



**Infralittoral of rocky shores adjacent to the cultivation of bijupirás
(*Rachycentron canadum*) in Enseada do Bananal, Baía da Ilha Grande,
RJ, Brazil**

**Infralitoral de costões rochosos adjacentes ao cultivo de bijupirás
(*Rachycentron canadum*) na Enseada do Bananal, Baía da Ilha Grande,
RJ, Brasil**

Marcella Z. Amaral

Faculty of Oceanography, State University of Rio de Janeiro
Laboratory of Biological Oceanography, Faculty of Oceanography, Rio de Janeiro State
University
zicarimarcella@gmail.com

Alexandre F. Azevedo

Faculty of Oceanography, State University of Rio de Janeiro

Marcos B. Pereira

Laboratory of Biological Oceanography, Faculty of Oceanography, Rio de Janeiro State
University

Mônica D. Corrêa-Silva

Postgraduate Program in Environmental Engineering
Faculty of Engineering, State University of Rio de Janeiro
Laboratory of Biological Oceanography, Faculty of Oceanography, Rio de Janeiro State
University

1 INTRODUCTION

With the advancement of world population growth and constant use of environmental resources, questions arise as to how to manage the environment, as it provides fundamental resources for human survival and food production. The cultivation of marine organisms has become a sustainable production tool to meet the demand for food and the scarcity of fish. Among these production techniques at sea is fish farming. Its production process added to the feeding and nutrition techniques of the cultivated fish, can impact the environment. Mariculture in the region of Ilha Grande, through malacoculture and recently by the cultivation of bijupirás, has proved to be a favorable activity.

Rocky coastal habitats are very popular, well-studied and highly relevant environments. In the infralittoral, ecological interactions and relationships are more determinant in the distribution of organisms, while environmental factors are more stable. The characterization of the composition, distribution and patterns of benthic communities

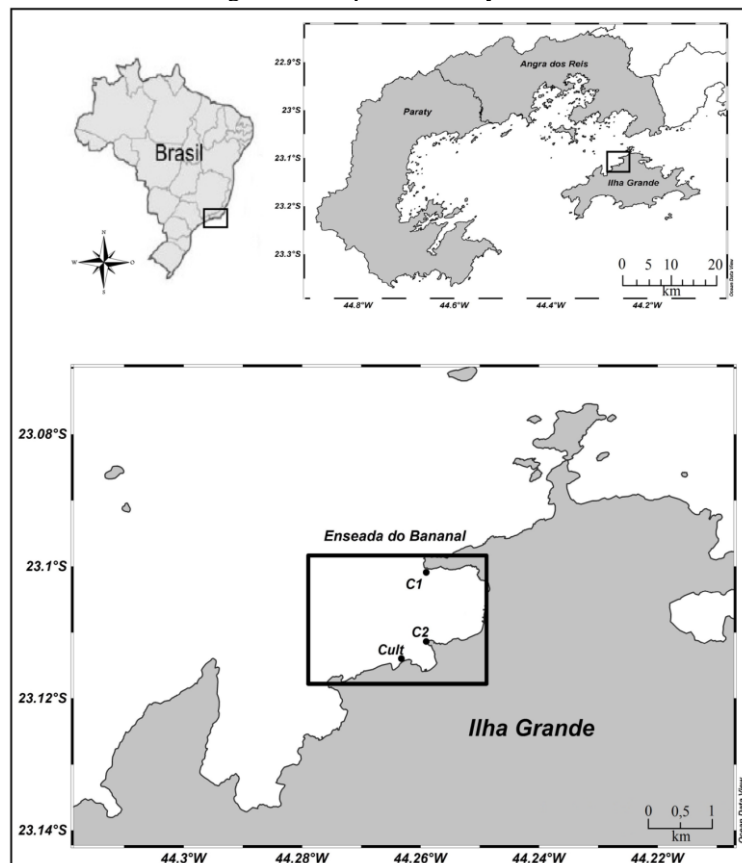
in consolidated substrates is an important source of information to support ecosystem management programs.

This study aimed to evaluate the effects of bijupirás cultivation on the infralittoral benthic community by characterizing its composition and structure at three stations in Enseada do Bananal, Ilha Grande, Rio de Janeiro.

2 METHODOLOGY

Three collection stations were determined: one in front of the bijup cultivation and two control areas (Figure 1).

Figure 1 - Map of the study area.



Sampling of biological data was carried out in four campaigns: in September and December 2019, and in August and November 2020.

In the infralittoral region (between 3 and 4m depth), 10 quadrats (50x50cm) were randomly positioned in each of the collection stations. The estimation of the percentage of cover was performed using the point intersection method (non-destructive), considering the organism under each intersection equal to 1%.



Species richness, diversity and evenness were calculated. Differences between richness results for comparisons between sites and campaigns were also assessed.

3 RESULTS AND DISCUSSION

Twenty-seven taxa were identified among invertebrates and macroalgae. The highest number of Rhodophytas algae, followed by Chlorophytas species, and the lowest number of Phaeophytas, represents the biogeographic pattern of the Brazilian coast.

Table 1 - Benthic communities taxa of infralittoral found in Enseada do Bananal and their respective occurrences: C1 (Control 1), C2 (Control 2) and Cult (Cultivation). Source: The author (2021).

Táxons	1ªCampanha			2ªCampanha			3ªCampanha			4ªCampanha		
	C1	C2	Cult	C1	C2	Cult	C1	C2	Cult	C1	C2	Cult
BRYOZOA												
<i>Schizoporella errata</i> (Waters, 1878)				X			X					
CNIDARIA												
<i>Millepora alcirconis</i> Linnaeus, 1758											X	
<i>Mussismilia hispida</i> Verril, 1902	X	X	X	X	X		X	X				X
<i>Palythoa caribaeorum</i> Duchassaing & Michelotti, 1860	X	X	X	X	X	X	X	X	X	X	X	X
<i>Tubastrea tagusensis</i> Wells, 1982	X	X		X	X	X	X	X		X	X	X
<i>Zoanthus sociatus</i> Ellis, 1768		X		X			X	X		X	X	
GASTROPODA												
<i>Claremontiella nodulosa</i> C. B. Adams, 1845			X									
PORIFERA												
<i>Cliona</i> sp.								X		X		
<i>Desmapsamma anchorata</i> Carter, 1882							X	X	X	X	X	X
<i>Scopalina ruetzleri</i> Wiedenmayer, 1977										X	X	
<i>Tedania ignis</i> Duchassaing & Michelotti, 1864		X	X				X			X	X	
CHORDATA												
<i>Didemnum nocturnum</i> Monniot F. & Monniot C., 1997	X	X	X	X		X	X	X	X	X	X	X
<i>Didemnum</i> sp.	X	X									X	
<i>Diplosoma</i> sp.										X		X
<i>Phallusia nigra</i> Savigny, 1816		X					X				X	
COLOROPHYTA												
<i>Bryopsis pennata</i> J.V.Lamouroux, 1809								X				
<i>Chaethomorpha antennina</i> (Bory) Kützing, 1847				X			X					X
<i>Ulva lactuca</i> Linnaeus, 1753							X					
<i>Cladophora</i> sp.		X		X	X	X	X	X	X	X	X	X
PHAEOPHYTA												
<i>Dictyota ciliolata</i> Sonder ex Kützing, 1859										X		
<i>Hinckesia mitchelliae</i> (Harvey) P.C.Silva, 1987	X	X	X	X	X	X	X	X	X	X	X	X
<i>Padina pavonica</i> (Linnaeus) Thivy, 1960	X	X	X					X				X
RHODOPHYTA												
<i>Amphiroa</i> sp.	X	X	X	X	X	X	X	X	X	X	X	X
<i>Centroceras clavulatum</i> (C.Agardh) Montagne, 1846		X		X	X	X	X				X	
<i>Dasya</i> sp.						X					X	
<i>Gelidium pusillum</i> (Stackhouse) Le Jolis, 1863							X					
<i>Jania adhaerens</i> J.V.Lamouroux, 1816	X	X	X	X	X	X	X	X	X		X	X
Sedimento							X			X		
Total: 27	9	14	9	12	8	9	15	15	8	15	13	12

There was a tendency to lower richness in the Cultivation season, while the highest values of diversity and equitability indices were observed in all campaigns in this same season (Table 2).

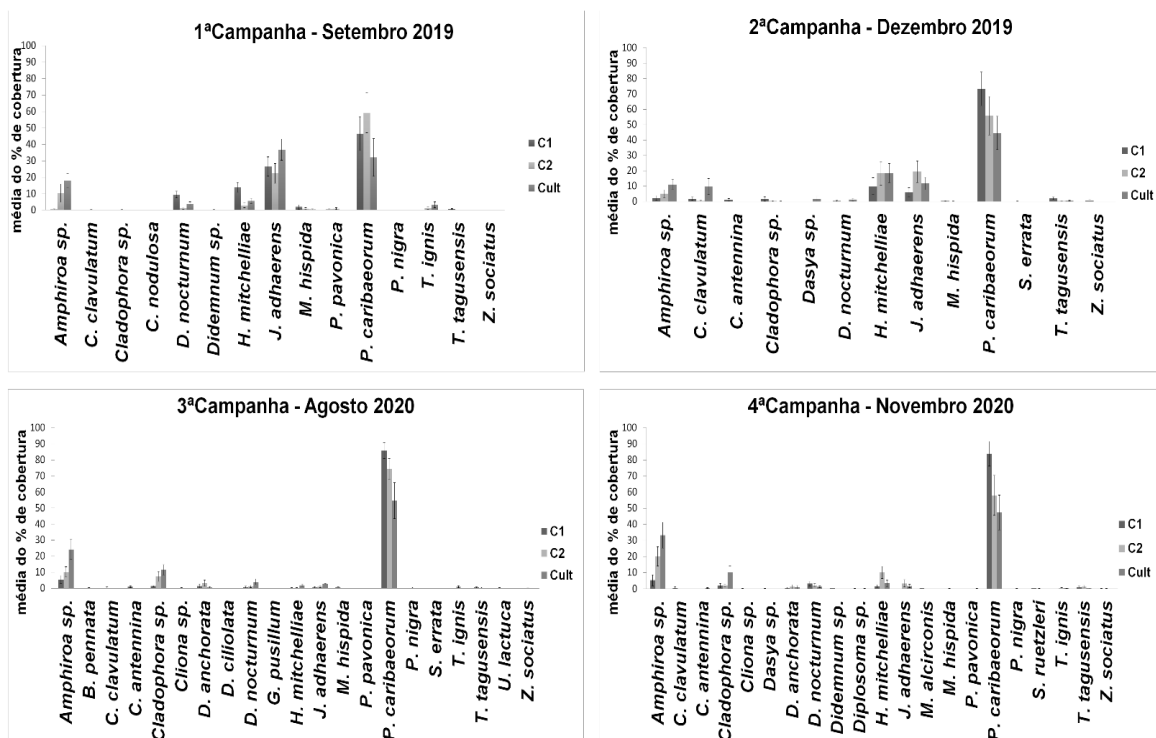
Undisturbed environments are characterized by high diversity and evenness.

Table 2 - List of structural descriptors (richness, Shannon-Weaver diversity and Pielou evenness) of the species of the studied community, between September 2019 and November 2020. Source: The author (2021).

Período	1ªCampanha			2ªCampanha			3ªCampanha			4ªCampanha		
	C1	C2	Cult	C1	C2	Cult	C1	C2	Cult	C1	C2	Cult
Riqueza	9	14	9	12	8	9	15	15	8	15	13	12
Índice de diversidade de Shannon-Weaver (H')	1,4	1,2	1,5	1	1	1,6	0,6	1	1,3	1	1	1,3
Índice de equitabilidade de Pielou (J)	0,6	0,5	0,7	0	1	0,7	0,2	0	0,6	0	1	0,5

The mean percent cover of identified species \pm standard error was calculated (Figure 1). The most abundant species in all campaigns and seasons was the Cnidaria *Palythoa caribaeorum*. Its high percentage of coverage is an indicator of a site with good water quality, since this species does not tolerate environments with low quality. Its average coverage in this study is within the levels considered as optimal in the region (above 30%).

Figure 2 - Average percentage cover of species identified in the three sampling stations, in each campaign (mean \pm standard error). Source: The author (2021).





4 CONCLUSION/FINAL CONSIDERATIONS

Monitoring and research are essential to evaluate mariculture, since the effects of this activity can affect the composition and structure of benthic communities.

The composition and structure of the benthic communities of the infralittoral of the control areas and of the area adjacent to the bijupira cultivation did not differ from each other, and the biogeographic pattern is in accordance with that of other regions of Ilha Grande Bay and the Brazilian coast.

It is suggested to complement this with further medium to long-term studies to analyze changes due to marine farms.



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