

# Need for Strategic Environmental Assessment on the Bi-Oceanic Route in Mato Grosso do Sul

Necessidade de Avaliação Ambiental Estratégica na Rota Bioceânica em Mato Grosso do Sul

*Necesidad de Evaluación Ambiental Estratégica em la Rota Bioceánica en Mato Grosso do Sul*

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Received on June 22<sup>th</sup>, 2023; accepted on June 26<sup>th</sup>, 2023.

DOI: <http://dx.doi.org/10.20435/inter.v24i4.4167>

**Abstract:** This article addresses the need to use Strategic Environmental Assessment (SEA) as a tool to assess the environmental impacts resulting from the implementation of the Bioceanic Route in Mato Grosso do Sul, also known as the Bioceanic Corridor or the Latin American Integration Route (RILA). The main objective is to examine the lack of coordinated action in predicting the environmental impacts of this route and identify the best legal instruments within the Brazilian system to conduct this assessment. The methodology used includes literature review, analysis of documentary data from public agencies, and investigation of relevant legislation on the subject. The Brazilian development model, which prioritizes economic interests, requires the protection of other issues, especially environmental ones. Decision-making on public policies should be guided by the principle of sustainable development, involving participation and awareness of the community. The article examines different instruments of Environmental Impact Assessment (EIA), such as the Preliminary Environmental Impact Study (EIS) and its Environmental Impact Report, as well as Strategic and Integrated Environmental Assessments. As a strategy to address the potential negative consequences of the Bioceanic Route, the implementation of SEA is proposed as a policy, promoting greater government transparency and connection between the economy, quality of life, and the environment. The authors argue that, in the case of the Bioceanic Route, SEA is the most suitable instrument to assess the environmental and social impacts resulting from this undertaking. In summary, the implementation of the Bioceanic Route in Mato Grosso do Sul requires a comprehensive analysis of environmental impacts and the adoption of appropriate measures to mitigate potential negative consequences. The use of Strategic Environmental Assessment (SEA) emerges as a promising solution to evaluate and manage the effects of this route, ensuring sustainable and balanced development for the region.

**Keywords:** Bi-Oceanic Road Route; environmental impact; Strategic Environmental Assessment (SEA).

**Resumo:** Este artigo aborda a necessidade de utilizar a Avaliação Ambiental Estratégica (AAE) como instrumento para avaliar os impactos ambientais decorrentes da implantação da Rota Bioceânica em Mato Grosso do Sul, também conhecida como Corredor Bioceânico ou Rota de Integração Latino-Americana (RILA). O objetivo principal é examinar a falta de ação coordenada na previsão dos impactos ambientais dessa rota e identificar os melhores instrumentos jurídicos dentro do sistema brasileiro para realizar essa avaliação. A metodologia utilizada inclui revisão bibliográfica, análise de dados documentais de órgãos públicos e investigação da legislação relacionada ao tema. O modelo de desenvolvimento brasileiro, que prioriza interesses econômicos, requer a proteção de outras questões, especialmente as ambientais. A tomada de decisões sobre políticas públicas deve ser permeada pelo princípio do desenvolvimento sustentável, envolvendo a participação e conscientização da coletividade. O artigo analisa diferentes instrumentos de Avaliação de Impactos Ambientais (AIA), como o Estudo Prévio de Impacto Ambiental (EIA) e seu Relatório de Impacto Ambiental, além das Avaliações Ambientais Estratégica e Integrada. Como estratégia para enfrentar as possíveis consequências negativas da Rota Bioceânica, propõe-se a implementação da AAE como política,

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promovendo maior transparência governamental e conexão entre economia, qualidade de vida e meio ambiente. Os autores argumentam que, no caso da Rota Bioceânica, a AAE é o instrumento mais adequado para avaliar os impactos ambientais e sociais decorrentes desse empreendimento. Em suma, a implementação da Rota Bioceânica em Mato Grosso do Sul requer uma análise abrangente dos impactos ambientais e a adoção de medidas adequadas para mitigar possíveis consequências negativas. A utilização da Avaliação Ambiental Estratégica (AAE) se apresenta como uma solução promissora para avaliar e gerenciar os efeitos dessa rota, assegurando um desenvolvimento sustentável e equilibrado para a região.

**Palavras-chave:** Rota Bioceânica; impacto ambiental; Avaliação Ambiental Estratégica (AAE).

**Resumen:** Este artículo aborda la necesidad de utilizar la Evaluación Ambiental Estratégica (EAE) como herramienta para evaluar los impactos ambientales derivados de la implementación de la Ruta Bioceánica en Mato Grosso do Sul, también conocida como Corredor Bioceánico o Ruta de Integración Latinoamericana (RILA). El objetivo principal es examinar la falta de acción coordinada en la predicción de los impactos ambientales de esta ruta e identificar los mejores instrumentos legales dentro del sistema brasileño para llevar a cabo esta evaluación. La metodología utilizada incluye revisión bibliográfica, análisis de datos documentales de organismos públicos e investigación de la legislación relevante sobre el tema. El modelo de desarrollo brasileño, que prioriza los intereses económicos, requiere la protección de otras cuestiones, especialmente las ambientales. La toma de decisiones en políticas públicas debe estar guiada por el principio del desarrollo sostenible, involucrando la participación y conciencia de la comunidad. El artículo examina diferentes instrumentos de Evaluación de Impacto Ambiental (EIA), como el Estudio de Impacto Ambiental Preliminar (EIS) y su Informe de Impacto Ambiental, así como Evaluaciones Ambientales Estratégicas e Integradas. Como estrategia para abordar las posibles consecuencias negativas de la Ruta Bioceánica, se propone la implementación de la EAE como política, promoviendo una mayor transparencia gubernamental y conexión entre la economía, la calidad de vida y el medio ambiente. Los autores argumentan que, en el caso de la Ruta Bioceánica, la EAE es el instrumento más adecuado para evaluar los impactos ambientales y sociales resultantes de esta iniciativa. En resumen, la implementación de la Ruta Bioceánica en Mato Grosso do Sul requiere un análisis integral de los impactos ambientales y la adopción de medidas adecuadas para mitigar posibles consecuencias negativas. El uso de la Evaluación Ambiental Estratégica (EAE) se presenta como una solución prometedora para evaluar y gestionar los efectos de esta ruta, asegurando un desarrollo sostenible y equilibrado para la región.

**Palabras clave:** Rota Bioceânica; impacto ambiental; Evaluación Ambiental Estratégica (AAE).

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## 1 INTRODUCTION

The State of Mato Grosso do Sul will become the final and main point of the Bioceanic Route in Brazil. It is projected that the bridge connecting Porto Murtinho, in the Municipality of Porto Murtinho, to Paraguay, in the city of Carmelo Peralta, will be completed by 2025. This route will be traveled by thousands of vehicles, realizing the long-held dream of Latin American integration.

Initially, the designation used was "Bioceanic Corridor," especially by the government, in line with the Transport Corridors defined by the South American Council on Infrastructure and Planning, previously called Integration and Development Axes. Later, the name "Latin American Integration Route" was adopted, as the word "corridor" limited the route to a mere "passageway for transportation." The name "Integration Route" provided greater legitimacy and expanded the concept of "integration," allowing for the coordination of other benefiting cities and promoting more balanced development in Mato Grosso do Sul (Asato, 2021).

For this article, the name "Bioceanic Route" was chosen due to its broader usage in news, articles, research, and periodicals, facilitating reader association with the subject matter.

This program aims to establish an international road corridor to connect Brazil, Paraguay, and Argentina to the ports in northern Chile. In Mato Grosso do Sul, all the cities that currently serve as passage routes from Mato Grosso, Goiás, Minas Gerais, São Paulo, and Paraná will be impacted. Starting from Campo Grande, the route will pass through Sidrolândia, Nioaque, Guia Lopes da Laguna, Jardim, and Porto Murtinho.

Despite the immense benefits and advancements that the implementation of this route will bring to the state, there are also numerous negative environmental impacts associated with it. However, these impacts have not been properly identified and anticipated yet, and so far, there has been no centralized effort to assess them and adopt measures to avoid, mitigate, or compensate for them.

This research focuses on the challenges and impacts that the state of Mato Grosso do Sul will face with the regional development provided by the Route, especially regarding commercial and productive integration between different states of Brazil and the involved countries.

It is important to note that the lack of specific studies on the environmental impacts of the Bioceanic Route in Mato Grosso do Sul does not mean that these impacts do not exist or are not relevant. Therefore, it is necessary to conduct more detailed and specific scientific studies to understand the environmental effects of its implementation.

The objective of this article is to characterize the Route, analyze the legal framework guiding the Strategic Environmental Assessment, identify some potential environmental impacts, and, based on that, highlight the absence of coordinated action to anticipate these impacts and study which legal instrument within the Brazilian system would be best to evaluate them.

This article adopts a research methodology based on literature review and analysis of relevant documents. Scientific publications, government reports, and technical studies related to the Bioceanic Route, its environmental and social impacts were consulted. Additionally, available information on previous experiences with similar projects, such as the waterways of the Brazilian Midwest, was considered. From these sources, potential environmental and social impacts resulting from the Bioceanic Route were identified, and reflections on the need for a more comprehensive approach, such as the Strategic Environmental Assessment, to effectively assess and address these impacts were presented.

This article is organized in a comprehensive manner to address the issue of the Bioceanic Route and its environmental impacts. In addition to the introduction, which provides the context and importance of the topic, the article is divided into three main sections. The first section is dedicated to the characterization of the Bioceanic Route, providing relevant information about the project. The second section discusses the Strategic Environmental Assessment as a suitable legal instrument for the case, highlighting its importance in analyzing environmental and social impacts. Finally, the third section addresses the potential environmental impacts of the Bioceanic Route in Mato Grosso do Sul, exploring aspects such as increased vehicle traffic, urbanization, deforestation, and other factors related to the route's implementation. The conclusion synthesizes the main considerations and emphasizes the importance of a comprehensive approach in analyzing the environmental impacts of this undertaking.

## **2 BIOCEANIC ROUTE: BETWEEN INTEGRATION AND INFRASTRUCTURE**

According to Wilke (2022), the Bioceanic Route, originally known as the Initiative for the Integration of South American Regional Infrastructure (IIRSA), is a transportation corridor aimed at connecting Brazil to the Pacific Ocean, crossing the central region of South America. While the idea of a bioceanic route has existed for decades, the current proposal to construct a highway connecting Brazil to Chile, passing through Paraguay and Argentina, has gained prominence in recent years.

The Bioceanic Route proposal seeks to improve transportation infrastructure in the region, reduce operational and financial costs, promote trade and integration among South American countries, and shorten the arrival time of production, particularly for Asian countries like China and Japan.

Although the idea of a bioceanic route was first discussed in the 1990s, it was only in recent years that it gained momentum with the support of governments and international institutions. In 2000, South American presidents initiated discussions on the opening of a Bioceanic Highway Corridor, aiming for state cooperation and the integration of the South American continent (Wilke, 2022).

The road connection provided by the Bioceanic Corridor gained momentum in 2015 when the Assumption Declaration on the Bioceanic Corridor was signed, in which the presidents of the countries involved reaffirmed their commitment to regional integration. Since then, a Working Group (WG) has been established, bringing together authorities and experts from various fields, with the aim of advancing studies and proposing actions to make the Corridor viable (Wilke, 2022).

The Bioceanic Route or Corridor is an initiative that seeks to create a new route for international trade, reducing dependence on Atlantic ports and offering a faster and more cost-effective option for the transportation of goods between South American countries and the Pacific Ocean. When completed, this corridor will allow Brazilian products to reach Asian markets more quickly, increasing the country's export competitiveness. Additionally, the construction of this route is expected to boost regional development, generating business opportunities and jobs along the highways and railways (Castro, 2019).

According to Asato (2021), the itinerary of the route originates in Campo Grande, Brazil, and heads towards the ports in northern Chile, integrating into the Bioceanic Corridor. Therefore, it is understood that the Bioceanic Corridor is a corridor that will connect ports in the Atlantic Ocean, such as Santos and Paranaguá, to Chilean ports in the Pacific Ocean, with access to Asian ports, the Eastern Coast of the United States, Canada, and the Middle East. In other words, the Route is part of the Bioceanic Corridor.

Asato (2021) states that a corridor can be understood as a physical passage, but the Bioceanic Route goes beyond that, encompassing human, social, commercial, cultural, and environmental integration. For this reason, this route is of great relevance to academia, as well as to the government and private sectors.

Barros *et al.* (2020) affirm that the state of Mato Grosso do Sul has a privileged geographical location, bordering several Brazilian states such as Mato Grosso, Goiás, Minas Gerais, São Paulo, and Paraná, as well as sharing borders with Paraguay and Bolivia. Additionally, the state is connected to Argentina and Uruguay through railways, highways, and waterways on the Paraná and Paraguay rivers. Therefore, Mato Grosso do Sul has the potential to become the logistical center of the Bioceanic Highway Corridor, not only the starting or ending point of regional logistic chains.

The state of Mato Grosso do Sul plays a crucial role in the Bioceanic Route, which aims to connect the Atlantic coast to the Pacific coast for the flow of production. Starting from the municipality of Campo Grande, which is the closest Brazilian capital to the border with Paraguay, the route crosses the territory of Mato Grosso do Sul until reaching Paraguayan, Argentinean, and Chilean lands, reaching the ports of Antofagasta, Mejillones, and Iquique in Chile. With a length of 2,396 km, this section of the Bioceanic Route passes through a wealth of existing natural resources, natural beauty, cultural and tourist heritage, and other potentialities.

The route of the Bioceanic Route begins in Brazil, in Campo Grande, and at the strategic point of Porto Murtinho, crosses the Paraguayan Chaco in the municipalities of Carmelo Peralta, Mariscal Estigarribia, and Pozo Hondo. It then continues to northern Argentina, passing through Misión La Paz, Tartagal, Jujuy, and Salta. Finally, it reaches Chilean territory, crossing the Andes Mountains and reaching the city of Calama, passing through Sico and Jama. The route can extend to the ports of Antofagasta and Mejillones or go up to the port of Iquique. In this way, the Brazilian Midwest connects with the Paraguayan Chaco, the Argentine provinces, and finally reaches the Chilean ports on the Pacific Ocean.

The Bioceanic Route, also known as the Latin American Integration Route (RILA), has the potential to become not only a corridor for agricultural production from Brazil, Paraguay, Argentina, and Chile but also a transnational tourist-cultural route with common activities that benefit all the countries involved.

According to Sobrinho (2021), this initiative will be a catalyst for product flow, stimulating logistics connectivity among the four countries and attracting investors. Additionally, the Bioceanic Corridor will favor the transportation of goods and people, boosting tourism. The main objective of this corridor is related to connectivity, competitiveness, and regional integration. This involves reducing transportation time and increasing efficiency in the transport of goods, creating new trade flows and investments, generating jobs in various areas, and coordinating among local stakeholders, taking into account the interests of local populations.

This vision is reinforced by Castro (2019), who highlights that the "productive externalities" of the Route can drive the development of municipalities along the highway, promoting border integration and increasing the flow of overland visitors to countries, municipalities, and attractions along the tourist route.

Due to the nature of this major logistics initiative, which will involve intense movement of cargo and people, it is important to consider that the impacts will not be restricted only to the stretch between Campo Grande and Porto Murtinho in Mato Grosso do Sul. The capital will only be a passage for thousands of vehicles that will have other Brazilian states as their origin or destination.

Therefore, it is evident that the cities that are already part of this flow route, whether destined for or originating from the north (through Mato Grosso) or other border states such as Goiás, Minas Gerais, São Paulo, and Paraná, will also be impacted by this initiative.

### **3 ENVIRONMENTAL STRATEGIC ASSESSMENT AS AN APPROPRIATE LEGAL INSTRUMENT FOR THE CASE**

Initially, it is important to note that the 1988 Federal Constitution does not directly define what the environment is, but the infraconstitutional legal system has already established this definition. According to Law No. 6.938/1981, the environment is defined as "the set of conditions, laws, influences, and interactions of a physical, chemical, and biological nature that allows, shelters, and governs life in all its forms," as pointed out by Loubet (2011).

The combination of Law No. 6.938/1981 with Law No. 7.346/1985 and Article 225 of the Federal Constitution leads to the conclusion that the environment is not limited only to the natural aspect, such as natural assets (soil, atmosphere, water, life), but also encompasses the artificial aspect (built urban space) and the cultural aspect (human interaction with the environment,

such as tourism, urban planning, zoning, landscaping, historical monuments, and other artistic, aesthetic, touristic, landscape, historical, and archaeological values) (Mazzilli, 2001). Therefore, the analysis of potential environmental impacts should cover not only the natural environment, such as wildlife mortality, but also other aspects related to urban planning and cultural heritage.

On the other hand, the concept of environmental impact is present in Resolution Conama n. 01/86, which defines it as "any alteration of the physical, chemical, and biological properties of the environment, caused by any form of matter or energy resulting from human activities that directly or indirectly affect: I- the health, safety, and well-being of the population; II- social and economic activities; III- the biota; IV- the aesthetic and sanitary conditions of the environment; V- the quality of environmental resources" (Article 1, I to IV).

It is important to highlight that an environmental impact can be both negative and positive. On the other hand, environmental degradation, according to the National Environmental Policy Law (Federal Law n. 6.938/2003), is defined as the "adverse alteration of the environment," while pollution is the degradation of environmental quality resulting from activities that directly or indirectly harm the health, safety, and well-being of the population, create adverse conditions for social and economic activities, and affect the aesthetic conditions of the environment (Article 3, II and III).

Given the inevitable negative environmental impacts that will arise from the Bioceanic Route, it is necessary to identify which instrument of the Brazilian legal system of Environmental Law is most suitable for identifying, predicting, preventing, avoiding, mitigating, and/or compensating for such impacts.

The most well-known instrument in Brazilian legislation for assessing environmental impacts is environmental licensing, which stems from Federal Law No. 6.938/81, establishing that any activity potentially causing environmental degradation must obtain a license issued by the competent state agency.

Environmental licensing is an administrative procedure aimed at authorizing the location, installation, expansion, and operation of ventures and activities that use environmental resources, considering them potentially polluting or capable of causing environmental degradation. It is regulated by Resolution No. 237/1997, which establishes guidelines and rules for licensing, in accordance with the legal, regulatory, and technical standards applicable to each specific case. Through this process, the competent environmental agency assesses the environmental impacts caused by the venture or activity, establishing the necessary conditions and measures for the mitigation, control, and monitoring of these impacts. Thus, environmental licensing seeks to reconcile economic development with environmental protection, ensuring compatibility between human activities and the preservation of natural resources.

Within the environmental licensing process, various studies may be required, with the most comprehensive being the Preliminary Environmental Impact Study, required for "highways with two or more traffic lanes," as provided for in Article 225 of the Federal Constitution and regulated by Resolution No. 01/1986.

Based on Conama Resolution No. 1/1986, it is widely recognized that the Environmental Impact Study (EIS) and the Environmental Impact Report (EIR) are mandatory in specified cases. This resolution establishes a mandatory minimum, which can be expanded but never reduced. There is an absolute presumption that the activities mentioned in the resolution have the potential to cause significant environmental degradation.

Jurisprudence also reinforces this interpretation, as observed in the ruling of the Federal Regional Court of the 1st Region. In this specific case, environmental licensing for the construction of a grain terminal was granted based on the approval of the EIS/EIR, respecting Conama Resolution No. 1/86, which requires the preparation of these studies for activities such as ports and terminals.

Regarding the Preliminary Environmental Impact Study, Antunes (2002) emphasizes that the public administration cannot waive its execution whenever licensing activities or installations that are effectively or potentially polluting or causing environmental degradation are involved. The legal principle to be observed is that, in the presence of potential or current risks, the environment must be preserved through the preparation of an environmental impact study. If the public administration unduly waives this requirement, citizens, associations, and the Public Prosecutor's Office have the right to judicially demand the requirement of this study. Modern environmental doctrine is oriented towards considering the need for the EIS as indispensable whenever the conditions provided in Article 225, § 1, IV of the Federal Constitution of the Federative Republic of Brazil are present. Therefore, it can be stated that in cases where activities or installations have the potential to cause significant pollution or environmental degradation, any license issued without the prior completion of the environmental impact study is null and void, and the Judiciary has the power to declare this nullity when prompted by a legitimately interested party.

However, it is important to note that both environmental licensing and the EIA-Rima may not be adequate instruments to address the potential environmental impacts of the Bioceanic Route in the state of Mato Grosso do Sul. This is because the Bioceanic Route is not merely a project or activity linked to a specific entrepreneur, but rather a true international development program encompassing an entire region of South America, with far-reaching impacts beyond the mere construction of a bridge, such as the one being carried out in the municipality of Porto Murtinho.

In the Brazilian context, environmental licensing and the Environmental Impact Study are mainly applied to specific and localized ventures. However, broader government policies, programs, and projects often lack a comprehensive assessment of their impacts, according to Sánchez (2008).

The inherent limitations of the EIA, even the most comprehensive ones, in deeply analyzing technological and location alternatives, adequately considering cumulative and indirect impacts, necessitate the adoption of Strategic Environmental Assessment (SEA). Frequently, public controversies surrounding individual project assessments are related to previous decisions or the continuity of established policies whose environmental consequences are already known. Project assessments often do not encompass the entirety of cumulative, synergistic, and indirect impacts, requiring coordinated governmental action or even the creation of new laws and institutions for their mitigation.

The evaluation of environmental impacts, provided for in the National Environmental Policy (Federal Law No. 6.938/2003), is a separate instrument from licensing and the review of potentially polluting activities, as established in Article 9, item III. While environmental licensing is a procedure that grants or denies a license and involves the assessment of environmental impacts, including the EIA-Rima, the evaluation of environmental impacts encompasses a variety of studies that may occur outside the licensing procedure, as noted by Maciel (2012).

At the international level, Strategic Environmental Assessment (SEA) and Integrated Environmental Assessment (IEA) have been used for a long time. In the United States, the initial

guidelines for SEA were established by the National Environmental Policy Act in 1969. The World Bank adopted an internal directive in 1989 to allow regional assessments that used EIA. The European Economic Community proposed the first directive on Environmental Assessment of Policies, Plans, and Programs, which was accepted by the Council of the European Union in 2001, known as the SEA Directive.

In Brazil, SEA is an integral instrument of the National Environmental Policy (PNMA), regulated by Law No. 6.938/1981, which addresses Environmental Impact Assessment (EIA). However, SEA has not been fully regulated in the country yet, although it has been used in some locations. SEA is considered an environmental policy instrument that aims to assess the impacts of actions proposed by policies, plans, and programs in a phase prior to projects. However, its application in Brazil is still limited and voluntary, which weakens the instrument (Urbano; Almeida, 2016).

The absence of comprehensive regulation of Strategic Environmental Assessment (SEA) in Brazil results in some confusion regarding its use since, as highlighted by Sanches (2008), the term "strategic environmental assessment" allows for different interpretations. Its objectives, scope, and potential can easily become subject to disagreement if not defined through legislation, regulation, or agreement among stakeholders.

Strategic Environmental Assessment (SEA) is a process that involves the upfront assessment of the impacts and effects that a strategic decision on a policy, plan, or program may have on the environment and the sustainability of natural resources. Teixeira (2008) describes SEA as an environmental assessment of policies, plans, and programs that assists decision-makers in identifying and evaluating impacts, maximizing the positive ones, and minimizing the negative ones. The objective of SEA, as defined by the Ministry of the Environment in 2002, is to integrate environmental issues into planning and implementation, promoting a prior analysis of potential impacts and contributing to more informed and sustainable decision-making.

The Ministry of the Environment in 2006 highlights the difference between SEA and Integrated Environmental Assessment (IEA). Although they are similar tools, IEA is an environmental analysis of scenarios and impacts in a basin within existing or planned policies, while SEA involves not only integrated assessment but also the compatibility between policies, plans, and programs for managing the uses and conservation of natural resources in a territory, incorporating the environmental dimension into sectoral and national planning.

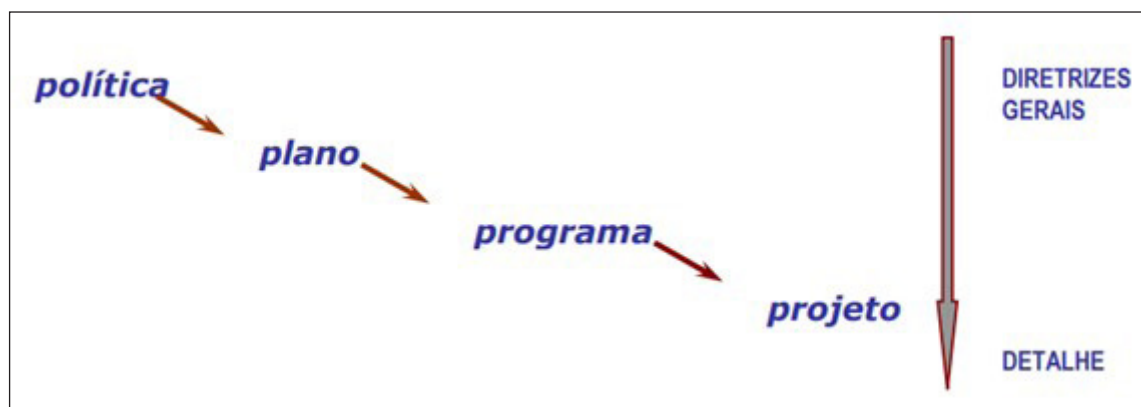
Marchesan (2020) also emphasizes the importance of Strategic Environmental Assessment, especially for plans, projects, and programs of great complexity, which should be preceded by this assessment, which analyzes different planning scenarios for a given territory, multiple impacts, and even potential greenhouse gas emissions in the context of climate change.

Therefore, Strategic Environmental Assessment is used to assess the overall impacts of various activities in a cumulative and synergistic manner, while Integrated Environmental Assessment is more specific, applying to a particular sector or type of project, such as the hydropower development of a river basin. In this sense, Strategic Environmental Assessment is the most suitable impact assessment instrument for the case of the Bioceanic Route.

In this delineation, the following figure illustrates the scope of each of them (Sanches, 2008, p. 10):



Figure 1 – Theoretical conception of the articulation between PPPs and dominant projects in the literature on SEA.



Source: Sanches (2008, p. 10).

Figure 1 delimits the scope of Strategic Environmental Assessment (SEA) and Integrated Environmental Assessment (IEA) in the literature on the subject.

While environmental licensing focuses on specific and individual projects, SEA and IEA are applied to more comprehensive programs.

Although SEA is not expressly regulated in Brazil, its adoption has been required as a necessary tool due to the constitutional requirement of the right to a balanced environment for all and the obligation of the government to preserve it for present and future generations (Article 225, Federal Constitution). Furthermore, the requirement of SEA is supported by the principle of mandatory state intervention in the environment, as established in Article 23, VI and VII of the Federal Constitution, which assigns administrative competencies to the federative entities to protect the environment, combat pollution, and preserve forests, fauna, and flora.

This requirement is also supported by Principle 17 of the Rio Declaration (1992), which establishes the need for environmental impact assessment for all activities that cause considerable negative impacts on the environment.

Moreover, the obligation to adopt assessments of synergistic impacts, such as SEA and IEA, also stems from the principle of sustainable development, which seeks to integrate economic growth with environmental preservation to ensure the social well-being of present and future generations (Ferri; Mattei; Medeiros, 2022, p. 159).

The Decision 464/2004 of the Federal Court of Auditors was a significant ruling that recommended the adoption of SEA in the formulation of the Plurianual Plan and in the planning of sectoral policies, plans, and programs. This approach offers two advantages over the current form of environmental management. First, it allows for a predominantly proactive approach that considers the cumulative impacts of various projects, which is difficult to achieve solely through the use of Environmental Impact Assessment and Environmental Impact Reports. Second, it contributes to the sustainability of development by integrating the environmental, economic, and social dimensions in planning.

Some states, such as Minas Gerais, have adopted SEA or IEA instruments within their territories. Normative Deliberation No. 175/2012 implemented IEA as a supporting tool for planning the implementation of new hydroelectric projects in the state. Although there is no regulation for SEA, the creation of Environmental Management Units (NGAs) within the State

Secretariats, through Decree No. 43.372/2003, allows for the development of SEA in some sectors, such as energy and transportation, in Minas Gerais (State Environmental Foundation).

In the case of the Bioceanic Route, the best option is SEA, as will be highlighted. Mato Grosso do Sul has already adopted this instrument, as evidenced by the National Water and Sanitation Agency, which conducted an Integrated Environmental Assessment of the impacts of all planned hydroelectric projects in the Paraguay River Basin (Agência Nacional de Águas [ANA], 2020).

Thus, SEA is an important tool for assessing the overall impacts of various activities in a cumulative and synergistic manner, while IEA is applied to specific sectors such as hydroelectric power plants. The adoption of SEA is supported by constitutional principles, regulations, and international guidelines, aiming to ensure sustainable development with due consideration to environmental, economic, and social aspects.

Regarding the requirement for Strategic Environmental Assessment (SEA) and Integrated Environmental Assessment (IEA) for the Bioceanic Route in the State of Mato Grosso do Sul, there are several constitutional and legal foundations that support this demand.

The Monitoring Group (GAP) for the Elaboration of the Water Resources Plan for the Paraguay River Basin recommended the suspension of all licenses until the completion of the IEA studies. In a meeting held on August 11, 2017, GAP approved the recommendation to await the results of the studies on the effects of hydroelectric power plants in order to incorporate their findings into the analysis of licensing and permits for new hydroelectric plants in the region.

Previously, in Mato Grosso do Sul, through a Conduct Adjustment Term in Civil Inquiry No. 053/2002 between IMASUL, the State Public Prosecutor's Office (MPE), and the Federal Public Prosecutor's Office (MPF), the completion of a Strategic Environmental Assessment of the Verde River Sub-basin was required (IMASUL, 2008).

Jurisprudence has also recognized the need for an Integrated Environmental Assessment for projects with synergistic impacts. Judicial decisions, such as those from the Santa Catarina State Court of Justice (TJSC) and the Paraná State Court of Justice (TJ-PR), confirm the impossibility of licensing various projects without this integrated assessment (TJSC, Interlocutory Appeal No. 2011.018854-2, TJSC, Interlocutory Appeal No. 2011.022254-5, TJ-PR, AI No. 0012226-84.2021.8.16.0000). Furthermore, an emblematic ruling from the 4th Region Federal Court of Appeals (TRF-4) established the need for an Integrated Environmental Assessment of the Tibagi River Basin as a prerequisite for granting environmental licenses for the construction of Hydroelectric Power Plants in that basin, except for the Mauá HPP (TRF-4, Civil Appeal 1999.70010075146).

Based on this information, it is evident that there is a solid constitutional and legal basis to require the implementation of Strategic Environmental Assessment as an instrument to assess the environmental and social impacts of the Bioceanic Route in the State of Mato Grosso do Sul.

#### **4 POSSIBLE ENVIRONMENTAL IMPACTS OF THE BIOCEANIC ROUTE IN MATO GROSSO DO SUL**

The implementation of the Bioceanic Route in the state of Mato Grosso do Sul has the potential to bring significant benefits, such as economic development, increased product competitiveness, cost reduction, regional integration, and promotion of tourism and local development (Camilo-Pereira; Abrita; Fonseca, 2021). However, it is also important to consider

the challenges and issues that may arise along with this route, such as drug trafficking, arms smuggling, human trafficking, sanitation issues, and smuggling.

According to the National Logistics and Transportation Plan report of 2011, road freight transportation is predominant in Brazil, accounting for 58% of the country's cargo movement. Given Brazil's continental size, which transported approximately 645 billion ton-kilometers (TKUs) through road transportation in 2011, both for the domestic market and for exports, it is necessary to have an efficient road freight transportation infrastructure and seek to balance the country's transportation matrix (Brasil, 2012).

Possible impacts can be observed by considering what happened with the waterways in the Brazilian Midwest, such as the Mercosul Waterway (Paraná-Paraguay) and the Araguaia-Tocantins Waterway. These projects proposed by the Brazilian federal government in the 1990s had significant indirect effects, such as increased occupation of the region, increased deforestation of native vegetation areas, and pressure on indigenous lands, driven by the expansion of soybean monoculture facilitated by the existence of cheaper and more accessible transportation means. Dealing with these indirect impacts goes beyond the responsibilities and institutional competencies of the project proponent, requiring a strategic approach that identifies key issues and allows for discussion and development of solutions before the individual presentation of each project for evaluation and licensing. The environmental impact assessments of each project could then focus on identifying, predicting, and assessing specific impacts and defining management measures compatible with the proponent's institutional capacities (Sánchez, 2008).

Furthermore, increased competitiveness and improved logistics can lead to an increased demand for land, especially in the Pantanal region, peripheral Pantanal regions, and the Paraguayan Chaco, which may incentivize deforestation.

Among the possible negative environmental impacts of the Bioceanic Route, the increase in the number of vehicles, especially trucks, circulating in the state stands out, which will inevitably lead to increased emissions of polluting gases that contribute to pollution and climate change, as well as posing a risk to wildlife due to accidents and other impacts (Camilo-Pereira; Abrita; Fonseca, 2021).

Among the possible environmental impacts that may arise from the implementation of the bioceanic route or corridor, the following can be listed:

- 1) Deforestation and loss of natural habitats: The construction of infrastructure can result in the deforestation of large areas of native forests and other natural habitats, leading to biodiversity loss and alterations in the local ecosystem.
- 2) Soil erosion and river siltation: The construction of roads and railways can increase soil erosion and river siltation, negatively affecting nearby aquatic and terrestrial ecosystems.
- 3) Conflicts with traditional communities: The construction of the highway and railway can impact traditional communities, such as indigenous peoples and quilombolas, who rely on the region's natural resources and may be displaced or have their ways of life affected.
- 4) Air and noise pollution: Vehicle and train traffic can cause air and noise pollution, affecting the quality of life of nearby communities and the health of the animals inhabiting the region.
- 5) Increased risk of environmental accidents: The construction of infrastructure can increase the risk of environmental accidents, such as chemical or fuel spills, which can have negative impacts on local fauna and flora.

- 6) Population increase due to new opportunities and employment, with significant urban impacts such as lack of basic sanitation, precarious housing, occupation of environmentally sensitive areas (e.g., riverbanks in permanent preservation areas), among others.
- 7) Other significant social impacts, such as increased violence, housing demand, and many others that need to be inventoried.

Therefore, careful planning and appropriate mitigation strategies are necessary, such as the restoration of degraded areas, the construction of wildlife crossings, the adoption of clean transportation technologies, and minimizing ecosystem impact during construction. It is important that these measures be implemented from the beginning of the project and continue to be applied during the operation of the highway, as it is currently in the implementation phase.

## 5 CONCLUSION

With the implementation of the Bioceanic Route, positive impacts are expected for Mato Grosso do Sul, such as job creation, cost reduction, increased trade, and tourism incentives. However, it is also important to consider the negative impacts that may arise, both environmental and social.

One of the main negative environmental impacts of the Bioceanic Route is the increase in vehicle traffic, especially trucks, which can lead to an increase in emissions of polluting gases, contributing to air pollution and climate change. Additionally, the increase in road traffic can pose a risk to local fauna, with an increase in cases of roadkill.

Another point to be observed is the urban impacts resulting from the population growth due to the employment opportunities generated by the Bioceanic Route. This can lead to problems such as lack of basic infrastructure, poor housing, and occupation of environmentally sensitive areas, such as riverbanks and preservation areas.

Furthermore, the competitiveness and appreciation of areas along the route may stimulate an increase in land demand, which, in turn, can result in deforestation in the Pantanal region, areas near the Pantanal, and the Paraguayan Chaco. These impacts can have significant social consequences, such as increased violence and the need to provide adequate housing for the population.

Given that the Bioceanic Route is not just an isolated project but a national and international initiative, traditional environmental impact assessment instruments, such as environmental licensing and Environmental Impact Assessment (EIA), may be insufficient to address all the impacts arising from this undertaking. In this regard, Strategic Environmental Assessment (SEA) emerges as a more comprehensive and appropriate approach to identify, predict, avoid, mitigate, and compensate for the environmental impacts of the Bioceanic Route.

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