

# Environmental licensing screening in Espírito Santo state: the practice for small Hydroelectric Power Plants

*Triagem no licenciamento ambiental do estado do Espírito Santo: a prática para Centrais Geradoras Hidrelétricas*

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## ABSTRACT

In the context of Environmental Licensing (EL), project screening is an essential process that establishes whether Environmental Impact Assessment is needed or not. This paper analyzes the EL screening of a type of Small Hydroelectric Power Plants (less than 3 MW) in Espírito Santo state and compares it with other states in Brazil. The methodological process involved document analysis, good practices criteria application, and comparative analyses of the case study. The document analysis allowed us to understand how EL procedures in Espírito Santo have changed over time. The good practices criteria application allowed us to discuss how well processes aligned with outlined objectives. Finally, the comparative analysis between Espírito Santo and other Brazilian states allowed us to identify possible improvements for Espírito Santo's EL system. For example, screening could be improved by considering environmental sensitivity metrics for project classification and establishing guidelines for case-by-case analyses.

**Keywords:** Environmental Licensing. EIA. Screening. Hydroelectric.

## RESUMO

No contexto do Licenciamento Ambiental (LA), a triagem dos projetos é fundamental e estabelece a necessidade, ou não, da Avaliação de Impacto Ambiental (AIA). Este trabalho analisa a triagem do LA de Centrais Geradoras Hidrelétricas no Espírito Santo (ES) e a compara com outros estados. Foram utilizadas análise documental, aplicação de critérios de boas práticas e análise comparativa

*de um Estudo de Caso. A análise documental possibilitou entender como o LA do ES tem modificado seus procedimentos ao longo do tempo e a aplicação dos critérios permitiu discutir seu alinhamento com o que se espera de uma triagem. Por fim, a comparação com a prática de sistemas de outros estados brasileiros permitiu identificar possibilidades de melhoria no sistema do ES. Como sugestão de aprimoramento da triagem, destaca-se a necessidade de consideração da sensibilidade do meio para a definição do enquadramento do projeto e o estabelecimento de diretrizes para a análise caso a caso.*

*Palavras-chave: Licenciamento Ambiental. AIA. Triagem. Hidrelétricas.*

## 1 INTRODUCTION

Environmental Licensing (EL) is used by the Brazilian National Environmental Policy (PNMA) to authorize implementing operating activities that use natural resources or cause degradation to the environment (SÁNCHEZ, 2020). Environmental Impact Assessment (EIA) is another PNMA instrument (BRASIL, 1981), which is a systematic process that examines and anticipates future environmental consequences from development actions (GLASSON; THERIVEL; CHADWICK, 2012). In this sense, for projects with the potential to cause significant environmental impacts, EIA provides information to the EL decision-making process, and, in advance, EIA assesses the project's potential for causing significant impacts (FONSECA; SÁNCHEZ; RIBEIRO, 2017). Furthermore, EIA identifies, measures, and proposes measurements for controlling and mitigating impacts (SOUSA *et al.*, 2014).

The EL process includes stages like screening. In an initial assessment, screening identifies the project's potential for causing significant impacts, defining whether an EIA is necessary and, if it is, defining the type of study needed (IAIA; IEA, 1999). Screening can lead to three scenarios depending on a project's potential for causing significant impacts: (1) EL exempt from EIA; (2) EL subject to simplified EIA; or (3) EL subject to comprehensive EIA (ROCHA; FONSECA, 2017). This stage reflects the first level of commitment to the environmental protection system (RAJARAM; DAS, 2011) and is a critical decision phase (WOOD; BECKER, 2005) since it implicitly involves making judgments on potential environmental consequences for projects (PINHO; MCCALLUM; CRUZ, 2010).

For defining screening scenarios, the environmental agency responsible for conducting the EL process uses lists (positive and negative), thresholds criteria (related to size), project location criteria, potentially affected environmental resources and case-by-case analysis (SÁNCHEZ, 2020). Rocha and Fonseca (2017) state that screening can axe on project thresholds considering the type of project, its size, and its polluting potential. Almeida and Montaña (2015) refer to this approach as project classification and claim that it guides the screening and indicates the studies and documents that will guide the EL process. The criteria used in judging the impact's significance, which guide screening, can be objective or subjective (CANTER; CANTY, 1993). They must, however, be clear and systematic and separate the activities with the potential to cause significant impacts from activities with insignificant potential (ALMEIDA; MONTAÑO, 2015).

The potential of a project for causing significant impacts depends on environmental vulnerability (environment function), in addition to requests imposed by projects on the environment (project function) (GLASSON; THERIVEL; CHADWICK, 2012). Even projects that would initially have minor impacts can seriously impact sensitive environments, whereas the opposite is true of projects with high environmental demands implemented in resilient environments. Inadequate screening can be too permissive and not adequately protect the environment, or it could be unnecessarily conservative, focusing on insignificant impacts. When an EIA is unnecessarily requested, additional project costs and delays can occur (WOOD; BECKER, 2005). Furthermore, screening effectiveness is significant for environmental agencies in optimizing human and financial resources for environmental protection since these agencies often operate with limited administrative capacities and budgets (ROCHA; FONSECA, 2014).

EL for Central Hydroelectric Power Plants (CHPP), the focus of this research, is an example of a situation where screening results for the same project can have three results: i) EL exempt from EIA, ii) simplified EIA, or iii) comprehensive EIA, depending on the characteristics of the location where a project is implemented. Small Hydroelectric Power Plants are divided into categories depending on their size. The definitions may vary according to country, as no internationally accepted definition exists. In the Brazilian context, the CHPP is a small hydroelectric power plant very similar to another type named "Small Hydroelectric Plant" (SHP). From January 2015 to March 2020, small plants ratings less than 3 MW were classified as CHPP (BRASIL, 2015). Currently, this maximum power is set at 5 MW (BRASIL, 2020). Since CHPP are smaller than SHP, they do not usually have the same problems as Hydroelectric Power Plants (HPP) because they do not require large structures or large flooded areas. Therefore, the CHPP project impacts are presumed to be of lesser magnitude when compared to those expected by an HPP (CORRÊA FILHO; PONTE; SOARES, 2017), but they can still be significant depending on project location sensitivity. Also, cumulative impacts from these small projects can be significant or surpass HPP impacts (ATHAYDE *et al.*, 2019).

Pope *et al.* (2013) suggest that EIA research should advance concerning the "fundamentals of impact assessment", including screening. Rocha and Fonseca (2017) also describe the importance of further investigation into screening, claiming that there is a dearth of research at this stage in Brazil, and emphasized that issues related to evolutions and effectiveness of procedures remain little explored.

Thus, the importance of the screening stage and the need for research on practice justify this paper (ROCHA; FONSECA, 2017). Furthermore, practical research bringing empirical evidence on the effectiveness of "impact assessment systems" in Brazil is essential (MONTAÑO; SOUZA, 2015). Finally, a better understanding of how screening occurs in Brazil is a fundamental step towards effectiveness for the entire system (ROCHA; FONSECA, 2017).

This study analyzes screening processes for CHPP projects in Espírito Santo (ES) state, in Brazil. The objective of the study was to analyze the screening of CHPP processes in ES's EL by comparing good practice criteria, allowing us to discuss how practices align (or not) with expected screening practices, and to compare practices with other states to identify possibilities for improvements on the screening process.

## 2 METHODOLOGY

As detailed below, the methodological procedures were divided into two stages: analyzing EL screening processes in Espírito Santo and comparing Espírito Santo with other Brazilian states.

### 2.1 SCREENING ANALYSIS

First, we searched to identify CHPP projects submitted to the state environmental agency in Espírito Santo up to 2019. This step occurred at the State Institute for the Environment and Water Resources (Iema), where we identified and analyzed 12 EL processes of CHPP submitted between 1999 and 2018 (no project submitted in 2019) – Table 1.

The document analysis for the case files (up to the end of the screening stage) allowed us to understand how screening was carried out for each case studied. In addition, this method helped us understand how the project was classified for subsequent screening. We identified the different procedures and legislation used and their modifications throughout the studied period using the case files. Furthermore, the document analysis allowed us to classify procedures according to the three scenarios listed by Rocha and Fonseca (2017): i) EL exempt from EIA, ii) simplified EIA, and iii) comprehensive EIA.

**Table 1** | EL processes of CHPP identified and analyzed.

Identification	Process number	Year	Municipality
1	24419222	1999	Água Doce do Norte
2	35255137	2006	Conceição do Castelo
3	35454512	2006	Santa Tereza
4	49370480	2010	Rio Novo do Sul
5	73863670	2016	Serra
6	77794982	2017	Alegre
7	77794850	2017	Domingos Martins
8	79746446	2017	Alegre
9	80441700	2017	João Neiva
10	80940838	2018	Domingos Martins
11	80876595	2018	Alfredo Chaves
12	83722467	2018	Domingos Martins

Source: Authors' elaboration.

Based on Oliveira *et al.* (2016) and Rocha and Fonseca (2014), we considered the following: an EL exempt from EIA is where a study that does not involve a structured impact assessment process, focusing on establishing controls for known environmental impacts, without necessarily carrying out impact analysis; an EL subject to a simplified EIA is where a study that needs impacts assessment but uses a more straightforward approach than the Environmental Impact Statement (EIS); and an EL subject to a comprehensive EIA, that requires an EIS. This classification was related to the type of study required in the EL process, which was performed using content analysis of the studies, either using the legal definitions or the term of reference that directed the drafting of this study.

Next, we analyzed the screening processes by applying criteria based on EIA best practice operating principles (IAIA; IEA, 1999). These principles establish that the screening process should provide information for determining whether or not a proposal should be subject to EIA and, if so, at what level of detail. They also point out that the EIA must be rigorous, implying that the process should employ methodologies and techniques appropriate to address the problems identified. So, the analysis carried out in this study focused on: if there were parameters for defining the type of EL (rigour in classification to determine whether a project should be submitted to EIA or not) and the type of study needed (rigour for establishing levels of detail). We also verified how screening defines the parameters used to calculate the EL fee. The latter was based on Rocha and Fonseca (2017). These authors highlight that the differences between the EL process and the cost of application fees among Brazilian states can affect practical business concerns, either incentivizing or disincentivizing project installations in specific regions. They also suggest that research should explore differences in procedures and costs and the further implications.

In summary, the analysis sought to verify whether screening fulfilled its functions in directing EIA use on EL processes. Three criteria were applied to each of the 12 EL processes, using the following guiding questions: 1. Does the system have parameters for defining the type of EL (exempt from EIA, simplified EIA or comprehensive EIA)? 2. Does the system have parameters for defining the type of study required? 3. Does the system define the value or parameters used to calculate the EL fee? First, the criteria were applied to each of the 12 EL processes individually to answer them using the information in the case files. However, after analyzing the initial results, we noticed that they were related to the legal framework related to the EL procedures and not to each process. Thus, the criteria were applied to each of the three EL procedures in the studied period. The guiding questions were answered with either a "yes" or a "no".

During the case files analysis, we also needed to realize structured interviews to confirm the information we collected from the EL process and legislation. The interviews were held online, using a questionnaire sent by email and answered by lema managers. The questions were related to confirming the procedures and sought to obtain information not present in legislation, for example, the absence of procedures for defining the type of study, with analysis on a case-by-case basis. We did not need to submit the interviews to an ethics committee review for research with human beings since we were not dealing with individual opinions but environmental agency data and procedures confirmation (BRASIL, 2016).

## 2.2 COMPARING BRAZILIAN STATES

Comparing practices at Espírito Santo with EL screening processes of CHPP in other states allowed us to reflect on the practices at Espírito Santo, based on the experiences of other Brazilian states, to identify areas for improvement. First, the same screening analysis criteria applied to Espírito Santo were applied to other states. Then, using a Case Study (CS), we simulated the screening process for a licensed project in Espírito Santo.

In the first stage, to compare the criteria, we needed to search normative documents contained on state environmental agency websites, to identify procedures applied to CHPP. Only the states with easily accessible screening information were included, resulting in 17 of the total 27 Brazilian states (including the Federal District): Alagoas, Amazonas, Ceará, Espírito Santo, Goiás, Mato Grosso do Sul, Minas Gerais, Pará, Paraíba, Paraná, Pernambuco, Piauí, Rio de Janeiro, Rio Grande do Sul, Rondônia, Santa Catarina, and Sergipe.

Next, project “CHPP Ponte 2” (Process IEMA 80876595, process 11 in this study) was randomly chosen as the Case Study (CS). The project was for 1.7 MW of installed power, a 266.80 km<sup>2</sup> drainage basin, and ecological flows at 0.74 m<sup>3</sup>/s. The project did not foresee creating a reservoir nor interfering with protected areas, indigenous areas, communities, highways and railways.

We decided to use only states that met all the screening criteria applied to compare the CS. In addition, these states had detailed enough information to simulate screening and to make comparisons. Thus, CS comparisons were made only for Mato Grosso do Sul, Minas Gerais, Paraná, Rio Grande do Sul, and Santa Catarina, unlike the analysis criteria, applied to all 17 states. The types of EL required for the CS in the states were also classified using the same analysis of the Espírito Santo (exempt from EIA, simplified EIA, and comprehensive EIA).

Comparisons with other Brazilian states allowed us to reflect on practices in Espírito Santo and propose some points for improvements. Despite information limitations from some Brazilian environmental agency websites, this comparison information can serve as inspiration and support for learning and research (FONSECA; RESENDE, 2016).

## 3 RESULTS AND DISCUSSION

The results are presented according to the two methodological stages.

### 3.1 CHPP SCREENING ANALYSIS FOR ENVIRONMENTAL LICENSING IN ESPÍRITO SANTO STATE

During the studied period (1999-2019), in which the 12 analyzed EL processes of CHPP took place, Espírito Santo state had three different EL procedures (Table 2). Upon analyzing the data in chronological

order, we understood these procedures and analyzed what they said about the EL processes screening of CHPP. First, for screening, we noticed that the procedures for project classification meant that projects were always classified according to project size and polluting/degrading potential (PDP).

**Table 2 |** Environmental Licensing procedure characteristics for Espírito Santo state.

Year	EL Procedure	Identification process	Project size	PDP	Class
1998	Decree 4344-N/1998	1, 2 e 3	Mc S M L	Mc S M L	Sp I II III IV
2007	Decree 1777/2007	4 e 5	S M L	High	II III IV
2016	Decree 4039-R/2016	6 a 12	S M L	High	II III IV

Subtitle: Mc: micro; S: small; M: medium; L: large; Sp: simplified.

Source: Authors' elaboration.

Decree 4344-N/1998 established the first procedure (ESPÍRITO SANTO, 1998), called the Environmental Licensing System for Polluting Activities (Slap). At that time, both project size (function of flooded area) and the PDP (function of power) for the projects were divided into four categories: Micro (Mc), Small (S), Medium (M), or Large (L). Furthermore, regarding the class (combination between project size x PDP), the project could either be Simplified (Sp) or classes I, II, III or IV.

In 2007, by State Decree 1777/2007, this procedure became the System of Environmental Licensing and Control of Polluting or Degrading Activities of the Environment (Silcap). This decree classified projects using an index (I), calculated relative to the flooded area (FA), and the extension of the reduced flow section (RFS) -  $I=FA+2*RFS$ . If a project did not consider building a reservoir, the FA would be zero. The index accounted for the project size (S, M or L, since the classification in micro size no longer existed), which, when related to the PDP (consistently high, and no longer a function of power), determined the project class (either II, III or IV, while keeping the same Slap characteristics) (ESPÍRITO SANTO, 2007). The update on the Silcap in 2016 resulted in classifications being carried out based on two annexes from Iema 14-N/2016 Normative Instruction (NI), but there were no changes on project size determinations, PDP, nor CHPP class (ESPÍRITO SANTO, 2016a; 2016b).

The EL fee in Espírito Santo was established by Law 7001/2001, which related the class and type of license (in this case, Prior License) for defining the price. The values were updated by State Laws 10612/2016, 10710/2017, and 10788/2017.

After describing the three EL procedures, one can see a marked change in 2007, when the project size, PDP, and class parameters were changed. The process analyses allowed us to verify that the project classification always had the same results from the beginning of the Silcap, regardless of the projects and environmental characteristics wherein the projects would be inserted (Table 3). Despite this procedure standardizing only the PDP (consistently high), the parameters always led to small project size classifications. This stems from the fact that CHPP screening follows the same project classification code as other hydroelectric power plants projects. That is, using the same project classification code for all hydroelectric power plants projects results in CHPP compared with larger projects, and as a result they are always classified as small and cannot be differentiated from the others.



**Table 3** | Results for project classification and screening processes.

Identification process	EL procedure	Year	Framing			Screening
			Project size	polluting/ degrading potential	Class	Type of Environmental Licensing
1	Slap/1998	1999	S	S	I	Simplified EIA - ECR
2		2006	Mc	Mc	Sp	Exempt from EIA - no study
3		2006	Mc	Mc	Sp	Exempt from EIA - ECP + DARP
4	Silcap/2007	2010	S	High	II	Exempt from EIA - no study
5		2016	S	High	II	Exempt from EIA - ECP
6	Silcap/2016	2017	S	High	II	Exempt from EIA - no study
7		2017	S	High	II	Simplified EIA - ECR
8		2017	S	High	II	Simplified EIA - ECR
9		2017	S	High	II	Simplified EIA - ECR
10		2018	S	High	II	Simplified EIA - ECR + ECP + DARP
11		2018	S	High	II	Simplified EIA - ECR
12		2018	S	High	II	Exempt from EIA - ECP

Subtitle: Mc: micro; S: small; Sp: simplified; ECR: Environmental Control Report; ECP: Environmental Control Plan; DARP: Degraded Area Recovery Plan.

Source: Authors' elaboration.

Currently, Silcap/2016 is still valid, but the project classification code was updated by NI 15-N/2020 (ESPÍRITO SANTO, 2020). Even without applying it during the analysis of the processes used in this research, we decided to add this update in the discussions since it is the legislation currently being used. This 2020 update changed the project size definition parameters, previously based on flooded area and extension of the RFS, and started to consider installed power. This modification seemed to indicate a potential setback in project classification since it excluded two parameters that had more direct relationships with environmental impacts for this type of project. However, there may be relationships between the flooded area, extension of the RFS, and installed power. The change related to parameter project size did not solve the problem in the previous regulations since CHPP projects will always be small, while the PDP remains fixed at high. The fees were updated via Law 11229/2020, but the way fees are determined has not changed over time since its calculation follows the project class and type of required license.

Analyzing the EL in Espírito Santo and its modifications once can see that only on the Slap we identify slight considerations for locational characteristics during the project classification processes, which is mentioned only in a part of the state decree: "The polluting/degrading potential of activities [...] is defined [...] by considering the effects of activities on soil, air, and water" (ESPÍRITO SANTO, 1998, Art. 58). Despite the changes, one can see that the EL in Espírito Santo has no project classification parameter that considers the sensitivity of the environment, not even indirectly, while the project classification criteria only reflect the CHPP project characteristics. Therefore, the absence of locational parameters for project classification is an essential factor in EL screening in ES. Among the projects analyzed, some projects installed in sensitive environmental areas had the same project classification results as other projects installed in resilient environmental areas. Thus, because procedures that always lead to the same project classification results are adopted without considering environmental sensitivity, the EIA system can wrongly classify specific projects, even though these projects could generally have some

kinds of EL simplifications. No institutional mechanisms were found to identify or correct errors of this nature, both for case document analysis and during the interviews.

Rocha and Fonseca (2017) evaluated the Southeast region of Brazil and pointed out that the criteria used in screening processes were based on project typology, size, and PDP. This goes against the grain of best international practices (IAIA; IEA, 1999) since potential impacts are decisive screening factors depending on project characteristics and environmental sensitivity (GLASSON; THERIVEL; CHADWICK, 2012). In the opinion of experts, introducing locational factors into screening criteria should be an urgent improvement for the Brazilian EIA systems (FONSECA; SÁNCHEZ; RIBEIRO, 2017). Based on this, introducing location criteria already appears as an essential point for improving screening processes in the Espírito Santo state.

After identifying the mechanisms for project classification, we sought to verify how this project classification was applied to the screening process to define the type of EL. In the period studied, the type of EL (Table 3) was always defined in a case-by-case analysis, which was not related to the legislative framework. Although the case-by-case analysis does not appear in any EL normative procedures by legislation in Espírito Santo, the case-by-case analyses were identified in all processes we studied. However, analyzing the case files, none of the processes mentioned how (and why) they decided on the type of EL or study. Information obtained during the interviews confirmed no established parameters for defining the type of EL. Even on a case-by-case analysis, screening criteria clarity is necessary for both rigour and transparency in EIA decision-making processes (IAIA; IEA, 1999) and an essential repository of information for the EIA learning process (CRUZ; VERONEZ; MONTAÑO, 2018). Using a case-by-case approach during screening may capture the significance of the potential environmental impacts of a project. However, if it is misused, it can also be complex, slow, and expensive (ROCHA; FONSECA, 2017).

The same was valid for defining the type of study, which is requested at the discretion of the environmental agency analyst, without using guiding criteria. Nadeem and Hameed (2008) also noticed the absence of criteria for defining the type of environmental study needed when analyzing Pakistan's EIA.

Given the procedures involved in granting EL in Espírito Santo, in legislation and processes, and the content required in different studies, the type of EL was identified, considering the procedures described in the methodology. We considered: EL exempt from EIA, as cases involving Environmental Control Plans (ECP) and Degraded Area Recovery Plans (Prad); EL subject to simplified EIA, as being cases when Environmental Control Reports (ECR) were required; and EL subject to comprehensive EIA, as being cases when the EIS was required. Half of the projects was licensed using simplified EIA, with the most common study being the ECR, and the other half were licensed with EIA exemptions (Table 3). Despite appearing to be a somewhat coherent result for a CHPP, rescuing the risks of inadequate screening, without considering the environmental sensitivity, some projects may be unnecessarily rigorous (WOOD; BECKER, 2005), while others are pretty permissive (ATHAYDE *et al.*, 2019).

Next, the CHPP screening analysis in Espírito Santo was complemented by applying best practices criteria (Table 4). As described in the methodology section, the criteria were applied to each procedure established in legislation and adopted over time, including changes made recently by NI 15-N/2020. A fact already mentioned was that no specific parameter for case-by-case analyses was identified in the case files analysis for defining the type of license, nor the type of study required, corroborating the results presented in Table 4.

**Table 4 |** Analysis of screening in Environmental Licensing process in Espírito Santo.

Criteria	Slap/1998	Silcap/2007	Silcap/2016	NI 15-N/2020
1 - Does the system have parameters for defining the type of EL?	no	no	no	no
2 - Does the system have parameters for defining the type of study required?	no	no	no	no
3 - Does the system define the value or parameters used to calculate the EL fee?	yes	yes	yes	yes

Source: Authors' elaboration.



The analysis based on the best practices criteria shows that, despite changes to EL procedures, we observed no changes in fulfilling the criteria for analyzing the CHPP screening processes. Despite legislation having parameters for project classification CHPPs (Silcap project classification always led to the same result), this was not used to screen projects, and screening (requiring EIA and type of study), was done on a case-by-case analysis, without legal provisions, and without applying any guiding parameters. During the analyzed period, the screening procedures always focused on classifying the project to determine the price of the fee that would be charged for the EL, and criteria for establishing the type of EL and necessary study were not defined. This lack of rigour to define whether an EIA was necessary and, if so, to define the type of study goes against best practices (IAIA; IEA, 1999). The procedures adopted in Espírito Santo do not indicate (and do not support indicating) a systematic and judicious process for defining the type of EL and the type of study needed, which is fundamental for EIA screening outcomes (IAIA; IEA, 1999; ROCHA; FONSECA, 2017). This is worrying since the screening is a critical decision phase (WOOD; BECKER, 2005).

Given these results and observing practices from other states, we can offer guidelines for improvements, as presented in the following section.

### 3.2 COMPARING SCREENING IN DIFFERENT BRAZILIAN STATES

To compare CHPP screening with other Brazilian states, we needed to identify states with environmental agency websites with sufficient information on the screening stages for this project typology (including available legislation). Using the availability of information as a criterion proved to be adequate since transparency and availability of information are essential practices in processes involving multiple stakeholders (SNELLEN; THAENS; DONK, 2012). Furthermore, according to Fonseca and Resende (2016), state environmental agency websites have evolved in recent years and are essential sources of information on EL practices in Brazil.

We compared current EL procedures in Espírito Santo (NI IEMA 15-N/2020). Table 5 shows the result of applying CHPP screening criteria to other surveyed states. Of the total 27 Brazilian states, 10 had no information (Acre, Amapá, Bahia, Distrito Federal, Maranhão, Mato Grosso, Rio Grande do Norte, Roraima, São Paulo, and Tocantins). This study corroborates results from Fonseca and Resende (2016), who compared website content from state environmental agencies and percentage compliance with best practices in providing information. Of the 17 analyzed states here, 12 (Alagoas, Amazonas, Ceará, Espírito Santo, Mato Grosso do Sul, Minas Gerais, Pará, Paraná, Pernambuco, Rio de Janeiro, Santa Catarina, and Sergipe) received "good" or "fair" ratings from Fonseca and Resende (2016). Therefore, the analyzed information was easily accessible, although São Paulo and Bahia states were evaluated as the best by Fonseca and Resende (2016), but did not have necessary screening information here in this study.

The overview in Table 5 shows that 10 states did not meet any criteria. Espírito Santo, as already discussed, only fulfilled the criterion related to fees. Only five states used screening parameters to define the type of EL and the fees (Mato Grosso do Sul, Minas Gerais, Paraná, Rio Grande do Sul, and Santa Catarina), but Piauí met two criteria. We should note that the focus of the analysis was on CHPP screening and that this assessment may not apply to other cases, thereby not constituting a complete assessment of screening in these states.

In summary, the application of analysis criteria showed that the screening situation in Espírito Santo does not differ much from other Brazilian states. However, the lack of clear information on EL and the need for discretionary environmental agency definitions compromises not just screening but the entire process, especially concerning decision-making. For Abema (2013), the lack of clarity or imprecise rules and a high degree of analysts and manager discretion is one challenge for improving EL in Brazil.

The states that met all criteria were used in the second part of the comparative analysis since they had enough detailed information to allow for this comparison. Thus, a more detailed analysis of the Espírito

Santo screening processes for CHPP was compared with five other states using the CS we had chosen (Table 6). The definition of the type of EL in this table was based on the type of study brought by the legislation, and the study content was verified to identify if the EL case was exempt from EIA, simplified EIA, or comprehensive EIA, according to the methodology.

**Table 5 | Analyzing CHPP screening in some Brazilian states.**

State	Analyzed legislation	Criterion 1 (need for EIA)	Criterion 2 (type of study)	Criterion 3 (licensing fee)
Alagoas	Law 7625/2014	No	no	no
Amazonas	Law 3785/2012	No	no	no
Ceará	Resolution Coema 02/2019	No	no	no
Espírito Santo	NI IEMA 15-N/2020	No	no	yes
Goiás	Environmental Licensing Manual	No	no	no
Mato Grosso do Sul	Resolution Semade 9/2015 and Decree 11766/2004	Yes	yes	yes
Minas Gerais	Normative Resolution Copam 217/2017	Yes	yes	yes
Pará	Resolution Coema 117/2014	No	no	no
Paraíba	Administrative Norm 101/2019	No	no	no
Paraná	Resolution Sedest 09/2021 e Law 10233/1992	Yes	yes	yes
Pernambuco	Law 14249/2010	No	no	no
Piauí	Resolution Consema 033/2020	Yes	yes	no
Rio de Janeiro	Resolution Inea 32/2011	No	no	no
Rio Grande do Sul	Resolution Consema 388/2018	Yes	yes	yes
Rondônia	Law 3686/2015	No	no	no
Santa Catarina	Resolution Consema 98/2017, NI IMA 44/2019 e Law 15940/2012	Yes	yes	yes
Sergipe	Resolution Cema 06/2008	No	no	no

Source: Authors' elaboration.

The comparisons show that Espírito Santo, Mato Grosso do Sul, Rio Grande do Sul and Santa Catarina used EL subject to simplified EIA, while Minas Gerais was EL exempt from EIA. Since screening information was lacking in Paraná, both cases were possible. Therefore, the comparative analysis considering the CS showed that Espírito Santo, Mato Grosso do Sul, Rio Grande do Sul, and Santa Catarina have more conservative screening, while Minas Gerais and Paraná are potentially more flexible, allowing EL exempt from EIA. For Minas Gerais state, it is worth noting that the EL of CHPP for the CS takes place via mere registration. No state required EL with comprehensive EIA, and the most frequent requirement was a simplified EIA. Regarding EL process simplifications, Oliveira *et al.* (2016) showed that simplifications could reduce the degree of process safety by reducing information volumes, EL analyses, and public participation; however, simplified procedures can streamline licensing and reduce process costs. Simplifying has the sense of making it more explicit, less complex and what one should seek for the EL is a simpler normative model, as long as they do not diminish safety and efficiency in examining negative environmental externalities (GARBACCIO; SIQUEIRA; ANTUNES, 2018).

**Table 6 |** Comparative analysis using the case study (process 11 from Table 3).

State	Screening parameters	Screening Result for the Case Study		
		Type of EL	Study	Fee (R\$)
Espírito Santo*	Power	Simplified EIA	ECR	2,096.39
Mato Grosso do Sul	Power and reservoir area	Simplified EIA	PEA	Not Evaluated**
Minas Gerais	Reservoir volume and location criteria	Exempt from EIA	SEL	197.2
Paraná	Flooded area; area of suppressed native vegetation in the initial regeneration stages; area of suppressed native vegetation in the medium regeneration stages; area of suppressed native vegetation in the advanced regeneration stages; length of the adduction system; extension of the reduced flow section; number of unfeasible-use rural properties; installed power and flooded area.	Exempt from EIA (ECP) or Simplified EIA (SES)	ECP or SES	318.22
Rio Grande do Sul	Ecological flows in reduced flow sections and zoning sensitive areas	Simplified EIA	SES	418.25
Santa Catarina	Power, polluting/degrading potential and flooded Area	Simplified EIA	SES	1,868.10

Subtitle: \*analysis considering the updated NI Iema 15- N/2020

\*\*could not evaluate given the information on the Espírito Santo case study

ECR: Environmental Control Report; ECP: Environmental Control Plan; PEA: Preliminary Environmental Study; SEL: Simplified Environmental License; SES: Simplified Environmental Study.

Source: Authors' elaboration.

We observed a relationship between the type of EL and the fee charged. States with EL subject to simplified EIA had the highest rates relative to states with EL exempt from EIA. The fee in Minas Gerais is ten times lower than the fee in Espírito Santo. In Minas Gerais, the EL is made using registration and is exempt from EIA, while in Espírito Santo is necessary an environmental study based on simplified EIA.

Santa Catarina had screening results that were more similar to Espírito Santo, with EL performed using simplified EIA and SES, and the EL fee was closest to the fee charged in Espírito Santo.

It is worth noting that states that meet screening criteria also have some kind of guideline of the project location or environmental sensitivity. In Minas Gerais and Santa Catarina, the PDP is defined using activity impacts relative to air, soil and water. In Minas Gerais, the locational factor was weighed in the screening process. The Paraná also considers sensitive areas, and the Rio Grande do Sul has specific procedures depending on the SHP and CHPP. In Rio Grande do Sul, the state has a location map of areas for use in EL of SHP and CHPP, separating them into suitable or unsuitable areas where the projects could be subjected to specific studies on migratory ichthyofauna.

The screening analysis of the CHPP project in Espírito Santo, and the comparisons with other Brazilian states, allowed us to reflect on these practices and consequently propose some improvements. First, we highlight the need for inserting locational factors in screening parameters. Minas Gerais and Santa Catarina determine PDP relative to air, soil, and water, and this is a good practice. Also, Minas Gerais

introduced locational factors in determining parameters for screening, which is an interesting practice, and a significant advancement in legislation in Minas Gerais (ALMEIDA; MALVESTIO; BERNADI, 2019).

Even regarding project location, maps of specific suitable areas for SHP and CHPP, as is done in Rio Grande do Sul state, can enhance benefits on considering environmental sensitivity in the screening process. Therefore, integrating EL and EIA with other instruments from the Brazilian National Environmental Policy is needed, mainly for Environmental Zoning. Interactions between these three instruments can occur at different times, and when observing their objectives, we see a close relationship between them (MONTAÑO *et al.*, 2004). For example, environmental Zoning indicates areas with more or less potential (or restrictions) for implementing specific activities and can dispense with or reinforce the need for using EIA (MONTAÑO *et al.*, 2007). By contrast, not integrating these instruments ends up overloading EL, which ends up taking on functions that it should not (IGNÁCIO; ALMEIDA; MONTAÑO, 2012).

Another Espírito Santo screening feature that needs improvement is returning to a conceptual basis for screening and its role in being rigorous in separating projects depending on their environmental impact potential. Screening in Espírito Santo state (which today is based on a case-by-case analysis without guiding parameters, with project classification used only to determine the EL fees) would now have criteria for screening projects, considering not only PDP but also environmental sensitivity. This could reduce discretion in defining EL type, and the screening stage could fulfil its role in EL processes.

## 4 CONCLUSION

During the studied period, Espírito Santo had three different EL procedures. In all of them, the CHPP classification was used to calculate the EL fee, with no directions for the screening process. Screening, which should define whether an EIA is needed or not and what type of study, was defined on a case-by-case analysis. However, this analysis is not outlined in the Espírito Santo state's legal EL procedures and is carried out without guiding parameters, at the discretion of the environmental agency analyst. The adopted procedure in the Espírito Santo state does not align with screening best practices since it does not indicate (and does not support indicating) criteria for defining the types of EL nor the types of necessary studies, which is fundamental for EIA screening outcomes.

Another deficiency was the absence of project classification and screening parameters related to environmental sensitivity, which reflected only on CHPP project characteristics. Adopting procedures that always lead to the same project classification results without considering environmental sensitivity and screening without guiding parameters mean that the EIA system may be subject to misclassifications for CHPP projects without accounting for institutional mechanisms for identifying or correcting errors of this nature.

The screening of Espírito Santo could improve by classifying projects accounting for environmental sensitivity. Regarding screening, in addition to being supported by the project classification outcome, criteria for case-by-case analyses need to be established. Finally, we suggest that screening of CHPP allows for defining the type of EL (exempt from EIA, simplified EIA, or comprehensive EIA) and the type of study based on clear criteria.

One limitation of this study was that the conclusions here are only valid for the project typology studied in the periods analyzed and applied to Espírito Santo state. Therefore, we suggest that future studies apply other project typologies and contexts. In addition, new studies should explore and analyze other screening aspects, like thresholds and the possibility of public participation.

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