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EVALUATING THE ENVIRONMENTAL LICENSING PROCESS OF MARINE CALCAREOUS ALGAE BY THE IBAMA IN BRAZIL: CONTRIBUTIONS TO INSTITUTIONAL LEARNING

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Abstract

Currently, the efforts of marine research and marine resources exploitation are rising. However, debate usually is divided into economic and conservation approaches. One procedure used in Brazil to achieve coherence between economic development and environmental management in exploitation of natural resources is the environmental licensing. In Brazil, this activity is relatively recent and so little is known about the actual negative environmental impacts. The goal of this paper was to evaluate the main positive and negative aspects from environmental licensing process of exploitation of marine algae in Brazil guided by the IBAMA, focusing on processes with operation license emitted or expired. This qualitative research and methodology was developed into different stages between 2014 to 2015, analysis of legislation, information in licensing online systems and consultation in the technical collection of IBAMA head office, in Brasília. From processes evaluated, some of the main negative aspects found were incomplete studies, occurrence of irregularities, time elapsed and judicial intervention. On the other hand, positive aspects were strategies to give more speed and efficiency to processes. For breaching the conditions of operating licenses, all these licenses were suspended. The improvement of environmental licensing is needed and very required by several actors. However, it needs a broad discussion that considers the institutional existing experiences and limitations, mainly under challenges and pressure in its operational, budgetary or political performance.

Keywords: *Lithothamnium* sp., IBAMA. Information accessibility. Marine resources.

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1 Introduction

Marine resources: from use to challenges of conservation

The calcareous algae are composed biologically by calcium carbonate in their structure and they are distributed in several genus and species. Genus usually known are *Lithothamnion*, *Amphiroa*, *Sporolithon* and *Lithophyllum*, both from Phylum Rhodophyta, and *Halimeda*, from Phylum Chlorophyta (REITNER; THIEL, 2011).

In the ecosystemic approach, studies point out the importance of the calcareous algae like founder species, driving habitat diversity to marine organisms (AMADO-FILHO et al., 2010; BASSO, 2012; COSTA et al., 2020). Due to chemical composition and suitable porosity for economic use, some economic applications for this kind of algae are animal and human supplementation, fertilizer, soil concealer, aquarium ornamentation and water treatment (KEMPF, 1980; DIAS, 2000; CAVALCANTI, 2007).

Literature usually reports impacts associated with mining activities of a category called marine granulate – basically sand and gravel - among them pollution, habitat destruction, changes in topography of marine bottom, and reduction of variety of benthic species (NEWELL et al., 2004). Nonetheless, although IBAMA normative ruling 89/2006 states that the overexploitation of marine algae banks affects the biodiversity, impacts of marine calcareous extraction considered here as calcareous algae in living and non-living forms are neither well known nor easily available (GROOT, 1996; GOMES; PALMA; SILVA, 2000; NEWELL et al., 2004).

Several challenges must be overcome to reach a sustainable local and global use of marine resources. Constantly, the overlap between potential areas economically and territories with priority status for conservation are reasons of conflict among big companies, the environment activists and small threatened groups (SANTOS et al., 2016; VILLÉN-PÉREZ et al., 2017).

To better manage it, the State must level out needs and guarantee the protection of the environment, not only for the current generation but also the future ones. In policy aspects, environmental licensing is a suitable instrument to promote it.

Environmental licensing of marine calcareous: general aspects and challenges

Environmental licensing is an instrument of environmental Brazilian policy, instituted by the law 6,938/1981, whose main purpose is balancing environmental management and economic development. In practical terms, activities or commercial users of environmental resources that are potentially polluting or able to cause environmental degradation require an appropriate legal authorization from a competent environmental agency, i.e. licenses in order to carry out their activities (CONAMA, 1997; FIORILLO et al., 2015).

In Brazil, environmental protection is a common competence shared by Union, States, Federal District and the municipalities and established by the Federal Constitution of 1988. According to Law 6,938/1981, only institutions belonging to the National Environment System - SISNAMA - are able to guide licensing and provide or not - the authorization requested, within its constitutional competence, divided into national and local environmental agencies, e.g. from state and municipal level. Several legal and administrative regulatory instruments regulate the environmental licensing and provide important guidelines related to each stage.

The IBAMA is a public entity created by the law 7735/1989, with head office located in Brasília, and has jurisdiction in all national territory. The main activities conducted by IBAMA concern environmental policing, control, monitoring and licensing. The decree 8973/2017 points out as IBAMA's responsibilities, the environmental licensing of activities considered effective or potentially polluting or able to trigger environmental degradation; monitoring and applying penalties in cases of non-compliance of established measures; and the generation and dissemination of environmental information.

Among different kinds of typology – mining, oil and gas, artificial reefs, hydropower plants - licensed by IBAMA, stands out the marine calcareous, that is a generic nomenclature not well defined by a specific IBAMA normative, but usually stands for calcareous algae, rhodoliths, nodules and biodetritic marine sediment. Currently, this typology was included into a unique category called mining, however it is needed to draw a distinction of what living (algae), and non-living forms (sediment) are considered. In the past, processes related to artisanal commercial exploitation of marine algae located at transition zones of terrestrial and coastal areas were licensed by IBAMA. Currently, the most part of processes are related to non-living forms extraction.

Although it has advanced in recent years in terms of knowledge and technological investments in the marine environment, in the literature the gap of environmental public information is commonly reported, alongside the difficulty for accessing environmental information for the society.

As a result, these facts contribute to fragile transparency and accountability, keeping barriers to social participation, better environmental management and the improvement of public policies and governance (GOUVEIA et al, 2004; ZHOURI, 2008; BONNE, 2010; HYDER et al., 2015).

The guarantee of access to information and social participation might improve the decision-making process that affects the environment and the social aspects related to it and a suitable resources management, mainly in the coastal and marine environment, where impacts sometimes are not quickly visible, and limits among natural territories are not well delimited, as well as restoring the impacts left by disasters might take long (HAKLAY, 2003; CARMO, 2013; OLIVEIRA et al., 2020).

In Brazil, CF of 1988 assured citizens the right to access to public information, except to sensitive information related to personal and classified data. This right was reinforced by the law number 10,650/2003, law that establishes the National System of Environmental Information (SINIMA); and other legal instruments applicable to the public sector focused on transparency. Only with the advent of the law 12,527/2011 - law of access to information -, the constitutional right of access to public information and the procedures to get one was regulated. Nevertheless, despite these legal instruments, the availability and access to public government data still face some difficulties (MACIEL, 2020; SILVA et al., 2020).

Currently, the United Nations established the Decade of Ocean Science for Sustainable Development 2021-2030, whose one of the goals is to bring together efforts to bridge the existing gap of knowledge about marine environment to support effective practices of management. Additionally, one of the Sustainable Development Goals from global Agenda 2030 is related to conservation of oceans and marine resources. However, to attach these goals and implement effective measures to global and local conservation, not only more policies institutional capacity, budget and governance but also database and available information of activities in marine environment to support decisions and reveal points for institutional and policy improvement (MILLS et al., 2020; NAM, 2020; MACPHERSON et al., 2021).

The main goal of this work was evaluating the environmental licensing process of marine calcareous algae by the IBAMA and making suggestions of improvement in the process. Additional goals were to get information about nature or resources extracted – living or nonliving; main states of collection; main environmental impacts recorded in the monitoring reports and identify misconceptions, gaps and best practices related to proceeding.

This study does not represent the entire universe of processes of marine calcareous licensing at IBAMA, it was mainly due to the information availability and other operational questions during this development. All data used in this work are public.

2 Material and Methods

This was qualitative research developed from 2013 to 2015 based on nine processes mapped in IBAMA website related to calcareous typology and with operation license emitted. However, details and information about each one were not totally available on the website. Therefore, the methodology was divided into a series of steps at different times to get the complete information: (1) review of the Brazilian legislation related to environmental licensing, marine calcareous typology and marine management; (2) analysis of the records and documents got in different channels of government and public access, e. g. electronic institutional system of the IBAMA and National Environmental Licensing Portal and by the e-SIC (Access to information System); (3) consultation of documents at IBAMA Brasília Office occurred for three weeks in October 2015, specifically in Environmental Licensing Board Archive and Central Archive.

A previous checklist guided the analysis and comparison of the processes: description of algae of interests, environmental studies presented, rule in force, violation occurrence and others. The main findings were displayed in charts to support the analysis of the results and discussion.

3 Results and Discussion

From nine identified processes, they were distributed: three processes with expired LO, four processes with emitted LO and two processes with renewed LO. Results presented here focusing on four processes of expired and emitted LO due the available information during this research. The location of activities were Espírito Santo and the Pernambuco coast.

Open procedure and regulation in force

The time between the initiation of the procedure and the emission of the license were more than one year of duration. As result, at least one of the processes had to adjust in terms of changing legal normative. With the implementation of a new regulation, these holders had to make the proper adjustment, which resulted in enlargement of the time of procedure and even continuity of activities.

In terms of the applicable legal framework related to marine algae, the IBAMA published some normative ruling (IN) in order to complement national and specific environmental legislation.

Previously, the first legal document was the IBAMA directive 147/1997, that brought information about calcareous algae, the kind of permittee companies for the exploration, area limits for material collection and general information about environmental license and restrictions in case of environmental infringement. This legal document was replaced by IBAMA IN 46/2004, that better characterized constraints and requirement models and other files needed to follow the workflow of licensing. Lastly, it was replaced by IBAMA IN 89/2006, which incorporated the main information from previous normative. These regulations regulate exploitation, transport and sale of marine algae in Brazilian coast, specifically live organisms in the superficial layer.

In terms of instances of the opening process, the most part of the processes was opened in a local instance and collaborative support among these and the executive board from head office - DILIC, public body from IBAMA structure responsible by the operation of environmental licensing at federal level - was watched both in the starting of the processes and during the development of them. It was a positive feature in the licensing because it let the experiences and the local knowledge provide better support to decision-making and environmental control.

Activity features and purposes

The artisanal extraction was related mainly to marine algae capture, commerce transportations and sale to authorized companies both in Brazil and foreign countries linked to commercial purposes of the aquarium market. These licenses were required by legal entities of small size with CNPJ - National Registry of Legal Entity. The main goal of the activities was exploiting and commercializing calcareous algae, mainly from genus *Lithothamnion sp.* (live algae) and *Halimeda sp.* (gravel). Furthermore, misinterpretation about capture of these genus of algae in the form of gravel was constant, despite the guidance of the legislation specifying the need of consultation to National Mining Department (ANM) in these cases.

In general, processes had a succinct characterization and were mostly unclear, with information missing about environment studies, planned activities and characteristics of the operational activities. The fulfillment of FAP - form of opening process and its structure contemplates general information about the activities or enterprise under licensing, for example physical, biological and socioeconomic means, including location, goal and holder of the process.

As a result, this form provides previous information and initial stages of the licensing process and the knowledge by society about the purpose of it. However, the most part of existing information in the FAPs were generic and about activity - process number, typology, responsible coordination and location and holder. In addition, about public access to IBAMA system, maps are usually not available and neither are additional information about location, physical and biotic environment.

Environmental studies and impacts

An important point to understand the particularities from federal licensing is the participation of other actors in the process, e.g. ANM, Chico Mendes Institute for Biodiversity Conservation - ICMBIO and other non-governmental ones. The ANM leads an important role in algae calcareous licensing, when the commercial interest product is biodetritic sediment existing in sub superficial layers (non-living resources), considered as mineral resource deposit. In this case, the previous requirement is done to ANM for research and study, and posteriorly the step of environmental licensing is asked at IBAMA.

Most previous terms of reference (TRs) used to guide the elaboration of environmental studies were templates. In addition, despite opportunities provided by IBAMA, not only to holders but also to other institutions related to environmental licensing, e.g. Tamar Project and Conservation Units, there was no expression or contributions in opportune time to final version of TRs. In relation to environmental studies, they were somewhat simplified, due initially to the features of activities. Information constraints about geographic coordinates, *datum* and the used scale did not foster the real understanding of areas of interest to capture.

Conflicting information also was found about the biological features of interest algae and it was unclear procedures to be adopted to remove marine associate organisms and its destination, and consideration in the moment of capture of algae and pieces of substrate - all material as alive or not. In spite of the lack of real definitions about methodologies, programs and indicators to evaluate occurrence of impacts during the operation of activities, this generic mention of impacts and misconception among impact and activity were weak aspects from studies.

Lack of perspicuity among impacts and measures were also realized in terms of measured proposals to mitigate the impacts expected. They were insufficient and have often been confused with the specific normative requirements, for instance division into sub-areas of capture and prioritization in the removal of loose algae, specifically *Lithothamnion* and *Halimeda*.

Other measures were considered in the studies to reduce the environmental impacts during the activities. Lastly, environmental monitoring plans were generic and presented to IBAMA only after the emission of operation license, as required restriction. Ideally, the purpose of them would be evaluating evolution and possible changes of environment under collect circumstances.

Due to the lack of some information related to activities and clarity in methodologies would be developed, the IBAMA requested complementary information to environmental studies to better clarify them. An interesting point was the suggestions given and required information into technical views. It illustrates the importance of IBAMA not only in the attachment of the institutional attributions established by the legal normative but also as an institution able to provide orientation.

In all environmental studies evaluated by IBAMA there was need of additional information by the holders, including in a general way the following: details about activities' methodology, perspicuity about methods and equipment to delimit exclusion areas. It also required mitigation measures more consistent, to show by the holders knowledge and care to hinder or avoid impacts on the environment.

Environmental monitoring and fulfillment of the licensing constraints

Previous surveys before license emission were other important points in terms of verification of area of interests by IBAMA staff and comparing them to information given by holders and the situation in the field. Actions like enforcing the police power and the establishment of preventive measures from the public administration. In both processes, the license emitted was the kind the operation one, due to the nature of activities, with the cost varying among them owing to the logistics involved and the four-year duration, except one the process, with two licenses emitted in different moments due to judicialization.

After each license is given, some specific or generic environmental constraints must be complied. In case they are not watched or environmental crimes were committed, the law 9,605/1998 establishes specific sanctions to be applied, for example, fines, embargo, infraction notice and others.

License constraints are needed to guarantee the faithful greeting of conditions to perform operational activities authorized by licenses. In this case, the environmental constraints were divided into two kinds: generic and specific.

The specific one usually contemplated restriction of collect and procedures to export and the presentation of monitoring reports within established deadlines in order to watch the environmental recovery. Overall, the environmental constraints were similar in all processes and, according to LOs emitted, the validity of the licenses is conditional on strict compliance with these constraints.

Among four processes evaluated until 2016, only information about environmental reports presentation from 2 processes. None of the environmental reports from the consulted processes in this research is available on IBAMA's website. Some weaknesses were identified, for instance: little knowledge to identify and quantify the accompanying organisms that were made based on popular knowledge, thus leaving to the IBAMA analysts the appropriate identification; lack of coordinates of collect points and suitable scale of maps, making it difficult to pinpoint their location. In a general way, the algae were sold to international and national companies in both processes. Details about recovery and other information were not available.

Violations and sanctions

The non-compliance with the license environmental constraints, specifically unauthorized capture of marine organisms, resulted in environmental infraction. Among them, calcareous algae collected above the permitted quantity, sedimentary rocks and marine invertebrates - coral reef blocks were pointed out. In all processes, presence of marine organisms associated were reported in material captured. The IBAMA suspended the operation license as another administrative penalty, based on non-compliance with constraints and the precautionary principle, as a preventive measure. The operation license and the emission of new GTAMs were suspended based on the precautionary principle and principle of legal certainty. It must be observed that the suspension of the license is not synonymous with the cancellation of it and just the suspension of the effects of that

An interesting point watched was how the intervention of different actors in verifying the occurrence or not of irregularities, for example Brazilian Federal Revenue, Public Prosectur and others. Actions like that reinforce how important the joint action of several actors - governmental and non-governmental - is in the environmental licensing process, not only in *ex ante* but also *ex post* stages of the license emission. In short, all these points clearly show the dynamic of environmental licensing and restate the need to not allow itself to be led by generic and simplistic speech that does not take into account previous experiences from processes, be them successful or not.

Total process time, governance and institutional aspects

The time elapsed between request of procedure opening and license emission varied among the processes. It is noticeable the economic loss got by some of the holders, either by the stoppage of activities caused by legal adaptation or other operational impediments, or yet the need for judicial intervention. On the other hand, measures for improving and expedite the environmental licensing process – under legal procedure – also were watched, among them, the can be pointed out: in-person meetings among technical staff of IBAMA and the holders and available to solve any doubts or giving additional guidance, communication with other stakeholders, both for support in inspection activities or joint elaboration of reference terms to guide environmental studies.

Frequently it is said about lengthy environmental licensing, but beyond the necessary bureaucracy, the set of factors that contribute to it are not really discussed in depth and broadly. As seen in sections before, the need of additional information to clarify items not attended in reference terms or about misinformation in environmental studies, judicial intervention, irregularities committed, besides the specific dynamic of procedure to involve other actors into the arena in different moments have contributed decisively to increase of total time. At the same time, it is necessary having in mind that as well as an institution part of the Public Administration, the IBAMA, in order to perform and defend the public interest, must act under observance of legal normative, besides other aspects that conform its performance.

Another point is the need of time enough to analyze documents related to process and attending other administrative tasks, with a limited structure and workforce. Some efforts have been made in terms of systematization, for instance, the implementation of the System of Federal Environmental Licensing Management - SisG-LAF, since 2020. However, other improvements need to be made - not only related to system and modernization but also to staff, as training, headcount and support to inspection - and require for that budget assignment to execute effective actions. The last public tender happened in January of 2022 – nine years after the last one - and although some internal movements are possible to seize the workforce into Public Administration, specific positions for environmental auditors and analysts are fulfilled by public contests.

Given all this information, reinforce here the need of institutional strengthening of IBAMA, mainly to face the debate of economic growth and environmental conservation in terms of licensing and protected areas. This debate needs to be broadly discussed, taking into account the existing institutional experience and learning - as IBAMA as other actors and the guarantee of even resource allocation in order to keep the environmental policy in an effective way. In addition, the society must understand the importance of budget to building administrative and strategic actions, as well as highlighting how the public service suffers with budgetary cuts on lower decision power portfolios, avoiding repetitive speeches that state the environmental license as an obstacle to economic growth.

Access to information and general limitations of the research

The biggest difficulty to develop this research that time was due to access to public environmental information related to this kind of type of study from IBAMA. Add to this the existence of outdated information in website of IBAMA, files not located in person consultation, lack of digital processes as well as wrong interpretation of Protocol office in Superintendency of Bahia, in Salvador city, about the Law of Access to Information and its implications, being necessary the intervention of IBAMA Ombudsman office to solve this question - data and information related to environmental studies and licensing process, with exception of sensitive information, are public. Although SisG-LAF implementation and of improvement made in terms of digital transformation and open data system in recent years, the availability of information in public access of the website requires further attention and its implementation of this system is recent yet.

Lastly, the information evaluated in this research is only a small picture of the environmental licensing of marine algae - specifically calcareous one in Brazil. It was not possible to consult inspection and juridical departments to get additional information and clarifying about the existing judicial interventions and the infraction reports, nor get in touch with holders to hear a non-governmental opinion about the process, what would contribute with this work.

Future research and proposals of improvement

There is a lot to understand about activities related to exploitation of marine calcareous algae, as living or not - living resources, and the environmental impacts created, both positive or not. This research field still requires more attention and support, which knowledge produced might increase the existing knowledge about Brazilian marine resources, encourage other economic and conservation research as well improve marine policies more suitable and based in evidence.

After all, some recommendations of this research are the review of IBAMA IN 89/2006, based on knowledge acquired during the processes, enhancement of resource allocation to IBAMA better develop its activities, continuity of digital transformation, the strengthening of partnerships among IBAMA and other institutions, including Universities, and institutional knowledge management, take into account the particularity of each type and the key role played by IBAMA staff in the processes. Some founds discussed in this work are aligned with points discussed broadly in recent report of process of public access TC 020.056/2020-6, that evaluated the environmental licensing by the IBAMA in relation to external audit of operational nature, that is, exam of the performance and mainly the efficiency, economy and effectiveness principle, of the Federal Brazilian Court of Accounts (TCU), reinforcing the need of different stakeholders – government, universities, companies – understanding and contributing to improvement of the environmental licensing in Brazil.

4 Conclusions

Environmental licensing is an ongoing process and involves multiple actors and legal, institutional and social aspects. This paper provides some contributions to debate related to economic exploration and licensing of calcareous algae alive in Brazil, both in academic approach and institutional one. However, it does not end the issue that needs the continuity of other surveys, for example, about processes related to exploitation of non-living algae from continental shelf.

In the face of current context of flexibility of environmental licensing mainly based on historical and existing negative aspects, this paper reveals how the existence of judicial intervention, irregularities and gaps in the processes contributed to total time of licensing, and how not to let oneself be led by the length or apparent simplicity of activities, allowing speed to speak louder than knowledge and ensuring the necessary to keep the environment and society safe. Lastly, in spite of significant efforts in terms of system information it is understood that the licensing processes need to become more transparent and available, since most of them are kept confined in physical archives of IBAMA, which is inappropriate in the advanced technologies age.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

José Ângelo Sebastião Araújo dos Anjos: conceptualization, methodology and supervision. **Luana Sena Ferreira**: conceptualization, analysis, methodology, writing - original draft, review & editing.

DECLARATION OF INTEREST

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