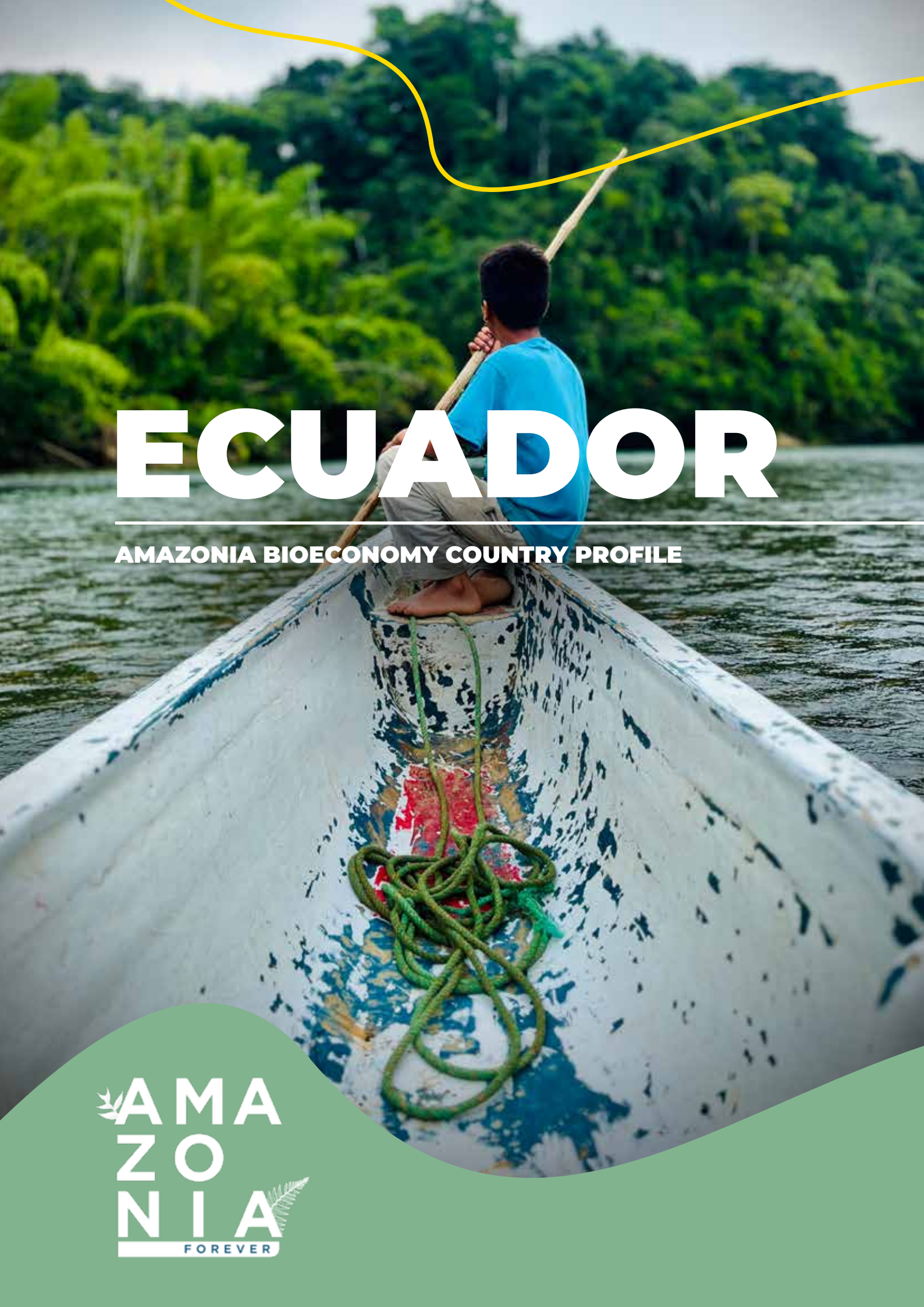




ECUADOR

AMAZONIA BIOECONOMY COUNTRY PROFILE

AMAZONIA FOREVER

POLITICAL SPHERE

Ecuador has a number of frameworks that lay the basis for its bioeconomy. One noteworthy initiative is the Amazonian Productive Transformation Agenda – Sustainable Agro-productive Conversion in the Ecuadorian Amazon (ATPA-RAPS). Launched in 2015 by the Ministry of Agriculture and Livestock, this program aims to bolster the economic, social, and environmental sustainability of the agricultural sector within the Ecuadorian Amazon. Furthermore, the Secretariat for the Amazon has placed considerable emphasis on promoting family farming, aquaculture, subsistence fishing, and eco-tourism[27]. Additionally, non-timber forest products are recognized as a vital source of employment and income generation, with great potential for bio-enterprises that harness the rich biodiversity of the Amazon.[28]

The establishment of a national bioeconomy policy commenced with the enactment of Ministerial Agreement 034 in 2019. This Agreement lays out guidelines for promoting bio-enterprises, a new economic sector that combines natural wealth, cultural diversity and traditional knowledge related to biological resources.[29] A survey conducted by the Ministry of the Environment that same year revealed that 65% of biodiversity-related projects were still in the early stages of development. Notably, only 20% of these ventures were situated in the Amazon.[30]

Ecuador is actively working to define the parameters of its bioeconomy. Also in 2019, the AFD Group and Sustainable Environmental Investment Fund (FIAS) signed a Bioeconomy Technical Assistance agreement with buy-in from 34 public and private entities.[31] Following the creation of a National Compact for Sustainable Bioeconomy in 2020, the Universidad Técnica Particular de Loja (UTPL) was selected to draft a national bioeconomy strategy in the form of a White Paper that synthesizes input from various sectors (private companies, civil society organizations, academia, etc.).[32] This document is expected to be released by the end of 2023, and will provide critical analyses and clarity for relevant value chains. The underlying objective is not to replace Ministerial Agreement 034 but to expand upon it, integrating bio-entrepreneurship within a broader initiative that seeks to forge strategic partnerships and foster green innovation.

[27] Secretaría Técnica de la Circunscripción Territorial Especial Amazónica. (2022). Plan Integral para la Amazonía 2021-2025. https://www.secretariadelamazonia.gob.ec/wp-content/uploads/downloads/2022/09/PIA_final-Digital-.pdf
[28] Ibid.
[29] Ibid.
[30] IICA. (2021). Desarrollo Productivo de las Provincias Amazónicas, a través de Innovaciones Agropecuarias y Comercialización Diferenciada. https://repositorio.iica.int/bitstream/handle/11324/17525/5119-00.pdf
[31] Agence Française de Développement (AFD). (2022, May 18). Bioeconomy: protecting biodiversity for an "economy for life." https://www.afd.fr/en/actualites/bioeconomy-protecting-biodiversity-economy-life
[32] Fondo de Inversión Ambiental Sostenible (FIAS). (2023, March 3). Construcción participativa del Libro Blanco sobre BioEconomía en Ecuador. https://fias.org.ec/construccion-participativa-del-libro-blanco-sobre-bioeconomia-en-ecuador/

BIOECONOMY PRINCIPLES

Principle	Analysis
Utilization of biological resources and processes	Policies highlight the "sustainable utilization of native biodiversity."[33]
Integration of science, technology, and innovation	Amazonia is not integrated into the country's science, technology, and innovation system. The Idearium platform does not show any registered and accredited spaces for innovation and technology transfer in Amazonia.[34]
Inclusion of ancestral and traditional knowledge	The Bioeconomy Pact emphasizes "promoting social inclusion, reducing territorial disparities, and ensuring equitable distribution of benefits from productive activities."[35]
Investments that enhance value addition through improved processing and supply chain efficiencies	The focus on bio-entrepreneurship often results in developments being limited to short-term strategies and sectors with little added value,[36] such as fresh and processed foods, and services like tourism. Strategies like Innovando Amazonía aim to encourage productive diversification, responsible and sustainable use of both renewable and non-renewable resources.[37]
Environmental sustainability, decarbonization, and the provision of environmental services, alongside the substitution of fossil fuel-based products with more sustainable alternatives	The Ecuadoran bioeconomy will be based on the 'conservation, use, and sustainable management of biodiversity and agrobiodiversity, to transition towards a productive development model that is resilient, competitive, cooperative, and diversified, towards a model that generates dignified employment, social inclusion, and an equitable distribution of benefits.'[38]

[33] Ministerio del Ambiente, Agua y Transición Ecológica (MAATE). (2019). Acuerdo Ministerial No 034: lineamientos para el fomento del bioemprendimiento. http://suiadoc.ambiente.gob.ec/documents/10179/6575780/Acuerdo+Ministerial+034_Lineamientos+para+el+Fomento+de+bioemprendimientos.pdf
[34] Secretaría de Educación Superior, Ciencia, Tecnología e Innovación. (n.d.). Idearium. https://www.idearium.gob.ec/
[35] Gobierno de Ecuador. (2020). Pacto Nacional por la Bioeconomía Sostenible. https://wwflac.awsassets.panda.org/downloads/pacto_nacional_por_la_bioeconomia_texto_definitivo.pdf
[36] IICA. (2021). Desarrollo Productivo de las Provincias Amazónicas, a través de Innovaciones Agropecuarias y Comercialización Diferenciada. https://repositorio.iica.int/bitstream/handle/11324/17525/5119-00.pdf
[37] Alianza para el Emprendimiento e Innovación. (2022). Innovando Amazonía. https://www.aei.ec/innovando-amazonia-2022/
[38] Gobierno de Ecuador. (2020). Pacto Nacional por la Bioeconomía Sostenible. https://wwflac.awsassets.panda.org/downloads/pacto_nacional_por_la_bioeconomia_texto_definitivo.pdf

TIMELINE OF KEY PUBLIC POLICIES

Year	Policy	Description
2008	Socio Bosque Project (PSB)	Economic incentives to farmers and indigenous communities that voluntarily commit to the conservation and protection of their native forests or other native vegetation.
2008	National Plan for Good Living 2013-2017 (PNBV)	It contemplates a series of actions to protect and manage nature's resources in order to ensure the well-being of the population.
2013	Financial Sustainability Project (PSF) Competitive Funding Mechanism	Generate a transparent and competitive process among all organizations and communities that are part of or are in the areas of influence of the Protected Areas.
2013	National Sustainable BioTrade Program	Implemented with substantive contributions to knowledge, tools, proposals and initiatives focused on the management and use of goods and services derived from native biodiversity, under criteria of environmental, social and economic sustainability in the provinces of the Amazon.
2014	National Strategy for the Change of the Production Matrix	Planning tools, public actions (defined by different levels of government) and private actions to complement efforts in industries, products and services to take advantage of the capabilities and potential identified in the territory.
2015	Agenda for Amazonian Productive Transformation and Sustainable Agroproductive Reconversion in the Ecuadorian Amazon (ATPA-RAPS)	Transform the agricultural production activities in the Amazon into sustainable agro-productive systems, taking into account economic, social, environmental, and cultural perspectives, through the comprehensive planning of farm management. This initiative aims to free up pasture areas for crop diversification and reforestation efforts, under the stewardship of the Ministry of Agriculture and Livestock (MAG).
2015	National Biodiversity Strategy (NBS) 2015-2030	It incorporates a prospective vision for biodiversity in 2030 and an action plan through 2021.
2015	Organic Law on Agrodiversity, Seeds and Promotion of Sustainable Agriculture	Aims to protect, revitalize, multiply, and promote agrobiodiversity related to plant genetic resources for food and agriculture.
2017	Organic Environmental Code	Article 30: Underscores the role of enhancing the nation's socioeconomic progress and reinforcing a community-focused, cooperative economy. This involves the responsible management and use of biodiversity, and the development of biotrade and similar enterprises.
2017	National Development Plan 2017-2021	Aims to enhance productivity, foster diversified production and bioeconomy, and promote balanced regional development, food and energy sovereignty, environmental sustainability, comprehensive rural development, fair trade, and economic stability.
2017	Integral Amazonian Program for Forest Conservation and Sustainable Production (PROAmazonia)	Aims to enhance productivity, foster diversified production and bioeconomy, and promote balanced regional development, food and energy sovereignty, environmental sustainability, comprehensive rural development, fair trade, and economic stability.
2018	Center for the Promotion and Development of Sustainable BioBusinesses of Ecuador (BioEmprende)	Works with four commodities that are considered the main causes of deforestation and aims to direct traditional production towards sustainable production of these products
2019	Ministerial Agreement No. 34 Guidelines for the Promotion of Bioentrepreneurship	Encourage the establishment of a sustainable development model within the nation that will stimulate the creation of enterprises centered on the responsible utilization of natural resources, encompassing biocommerce, bioentrepreneurship, and bioindustry.
2019	National Pact for Sustainable Bioeconomy	Sets the guidelines for the promotion of bioenterprises based on the sustainable use of native biodiversity as a strategy for the conservation of natural heritage.
2020	National Pact for Sustainable Bioeconomy	Set the initial parameters for the bioeconomy in Ecuador, acknowledging it as an alternative to traditional development models.
2021	Integral Plan for the Amazon (PIA) 2021-2025	Guarantee sustainable development in the Ecuadorian Amazon, based on the recognition and enhancement of the biophysical and socio-cultural particularities of this territory.
2023	Innovando Amazonía	This program aims to promote productive diversification, the responsible and sustainable utilization of renewable and non-renewable resources, and the specialization of human talent in activities that generate added value with territorial relevance. It ensures equitable access to the means of production.
In progress	White Paper and National Strategy for a Sustainable Bioeconomy in Ecuador	The development of the Public Policy on Bioeconomy is being coordinated in collaboration with the Sustainable Environmental Investment Fund (FIAS), the Ministry of Environment, Water, and Ecological Transition (MAATE), and the Ministry of Production, Foreign Trade, Investments, and Fisheries (MPCEIP). The preparation of this document will be carried out by consultants from the Technical University of Loja (UTPL), working alongside public and private entities in the country. Additionally, a Financing Agreement for the technical assistance fund has been signed between the French Development Agency (AFD) and the Ministry of Economy and Finance.

INTERVIEW FINDINGS

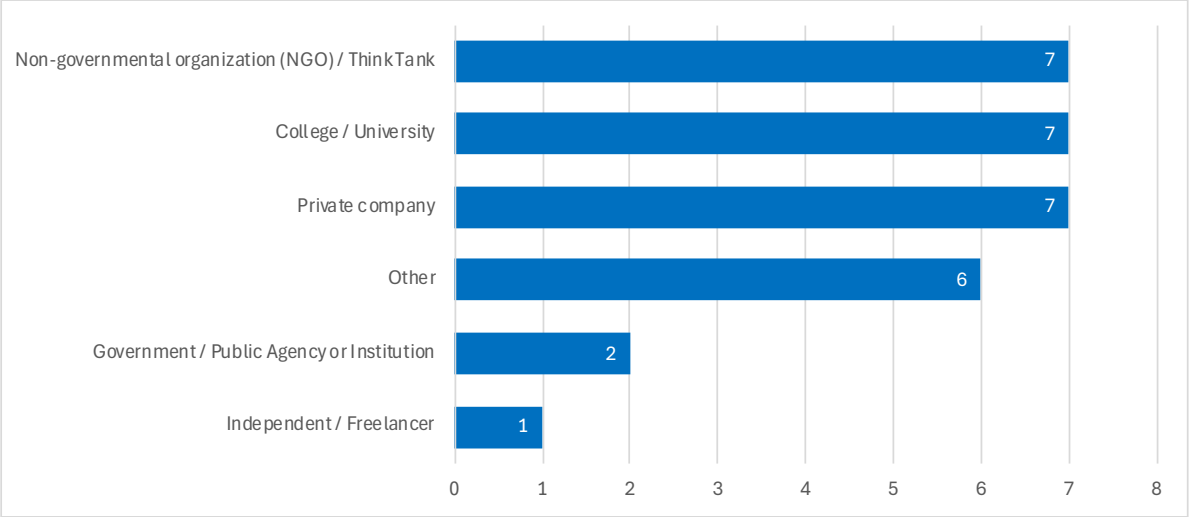
As the country awaits the release of the White Paper, experts interviewed for this study report a notable lack of consensus on the definition of the bioeconomy. For example, the Ministry of the Environment frequently employs the term "bioeconomy," whereas the Ministry of Finance prefers the phrase "circular economy," particularly when discussing waste management and recycling initiatives in urban centers. Furthermore, interpretations of the bioeconomy vary significantly across different regions, such as the Amazon, the Pacific coast, the Andes, and the Galapagos. In Amazonia, for instance, phrases like "bio-entrepreneurship" and "biotrade" are prevalent, alongside concepts such as "conservation," "sustainable use," and "community development."

In Ecuador today, the bioeconomy is generally understood as economic activities that prioritize sustainability, inclusivity, resilience, and equity. Although there is no consensus on a precise definition, experts contend that the characteristics of Ecuador's bioeconomy will be distinct from those of developed nations and territories. For example, Ecuador's relative lack of biomass resources makes it a poor fit for the European Union's characterization of the bioeconomy. Some authorities suggest that Ecuador should focus on leveraging its rich biodiversity, reducing poverty, and harnessing specific natural resources for specialized scientific and medical applications. On the matter of biotechnology, Ecuador's capacity remains considerably untapped, and the nation has not yet established formal regulations governing access to genetic resources or the traditional knowledge of indigenous communities regarding medicinal plants.

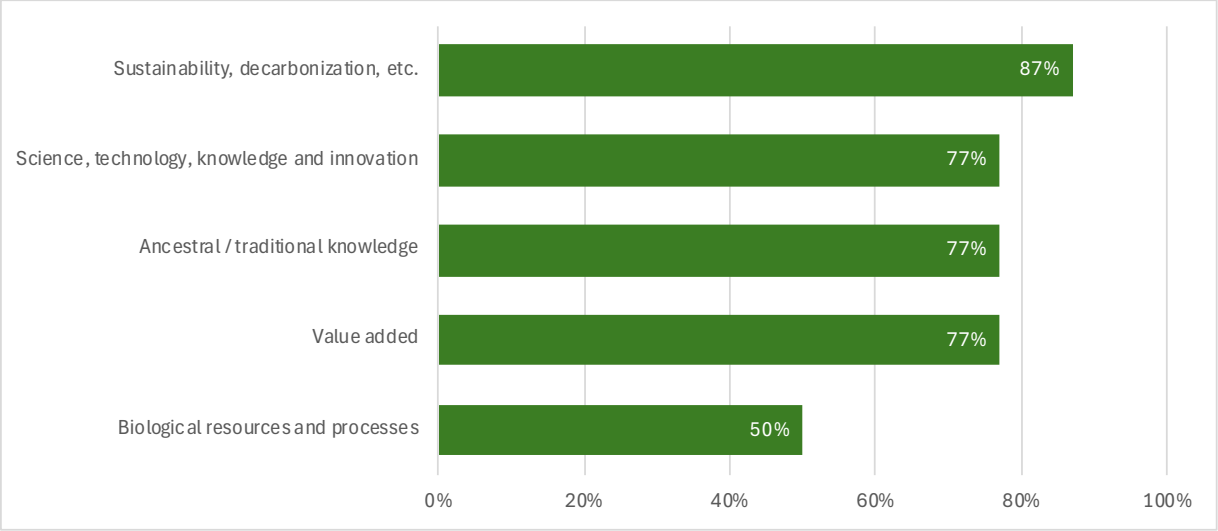
A key question revolves around the potential of the bioeconomy to alleviate poverty and enhance overall well-being, as opposed to merely concentrating on adding value to specific sustainably-sourced commodities. The answer will depend in part on Ecuador's ability to add value to bioeconomy products and to guarantee a fair distribution of the ensuing benefits, particularly among local communities that produce the raw materials. In this context, it is important to consider the participation of indigenous populations, the establishment of community-based frameworks, and the provision of substantial support to Amazon communities.

SELECT KEY SURVEY RESULT

ORGANIZATION TYPE



PRINCIPLES UNDERLYING BIOECONOMY-RELATED ACTIVITIES



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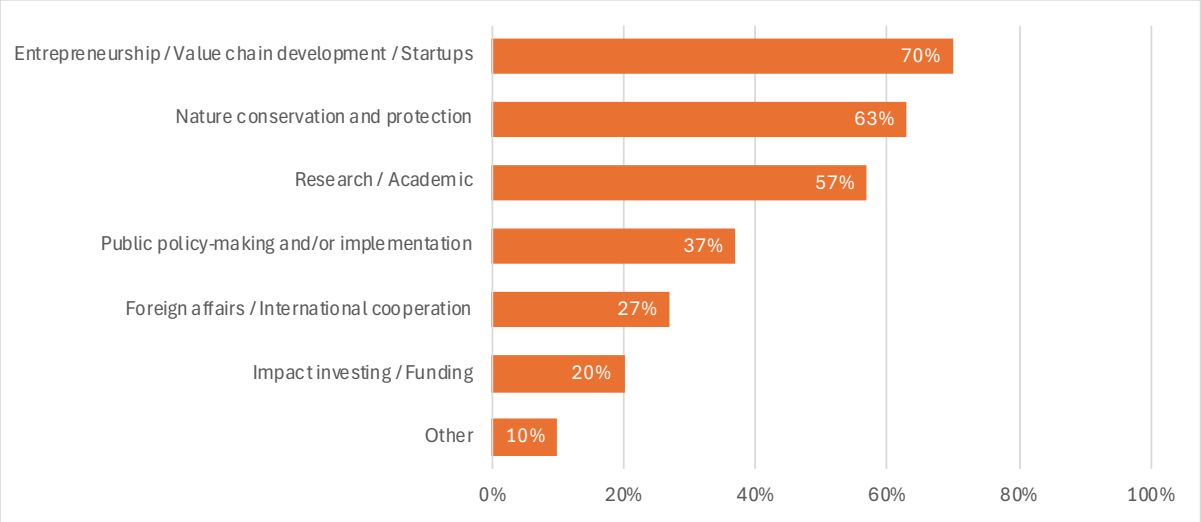

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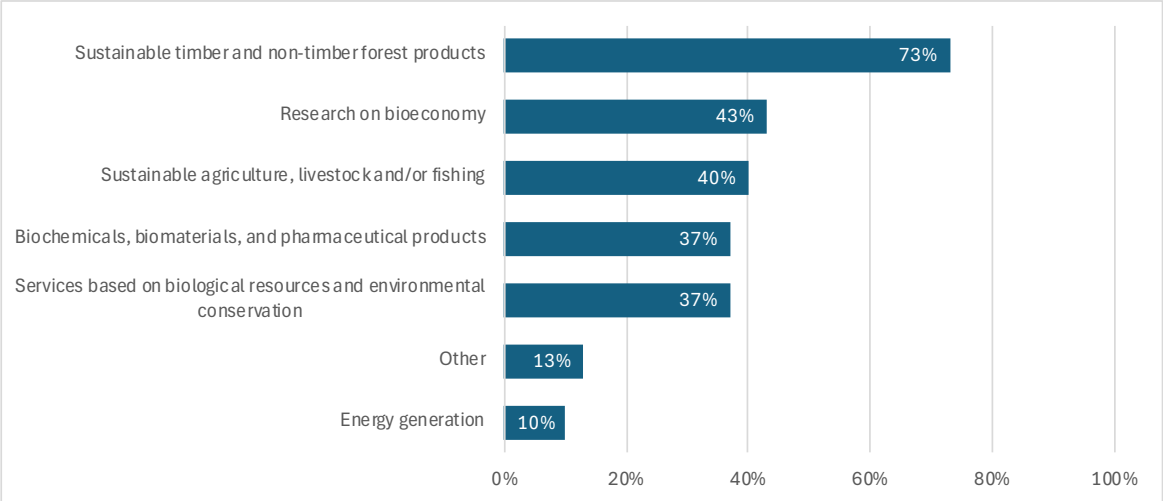
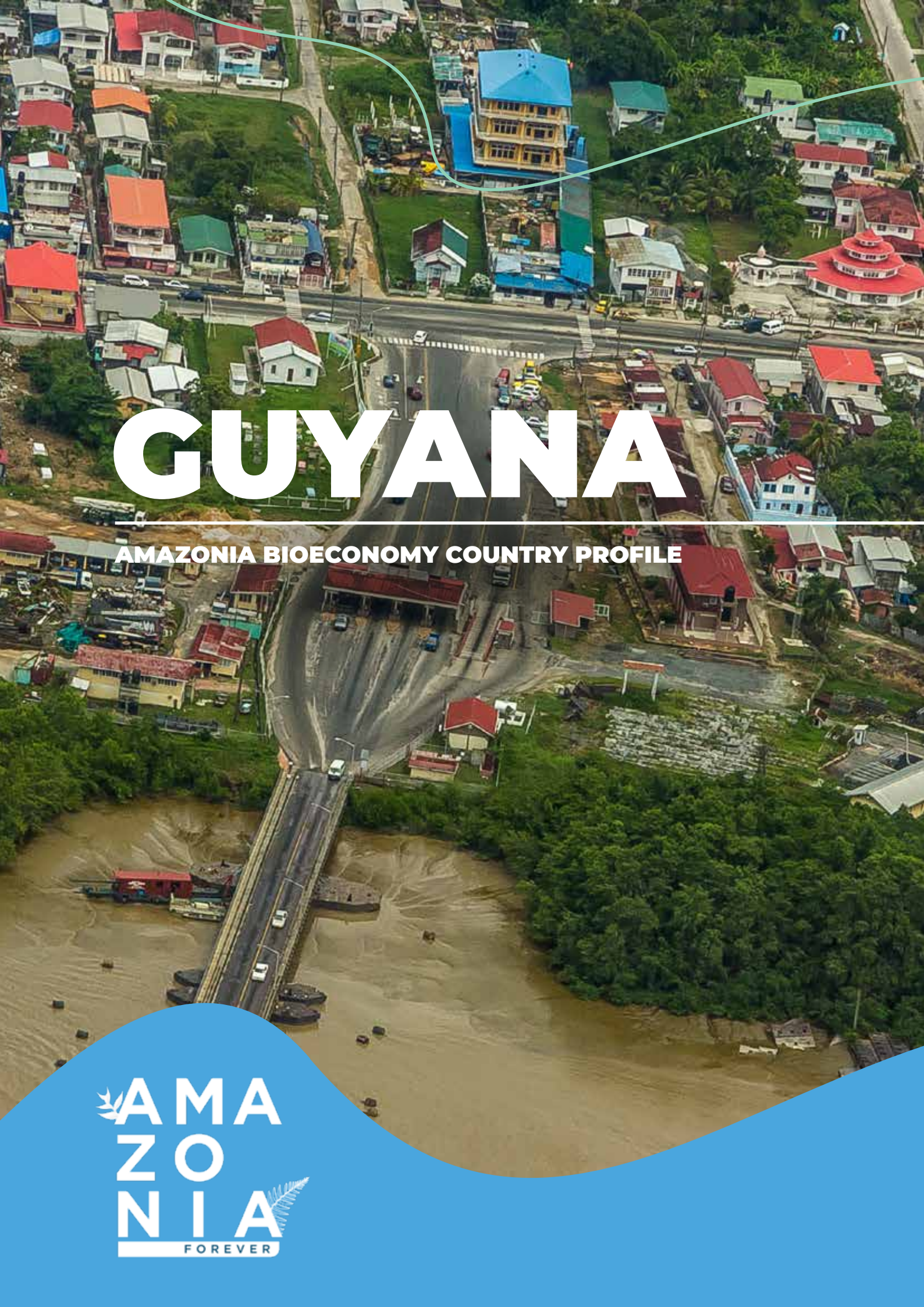




GUYANA

AMAZONIA BIOECONOMY COUNTRY PROFILE

AMAZONIA FOREVER

POLITICAL SPHERE

Despite the absence of a dedicated bioeconomy strategy in Guyana, various policies incorporate elements and sectors that are conducive to sustainable growth. Notably, the Low Carbon Development Strategy 2030, unveiled in 2009, envisions a transition based on reduced deforestation and forest degradation and highlights the importance of investments in sectors such as aquaculture and ecotourism. In addition, this strategy presents adaptation measures in the forestry sector, which include engaging local communities and indigenous populations in forest stewardship, preservation, and management. Moreover, it advocates for partnerships with research and development institutions to restore degraded forests and protect economically-strategic species that are also resilient to the impacts of climate change.

2019 saw the introduction of Green State Development Strategy: Vision 2040, a framework that presents the idea of "green goods" – encompassing products like organic sugar and rice, biofuels derived from sugar, and certified wood products.[40] Additionally, the strategy suggests there is considerable promise in the realm of biotechnology, particularly regarding biochemicals and bioplastics. Furthermore, the term "green products" extends to items such as cosmetics, food, and medicinal products that are made with low-impact, natural ingredients sourced from local species and are harvested using sustainable methods. The discovery of oil and gas in 2015[41] also has promoted the implementation of such green strategies "as a newcomer to the fossil fuel industry, while the nation is clearly on the cusp of wealth, it is also pursuing a green economy as part of its articulated Low Carbon Development Strategy (LCDS)."[42]

[40] Government of Guyana. (2019). Green State Development Strategy: Vision 2040. https://faolex.fao.org/docs/pdf/guy199315.pdf
[41] McWilliams, G. et al. (2023, October 23). FACTBOX Offshore discoveries turn tiny Guyana into oil hotspot. Reuters. https://www.reuters.com/business/energy/offshore-discoveries-turn-tiny-guyana-into-oil-hotspot-2023-10-23/
[42] Blackman, T., & Walcott, C. (2022, July 20). Guyana's Fossil-Green Economy as a Model Climate Change Agent. OilNOW. https://oilnow.gy/featured/guyanas-fossil-green-economy-as-a-model-climate-change-agent/

BIOECONOMY PRINCIPLES

Principle	Analysis
Utilization of biological resources and processes	The Green State Development Strategy underscores the importance of managing natural resource wealth, indicating a strategic approach to resource governance.
Integration of science, technology, and innovation	Fossil fuel foundations and companies have made important investments in sustainable employment and conservation
Inclusion of ancestral and traditional knowledge	Recognizes the validity and value of traditional indigenous knowledge, particularly regarding the preservation and utilization of the country's key natural resources, such as forests.
Investments that enhance value addition through improved processing and supply chain efficiencies	Primary focus on biotechnology, specifically the promotion of biofuels as a part of a renewable resources portfolio.[43] No established national strategy for the manufacturing of products or bioservices. Guyana is an economy which remains in the primary stage of commodity production[44]. The production of bio-based products with added value is very limited in the country, in fact, there isn't any incentive or technical capacity for commercial production and export of organic foods from Guyana. Except for heart of palm, organic farming in Guyana is done at subsistence or at very small semi-commercial levels.[45]
Environmental sustainability, decarbonization, and the provision of environmental services, alongside the substitution of fossil fuel-based products with more sustainable alternatives	The "green agenda" envisions an enduring, resource-efficient economy focused on sustainability, low carbon emissions, and resilience.

[43] Institute of Applied Science and Technology. (n.d.). Biofuel. https://iast.gov.gy/biofuel/
[44] Baluch, N., & Rambarran, R. (2018). Development of Guyana in the 21st Century: Promoting Green Innovations A Note on the Innovation Ecosystem of Guyana and Promoting Green Innovations in the Current Environment. https://www.researchgate.net/publication/340683227_Development_of_Guyana_in_the_21_st_Century_Promoting_Green_Innovations_A_Note_on_the_Innovation_Ecosystem_of_Guyana_and_Promoting_Green_Innovations_in_the_Current_Environment
[45] Partnership for Action on Green Economy. (2019). Guyana Green Economy Modelling Study (p. 44). United Nations Environment Programme. https://www.greenpolicyplatform.org/sites/default/files/downloads/resource//GUYANA_GREEN_ECONOMY_MODELLING_STUDY_PAGE.pdf

TIMELINE OF KEY PUBLIC POLICIES

Year	Policy	Description
2009	Low Carbon Development Strategy 2009-2015	Outlines vision for promoting economic development, while at the same time combating climate change.
2012	National Biodiversity Strategy and Action Plan (2012-2020)	Biodiversity is sustainably utilized, managed and mainstreamed into all sectors contributing to the advancement of Guyana's bio-security, and socioeconomic and low carbon development.
2019	Green State Development Strategy: Vision 2040	Lays out policies to transform and restructure Guyana's economy, ensuring significant and sustainable management of its natural resources.
2020	National Strategy for Agriculture 2013-2020	Shift the perception of agriculture from just subsistence to a driver of wealth and entrepreneurship, aimed at supplying both local and export markets with food and non-food products. The strategy aims to enhance agricultural productivity and sustainability through 25 Priority Areas, focusing on modern farming methods, biotechnology, precision agriculture, and improved agricultural infrastructure.
2022	Guyana-EU FLEGT VPA Memorandum of Understanding for a Forest Partnership	Protect, restore, and sustainably manage forests. Collaborate to boost the forest bioeconomy, creating employment and advancing socio-economic growth through eco-friendly forest product industries and improved market access.

INTERVIEW FINDINGS

Although the bioeconomy could play a significant part in Guyana's sustainable development, experts interviewed for this study noted that the concept remains underdeveloped. This situation may arise in part from the economy's reliance on a limited array of agricultural commodities, especially sugar and rice, as well as on extractive sectors. While some initiatives exist to market non-timber forest products, there is insufficient collaboration between civil society and research agencies to create bio-based products with added value.

Instead of the term "bioeconomy," expressions such as "green economy" and "low-carbon strategy" are more frequently used. Experts believe that the global relevance of bioeconomy makes it important for universities and civil society organizations to be familiar with the concept. At the same time, this also opens the possibility for it to be perceived as a "buzzword" imposed by developed nations, or for it to remain in the sphere of intellectual debate rather than practical implementation.

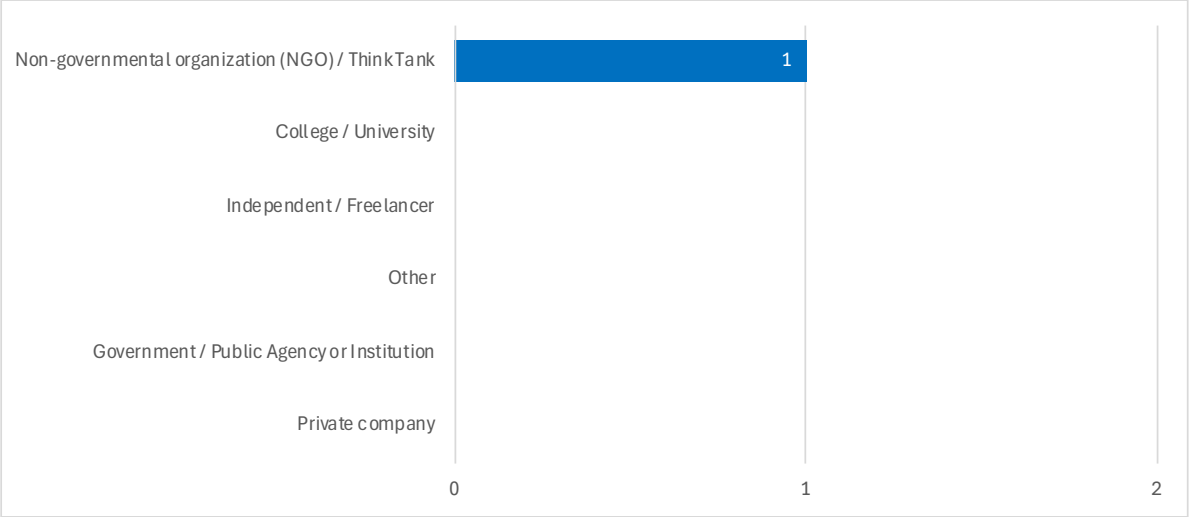
A lack of clarity regarding the term could render Guyana less capable of securing funding and resources pertinent to the bioeconomy, especially in comparison to neighboring Amazonian nations where the term is more widely recognized. Guyana's relative disconnect from the broader Amazon region, both linguistically and in other respects, makes it difficult for its voice to be heard at regional conferences, including the 2023 bioeconomy summit in Belém. This is important to keep in mind when considering that the country does not necessarily face the same challenges as those of its neighbors – for example, deforestation and expansive monoculture agriculture are not as much of a threat in Guyana as they are in Brazil.

Nevertheless, Guyana has much to learn from Brazil and other countries, particularly in regards to bioethanol. In this way, the bioeconomy can help Guyana break free from dependence on fossil fuels and participate in the worldwide shift toward sustainable energy sources.

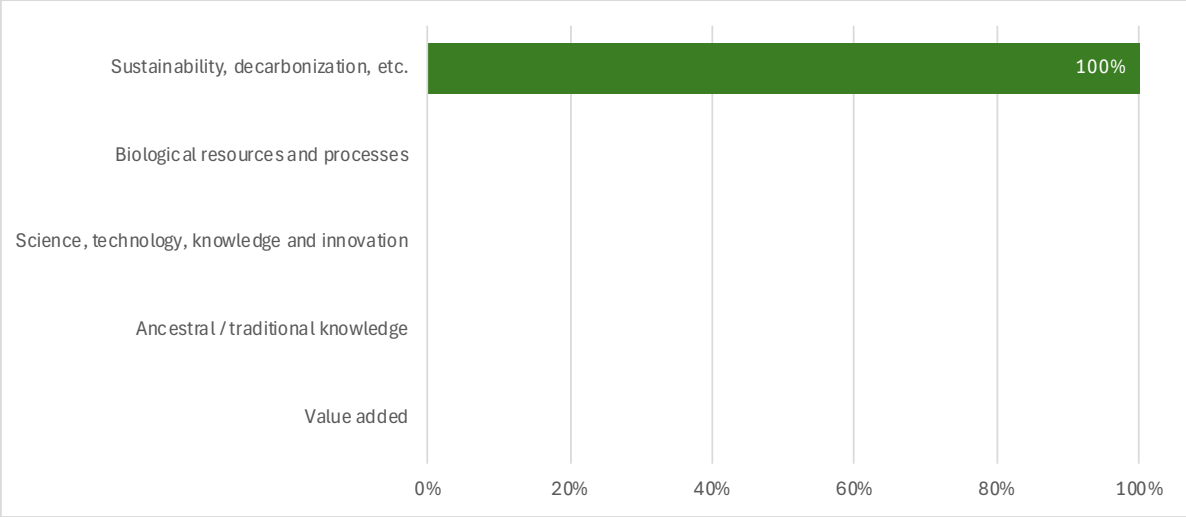
Elsewhere, civil society organizations work with local communities to promote sustainable livelihoods and conservation through nature tourism (CI Guyana). The success of these efforts often derives from having the communities take ownership and from considering cultural and economic circumstances at the village level. For example, experts underscored the importance of offering specialized technical assistance to indigenous and local populations, akin to the support provided by Embrapa in Brazil. This assistance ought to be distinct from the aid given to conventional farmers. Moreover, bioeconomy endeavors must tackle disparities and thoroughly comprehend the sociocultural contexts in which new enterprises are established. Experience indicates that the shift from subsistence to cash-based livelihoods requires long-term village and life plans, and may have unintended consequences without proper management. Consequently, as the bioeconomy grows in Guyana, it is imperative to address not only economic growth but also crucial societal issues.

SELECT KEY SURVEY RESULT

ORGANIZATION TYPE



PRINCIPLES UNDERLYING BIOECONOMY-RELATED ACTIVITIES



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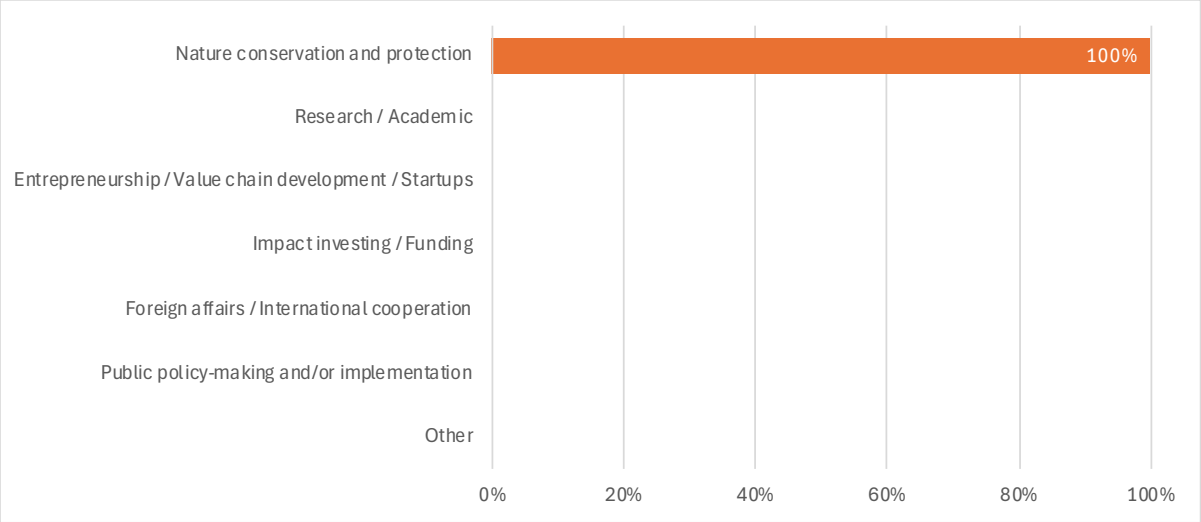
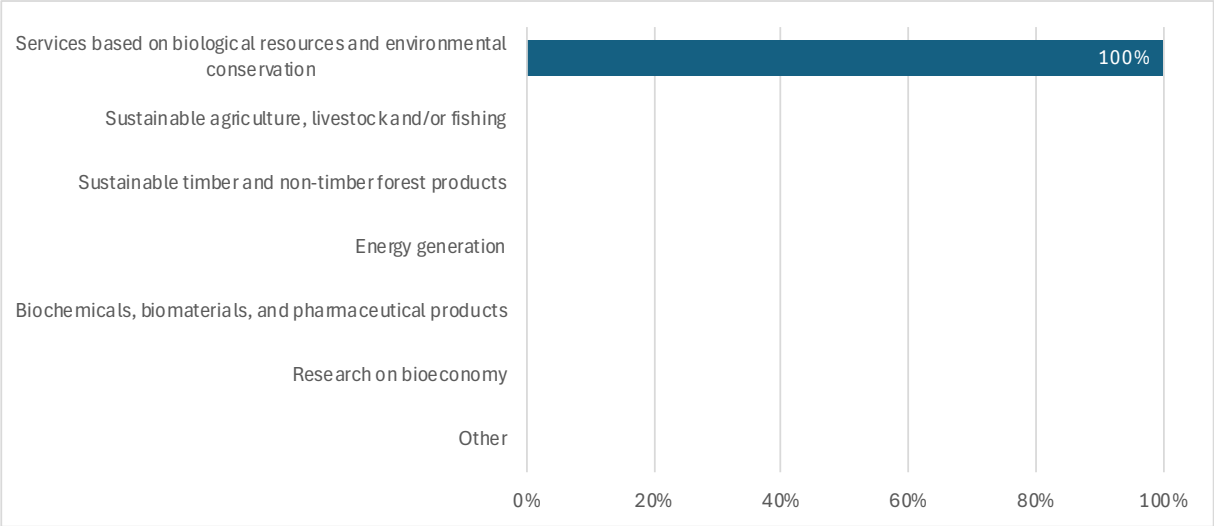


FOCUS AREAS



PERU

AMAZONIA BIOECONOMY COUNTRY PROFILE

AMAZONIA FOREVER

POLITICAL SPHERE

Although the concept of bioeconomy has not been formally integrated into Peru's policy frameworks, over the years the government has implemented relevant initiatives in certain sectors. For example, in 2004 the Ministry of Foreign Trade and Tourism (MINCETUR) and the Commission for the Promotion of Peru for Export and Tourism (PROMPERU) launched the National Biocommerce Promotion Program (PNPB) to enhance processes and boost exports. Peru went on to champion bio-businesses through a Regional Export Plan that made Peru a prominent exporter of Brazil nuts, palm heart, coffee and cocoa.

Peru's biocommerce framework is influenced by the United Nations Conference on Trade and Development (UNCTAD) BioTrade Initiative, which seeks to add value to native biodiversity.[46] To date, the focus has centered on the creation of bio-businesses and trade practices that are economically viable, environmentally sound, and socially responsible, all while considering the demands of global markets.

Among the key documents that highlight the potential of Peru's Amazonian bioeconomy stands the Ministry of the Environment's Resolution 046-2020. This pivotal document establishes general guidelines for the identification and advancement of eco- and bio-businesses. It defines "biocommerce" as enterprises that utilize the sustainable management of native biodiversity resources to foster investment and commerce, aligning with the goals set forth by the Convention on Biological Diversity. Moreover, the Resolution champions the growth of economic activities at the community level through the formation of strategic partnerships and the enhancement of biodiversity products that are designed to be socially fair and commercially sustainable in both domestic and global markets.[47] It categorizes bio-enterprises into four distinct sectors: the revaluation of waste, eco-friendly construction, the efficient employment of energy and resources, and bio-enterprises that involve products that closely align with the bioeconomy.

[46] Ministerio del Ambiente, Dirección General de Diversidad Biológica. (2015). Impacto de la promoción del biocomercio en el Perú: retos y oportunidades. Ministerio del Ambiente. https://unctad.org/system/files/official-document/ditc-ted-17052018-BioTrade-SCC-peru1.pdf
[47] Ministerio del Ambiente. (2020). Resolución Ministerial N.° 046-2020-MINAM. https://cdn.www.gob.pe/uploads/document/file/522975/RM._046-2020-MINAM.pdf

BIOECONOMY PRINCIPLES

Principle	Analysis
Utilization of biological resources and processes	Bio-businesses center around the sustainable use of biodiversity resources. Similarly, due to the country's significant focus on circular economy and green growth, there is a substantial emphasis on the reuse of organic or inorganic waste.
Integration of science, technology, and innovation	A Research and Innovation Agenda for Biocommerce (AIIB) was established in 2012 to guide and coordinate R&D activities, and the National Council of Science, Technology and Technological Innovation (CONCYTEC) also collaborates on the National Research Agenda on Climate Change. Moreover, the Peruvian Amazon Research Institute (IIAP) has been working with SINCHI, a Colombian research institute, to develop genetic inventories in the Amazon.
Inclusion of ancestral and traditional knowledge	Law 27811 requires Prior Informed Consent from indigenous peoples when the intent is to use their collective knowledge for scientific, commercial, or industrial purposes. This aligns with the Nagoya Protocol's emphasis on ensuring that the benefits derived from the utilization of genetic resources are shared in a fair and equitable manner. It's important to consider that the entry into force of the Nagoya Protocol will have significant implications for the flow of genetic resources, research and development (R&D) based on natural genetic and biochemical resources, and the trade of products derived from or obtained through biodiversity.
Investments that enhance value addition through improved processing and supply chain efficiencies	Non-governmental organizations (NGOs) and international cooperation efforts are crucial in fortifying essential value chains. Despite their importance, the scope of these projects remains constrained, and there is a lack of adequate capacity to evolve these strategies into a framework for regional development. The government has endorsed various initiatives that incorporate science and technology elements, including "Reto Bio" under the Innóvate Perú program, "Peru Produces: Innovation in the Face of Climate Change" spearheaded by the Ministry of Production, "BioInvest" and "Biomatch," both managed by MINAM. Nevertheless, Amazonia's engagement in this sphere of innovation is minimal.
Environmental sustainability, decarbonization, and the provision of environmental services, alongside the substitution of fossil fuel-based products with more sustainable alternatives	The push to promote bio-businesses aims to implement sustainable management and enhance the value of natural resources and ecosystem services.

[43] Institute of Applied Science and Technology. (n.d.). Biofuel. https://iast.gov.gy/biofuel/
[44] Baluch, N., & Rambarran, R. (2018). Development of Guyana in the 21st Century: Promoting Green Innovations A Note on the Innovation Ecosystem of Guyana and Promoting Green Innovations in the Current Environment. https://www.researchgate.net/publication/340683227_Development_of_Guyana_in_the_21_st_Century_Promoting_Green_Innovations_A_Note_on_the_Innovation_Ecosystem_of_Guyana_and_Promoting_Green_Innovations_in_the_Current_Environment
[45] Partnership for Action on Green Economy. (2019). Guyana Green Economy Modelling Study (p. 44). United Nations Environment Programme. https://www.greenpolicyplatform.org/sites/default/files/downloads/resource//GUYANA_GREEN_ECONOMY_MODELLING_STUDY_PAGE.pdf

TIMELINE OF KEY PUBLIC POLICIES

Year	Policy	Description
1993	Political Constitution	Land and soil are primarily allocated for agricultural development under private ownership, and the crops and plantations cultivated on these lands are owned by individuals or entities and are subject to oversight by the Ministry of Agriculture.
1995	Law 26505	Private investment in the development of economic activities in the national territory and in rural and native communities: development and support of agribusiness
2004	National Biotrade Promotion Program (PNPB)	Promotes the sustainable use of the country's biodiversity and traditional knowledge while ensuring the fair and equitable sharing of benefits.
2009	National Environmental Policy Policy Axis 1	Conservation and use of natural resources and biological diversity.
2012	BioTrade Research and Innovation Agenda 2012-2021	Defines a vision, a mission and a set of BioTrade principles and criteria, as well as initiatives for its implementation in the country.
2014	National Biodiversity Strategy to 2021	Increase the contribution of biodiversity to national development.
2016	National Strategy on Forests and Climate Change (NBSCC)	The document presents a comprehensive strategy for the nation's economic and social progression. It includes numerous pledges that support sustainability, ecological expansion, conservation efforts, addressing disparities, and advancing the Sustainable Development Goals. Nevertheless, its primary emphasis remains on conventional GDP expansion.
2016	Decreto Supremo	Approves the National BioTrade Strategy and its Action Plan to 2025 (MINCETUR) to promote and implement biotrade in Peru.
2018	National Competitiveness and Productivity Policy Policy 9.2	Encourage the country's environmental competitiveness and promote private investment for the development of bio-businesses.
2020	Ministerial Resolution No. 046-2020-MINAM	General guidelines for identifying and promoting eco-businesses and bio-businesses.
2021	Regulation of Organization and Functions (ROF) of MINAM Article 48	Promote bio-businesses and eco-businesses with the participation of the private sector, in coordination with the competent entities.
2023	Interinstitutional Agreement	Signed between COFIDE and the Ministry of the Environment (MINAM) on bio-businesses.

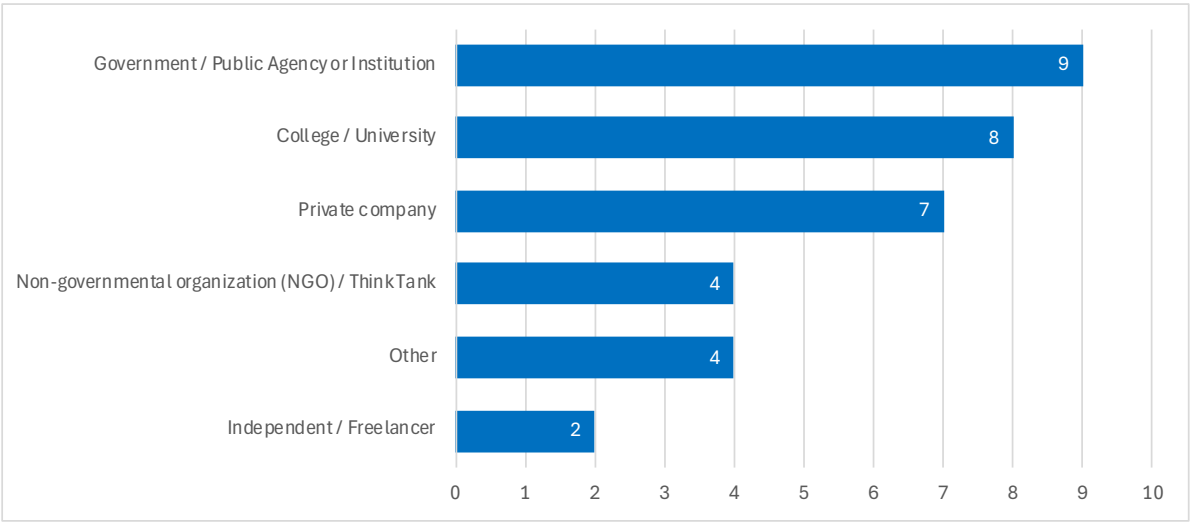
INTERVIEW FINDINGS

Experts interviewed for this study placed considerable emphasis on the principles of the "circular economy" and the pursuit of "green growth." They also noted that the conversation on bioeconomy-related concepts can differ across Peru's diverse regions, such as the Pacific coast, Andes and Amazon. Given that the term "biocommerce" is enshrined in laws like the ones cited above, the specific considerations and facets of "bioeconomy" may not be as readily apparent or understood by local actors.

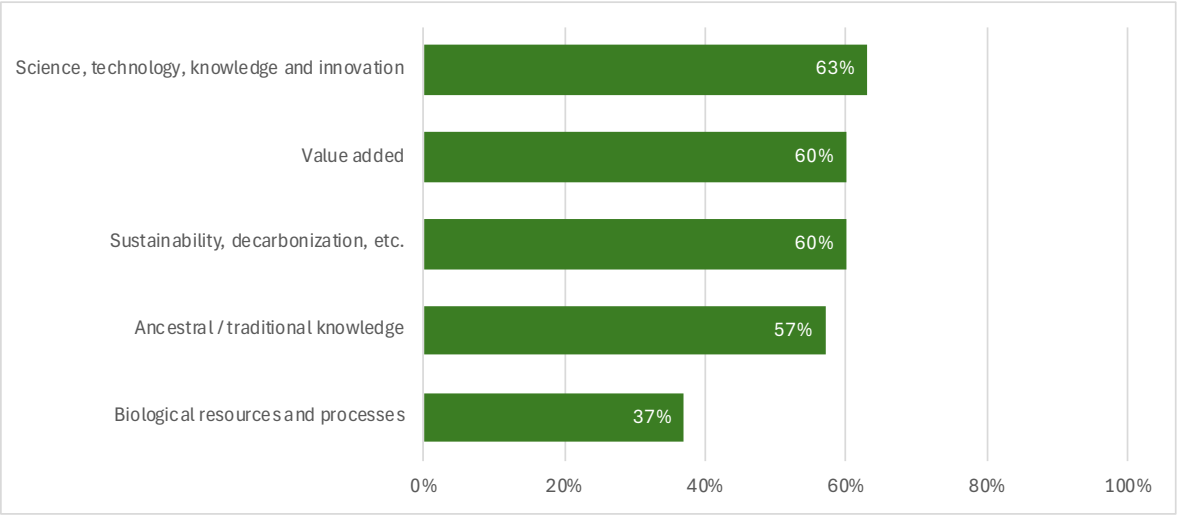
Even so, interviewees regarded the concept of bioeconomy as an innovative way to balance resource management and production with conservation efforts. In Amazonia, this approach involves harnessing the rich biodiversity to create economic opportunities for indigenous communities, since conservation cannot be achieved if communities are unable to meet basic needs. Certain products, including aquaculture, camu camu and buriti (in which women are particularly involved) are seen as having considerable promise for bolstering the Peruvian Amazon bioeconomy. Interviewees emphasized the importance of collaborating with local producers to develop life plans and forest management strategies to guarantee the long-term success of bioeconomy projects.

SELECT KEY SURVEY RESULT

ORGANIZATION TYPE



PRINCIPLES UNDERLYING BIOECONOMY-RELATED ACTIVITIES



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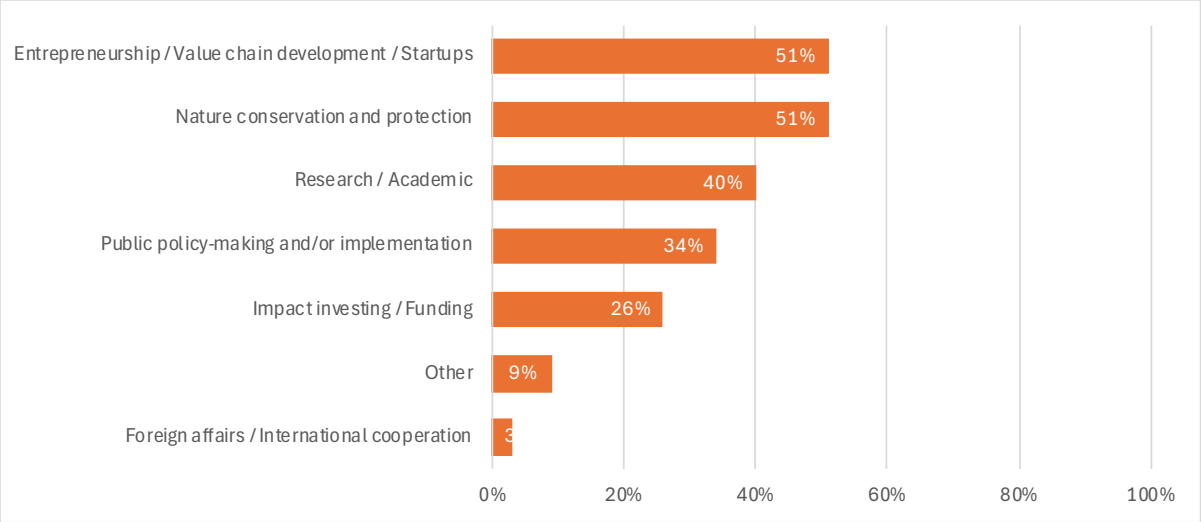

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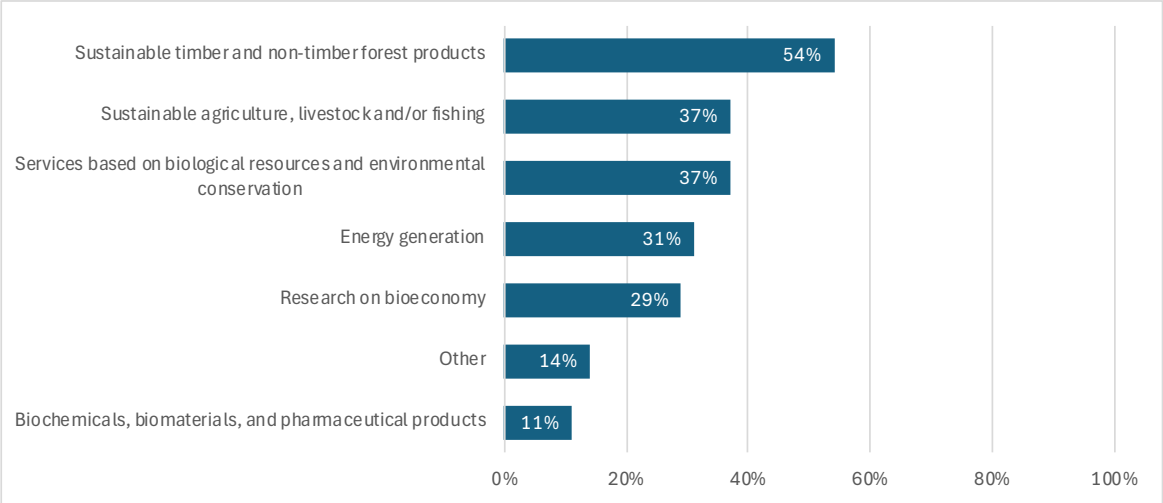
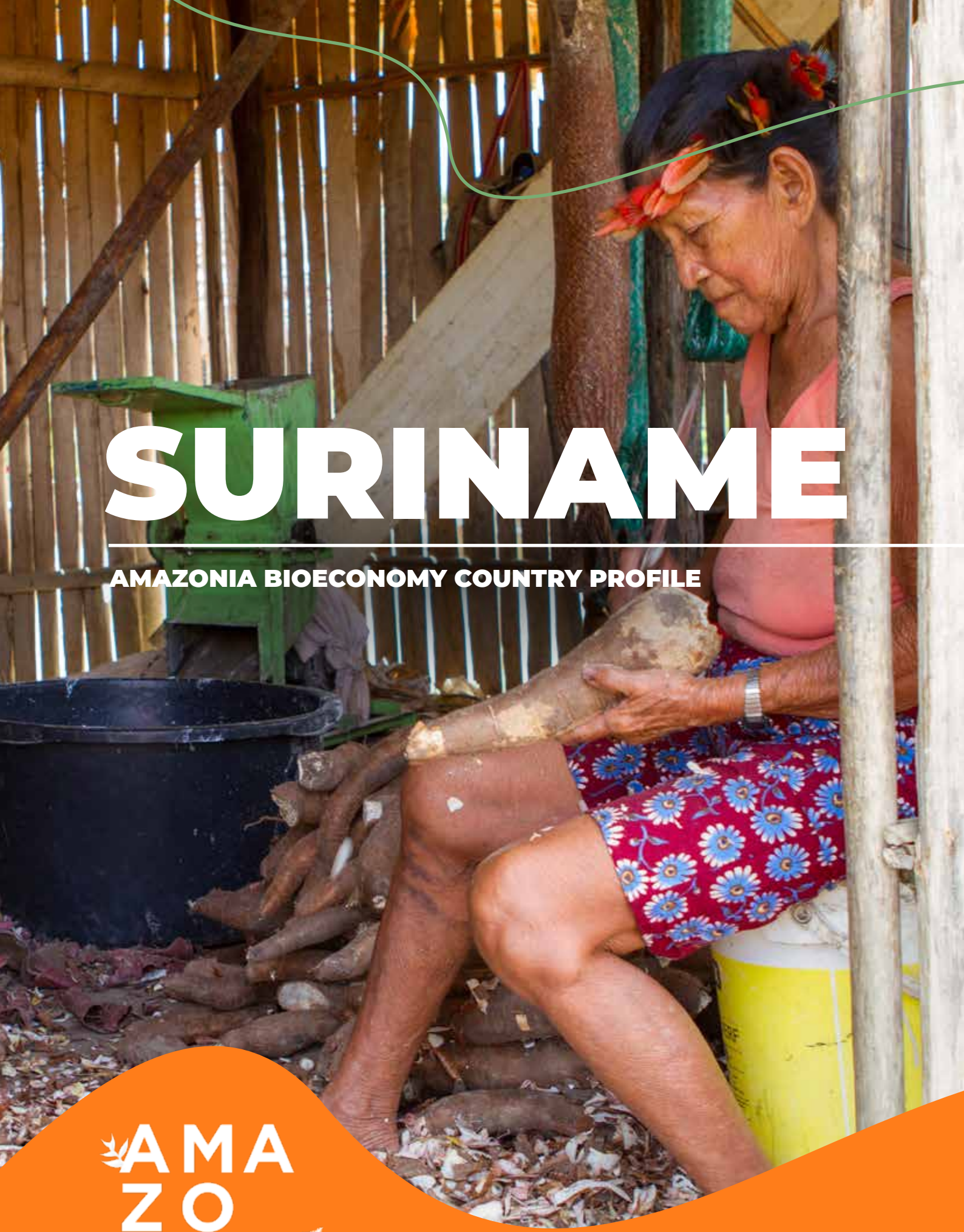




SURINAME

AMAZONIA BIOECONOMY COUNTRY PROFILE

AMAZONIA FOREVER

POLITICAL SPHERE

Suriname's ability to seize the opportunities presented by the bioeconomy will rely in part on the effectiveness of its environmental governance. The current cabinet includes the country's first-ever Minister of the Environment, which signals a growing commitment to taking environmental issues seriously. Suriname is also one of only three countries with a carbon-negative economy, making it a significant ally in the global fight against climate change. In its Nationally Determined Contributions (NDCs), Suriname has committed to preserving the integrity of its forest cover as a carbon sink. It also aims to increase efforts on sustainable forest and ecosystem management, develop climate-smart farming, and minimize deforestation and forest degradation.

The principal policy that aligns with bioeconomy principles is the Multi-Annual Development Plan 2022-2026 (Nationale Assemblee, 2021). This strategic document makes explicit references to concepts such as "greening and green growth" and underscores the significance of reducing import tariffs for green technologies and production methods. Furthermore, it lays the groundwork for establishing robust data collection mechanisms, which are essential for securing financing dedicated to green initiatives. The Plan also touches upon the sectors of "sustainable tourism and ecotourism," acknowledging their burgeoning role in contributing to Suriname's environmentally-oriented growth and development trajectory. In a notable move, the Plan advocates for governmental support in promoting non-timber forest products (NTFPs) through partnerships with local and international entities, as well as with indigenous communities. This initiative would encompass not only the provision of training and the necessary machinery for processing NTFPs, but also the creation and enhancement of market structures to support the exportation of products with added value. Despite these alignments, it is noteworthy that the Plan does not explicitly mention "bioeconomy."

BIOECONOMY PRINCIPLES

Principle	Analysis
Utilization of biological resources and processes	Suriname's development plan speaks of the "Sustainable management of water, forest, and biodiversity resources."
Integration of science, technology, and innovation	Limited development, though theCenter for Agricultural Research in Suriname (CELOS) is an important promoter of research, including inventories of non-timber forest products (NTFPs).
Inclusion of ancestral and traditional knowledge	Recognizes both the need to strengthen land rights for indigenous and Maroon communities and the potential contributions these groups can make to sustainable and culturally sensitive tourism.
Investments that enhance value addition through improved processing and supply chain efficiencies	Limited development, important work of the Center for Agricultural Research in Suriname (CELOS) affiliated with the Anton de Kom University of Suriname (AdeKUS).
Environmental sustainability, decarbonization, and the provision of environmental services, alongside the substitution of fossil fuel-based products with more sustainable alternatives	Strategies for the sustainable use of biodiversity and its preservation are closely linked to low-carbon development measures.[50]

[50] Esseboom, M. (2011, June). Non-Timber Forest Products in Suriname. Vakblad Bos En Natuur, 6, 9. https://kar.kent.ac.uk/75573/1/Vakblad_bos_en_natuur_06.pdf

TIMELINE OF KEY PUBLIC POLICIES

Year	Policy	Description
2017	Policy Development Plan 2017-2021	Emphasizes the need for "economic diversification, using the many possibilities provided by nature and at the same time protecting the environment".
2019	Nationally Determined Contribution (NDC) 2020	Suriname is dedicated to preserving the integrity of its forest cover, which constitutes 93% of its terrain, as a vital carbon sink. The nation is intensifying endeavors in sustainable forest and ecosystem management, fostering the development of climate-smart agriculture, and striving to minimize the impact of deforestation and forest degradation.
2019	National Adaptation Plan (NAP)	Utilizes a versatile methodological framework that assists Suriname in undertaking extensive climate adaptation planning for both the medium and long term. Strategic objective pertaining to agriculture, livestock, and fisheries: An all-encompassing national research program focused on climate-resilient crops, agricultural techniques, animal husbandry, and fisheries is to be established.
2020	Environmental Framework Act	The safeguarding and sustainable stewardship of Suriname's environment, along with the enactment and realization of responsibilities stemming from Suriname's adherence to international accords. These include prominent agreements such as the United Nations Framework Convention on Climate Change, the United Nations Convention on Biological Diversity, the Paris Agreement, and the conventions originating from Stockholm and Rotterdam.
2022	Multi-Annual Development Plan 2022-2026	Outlines mission of sustainable management of water, forest, and biodiversity resources.

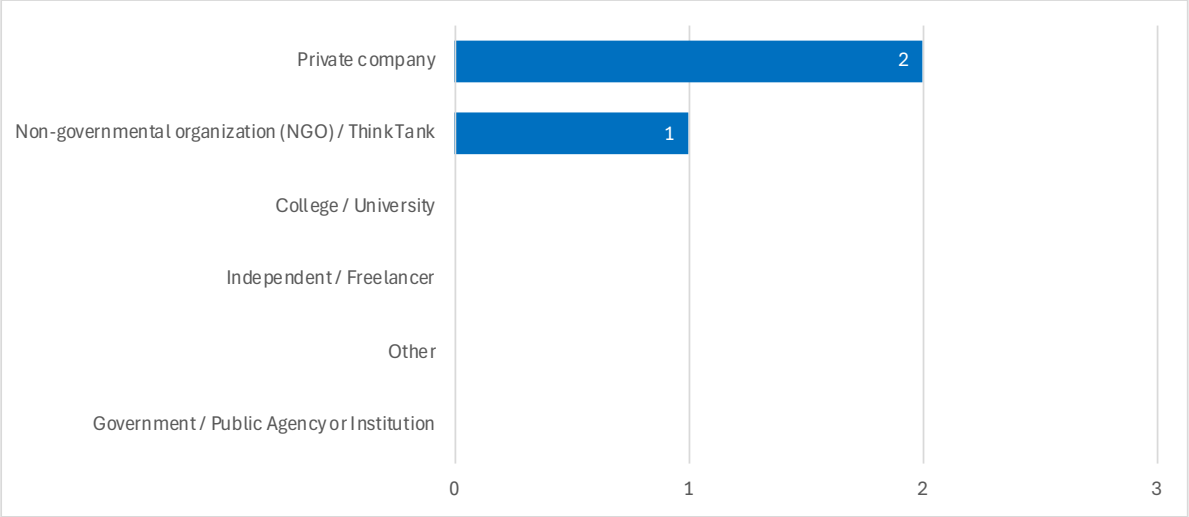
INTERVIEW FINDINGS

Experts interviewed for this research concurred that it is more common to hear politicians use "green economy" or "green services," especially in reference to carbon credits. Prominent civil society organizations such as Tropenbos Suriname and the Amazon Conservation Team (ACT-Suriname) have also adopted their own terminology over the years: "forest landscape governance" and "biocultural conservation," respectively.

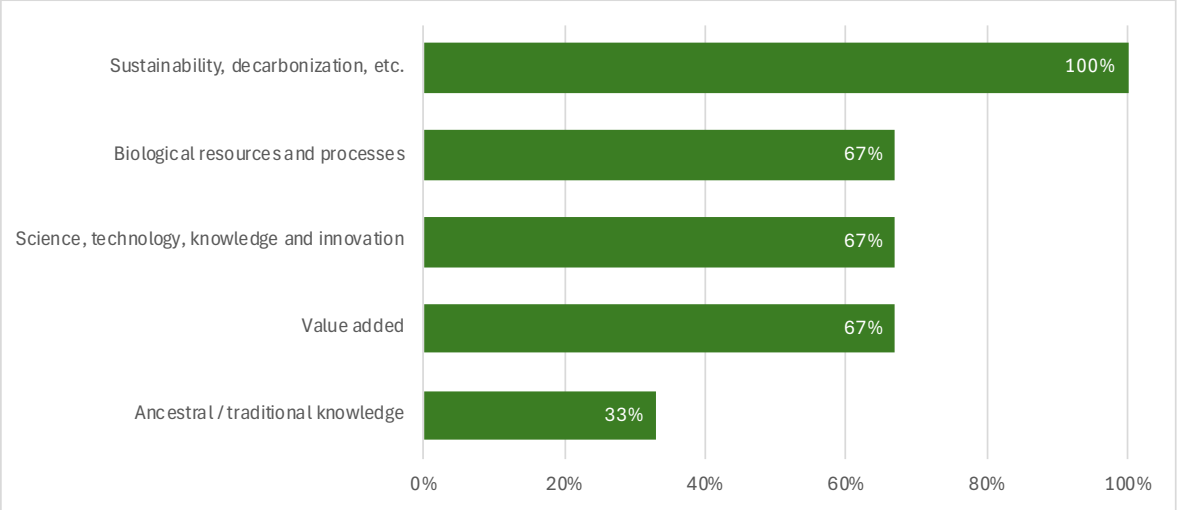
While Suriname is not actively engaged in the production of biofuels, there is a significant amount of work being done in the realm of "sustainable livelihoods" through methods such as agroforestry and the use of non-timber forest products (NTFPs), in addition to responsible business practices and financial management. Small-scale production of forest products tends to be more feasible than mass or bulk production, and civil society organizations have identified the potential to market them internationally as niche, value-added products. Furthermore, one expert highlighted the promising prospects for tourism centered around nature and culture, given that the Maroon and Amerindian cultures are remarkably well-preserved, offering visitors unique and authentic experiences. Taken together, these initiatives emphasize the importance of internal and culturally-sensitive governance to empower indigenous and tribal peoples in managing the forest and defending their interests when doing business with the outside world. Future efforts to promote the Suriname bioeconomy should take into account the best practices and lessons learned through past projects. Interviewees emphasized the need for all stakeholders to recognize that bioeconomy projects take time to gain traction and generate financial returns. This includes donors, who often desire quick results that may not be realistic in real-world circumstances. In a similar vein, there is a tendency for individuals to gravitate towards immediate financial benefits offered by extractive industries or traditional farming practices, rather than investing in the more enduring sustainability and economic feasibility of bioeconomy enterprises. Such past experiences highlight the need for a shared vision and objectives among funders and those executing projects within Suriname. Given the challenges that project implementers face in meeting deliverables and efficiently disbursing funds, it is of paramount importance for advocates of the bioeconomy to carefully consider the genuine desires and needs of the local population.

SELECT KEY SURVEY RESULT

ORGANIZATION TYPE



PRINCIPLES UNDERLYING BIOECONOMY-RELATED ACTIVITIES



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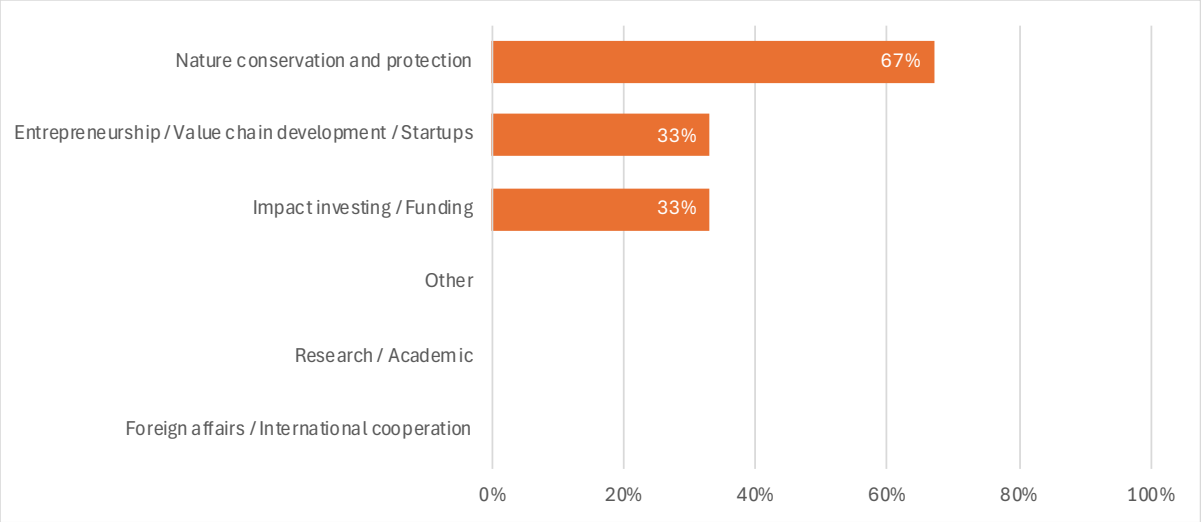

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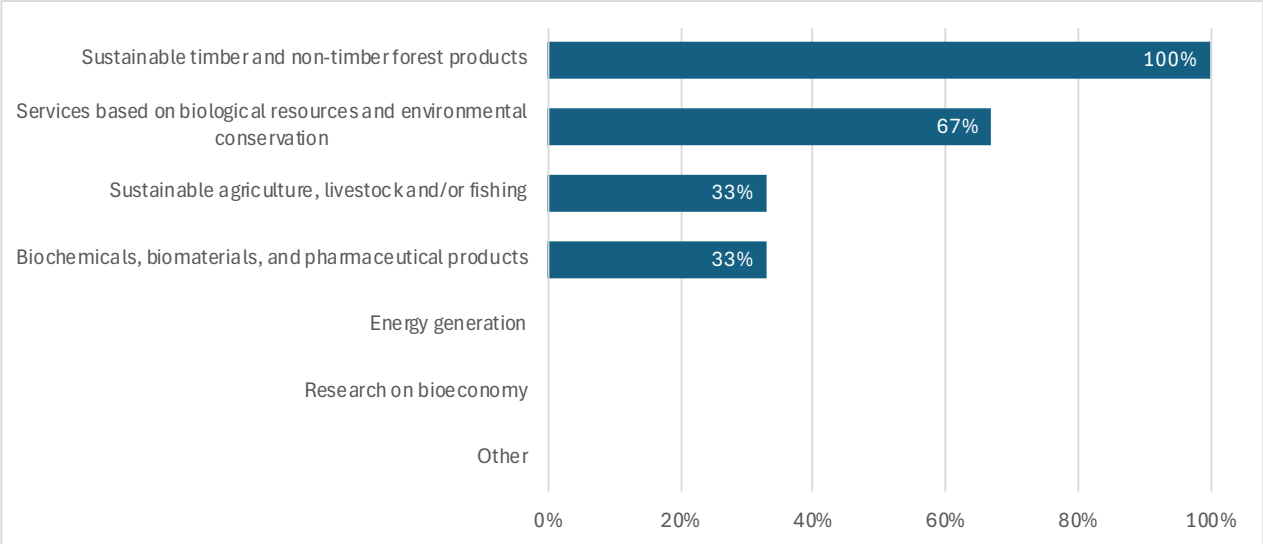


VENEZUELA

AMAZONIA BIOECONOMY COUNTRY PROFILE

AMAZONIA FOREVER

POLITICAL SPHERE

The development of bioeconomy-related strategies in Venezuela must be understood against the backdrop of a complex political environment and institutional crisis that has persisted since 1998. The 1999 Constitution establishes explicit guidelines for the use of natural resources and biodiversity. Specifically, Article 129 mandates that any party intending to engage in activities with the potential to damage ecosystems is required to carry out an environmental impact assessment in order to preserve ecological balance and to promote sustainable development.[51]

Over the past decade, Venezuela has implemented various modifications to its approach regarding environmental policies. For instance, the 2008 Biological Diversity Management Law establishes clear directives and restrictions for biotrade, defined as "the set of activities of collection and/or production, processing, and marketing of goods and services derived from native biodiversity, under sustainability criteria."[52] As determined by the National Assembly, biotrade should not only conserve and sustainably use biological diversity but also ensure an equitable distribution of benefits that respects the rights, knowledge, and customs of local communities and indigenous peoples.

A prime illustration of the Venezuelan government's approach to bioeconomy is the Great Agro-Venezuela Mission, initiated in 2011 and revitalized in 2020 with the aim of bolstering agricultural and agro-industrial output. The Mission includes plans to augment local production of biocontrollers and biofertilizers, thereby lessening reliance on synthetic agrochemicals. The strategy also includes provisions for the safeguarding of genetic resources and seeds of vital crops. In addition, the Mission supports the enhancement of research, innovation, and technological advancement to boost agricultural productivity.[53]

[51] Acceso a la Justicia. (2022). Environmental Legislation in Venezuela (p. 10). https://accesoalajusticia.org/wp-content/uploads/securepdfs/2022/08/Environmental-Legislation-in-Venezuela-Executive-Summary.pdf
[52] Asamblea Nacional de la República Bolivariana de Venezuela. (2018). Ley de Gestión de la Diversidad Biológica. https://faolex.fao.org/docs/pdf/ven89953.pdf
[53] Gobierno Bolivariano de Venezuela. (2020). Gran Misión AgroVenezuela GMAV. http://www.minci.gob.ve/wp-content/uploads/2022/08/RESUMEN-AGROVENEZUELA.pdf

BIOECONOMY PRINCIPLES

Principle	Analysis
Utilization of biological resources and processes	The references in the regulations primarily pertain to native and biological diversity.
Integration of science, technology, and innovation	The development of agricultural bio-supplies in Venezuela is primarily driven by universities. Strategies from the science and technology sector in other areas of the bioeconomy are not identified.
Inclusion of ancestral and traditional knowledge	Article 120 of the Constitution specifically states that "the use of natural resources in indigenous habitats by the State will be carried out without harming their cultural, social, and economic integrity." Additionally, it is subject to prior information and consultation with the respective indigenous communities.
Investments that enhance value addition through improved processing and supply chain efficiencies	Advancements have been identified in added value, primarily in the agricultural sector, especially in relation to biocontrollers and biofertilizers, driven by the government.[54] Initiatives for generating bioproducts such as oils, pulps, etc. exist within local initiatives in the territory.
Environmental sustainability, decarbonization, and the provision of environmental services, alongside the substitution of fossil fuel-based products with more sustainable alternatives	The Biodiversity Management Law suggests that utilization should occur "under principles of ecological sustainability and bioethics, respecting cultural values and considering the fair and equitable participation of the population in the benefits derived from them."

[54] FUSAGRI, & IICA. (2022). Caracterización del sector bioinsumos agropecuarios en Venezuela (p. 44). FUSAGRI. https://www.fusagri.com/publication/bioinsumos-venezuela/bioinsumos_Venezuela_FUSAGRI-IICA.pdf

TIMELINE OF KEY PUBLIC POLICIES

Year	Policy	Description
1999	Constitution of the Bolivarian Republic of Venezuela	Article 129: In contracts entered into by the Republic with natural or legal persons, whether domestic or foreign, or in the permits that are granted which impact natural resources, it shall be deemed included—even if not expressly stated—the obligation to maintain ecological balance, to allow access to technology and its transfer under mutually agreed conditions, and to restore the environment to its natural state should it be altered, in accordance with the terms established by law.
2000	Biological Diversity Law	It considers that 'The State shall establish policies on the conservation and sustainable use of Biological Diversity, in accordance with the provisions set forth in this Law'.
2001	Land and Agrarian Development Law	Establishes the basis for integral and sustainable rural development in order to increase land productivity, as well as equity and fair land distribution.
2006	Organic Law of the Environment (Law No. 5.833)	It considers as a guideline for environmental planning the 'conservation of ecosystems and their sustainable use, ensuring their permanence'.
2008	Biodiversity Management Act	Title V establishes the provisions that will govern the management and conservation of ecosystems and their functions, natural resources and biological diversity, in order to guarantee their permanence and the social benefits derived from them as indispensable elements for life and their contribution to sustainable development.
2011	Agrovenezuela Great Mission Law	Aims to conserve biological diversity in all Venezuelan ecosystems to achieve the greatest collective well-being within the framework of sustainable development.
2012	National Strategy for the Conservation of Biological Diversity 2010-2020	Structured around seven strategic lines aimed at promoting the inclusive use of natural resources while preventing the social and environmental harm that their exploitation might cause.
2021	Innovation Eco Program	Sustainable business opportunities (Small Grants Program of the Global Environment Facility and the United Nations Development Programme, Global Environment Facility and the United Nations Development Programme)

INTERVIEW FINDINGS

Although some organizations like FUSAGRI employ the term "bioeconomy" within the scope of their programs and initiatives in Venezuela, experts interviewed for this research asserted that phrases like "sustainable development" and "sustainable use of ecosystem resources" are more frequently used in discourse. Additionally, other civil society organizations adopt terminologies including "productive economies" and indigenous "self-management" to describe value chains that integrate traditional knowledge in a respectful manner, with the aim of safeguarding cultural heritage and sustaining local ways of life.

One interviewee suggested that "biotrade" and "bioeconomy" may carry distinct implications. In their view, biotrade can potentially devolve into "biopiracy," showing little regard for sustainable resource use. Bioeconomy, in turn, could differentiate itself by incorporating robust value chain analyses that assist in establishing collection quotas and prices that truly represent the cost of conservation efforts.

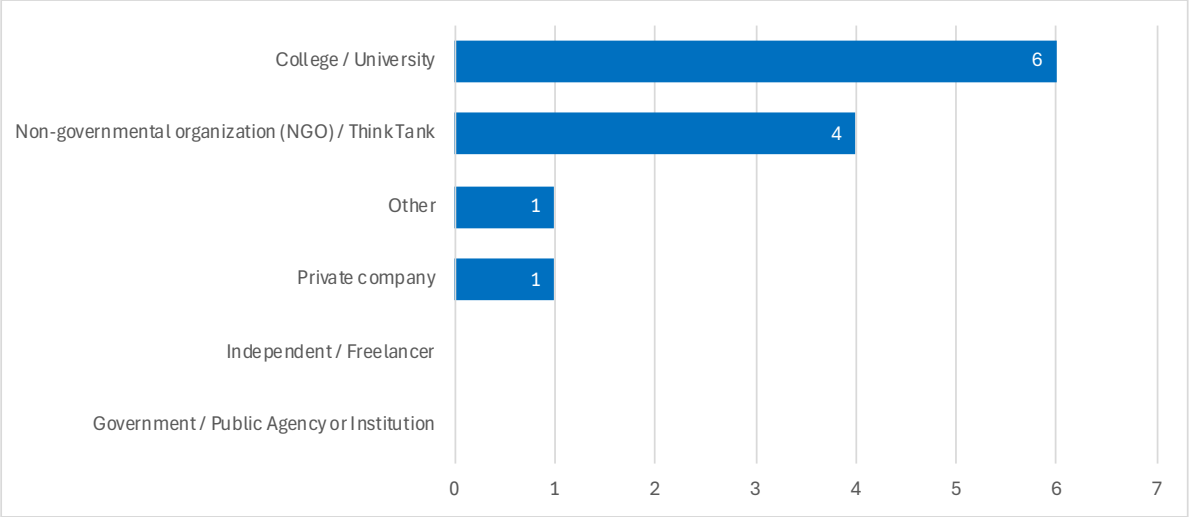
As in Bolivia, there are concerns that, if bioeconomy remains a nebulous concept, it could potentially encompass conventional production practices. Instead, experts stress that bioeconomic strategies must honor the integrity of entire ecosystems. For example, many indigenous communities harvest tonka beans (sarrapia) in ecologically-responsible ways, but growing global demand has prompted profit-seeking companies to commence large-scale production with greater environmental impacts. In the view of the civil society organizations interviewed for this study, the work of these companies would arguably cease to qualify as "respectful bioeconomy."

While it is true that top-down policies are instrumental for a broad rollout of the bioeconomy, experts emphasized a parallel need for bottom-up initiatives that preserve cultural heritage and maintain harmony with the natural environment. The significance attributed to forests by indigenous communities, for instance, extends beyond the notion of "ecosystem services," and reflects a deep spiritual connection to places imbued with the memory of their ancestors and collective history. Consequently, bioeconomy strategies must not merely offer technical support but should also incorporate and respect the knowledge already present in local communities.

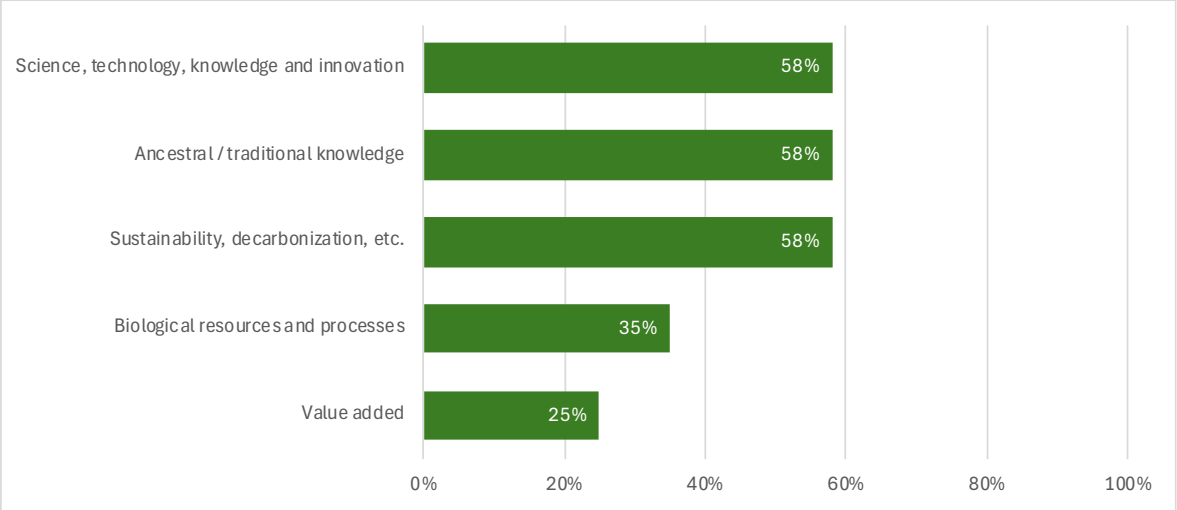
In the Venezuelan context, bioeconomy initiatives represent an important means to increasing the resilience of traditional economic systems against environmental crime, especially mining, and the extractivist status quo. The contrast between the promotion of the bioeconomy and the mining extractives that occurs particularly over the Orinoco Mining Arc. Although they may yield lower short-term profits, bioeconomy value chains hold the potential for long-term stability and the preservation of traditional knowledge accumulated over centuries of human settlement in the heart of the rainforest.

SELECT KEY SURVEY RESULT

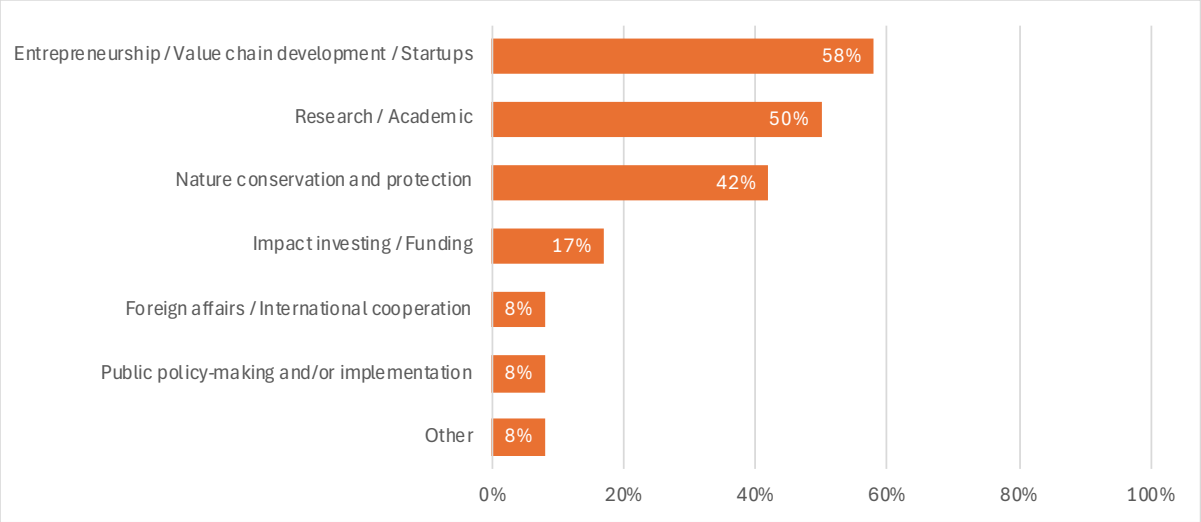
ORGANIZATION TYPE



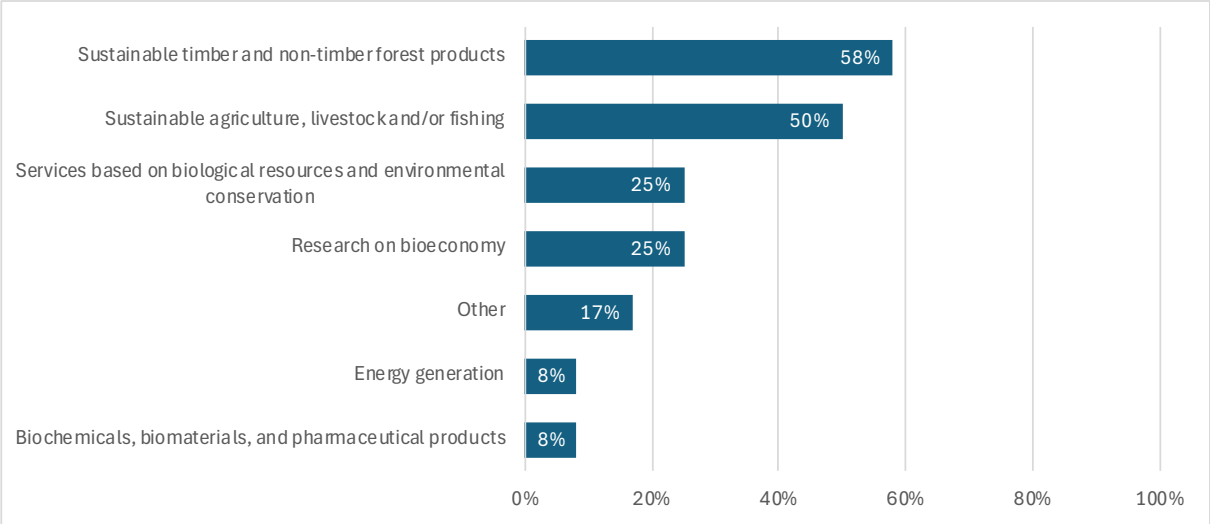
PRINCIPLES UNDERLYING BIOECONOMY-RELATED ACTIVITIES



SECTOR



FOCUS AREAS



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