The lack of cumulative impact analysis in the environmental licensing of the Industrial Port Complex at Pontal do Paraná, on the southern coast of Brazil

A ausência de análise de impactos cumulativos no licenciamento ambiental do Complexo Industrial Portuário, Pontal do Paraná, litoral sul do Brasil

Érica Vicente Onofre [1]

Juliana Quadros [2]

Natália Tavares de Azevedo [3]

[1] *Master in Sustainable Territorial Development, PhD Student, Universidade Federal do Paraná, Matinhos, Brazil*
E-mail: ambiental.onofre@gmail.com

[2] *Doctor in Zoology, Professor, Universidade Federal do Paraná, Matinhos, Brazil*
E-mail: quadros.juliana@gmail.com

[3] *Doctor in Environment and Development, Professor, Universidade Federal do Paraná, Matinhos, Brazil*
E-mail: natytav@yahoo.com.br

doi:10.18472/SustDeb.v13n3.2022.44007

Received: 07/07/2022
Accepted: 26/10/2022

ARTICLE- VARIA

ABSTRACT

The Environmental Impact Assessment is an environmental policy instrument developed in response to societal concerns about the negative impacts of major development projects and the recognition of planetary boundaries. In Brazil, it is part of the environmental licensing process, which also encompasses various weak points. Cumulative Impacts (CIs) from multiple interventions (both natural or anthropic) across specific spaces and time frames are routinely dealt with poorly. The installation of an Industrial Port Complex (IPC) at Pontal do Paraná, a municipality on the south coast of Brazil is currently undergoing an environmental licensing process. This article analyzes five projects' Terms of Reference (TR) and Environmental Impact Studies (EIS) to verify if and how the IPC projects assess CIs. The results suggest that TRs and EISs provide insufficient to assess CIs. In the political-procedural sphere, there is no institutionalization for Cumulative Impact Analysis. Moreover, even if it is performed, it is essential to consider how power relations affect the public acceptance of mega-projects. Locally, uncertainty about CIs reflects into scenarios of environmental unsustainability.

Keywords: Cumulative Impact Assessment. Environmental Impact Study. Territorial Planning. Atlantic Forest.

RESUMO

A Avaliação de Impacto Ambiental é um instrumento da política ambiental que surge como resposta às preocupações da sociedade sobre os impactos negativos dos empreendimentos e ao reconhecimento dos limites planetários. No Brasil, está inserido no processo administrativo do Licenciamento Ambiental, no qual fragilidades coexistem. Os Impactos Cumulativos (ICs), resultantes de múltiplas alterações decorrentes de intervenções (naturais ou antrópicas) concentradas espacial e temporalmente, corriqueiramente, recebem tratamento insuficiente. A instalação de um Complexo Industrial Portuário (CIP) no município de Pontal do Paraná está em fase de licenciamento ambiental. Este artigo objetivou verificar se e como os projetos do CIP avaliam os ICs por meio de análise documental dos Termos de Referência (TR) e Estudos de Impacto Ambiental (EIA) de cinco empreendimentos. Os resultados apontam que os TRs e EIAs são insuficientes na análise dos ICs. No âmbito político-procedimental, não há institucionalização para a prática de Análise de Impactos Cumulativos. Mesmo que ela ocorra, é imprescindível considerar o peso das relações de poder para aceitação pública de megaempreendimentos. Localmente, as incertezas sobre os ICs refletem cenários de insustentabilidade ambiental.

Palavras-chave: Avaliação de Impactos Cumulativos. Estudo de Impacto Ambiental. Planejamento Territorial. Floresta Atlântica.

1 INTRODUCTION

Research and practice on cumulative impacts are at their early stages in Brazil. However, it is essential to guide initiatives that prevent and address socio-environmental problems (DIBO, 2018). This field of knowledge is aligned with the policy of preventive environmental management and is part of the more extensive Environmental Impact Assessment (EIA) framework (MORGAN, 2012). The EIA emerged as a response from governments and scientists to the impacts of industrialization on human and environmental health. This technical-institutional approach is aligned with moderate environmentalism, i.e., ecological modernization, which argues it has the potential to overcome conflicts between economic development goals and environmental endeavours (MILANEZ, 2009; PI PUIG, 2019).

In Brazil, the technical instrument of EIA is part of the Environmental Licensing process[1], one of the mechanisms used to approve project implementation as part of the National Environmental Policy (BRASIL, 1981). Therefore, the EIA process encompasses the steps needed to assess if a specific proposal might affect the current environmental conditions and informs the decision-making process of environmental licensing. Any activities that modify the environment are subject to approval from the environmental agency responsible for granting a three-phase environmental license (Preliminary License – PL, Installation License – IL, and Operating License – OL) (SÁNCHEZ, 2020).

This article focuses on Major Development Projects (MDPs), which are primarily linked to transforming environmental spaces into infrastructures to extract territorial goods (e.g., ore, agricultural resources, electricity, and oil) and provide logistical support for their transportation (roads, ports, railways, gas pipelines, polyducts, etc.). Since the 1970s, these projects have been led by the private sector (large corporations) and enabled by the State via sectoral macro-policies, planning, and ordinances so these projects can be financed through plans, programs, and multilateral banks (BERNO DE ALMEIDA *et al.,* 2010; CASTRO, 2012; GUSMÃO, 2010; VAINER, 2007).

Due to their socio-environmental consequences, the political and procedural aspects for approving MDPs have drawn the attention of Political Ecology researchers. According to Acselrad (2011) and Zhouri (2008), MDPs are part of a violent process that expropriates family farmers, artisans, peasants, and indigenous peoples whose sustenance and production are natural, common goods. Furthermore,

the project impacts are not democratic, i.e., risks and uncertainties are unevenly distributed and affect populations that are already historically vulnerable. According to Acselrad (2011), "the project planners or investors tend to minimize the presence of certain populations in the areas where they intend to settle," from the conception of territorial planning to the "active lack of knowledge" of how the projects being licensed will affect these groups (PHASE *et al.*, 2011, p. 26).

Nevertheless, Acselrad (2011) considers that no development project should be carried out under the pretext of progress, sacrificing social groups and causing incalculable environmental costs. On the other hand, as the main instrument for approving Major Projects, the EIA reproduces conventional methods, including the separation of biophysical aspects and socio-political and cultural dimensions, as well as the difficult discussion about the relationship between environmental equity and social and environmental inequality (LEROY; ACSELRAD, 2011). Fase, Ettern, and Ippur (2011) and Zhouri (2008) point out that the EIS/EIRs (or, in Brazilian Portuguese, *Estudo de Impacto Ambiental*, EIA, and *Relatório de Impacto Ambiental*, RIMA) have been converted into a reactive assessment of public approval for projects in the social and political sphere, rather than a proactive, assertive mobilization around the environmental impacts to inform the decision-making process. That adds to the numerous battles and legal disputes arising from non-compliance, technical differences, licensing competence, and the lack of and/or insufficient engagement from the people. The Public Ministry (PM) of the Union and States have performed numerous interventions targeting the lack of transparency and misconduct that often cause the judicialization processes, which are a mark of Brazilian environmental licensing (HOFMANN, 2015, p. 41; 57-59).

In the EIA process, Cumulative Impacts (CIs) are often disregarded, despite calls from the scientific community, social groups, and movements warning about their importance. CIs result from anthropic or natural actions concentrated in specific spaces and time frames, and that cause a substantial change in socio-environmental systems (OLAGUNJU; GUNN, 2015). In this sense, Sánchez (2020, p. 280) defines that "cumulative impacts are the entire effects on an environmental resource, ecosystem or community, regardless of the origin of its causes."

That is the backdrop for a discussion surrounding the significance of small enterprises and their impacts: although they can be considered insignificant individually, they might cause irreparable damage from a cumulative perspective. Similarly, projects analyzed individually may have significantly lower impacts than perspectives that take into account if they are concentrated in a specific spatial or time frame (CLAYS; PEREIRA, 2019; DUARTE *et al*., 2017; MONTAÑO *et al.*, 2014; SANCHEZ, 2020). Following this view, Siqueira-Gay *et al.* (2019) add to the discussion around potentially significant impacts resulting from the installation of a set of small hydroelectric plants (SHPs), especially in the Amazon region, and their neglected cumulative impacts: "when the small is not beautiful."

In Brazil, institutionally, there is no specific regulation regarding Cumulative Impact Assessments (CIAs). However, regarding the impact and alternative analysis, the Brazilian National Environment Council (Conama) Resolution No. 1/1986 suggests/recommends considering the description of "their cumulative and synergistic properties; the distribution of social burdens and benefits" (CONAMA, 1986). Despite this recommendation to analyze CIs in the context of the EIA, other instruments like the Strategic Environmental Assessment (SEA) and the Integrated Environmental Assessment (IEA) have been employed when planning hydrographic basins, especially for the same type of enterprise, i.e., hydroelectric plants and SHPs in the Amazon (GALLARDO *et al.,* 2017; SIQUEIRA-GAY *et al.,* 2019).

In Brazil, tensions and disputes have followed the environmental licensing of large projects amidst systematic dismantling and environmental deregulation (BARCELOS, 2020; ZHOURI, 2008). At regional and local levels, the MDP-based development model has been advancing rapidly (ALÍER, 2007). In Paraná, a state in southern Brazil, the economy has been following a model based on competitiveness and agribusiness integration networks. Thus, these regions are centred around their primary products

(soybean, coffee, and electricity) and their port-based logistic framework (SILVA; GONÇALVES, 2019). Regarding the latter, the coastal region of Paraná has a hub that encompasses the Port of Paranaguá and Antonina, located in the Paranaguá Estuarine Complex. Industrial port activity expanded in recent decades, causing changes in the occupation and use of these territories for capital accumulation (ABRAHÃO; CANEPARO, 2014; CUNHA, 2018).

The present case highlights the municipality of Pontal do Paraná and the intent to convert a territory that is currently used mainly by the beach tourism sector and is strongly marked by the presence of traditional fishing communities (PIERRI *et al.,* 2006) into an industrial port complex (CUNHA, 2018). Therefore, considering the set of five MDPs undergoing the licensing process that constitutes the Industrial Port Complex (IPC) of Pontal do Paraná, this article aims to analyze if and how the Terms of Reference and the Environmental Impact Studies of these projects address cumulative impacts. Therefore, the next section of this article focuses on the context of Pontal do Paraná, the projects, and the disputed territories, followed by the methodology, the results, the discussion, and the final considerations.

2 PONTAL DO PARANÁ: MAJOR DEVELOPMENT PROJECTS AND DISPUTED TERRITORIES

The coast of Paraná plays a vital role in nature conservation due to its social biodiversity potential and being home to the most extensive continuous remnants of the Atlantic Forest (PDS LITORAL, 2019). On the other hand, it faces severe social vulnerability problems (AZEVEDO, 2016), abandonment policies (TIEPOLO, 2016), and conflicts surrounding plans for the territory (CALDEIRA, 2018; CUNHA, 2018). That resulted in significant disputes over the social and spatial production therein, accompanied by capital accumulation to the detriment of Pontal do Paraná's sociocultural and natural vocations (AZEVEDO, 2016; CALDEIRA, 2018; CUNHA, 2018; TIEPOLO, 2016).

The urbanization process of Pontal do Paraná was directly connected to the private sector and involved a public land concession contract for a company, "Balneária Pontal do Sul," in 1950. That shows the history of the privatization of public lands that triggered territorial conflicts with fishing communities and the contradictions surrounding the municipality's territorial planning (CUNHA, 2018).

Pontal do Paraná is mainly a beach municipality geared towards tourists (IPARDES, 2022). However, since the 1980s, there have been port and oil ventures (Tenenge; CBC Heavy Industries S.A., a representative of Mitsubishi Motors in Brazil; Techint; and FEM – Projects, Constructions, and Assembly), but in the following years, these initiatives declined and were deactivated (CUNHA, 2018). Among the municipalities on the south coast, Pontal do Paraná has the highest population growth, mainly due to new industrial and port initiatives. Estimates indicate that, in 2035, the municipality might double the population (amounting to approx. 50 thousand inhabitants) when compared to these figures for 2010 (when it had 20,920 inhabitants) (PDS LITORAL, 2019). Regarding social vulnerability, according to Azevedo (2016), there is a rural sector with 177 residents who are considered highly vulnerable. For the author: "about 38% live in areas of medium social vulnerability, and just over 0.5% live in a high vulnerability sector, the Maciel fishing community" (AZEVEDO, 2016, p. 114). Data from 2008 show that fishing is the main occupation of 2% of the population of Pontal do Paraná, totalling approx. 400 people, according to Colônia de Pescadores, a fisherman organization with 13 locations spread around the municipality (CALDEIRA; PIERRI, 2014). It is also important to point out the presence of the original Guarani peoples in the Sambaqui Indigenous Land, a protected area yet to be titled (INSTITUTO SOCIOAMBIENTAL, 2020).

The Industrial Port Complex proposed for Pontal do Paraná includes installing five new projects[2] requiring an EIS/EIR for environmental licensing. These projects are: A. 3P Porto Pontal, also known as Pontal do Paraná Container Terminal (PPCT); B. Melport Maritime Terminals; C. Odebrecht; D. Subsea7;

and E. New Infrastructure Lane. All are located near the Guaraguaçu River, and four are in front of the Indigenous Land of Ilha da Cotinga. Project D overlaps with the Sambaqui Indigenous Land and 15 other areas occupied by traditional communities, composed mainly of fishermen, who will be directly or indirectly affected (Figure 1).

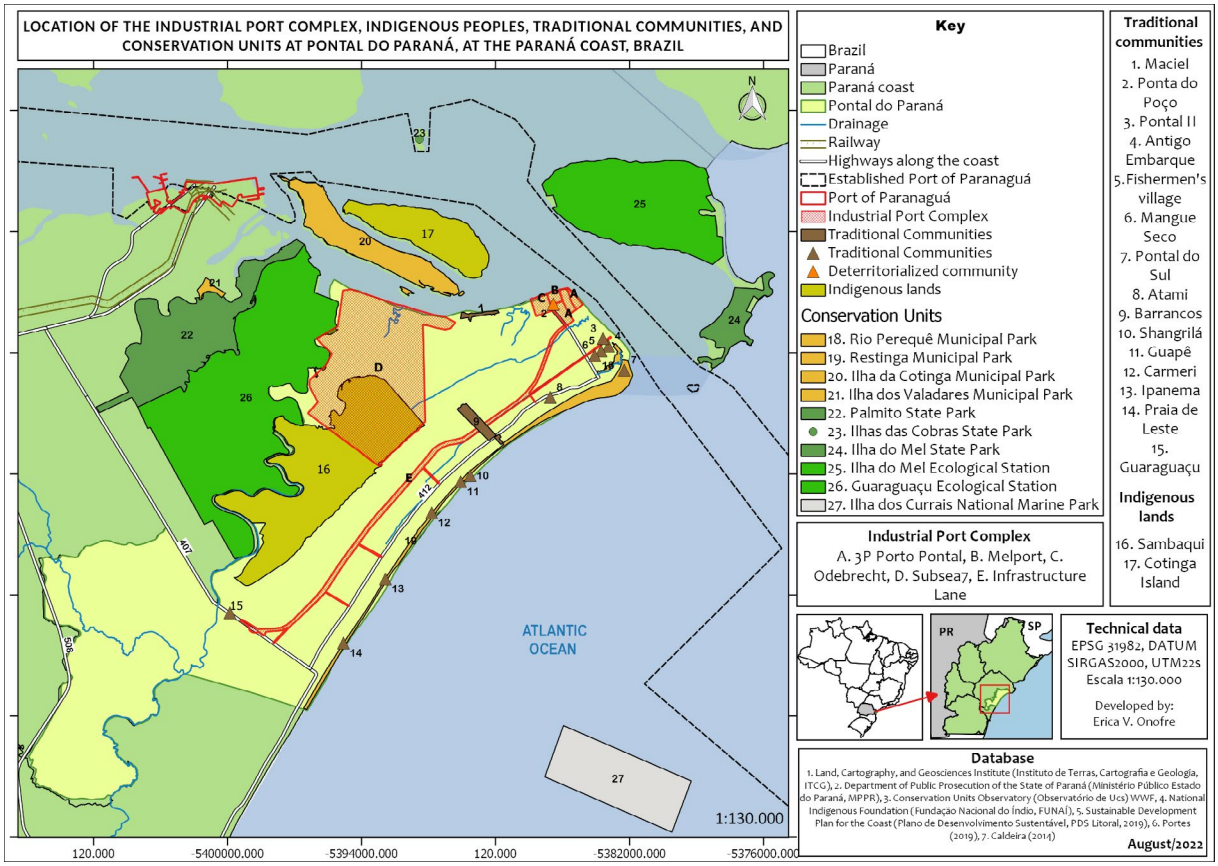

Figure 1 | Location of the Industrial Port Complex, Traditional Peoples, Communities, and Conservation Units at Pontal do Paraná, at the Coast of Paraná

Source: Authors (2021).

3 METHODOLOGY

The documentary analysis method adopted consists of three steps: (1) thematic contextualization; (2) origin, historical context of when the document was produced, authorship, goals, and target audience identification; and (3) scheme and analysis of the document (LÉTOURNEAU, 2011). Steps 1, 2, and part of 3 (the scheme) are when most of the document consultation process takes place. In this sense, for the present article, the thematic contextualization encompassed establishing a definition of environmental licensing, EIA, and its procedures. Therefore, step 2 is included in Table 1 below. The document scheme is based on the items analyzed and how these analyses were performed, as shown in Table 1. Four Terms of Reference[3] (TRs) and the five environmental impact studies of the five MDPs undergoing the licensing process in Pontal do Paraná (Table 1) were analyzed (Table 1). They were obtained with the help of the Coastal Observatory (OC2) of the Coast of Paraná (OC2) and researchers linked to the Geography Postgraduate Program of the Federal University of Paraná. The documents were accessed in the second half of 2019 and consulted between 2019 and 2021.

Table 1 | *Description of the projects undergoing the licensing process in Pontal do Paraná, Paraná coast (Brazil), and documents analyzed*

Document	*Enterprise*	*Licensing Agency / Phase*[4]	*EIS Year*	*Project*
TR and EIS – 3P Porto Pontal (3P)	Porto Pontal Paraná Importação e Exportação Ltda.	Ibama / IL subject to the construction of a new highway.	2007 and 2010[5]	Private
Description: The project encompasses "mooring structures, open-air storage areas, and internal pathways, warehouses, as well as administrative and support structures" (AMB PLANEJAMENTO AMBIENTAL, 2007). The project is estimated at BRL $1,500,000,000.00.				
TR and EIS – Melport Terminais Marítimos Ltda. (MTM)	Melport Terminais Marítimos Ltda	IAP / PL has been issued	2014	Private
Description: Multifunctional terminal for liquid storage, a general cargo warehouse, a container yard, and offshore logistical support (ENVEX et al., 2014). The project is estimated at BRL 100,000,000.00.				
TR and EIS - Infrastructure Lane	DER (Department of Roads of the State of Paraná)	IAP / IL (under legal dispute by the Department of Public Prosecution of Paraná - MP-PR)	2016	Public
Description: The work consists of implementing a new highway (Via Arterial) connected to the state highway PR-412 (four collector lanes); expansion and correction of an existing channel by the DNOS (Departamento Nacional de Obras de Saneamento, National Department of Sanitation Works); railroad implementation; pipeline deployment; transmission and sanitation pipelines implementation (ENGEMIN, 2016). The project is estimated at BRL 270,000,000.00.				
EIS[6] - Wharf and dredging refurbishment – Odebrecht (ODB)	Construtora Norberto Odebrecht S.A.	IAP / Licensing withdrawn after Operation Car Wash	2011	Private
Description: The project consists of the readjustment of the quay for the mooring of ships and dredging to deepen the Galheta Channel. It is estimated at BRL $15,000,000.00 (MRS ESTUDOS AMBIENTAIS, 2011).				
TR and EIS – Base de soldagem Subsea7 do Brasil (SS7)	Subsea7 do Brasil Serviços Ltda	IAP/LP granted and canceled	2009	Private
Description: Norwegian construction and engineering company focused on oil and gas exploration subsea bases. The project is estimated at BRL 103,000,000.00 (AAT, 2009).				

Note: Ibama (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis, Brazilian Institute of the Environment and Renewable Natural Resources) is the national environmental licensing agency. In contrast, the IAP (Instituto Ambiental do Paraná, Paraná Environmental Institute), currently called IAT (Instituto Água e Terra, Water, and Land Institute), is the state Environmental licensing agency. Other acronyms: IL = Installation License; PL = Preliminary License; TR = Terms of Reference; EIS = Environmental Impact Study.

Source: The authors, based on the EISs, Cunha (2018), and Ibama (2020) and Pigosso (2018).

To verify whether the TRs and EISs deal with cumulative impacts or not, we searched for the Brazilian Portuguese equivalents of "cumulative," "cumulativeness," "synergy," and "synergistic" in the environmental prognosis chapter. This section was chosen because it appears after the environmental diagnosis, which provides the basis for forecasting and analyzing the impacts and proposing any mitigating and/or compensatory measures. As Sánchez (2020) explains, the environmental diagnosis is a step before the environmental prognosis. The diagnosis enables one to "obtain and organize the information needed to identify and forecast the impacts," i.e., it provides the benchmark to assess the impacts, which is done in the next step, the environmental prognosis (SÁNCHEZ, 2020, p. 182). Since this analysis focuses on the impact assessment, this section is considered the most relevant one. The content indicated by the keywords was then read to analyze how the cumulative impacts were addressed. That was done following the content analysis criteria of Cooper and Sheate (2002), adapted

by Barros and Pereira (2019), as described in Table 2. It was analyzed whether the document meets ("Yes"), does not meet ("No"), or partially meets ("Partially") each criterion.

Table 2 | Criteria used to analyze the Terms of Reference (TRs) and Environmental Impact Studies (EISs) of Major Development Projects undergoing the licensing process in Pontal do Paraná, on the Paraná coast, Brazil

A. Do the TR demand for the cumulative impacts (CIs) to be considered**?
B. Do the EISs mention the terms "cumulative", "cumulativeness", "synergy"*, "synergistic"*?
C. Do the EISs define "cumulative environmental impacts," "cumulativeness," or "synergy"*?
D. Do the EISs identify CIs for the planning*, implantation, operation, and deactivation* phases?
E. Are the CIs described in qualitative terms? If yes, how?*
F. Are the CIs described in quantitative terms (magnitude prediction)?
G. Is the methodology used to identify and assess CIs described and applied?
H. Are the CI study limitations identified and described?

*Source: Created and adapted by the author based on Cooper and Sheate (2002), as adapted by Barros and Pereira (2019). Key: **criterion included by the authors; *Added by the authors*

4 RESULTS AND DISCUSSION

Based on the document analysis criteria, these were the results for the four Terms of Reference (TRs) and the five Environmental Impact Studies (EISs) (Table 3).

Table 3 | Compliance of the Terms of Reference (TRs) and Environmental Impact Studies (EISs) in relation to the criteria analyzed for the Major Development Projects (MDPs) under licensing in Pontal do Paraná, at the Paraná coast, Brazil

Criterion	*Criteria assessment*	*Projects*
A. Do the TR demand for the Cumulative Impacts (CIs) to be considered?	Yes	Melport and Infrastructure Lane
	No	PPCT; Subsea7
	Partially	-
B. Do the EISs mention the terms "cumulative"; "cumulativeness"; "synergy"*; "synergistic"?	Yes	PPCT; Subsea7; Melport; Infrastructure Lane
	No	Odebrecht
	Partially	-
C. Do the EISs define "cumulative environmental impacts", "cumulativeness", or "synergy"?	Yes	-
	No	PPCT; Odebrecht; Melport; Infrastructure Lane
	Partially	Subsea7
D. Do the EISs identify CIs for the planning, implantation, operation, and deactivation phases?	Yes	-
	No	Odebrecht; Melport; Infrastructure Lane
	Partially	Subsea7; PPCT
E. Are the CIs described in qualitative terms? If yes, how?	Yes	-
	No	Odebrecht; Melport; Infrastructure Lane
	Partially	Subsea7, PPCT

Criterion	*Criteria assessment*	*Projects*
F. Are the CIs described in quantitative terms (magnitude prediction)?	Yes	-
	No	PPCT; Odebrecht; Melport; Infrastructure Lane, and Subsea7
	Partially	-
G. Is the methodology used to identify and assess CIs described and applied?	Yes	-
	No	Odebrecht; Melport; Infrastructure Lane
	Partially	PPCT; Subsea7
H. Are the CI study limitations identified and described?	Yes	-
	No	PPCT; Subsea7; Odebrecht; Melport; Infrastructure Lane
	Partially	-

Source: The authors (2020).

CRITERION A.

The two TRs that point out the need to consider the CIs, namely the Melport and Infrastructure Lane projects, were developed by the Paraná Environmental Institute (*Instituto Ambiental do Paraná*, IAP). The highway TR was developed based on Resolution No. 46/2015 of the State Department of the Environment (*Secretaria Estadual do Meio Ambiente*, Sema), which establishes the "requirements, definitions, criteria, guidelines, and administrative procedures of Environmental Licensing and Environmental Regularization of land road projects, both public and private, to be performed in the State of Paraná".

The TRs of the Melport and Infrastructure Lane MDPs have similar contents; in the fourth paragraph of the introduction, they state "positive and negative impacts, both direct and indirect; primary and secondary; short, medium and long term; cyclic, cumulative and synergistic [...]". In their respective summaries, they describe that the Chapter on "Environmental Impact Assessment" must identify and assess the environmental impacts considering "each of the natural environment components addressed in the environmental diagnosis and the various impact factors and their time of incidence (time frame), as well as an integrated analysis of these factors, their synergism or attenuation". The other two TRs analyzed, namely the 3P Porto Pontal and Subsea7 projects, were developed by Ibama and did not meet this criterion.

CRITERION B.

Four EISs met this criterion, and only the EIS of the Odebrecht project did not meet it. In the 3P Porto Pontal EIS (related to the PPCT), the word "cumulative" appears once; "synergy" 32 times, and "synergistic" 93 times. "Synergy" appears as an attribute of the impact assessment matrix concerning the presence or absence of specific impacts.

The Subsea7 EIS mentions the following terms: "synergy" 52 times and "synergistic" eight times. In this case, the word "synergy" appears as an attribute of the impact matrix, similar to the PPCT project EIS. That explains the number of mentions.

On the other hand, the Melport EIS employs the term "cumulative" once, "synergy" twice, and "synergistic" once. The terms "Synergy" and "cumulativeness" do not appear in the context of impact assessment. This specific study considers other projects in the area and their importance for impact assessment, as described here: "Potential conflicts regarding distinct uses of coastal water": "the synergistic and cumulative effect of the various projects planned and being implemented in the region

led to the development of compatible and complementary activities therein, often in opposition to those that previously existed" (ENVEX; 2014, p. 1162).

The Infrastructure Lane EIS mentions the term "synergy" and "synergistic" both once, as follows:

> The impacts detected in the matrix composed by leveraging Impactful Actions x Impacted Environmental Factors were described below, as per means of occurrence (quantitatively, whenever possible); project phase in which they are expected to occur; their potential synergy to other actions that may lead to the emergence and/or aggravation of other impacts (ENGEMIN, 2016, p. 4)

The term "synergistic" is employed to refer to the relationship between impactful factors, considering that "when environmental impacts occur on a specific factor and are rarely restricted to that factor, usually causing a synergistic effect on other factors" (ENGEMIN, 2016 p. 4).

CRITERION C.

The 3P Porto Pontal, Odebrecht, Melport, and Infrastructure Lane EISs include no definitions. The Subsea7 EIS defines "synergy": "an impact is considered synergistic when it is directly related to another and can increase its positive or negative effect. When there is no such possibility, the impact is classified as non-synergistic" (AAT, 2009, p.1103). No definitions of the terms "cumulative impacts" and "cumulativeness" were found. This criterion was considered partially met given the following, in which there is some approximation to the aforementioned:

> Synergistic: concerning other impacts, i.e., whether the association of the impact under analysis with others can increase its positive or negative effect; Non-synergistic: when there is no mutual relationship with other impacts. An example of a synergistic impact would be the deposition of sediments due to soil loss from erosive processes (AAT, 2009, p. 1101).

CRITERION D.

The 3P Porto Pontal and Subsea7 EISs had similar EIA approaches. In both cases, "synergy" was employed as an attribute of impact assessment and classification, thereby pointing out the synergistic aspect of the impacts of each phase (which, in turn, would be triggered based on the presence or absence of synergy) so this criterion was considered partially met. The 3P Porto Pontal EIS does not define "synergy" but lists it as an attribute to be assessed in each phase.

Three EISs (Odebrecht, Melport, and Infrastructure Lane) did not identify CIs in any of the phases and do not consider "synergy" and "cumulativeness" as impact attributes. For the phases assessed in the studies, the Infrastructure Lane EIS encompassed the Implantation and Operation phases; Melport included Implantation, Operation, and Deactivation; Odebrecht: Planning and Installation and; Subsea7 and 3P Porto Pontal considered all phases, except deactivation.

CRITERION E.

The 3P Porto Pontal project EIS includes a qualitative description of 16 environmental impacts after identifying the synergy attribute in the phase and between impacts (see examples in Table 4). Some negative impacts in the same phase were not considered synergistic: 1. Material and moral damages from displacing the population living in the affected area; 2. Increased risk of accidents on highway BR 277: "This has no present synergy with other impacts that are considered meaningful at this phase" (AMB, 2007, p. 98); 3. Health issues due to the increase in atmospheric pollutants; 4. Health issues and

other problems resulting from increased noise on state highway PR 412; 5. Damage to the structure of buildings near state highway PR 412 due to increased truck traffic; 6. Increased risk of accidents on highway BR 277; 7. Inhibition of new investments in tourism due to port activities: "This impact has no present synergies with other impacts planned for this phase" (AMB, 2007, p. 9). The synergy between phases was not assessed, only between impacts from the same phase.

Table 4 | Examples of environmental impacts listed and the qualitative descriptions of the ones considered as having synergy in the 3P Porto Pontal EIS

	Impact (Nature): Description
1	The worsening quality of life due to insufficient basic infrastructure and public services (N): "It has synergy with the inhibition of the influx of tourists, insofar as the worsening of services will discourage them from choosing Pontal do Paraná as a leisure destination; in turn, that may further worsen the situation given the loss of resources they were to invest" (p. 162)
2	An increase in public safety issues (N): "But there would be synergy with the inhibition of tourist influx to the municipality, in the sense that it would, in part, motivate, and, in turn, foment poverty and social disintegration, due to the decrease in sources of income." (p. 163)
3	Increase in prostitution (N): "Synergy with the potential inhibition of tourist influx; it could be higher, as it might add to the problem" (p. 163)

Key: (N) Negative Impact.

Source: The authors, based on the 3P Porto Pontal MDP EIS.

The Subsea7 EIS considered synergy an attribute. For example: Impact– Dispersion of noise pollution; Attribute–Synergy with other impacts/risks; Qualification–Increased edge effect in areas adjacent to the affected area; disturbances to terrestrial fauna in general due to noise emission; alterations in habitat use by medium and large mammal species; displacement and disturbances to aquatic fauna.

Other MDP EISs (Odebrecht, Melport, and Infrastructure Lane) did not meet this criterion.

CRITERION F.

The 3P Porto Pontal, Odebrecht, Melport, Infrastructure Lane, and Subsea7 EISs did not meet this criterion. The Subsea7 EIS used weights and attributes to assess the importance of the impact, which did not necessarily affect the ability to predict the magnitude of the impact. The weight attributed to synergy was as follows: 1 – not synergistic; 3 - synergistic. This was the methodology to define the value and importance of the environmental impact: "VALUE = (NATURE) X (1.0 X IMPORTANCE) + (0.9 X PROBABILITY OF OCCURRING) + (0.8 X SCOPE) + (0.7 X SYNERGY)".

CRITERION G.

The Subsea7 EIS considered the synergy attribute and described the methodology used to identify impact synergy. According to the EIS, presence and absence were based on whether the impact had a direct relationship with and consequently increased another one, regardless of it being positive or negative (see the transcript in criterion D). Furthermore, "when the impact is synergistic, the other impacts that may be increased must be mentioned" (AAT, 2009, p. 1101).

Despite including the synergy attribute, 3P Porto Pontal did not present a cohesive assessment methodology. Still, it mentions that "to determine whether an impact is synergistic or not and how relevant that may be, each impact was pondered in relation to others in the same phase," as seen in Table 4 of criterion E.

The Odebrecht, Melport, and Infrastructure Lane EIS did not meet this criterion since the CIs were not identified in the evaluation process.

CRITERION H.

None of the studies met this criterion. The Melport MDP mentions other development projects in the area but raises no uncertainties regarding the CIs.

The two TRs that demanded considering CIs did not describe a methodology to assess these CIs, which highlights the context shown by Barros and Pereira (2019) and Montaño *et al*. (2014), according to whom CIs are unduly taken into consideration during the environmental licensing process, leading to poor results in the EIA due to the lack of adequate technical guidelines. In addition, given that the same environmental agency is responsible for both TRs, the documents are standardized, even though the projects encompass significantly different activities. The problem is even more aggravating in the case of the Infrastructure Lane, in which seven different activities are aggregated in the same project and licensing process. During an analysis of the pressure-estate-response for a CIA of projects in the State of Minas Gerais, Neri *et al*. (2016, p. 296) state that the broad and general format of TRs for EISs is one of the reasons behind data inconsistency or unavailability.

From a technical point of view, the results showed that the TRs are guided by Conama Resolution 1/86, which recommends considering the impact's cumulative and synergistic "properties." The TRs that suggest considering the CIs during the assessment follow this same guideline. These studies reflect the guidelines from Conama and the environmental agency that developed the TR. Sánchez (2020) points out a common misconception about what is expected from a CIA. For the author, "assessing cumulative impacts is not the same as indicating in an EIS whether an impact has 'cumulative or synergistic properties', which is a common practice in Brazil," and the cases analyzed to prove that. The inconsistency and uncertainty from the onset of the environmental licensing process (as seen in the TRs) permeate the precariousness of impact studies and compromise the seriousness and rigour of CI assessments. In this sense, Siqueira-Gay *et al.* (2019) highlight that "Environmental Impact Studies need detailed guidelines to improve potential impact interaction analyses," drawing particular attention to the development of TRs. That demonstrates the gap between the theoretical-conceptual, scientific works and EIS's practice and professional application, as Morgan (2012) highlighted. So, it is worth noting that although synergism and attenuation are related to CIs, these terms are used as an attribute linked to the impact's property.

Regarding The PPCT project, in addition to not including recommendations from the environmental agency to consider the cumulative impacts, it has been at the centre of legal battles. Moreover, the entrepreneur attempted to run in the mayoral elections of Pontal do Paraná in 2020 with the motto "The Pontal We Want," bringing the works on the new port and highway (the New Infrastructure Lane) to the forefront of his campaign. Later, according to news reports, the businessman withdrew his candidacy in response to a Federal Police operation that "targeted him amidst investigations of irregularities for granting of an environmental license to Porto Pontal Paraná Importação e Exportação SA" (REVISTA OESTE, 2020). According to the news published in G1, "the businessman is under investigation by the Federal Police and is suspected of paying over BRL 1 million in bribe to obtain an environmental license for a new port in Pontal do Paraná" (G1, 2020).

However, the Odebrecht case highlights the need for the State of Paraná to establish a database that facilitates access to public environmental information and overcomes obstacles to scientific development, thereby improving political and professional practices. On the topic of CIAs, authors like Foley *et al*. (2017), Murray *et al.* (2014) and Olagunju and Gunn (2015) note the difficult access or lack of data as obstacles to developing this science. Foley *et al.* (2017) go one step further and identify

the problem as an investment opportunity, given the need for databases, tools, and regional models capable of aligning science, policies, and practice.

Regarding the presence and absence of terms in the EIAs, the Odebrecht project did not meet this criterion. In the other four studies, "synergy" or "synergistic" were more frequently used as attributes of the impact matrix that defined only presence and absence. As Barros and Pereira (2019) and Montaño *et al*. (2014) highlight, CIs are treated inadequately, and there is severe confusion regarding the terms used. Barros and Pereira (2019) identified that "cumulativeness was wrongly treated as a property of synergism." Similarly, it was noted that the EIS indicated synergy as an impact-related attribute, as aforementioned in Sánchez (2020). Four projects did not include term definitions. Two (namely the Infrastructure Lane and Melport EISs) included demands in the TRs to consider the CIs during their technical impact assessment studies.

The CIs in the planning, implantation, operation, and deactivation phases were not considered in three EISs (Melport, Odebrecht, and Infrastructure Lane). The PPCT and Subsea7 EISs use the term "synergy" as an impact attribute when related to others in their respective phases; this phase-based approach to CIs partially met this criterion. The lack of definitions and methodology fosters confusion when synergy is used as an attribute. That is corroborated by Barros and Pereira (2019) and is considered customary negligence that hinders environmental studies. In the specific case of Odebrecht, impact assessment focused on the planning and installation phases and did not include the operation phase; the justification for this is that the facilities had been previously used for other industrial activities. That raises concerns about the lack of CI analysis and a historical and spatial benchmark (OLAGUNJU; GUNN, 2015; SPALING, 1994) of impacts that have already been left on the environment due to activities done in the 1980s, the deactivation process and the current State, after years of ecosystem recovery. The latter is an essential difference in a proper CIA, where the stages are primarily based on selecting important Social and Environmental Components (SEC) and their status, unlike the EIA, which mainly focuses on the activity/impact (SÁNCHEZ, 2020).

The qualitative and quantitative approaches of the CIs proved to be lacking. There was no analysis between projects, and although the results show a similar synergy approach in the Subsea7 and PPCT MDPs, this study consisted of descriptive analysis without paying attention to space and time scales and presenting a gap between essential phases of cumulative environmental change. The Subsea7 project was the only exception because it quantified the synergy attribute to define impact magnitude and included the methodology. Despite this, it should be noted that mentioning this synergy attribute is not aligned with the CI approach advocated by Spaling (1994); therefore, that study is not enough to identify and assess cumulative impacts. That methodology was not present in the other EISs, nor were any uncertainties concerning CIs. Although this research is limited to five projected projects from a single municipality on the coast of Paraná, this research shows and reinforces that CIs are non-existent or insufficiently addressed in TRs and EISs that are part of the CIA review process, as argued by Montaño *et al.* (2014) and Neri *et al.* (2016).

When questioning the technocracy surrounding the CIA system and the environmental licensing process, Fase *et al*. (2011) suggest that the EIS methods employed in EISs "snatched by the economic interests involved in the project and in the repeated development of formally standardized and socially void impact studies." That is based on the qualitative description of some impacts considered to be synergistic in the 3P Porto Pontal EIS, e.g., 1. Increased prostitution; 2. The worsening quality of life due to insufficient basic infrastructure and public services; and 3. Increase in public safety issues, which interacts with 4. Inhibition of tourist influx. With this in mind, how will the State, corporate agents, and the local population face these issues resulting from installing a new industrial port complex in the municipality? That question remains unanswered, given that the current format of impact assessment is lacking, inefficient, and does not analyze the evident interaction between these four impacts, for instance. Furthermore, it does not consider the historical and future condition of the affected SECs and the interactions of impacts between projects (SÁNCHEZ, 2020), especially considering that the

social and spatial occupation of the Paranaguá Estuarine Complex already meets the criteria for high environmental impact due to the Paranaguá and Antonina Port and other industrial activities (ABRAHÃO and CANEPARO, 2014).

Bronz (2013) points out the business discourse strategy that claims "the State is not me" when the implantation of MDPs causes and increases negative social and environmental consequences. In this case, new questions arise from the institutionalized State's resilience to face the problems caused by these economic vectors. Guzmão (2010, p. 35) highlighted that "we must ask whether these agents–who are in direct contact with new emerging pressures and the immobilizing deficiencies of old–will be able to act strategically".

Finally, the EIA examination process of individual projects was not considered robust enough to analyze CIs. That is not far from other scientific findings. As Neri *et al*. (2016) suggested, despite confirming the need to perform CIAs in cases like Pontal do Paraná, "the approaches and methods commonly applied to the environmental impact assessment of an individual project might not be adequate." The difficulties and limitations are even harsher when considering simultaneous, spatially concentrated projects from different proponents and various typologies. Therefore, the present article highlights this complex and uncertain scenario, which covers how space appropriation by the set of projects will trigger in the short, medium, and long term, significantly affecting the most vulnerable coastal communities and essential natural and cultural environments.

5 FINAL CONSIDERATIONS

The objective of analyzing whether and how TRs and EISs of the major development projects in the Pontal do Paraná Industrial Port Complex assess cumulative impacts was achieved. However, this first approach was limited to the projects' negotiations and did not include other sources of impact, e.g., natural events. Another limitation was its local approach, which was restricted to the region. With this in mind, the most noteworthy points are as follows:

1. The lacking CI approach in which the CIA was conceived has been widely investigated in the literature. That adds to the numerous complaints about how the decision-making processes around Major Development Projects are carried out and how they are mostly limited to reproducing public approval of the enterprise. The legal dispute and investigation involving the purchase of an environmental license for Porto Pontal further aggravate this scenario.

2. Despite receiving the licenses, the MDPs linked to the IPC lack sufficient CI analyses. That occurs from the initial process of environmental licensing with the underwhelming development of the TRs, which are still far from scientific discussions in the field of impact assessment, proving to be ineffective in identifying and assessing CIs. A more robust impact assessment process focused on cumulative impacts, and their methodologies should consider the whole set of projects and territorial planning, not merely individual assessments alongside pre-approved projects. A potential solution would be using different impact assessments discussed and implemented worldwide, such as CIA, SEA, and IEA. The SEA and the IEA are already used for SHPs in the Amazon.

3. Individual granting of environmental licenses and the lack of an EIA process capable of addressing CIs raises serious concerns, given the potential of the projects in Pontal do Paraná to bring forth a context of uncertainty from a social and environmental perspective. This is evident in the case of territorial expropriation of a traditional fishing community (i.e., Ponta do Poço) and the risk imposed on two new cases (the Sambaqui

Indigenous Land and the Maciel Fishermen's Community, as shown in Figure 1). In addition to this tension from overlapping disputed territories, there is an increased risk of deforestation that might result in the loss of Atlantic Forest areas considered highly relevant for conserving biodiversity (MMA, 2018) and the culture and know-how of different ethnic groups that inhabit the region and engage with this fundamental biome.

4. Some limitations of this article include the lack of discussion around the dimension of power. Because of this, it is essential to reflect on how intrinsic issues of the modern colonial and capitalist system might still have a crucial role in democracy and how they permeate power relations in decision-making processes. Or, even with better cumulative impact assessment during the environmental licensing process, would power relations still be relevant in the final say of decision-making processes?

NOTES

1| Environmental licensing is part of the National Environmental Policy, Law No. 6938 of August 31st, 1981. Two Resolutions of the Brazilian National Environment Council [Conselho Nacional de Meio Ambiente, Conama] are important for understanding the applicability of EIA in Brazil: Resolution No. 1/1986, which deals with the criteria, definitions, responsibilities, general guidelines for using and implementing the EIA, and even the establishment of the Environmental Impact Study and Environmental Impact Report (EIS/EIR) and Resolution No. 237/1997, which provides an overview of environmental licensing procedures and criteria.

2| Currently, only the Techint facilities are still in place, but it is deactivated at the moment.

3| It was not possible to obtain the Terms of Reference (TR) of the Odebrecht MDP despite filing a formal application to Instituto Água e Terra (IAT) and a request to the Specialized Environment Support Group (Grupo de Apoio Especializado em Meio Ambiente, Gaema) of the Department of Public Prosecution of the State of Paraná.

4| Licensing phase at the time of consultation, in 2020.

5| The 2010 EIS is a request for additional information about the physical and biotic environment. The EIS itself explains which additional information was requested by the environmental agency, so the technical report requesting this additional information was excluded from the analysis. Furthermore, the additional EIS does not mention cumulative impacts, which are the focus of the present analysis.

6| The Odebrecht MDP Terms of Reference (TR) were not analyzed because they were not provided by the state environmental agency.

ACKNOWLEDGMENTS

The Coordination for the Improvement of Higher Education Personnel (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, Capes). The Federal University of Paraná, especially the Coast Campus – Matinhos. The Department of Public Prosecution of the State of Paraná and to the Specialized Environment, Housing, and Urbanism Support Group (Grupo de Apoio Especializado em Meio Ambiente, Habitação e Urbanismo, Gaema) – Paranaguá.

REFERENCES

ABRAHÃO, C. M. S.; CANEPARO, S. C. Porto de Paranaguá: entrelaces históricos e configuração territorial. VII Congresso Brasileiro de Geógrafos, Vitória – ES, **Anais**, p. 2-14, 2014.

ACSELRAD, H. Introdução. 2011, p. 41-55. In: FASE; ETTERN; IPPUR. R**elatório Síntese do Projeto Avaliação de Equidade Ambiental como instrumento de democratização dos procedimentos de avaliação de impacto de projetos de desenvolvimento**. Rio de Janeiro, 2011, p. 176.

AAT CONSULTORIA E ENGENHARIA AMBIENTAL. Base de Soldagem Subsea7 – Paranaguá. **Estudo de Impacto Ambiental**. Curitiba, 2009.

AMB PLANEJAMENTO AMBIENTAL. Terminal Portuário localizado no município de Pontal do Paraná, PR. **Estudo de Impacto Ambiental**. Curitiba, 2007.

AZEVEDO, N. T de. A vulnerabilidade social dos municípios do litoral do Paraná: construção do Índice de Vulnerabilidade Social (IVS) com base nos dados dos setores censitários IBGE 2010. **Revista Guaju:** Matinhos, v. 2, n. 2, p. 89-124, 2016. DOI: http://dx.doi.org/10.5380/guaju.v2i2.49767

BARCELOS, E. A. da. S. Desregulação ambiental e disputas políticas: uma breve retrospectiva do desmonte do licenciamento ambiental no Brasil. **Revista de Geografia e Ecologia Política: Ambientes**, v. 2, n. 2, p. 278-329, 2020. DOI: https://doi.org/10.48075/amb.v2i2.26589

BARROS, J. A. T.; PEREIRA, A. A. Impactos cumulativos não são analisados em Estudos de Impactos Ambientais no Estado de Minas Gerais. **Roraima: Revista Geografia Acadêmica**, v. 13, n.1, p. 105-115, 2019. ISSN 1678-7226.

BRASIL. **Lei n° 6.938, de 31 de agosto de 1981**. Institui a Política Nacional do Meio Ambiente (PNMA). Brasília, 1981.

BRASIL. **Portaria n° 463, de 18 de dezembro de 2018**. Áreas Prioritárias para a Conservação, Utilização Sustentável e Repartição de Benefícios da Biodiversidade Brasileira ou Áreas Prioritárias para a Biodiversidade. Brasília, 2018.

CALDEIRA, G. A. **Justiça ambiental e desenvolvimento alternativo:** limites e possibilidades para pesca artesanal em Pontal do Paraná – PR. 2018. 391 f. Tese (Doutorado em Meio Ambiente e Desenvolvimento) – Setor de Ciências Agrárias, Universidade Federal do Paraná, Curitiba, 2018.

CALDEIRA, G. A.; PIERRI, N. As relações econômicas e a gestão compartilhada dos recursos comuns: o caso da pesca marinha em Pontal do Paraná, Sul do Brasil. Universidade Federal do Paraná. **Rev. Desenvolvimento e Meio Ambiente**, v. 32, 2014, p. 119-137. DOI: http://dx.doi.org/10.5380/dma.v32i0.35927

CONSELHO NACIONAL DO MEIO AMBIENTE. **Resolução Conama n° 001, de 23 de janeiro de 1986**. Brasília, 1986.

CONSELHO NACIONAL DO MEIO AMBIENTE. **Resolução Conama n° 237, de 19 de dezembro de 1997**. Brasília, 1997.

COOPER, L. M.; SHEATE, W. R. Cumulative effects assessment: a review of UK environmental impact statements. **Environmental Impact Assessment Review**, 22, p. 415-439, mar/2002. DOI: https://doi.org/10.1016/S0195-9255(02)00010-0

CUNHA, I. M. da. **Cidade, lei e desenvolvimento:** Pontal do Paraná, uma estrada para o futuro? 2018, 122 f. Dissertação (Mestrado em Meio Ambiente e Desenvolvimento) – Universidade Federal do Paraná, Curitiba, 2018.

DIBO, A. P. A.; NOBLE, B. F.; SÁNCHEZ, L. E. Perspectives on Driving Changes in Project-based Cumulative Effects Assessment for Biodiversity: lessons from the canadian experience. **Environmental Management**, p. 929-941, 2018. DOI: 10.1007/s00267-018-1086-6

DUARTE, C. G.; DIBO, A. P. A.; SÁNCHEZ, L. E. O que diz a pesquisa acadêmica sobre Avaliação de Impacto Ambiental e licenciamento ambiental no Brasil? **Revista Ambiente & Sociedade**, n° 1, 2017, p. 245-278. DOI: https://doi.org/10.1590/1809-4422ASOC20150268R1V2012017

ENGEMIN ENGENHARIA E GEOLOGIA LTDA. Implantação da Faixa de Infraestrutura em Pontal do Paraná. **Estudo de Impacto Ambiental (EIA)**, Outubro 2016.

ENVEX Engenharia e Consultoria S/S Ltda.; ACE Auditoria, Consultoria e Educação Ambiental Ltda. **Estudo de Impacto Ambiental Melport Terminais Marítimos Ltda**. Curitiba, 2014.

FOLEY, M. M. et al. The challenges and opportunities in cumulative effects assessment. **Environmental assessment impact review**. p. 122-134, 2017. DOI: https://doi.org/10.1016/j.eiar.2016.06.008

G1. RPC Curitiba. **João Carlos Ribeiro (PSC) anuncia desistência de candidatura à Prefeitura de Pontal do Paraná**. Curitiba, 2020. Available at: https://g1.globo.com/pr/parana/eleicoes/2020/noticia/2020/10/23/joao-carlos-ribeiro-psc-anuncia-desistencia-de-candidatura-a-prefeitura-de-pontal-do-parana.ghtml. Access in: 2021.

GALLARDO, A. L. C. F. *et al.* A avaliação de impactos cumulativos no planejamento ambiental de hidrelétricas na Bacia do Rio Teles Pires (região amazônica). **Revista Desenvolvimento e Meio Ambiente**, v. 43, 2017. DOI: 10.5380/dma.v43i0.53818

GOVERNO DO ESTADO DO PARANÁ. **Plano de Desenvolvimento Territorial Sustentável (PDS Litoral):** produto final. Litoral do Paraná, 2019.

GOVERNO DO ESTADO DO PARANÁ. Secretaria Estadual de Meio Ambiente e Recursos Hídricos. **Resolução Sema, n° 46, de 17 de junho de 2015**. Paraná, 2015.

HOFMANN, R. M. **Gargalos do licenciamento ambiental federal no Brasil**. Brasília: Câmara dos Deputados, 2015, p. 1-86. Available at: http://bd.camara.gov.br/bd/handle/bdcamara/24039. Access in: 2021.

INSTITUTO CHICO MENDES DE CONSERVAÇÃO DA BIODIVERSIDADE (ICMBIO). **Mosaicos reconhecidos oficialmente:** Mosaico do Lagamar. Brasília, DF, 2006.

INSTITUTO PARANAENSE DE DESENVOLVIMENTO ECONÔMICO E SOCIAL (IPARDES). **Cadernos municipais:** Pontal do Paraná. 2022. Available at: http://www.ipardes.gov.br/cadernos/MontaCadPdf1.php?Municipio=83255&btOk=ok. Access in: 2022.

INSTITUTO SOCIOAMBIENTAL. **Observatório de Terras Indígenas no Brasil:** pesquisa. Available at: https://terrasindigenas.org.br/pt-br/brasil. Access in: jul. 2020.

LEROY, J. P. *et al.* Relatório **Síntese do Projeto Avaliação de Equidade Ambiental como instrumento de democratização dos procedimentos de avaliação de impacto de projetos de desenvolvimento**. Rio de Janeiro, 2011.

LÉTOURNEAU, J. **Ferramentas para o pesquisador iniciante**. São Paulo: Martins Fontes, p. 99-142, 2011.

MONTAÑO, M. *et al.* Quality review of environmental impact statements applied to small hydropower plants. **Holos Environment**, n. l, v. 14, p. 1-14, 2014. DOI: 10.14295/holos.v14i1.6787

MORGAN, R. K. Environmental impact assessment: the state of the art. **Journal Impact Assessment and Project Appraisal**, v. 30, n° 1, p. 5-14, 2012. DOI: https://doi.org/10.1080/14615517.2012.661557

MRS ESTUDOS AMBIENTAIS. Licenciamento Ambiental para as Obras de Readequação e Dragagem de Cais em Pontal do Paraná – PR. **Estudo de Impacto Ambiental**. Porto Alegre, 2011.

NERI, A. C.; DUPIN, P.; SÁNCHEZ, L. H. A pressure-estate-response approach to cumulative impact assessment. **Journal of Cleaner Production**. p. 288-298, 2016. DOI: https://doi.org/10.1016/j.jclepro.2016.02.134

OLAGUNJU, A. O.; GUNN, J. A. E. Selection of valued ecosystem components in cumulative effects assessment: lessons from canadian road construction projects. **Impact Assessment and Project Appraisal**, v. 33, n. 3, p. 207-219, 2015. DOI: https://doi.org/10.1080/14615517.2015.1039382

PIERRI, N. O litoral do Paraná: entre a riqueza natural e a pobreza social. Editora UFPR. **Desenvolvimento e Meio Ambiente**, n. 8, 2003, p. 25-41. DOI: http://dx.doi.org/10.5380/dma.v8i0.22047

PIERRI, N. *et al.* A ocupação e o uso do solo no litoral paranaense: condicionantes, conflitos e tendências. Universidade Federal do Paraná. **Revista Desenvolvimento e Meio Ambiente**, n. 13, p. 137-167, 2006. DOI: http://dx.doi.org/10.5380/dma.v13i0.9849

REVISTA OESTE. Política. **Alvo da PF, bilionário desiste de candidatura a prefeito**. 2020. Available at: https://revistaoeste.com/politica/alvo-da-pf-bilionario-joao-carlos-ribeiro-desiste-de-candidatura-a-prefeito/. Access in: 2021

SÁNCHEZ, L. H. **Avaliação de Impacto Ambiental:** conceitos e métodos. São Paulo: Editora Oficina de textos, 3. ed. 2020.

SIQUEIRA-GAY, J. *et al.* Quando o pequeno não é belo: negligenciando os impactos cumulativos de Pequenas Centrais Hidrelétricas na Amazônia. **EcoDebate**, 2019. Available at: https://www.ecodebate.com.br/2019/07/02/quando-o-pequeno-nao-e-belo-negligenciando-os-impactos-cumulativos-de-pequenas-centrais-hidreletricas-na-amazonia-por-juliana-siqueira-gay-et-al/. Access in: 2022.

SPALING, H. Cumulative Effects Assessment: concepts and principles. **Impact Assessment**, v. 12, n. 3, 1994, p. 231-251. DOI: https://doi.org/10.1080/07349165.1994.9725865

TIEPOLO, L. M. A inquietude da Mata Atlântica: reflexões sobre a política do abandono em um terra cobiçada. Matinhos: **Revista Guaju**, v. 1, n. 2, p. 96-109, 2015. DOI: http://dx.doi.org/10.5380/guaju.v1i2.45057

VAINER, C. B. Planejamento Territorial e Projeto Nacional: os desafios da fragmentação. **Revista Brasileira de Estudos Urbanos e Regionais**, n. 9, v. 1, 2007, p. 9-23. DOI: https://doi.org/10.22296/2317-1529.2007v9n1p9

ZHOURI, A. Justiça Ambiental, diversidade cultural e accountability: desafios para governança ambiental. **Revista Brasileira de Ciências Sociais**, v. 23, n. 68, p. 97-107, 2008. DOI: https://doi.org/10.1590/S0102-69092008000300007