

Chart 1: General aspects from processes

Criterion	Process I	Process II	Process III	Process IV
IBAMA process no.	02019.002435/2003-76	02019.001610/2004-99	02001.006376/2005-66	02001.001073/2009-81
Initiation of proceeding	October/2003	November/2004	October/2005	March/2009
Rule in force	ID ¹ 147/1997 NR ² 46/2004	NR 46/2004	NR 46/2004 NR 89/2006	NR 89/2006
Instance of licensing	NLA ³ /PE/DILIC ⁴	NLA/PE	NLA/ES	COMOC ⁵ /DILIC/NLA-ES
Qualification	Legal entity	Legal entity	Legal entity	Legal entity
FAP⁶	Lack of information	Lack of information	Lack of information	Simple characterization
Commercial interest algae	<i>Lithothamnion sp.</i> and <i>Halimeda sp.</i>	<i>Lithothamnion sp.</i> and <i>Halimeda sp.</i>	<i>Amphiroa rígida</i> J. V. Lamoroux and <i>Sporolithon</i> <i>australasicum</i> (Foslie Tomita)	Calcareous nodules (rhodoliths) and arribadas algae
Location	North coast of PE ⁷	North coast of PE	North coast of ES ⁸	North coast of ES

Source: authors' conception.

¹ID: IBAMA Directive; ²NR: Normative Ruling; ³NLA: Local center of environmental licensing; ⁴DILIC: Executive board of environmental licensing; ⁵COMOC: Mining Coordination of IBAMA; ⁶FAP: Form of opening process and generic characterization of activities; ⁷PE: Pernambuco state; ⁸ES: Espírito Santo state.

Chart 2: Environmental studies and documents related to support licensing

Criterion	Process I	Process II	Process III	Process IV
Term of Reference	Template document	Template document	Template document	Template document
Environmental Study	Simplified	Simplified	Simplified	Simplified
Impacts expected	Income source (+) ¹	Income source (+)	Stock decline (-) ² Interference with ichthyofauna etc. (-) Reducing water transparency (-) Job creation (+)	Considered low due to feature of manual capture
Mitigation measures	Compliance with requirements (sub-areas) and prioritization of the algae of interest	Compliance with requirements (sub-areas) and prioritization of the algae of interest	Exclusion area and rotation among capture areas	Monitoring of areas of capture and control, rotation among capture areas
Positioning of IBAMA³	Lack of clear mitigation measures and information about activities; orientation about DNPM ⁴ competence; further information required	Lack of clear mitigation measures and information about activities; further information required	Lack of information and conflicting information mainly about biology of algae of interest; further information required	Further information required

Source: authors' conception.

¹(+) positive impact, might promote benefits in terms of social aspects; ²(-) negative impact, might promote damage to the environment; ³IBAMA: Brazilian Environmental Agency; ⁴DNPM: National Agency of Mining.

Chart 3: Supplementary information to support licensing

Criterion	Process I	Process II	Process III	Process IV
Additional information required	Detailed methodology and information about interference with Conservation Unit	Lack of information ¹	Monitoring plan of calcareous algae stock from the extraction areas	Information about allowed quantity, method for rhodolith monitoring, qualified buyers and others
Conflicting activity surroundings	Other companies of same activities	Information not located	Portocel	Building of the shipyard Jurong Aracruz
Interference with Conservation Unit	Information not located	Information not located	Proposal of creation of National Marine Park of Santa Cruz; APA ² of Praia Mole	Proposal of creation of APA and REVIS ³
Initial survey	Yes	Yes	Lack of information	Lack of information

Source: authors' conception.

¹Information not located based on available documents consulted; ²APA: Environmental Protection Area; ³REVIS: Wildlife refuge.

Chart 4: Environmental licenses and constraints

Criterion	Process I	Process II	Process III	Process IV
License emitted	LO ¹ 464/2005	LO 495/2006	LO 496/2005 LO 536/2006	LO 925/2010
Licensing's cost² (BRL)	3,575.78	3,606.81	6,027.25	3,606.81
Duration of License	4 years	4 years	4 years	4 years
Specific environmental constraints	Depth ³ and distance ⁴ to capture, prohibition of automated capture, removal of organisms associated, half-yearly reports	Depth and distance to capture, prohibition of automated capture, removal of organisms associated, half-yearly reports	Depth and distance to capture, removal of organisms associated, biannual reports, biennial timeframe of capture and quarterly reports	Copy of the documentation of qualified buyers, list of names of the fishermen qualified to activity and respect to polygonal area delimited
Environmental monitoring constraints	Photographs of environment, proposal of exploitation and environmental education program for fishermen	Photographs before, during and after, proposal of activity and environmental education program for fishermen	Photographs, proposal of activity and environmental education program; monitoring program of benthic community and calcareous algae	Annual report of activities performed

Source: authors' conception.

¹LO: Operation License; ²Licensing's cost: worth of LO emission plus document's analysis in Brazilian Real; ³1.50 m; ⁴ 100 m of the inferior boundary of the beach.

Chart 5: Judicial involvement and insights post-license

Criterion	Process I	Process II	Process III	Process IV
Reports presented	One quarterly and one half-yearly (both from 2006)	Mentioned into processes, but not located	Not presented due to embargo and disruption of the activities	Half-yearly (related to years: 2012, 2012, 2013 and 2014) ¹
Gaps encountered	Lack of scientific identification Lack of detailed information	Lack of information ²	Conflicting information	Lack of information
Location of recipient	Brazil (PE ³ , RJ ⁴ , SP ⁵) United States, Canada, Denmark, Austria, England and France	Lack of information	United States and Europe	Brazil (Local companies in ES ⁶)
Non-compliance of environmental requirements	Removal of organisms associated and unauthorized capture	Lack of information	Removal of organisms associated, unauthorized capture and half-yearly reports	Annual reports and other documents required not presented
<i>Ex-post</i> survey and environmental control	Yes	Lack of information	Yes	Yes

Source: authors' conception.

¹Information updated after 2016; ²Information not located based on available documents consulted; ³Pernambuco state; ⁴Rio de Janeiro state; ⁵São Paulo state; ⁶Espírito Santo state.

Chart 6: Environmental sanctions and current status of the processes

Criterion	Process I	Process II	Process III	Process IV
Environmental infraction	Collect of calcareous algae nodules and coral block	Lack of information ¹	Amount from higher than authorized and collect of coral block	Collect of calcareous algae and aquatic invertebrates
Administrative penalty	Suspension of the license and embargo	Suspension of the license	Confiscated	Confiscate
Other actors engaged	CPRH ² , RFB ³ , UFPE ⁴ , MP-PE ⁵ , MPF ⁶	Lack of information	Tamar Project, IEMA ⁷ , Federal Prosecutor Specialized, TRF ⁸ , Environmental Police	City government of Aracruz/ES, ICMBIO ⁹ , IEMA, REVIS of Santa Cruz ¹⁰
Situation in 2016¹¹	Expired license	Expired license	Expired license	Expired license
Current situation¹²	Removed on the IBAMA website	Expired license	Removed on the IBAMA website	License renewed
Judicial involvement	Yes	Not	Yes	Lack of information

Source: authors' conception.

¹Information not located based on available documents consulted; ²Information consulted in May, 2016; ³Information consulted until April, 2021. ⁷CPRH: State Agency for the environment and water resources; ⁸RFB: Brazilian Federal Revenue Office; ⁹UFPE: Federal University of Pernambuco; ¹⁰MP-PE: State Public Ministry; ¹¹MPF: Federal Public Ministry; ¹²IEMA: State Institute for the environment of ES; ¹³TRF: Federal Regional Court; ¹⁴ICMBIO: Chico Mendes Institute of Biodiversity Conservation; ¹⁵REVIS: Wildlife refuge.