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Abstract: *Brazil is one of the world's leading producers and exporters of agricultural products, and it should continue to expand its production in the coming decades, remaining one of the main providers of food, fiber, and bioenergy for domestic and foreign consumption. This study aimed to analyze, by using Static Computable General Equilibrium model (BREA), the impacts on intermediate demand and the growth of agricultural production necessary for GDP to reach the expected projection for 2030, both for Brazilian macro-regions and for the MATOPIBA as well as the loss of native forest necessary for this happens. As a result, to compose the GDP growth in the North region, fruit growing would emerge with an increase of 9.2%. In MATOPIBA, soybean growth in suppressed forest areas showed an elevation of approximately 9.7%. It is observed that soy would continue to migrate to regions that hold cheap land and without the soybean moratorium embargo. The total amount of forests suppressed in Brazil for the expected economic growth to occur would be 490,000 ha. It is concluded that the economic growth related to the agricultural sectors is also linked to the conversion of native vegetation areas for future economic growth.*

Keywords: *Soy, Deforestation, Economic Growth, Cerrado, MATOPIBA.*

Resumo: O Brasil é um dos principais produtores e exportadores mundiais de produtos agrícolas e deve continuar expandindo sua produção nas próximas décadas, mantendo-se como um dos principais fornecedores de alimentos, fibras e bioenergia para consumo interno e externo. Este estudo teve como objetivo analisar, por meio do modelo de Equilíbrio Geral Estático Computável (BREA), os impactos sobre a demanda intermediária e o crescimento da produção agrícola necessários para que o PIB atinja a projeção esperada para 2030, tanto para as macrorregiões brasileiras quanto para o MATOPIBA como bem como a perda de mata nativa necessária para que isso aconteça. Com isso, para compor o crescimento do PIB da região Norte, a fruticultura despontaria com crescimento de 9,2%. No MATOPIBA, o crescimento da soja em áreas de floresta suprimida apresentou uma elevação de aproximadamente 9,7%. Observa-se que a soja continuaria migrando para regiões que possuem terras baratas e sem o embargo da moratória da soja. A quantidade total de florestas suprimidas no Brasil para que ocorra o crescimento econômico esperado seria de 490.000 ha. Conclui-se que o crescimento econômico relacionado aos setores agropecuários também está atrelado à conversão de áreas de vegetação nativa para o crescimento econômico futuro.

Palavras-chave: Soja, Desmatamento, Crescimento Econômico, Cerrado, MATOPIBA.

Resumen: *Brasil es uno de los principales productores y exportadores de productos agrícolas del mundo, y debe continuar expandiendo su producción en las próximas décadas, manteniéndose como uno de los principales proveedores de alimentos, fibras y bioenergía para el consumo interno y externo. Este estudio tuvo como objetivo analizar, utilizando el modelo de Equilibrio General Computable Estático (BREA), los impactos sobre la demanda intermedia y el crecimiento de la producción agrícola necesarios para que el PIB alcance la proyección esperada para 2030, tanto para las macrorregiones brasileñas como para el MATOPIBA como así como la pérdida de bosque nativo necesario para que esto suceda. En consecuencia, de componer el crecimiento del PIB de la región Norte, la fruticultura emergería con un aumento del 9,2%. En MATOPIBA, el crecimiento de* *soja en áreas de bosque suprimido mostró una elevación de aproximadamente 9.7%. Se observa que la soja seguiría migrando a regiones que tienen tierra barata y sin el embargo de la moratoria de la soja. La cantidad total de bosques suprimidos en Brasil para que ocurra el crecimiento económico esperado sería de 490.000 ha. Se concluye que el crecimiento económico relacionado con los sectores agrícolas también está ligado a la conversión de áreas de vegetación nativa para el crecimiento económico futuro.*

Palabras clave: *Soja, Deforestación, Crecimiento Económico, Cerrado, MATOPIBA.*

INTRODUCTION

The supply of food, fiber, bioenergy, and water for a growing global demand are examples of ecosystem services vital to human survival (LOYOLA et al., 2021; XU et al., 2021). However, such provision is directly and indirectly linked to deforestation, loss of natural habitat and impacts on biodiversity, greenhouse gas (GHG) emissions and depletion of water resources (DA SILVA et al., 2021).

Brazil is one of the main agricultural producers and exporters in the world and has conditions to continue the improvement of its production in the coming decades (MINISTRY OF AGRICULTURE, LIVESTOCK AND SUPPLY - MAPA, 2020). This projected expansion is linked to substantial investments in new road infrastructure aiming the, promotion of agricultural expansion, in which, if there are no pro-environmental actions, the tendency will be to increase the levels of deforestation (ARIMA et al., 2011; RODRIGUES e MELO, 2017; FREITAS 2019).

While this development can bring economic benefits, it can also intensify disputes over land tenure, devastate biodiversity and unbalance the provision of ecosystem services that are very valuable to society (SOLIDARIDAD, 2021). According to Sparovek et al., (2019), Suela et al., (2021) and Maca-Millán et al., (2021), the preservation of Brazilian native vegetation is highly dependent on the intense implementation of public protection legislation and regulations, as well as pro-environmental protection alternatives, whether public or private.

However, the Brazilian environmental legislation (Federal Law nº 12.651: New Forest Code - NCF) does not consider the peculiarities of each biome when delimiting pro-environmental actions, becoming inefficient in a large part of the country (BRASIL, 2012; POLIZEL e others, 2021). Thus, the NCF is a national and general code, but each state is responsible for authorizing deforestation. And each authorization procedure differs significantly between states (BRASIL, 2012). Another important point of the Brazilian NCF is its obligation in relation to the protection of native areas. The code requires protection between 80% for the Amazon biome and 20% for the other biomes. What causes some confusion to the producers and in many cases the lack of transparency about the requests (BRASIL, 2012).

The research focused on the MATOPIBA region and not the whole country (MATOPIBA acronym for the states of MAranhão, TOcantins, Piauí and BAhia)[1], territory mostly inserted in the Cerrado biome and which has been showing great economic growth and levels of deforestation. The Cerrado biome as a whole has been explicitly and implicitly considered a buffer zone for the Amazon biome. In which, in the last two decades, it has become the most profitable target for rural commodity producers (FERREIRA-PAIVA et al., 2022). And this factor requires greater measures of environmental protection in order to preserve the biome (SPAROVEK et al., 2019).

[1]MATOPIBA is the territorial division created through a technical cooperation agreement signed in 2014 between some ministries and federal agencies to designate the potential area for agricultural expansion in an area that has been constantly described by Brazilian governments as the "last world agricultural frontier". In May 2015, the Brazilian government created, by decree, the MATOPIBA special region and launched the MATOPIBA Agricultural Development Plan (PDA - MATOPIBA), designating the area for the development of agricultural and mining activities (EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA - EMBRAPA, 2015).

In this sense, this study aimed to analyze, through a static Computable General Equilibrium (CGE) model, the BREA (Brazilian Economic Analysis) model. The impacts on intermediate demand and on the growth of agricultural production. necessary for the Gross Domestic Product (GDP) to reach the proposed projection for 2030. To this end, the model verified the loss of native forest necessary, if no pro-environmental action occurs (DINIZ 2012; CABRAL, 2013; FERREIRA FILHO et al., 2015; FRANCISCO and GURGEL, 2020).

2 – LITERATURE REVIEW

After searches on the themes relating studies of economic projection and environment using General and/or Partial Equilibrium models. It was possible to find research capable of associating the increase in deforestation levels with the possible growth of the Brazilian GDP. Diniz (2012) compared the impacts of the land use legislation contained in the Forest Code prior to 2012, with the proposal of the New Forest Code (NCF) on the Brazilian economy. Using the Term-BR EGC model, he concludes that compliance with the previous version of the Forest Code would lead to a GDP drop of 0.37%, but with the NCF the drop is 0.19%.

Cabral (2013) applied the MIT-EPPA model, a dynamic global economic model, to assess the impacts of a restrictive deforestation policy in the Cerrado and the Brazilian Amazon, in accordance with the Brazilian Climate Change Plan. The results suggested that deforestation restrictions generate a drop of 0.15% in the national GDP, a small negative impact on the production of agricultural sectors, but allow the preservation of about 68 million hectares of forest until 2050. Ferreira Filho et al., (2015) use the TERM-BR model to estimate the economic impacts of the end of Brazilian deforestation. The model proposed simulate the policy to reduce deforestation in the Amazon (PPCDAM), which aims to reduce the annual deforestation rate by 80% in relation to the annual average observed between 1996 and 2005, as well as the end of deforestation by 2015. The results point to a small decrease in GDP, which can be offset by increased agricultural efficiency.

Francisco and Gurgel (2020) studied the potential economic impacts of curbing illegal deforestation in Brazil by 2030 horizon. A dynamic and global CGE model was used for the propose, capable of representing competition for alternative land uses. The main results founded out that land use restriction policies cause the intensification of agriculture and increase productivity. Livestock production is negatively affected by 2.3% to 3.6% compared to a baseline scenario in 2030 and 2050, respectively. The Brazilian GDP decreased below less than 0.1%. In conclusion, the results indicate that the potential costs associated with intensification and increasing efficiency in crops and livestock are quite low.

3 – METHODOLOGY

3.1 – COMPUTABLE GENERAL EQUILIBRIUM

The EGC Models have been widely used in research on pro-environmental policies and GDP growth analysis in several countries (SUELA et al., 2020; STOCCO et al. 2020). Another point of interest is that general equilibrium modeling, when compared to econometrics and other sectoral approaches used to carry out land use projections, has the advantage of representing the entire economy. The EGC models consider micro and macroeconomic feedbacks through adjustments of prices of goods and production costs when the shocks are realized. As some technological development related to production or a change in consumption preference.

3.2 – STATIC COMPUTABLE GENERAL EQUILIBRIUM

Static EGC models are able to investigate the total effects and spillovers of actions aimed at the growth of a country's production (for the case under study: analysis of Brazilian GDP growth). In this type of modeling, the final demand of each region is structured and composed of household spending, government consumption, investment and exports. The model is based on optimizing behavior, and agents produce, consume and sell services and products. Consumers with their restrictions and preferences choose products that maximize their utility function. Preferences are hypothetically convex and continuous, and their resulting continuous demand functions are homogeneous from zero degrees with respect to prices, so only relative prices can be determined.

In regarding of production, the technology is based on a production function with constant returns to scale[2], which combines intermediate inputs and primary factors (capital, labor and land). Corporate profits are zero at equilibrium. It is assumed that companies have specific production technology and demand factors to minimize their costs. The model allows the assessment of direct and indirect effects resulting from changes in public policies, such as tax rates, donations and tariff shocks.

3.3 – BREA MODEL AND ITS DATABASE COMPOSITION

The BREA model was built using the GTAPinGAMS nomenclature and written in the MSPGE language. The model is structured with several databases, which are sorted in two different modules: land use and economy. The economic module uses the national accounts from 2009 to 2018 made available by the Brazilian Institute of Geography and Statistics (INSTITUTO BRASILEIRO DE GEOGRAFIA E STATÍSTICA - IBGE, 2020b). The input-output table for Brazil is estimated according to Guilhoto et al., (2010) and disaggregated among all Brazilian municipalities by Núcleo de Economia Regional e Urbana (NEREUS-Universidade de São Paulo). The final data are aggregated across 36 sectors and three factors of production: capital, labor and land, according to Table 1.

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[2]Steady return to scale occurs when the company increases its inputs or resources and automatically observes a proportionate increase in output or output.

Table 1 _ Regions, sectors, primary and land use categories

Region		Sectors		Primary factor inputs	
South	STH	Mineral Iron	MIN	Capital	CAP
Southeast	SST	Coal	COAL	Labor	LAB
Center-West	CST	Mineral Extraction	NMM	Land	LND
North	NTH	Meats	MEAT	*Cropland*	*CROP*
Northeast	NST	Soy oil	OSD	*Pasture*	*PAST*
Northeast Cerrado	NSTC	Foods	FOOD	*Degraded pasture*	*DPAS*
		Textile and wood	TEX	*Natural Forest*	*NFOR*
Sectors		Refined oil	ROIL	*Planted Forest*	*PFOR*
Rice	RICE	Ethanol	ETH	*Managed Forest*	*MFOR*
Maize	CORN	Chemistry	CHM	*Protected areas*	*PA*
Cane	CANE	Fertilizer	FERT	*Natural areas*	*NAT*
Soy	SOY	Defensives	DFN	*Unused land*	*UNU*
Fruit	FRIT	Steel metal non-metallic	MMI		
Other Cultures	OCUL	Machines	MAC		
Forestry	FRST	Other Industry	OIND		
Cattle	CTTL	Electricity	ELEC		
Other live animals	OLA	Pipe gas	PGAS		
Swine	SWIN	Water	WTR		
Poultry	PTRY	Public Services	PSRV		
Milk	MILK	Construction	CONS		
Oil	OIL	Services	SERV		
Gas	GAS	Transportation	TRNS		

Source: BREA.

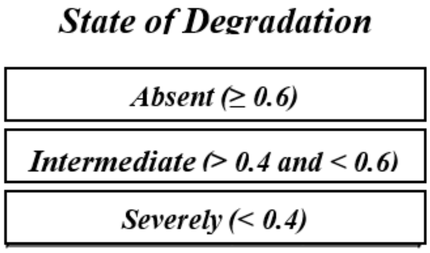
The BREA, in addition to a Static EGC model, is also a multi-regional and multi-sectoral model that represents the Brazilian economy represented in six regions: South, Southeast, Midwest, Northeast, Northeast of the Cerrado and North (MATOPIBA), Figure 1. The model BREA has the database referring to the national GDP, as well as the breakdown of these values for each Brazilian state between the years 2009 and 2018 (IBGE, 2020b). Other important databases that were included in the model for the proposed composition are: planted area (ha), harvested area (ha) and production value (one thousand reais) of the main Brazilian agricultural crops (rice, corn, soybeans, sugarcane, fruit and other crops). This information was obtained at the level of Brazilian municipalities, for the years between 2018 and 2020, a period that proved to be sufficient for the analysis of this study (IBGE, 2020d).

Figure 1 - Regional aggregation of Brazil in the BREA model

Source: Own elaboration adapted from.

The composition of the database on land use changes required, pasture quality data. This information was obtained at the municipal level. Pastures are classified into three different "types": severely degraded, intermediate degradation and ausent degradation. Classification carried out through the indicative of the Vegetation Index existing in the pastures (LABORATÓRIO DE PROCESSAMENTO DE IMAGENS E GEOPROCESSAMENTO - LAPIG, 2022).

Figure 2 – LAPIG stratification in three degradation state classes



Source: LAPIG Adaptation (2022).

LAPIG (2022) works with three distinct degradation status classes: Absent, Intermediate and Severe (Figure 16). Grassland status classification was based on EVI values - Improved Vegetation Index, provided by the MODIS MOD13Q1 model (HUETE et al., 2002). The EVI is normalized with a scale between 0 and 1, the closer the biome's territory is to 1, the better its vegetation is. EVIs also show positive correlations with vegetation resilience. Therefore, vegetation indices have been used to assess the state of degradation and estimation of biomass in pastures (ECKERT et al., 2014; PEREIRA et al., 2018; GARGIULO et al., 2020). Furthermore, it was decided to insert information for the years 2009, 2010, 2019 and 2020 (LAPIG, 2022).

As there are several uses for the land, the composition of land occupation is necessary, for the best capture of results. Thus, the Rural Environmental Registry, Legal Reserve, Conservation Units, Planted Forests, Indigenous Lands, Military Areas, Quilombola Areas and Unallocated Public Areas were inserted into the model. This information is important to delimit the entire Brazilian area, allowing not to extrapolate the exact amount of land in the model, a factor that transfers greater transparency and certainty to the responses of land use in the model (CADASTRO AMBIENTAL RURAL, 2022; LAPIG, 2022).

4 – RESULT AND DISCUSSION

4.1 – ECONOMIC GROWTH

In order to verify the possible loss of future native vegetation in Brazil, it was decided to use the projections of average growth of the Brazilian GDP between the years 2009 and 2030, focusing on analyzing the changes in the productive levels of the agricultural sectors. According to Embrapa (2018); Embrapa (2019) and Mapa (2020), for Brazilian plant and animal production to be able to meet internal and external demand, as well as fulfill their respective roles in the expected growth of GDP until 2030, it will be necessary to introduce a large extension of productive land. For this analysis, we chose to use three different levels of GDP projection for each Brazilian macro-region, as well as for the MATOPIBA region, see Table 2: normal (realistic projection); higher (optimistic projection); and lower (pessimistic projection) (TEIXEIRA and VIANNA, 2013; IBGE, 2020b; IBGE, 2022).

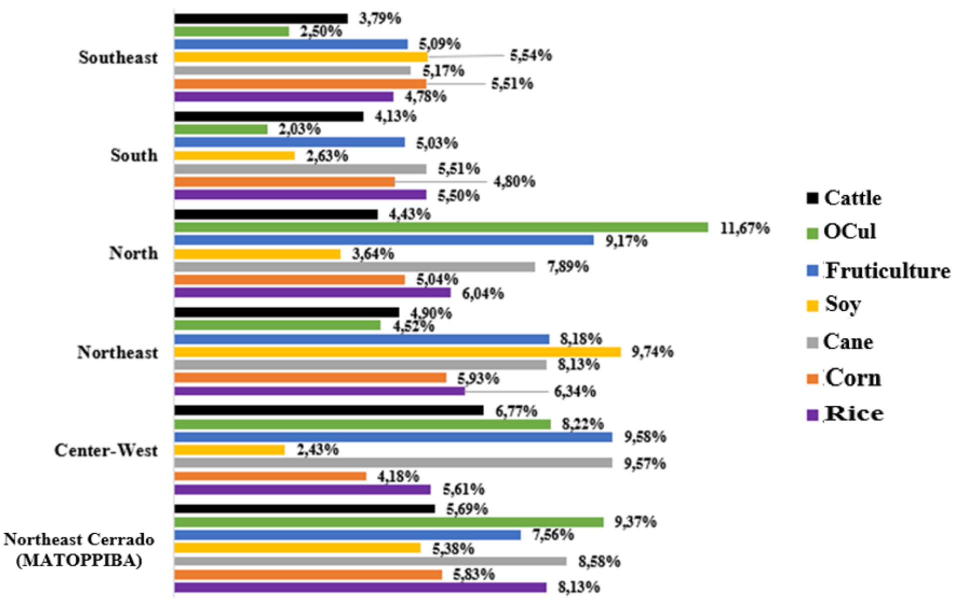
Table 2 - Average GDP growth by regions of the BREA model

REGIONS	REALISTIC	OPTIMISTIC	PESSIMISTIC
NORTHEAST CERRADO (MATOPIBA)	6,37%	7,45%	3,73%
Center-West	6,52%	7,60%	3,87%
Northeast	6,09%	7,17%	3,46%
North	6,80%	7,89%	4,15%
South	6,33%	7,41%	3,70%
Southeast	5,79%	6,86%	3,16%

Source: Own elaboration

Table 2 presents the macro-regional and regional economic growth projections expected for 2030. It is noted that MATOPIBA (Northeast Cerrado), the Center-West and the North are the regions that would present the highest levels of growth. With the growth of the Brazilian GDP, growth is expected in the production of agricultural commodities (soybean, corn, animal protein), and the MATOPIBA region (Northeast Cerrado), and the macro-regions of the Center-West and North were the ones that presented the highest rates of production of agricultural commodities in the last two decades (AGROSATÉLITE, 2020; XU et al. al., 2021; RUSSO LOPES et al., 2021; CHRIST et al., 2022). Thus, the information about economic growth used is showing the sense of expected growth.

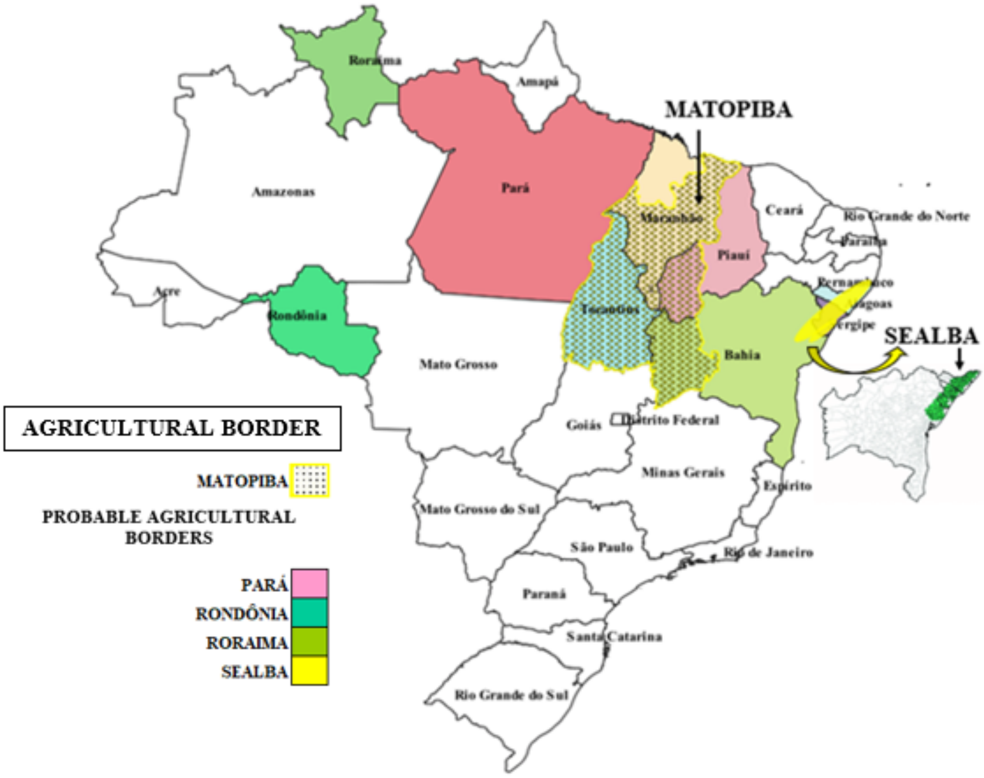
Figure 3 - Participation in production in % of the main agricultural crops in Brazil



Source: Own elaboration

It will now be analyzed what would be the impact on the level of production of the main commodities in Brazil. As can be seen in Figure 3, the North, Northeast, Midwest and MATOPIBA are the regions that stand out in the production of commodities, a fact that corroborates the expectations regarding agricultural production for several of the states (agricultural borders or quoted for future agricultural frontiers) of these states such as: MATOPIBA, Roraima, Rondônia, Pará and SEALBA (acronym for SErgipe, ALagoas and BAhia)[3], see Figure 4.

Figure 4 - Brazilian agricultural borders



Source: Own elaboration

Figure 3 demonstrates that the northern region of the country will focus on the production of crops such as sorghum, peanuts, cotton (Ocul), fruit and sugarcane, and there will be a loss of space for soy, the country's main commodities, the soy. A very relevant result that presents the real situation of this cultivar in the region. The growth of soybeans in the North of the country may have ceased to be interesting for the producer, as the land tenure situation in the region is unstable and without guarantees of compliance with environmental laws. In this sense, the farmer's risk of suffering sanctions due to the soybean moratorium is very high, which makes this crop not very considerable for starting crops on "new" lands, supporting the response found by the model (DA SILVA et al., 2018; SOTERRONI et al., 2019).

In the Figure 3, however soy production continues to migrate to regions with cheap land and without the embargo of the soy moratorium, the Brazilian Northeast and MATOPIBA. These regions of great importance in the production of this commodity. Currently, MATOPIBA is responsible for the production of 14% of the national production of soy, by the end of the next decade, 2030, the participation in national agricultural production will be 20% (MAPA, 2020).

[3]Region of the Brazilian outback, an area that is located between the Zona da Mata and the outback of the Northeast region of Brazil. It is a semi-arid area with a predominance of the Caatinga biome (EMBRAPA, 2022).

This growth is explained by its agricultural development that took place in the last two decades, as well as the introduction of the PDA-MATOPIBA, a government action that facilitated the entry of agricultural production in this region[4]. However, when comparing the projection of soybean production growth between MATOPIBA and the Northeast, there is a greater growth in the production of this crop in the Northeast region of the country, a fact that also corroborates the future projections for this territory that has been considered for be called the agricultural frontier. SEALBA, a region belonging to the Brazilian outback region, for example, is currently being quoted as the newest agricultural frontier in the country, this action may cause the same positive impacts in relation to agricultural production that occurred in MATOPIBA in recent years (EMBRAPA, 2019).

For the Midwest and MATOPIBA, production will focus on fruit, sugarcane, peanuts, cotton, sorghum and rice. These results demonstrate that the growth in the production of new crops in these regions is in line with the projections of Embrapa (2018) and Mapa (2020), in which other crops, apart from soy and beef production, will also be, dynamized.

However, for the economic growth of a country, it is necessary that the productive sectors consume continuously. And this consumption is called intermediate demand. The intermediate demand represents the supply and acquisition of each sector in relation by itself and the other sectors (GUILHOTO et al., 2010). When carrying out studies using GDP projections in General and/or Partial Equilibrium models, configured in a multisectoral way, it is possible to verify the intermediate demand of each sector proposed in the model, so that the suggested GDP development occurs.

As the BREA model was built to represent the Brazilian multisectors, when applying the impact on the growth of each region, it was possible to identify the reasons of the participation of each sector in the economic growth of Brazil for the year 2030. It is worth mentioning here, two important points: i) following the profile of this research - "determine the possible area of deforested native vegetation - for the suggested economic growth to occur for 2030, the focus of the analysis for the discussion will be to present only the sectors that use more intensively the factors land, capital and labor in the model and; ii) the analysis will be performed only for the realistic projection (which can be seen in Table 1) in order to avoid repetitive analysis.

Figure 5 presents the share of each intermediate demand resulting, in percentage, from the main Brazilian agricultural commodities, for the “realistic” economic growth of their respective regions. The Midwest (CST), Northeast (NTH) and MATOPIBA (NSTC) regions have a large share of intermediate consumption. It is possible to find answers about this impact in the literature that deals with the subject. According to Embrapa (2018), soybean production in the Brazilian Northeast, for example, faces great difficulties in implementing, especially in the SEALBA region, whether due to soil maintenance, the acquisition of agrochemicals or the climate, factors that make any start more expensive. of planting and what can explain this high consumption value, 8.7%.

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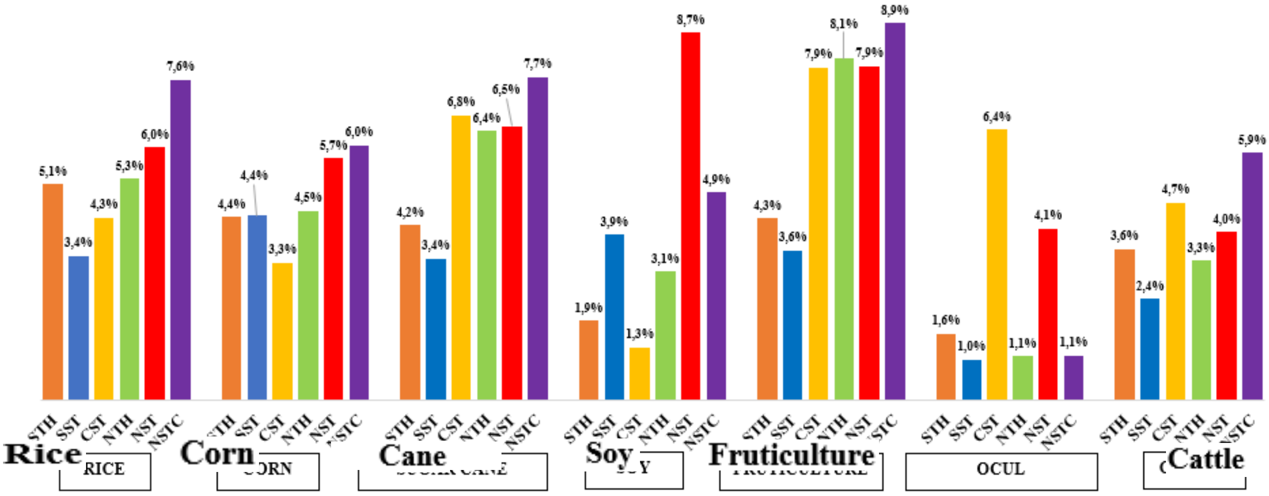
[4]In May 2015, the Brazilian government created, by decree, the MATOPIBA special region and launched the MATOPIBA Agricultural Development Plan (PDA - MATOPIBA), designating the area for the development of agricultural and mining activities (EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA - EMBRAPA, 2015).

Figure 5 - Share in intermediate demand in % of the main agricultural crops in Brazil.



Source: Own elaboration

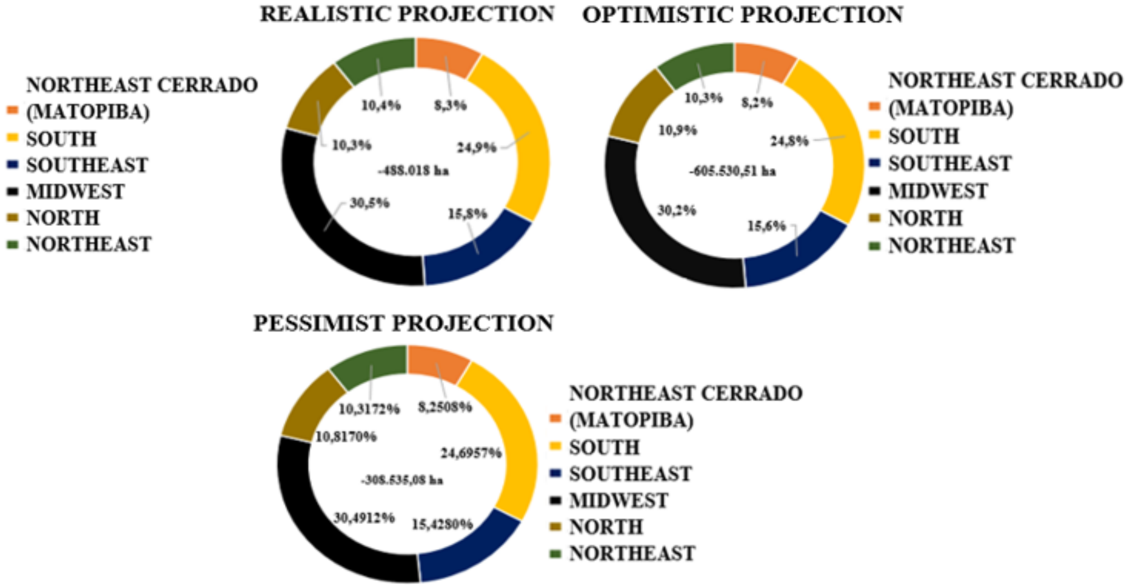
Another interesting point is MATOPIBA's outstanding participation in consumption in almost all agricultural sectors (rice, corn, sugarcane, fruit growing and cattle production). This region has great growth potential, mainly for the production of commodities, however, its soil deficient in minerals, requires great maintenance and correction and its low rainfall demands investment in irrigation, these factors have the capacity to excessively raise its costs of production (MAPA, 2021; SUELA et al., 2021).

4.2 – IMPACT OF ECONOMIC GROWTH ON NATIVE FOREST SUPPRESSION

For the growth of agricultural production to happens, two options can occur, simultaneously or separately, they are: i) growth in productivity, in which the use of new land extensions does not necessarily have to happen so that the production increase and; ii) introduction of crops in new areas, either already destined for production (pasture and/or areas of other crops), or in areas of native forest. It is worth noting that the relationship between total production and total inputs (Total Factor Productivity - TFP) considered in the BREA model is constant and equal to one, between land, capital and labor.

With the growth of production and the intermediate demand of the existing multisectors in the BREA, it was possible to capture the amount of native vegetation that would be suppressed so that production could be satisfied. The capture of new territories from native forests can be seen in Figure 6. The amount of productive territory originating from native vegetation that would be added if GDP followed the three proposed projections (realistic, optimistic and pessimistic, see Table 1).

Figure 6 – Participation of the model regions in the loss of native vegetation



Source: Own elaboration.

Figure 6 shows that the Midwest region would be the macro-region with the greatest loss of native vegetation in the three proposed projections. When analyzing the realistic projection, of the 490 thousand hectares of native vegetation suppressed throughout Brazil, approximately 197 thousand hectares of the Cerrado biome would be deforested to increase the production of these commodities. This would occur because the Center-West and MATOPIBA form almost the majority of the Cerrado biome.

By adding the area of native forest suppressed in this region to the amount deforested in the Midwest macro-region, one has, for a realistic GDP projection, the Cerrado biome would be the ecosystem that would suffer the most from the impacts of economic growth. Brazilian state, with a loss of 190 thousand hectares. These results confirm the finds founded out in Fian (2018), Stocco et al. (2020), Polizel et al. (2021), Loyola et al. (2021).

FINAL CONSIDERATIONS

This research analyzed the possible impacts caused by the GDP growth projected for 2030 on intermediate consumption and production of the main agricultural sectors in Brazil by using a Computable Static General Equilibrium model, the BREA model. The model was able to project agricultural production growth results that support studies by organizations such as Embrapa and MAPA, centers of excellence in studies related to the rural environment. It was noted the perpetuation regarding the migration of soy production to new regions, or that are already considered agricultural frontiers (MATOPIBA) and to those that are being quoted to be future agricultural frontiers, such as SEALBA.

It was found that the North, Midwest and MATOPIBA would be the main consumers of the existing sectors in the model, in order to be able to meet the economic growth projected for 2030. This fact sheds light on the need for investments in these regions, which is to say, that these territories will be able to attract new investments in infrastructure and in sectors aimed at the production of inputs for agricultural use.

Another point much discussed in the results was the possibility of new deforestation throughout Brazil. It was noted that economic growth related to the agricultural sectors is also linked to the conversion of areas of native vegetation for the growth of future production, both of commodities and other types of agricultural production. This fact confirms the studies on the trade-off between the environment and economic growth. In addition to fostering discussions on the importance of government policies aimed at environmental issues and/or the importance of pro-environmental action plans such as Payment for Environmental Services mechanisms.

It should be noted that concern for the environment can add value and/or prevent economic loss in production of agricultural origin. Sanctions caused by the consumer market through the soy moratorium or Payments for Environmental Services related, for example, to the protection of native forest areas, are important examples of what has been taking place. These options have the potential to motivate and/or guide the producer on good practices related to forest protection, in addition to expanding the economic gains of producers.

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