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Analysis of The Environmental Licensing of Mining for Civil Construction in Minas Gerais State, Brazil

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Abstract: Currently, due to the repeal of COPAM Normative Deliberation (DN) No. 74/2004, the regularization of mining activities for civil construction in the state of Minas Gerais, Brazil is conducted through DN COPAM No. 217/2017. This regulation abolished the Environmental Operating Authorizations (AAF) and introduced the inclusion of locational criteria assessment in the screening phase of the environmental licensing process, aiming to consider the significance and sensitivity of environmental elements within the licensing modalities. Through analysis on the Environmental Licensing System (SLA) platform of the State Secretariat for the Environment and Sustainable Development (SEMAD), of 14 projects encompassing mining activities for civil construction that had previously been regularized under the AAF, it was observed that 12 of these projects would necessitate further environmental documentation and studies. This includes the submission of the Environmental Control Report (RCA) and the Environmental Control Plan (PCA), in addition to specific studies addressing the identified locational criteria. The objective of the paper was to analyze the main changes in the screening phase of the environmental licensing processes for mining activities (small-scale and medium pollution potential) for civil construction, following the implementation of DN COPAM No. 217/2017 in Minas Gerais, Brazil.

Key words: mining, environmental vulnerability, environmental regularization

1. Introduction

Mineral extraction, in general, involves various activities that can potentially be harmful to the environment. For this reason, mining projects must undergo environmental licensing procedures and be subject to supervision by the proper environmental agency. Due to population growth and consequently the demand for construction materials, mining activities focused on the construction sector, including the extraction of sand and gravel for immediate use in construction, rock extraction for gravel production, and open-pit mining of ornamental and cladding rocks, experienced significant growth between the years 2000 and 2018 in Minas Gerais State, located in southeast of Brazil [1]. Currently, with the revocation of Normative Deliberation (DN) COPAM No. 74/2004, the regularization of activities in Minas Gerais is conducted under Normative Deliberation (DN) COPAM No. 217/2017. This norm abolished the Environmental Operating Authorization (AAF) and included the categorization of activities according to locational criteria in the screening stage of the environmental licensing process, in order to consider the relevance and sensitivity of environmental components in the licensing modalities [2]. Furthermore, the locational criteria for classification refer to the relevance and sensitivity of the environmental components that characterize them. They are assigned a weight of 0 (zero) if the activities do not fit into any of the specified criteria, a weight of 1 (one) or a weight of 2 (two) if they fit into the established criteria, as shown in Table 1 [2]. The AAF, being a simpler and faster process, did not require the presentation of environmental studies, which expedited the environmental regularization of the enterprise. On the other hand, the lack of technical information

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became a hindering factor for the environmental agency's oversight. Additionally, the AAF did not allow the establishment of environmental conditions. As a result, the environment and the interests of communities neighboring the enterprises became more vulnerable [3]. With this study, the aim was to evaluate the possible changes in the screening stage of the environmental licensing process for the three mining activities focused on the construction sector mentioned earlier. The focus was to assess the impact of the discontinuation of AAFs and the inclusion of locational criteria in the regularization of these activities. The study sought to discuss whether the changes in environmental legislation in the state of Minas Gerais will ensure the protection of the environment, especially in the most vulnerable areas. Since these changes are recent, this analysis of the studied activities has not been documented until now.

Table 1 Locational criteria for classification, adapted from normative deliberation (DN) COPAM No. 217/2017 [2].

Locational Criteria for Classification	Weight
Location within an area of high or very high potential for the occurrence of cavities, as per official data from CECAV-ICMBio.	1
Location within an upstream drainage area of a watercourse segment classified as a special class.	1
Location within Biosphere Reserve, excluding urban areas.	1
Location within formally established Ecological Corridor, as per legal provision.	1
Location within Sustainable Use Conservation Unit, excluding APA (Environmental Protection Area).	1
Location within the buffer zone of a Full Protection Conservation Unit, or within 3 km of its surroundings when there is no buffer zone established by a Management Plan; excluding urban areas.	1
Surface water intake in a Conflict Area due to water resource usage.	1
Vegetation removal, except isolated trees.	1
Location within areas designated as Ramsar Sites.	2
Location within Full Protection Conservation Unit, under conditions prescribed by Law.	2
Vegetation removal in priority conservation areas, considered of “extreme” or “special” biological importance, except isolated trees.	2

2. Material and Methods

Technical processes were selected with AAFs granted according to Normative Deliberation (DN) COPAM No. 74/2004, between the years 2000 and 2017, for the three mining activities focused on the construction sector that were studied.

Next, the historical data of licensed enterprises in Minas Gerais was downloaded in shapefile format from the Secretary of State for Environment and Sustainable Development (SEMAD), along with the locational criteria for classification provided by the Spatial Data Infrastructure of the State System for Environment and Water Resources (IDE-Sisema) [4].

Subsequently, in QGIS software version 3.18, a filter was applied to select enterprises conducting mining activities for the construction sector, classified as Class 2 (“small-scale” and “medium potential polluter/degrader”) according to DN COPAM No. 74/2004, which were previously classified as Class 1 under the old DN COPAM No. 74/2004 [5].

After the previous step, two enterprises for each of the three construction-focused activities were mapped: two without 0-weigh locational criteria, two with 1-weight locational criteria, and one with a 2-weight locational criterion, in order to verify the licensing modality of the activities according to the current regulations in the State.

The technical processes of the mapped enterprises were analyzed in the online tool of the Integrated Environmental Information System (SIAM) of the state

of Minas Gerais to identify those that have AAFs [6]. Fourteen technical processes with AAFs were identified (Table 2).

Table 2 Processes selected with environmental operating authorization (AAF) in the integrated environmental information system (SIAM).

Code and Activity	Technical Process with Environmental Operating Authorization (AAF)	Grant date	End of the licensing period	Integrated Basic Guidance Form (FOBI) Number
A-03-01-8 Extraction of sand and gravel for immediate use in civil construction	34100/2012 01192/2013 17504/2013 26609/2010 24379/2013	16/01/2013 14/06/2013 26/11/2013 08/12/2014 23/12/2014	16/01/2017 14/06/2017 26/11/2017 08/12/2018 23/12/2018	Not available 0047496/2013 2092638/2013 1203511/2014 0240761/2014
A-02-09-7 Extraction of rock for gravel production	14492/2008 01803/2004 19171/2017 03156/2001	11/08/2009 08/11/2006 26/09/2017 02/05/2013	11/08/2013 08/11/2010 26/09/2021 02/05/2017	270981/2009 626986/2010 Not available 0249944/2013
A-02-06-2 Open-pit mining -Ornamental and cladding rocks	19518/2014 42723/2013 10393/2013 15899/2010 13539/2016	30/09/2014 30/06/2015 28/05/2013 08/04/2011 16/09/2016	30/09/2018 30/06/2019 28/05/2017 08/04/2015 16/09/2020	0710339/2014 Not available 0550172/2013 237684/2011 A 0907302/2016 B

For the activity of rock extraction for gravel production, no processes were identified with AAF from enterprises classified under 2-weight locational criterion.

With the data obtained in the previous steps, the classification simulation and the necessary documentation for the environmental regularization of these activities were carried out following the guidelines of Normative Deliberation (DN) COPAM No. 217/2017 through the online platform Environmental Licensing System (SLA) [7].

Finally, the classification simulation and the documentation required for the formalization of the environmental licensing processes in SLA were compared with the documentation required to obtain the AAF according to the guidelines of Normative Deliberation (DN) COPAM No. 74/2004.

3. Results and Discussion

3.1 Results

3.1.1 Activity A-03-01-8 — Extraction of Sand and Gravel for Immediate Use in Civil Construction According to Normative Deliberation (DN) COPAM No. 217/2017.

The simulation of the environmental regularization for sand and gravel extraction activity for immediate use in civil construction indicated classification for 2 enterprises under the Simplified Environmental Licensing (LAS-Cadastro) modality, 2 enterprises under Simplified Environmental Licensing and Simplified Environmental Report (LAS-RAS), and 1 enterprise under Concomitant Environmental Licensing (LAC1), as shown in Table 3.

The LAS-Cadastro modality, resulting from the intersection of Class 2 and 0-weight locational criteria, applies to two enterprises, is equivalent to the AAF, and does not require the presentation of environmental studies. The required documentation would be the CAR (Rural Environmental Registry), Municipal Certificate (land use and occupation), and Property Registration Certificate.

The LAS-RAS modality (1-weight locational criterion) the required documentation would be the same as LAS-Cadastro, with the addition of the Federal

Technical Registry of Environmental Activities and Defense Instruments (CTF/AIDA), the RAS (Simplified Environmental Report), and the locational criteria studies "Location planned in the Biosphere Reserve, excluding urban areas" and "Location planned in the buffer zone of Integral Protection Conservation Unit, or within 3 km of its surroundings when there is no buffer zone established by a Management Plan; excluding urban areas".

Table 3 Simulation results of environmental regularization for mining activities related to civil construction according to Normative Deliberation (DN) COPAM No. 217/2017.

Code and Activity	No. of Enterprises	Licensing Modality	Documents that would be required*	Locational Criterion (Weight)
A-03-01-8 Extraction of sand and gravel for immediate use in civil construction	2	Simplified Environmental Licensing (LAS-Cadastro)	-	0
	2	Simplified Environmental Licensing and Simplified Environmental Report (LAS-RAS)	Federal Technical Registry of Environmental Activities and Defense Instruments (CTF/AIDA); study regarding locational criteria; Simplified Environmental Report (RAS).	1
	1	Concomitant Environmental Licensing (LAC1)	CTF/AIDA; study regarding locational criteria; Environmental Control Report/Environmental Control Plan (RCA/PCA); Plan for the Recovery of Degraded Areas (PRAD); Publication of License Application; Proof of Authorization for Environmental Intervention (AIA) process protocol.	2

*For all enterprises, the following documents would be requested: CAR, Municipal Certificate (land use and occupancy), Certificate of Property Registration for the project, the importation of the polygon file for the project in shapefile format, and the ANM process number with the year, titleholder, and mineral substance.

The CTF/AIDA (Federal Technical Register of Activities and Instruments for Environmental Protection) is a mandatory registration at the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA) for individuals and legal entities engaged in environmental consultancy and the industry and trade of equipment, devices, and instruments aimed at controlling polluting activities [8].

The RAS is a study to identify the environmental aspects, impacts, and control measures related to the location, installation, operation, and expansion of an activity [9].

The study for areas within a Biosphere Reserve should assess whether the implementation/operation of the enterprise will alter the land use of the area occupied by traditional communities, whether there will be the removal of species used in the activities carried out by these communities, and whether it will affect existing cultural manifestations or tourism activities located in the vicinity of the company area [10].

The study of this locational criterion should assess the predicted impacts on activities conducted within the Conservation Unit, such as environmental services, prevention and control of forest fires, deforestation, hunting, irregular occupations, research activities, and environmental education [10].

One enterprise would currently be classified under the LAC1 modality, resulting from the combination of class 2 with the 2-weight locational criterion "Suppression of native vegetation in priority areas for conservation, considered of 'extreme' or 'special' biological importance, except for isolated trees".

In this modality, in addition to the basic documents, the Environmental Control Report/Environmental Control Plan (RCA/PCA) with ART, the Plan for the Recovery of Degraded Areas (PRAD), Publication of License Request, proof of the protocol of the

Authorization for Environmental Intervention (AIA) process, and the study of the locational criterion are required.

The RCA should cover the description of the enterprise to be licensed, a description of the production process, and a characterization of solid waste, liquid effluents, atmospheric emissions, and noise [9]. The PCA should contain proposals to prevent or correct the environmental impacts resulting from the installation and operation of the enterprise, as identified in the RCA [9].

The objective of the PRAD is to define the necessary measures for the recovery or restoration of the degraded area, thereby minimizing environmental impacts [11].

The study of Priority Areas for Conservation should provide information on the existing characteristics of the affected areas and the identified anthropogenic pressures (mining, livestock, agriculture, urban expansion, etc.), according to the document "Biodiversity in Minas Gerais — An atlas for conservation" (2005). Additionally, impacts on rare, endemic, or threatened species (flora and fauna) should be analyzed [10].

The publication should be made in a regional or local newspaper with wide circulation by the entrepreneur before the formalization of the process and within 30 days after the publication of the environmental license's concession [2]. This makes the information about the progress of environmental licensing processes more accessible to the population.

In situations involving the removal of native vegetation, the Authorization for Environmental Intervention (AIA) must be obtained from the State Institute of Forestry (IEF) [13].

3.1.2 Activity A-02-09-7 — Rock Extraction for Gravel Production according to Normative Deliberation (DN) COPAM No. 217/2017.

Regarding the activity of rock extraction for gravel production, all four selected companies, after simulation, were classified under the LAS-RAS modality (Table 4).

Two enterprises are not subject to any locational criteria. The intersection of class 2 and the locational criterion (weight 0) resulted in the LAS-RAS modality, as indicated in Table 4.

Table 4 Simulation results of extraction of rock for gravel production according to Normative Deliberation (DN) COPAM No. 217/2017.

Code and Activity	No. of Enterprises	Licensing Modality	Documents that would be required*	Locational Criterion (Weight)
A-02-09-7 Extraction of rock for gravel production	2	Simplified Environmental Licensing and Simplified Environmental Report (LAS-RAS)	Federal Technical Registry of Environmental Activities and Defense Instruments (CTF/AIDA); Simplified Environmental Report (RAS).	0
	2	LAS-RAS	CTF/AIDA; study regarding locational criteria; RAS.	1

*For all enterprises, the following documents would be requested: CAR, Municipal Certificate (land use and occupancy), Certificate of Property Registration for the project, the importation of the polygon file for the project in shapefile format, and the ANM process number with the year, titleholder, and mineral substance.

According to Article 20 of DN COPAM No. 217/2017, the LAS-Cadastro modality is not permitted for this activity [2].

One enterprise is situated in a "location planned in an area of high or very high potential for the occurrence of cavities, according to official data from CECAV-ICMBio" (1-Weight Locational Criterion).

For this locational criterion, a speleological study must be provided, aimed at identifying potential natural cavities located within the influence areas of the

enterprise, and assessing the actual and potential impacts on speleological heritage [10]

Another company the 1-weight locational criterion was attributed due to its location within the Atlantic Forest Biosphere Reserve.

For the rock extraction for gravel production activity, no technical processes were identified under 2-weight locational criterion. Consequently, for two of the technical processes, only the RAS would be required as a mandatory environmental study. For the other two processes analyzed, in addition to the RAS, the study of 1-weight locational criterion for areas with Cavities and within the Atlantic Forest Biosphere Reserve would be mandatory.

3.1.3 Activity A-03-01-8-Open-Pit Mining — Ornamental and Cladding Stones According to Normative Deliberation COPAM No. 217/2017

The intersection of category 2 with the locational criterion (weight 0) resulted in the LAS-RAS category for two companies, which would require the following documents: CAR, Municipal Certificate (land use and occupancy), Property Registration, CTF/AIDA, and RAS (Table 5). According to DN COPAM 217/2017, the activity cannot be classified as LAS-Cadastro [2].

Table 5 Simulation results of Open-pit mining - Ornamental and cladding rocks according to Normative Deliberation (DN) COPAM No. 217/2017.

Code and Activity	No. of Enterprises	Licensing Modality	Documents that would be required*	Locational Criterion (Weight)
A-02-06-2 Open-pit mining - Ornamental and cladding rocks	2	Simplified Environmental Licensing and Simplified Environmental Report (LAS-RAS)	Federal Technical Registry of Environmental Activities and Defense Instruments (CTF/AIDA); Simplified Environmental Report (RAS).	0
	2	LAS-RAS	CTF/AIDA; study regarding locational criteria; RAS.	1
	1	Concomitant Environmental Licensing (LAC1)	CTF/AIDA; study regarding locational criteria; Environmental Control Report/Environmental Control Plan (RCA/PCA); Plan for the Recovery of Degraded Areas (PRAD); Publication of License Application; Proof of Authorization for Environmental Intervention (AIA) process protocol.	2

For a company located within the area belonging to the Ecological Corridor, a study must be presented outlining the impacts of the establishment of the enterprise on species' habitat and the viability of their populations.

In cases of native vegetation removal, plans for rescuing rare, endemic, or threatened species and their reintroduction should be included if applicable [10].

Another company is located in an area with a high or very high potential for the occurrence of cavities. To achieve environmental regularization, a speleological study must be submitted.

The LAC1 modality was determined for one company. The mandatory documentation for formalizing the process includes, in addition to the LAS-RAS documents, a study related to locational criteria (suppression of native vegetation in priority conservation areas of "extreme" or "special" biological importance, excluding isolated trees), RCA/PCA with ART, PRAD, Publication of License Request by the entrepreneur, and proof of the AIA process protocol (Table 5).

3.2 Discussions

Regarding the AAF, the environmental process was more streamlined compared to conventional environmental licensing, without the requirement for the submission of environmental studies, prior inspections, and the establishment of environmental conditions [14].

As stated by Moraes (2003), it was through the Term of Responsibility with the ART that the entrepreneur declared to the environmental agency that the enterprise was ready to operate in compliance with the legally established environmental conditions and parameters.

As a result, the absence of technical information about the location of the enterprise, its impacts, and environmental control measures were factors that hindered the supervisory role of the licensing authority, potentially leading to the authorization of activities in inappropriate locations and conditions [14, 16].

Through the analysis and simulation of the screening phase of environmental licensing processes for 14 projects involved in mining activities for civil construction, which were previously regularized with AAFs, it was possible to assess that for 12 projects, additional documents and environmental studies would be required for the formalization of the processes.

With the implementation of the SLA platform, all stages of environmental regularization are conducted online, eliminating the need for physical process submissions and making the process less bureaucratic, while accelerating the analysis by environmental agencies.

Compared to the documents required to obtain AAFs, the changes detected in the documentation that would be required in the SLA platform include the CAR, CTF/AIDA, publication in widely known journals, environmental studies (RAS, RCA/PCA, PRAD), and specific studies for locational criteria.

The requirement of the CAR will assist in monitoring rural properties and controlling deforestation in Permanent Preservation Areas (APPs), Legal Reserves, and forests [15]. The CTF/AIDA will establish greater federal-level control by IBAMA (Brazilian Institute of Environment and Renewable Natural Resources) over the work of professionals providing environmental services [8]. The publication in most relevant journals will provide accessibility and enable the population to follow the environmental licensing process of companies.

Environmental studies for locational criteria must address ways to minimize impacts on faunal and floristic biodiversity, geological diversity, water resource management, and traditional communities, contributing to environmental preservation. Other changes were also detected in the screening phase. The submission of the enterprise's polygon shapefile represents progress in environmental licensing, as it allows the environmental agency to verify the vulnerability of the area through locational criteria as a complementary measure to inspections in the analyzed areas [16].

It should be clarified that despite the identified advancements, the requirement for more documents and environmental studies in the environmental licensing process does not guarantee an ecologically balanced environment. It is necessary for entrepreneurs to implement mitigating and compensatory measures established in the environmental studies, and it is required for the licensing environmental authority to exercise its role in monitoring, supervising, and inspecting approved licenses and their conditions.

4. Conclusions

- The presentation of the shapefile of the project's polygon represents an advancement in environmental licensing, as it enables the environmental agency to verify the environmental vulnerability of the area through locational criteria by checking the polygon in IDE-Sisema [16].
- The inclusion of locational criteria indicates the mandatory nature of environmental studies and aims to contribute to the prevention and control of environmental impacts through proposals for mitigative, reparative, and/or compensatory measures.
- Therefore, the documents and environmental studies, in conjunction with regulatory activities, compliance with environmental conditions, and

the use of tools like IDE-Sisema and SLA, can contribute to enhancing the administrative control of the environmental agency over environmental licensing processes in Minas Gerais.

- Future studies are recommended, encompassing the analysis of technical processes for other mining activities and their incorporation into locational criteria for framing, in order to highlight the areas of relevance and sensitivity of environmental components through the environmental studies required in the screening phase of the environmental licensing processes according to DN COPAM No. 217/2017.

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