

INDUSTRY-DRIVEN AND CIVIL SOCIETY-DRIVEN STRATEGIC ENVIRONMENTAL ASSESSMENTS IN THE IRON MINING AND SMELTING COMPLEX OF CORUMBÁ, BRAZIL

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Historical records of socio-environmental impacts related to large-scale iron ore development in Brazil are driving different planning approaches in the burgeoning iron mining and smelting complex of Corumbá, located at the border of the Pantanal ecosystem in the Brazilian state of Mato Grosso do Sul. Among the most relevant efforts are two strategic environmental assessments (SEA): one was led by a mining company and the other by a civil society committee. This paper assesses to what extent these SEAs can contribute to the mitigation of negative socio-environmental impacts of the Corumbá Complex. It also evaluates if the SEA methodologies meet a number of SEA Performance Criteria. The analyses, which were based on literature reviews and content analysis of the SEA documents, reveal that the two SEAs represent an important effort to incorporate environmental variables into more strategic levels of the Pantanal region's planning. Nonetheless, both SEAs have serious limitations, given that they are not formally nested in governmental policies, plans and programmes.

Keywords: Strategic Environmental Assessment (SEA); SEA performance criteria; mining and smelting complex/cluster; Pantanal; Latin America; Brazil.

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Introduction

The pace of industrialisation and urbanisation of the past decades has resulted in severe damage to Brazilian ecosystems. This paper discusses one of the most recent responses of Brazilian society to this problem: the application of strategic environmental assessments (SEAs).

The term SEA is most commonly used to describe certain types of environmental impact assessments (EIAs) that focus on future implications for government and/or sectoral policies, plans and programmes (PPPs) (Therivel, 2004). Brazil has a mandatory EIA system underpinned by the National Environment Policy (Law No. 6.938/81) and numerous state and federal regulations. This system, which applies to project-level engineering projects, has been criticised because of their limitations. Brazilian EIAs do not fully account for political and land-use planning decisions that can have major social and environmental ramifications (ABEM, 2013; CNI, 2013; MPU, 2004). Hence, there are growing calls for carrying out SEAs. Nonetheless, the practice of SEA in Brazil has been voluntary, in the sense that these assessments have not been driven by regulations.

According to Teixeira (2008), the practice of SEA in Brazil has two milestones. The first refers to the 1994–1998 period, marked by the São Paulo State Environment Council efforts to expand the use of EIAs to sectoral policies and programmes. Also in 1994, an SEA was developed for the Brazil-Bolivia Pipeline construction project to meet the demands of financing agencies. The second period, from 1999 to 2002, was marked by capacity building efforts undertaken by the Ministry of the Environment. One could argue, however, that Brazil is now experiencing a third milestone, one of questioning the current diversity of SEA procedures, concepts, and formats.

Based on data gathered by Malvestio and Montaña (2013) and Teixeira (2008), Brazil has witnessed more than thirty (30) cases of SEAs proposed by the government and private sector organisations. In the case of government SEAs, attempts have been made to incorporate environmental issues into more strategic areas, such as in the planning of government PPPs. An example is the SEA for the Integrated Development Plan for Sustainable Tourism in the North Coast, commissioned in 2006 by the Ministry of Tourism, which was recently evaluated by Lemos *et al.* (2012). Private and state-owned companies, driven by pressures to optimize environmental licensing and by multilateral development agencies (Pellin *et al.*, 2011) have also conducted SEAs. Examples include the SEAs commissioned to assess the cumulative impacts of a group of projects for the Rio Madeira hydropower complex, in 2005, by FURNAS, and in 2007, for the Rio de Janeiro Petrochemical Complex (COMPERJ), by PETROBRAS.

Both government and private SEAs are being proposed on a predominantly unregulated and experimental basis. With the possible exception of some types of strategic assessments conceptualised as integrated impact assessments (IIA), the practice of SEA in Brazil lacks legal mechanisms conditioning the development of policies, plans and programmes to the findings of SEAs. Such an approach raises the question of whether the results of SEAs could be legitimately incorporated into planning decisions. It also seems to limit the role of State Attorneys in ensuring proper industrial development.

This phenomenon is driving the attention of Brazilian scholars, but is not yet a “trendy” research line of inquiry. There appears to exist three general avenues of research on SEAs in Brazil: (1) SEA methodological proposals to specific sectors and contexts (Cavalcanti and La Rovere, 2013; Gallardo and Bond, 2011; Garfi *et al.*, 2011; Oberling, 2008; Pellin *et al.*, 2011); (2) analysis of SEA drivers (Pellin *et al.*, 2011; Tachard *et al.*, 2007) and (3) description of case studies and perspectives for SEA implementation in Brazil (Agra Filho, 2002; Burian, 2006; Cavalcanti *et al.*, 2012; Eglar, 2001; MMA, 2002; Oliveira *et al.*, 2009; Sánchez and Silva-Sánchez, 2008). Several other issues (e.g. empirical, procedural) remain largely unexplored. One of these issues refers to the quality of the SEA processes and their respective reports. Malvestio and Montaña (2013) stress that the effectiveness of Brazilian SEAs has yet to be properly examined.

This paper seeks to contribute to reduce this knowledge gap by evaluating, in a critical and comparative manner, two SEAs applied to the proposed Corumbá Iron Mining and Smelting Complex. A private mining company, Rio Tinto, carried out one of the SEAs; the other SEA was commissioned by a civil society committee called Platform for Dialogue (Plataforma do Diálogo in Portuguese). The investigation was driven by the following question: To what extent can the Rio Tinto and the “Plataforma do Diálogo” assessments contribute to improving environmental management of the Complex and to the mitigation of social and environmental impacts? Answers to this question are expected to inform SEA policy-making in Brazil and in other contexts of unregulated SEAs.

This article is organized in six sections. The next section describes the methodology. The third section describes the context in which the SEAs were carried out. The fourth section undertakes a detailed analysis of the Corumbá SEAs. The fifth section discusses the results of the assessments, highlighting their limitations and potential contributions towards the management of the environmental impacts of the iron-steel complex. And, finally, the last section presents some final considerations regarding the implications of the analysis to policy-making and future research.

Methodology

The methodological approach adopted in this study is essentially qualitative. Data were collected through academic/grey literature reviews. Reviewed publications were drawn from multiple sources, including academic journals, government and corporate reports, and websites. To assess the potential effects of the Corumbá SEAs, a detailed content analysis was carried out of the SEA reports in order to understand the extent to which the assessments, as described in those documents, met nine (9) criteria deemed to be “good practice” by the literature. Most of these criteria refer to the SEA Performance Criteria of the International Association for Impact Assessment (IAIA, 2002), chosen in the course of several workshops of the Association from 1988 to 2000. The IAIA criteria, while widespread in SEA research, are neither valid for every type of assessment nor across every country (Fische, 2002). In order to identify policy-relevant aspects in the context of the two SEAs of Corumbá, this study considered additional good practice SEA criteria highlighted by authoritative sources in this area (e.g. Dalal-Clayton and Sadler, 2005; Fischer, 2007; Partidário, 2003; Partidário and Clark, 2000; Sadler, 1996; Therivel, 2004). The selected criteria that framed the analysis are:

- (1) integration of issues and planning levels;
- (2) public participation;
- (3) proactive and prior assessment of main cumulative impacts;
- (4) vision of sustainability;
- (5) diagnosis and baseline;
- (6) clear objectives and respective assessment indicators;
- (7) identification of alternatives;
- (8) implementation, mitigation and monitoring measures (indicators); and
- (9) responsibilities and clear roles of participating institutions.

The SEAs that took place in the proposed Iron Mining and Smelting Complex of Corumbá generated two key reports: Avaliação Ambiental Estratégica do complexo minero-siderúrgico de Corumbá (MCR, 2007), which presents the results of the Rio Tinto SEA; and Avaliação Ambiental Estratégica (AAE) do Pólo minero-industrial de Corumbá (LIMA, 2008), which presents the results of the Platform for Dialogue SEA. Each of the nine criteria set above were considered in the content analysis of those two reports. To lessen the subjectivity of the analysis, the findings were systematically discussed among the authors and contextualized in light of the professional literature. The results are presented in the fourth section according to each of the nine criteria.

The Iron Mining and Smelting Complex of Corumbá

Corumbá is a city located at the border of the Pantanal ecosystem in the Brazilian state of Mato Grosso do Sul (Fig. 1), an area that is ecologically rich and fragile. Part of the municipal territory extends over the Maciço do Urucum geological formation, which includes Brazil's third largest iron ore reserve. Currently there is no formally established iron mining and smelting complex in the region. At the time of the SEAs, there were five mining companies extracting iron ore in the area. The Mineração Corumbaense Reunida (MCR), owned by Rio Tinto Brazil, had the largest operation in the area (3,0M/year), followed by MMX (2,5Mt/year) and Vale (1,57Mt/year) (LIMA, 2008). There are companies in the region that mine iron ore and manganese, as well as an iron alloy plant, controlled by Vale and a steel mill run by MMX. The latter has been operating since 2007 in an area donated by the state government to encourage the creation of the aforementioned complex. In 2005, a thermal power plant — Termopantanal, owned by the MMX group — received prior environmental license to its project, but it was never built.



Fig. 1. Approximate locations of the proposed Iron Mining and Smelting Complex of Corumbá and of the existing Minas Gerais (MG) and Carajás complexes.

In addition to these ventures, other companies from the mining and steel industry, as well as from the gas sector, have shown signs of expanding and diversifying local production, particularly the MCR, which even announced their steel mill project. Other smaller steel mills were being licensed by the state environment agency. Altogether, these proposed developments have the potential to multiply the area's pressure on the environment, by turning a relatively stable setting into an industrial, commercial and demographic hub. Nonetheless, the local scenario changed significantly in 2009, when Vale acquired MCR, and all operations from Rio Tinto in the area. As a result, Rio Tinto's ambitious expansion plans, seen as the main driver of the mining and smelting complex, were suspended.

Brazil has two other regions (Fig. 1) where the historical confluence of iron mining and smelting industries resulted in severe socioecological problems: (1) Minas Gerais State and (2) Carajás Province, located in the eastern portions of Pará State. The demand for wood charcoal (used as a smelting fuel) and the rapid population growth, in both regions, were not appropriately planned. Minas Gerais and Carajás welcomed numerous mining and smelting industries, while overlooking the regions' capacity to produce wood charcoal in a sustainable manner. Moreover, those regions witnessed their population to multiply without due consideration to housing, institutional, and health constraints. The implications were catastrophic: hundreds of thousands of hectares of deforested areas and serious social problems, such as inequality, violence, and poverty. The problems in Carajás and Minas Gerais became historical lessons of poor socioenvironmental planning (Fearnside, 2000). There is an expectation in Brazilian society today that governments, when developing new iron mining and smelting clusters, such as Corumbá's, will not commit the same mistakes. However, the bureaucratic solutions to these industrial clusters are not easy. These areas usually include a mix of different companies located in public and private lands, which are subject to numerous permits/approvals from municipal, state and federal institutions. Solutions are not straightforward. However, SEAs have been increasingly seen as the "ideal" framework to coordinate and anticipate the necessary efforts.

The Corumbá SEAs

A foreseeable social and ecological disaster in the burgeoning iron mining and smelting complex of Corumbá led several non-governmental organisations active in the area, together with the State Attorney's Office, to closely follow the activities of the companies in the region. The State Attorney's Office proposed two main actions: the joint licensing of the steel mills that were interested in

establishing themselves in the region and the establishment of the so-called “Platform for Dialogue between the Second and Third Sector on the Corumbá Mining and Industrial Complex”, which came to be known just as “Plataforma”. One of the main objectives of the “Plataforma” was to seek solutions for reconciling the development needs of Corumbá with the conservation of the Pantanal (LIMA, 2008). The “Plataforma” consisted of four companies from the mining, steel, energy, oil and gas industries and ten non-governmental organisations, with the presence of the State Attorney’s Office, as observer. Among other actions, the “Plataforma” was responsible for enabling and following the development of an SEA for the complex, to be financed by the participating companies. Two “heavies” — Vale and Rio Tinto — , however, did not take part. The former because of a management decision, the latter initially seemed to support the initiative, but then backed out alleging delays in implementing the SEA. Rio Tinto then decided to commission its own SEA, concluded in mid-2007, when the surveys of the “Plataforma” SEA were just beginning. The first version of the executive report of the “Plataforma” SEA was delivered in December 2008. The two SEAs are analysed below according to the nine criteria listed in the second section.

Integration of issues and planning levels

Authors, such as Lee (2006), Fische (2006) and Partidário and Clark (2000), agree that there must be vertical integration among impact assessments carried out at different planning stages and horizontal integration with other PPPs, as well as integration among different types of impacts.

In the case of the Rio Tinto SEA, the assessment is in no way connected to public policies. Biophysical, economic and social factors were identified as constraints for the feasibility of the industrial projects. The impacts of the undertaking were analysed with respect to the carrying capacity of the environment, taking into account the cumulative nature of some of these. The integration of biophysical and social impacts was not addressed.

In the “Plataforma” SEA, the various biophysical and socioeconomic components are described in the baseline chapter, but, initially, in an independent manner. Horizontal integration can be seen in the diagnosis, with a matrix showing integration among the “development generating processes” and the “constraining environmental aspects”. Vertical integration is sought by grouping information from separate environmental impact studies carried out individually for some of the planned undertakings and by identifying the main plans, programmes and projects that affect the mining and industrial projects.

Public participation

Fischer (2003) stresses that public participation in the SEA provides a crucial opportunity for society to understand the problems related to the PPPs, allowing for more streamlined decision making. Nevertheless, according to Gibson *et al.* (2005), public participation has been limited in environmental assessments and restricted to the last stage of project approval. This would be one of the reasons for the problems faced in project approval, shown by Partidário (2007) and Noble (2009b).

During the assessment period the Rio Tinto website stated that the study was open to contributions, saying that the company was holding meetings with the community in order to carry out a democratic assessment. However, no formal public consultations were held. Nor was there independent validation. The final document was given to government agencies but was not made available on the Internet.

The “Plataforma” SEA had a validation process at each step carried out by the “Plataforma”. Government institutions, universities and society were asked, prior to the assessment, which priority issues they would like to see being addressed. In the initial stage of the work, an inaugural public meeting was held in Corumbá to announce the SEA work plan, introduce the technical staff and provide general explanations. Almost a year later, public consultations were held to present the proposed guidelines and recommendations and to collect further contributions to be incorporated in the study. Public participation was small and the results of this consultation were not described in the document, although the study states that the contributions were implicitly incorporated. The entire study was made available on the Internet.

Proactive and prior assessment of the main cumulative impacts

Assessments were carried out at the same time as environmental licensing and not during the prior planning stages. One of the main factors that encouraged the development of strategic studies was the need for a joint assessment of the projects that make up the potential complex.

The discussion on the consideration of cumulative and indirect impacts in environmental assessments has been included in several specific guidelines (Canter and Ross, 2010; Hegmann *et al.*, 1999; Walker *et al.*, 1999). The potential of SEAs for addressing these impacts has been one of their major benefits (Annandale *et al.*, 2001; Bragagnolo *et al.*, 2012).

The Rio Tinto study states that its main objective is to assess the cumulative effects arising from the establishment of the complex. The total cumulative

impacts were identified and compared to the carrying capacity, with regard to water use, atmospheric emissions, biodiversity, transport systems and the impacts on social and urban environments. The “Plataforma” SEA analysed the cumulative impacts, in the assessment of scenarios, when studying the effects of establishing the group of projects, on the demand for water resources, charcoal, electricity, land use change, biodiversity loss, ecosystem dynamics, transport systems, atmospheric emissions and socioeconomic conditions. Each SEA adopted specific methodological approaches to their cumulative effects assessments.

Vision of sustainability

Over the past fifteen years, several authors (e.g. [George, 1999](#); [Gibson, 2006](#)) emphasised the need to view environmental assessments as instruments for promoting sustainability. They argue that visions of sustainability can promote the integration of social and environmental aspects, highlighting possible conflicts among these dimensions and their potential solutions. While there has been some controversy surrounding the challenges of integration in sustainability assessments ([Morrison-Sauders and Fischer, 2006](#)), sustainability-driven assessments are seen as one of the most promising trends in the fields. As [Pope et al. \(2005\)](#) put it: “Assessment for sustainability represents a fundamentally new way of thinking about impact assessment and has the most potential to make significant shifts towards sustainability” (p. 299).

The Rio Tinto SEA, in its final considerations, only addresses the pressures that projects can exert on the local sustainability of Corumbá and its surroundings, but does not discuss a vision for the future of sustainable development under the watchful eye of society. In addition to not identifying a vision for the future, no goals for sustainability were proposed.

The “Plataforma” SEA includes a vision for the future developed by the technical staff responsible for the SEA, based on the vision stated in a state government document that discusses scenarios for 2020 and after “Plataforma” members were heard, who also validated the final text with the participants of the public consultation. Sustainability objectives and their respective indicators were developed based on the vision for the future.

Baseline and diagnosis

In an SEA, the baseline is set by depicting the current state of the environment and social aspects to enable comparison with a future state, after strategic actions have been implemented ([Therivel, 2004](#)). SEAs should provide an adequate description of the current condition of the environment and its possible evolution in the future and

use this information as the basis for the environmental impact assessment and for comparing alternatives. The baseline description should also take the environmental sensitivity factors and/or problems (Wright, 2007) into account, that is, carrying out a diagnosis of the current situation, pointing out existing or potential conflicts.

The Rio Tinto SEA makes no explicit reference to the baseline, although its third chapter, entitled “Regional Characteristics Relevant to the Strategic Environmental Assessment”, attempts a description of the study area. Chapter 4, even though named “Regional Socio-environmental Constraints and Assessment of the Carrying Capacity”, is concerned with the bottlenecks encountered for project implementation and not with the constraints to regional sustainability.

In the “Plataforma” SEA, the baseline is divided into two parts: in the first, the biophysical and socioeconomic components are identified as “environmental constraints to development”. In the second part, activities that have an important role in the area are identified, regardless of whether they are connected to mining and steel and to sectors that are strategic for developing the planned projects. The following issues are examined: land use and occupation, agriculture, development of mining and industrialisation, charcoal chain used in the steel industry, tourism, transport logistics and energy infrastructure. An extensive baseline was justified as a requirement of the NGOs operating in the area, who expected a thorough treatment of the aspects related to biodiversity and the ecological processes in the area of influence of the projects, given the sensitivity of the biome. Nevertheless, authors such as Partidário (2007), emphasise that strategic environmental assessment studies should make use of a succinct baseline. The diagnosis identified points of tensions and conflicts between industrial activities and environmental preservation.

Clear objectives and respective assessment indicators

This criterion is associated to SEAs used in evaluating PPPs. Therefore, as proposed by Partidário (2007), “analysis is centered on the development goals or on the problems that the plan or programme aims to solve and not on the actions proposed in the plan or programme as solutions or results” (p. 13). In this case, indicators are meant to “test” whether the goals set out in the SEA, based on the objectives established by a PPP, can be attained given the possibilities and alternatives discussed in the SEA. Since the SEAs under study did not aim to analyse PPPs, a different approach to the objectives was used. Both SEAs define objectives to evaluate the environmental consequences of establishing the complex. The “Plataforma” SEA also affirmed the intention of providing guidance for decisions on project implementation strategies.

The Rio Tinto SEA makes it very clear that its objective is to “analyse the possible cumulative impacts arising from the expansion of iron ore production and from the implementation and operation of a steel mill complex in the municipality of Corumbá-MS” (MCR, 2007, 1). It also states that evaluating public policies and programmes or putting forward proposals and guidelines for public sector regional planning is not among its objectives.

The “Plataforma” SEA stated that it had two main objectives (LIMA, 2008, 152): assess the environmental, social and economic implications of the industrial activities to be fostered in the region and their ramifications for the sustainability of the Pantanal plains; and to assist the processes for development and decision making with regards to the strategy for establishing an integrated development programme for the mining and industrial complex in an ecologically, socially and economically sustainable manner for the region.

Identifying alternatives

Previous research has repeatedly recommended the identification and discussion of more sustainable alternatives. Alternatives can relate to the project, plan or programme itself, or to technological, locational and temporal options (when and in what sequence should actions be carried out?). With respect to policies, plans and programmes, the question is “why do it” and “if carried out, what are the consequences?”. And with regard to projects, the questions are “where” and “how” (Therivel, 2004).

In the Rio Tinto SEA, the logistic and locational alternatives are put forward and discussed in order to justify previously made decisions. Scenarios are considered only for the levels of production and industrialisation.

The “Plataforma” SEA discusses alternatives in the development of scenarios. The exercise of developing scenarios is an attempt to show how “certain alternatives can influence future conditions in a given system” (LIMA, 2008, 318). Three scenarios were developed: baseline, and development scenarios 1 and 2. The first deals with the tendency of project implementation, considering those that have already been licensed; the second encompasses planned mining and steel projects, whose uncertainties regarding their implementation are greater and the third includes the gas-chemicals complex. In the three scenarios, alternatives for establishing the complex itself are discussed, including energy, logistic, technological and location alternatives. However, since some of the undertakings are already operational and others are undergoing licensing, this discussion is limited because decisions have already been taken by the companies on their production paths.

From a transport logistics perspective, the study showed that the best option was a route not previously considered, rail and port. In indicating a new option, the SEA points decision makers to other possibilities for consideration. However, this decision is beyond the project level, beyond the companies, since it depends on an inter-sectoral policy to be coordinated at the federal level. The reason for this is that the decision to enable railways is contingent on extra-regional factors and involves the discussion of enabling a new development direction.

Implementation, mitigation and monitoring measures

A proposal for implementation and mitigation measures should be included in the final stages of the SEA report (Therivel, 2004). However, monitoring the implementation of these actions is more important, as several authors have stressed (Noble, 2003; Partidário and Clark, 2000).

In the Rio Tinto SEA, implementation measures are described in the discussion of each scenario. Nevertheless, these measures are similar to those put forward in an EIA and, in fact, most data were obtained from the EIAs of the expansion of the MCR mine and steel mill complex. Mitigation and monitoring measures are discussed in passing and do not inform a post-implementation follow-up.

Chapter 12 of the “Plataforma” SEA is dedicated to the proposal of control and follow-up guidelines for the strategic impacts, taking into account environment friendlier technological paths. It also proposes a set of indicators, based on sustainability goals and on the results of the diagnosis of environmental issues and crucial factors. The idea is that these indicators, which are used to evaluate scenarios, can provide information for verifying the behavior of environmental, social and economic conditions on project implementation.

Responsibilities and clear roles

Neither of the analysed studies included government participation in the discussion on the scope of the work. This, however, does not mean that responsibilities should not be assigned to the various levels of government with respect to the execution and management of the undertakings.

The Rio Tinto SEA did not include the institutional issue nor did it identify the main stakeholders, such as private institutions, public agencies, civil society or the third sector. While it puts forward recommendations, it does not assign responsibilities for carrying out and managing these actions.

The “Plataforma” study identifies the main stakeholders and their respective activities in the area of study. Chapter 9 attributes the institutional responsibilities and presents the current local, state and federal governance frameworks, in

addition to the role of the State Attorney's Office. This chapter was not included in the first stages of reporting and was demanded by "Plataforma" members. Lastly, in proposing control and follow-up guidelines for the strategic impacts (Chapter 12), the institutions responsible for carrying out or requiring implementation of the action for each proposal were identified. At the end of the guidelines, a new governance framework was proposed.

Putting the SEAs into Perspective

The analyses showed that the SEAs have significant differences in terms of methodology and content. They also show that, as a rule, the SEAs meet the nine good practices criteria with limitations. Table 1 below outlines the main findings discussed in the fourth section.

Among the limitations of the Rio Tinto assessment are: limited public participation, inadequate baseline, lack of discussion of alternatives, focus on justifying pre-made choices, lack of a vision for the future and of sustainability goals. The assessment is a technical study carried out without input from government and civil society. One could argue that the study should be better conceptualised as an Environmental Cumulative Effects Assessment, rather than a strategic assessment. It was carried out, however, with a high degree of professionalism. The study was consistent with the proposed objective, that is, to evaluate the cumulative impacts of the group of undertakings (MCR, 2007). The assessment concentrated on identifying barriers that could hinder the establishment of the Complex, the so-called environmental, logistic, social and economic constraints. Other previously made decisions related to the projects were only justified, such as the choice of location and distribution of logistics. The focus was on the MCR/Rio Tinto ventures. Even though the issue of charcoal is one of concern for the community, for example, the different options for its acquisition were not discussed because the company stated that it would use coal.

The "Plataforma" SEA proved to be more consistent with good practices recommendations, notably in terms of: participation; integration of biophysical, social and economic components established in the diagnosis; identification of a vision for the future and sustainability goals; discussion of alternatives; more comprehensive implementation and mitigation measures; proposals for follow-up indicators associated with sustainability goals; and identification of stakeholders and the institutional framework, with proper allocation of responsibilities. The main points of criticism refer to the baseline that goes beyond strategic issues, vision for the future and sustainability goals focusing on just a few dimensions of

Table 1. Comparative table of the SEAs with respect to good practices.

Good practice criteria	Rio tinto SEA	Plataforma SEA
Integration of issues and planning levels	Not integrated into PPPs. Describes biophysical and socioeconomic elements, shortcomings in addressing the interactions in the diagnosis. Integrates data from EIAs of individual projects. Considers cumulative impacts.	Does not evaluate PPPs, but identifies the main planning actions of interest. Addresses the biophysical, social and economic components and presents a matrix of their interaction with industrial activities. Considers cumulative impacts.
Public participation	No formal public consultations. No independent validation. Final document was handed to state and municipal government officials.	Study validated by a representative group of the second and third sectors. Public consultation to incorporate contributions, with limited participation. Results were considered implicitly in the document.
Proactive and prior assessment of main cumulative impacts	Occurs at the same time as project licensing. Evaluated the total cumulative impacts. No evaluation of second order, synergistic, impacts.	Occurs at the same time as project licensing. Evaluated the cumulative effects on the main components, with emphasis on a new calculation for charcoal demand, which would have been underestimated in a previous study presented by the MMX company. Does not elaborate on the synergistic effects.
Vision of sustainability	Does not identify a vision for the future nor does it establish sustainability goals.	Defines a vision for the future and outlined sustainability goals, albeit questionable ones.
Diagnosis and baseline	Baseline is not explicit. Described in two different chapters, blending in with the diagnosis.	Divides the baseline in two: description of components (biophysical, social and economic) and identification of local economic and industrial activities. Diagnosis highlights and discusses crucial issues and conflicts.

Table 1. (Continued)

Good practice criteria	Rio tinto SEA	Plataforma SEA
Clear objectives and respective assessment indicators	Defines the assessment of cumulative impacts of the undertakings that make up the Complex as the main objective, but does not propose indicators to test implementation of the objective.	Goals are related to the assessment of environmental, social and economic implications of industrial activities for the region and to aid in decision making. Does not list indicators to verify goals.
Identification of alternatives	Alternatives are only presented to justify previously made decisions on location and technological and transport options, among others.	Technological, location, logistic and energy options are included in the discussion on scenarios, stressing those that are more environmentally friendly. The alternatives are limited because some undertakings are already projected. Indicates an important alternative for transport logistics.
Implementation, mitigation and monitoring measures (indicators)	Implementation and mitigation measures are described in the form of an EIA. Does not propose a system of indicators for following up current and future environmental conditions.	Implementation, mitigation and monitoring measures are recommended in the final guidelines. Indicators are proposed based on the sustainability goals and on the critical factors. They are used to evaluate scenarios and for monitoring the consequences of establishing the ventures.
Responsibilities and clear roles	Does not address the institutional issue, nor does it identify the stakeholders. Does not discuss the governance framework nor are responsibilities assigned for accountability and following up on recommendations.	Identifies stakeholders, describes institutional framework and assigns responsibilities for overseeing/executing the proposed final guidelines.

sustainability; the methodology for assessing cumulative impacts does not include synergistic effects; and limited society (public) participation. From the beginning, external participation was concentrated in non-governmental organisations, a group that has proven to be the most interested party in the discussions on the

industrialisation projects, with the support of the State Attorney's Office. NGOs intend to be guided by the recommendations put forward in the final report for future demands, using this reference document to guide planning and management actions in the Complex.

An important aspect for discussion was the concept of SEA used in these studies, bearing in mind that neither of them evaluated the implementation of a government policy, plan or programme. In spite of the apparent inappropriate use of the term SEA to describe these assessments, they went beyond typical project EIAs as they considered aspects that historically have been ignored in decision making on the development of mining and smelting regions, such as Minas Gerais and Carajás. The Rio Tinto SEA, for example, explains that the company will use a different kind of technology in the steel process, based on the use of sinter feed, in addition to imported coal, to avoid dependence on regional biomass. The "Plataforma" SEA, in turn, raises an important question with respect to the Forestry Plan submitted by a mining company. It says that the company will have to invest more in reforestation areas or will have to make use of the market to ensure supply, raising concerns about the pressure on native forests and a possible stimulus for coal smuggling from neighboring countries. This sends an important signal to decision makers and society about the need for extra care when dealing with the issue of coal. With respect to the potential for attracting people to the Corumbá Complex, both studies showed the lack of available land in the municipality for urban growth. Studies project the expansion to be directed towards the neighbouring municipality, Ladário, while stressing its limited capacity to do so.

In order to facilitate the conceptual understanding of various types of environmental impact assessments, [Hacking and Guthrie \(2008\)](#) developed a graphical framework that places assessments based on their characteristics. This framework has three dimensions dealing with strategic focus, integration and scope of examined issues. Based on this framework, the two SEAs analysed in this paper were plotted ([Fig. 2](#)) to highlight their main differences.

The location of the SEAs in [Fig. 2](#) does not claim to be accurate, but only to assist in understanding how much further SEAs can go beyond project assessments and how far they are from more integrated and strategic assessments, such as the sustainability assessments carried out in Canada and Australia ([Gibson et al., 2005](#); [Pope et al., 2005](#)). Notwithstanding the suitability of the term SEA to describe the Pantanal assessments, it is true that these went beyond the traditional project EIAs and, thus, have the potential to better direct the planning of the activities projected for the region.

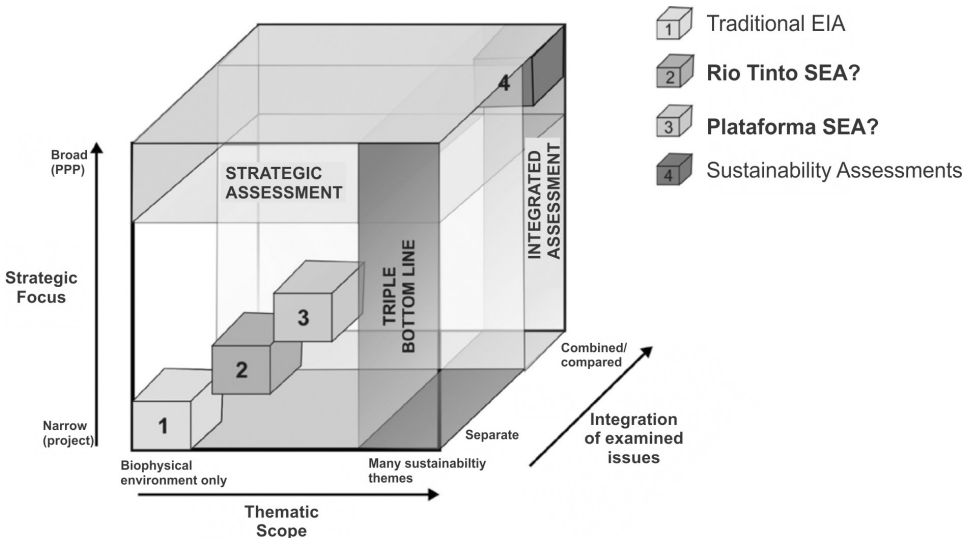


Fig. 2. Degree of thematic scope, strategic focus and integration of the examined SEAs.

Source: Adapted from the [Hacking and Guthrie \(2008\)](#) framework.

The two SEAs reviewed here reflect the plurality of SEA concepts and methodologies adopted in Brazil and elsewhere. [Malvestio and Montano \(2013\)](#), after analysing almost a third of the more than 30 SEAs recorded in Brazilian history, stated that “(...) different types of assessment with different objectives and methodological approaches are presented in Brazil under the label of Strategic Environmental Assessment”. According to the authors, “the variability in the performance to each effectiveness criterion [adopted by the authors in their study] is taken as evidence that Brazil has not achieved consistency in SEA procedures, reinforcing the need for improvements in the current system.” Such plurality, however, is not a Brazilian phenomenon. [Chaker et al. \(2006\)](#), in their analysis of 12 countries with both mandatory and voluntary SEAs, found variability in connection with several aspects of the SEA systems, such as screening, scoping, reporting, and public participation. Similar findings were found by [Tetlow and Hanusch \(2013\)](#) and [White and Noble \(2013\)](#) in their reviews of the state of the art of both SEA practice and research globally, as well as by [Noble \(2009a\)](#) in his review of SEA experiences in Canada.

Yet some authors are not too worried about the lack of consistent SEA procedures. As [Tetlow and Hanusch \(2013\)](#) put it: “(...) it is time to stop trying to formulate a common standardised understanding of SEA, and to rather give due recognition to the richness of different approaches and the value they add to different contexts.” Perhaps more important than an agreement over the ideal SEA

system is the identification of appropriate leverage points to effectively integrate the various forms of SEAs into strategic decision-making processes, so that SEAs become key drivers of meaningful social and environmental improvements on the ground.

One of the most crucial aspects observed in the analysis was that both the Rio Tinto and the “Plataforma” SEAs had limited government participation. This raises many concerns with respect to the legitimacy of the studies and the required motivation to implement their recommendations. The Plataforma de Diálogo, for example, is restricted to the second and third sectors, although government representatives were informed of the objectives of the study. This voluntary nature of the studies carried out in Brazil gives rise to discussions about the integration of the instrument to government planning levels.

Final Considerations and Future Developments: What Next?

This paper reflected on two SEA experiences in the proposed Corumbá Iron Mining and Smelting Complex. The main objective was to understand the extent to which the SEAs can contribute to improving environmental management of the Complex and to mitigating social and environmental impacts. The analyses showed that SEAs have significant differences in terms of methodology and content. While both SEAs met the nine good practices criteria with limitations, the “Plataforma” SEA proved to be more consistent with good practices.

Given the voluntary nature of the Corumbá SEAs, one cannot expect an immediate commitment by government officials and other private stakeholders to any of the proposed actions. The voluntary nature of Brazilian SEAs has given rise to discussions about the lack of an institutional and legal framework for that instrument. However, the means for providing this framework still arouses considerable controversy. [Teixeira \(2008, 105\)](#), for example, agrees with the creation of legislation to provide support, but as long as it “does not paralyze the SEA adoption process in Brazil”. The author further says that one of the main challenges to the evolution of SEAs in Brazil is to break away from the environmental impact perspective and begin to use a genuinely strategic approach to the environmental variable.

A study carried out by the Brazilian Ministry of the Environment ([MMA, 2002](#)), recommended the implementation of SEAs through legislation, but stressed that the instrument should not be linked to licensing and suggested that the Multi-Year Plans should make use of SEAs. In 2004, the Federal Audit Court published Decision No. 464, verifying the applicability of SEAs at the federal level of government and recommending that SEAs should be carried out for sectoral PPPs

and Multi-Year Plans. These government initiatives characterised the top-down model of planning, where vertical integration is sought from policy to plan to programme and from these to projects. In this regard, Sánchez makes an important statement: “(...) SEA can and should be used in the context of decisions that don't always lead to the design of projects later to be assessed in EIAs and subject to environmental licensing (Sánchez, 2008, 11).

In the cases of the Rio Tinto and Corumbá SEAs, there was a certain inversion of the process, meaning that the SEAs were formulated at the project level, irrespective of public policies, to influence higher planning tiers, following a bottom-up model. The two SEAs emerged as a reaction to public concern. Companies, non-governmental organisations, and the State Attorney's office tried to fill a void in statutory regulation, while conducting two assessments that were expected to question or reassure government decisions regarding the development of an industrial cluster. Such an approach is intriguingly different from the voluntary government-driven SEAs that have been conducted, for example, in Brazil's energy and tourism sectors and thus needs further research. These bottom-up, unregulated, civil-society-driven assessments risk not being able to influence government decision making, or just barely. Sánchez and Silva-Sánchez (2008) when analyzing the environmental agency-driven SEA of the São Paulo Ring Road concluded that it could not satisfactorily influence government decisions. The same was witnessed by the Ministry of the Environment in the case of the SEA for the Rio Madeira Hydropower Complex, commissioned by a state-owned company. If state/government-driven SEAs have not been able to effectively influence government decisions, one could not expect much from corporate-driven and civil society-driven assessments. This, however, is a speculation that needs investigation.

The new and growing SEA experiences in Brazil demonstrate the importance of debating the nesting into government policies, plans and programmes. The greatest problem does not lie in whether SEAs should be embedded into laws and regulations, but in how to achieve this. It is pointless to enact legislation that makes SEAs mandatory if society and key institutions are neither mature enough nor have the capacity to use the instrument. Specific actions should be sought in order to correct the problems with licensing and to establish a basis for adopting SEAs governed by solid regulatory and conceptual frameworks. It may well be the case that practice will show the way to these frameworks and not vice versa, avoiding not very effective bureaucratic processes.

This study also demonstrates the importance of discussing the use of SEA as a corporate planning tool. As noted above, Rio Tinto made an attempt to better evaluate its proposed actions considering broader temporal and spatial scales. But

to what extent would the company question its own choices? How unbiased could such an assessment be? Should it be unbiased? The avenues of research about corporate SEAs are wide open to debate.

One of the limitations of the present study is that only the SEA reports were analysed and not their real effectiveness in implementing the undertakings. It is suggested that future studies are necessary to address this stage. A question that merits further study is the implementation of the guidelines proposed in the studies. After all, to what extent will the government and other actors implement the recommendations of the SEAs?

Since this paper was concerned with the analysis of the various performance criteria for SEAs, it was not possible to explore each subject in depth. Thus, future studies could address specific items of these assessments such as cumulative impacts, public participation and others. Despite its limitations, this work was carried out during an important stage of the discussions on the SEA instrument in Brazil. The cases of Corumbá, together with other emerging examples of voluntary actions, are providing fertile material for analysis in order to understand how to move SEAs forward in Brazil.

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