TECHNICAL NOTE

APRIL 2023

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VALUE CHAIN AND MARKET STRUCTURE: THE OPPORTUNITY OF SOCIOBIOECONOMY

The increase in deforestation, directly or indirectly associated with agricultural and mining activities, is currently one of the main challenges for Brazil to achieve a sustainable development trajectory[1]. In addition to deforestation, the current development model, based on the export of agricultural and mineral commodities, such as soy, corn, beef, bauxite and iron ore, also contributes to the degradation of natural resources, the loss of biodiversity and the invasion of territories of traditional peoples and communities.

That means Brazil should invest in a new development model, based on sustainability, and ensure, at the same time, the insertion of global value chains at higher levels. On the contrary, since the 2010s, the country has been experiencing a process of repressing exports, with an increase in exports of basic goods, notably commodities, such as soybean, low value-added products. National imports, in turn, have been mainly of products with high added value, intended for domestic consumption and not to add value to exports.

Recent research indicates that, through bioeconomy, Brazil would be able to overcome its dependence on commodity exports and become a global leader in the production and export of higher value-added products[2]. The fact that it is one of the most biodiverse countries in the world and that it has highly qualified human capital in universities, research institutes and laboratories of private companies represents a huge advantage for the country[3]. This work shows the great potential that investment in sociobioeconomy, as the bioeconomy that takes into account the human dignity of the populations involved has been called[4], would have for the country, bringing greater added value to exports and sustainability in its development.

LOW VALUE-ADDED EXPORT

To observe the profile of Brazilian international trade "makes it possible to learn a lot about the changes undergone by the Brazilian economic structure and about the implications of those transformations for development"[5]. Based on that reasoning, Figure 1 shows the main products exported and imported by the country in 2021 and Figure 2 presents an overview of the Brazilian international trade in the period from 2000 to 2021, based on different indicators.

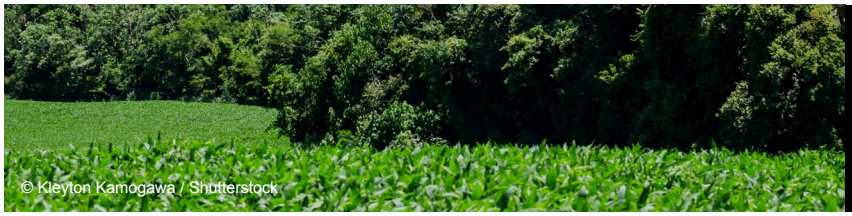

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Figure 1. Products exported (a) and imported (b) by Brazil in the year 2021* Percentages calculated in relation to the total value, in US$ billion. (*) An interactive version of this figure can be obtained at: http://comexstat.mdic.gov.br/pt/comex-vis. Fonte: Ministério da Indústria, Comércio Exterior e Serviços (MDIC, Comex Stat, 2022)

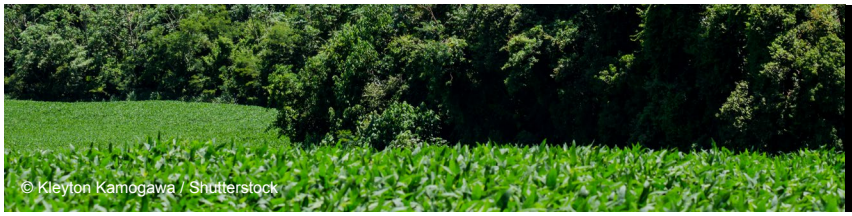
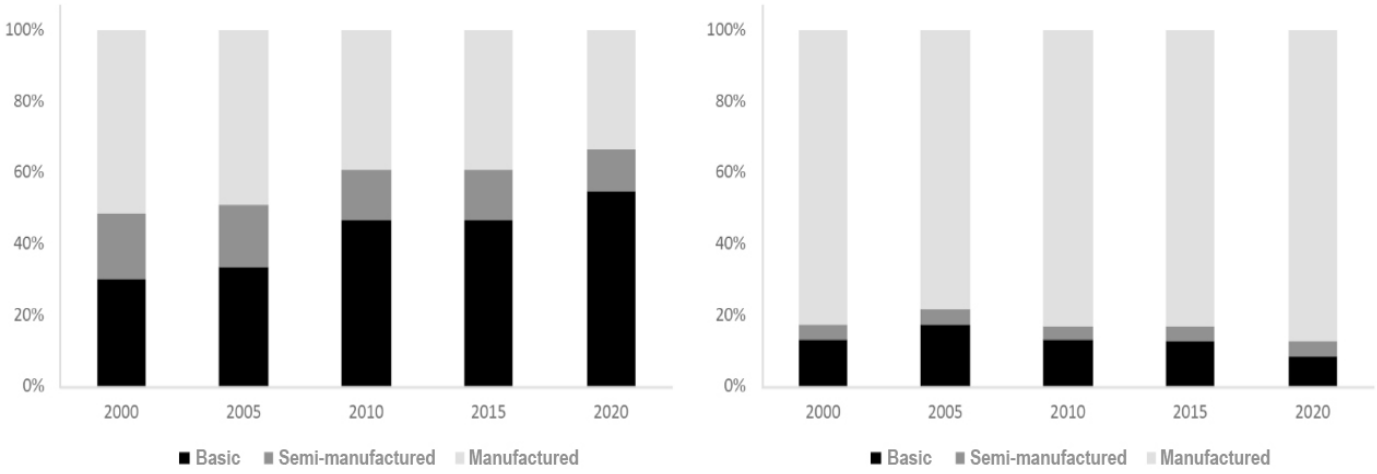


Figure 2. Overview of the Brazilian international trade in the period from 2000 to 2020.



Source: Ministry of Industry, Foreign Trade and Services (MDIC, Comex Stat, 2022): 2a exports and 2b imports.

Currently, basic goods, with a lower technological level and little added value, account for 57% of the value of national exports. In the case of imports, the share of manufactured goods has remained relatively stable over the last 20 years and always above 80% of the total value of exports (Figures 2a and 2b).

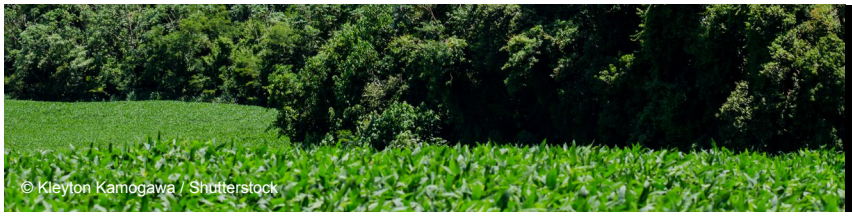
Between 2000 and 2020, Brazil was the world›s second largest exporter of grains (rice, barley, corn, soy and wheat). Brazilian sales accounted for 12.6% of the total globally marketed in the period, which corresponds to 14.9% of the total value of exports of those products. Soybean is the main product currently exported by the country, the world›s largest producer and exporter since 2019. The value of Brazilian soybean exports reached US$30 billion in 2020, which represents 51% of the value generated by the sales of the set of exporting countries that year[6]. The Brazilian performance in exports of agricultural products is related to the continuous growth in productivity, resulting from technological innovations in production, and the increase in the area planted with soybean.

MOST OF THE INCOME FROM SOYBEAN GOES ABROAD

Estimates of the 2022/2023 harvest for soybean is 152.4 million tons – 49.5% of the national grain production[7]. However, US, European and Chinese corporations take the largest share of the income generated in the Brazilian soybean production chain, even though the development of the soybean production in Brazil originated from national capital. That is, most of the profit from the grain production goes abroad, while the environmental consequences remain entirely in the country: deforestation attributed to soybean production between 2014 and 2018 in Brazil was 11,100 square kilometers, which represents emissions of 510.5 CO_2 Mt equivalent[8].

A study[9] sought to quantify the volume of virtual water carried by the soybean complex in Brazil, and more specifically by the exported part – that is, the amount of water used to produce the grain. Such an essential natural resource for the production of commodities is not actually accounted for in exports, as it does not remain in the final commodity. The study points out that the volume of water required for the production of one ton of soybean is 2,186 m3. Brazil exported over 86 million tons of soybean in 2021, which represents close to 188 billion m^3 of water. Brazil has been therefore a significant provider of the water needs of the importing countries.

As the Brazilian soybean production gained productivity and the global demand for the commodity intensified, foreign companies in the pre- and post-production segments (seeds, agrochemicals, agricultural machinery, processing, transportation and export) sought to increase their market share through the control of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several links in the chain and mergers/acquisitions of national companies.

That process generates a “repatriation of profits” and leads to a gradual reduction in the national participation in the generated revenues and in the governance model of the soybean production chain. The concentration of high value-added activities is accentuated in central regions, while Brazil remains in a peripheral position[10]. “The soy case” is the subject of a WWF technical note that details the links of the chain.

High prices in the international market encourage the country to continue investing in primary products, which limits productive diversification, increases the dependence of the national economy on commodity exports and inserts the country in global value chains (CGV) in a less dynamic way. Although the current scenario is favorable to Brazil, the reversal of the upward trend in prices could expose the Brazilian economy to macroeconomic instability, with long-term damage to development[11] [12] [13].

The current pattern of Brazilian foreign trade is considered a case of “regressive specialization[14].” That means the national production and export structures are strongly geared towards goods of low technological sophistication. These are goods with low demand income-elasticity, that is, an increase in the GDP of the countries that buy from Brazil doesn't raise much their demand, unlike the demand income-elasticity for the goods that Brazil imports. The result is the distancing of the Brazilian economy in relation to countries that operate at higher GVC levels and, at the same time, the experience of greater difficulties in obtaining sustained economic growth in the long term.

In addition, transnational companies have been increasing their participation in the Brazilian productive structure and foreign trade, as demonstrated in the soybean chain. The result is that the Brazilian economy has become more dependent on the corporate strategies of those companies, whose interest is the global expansion of markets for their goods and services. Researchers show that transnational companies based in Brazil adopt a strategy of ‘market and natural resource search’, with increasing specialization in the production and export of primary products[15].


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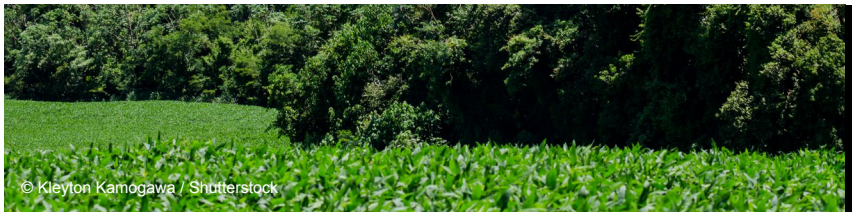
Extensive soybean plantation, Ponta Grossa, Paraná, Brazil.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THE POTENTIAL OF SOCIOBIOECONOMY

Faced with the uncertain picture of sustained economic growth in the long term, Brazil, by destroying its natural habitats, has been losing potential for exporting environmental services and products related to its biodiversity. In addition to being one of the richest countries in species, Brazil is also rich in relation to its socio-biodiversity, which involves the relationship between biological diversity, traditional agricultural systems (agrobiodiversity) and the use and management of those resources together with the knowledge and culture of indigenous peoples, traditional populations and family farmers. Recent research indicates that, through an economy associated with socio-biodiversity (socio-bioeconomy), the country would be able to overcome its dependence on commodity exports and become a global leader in the production and export of higher value-added products.

Sociobioeconomy depends on healthy natural environments and their ecosystem services, as its activities involve the management of land and natural resources. Another important element for sociobioeconomy development is the right to use territories and access land for the use and maintenance of natural resources protected by indigenous peoples and traditional communities, for the practice of sustainable extractivism. By promoting agroforestry systems on an agroecological basis, for example, sociobioeconomy depends on biomass, genetic resources, cultural ecosystem services, climate regulation, soil and water quality, pollination, etc[16]. Therefore, the quantification of the economic value of ecosystem services is very important to assess the potential of sociobioeconomy and, ultimately, to support decision making regarding the use of natural capital[17]. Such knowledge, when associated with appropriate management and regulation tools, enables the development of financial compensation mechanisms compatible with the sustainable use of natural resources[18 19], such as defined in the law on access to genetic heritage, protection and access to associated traditional knowledge and the sharing of benefits for the conservation and sustainable use of biodiversity[20].

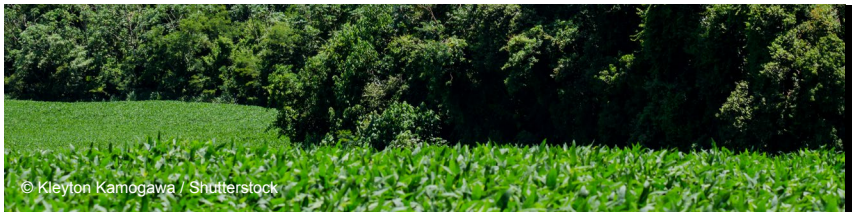
ECONOMICS OF BIOLOGICAL RESOURCES

According to the definition of the Global Bioeconomy Summit[21], bioeconomy corresponds to the “production, use and conservation of biological resources, including knowledge, science, technology and related innovation, to provide information, products, processes and services in all economic sectors aiming at a sustainable economy”. Any economic activity that uses bio-based products and processes and that makes the sustainable management of ecological systems is considered as part of the bioeconomy[22]. When we combine this concept with the dignity of the populations involved, recognizing and fairly remunerating their role in the production system, we can call it sociobioeconomy[23].

Bioeconomy enables the rational use of natural resources and the supply of goods and services with a high level of differentiation and added value, from human and animal food to pharmaceuticals, cosmetics, biofuels, among others, creating markets and new value chains[24].

The literature on environmental valuation has constantly evolved, especially when it comes to the ecosystem services that can be provided by tropical forests[25]. Such analyzes are important to shed light on losses resulting from deforestation and thus provide a basis for comparing economic benefits – like the income associated with agriculture and livestock[26]. Studies show that the destruction of the forest prevents not only that its benefits be enjoyed today, but also prevents the discovery of new potentialities in the future[27].

One of the most complete studies on the subject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estimates the values of provision and regulation ecosystem services of the Brazilian Amazon (food production, provision of raw material, mitigation of greenhouse gas emissions and changes in the rainfall regime)[28]. The calculated values vary widely throughout the territory and for each type of service evaluated, but on average they can reach up to US$737 per hectare/year. The results are extremely important in that they demonstrate that forest conservation may, in some of the areas analyzed, be more profitable than the opportunity cost of deforestation (gains from illegal logging plus those resulting from cattle raising or even soybean production in the deforested area).

Although the study does not make the explicit assessment of biodiversity, the authors identified that 12% of the Amazon rainforest area contains high biological relevance and draw attention to the fact that the greater the biodiversity of an area, the greater the availability of biological resources that can be economically exploited with high profitability through the development of medicines, cosmetics and other valued bioproducts[29].

BIODIVERSITY ASSETS

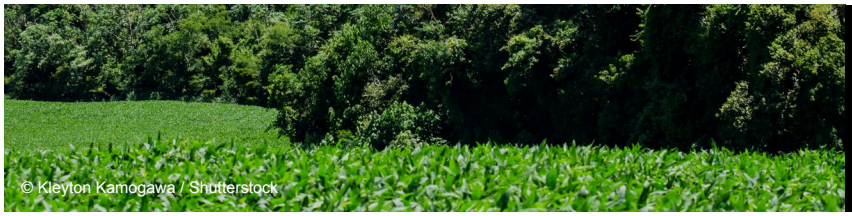
There are studies that show that the standing Amazon results in R$7 trillion per year to Brazil[30 31]. The use of the Amazon biodiversity assets in the food, cosmetics and oil industries alone currently generates US$3 billion annually. This value is only a small portion of the potential that a sustainable economy could generate in the region[32]. In the State of Pará alone, in 2019, the sociobioeconomy chain had an economic performance similar to that of livestock, R$ 5.4 billion, considering the rural production, local processing industry and commercialization of products, with the generation of 224 thousand jobs[33]. According to the same study, the economic value of the socioeconomic production chain in Pará could reach, by 2040, R$170 billion for ten selected products: açaí *(Euterpe oleracea)*, cocoa almond *(Theobroma cacao),* Brazil nut *(Bertholletia excelsa)*, palm heart, rubber *(Hevea brasiliensis)*, tucumã *(Astrocaryum aculeatum)*, cupuaçu almond *(Theobroma grandiflorum)*, cumaru *(Dipteryx odorata)*, murumuru *(Astrocaryum murumuru)* and Brazil nut oil *(Bertholletia excelsa)*. In terms of added value, estimates indicate 776% for Brazil nuts, 965% for palm hearts and an average of 182% for all ten products.

The commercial exploitation of açaí *(Euterpe oleracea)* can be mentioned as an example of the development potential of the Amazon bioeconomy. The fruit, which has always been part of the local population's diet, has expanded its market across the country and has been gaining prominence internationally, mainly in the United States, Europe and Japan. Brazil accounts for 85% of the world's açaí production[34]. Currently, it is the non-timber forest product that generates the highest value in the country, reaching US$134.6 million in 2020[35], taking into account only the in natura production. It is estimated that the extraction of açaí in Acre generates a net income of US$ 57 per hectare/year[36], but the value of the fruit in natura can increase up to 50 times after it is industrially processed[37]. A study on Pará indicates that the sectoral income generated by sociobioeconomy, taking into account the value added between the links of the chain, can increase the value of rural production 2.9 times (190%). In the case of açaí, the addition is of 191%[38].

POTENCIAL DEPENDE DE INVESTIMENTO

The development of a bioeconomy model for Brazil involves joint efforts between public authorities and the private sector, scientists and entrepreneurs, with the active participation of local communities and traditional peoples[39 40]. Studies show that, in order to promote a business climate favorable to sociobioeconomy, there must be new incentives, regulations and financing mechanisms for the different stages of the production chain, in addition to the development of points of sale and events, such as competitions and special fairs[41].

In that sense, the Amazon 4.0 initiative seeks to promote new opportunities for research, technology and learning to value and protect the Amazonian ecosystems and to equally serve the interests of those who maintain them: local populations, indigenous and traditional peoples. Partnership of the Institute of Advanced Studies of the University of São Paulo (IEA/USP) and the Institute of Man and Environment in the Amazon (Imazon), funded by the Arapyaú Institute, the project intends to take advantage of the value of nature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through market opportunities for sustainable products and services[42].

An important element to highlight is the need to strengthen the protection of natural resources through the creation of Sustainable Use Conservation Units such as Extractive Reserves (Resexs) and Sustainable Development Reserves (RDSs), and the strengthening of projects, plans and public policies that seek to support sustainable development in settlements, such as the Sustainable Development Settlement Project (PDS) or the Agroextractive Settlement Project (PAE), among others[43].

An example of the potential already identified for the açaí chain can only be achieved if the fruit processing is carried out locally, guaranteeing the producer a better price for the product. The installation of infrastructure, industries and small companies, partnerships between small producers and cosmetics companies, creation of cooperatives and associations, and qualification programs offered by universities or government agencies, such as Embrapa, are other initiatives that have been developed with the objective of ensuring greater economic gains for the region and, thus, preventing that its insertion in the international trade only happens through the exporting of one more commodity[44 45].

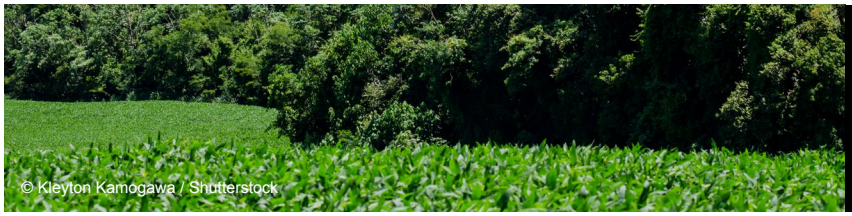
Another opportunity, identified in a study by WWF-Brazil[46], would be the inclusion of 94 thousand families in the economy (approximately 470 thousand people), who live in remote communities, electrically excluded. Some of those Brazilians are practically invisible to government actions and are portrayed in large numbers produced by the population census carried out by the Brazilian Institute of Geography and Statistics (IBGE). Knowing the economic and subsistence means of those remote Amazonian communities is fundamental to extend the potential of sociobioeconomy in Brazil.

A 2018 study[47] identified about 200 species of Amazonian flora with the potential to become raw materials for the development of products for the industry. Some of those species are already commercially exploited for food production, such as Brazil nuts (*Bertholletia excelsa*), guaraná (*Paullinia cupana*), andiroba (*Carapa guianensis*), tonka beans (*Dripteryxspp.*), cupuaçu (*Theobroma grandiflorum*), among others. Recent research indicates, however, that the income generated by extractive activity is compromised by deforestation, which has reduced the production of açaí, andiroba, Brazil nuts and tonka beans, mainly in municipalities in the southern and eastern regions of the Amazon. In addition to reducing diversity, deforestation disrupts the regional production chain, causing damage to producers, agroindustry and trade[48]. It also weakens traditional communities, increasing their vulnerability regarding health and nutrition, and conflicts over land and violence in the countryside.

The Origens Brasil project[49], a network that promotes sustainable businesses in the Amazon in priority conservation areas, with a guarantee of origin, transparency, traceability of the production chain and promoting ethical trade, demonstrates that there is market demand for bioeconomy products. Among the companies that buy products with the Origens Brasil seal are Natura, Vert. Wickbold, Havainas, Mãe Terra (Mother Earth), CitroBio and Osklen. With the involvement of several NGOs and traditional communities, the project operates in five large territories (Rio Negro, Solimões, northern Pará, Xingu and Tupi Guaporé), which encompass 37 conservation areas in the Amazon, contributing to the maintenance of 53 million hectares of standing forest[50].

Despite few specific studies on sociobioeconomy in the Cerrado, the diversity of species also indicates a great potential for development in the biome. A catalog produced by WWF-Brazil highlighted 20 Cerrado species already commercially produced (araticum, babassu, bacuri, baru, buriti, cagaita, cajuí, golden grass, coquinho-azedo, fava-d'anta, gueroba, jatobá, jenipapo, licuri, macaúba, mangaba, murici, pequi, pitomba and umbu). The catalog also shows 60 community enterprises, either associations or cooperatives, that produce, process and market the fruits of the Cerrado[51]. Also, a study prepared by Embrapa[52] identified about 110 native species with economic potential, most of them arboreal or shrub species.

Despite being products traditionally traded at fairs and local markets, their potential for the sociobiodiversity economy is greater than the exercised. Currently, there is a growing recognition of those species, and they start to guarantee some space in school meals and in large national and international supermarket chains. The sustainable expansion of their use depends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on the development of markets that recognize and fairly remunerate the services provided and the differentiated quality of sociobiodiversity products, and of inclusive financial mechanisms. The strengthening of sociobiodiversity productive chains should ensure the protagonism of communities and the promotion of socioeconomy rather than monoculture systems.

CONCLUSION

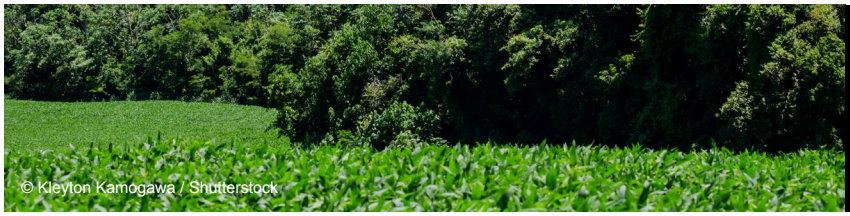
Brazil has benefited from the growth in international demand for commodities and the rise in their prices. Today, the country is one of the world leaders, alongside the United States and the European Union, in the production and export of agricultural products. National imports, in turn, have been characterized by manufactured goods for final consumption in the domestic market, with a smaller portion destined to add value to exports. That pattern consolidates the insertion of Brazil at low levels in global value chains and, in the long term, reduces the possibilities of sustainable development.

On the other hand, the country has great potential to become a global power through the sustainable use of products with high added value based on the sociobioeconomy, associating economic growth and sustainable and inclusive development. The chances of that happening without a serious commitment to combating deforestation of its forests and other natural ecosystems are minimal.

It is important to note that the studies presented here do not include the economic losses generated by global and regional climate change and predatory economic activities, which may affect the trade balance. The pollution of water and the compromise of available water resources, both surface and underground, resulting from excessive collection for supplying central pivots and other irrigation systems can cause damage to Brazilian agribusiness.

Furthermore, the maintenance of standing forests and the development of sociobioeconomy are not opposed to the expansion of agribusiness, which can be achieved with a more efficient use of arable land in Brazil. Studies show that such an expansion, without any additional deforestation, can meet the growing production demand by 2040[53]. On the other hand, the current model of expansion of monocultures implies high rates of deforestation, which generate great losses for Brazilian sociobiodiversity, in addition to compromising ecosystem services essential for society and for agribusiness itself.

Taking advantage of the national potential of sociobioeconomy, however, also requires State leadership through regulations, defense of rights and protagonism of traditional peoples and communities, more investments in infrastructure, science and technology, an industrial policy that contributes to increasing national competitiveness and the development of the institutional apparatus necessary to offer legal certainty to investors.



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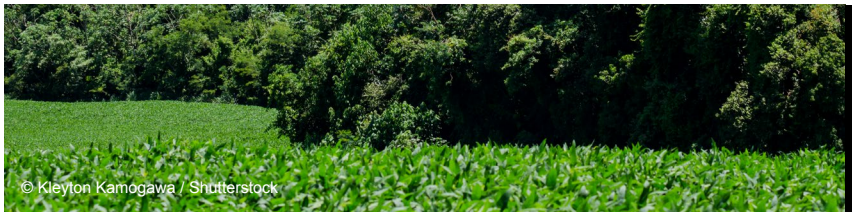

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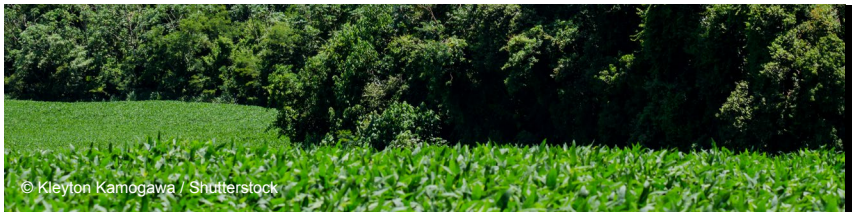
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