



DESENVOLVIMENTO
E MEIO AMBIENTE

BIBLIOTECA
DIGITAL
DE PERIÓDICOS
BDP | UFPR

revistas.ufpr.br

Protected Areas approach in the Brazilian EIA system: quality of Terms of Reference and Environmental Impact Statements of major projects in a remnant of the Atlantic Forest

Abordagem das Unidades de Conservação no licenciamento ambiental brasileiro: qualidade dos Termos de Referência e Estudos de Impacto Ambiental de grandes projetos em um remanescente de Mata Atlântica

Ariane Maria Basilio PIGOSSO^{1*}, Eduardo Vedor de PAULA¹

¹ Universidade Federal do Paraná (UFPR), Curitiba, PR, Brasil.

* E-mail de contato: ariane.pigosso@gmail.com

Article received on June 27, 2020, final version accepted on May 18, 2021, published on December 23, 2021.

ABSTRACT: Several initiatives emerged to deal with environmental problems, such as Protected Areas and Environmental Impact Assessment, spread worldwide. The coast of Paraná State, southern Brazil, is 82.6% covered by protected areas to conserve the remnants of the Atlantic Forest and its associated ecosystems, whereas port activities date back to the colonial period and remain important, demanding expansions. The present study evaluated the Protected Areas' approach given by environmental licensing processes of port and industrial projects surrounding the Paranaguá Estuarine Complex. To this end, two checklists assessed the Terms of Reference (TR) and the Environmental Impact Statements (EIS) to classify them. EIS turned out to be of average quality, although they fulfilled about 70% of the Terms of Reference requirements. The point is that the TR are indeed poor.

Keywords: environmental licensing; Paraná coast; checklist.

RESUMO: Diversas iniciativas têm sido tomadas para lidar com problemas ambientais globais, como Áreas Protegidas e Avaliação de Impacto Ambiental, presentes em todo o mundo. O litoral do Estado do Paraná, sul do Brasil, é 82,6% coberto por áreas protegidas para conservar os remanescentes de Mata Atlântica e seus ecossistemas associados, enquanto as atividades portuárias datam do período colonial e continuam importantes, demandando expansões. O presente estudo avaliou a abordagem das Unidades de Conservação nos processos de licenciamento ambiental de empreendimentos portuários e industriais no entorno do Complexo Estuarino de Paranaguá. Para tanto, dois checklists avaliaram os Termos de Referência e os Estudos de Impacto

Ambiental para classificá-los. Os resultados mostram que os Estudos se revelam de qualidade mediana, embora cumpram cerca de 70% dos requisitos do Termo de Referência. A questão é que os Termos de Referência são efetivamente ruins.

Palavras-chave: licenciamento ambiental; litoral do Paraná; lista de verificação.

1. Environmental Impact Assessment and Protected Areas

Environmental Impact Assessment (EIA) and Protected Areas (PAs) date back to the mid-twentieth when environmental questions began raising and demand solutions. Petts (1999) and Wood (2003) counted more than 100 and Sánchez (2013) around 200 countries that have EIA practices, while there are Protected Areas in 248 countries, according to the World Database on Protected Areas (UNEP, 2020), both key components of Environmental Management.

Clark (1983, p. 4) conceptualized that ‘the purpose of an EIA is to determine the potential environmental, social, and health effects of a proposed development.’ His understanding comprises assessing the physical, biological, and socio-economic effects for a logical and rational decision. Simultaneously, it is necessary to reduce potential adverse impacts by identifying possible alternative sites and procedures. It is essential to highlight the ‘decision-making aspect’ as emphasized by Jay *et al.* (2007) and the perspective that the most steps of the process should be to support it.

According to the IUCN (2020), “protected and conserved areas are the foundation of biodiversity conservation. They safeguard nature and cultural resources, improve livelihoods, and drive sustainable development”. Even though the origins

and motivations for protected areas and EIA were quite different, they have objectives in common, and the pursuit of sustainable development is one of the main.

Brazil has incorporated both into its policies, the first EIA was in 1972, and in 1981, it became a tool of the National Environmental Policy by Law 6 938 (Brasil, 1981¹; Sánchez, 2013). Several other laws and resolutions have emerged, as well as many initiatives discuss different conceptions of EIA effectiveness.

Together with several other treaties, EIA features in the Convention of Biological Diversity (Sánchez & Croal, 2012) which means it provides procedures and tools for ensuring that biodiversity considerations are included in the decision-making process, whether this is taking place inside or outside protected areas. If used effectively, it can result in development that is more sensitively planned and designed concerning biodiversity. Likewise, decision-making is a leading concern among the definitions of Environmental Impact Assessment, such as the ones provided by Wandesforde-Smith *et al.* (1985) and Morgan (2012).

Itatiaia National Park is considered the first park, from 1937 (Ferreira, 2004), while *Sistema Nacional de Unidades de Conservação* (SNUC), the Brazilian Protected Areas National System (Brasil, 2000) just arose in 2000, after a long pathway of different laws from different government depart-

¹ EIA culture only began after 1986 when the first resolution (about it) was enacted.

ments. Despite their management and effectiveness problems, Protected Areas² are strongly present in Brazil, 2100 of them cover 1.590.327 km² (CNUC/MMA, 2017) and all IUCN categories have their correspondence in SNUC (Rylands & Brandon, 2005; UNEP, 2020).

Nonetheless, both *SNUC* Law and *Conselho Nacional de Meio Ambiente* (CONAMA)³ determine that agencies responsible for protected areas surrounding the projects' areas must be consulted about the processes' continuity⁴. The Environmental Impact Statement (EIS)⁵ must provide the agency with information to support its decision. Resolutions 428 (CONAMA, 2010) and 473 (CONAMA, 2015) also seek to ensure that the agencies responsible for protected areas are consulted during the term of reference elaboration to demand the necessary information for their subsequent decision.

On the other hand, 'scoping is of fundamental importance to the effectiveness of the rest of the EIA study' (Morgan, 1998, p. 103 *apud* Snell & Cowell, 2006), the quality of decision-making (Harding, 1998; Singleton *et al.*, 1999; IEMA, 2004; Stookes, 2003 *apud* Snell & Cowell, 2006), and

it is yet 'poorly understood and under-researched aspect' of the EIA process (Mulvihill, 2003, p. 40 *apud* Snell & Cowell, 2006). In 2017, Borioni *et al.* (2017) highlighted its importance, and that scoping is not a 'popular' research topic in project EIA. There is little about scoping quality to the best of our knowledge, far less about scoping on specific fields of environmental assessment.

According to Duarte *et al.* (2017), just 8% of environmental impact research regards EIS quality. Lee's and Colley's methods and findings have been the primary foundation for such appraisals, basing several other studies (Sánchez, 2013). Literature review showed that studies regard topics such as place, the subfield of environmental analysis, and in most cases, the kind of activity. Canelas *et al.* (2005), for instance, show some tendency for the analysis of projects related to roads, infrastructure, energy industry, while Veronez & Montaña (2017) check the Brazilian reality of ports and energy projects. When searching for EIS appraisals from a specific subfield perspective⁶, public participation and social topics seem to be the most common, some concern biodiversity, but not many studies involve

² For the purposes of this study, Protected areas correspond to the IUCN's definition and to the Brazilian Portuguese expression *Unidades de Conservação*.

³ National Council on Environment (CONAMA) is the consultative and deliberative body of the National Environment System - SISNAMA, established by Law 6.938 / 81, which provides for the National Environment Policy, regulated by Decree 99.274 / 90.

⁴ SNUC (Law 9985/2000) says that environmental agencies responsible for protected areas have to authorize in the case of projects with significant environmental impact that affect the protected area or its buffer zone.

CONAMA Resolutions 428/2011 and 473/2015 determine the permit of a project with a significant environmental impact, located in a 3 thousand meter strip from the UC boundary, whose ZA is not established, is subjected to the authorization procedure, with the exception of: RPPNs, APAs and consolidated urban areas.

⁵ The environmental impact statement (EIS), also known as environmental impact study, is a document that outlines the impact of a proposed project on its surrounding environment.

⁶ According to IAIA website, some subfields are: biodiversity corporate social responsibility, cultural heritage, cumulative effects, displacement and resettlement, environmental management systems, gender and gender impact assessment, health, human rights impact assessment, impacts of tourism, incorporating climate change considerations in impact assessments, indigenous peoples, public participation, social impact assessment, strategic environmental assessment, sustainability assessment, technology assessment.

Protected Areas. Seeing the study area, its protected areas, and the projects, how are the protected areas considered in the licensing processes? EIS bad quality is a hypothesis since it is a common EIA problem and a subfield of EIA research.

2. Coast of Parana State under licensing process

Atlantic Forest, whose original extension covered 1,350,000 km² of Brazilian territory, was reduced to less than 12% (Fundação SOS Mata Atlântica, 2020) and it is considered a biodiversity hotspot. It has extreme biological importance as stated by Ordinance No. 009 of 2007 of the Ministry of the Environment (MMA, 2007) and has its vegetation protected by Law No. 11,428 (Brasil, 2006). The Coast of Paraná State and São Paulo State's southern coast comprise the largest continuous remnant of the forest, a Biosphere Reserve since 1993, and a UNESCO World Heritage since 1999.

There is 45⁷ Protected areas from different categories that cover 82,6% of the territory of Paraná Coast (Paula *et al.*, 2018). *Estação Ecológica de Guaraqueçaba*⁸ and about 40 thousand hectares of the *Área de Proteção Ambiental de Guaratuba*⁹ have been designated Ramsar Sites (ICMBio, 2015).

Conversely, other uses are related to port activities, agriculture, tourism, and fishery (Pierri *et al.*, 2006). Ports and their related industries are, among the previous activities, the most potentially polluting and degrading ones. Further, they go back to the colonial period (Caneparo, 1999) and have paramount importance for the State economy. Despite the presence of ports in Antonina and Paranaguá, Pontal do Paraná, a sun-and-beach municipality, has also become a focus for ports and industries in the past years.

Paraná Coast is undoubtedly a region in which biodiversity and conservation are major concerns, where there are many requisitions to develop potential polluter and degrader activities, so it is axiomatic to understand how they overlap to make good decisions.

3. Method

Paranaguá Estuarine Complex is the study area of this paper, along with ten licensing projects related to port activities and infrastructure, which had passed through the first step of the process, the 'previous license' (Figure 1)¹⁰. This way, they would already have a Term of Reference and an Environmental Impact Statement. The projects¹¹. have been labeled A to J as follows in Table 1.

⁷ *Parque Estadual Ilha das Cobras* was created after Paula *et al* presented the 44 protected areas.

⁸ Equivalent to the category 'Ia - Strict Nature Reserve' from IUCN.

⁹ Equivalent to the category 'V - Protected Landscape/ Seascape' from IUCN.

¹⁰ According to Fonseca *et al.* (2017, p. 91) "the generic EIA process in Brazil comprises three stages, in which proponents are required, first, to obtain a viability license, known as Previous License, then, a construction or Installation License, and, finally, an Operation License which needs to be periodically renewed".

¹¹ In most of the cases, agencies required the complete version, except by projects "B" and "E", cases of activity expansion.

TABLE 1 – Projects selected for the study, TR and EIS.

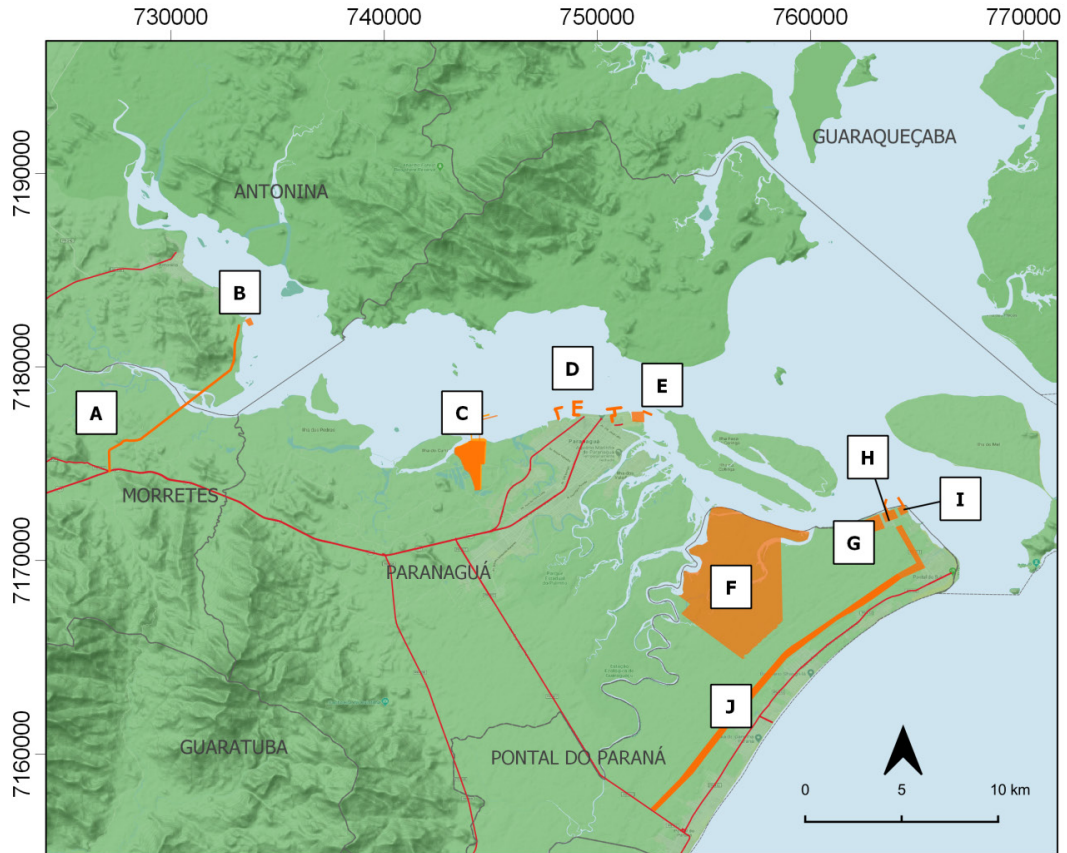
	Project	TR	Environmental Impact Statement
A	a road to a low demand port	IAT, 2015	<i>Estudo de Impacto Ambiental Rodovia PR-340 Trecho compreendido entre a BR-277 e Antonina Municípios de Morretes e Antonina-PR (Cia ambiental, 2016)</i>
B	low demand port expansion	IBAMA, 2011	---
C	new port	IAT, 2013	<i>Estudo Prévio de Impacto Ambiental Novo Porto Terminais Portuários Multi-cargas e Logística Ltda (Live ambiental et al., 2013)</i>
D	port expansion	IBAMA, 2014	<i>Estudo de Impacto Ambiental Ampliação do Porto de Paranaguá (Planave, 2018)</i>
E	port expansion	IBAMA, 2015	<i>Estudo Ambiental – EA - Projeto de complementação das obras de ampliação do Terminal de Contêineres de Paranaguá – TCP, Município de Paranaguá, PR (Aquadplan, 2016)</i>
F	welding station	IAT, 2009	<i>Estudo de Impacto Ambiental – Base de Soldagem Subsea7 Paranaguá (AAT, 2009)</i>
G	shipyard	IAT	<i>Estudo de Impacto Ambiental para Obras de Readequação e Dragagem de Cais em Pontal do Paraná – PR. (MRS, 2017)</i>
H	new port	IAT, 2013	<i>Estudo de Impacto Ambiental Melport Terminais Marítimos Ltda (ACE & Envex, 2014)</i>
I	new port	IBAMA, 2007	<i>Estudo de Impacto Ambiental Terminal de Contêineres Porto Pontal (AMB, 2008)</i>
J	a road to port I	IAT, 2014	<i>Estudo de impacto ambiental Faixa de infraestrutura em Pontal do Paraná (Engemin, 2016)</i>

SOURCE: The authors, based on EIS aforementioned, and on IAT's and IBAMA's TR.

Environmental agencies are obligated to allow the public access to documents, files, and administrative processes dealing with environmental matters (Brasil, 2003). To gather the documents needed, we consulted *IAT, Ministério Público Esta-*

*dual do Paraná; and Observatório de Conservação Costeira*¹². None of them had Project G's Term of Reference and project B's EIS in their databases, reason why they were not analyzed.

¹² Observatório de Conservação Costeira do Paraná - OC2 brings together professionals working in the field of biodiversity conservation, promoting the exchange and generation of scientific-technical information to voluntarily subsidize decision-making in the environmental management of the Paraná coast.



Nominal Scale: 1: 200000
DATA SOURCES
Boundaries: ITCG (2017); Road System: DER (2019); Google Terrain Hybrid (2020)
PROJECT INFORMATION
Coordinate System: SIRGAS 2000 Central Meridian: 51° F. 22S

MAP LEGEND	
Roads	Projects
Municipalities	Water



FIGURE 1 – Paraná Coast and projects under licensing process.
SOURCE: The authors (2021). Projects were georeferenced according to the EIS images.

Inspired by Lee *et al.* (1999), Guidance on EIS review (European Commission, 2001) and Bojórquez-Tapia & García (1998) *apud* Sánchez (2013), the authors¹³ developed the checklists to evaluate TR and EIS. The difference in this paper is that the evaluations are focused on protected areas. Most EIS quality studies do not present any further than “Identification of the protected areas that may be impacted by the project” for this subfield, as shown by Ribeiro & Almeida (2018). According to Lee *et al.* (1999), the criteria should be well defined and unambiguous, capable of reasonably consistent and objective application, and each should serve a distinct purpose, so the checklists seemed the best option to prevent judgments regarding the quality of the content presented.

The authors developed the checklists with questions whose answers are predominantly ‘yes’ (1), represented in green, and ‘no’ (0) represented in red. Some questions demanded further criteria, listed below the main question, and checked by light versions of the colors already used. A simple media of the criteria reflects the final assignment, case of questions 2 and 3 of EIS. In cases of partial compliance with the criteria presented by the main question, ‘0.5’, represented by yellow, was assigned.

Thematic blocks compound the checklists: 1 - description requested for the Protected Areas; 2 - the regional contextualization of coastal conservation; 3 - Spatial analysis; 4- Analysis of impacts; 5- Methods and critical analysis; and 6 – Conservation Background. Three specialists validated the

checklists on protected areas during the first author’s master’s degree evaluation steps. After simple sums, the fulfillment percentage of each checklist classified TR and EIS in excellent (81 - 100%), good (61 - 80%), average (41 – 60%), poor (21 – 40%), and very poor (0 – 20%).

Lastly, EIS were checked according to the requirements made in the TR. In a table, we listed all TR’s demands in the lines and the EIS in the columns and colored in grey the items that were not required by the correspondent EIS. After that, each EIS was consulted to verify if it had each of TR’s demands.

4. Results

4.1. Terms of reference

TR checklist (Table 2) shows that none of the Terms are even good. Poor terms of reference are remarkably similar despite being issued by different environmental agencies¹⁴. The criteria for determining which Protected Areas the studies should analyze, which were the areas of influence and requesting spatial analysis and addressing the priority conservation areas, were presented by all the Terms of Reference. However, it is necessary to address the specification level of the Terms. For example, the TR do not specify the essential information that should appear in the EIS. By reading the TR, different interpretations can be obtained, remaining exclusively on those responsible for composing the EIS to bring contents they believe meet the criteria

¹³ During the master's research of the first author, and with the validation of three specialists through this process.

¹⁴ In the Brazilian EIA system, there are not only federal and state environmental agencies responsible for licensing, but also the municipalities which have their own proper staff may do it as well.

requested. TR do not detail what kind of approaches are necessary and do not translate to the reader what the agency intended to evaluate.

Taking a closer look, most of the positive answers were for description questions. Description requested for the Protected Areas, questions 1 to 5, had a fulfillment of 5/5 in average TR, 2/5 in the poor TR, and 1/5 in the very poor ones. The regional (Paraná Coast) conservation contextualization, questions 6-11, had a fulfillment of 2/6 for average and poor TR, 1/6 for very poor ones. Spatial analysis, questions 12-16, had a fulfillment of 1/5 in all TR, except for the poor one, which attended 2/5. Analysis of impacts; questions 17 to 20 had a fulfillment of 2/4 in the average TR and poor one. 5- Methods and critical analysis, questions 21-23, had a fulfillment of 1/3 in the average TR. Conservation Background, questions 24-25, had no fulfillment at all.

4.2. *Environmental impact studies*

In the EIS Checklist (Table 3), it is noticeable that the EIS are not much better than the TR. One is very poor, while five are poor and four are average.

Even though some studies have scored in global and national contextualization (questions 1-2), mentions of the items considered for analysis do not constitute a good contextualization for the theme. Question 3, about the Paraná Coast Conservation Overview, received 'no (0)' in almost all cases. Although some EIS present some of the items, they do not constitute an overview, and the regional conservation scenario should cover the history that led to the current distribution of protected areas, what is protected, what needs to be protected, and which aspects influence it.

In the third group of questions (4-5), the EIS' chapters' criteria are the same as those stipulated by the TR, even though there is no explanation about the influence area. In the field of PAs descriptions (6), the EIS that performed better listed some essential items for analysis of the PAs, such as the existence of management plans and councils.

EIS 'I' was the only one to predicted impacts for the protected areas, although they are not detailed, and there are no specific measures for dealing with them. Four EIS specify measures to support the implementation and maintenance of protected areas (14). Spatial analysis (15-16), an efficient landscape analysis tool that contributes to the understanding of the themes and the decision making, has not scored just in two of projects, but there is no standard pattern for them to be analyzed as a group or even for the data to join a geodatabase. Regarding primary data, just one of the EIS scored, which is related to general information about the protected areas with no secondary source. All other items (17,19, 20, and 21) have not scored. There is no critical analysis of the data, and the EISs do not fully cover the respective TR, neither present relevant information not previously required by the TR.

4.3. *Observance of terms of reference by environmental impact studies*

The table below (Table 4) lists all the demands from the TR. The grey boxes represent that the TR did not request that item. Results show that, on average, protected areas' part of EIS fulfill 70% of their correspondents' TR' requirements, which leads to questioning why not 100% or if anyone has audit the EIS.

TABLE 2 – TR's checklist.

	A	B	C	D	E	F	G	H	I	J
1. Are descriptions of the Protected Areas required?										
2. Is it clear which Protected Areas the analysis should include?										
3. Were Areas of influence chosen as criteria?										
4. Is it necessary to include Protected Areas whose Buffer Zones are within the areas of influence?										
5. Is there a list of what to include about each protected area?										
6. Does it require a regional contextualization of the protected areas?										
7. Is this requirement detailed? Does it mention all the topics that have to be covered?										
8. Does it include ecological corridors or proposals for creating them?										
9. Does it include Mosaics of Protected Areas or proposals for creating them?										
10. Does it include priority areas for conservation or proposals for creating them?										
11. Does it ask for mapping and description of the areas capable of turning into protected ones?										
12. Is spatial analysis demanded?										
13. Does it describe the data which have to be addressed by the analysis?										
14. Are mapping characteristics pointed out?										
15. Does it demand to map priority areas, mosaics, and corridors?										
16. Does it demand to map of impacts related to the Protected Areas?										
17. Does it require analysis of impacts related to the Protected Areas?										
18. Does it require that the analysis of the impacts consider the aims of the Protected area?										
19. Does it require a significance analysis of the impacts that occur within the Protected Areas?										
20. Does it ask for corresponding mitigation and compensation measures for impacts within the Protected Areas?										
21. Does it ask for an analysis of the installing effects on the group of Protected Areas?										
22. Does it mention methods and criteria for collection or presentation of the Protected Areas data?										
23. Is critical data analysis of the presented data required?										
24. Does it mention nature conservation as relevant in the region?										
25. Are any of the requirements made justified by the outstanding importance of nature conservation?										

TABLE 3 – EISs' evaluation checklist developed by the authors.

	A	B	C	D	E	F	G	H	I	J
1. Does it present a chapter about the protected areas?	Green	Grey	Green	Green	Green	Green	Green	Green	Green	Green
2. Does it outstand the Paraná Coast's nature conservation importance?	Red	Grey	Yellow	Red	Green	Red	Yellow	Yellow	Red	Green
2.1 Paranaguá Estuarine Complex and Atlantic Forest	Red	Grey	Green	Red	Green	Red	Red	Green	Red	Green
2.2 Biodiversity hotspot	Red	Grey	Red	Red	Green	Red	Green	Green	Red	Red
2.3 Threatens to the Atlantic Forest – Atlantic Forest Law	Green	Grey	Green	Green	Green	Red	Red	Green	Red	Green
2.4 Ramsar Sites, UNESCO World Heritage Sites, Atlantic Forest Biosphere Reserve	Red	Grey	Red	Red	Green	Red	Green	Green	Red	Green
3. Is there an overview of the Protected Areas in Paraná Coast?	Red	Grey	Red	Green	Red	Red	Red	Yellow	Red	Red
3.1 Quantity of Protected Areas	Red	Grey	Red	Green	Red	Green	Red	Green	Red	Red
3.2 Goals	Red	Grey	Red	Green	Red	Green	Red	Green	Red	Red
3.3 Category	Red	Grey	Red	Green	Red	Green	Red	Green	Red	Red
3.4 Background	Red	Grey	Red	Green	Red	Green	Red	Green	Red	Red
3.5 Effectiveness	Red	Grey	Red	Green	Red	Green	Red	Green	Red	Red
3.6 Insertion in the Lagamar Mosaic	Red	Grey	Red	Red	Red	Red	Red	Red	Red	Green
3.7 Does it mention corridors? ¹⁵	Green	Grey	Green	Green	Red	Red	Red	Red	Red	Green
3.8 Does it present the priority areas for conservation? ¹⁶	Green	Grey	Green	Green	Green	Red	Green	Green	Green	Green
4. Does it describe the Protected Areas?	Green	Grey	Green	Green	Green	Green	Green	Green	Red	Green
5. Do the criteria for choosing the areas to be considered in the EIS match what Term of Reference has determined?	Grey	Grey	Yellow	Green	Grey	Green	Green	Grey	Green	Yellow
6. What is the information of each Protected Area?										
6.1 Identification (name, size, category)	Green	Grey	Green	Green	Green	Green	Green	Green	Green	Green
6.2 Management Plan	Green	Grey	Green	Green	Green	Red	Green	Green	Red	Green
6.3 Description of the area (environment, species, etc)	Red	Grey	Yellow	Green	Green	Green	Green	Green	Red	Red
6.4 Buffer Zone	Green	Grey	Yellow	Green	Green	Red	Green	Green	Red	Red
6.5 Management Team	Red	Grey	Red	Red	Red	Red	Red	Red	Red	Red
6.6 Council	Red	Grey	Red	Green	Red	Red	Red	Red	Red	Red
6.7 Goals	Red	Grey	Green	Green	Green	Green	Green	Green	Red	Green
Does it point out the direct impacts on Protected Areas or their Buffer Zone?	Red	Grey	Red	Red	Red	Red	Red	Red	Green	Red

¹⁵ Corridors of any kind, such as wildlife, biological, or ecological. The important aspect to be present is the idea of connection.

¹⁶ In the case of the Priority Areas for Conservation, the MMA, and the Strategic Areas for Biodiversity Conservation in Parana, they will be the same for all cases, and it would be interesting to analyze areas with potential for implementation of Protected Areas, highlighting criteria such as connectivity between PA.

Does it point out the indirect impacts on Protected Areas or their Buffer Zone?	Red	Grey	Red	Red	Red	Red	Red	Red	Red	Green	Red
Does it relate the project impacts to the Protected Areas goals?	Red	Grey	Red	Red	Green	Red	Red	Red	Red	Red	Red
Does it analyze the impact significance according to the Protected Areas goals?	Red	Grey	Red	Red	Green	Red	Red	Red	Red	Red	Red
Does it evaluate the installing effects for the group of Protected Areas?	Red	Grey	Red	Red	Red	Red	Red	Red	Red	Red	Red
Does it present corresponding mitigation and compensation measures for impacts within the Protected Areas?	Red	Grey	Yellow	Red	Yellow	Red	Red	Red	Red	Red	Red
Do these measures take the actions and programs of the Protected Areas into consideration?	Red	Grey	Red	Red	Red	Red	Red	Red	Red	Red	Red
Does it detail any additional support to the Protected Areas to be maintained? Or for the possible new areas? ¹⁷	Red	Grey	Red	Green	Red	Green	Green	Red	Green	Red	Red
Does it present spatial analysis?	Green	Grey	Green	Green	Green	Red	Green	Green	Green	Green	Green
Does it map the project according to the Protected Areas, Buffer Zones, and surroundings (buffers of 10 or 3km)?	Green	Grey	Green	Green	Green	Red	Green	Green	Red	Green	Green
Is critical data analysis presented? ¹⁸	Red	Grey	Red	Red	Red	Red	Red	Red	Red	Red	Red
Was there any primary data collection?	Red	Grey	Red	Green	Red	Red	Red	Red	Red	Red	Red
Does it check all the items required by the Term of Reference?	Grey	Grey	Red	Red	Grey	Red	Red	Red	Grey	Red	Red
Does it present any relevant information not required by the Term of Reference?	Grey	Grey	Red	Red	Red	Red	Red	Red	Red	Red	Red
Does it present any relevant information not mentioned in this list?	Red	Grey	Red	Red	Red	Red	Red	Red	Red	Red	Red

SOURCE: Checklist developed and fulfilled by the authors (2021).

¹⁷ Law 9.985/2000 determines that in cases of environmental licensing of undertakings with significant environmental impact, the entrepreneur is obliged to support the implementation and maintenance of protected area from the group of Integral Protection. Regarding the compensation amounts, it also regulates that the environmental licensing agency is responsible for defining the protected areas to be benefited with them, considering the proposals presented in the EIS and having heard the entrepreneur.

¹⁸ EISs are usually based on secondary data. It is expected a different approach, with new links between them.

TABLE 4 – Observance of the TR by the EIS.

	A	C	D	E	F	H	I	J
Identification	Green	Green	Green	Green	Green	Green	Green	Green
Description	Green	Green	Green	Green	Grey	Green	Grey	Green
Mapping	Green	Green	Green	Green	Green	Green	Green	Green
Areas (Federal/State/Municipal)	Green	Green	Green	Green	Green	Green	Green	Green
Influence Areas	Green	Green	Green	Yellow	Yellow	Green	Yellow	Green
Protected Areas 3 km distant from the project	Grey	Grey	Green	Green	Grey	Grey	Grey	Grey
Protected Areas 10 km distant from the project	Grey	Green	Grey	Grey	Grey	Green	Grey	Green
Buffer Zones	Red	Green	Green	Green	Grey	Green	Grey	Green
Priority Areas Highlight	Green	Green	Green	Grey	Yellow	Green	Yellow	Green
Verifying the increase of vehicles traffic surrounding the Protected Areas	Grey	Grey	Grey	Grey	Grey	Grey	Red	Grey
Indicating distances related to the enterprise and areas of influence	Yellow	Yellow	Grey	Grey	Grey	Green	Grey	Green
Identifying the Protected areas under the establishment process	Grey	Red	Grey	Grey	Grey	Red	Grey	Red
The approach of possible modifications caused in the Protected Areas/ Insertion of the project in the context of the Areas	Red	Red	Red	Grey	Grey	Red	Grey	Red
Considering the management plans (if there is any)	Yellow	Yellow	Green	Grey	Grey	Yellow	Grey	Yellow
Characterization of the potential areas to turn into protected areas	Green	Yellow	Green	Grey	Grey	Red	Grey	Yellow
Characterization of the unique sites for species reproduction	Red	Red	Green	Grey	Grey	Red	Grey	Red
Notation of protected areas which the responsible agency must approve the continuity of the licensing process	Grey	Grey	Green	Grey	Grey	Grey	Grey	Grey
Present characteristics of the protected areas, including goals and main protected ecosystems, and predominant vegetation	Grey	Grey	Red	Yellow	Grey	Grey	Grey	Grey
Link with compensation and mitigation measures	Grey	Grey	Grey	Red	Grey	Grey	Grey	Grey

SOURCE: List based on the TR's demands, checked according to the EIS. By the authors (2021).

5. Discussion

Terms of Reference did not demand any more than 44% of the checklist, they are very poor, poor, or average (Table 5). They seemed to merely guide the studies nevertheless, the EIS did not fulfill them. For example, Project E's have a very poor TR, it had most of its demands attended and still resulted in an average EIS. Once the observance of each demand is not mandatory for the continuity of the process, if no other instance requires them, absences of subjects demanded by the TR in the EIS may be overlooked. Duarte *et al.* (2017) point to recurring identical TR, used in distinct contexts, not deepening the knowledge about the regions, something that happened in the topics about protected areas in some of the TR evaluated.

IAT's and IBAMA's TR had the same mean, 36% of checklist's fulfillment. Also, IAT's best TR were the identical ones, published in 2013 and 2014. The inferior TR date back to 2007 and 2009.

EIS are poor and average: IAT's mean of checklist fulfillment was 34%, and IBAMA's was 46%. Despite the poverty of IAT's TR, none of the EIS that came after those IAT's TR were any better than the TR themselves. The EIS to attend IBAMA's criteria were all better than the TR. Despite none have checked all the items required by the TR, they filled at least 60%. The mean observance of the IAT's TR by the EIS was 70% and IBAMA's was 76%. When checking fulfillment percentages, the EIS fulfilled from 66% to 85% of the TR, which would be good if the TR were not so poor. Moreover, it is questionable the inability to fulfill such poor TR.

TABLE 5 – Overview of the scores.

	Licensing agency ¹⁹	TR Year	EIS Year	TR score	EIS Score	TR fulfillment by the EIS
A	IAT	2015	2016	32% - poor	29% - poor	67% - good
B	IBAMA	2011		56% - average		
C	IAT	2013	2013	44% - average	35% - poor	67% - good
D	IBAMA	2014	2018	36% - poor	52% - average	85% - excellent
E	IBAMA	2015	2016	36% - poor	60% - average	78% - good
F	IAT	2009	2009	16% - very poor	26% - poor	80% - good
G	IAT		2012		42% - average	
H	IAT	2013	2014	44% - average	43% - average	67% - good
I	IBAMA	2007	2008	16% - very poor	26% - poor	66% - good
J	IAT	2014	2016	44% - average	31% - poor	71% - good

SOURCE: The authors (2021).

¹⁹ IBAMA is the national environmental agency while IAT, which was IAP before, is the state one.

This fulfillment rate would lead to good EIS if the TR were good, reinforcing the well-done scoping phase's central role. The EIS are poor on protected areas topics, but that does not mean that little is written in the sections, which usually have several limited information pages. It consists of a pattern Sánchez (2013) already pointed out, in which studies are commonly exhausting, listing as much information about a topic as possible, rather than focusing on the strategic ones. With so many requirements during the whole licensing process, it is naive to expect time and money expenses to do what is not required. The EIS should indeed fulfill everything required by the TR, but that would not make them much better. It is worth recalling that Treweek (year unknown) presents implications of its CBD provisions for EIA, such as that EIA procedures should respect protected areas. It says that protected areas and their buffer zones should act as a trigger for EIA in Screening, which this study does not ratify.

There are four primary purposes regarding the Protected areas section on EIS: 1- public information, 2- protected areas agency consent, 3- environmental compensation, and 4- final decision making. Consequently, agencies responsible for the protected areas, agencies responsible for the licensing process, consultants responsible for the EIS and EIS Report, and the local population are stakeholders. Based on the licensing agency's scopes, consultants prepare EIS (and EIS report) for the stakeholders mentioned above. Some information is essential for all the stakeholders, and some are not. Nonetheless, all of them have to be provided with enough information to make their decisions. Efforts to gather the information necessary to attend the checklists depend differently according to the kind of information.

It is easy to find and update information about how significant Paraná Coast nature conservation is locally, regionally, nationally, and globally. The results are interesting to all stakeholders on different levels. The public would have access to more direct and communicative reports that highlight the connection between the conservation goals and the main issues for them, their lives.

For agencies responsible for the consent, the impact analysis linked to the conservation goals, their effects on the PAs, and the further possible procedures to mitigate or compensate them have major importance. However, to better understand the impacts on protected areas, the protected areas' characteristics must be considered. Paula *et al.* (2018) bring an overview of the PAs and show implementation rates for them, a fundamental basis that the EIS could easily update over time. Considering that the protected areas should be analyzed according to their conservation goals and the capacity to deal with the impacts, overlapping their areas and buffer zones with influence areas would no longer be so relevant as it is for all the stakeholders.

Compensation measures, which are leading points in the processes, are constantly destined for purposes not related to the impacts caused. They could benefit from most of the checklists' information, but evidently, the impacts on PA are the most relevant. EIS could not just be calculating the compensation amount but also pointing programs, partnerships, and others that could address the impacts and help decision-makers understand how efficient they may be.

Checklists seemed the best option to reach the goal since their previous usage, but they have their limitation regarding the information quality, which will be substantial in following investigations.

Results here presented are hardly comparable to other studies previously published due to the lack of studies that had approached protected areas as something that could suffer the effects of projects, or as a crucial element in many moments of the process, such as to preview compensation measures adequately. On the other hand, it contributes directly to EIA practice in Brazil since it alludes to a review of EIS, despite being partial, just focused on the protected areas. It shows how this topic is treated and purposes some advances when pointing from the topics that can be easily fulfilled by reliable secondary data gather to the ones that will always demand efforts or complex analysis.

This paper's data and the analysis are simple but powerful for further research and practice improvements. It brought the subject up as a research topic, mainly regionally. It is strongly relevant as a case study due to the number of protected areas and all the planning tools overlaps, the lack of resources of the State Environmental Agency to lead the processes, and the high claiming for big development projects.

One significant issue regards accessing the data. An organized and straightforward database about the licensing process would surely guarantee more competent actions regarding the processes. Both environmental agencies have public online databases. IBAMA's one is quite reasonable, while IAT's one is minimal. More than that, it is obscure to understand the processes' conduction, the reason why they should keep brief reports on each of the cases. Also, it would be interesting to test some guidelines to make the EIS more comparable. Baselines for comparison might boost investigations on the topic.

Other studies may advance from this one using the same checklists in other regions where conservation is also a significant aspect. Other sensible issues, such as the traditional population or health, could be investigated through similar checklists. After some improvements regarding protected areas in EIA practice, the checklists may become quickly outdated and later remove or add questions. Versions may consider evaluating more than the presence of subjects but how valuable and well done the contents presented are. Moreover, papers, manuscripts on the protected areas diagnosis, or environmental impact assessment, mainly addressing cause-and-effect, synergy, cumulativeness, strategic assessment, in the region will constantly contribute. However, Paula *et al.* (2018) worked on a foundation for the protected areas' information, and that should be often updated, either within the EIS or in research projects.

This paper indirectly shows how unorganized and lethargic the agencies and the whole theme in the region are. The region's main characteristics and the development types more likely to them were not central in the processes and the decision-making.

6. Conclusion

It is plausible to state that the approach given to protected areas during environmental licensing does not support any decision-making. The cases presented have shown that there has been no impact assessment on protected areas yet. EIS do not discuss impacts on protected areas, ways to mitigate them, possible effects they may have on other aspects of the area, cumulative effects, among others that could be useful to the protected areas

environmental agency to consent or not. PAs are minor issues during the environmental licensing processes despite their importance to the region.

There is no unquestionable formula for environmental impact assessment, and each country has developed its way since the beginning of the practice. It was important not to have strict guidelines at a time little about EIA was known, but practice and studies over the years feedback the system and make them feasible. Therefore, we recommend guidelines and manuals on good practice to improve the process.

That said, Terms of Reference, which have a major role, should be urgently upgraded. A simple beginning would consist of using the checklist as it is. A further step would be adapting it, and another would be requiring the protected area agency to assist with it. Further, there are detailed guidelines, templates, and manuals focused on whatever is necessary to improve decision-making. It has been common sense that there are specific calls for other scales of the procedure, for the different kinds of projects, for the different environments, for different necessities.

Organized, dynamic, public access databases are also urgent. Federal Protected Areas have their initiatives, whereas State ones do not. When a good database is available, the TR will demand complements and impact assessment, not much more than that. Good databases on licensing processes are more than urgent, though to reduce bureaucracy, facilitate the understanding, caring for transparency.

Acknowledgment

We acknowledge and are grateful for the financial support given by Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES. We thank Ministério Público do Estado do Paraná and Observatório de Conservação Costeira do Paraná for providing access to the licensing documents used.

References

AAT – Consultoria e Engenharia Ambiental. *Estudo de Impacto Ambiental – Base de Soldagem Subsea7 Parana-guá*, 2009.

ACE – Auditoria, consultoria e Educação Ambiental Ltda; Envex Engenharia e Consultoria S/S Ltda. *Estudo de Impacto Ambiental Melpport Terminais Maritimos Ltda*, 2014.

AMB – Planejamento Ambiental e Biotecnologia Ltda. *Estudo de Impacto Ambiental Terminal de Contêineres Porto Pontal*, 2008.

Aquaplan Tecnologia e Consultoria Ambiental. *Estudo Ambiental – EA - Projeto de complementação das obras de ampliação do Terminal de Contêineres de Paranaguá – TCP*, 2016

Borioni, R.; Gallardo, ALCF; Sánchez, L.E. Advancing scoping practice in environmental impact assessment: an examination of the Brazilian federal system *Impact Assessment and Project Appraisal*, 35(3), 200-213, 2017. doi: 10.1080/14615517.2016.1271535

Brasil. *Lei 6.938, de 31 de agosto de 1981*. Dispõe sobre a Política Nacional do Meio Ambiente, seus fins e mecanismos de formulação e aplicação, e dá outras providências. Brasília, DOU de 2/12/1981.

Brasil. *Lei n.º 9.985, de 18 de julho de 2000*. Cria o Sistema Nacional de Unidades de Conservação da Natureza, 2000. Brasília, DOU de 26/12/2006.

Brasil. *Lei n.º 10.650, de 16 de abril de 2003*. Dispõe sobre o acesso público aos dados e informações existentes nos

órgãos e entidades integrantes do Sisnama. Brasília, DOU de 17/4/2003

Brasil. *Lei 11.428, de 11 de dezembro de 2006*. Dispõe sobre a utilização e proteção da vegetação nativa do bioma Mata Atlântica, e dá outras providências. Brasília, DOU de 26/12/2006.

Canelas, L.; Almansa, P.; Merchan, M.; Cifuentes, P. Quality of environmental impact statements in Portugal and Spain. *Environmental Impact Assessment Review*, 25, 217– 225, 2005. doi:10.1016/j.eiar.2004.02.001

Caneparo, S. C. *Manguezais de Paranaguá: uma análise da dinâmica da ocupação antrópica no Perímetro Urbano de Paranaguá*. Curitiba, Tese (Doutorado em Meio Ambiente e Desenvolvimento) – UFPR, 1999.

Cia ambiental. *Estudo de Impacto Ambiental Rodovia PR-340 Trecho compreendido entre a BR-277 e Antonina Municípios de Morretes e Antonina-PR*, 2016.

Clark, B.D. The Aims and Objectives of Environmental Impact Assessment. *Environmental Impact Assess*, 14, 3–11, 1983. doi: 10.1007/978-94-009-6795-3_1

CNUC/MMA – *Cadastro Nacional de Unidades de Conservação*. Ministério do meio Ambiente. Available from: <<http://www.mma.gov.br/areas-protegidas/cadastro-nacional-de-ucs>>. Accessed: may. 2017.

CONAMA – Conselho Nacional do Meio Ambiente. *Resolução 428, de 17 de dezembro de 2010*. Dispõe, no âmbito do licenciamento ambiental sobre a autorização do órgão responsável pela administração da Unidade de Conservação (UC), de que trata o § 3º do artigo 36 da Lei 9.985 de 18 de julho de 2000, bem como sobre a ciência do órgão responsável pela administração da UC no caso de licenciamento ambiental de empreendimentos não sujeitos a EIA-RIMA e dá outras providências. Brasília, DOU de 18/12/2010.

CONAMA – Conselho Nacional do Meio Ambiente. *Resolução 473, de 11 de dezembro de 2015*. Prorroga os prazos previstos no §2º do art. 1º e inciso III do art. 5º da Resolução nº 428, de 17 de dezembro de 2010, que dispõe no âmbito do licenciamento ambiental sobre a autorização do órgão responsável pela administração da Unidade de Conservação (UC), de que trata o § 3º do artigo 36 da Lei nº 9.985 de 18 de julho de 2000, bem como sobre a ciência

do órgão responsável pela administração da UC no caso de licenciamento ambiental de empreendimentos não sujeitos a EIA-RIMA e dá outras providências. Brasília, DOU de 17/12/2015.

Duarte, C. G; Dibo, A. P. A; Sánchez, L. E. O que diz a pesquisa acadêmica sobre avaliação de impacto e licenciamento ambiental no Brasil? *Ambiente e Sociedade*, 20(1), 261-292, 2017. doi: 10.1590/1809-4422ASO-C20150268R1V2012017

Engemin. *Estudo de impacto ambiental faixa de infraestrutura em Pontal do Paraná*, 2016

European Commission. *Guidance on EIA: EIS Review*. Luxembourg: Office for Official Publications of the European Communities, 2001. Available from: <<https://ec.europa.eu/environment/archives/eia/eia-guidelines/g-review-full-text.pdf>> Accessed: feb. 2021.

Ferreira, I. V. Uma política nacional para as áreas protegidas brasileiras. In: *Anais do Congresso Brasileiro de Unidades de Conservação*. vol.2, 172-176. Curitiba, 17 a 21 de out., 2004.

Fonseca, A. Sánchez, L.E.; Ribeiro, J.C.J. Reforming EIA systems: A critical review of proposals in Brazil. *Environmental Impact Assessment Review*, 62, 90–97, 2017. doi: 10.1016/j.eiar.2016.10.002

Fundação SOS Mata Atlântica. *Dados Gerais*, 2020. Available from: <www.sosma.org.br/conheca/mata-atlantica>. Accessed: may. 2017.

ICMBio – Instituto Chico Mendes de Conservação da Biodiversidade. *Sítios Ramsar do Brasil*, 2015. Available from: <<http://www.mma.gov.br/areas-protegidas/instrumentos-de-gestao/sitios-ramsar>>. Accessed: oct. 2017.

IUCN – International Union for Conservation of Nature. *Protected Areas*, 2020. Available from: <<https://www.iucn.org/theme/protected-areas>>. Accessed: feb. 2018.

Jay, S.; Jones, C.; Slinn, P.; Wood, C. Environmental impact assessment: Retrospect and prospect. *Environmental Impact Assessment Review*, 27(4), 287–300, 2007. doi: 10.1016/j.eiar.2006.12.001

Lee, N.; Colley, R.; Bonde, J.; Simpson, J. *Reviewing the*

-
- quality of environmental statements and environmental appraisals, 1999. Available from: <<https://aardlink.files.wordpress.com/2013/08/op55.pdf>>. Accessed: feb. 2021.
- Live Ambiental; Soares Neto e Guerios Advocacia e Consultoria; BENTHOS; EnvEx. *Estudo Prévio de Impacto Ambiental Novo Porto Terminais Portuários Multicargas e Logística Ltda*, 2013
- MMA – Ministério do Meio Ambiente. *Áreas prioritárias para conservação. Uso sustentável e repartição de benefícios da biodiversidade brasileira*. Portaria MMA nº9, de 23 de janeiro de 2007. Available from: <https://www.mma.gov.br/estruturas/chm/_arquivos/biodiversidade31.pdf>. Accessed: mar. 2018.
- Morgan, R. K. Environmental impact assessment: the state of the art. *Impact Assessment and Project Appraisal*, 30(1), 5-14, 2012.
- MRS Estudos Ambientais Ltda. *Estudo de impacto ambiental para obras de readequação e dragagem de cais em Pontal do Paraná – PR*. Porto Alegre, jul. 2017.
- Paula, E. V.; Pigozzo, A. M. B.; Wroblewski, C. A. Unidades de Conservação no Litoral do Paraná: evolução territorial e grau de implementação. In: Sulzbach, M.; Quadros, J.; archanjo, D. (Orgs.). *Litoral do Paraná: território e perspectivas: dimensões de desenvolvimento*. Curitiba: Autografia, 1. ed., v.1, 41-92, 2018.
- Petts, J. *Handbook of environmental impact assessment*. Oxford: Blackwell, 1999.
- Pierri, N.; Angulo, R. J.; Souza, M. C.; Kim, M. K.; A ocupação e o uso do solo no litoral paranaense: condicionantes, conflitos e tendências. *Desenvolvimento e Meio Ambiente*, 13, 137-167, 2006. doi: 10.5380/dma.v13i0.9849
- Planave. *Estudo de impacto ambiental ampliação do Porto de Paranaguá*, 2018
- Ribeiro, A.L.G.; Almeida, M.R.R. Proposta de um Roteiro Geral para Elaboração e Verificação da Qualidade do Estudo de Impacto Ambiental (EIA). *Revista Brasileira de Geografia Física*, 11(6), 2173-2185, 2018. doi: 10.26848/rbfg.v11.6.p2173-2185
- Rylands, A. B.; Brandon, K. Unidades de conservação brasileiras. *Megadiversidade*, 1(1), jul. 2005.28-35. Available from: http://www.ecoturismoaventura.com.br/images/conservation_units.pdf
- Sánchez, L. E. *Avaliação de impacto ambiental: conceitos e métodos*. São Paulo: Oficina de Textos, 2. ed., 2013.
- Sánchez, L.E.; Croal, P. Environmental impact assessment, from Rio-92 to Rio+20 and beyond. *Ambiente & Sociedade*, 15(3), 41-54, 2012. doi: 10.1590/S1414-753X2012000300004
- Snell, T.; Cowell, R. Scoping in environmental impact assessment: Balancing precaution and efficiency? *Environmental Impact Assessment Review*, 26, 359–376, 2006. doi: 10.1016/j.eiar.2005.06.003
- Treweek, J. *Integrating biodiversity with national environmental assessment processes* A review of experiences and methods. Available from: <https://www.cbd.int/doc/nbsap/EIA/EIA-Main-Report.pdf>
- UNEP – United Nations Environment Programme. *Protected Planet*, 2020. Available from: <<https://www.protectedplanet.net/region/SA>>. Accessed: mar. 2018.
- Veronez, F.; Montaña, M. Análise da qualidade dos estudos de impacto ambiental no estado do Espírito Santo (2007-2013). *Desenvolvimento e Meio Ambiente*, 43, Edição Especial: Avaliação de Impacto Ambiental, 6-21, 2017. doi: 10.5380/dma.v43i0.54180.
- Wandesforde-Smith, G.; Carpenter, R. A.; Horberry, J. EIA in developing countries: an introduction. *Environmental Impact Assessment Review*, 5, 201-206, 1985. doi: 10.1016/0195-9255(85)90001-0
- Wood, C. *Environmental impact assessment: a comparative review*. Upper Saddle River, NJ: Prentice Hall, 2003.