Núcleo de Meio Ambiente
Universidade Federal do Pará
Rua Augusto Corrêa, 01, Guamá
Belém, Pará, Brasil
https://periodicos.ufpa.br/index.php/agroecossistemas

SOCIAL, ECONOMIC, AND ENVIRONMENTAL ASPECTS OF FISHING COMMUNITIES IN A MARINE EXTRACTIVE RESERVE IN THE PARAENSE AMAZON

Ana Paula Alencar
Universidade Federal do Pará
analencar1408@gmail.com

Maria de Lourdes Pinheiro Ruivo
Museu Paraense Emilio Goeldi
ruivo@museu-goeldi.br

Rosecelia Moreira Castro
Universidade da Amazônia
rosecelia.castro@gmail.com

Seidel Ferreira Santos
Universidade do Estado do Pará
botanish@yahoo.com.br

Paulo Aguiar Neto
Universidade Federal do Pará
paulo.aguiar_@hotmail.com

ABSTRACT: In the Amazon, among the several population groups dedicated to extractivism, those related to artisanal fishing stand out and are representative of the population who lives in line with the rivers and the sea. The objective of this study was to analyze and trace the socio-environmental profile of artisanal fishermen living in three fishing communities in the municipality of Bragança, northeastern Pará state, in the Caeté-Taperaçu Marine Extractive Reserve. To this end, interviews were carried out through questionnaires to 251 families of artisanal fishermen, between men and women, 85 (33.86%) from Vila dos Pescadores, 96 (38.25%) from Vila do Castelo and 70 (27.89 %) from Vila do Taperuçu. The results indicate the age of respondents between 18 and 55 years old, found low schooling, most have their own house, and annual income ranging from R$ 3,905.85 to R$ 5,506.56. Access to water is through the distribution network and the provision of urban cleaning services serves almost 50% of communities. The results obtained allowed us to trace a social, economic, and environmental profile of artisanal fishermen from fishing communities in the extractive reserve, which could serve as a basis for the generation of subsidies that involve the implementation of public policies that are directed to artisanal fishermen in the conservation unit in question.

KEYWORDS: Artisanal fishing, Amazon, Conservation Units, Public Policies.

ASPECTOS SOCIAIS, ECONOMICOS E AMBIENTAIS DE COMUNIDADES PESQUEIRAS DE UMA RESERVA EXTRATIVISTA MARINHA NA AMAZONIA PARAENSE

RESUMO: Na Amazônia, entre os vários grupos populacionais que se dedicam ao extrativismo, destacam-se os que estão relacionados à pesca praticada de forma artesanal e são representativos da população que habita em consonância aos rios e o mar.

Received: 2021-12-30
Evaluated: 2022-05-11
Accepted: 2023-02-01

O estudo objetiva a caracterização social, econômica e ambiental em três comunidades pertencentes a Reserva Extrativista Marinha Caeté- Taperuçu e, para assim, contribuir para traçar o perfil de pescadores que residem em três comunidades pesqueiras do município de Bragança, nordeste do estado do Pará, na Reserva Extrativista Marinha Caeté-Taperaçu. Foi realizada entrevista através de questionários a 251 famílias de pescadores artesanais entre homens e mulheres, sendo 85 (33,86%) da Vila dos Pescadores, 96 (38,25%) da Vila do Castelo e 70 (27,89%) da Vila do Taperuçu. Os resultados indicam a idade dos entrevistados entre 18 e 55 anos, constatou baixa escolaridade, a maioria possui casa própria e renda anual variando de R$ 3.905,85 a R$5.506,56. O acesso à água se dá pela rede de distribuição e a disponibilização dos serviços de limpeza urbana atendem quase 50% das comunidades. Os resultados obtidos permitiram obter um perfil social, econômico e ambiental dos pescadores artesanais de comunidades pesqueiras na reserva extrativista, podendo contribuir como base para a geração de subsídios que envolvam a implementação de políticas públicas que esteja direcionada a pescadores artesanais na unidade de conservação em questão.

PALAVRAS-CHAVE: Pesca Artesanal, Amazônia, Unidades de Conservação, Políticas públicas.

ASPECTOS SOCIALES, ECONÓMICOS Y AMBIENTALES DE LAS COMUNIDADES PESQUERAS EN UNA RESERVA MARINA EXTRACTIVA EN LA AMAZONÍA PARAENSE

RESUMEN: En la Amazonía, entre los diversos grupos poblacionales dedicados al extractivismo, se destacan los relacionados con la pesca artesanal y son representativos de la población que vive en la ribera de los ríos y el mar. El estudio tiene como objetivo analizar y rastrear el perfil socioambiental de los pescadores artesanales que residen en tres comunidades pesqueras en el municipio de Bragança, al noreste del estado de Pará, en la Reserva de Extracción Marina Caeté-Taperaçu. Para ello, se realizaron entrevistas a través de cuestionarios a 251 familias de pescadores artesanales, entre hombres y mujeres, siendo 85 (33,86%) de Vila dos Pescadores, 96 (38,25%) de Vila do Castelo y 70 (27,89%) de Vila hacer Taperuçu. Los resultados indican que la edad de los encuestados entre 18 y 55 años, encontró baja escolaridad, la mayoría tiene casa propia e ingresos anuales que oscilan entre R$ 3.905,85 y R$ 5.506,56. El acceso al agua es a través de la red de distribución y la prestación de los servicios de limpieza urbana atienden a casi el 50% de las comunidades. Los resultados obtenidos permitieron trazar un perfil social, económico y ambiental de los pescadores artesanales de las comunidades pesqueras de la reserva extractiva, que podría servir de base para la generación de subsidios que impliquen la implementación de políticas públicas que estén dirigidas a los pescadores artesanales en la unidad de conservación en cuestión.

PALABRAS CLAVES: Pesca artesanal, Amazonas, Unidades de Conservación, Políticas Públicas.

INTRODUCTION

The Amazon region has a population diversity, reflected through its geographical process of occupation between the mainland and the coast. Thus, reflecting on the means and customs of life and work. On the coast, the strength of professional occupation is linked to animal and plant extraction and, among this format, artisanal fishing in coastal communities in the Amazon stands out.

In the state of Pará, it is considered one of the most traditional and important extractive activities (OLIVEIRA *et al*., 2011; FREITAS *et al*., 2015) and it is through the waters, through fishing, that native populations have taken a large part of their diet for centuries (CHAVES; FURTADO, 2017).

In the state of Pará, it is considered one of the most traditional and important extractive activities (OLIVEIRA et al., 2011; FREITAS et al., 2015) and it is through the waters, through fishing, that for centuries native populations have taken a large part of their diet (CHAVES; FURTADO, 2017).

In coastal communities, this involvement with fishing takes place from childhood when parents begin to encourage participation, allowing their children to contribute to the capture of fish, exercising a learning process that occurs through practice, continuity, and shared experiences with the sociocultural universe that remains (VIEIRA *et al*, 2013; CHAVES; FURTADO, 2017). Understanding the social, economic, and environmental dynamics of these populations that practice artisanal fishing is important as a productive format is plain, establishing a vast dependence on natural resources and environmental cycles (OLIVEIRA; MANESCHY, 2014).

Several works that analyze the Brazilian coast corroborate to leverage the importance of traditional fishing communities the use of their knowledge and their insertion as their effectiveness has been shown in several systems, particularly in the management of different marine species (SANTOS; SCHIAVETTI, 2013; BARBOSA FILHO; COSTA NETO, 2016). However, it does not differ from the challenge of preserving ways of life that are different from the hegemonic, reconciling them with environmental conservation (PIMENTEL; RIBEIRO, 2016).

As a result, in Brazil, Marine Extractive Reserves - RESEX is one of the alternatives to protect the lifestyle of traditional populations, as well as ensure the sustainable use of natural resources. These reserves are distributed along the Brazilian coast and are part of large marine ecosystems. They are described as a model aimed at reconciling nature conservation through the sustainable use of natural resources. (BRASIL, 2000; SANTOS; SCHIAVETTI, 2013).

Santos and Schiavetti (2013) address the importance of work in protected areas. The authors, in addition, leverage the magnitude of having data on artisanal fishing in countries like Brazil. However, there is still some difficulty with data not yet available on fishing activity either inside or outside the protected areas, mainly in the state of Pará, which also causes conflicts in the management of these resources.

It is in this scenario that artisanal fishermen, residents of fishing communities in the municipality of Bragança in the state of Pará, who are part of the scope of the Sustainable Use Unit, Marine Extractive Reserve Caeté-Taperuçu-REM, created by Dec. s/nº of May 20, 2005, and which integrates the Amazonian coastal ecosystems composed of a variety of environments, such as estuaries, mangroves, restingas, and dunes.

Thus, the objective of this work was to make a social, economic, and environmental characterization of three communities belonging to the Caeté-Taperuçu Marine Extractive Reserve and, in order to do so, contribute to profiling these fishermen who reside in the Marine Extractive Reserve.

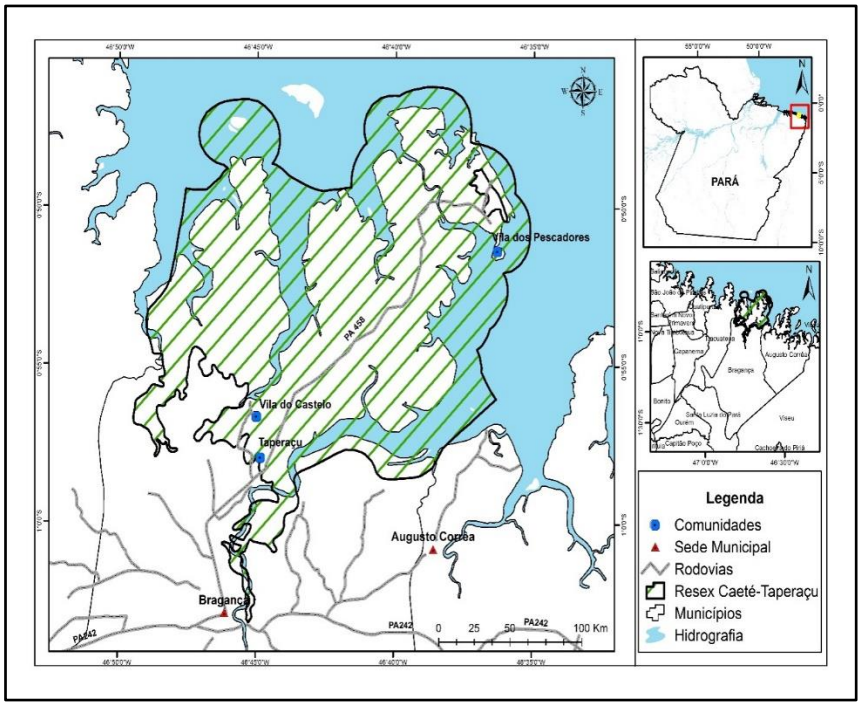
MATERIAL AND METHODS

The Caeté-Taperaçu Marine Extractive Reserve – RESEX-Marinha, was created by a Decree of May 20, 2005, and integrates the Amazonian coastal ecosystems covering a total surface of 7,591 km² of mangroves. In general, these areas represent the largest continuous range of mangroves on the planet and correspond to 56.6% of the mangroves in Brazil (SOUZA FILHO, 2005). It covers exclusively coastal-estuarine areas, that is, mangroves included in the formations that occur within this biome, as well as apicuns, salt fields, restingas, dunes, beaches, and coastal islands (MMA, 2012).

The city of Bragança, located 215 km from Belém, the state capital and is part of the Mesoregion of Northeast Pará. It has a climate classification according to Köppen and Geiger with an average annual temperature of 26.2°C, and average annual rainfall of 2,342mm. It covers an area equivalent to 42,068,086 hectares, bordering Tracuateua to the west, the municipality of Augusto Corrêa to the east, and to the South, the municipalities of Viseu and Santa Maria do Pará. The municipal capital has geographic coordinates of 01º 03´ 40" south latitude and 46º 45´ 16" west longitude (MME, 1998).

The assessed communities (Figure 1), Taperaçu, Castelo, and Vila dos Pescadores are located 15 km, 15 km, and 36 km from the municipal seat, respectively, and belong to the Microregion Bragantina. Access to the Municipality can be done by sea/river via the Atlantic Ocean, by the Caeté, Taperaçu, and Maniteua rivers; or by land, via the BR-316 (Belém-Bragança) and BR-308 highways, or through surrounding branches of neighboring municipalities.

Figure 1. Location map of the Caeté Taperaçu Marine Extractive Reserve and the communities: Vila dos Pecadores, Castelo, and Taperaçu.



Source: The authors (2021).

For the execution of the field work, authorization was requested to carry out the research, through community leaders and representatives of the communities and the oldest residents, from then on, there was initial mobilization through them. Thus, the snowball sampling method or "Snowball" was used (BALDIN; MUNHOZ, 2011). This method compares to the method already used by Furtado (1993), where a system described as an indication by relationship network, used in anthropological studies directed to artisanal fishermen.

The net system or "Snowball" system was the way found for fishermen to self-identify and indicate other fishermen, considering that this system would have greater security in identifying fishermen, as fisherman "A" indicated fisherman "B", and this one would identify the "C", denoting greater credibility since they had joint experience in the same activity.

After this first contact with the leaders and based on the indications of the first participants in the field research, the work evolved and asked these nominees for information about other members of the population of interest for the research (and now indicated by them), to only then, go out to conduct the interviews and also recruit and listen to them.

Upon indications, a prior selection of the interviewees was carried out. This selection was to meet the specificities of the study, following some requirements, which were: interviewing the family representative, regardless of gender; this person must have lived in the community for at least 10 years; have social documents such as CPF and RG and, consequently, be part of the Caeté-Taperaçu Conservation Unit; its their main source of income and work coming from artisanal fishing and being over 18 years old.

This screening for the Selection of artisanal fishing families had the help of community leaders, older residents, health agents, the representative of the Z-18 fishermen colony, and the representative of ASSUREMACATA – Association of Users of the Caeté Taperuçu Marine Extractive Reserve. Because of this, a visitation schedule was carried out with informal conversations, to know the daily life and

observe the relationships established in the Community. Following this schedule, the application of questionnaires that covered social, environmental, and economic aspects began.

The sampling effort in this case depended on the number of artisanal fishermen present in each community and willing to participate as long as they met the pre-established requirements. However, the number of interviews was carefully matched in order to ascertain the differences between the three assessed communities.

The questionnaire was applied through informal interviews, with semi-structured, open, and closed questions, in three communities (Vila dos Pescadores, Castelo, and Taperaçu), whose community was selected by a survey of previous information on the fishing activity carried out in these places. Data collection had two moments between 2015 and 2016 with previous data and continuity of field work in 2018. The questions were divided into three key groups, which are social, economic, and environmental aspects, as shown in Chart 1. It sets out the three main analyses.

Chart 1. Structure of the questionary applied to the social, economical, and environmental aspects.

• Gender • Age • Education • Annual income	• Government Benefits • Housing • Fishing commercialization	• Water supply • Sewage types and residue accommodation

After data collection, the information obtained was measured and compiled in the program (R Core Team, 2016), for data tabulation, being subjected to descriptive analysis, including the calculation of mean, standard deviation, and relative frequency, to be able to draw a socio-environmental and economic profile of the assessed communities.

RESULTS AND DISCUSSION

According to the data from the three assessed communities, it was found that the fishermen involved in the fishing activity, as shown in Table 1, considering the majority, were 26 and 35 years old, representing 35.86% of the interviewees, preceded by 25.5% which is equivalent to the age group of 36 to 45 years. The age group from 46 to 55 years old and over 55 years old represents the oldest fishermen, in terms of time involved in the fishing activity, which is equivalent to 25.49%. The minority of respondents was the percentage 13.15% are in the age group of 18 to 25 years old and are the youngest involved in the activity.

Table 1. Age class of artisanal fishermen at Vila dos Pescadores, Vila do Castelo and Vila Taperaçu.

Age class	Overall		Vila dos Pescadores		Vila do Castelo		Vila do Taperaçu	
	N	%	N	%	N	%	N	%
18 -25 years old	33	13.15	14	16.47	10	10.42	10	12.86
26-35 years old	90	35.86	23	27.06	42	43.75	42	35.71
36-45 years old	64	25.50	22	25.88	25	26.04	25	24.29
46-55 years old	35	13.94	16	18.82	9	9.38	9	14.29
Older than 55 years old	29	11.55	10	11.76	10	10.42	10	12.86

Source: The authors (2021).

These results corroborate with (ALVES et al.; FREITAS et al., 2015; DAADDY et al.; SANTOS et al., 2016) who show the age group of the population that is involved in the craft of artisanal fishing and are inserted in areas of environmental protection, which are in line with the studies of Santos et. al. (2018), highlighting the northeast of Pará, demonstrating the predominant age group from 40 years old, which is the majority who still practice artisanal fishing.

By relating the age of the fishermen, it was observed that it is the oldest who continue the fishing trade. Although some are granted a certain type of social benefits, such as retirement pension, that is, even receiving a certain amount from benefits, they still have fishing as their primary or secondary source of income, and

claim that they feel good and want to continue performing their profession is what they also describe (OLIVEIRA et al. 2016; SANTOS et al., 2016).

In terms of education (n=127), the majority 50.6% did not complete elementary school and the other numbers (n=89) corresponding to 35.46% were unable to answer, which shows the number of functional illiteracy, that is, individuals who, even if being able to collect letters and numbers, are unable to recognize simple texts (PEREZ, 2019).

This number is more representative in the community of Vila dos Pescadores, as 63.54% of the total number of respondents, from the perspective of schooling, people who did not know how to answer, it was identified that they did not know the meaning of schooling and therefore had difficulty in answering, thus pointing to functional illiteracy. Education among fishermen prevails and is demonstrated in words referring to the characterization of artisanal fishing (LIMA et al, 2012; OLIVEIRA; MANESCHY, 2014). Having described this, one of the explanations refers to the difficulty in reconciling study and work, since artisanal fishing is a necessity, mostly for subsistence, as it is a dynamic and exhausting activity that impairs the permanence of the school (OLIVEIRA et al., 2016).

In terms of personal identification documentation, it was found that (n=130) of the interviewees, in this case, women, had social documents (General Registration/Identity Card -RG) and CPF (Individual Taxpayer Registration) different from men who only (n =121) of respondents had such documents (Table 2). One of the justifications used to explain this number was that "they didn't have time to go get the documentation" or "they had lost it" and the most common was "the woman has a document", thus, using and sharing the documents of his "partner".

Regarding the social documents RG and CPF, it is worth mentioning that they are one of the documents that directly imply the acquisition of proof of the "professional fisherman" which is the RGP- General Registry of Fishing Activity. And it was found that most of them were the "companions" of the fishermen who had these documents.

Table 2. Social profile of the artisanal fishermen families interviewed in Caeté Taperaçu Marine Extractive Reserve, in the communities Vila dos Pescadores, Vila do Castelo and Vila do Taperaçu, frequency (n) and percentage of the answers.

	Overall descriptive mean of the communities		Vila dos Pescadores		Vila do Castelo		Vila do Taperaçu	
	N	Descriptive mean	N	Descriptive mean	N	Descriptive mean	N	Descriptive mean
Gender	251	38.02 ± 11.66	85	38.83 ± 12.31	96	36.85 ± 11.33	70	38.65 ± 11.34
Female (social documents)	130	36.43 ± 10.75	59	36.86 ± 10.94	39	35.82 ± 10.09	32	36.40 ± 11.44
Male (social documents)	121	39.77 ± 12.40	26	43.66 ± 14.29	57	37.57 ± 12.16	38	40.55 ± 11.03
Education (%)								
Incomplete Elementary	127	50.60	66	77.65	28	29.17	33	47.14
Complete Elementary	3	1.20	1	1.18	0	0.00	2	2.86
Incomplete High School	12	4.78	9	10.59	3	3.13	0	0.00
Complete High School	9	3.59	4	4.71	2	2.08	3	4.29
Illiterate	11	4.38	2	2.35	2	2.08	7	10.00
Not answered	89	35.46	3	3.53	61	63.54	25	35.71
RGP (%)								
Yes	50	19.92	15	17.65	26	27.08	9	12.86
No	196	78.09	66	77.65	69	71.88	61	87.14
Not answered	5	1.99	4	4.71	1	1.04	0	0.0.0

Source: The authors (2021).

This is one of the most important documents for those who have fishing as their main occupation, as it identifies the number of people and categorizes those who are developing it traditionally or industrially. The RGP works as one of the supporting instruments for the fisherman to be included in the Artisanal Fishermen Unemployment Insurance Program, better known as Seguro Defeso, in addition to having access to other social programs of the Federal Government, such as microcredit and social assistance (GOUVEIA et al. ., 2015).

And only (n=50) fishermen, that is, 19.92% of the total number of respondents had this document, differing from (n=196) artisanal fishermen 78.09% who did not

have the RGP is what is shown in Table 2, and respondents who do not have this document also demonstrated a lack of information about it. Thus, it was found that even those who had the document were in an inactive situation, causing the non-receipt of any subsidy related to the Defeso insurance program.

The income of fishermen in the three assessed communities is directly linked to two priority forms: fishing and financial aid from social projects (Table 3). This income from artisanal fishing activities varies according to harvest and off-season periods, demonstrating seasonal variation, and this relationship can also be seen in other artisanal fisheries carried out in riverside communities in the Brazilian Amazon (LIMA et al., 2012).

Based on this diversification, it is estimated that the average annual income per family from artisanal fishing ranges from R$ 3,905.85 to R$ 5,506.56 per year, which may vary due to the aforementioned aspects.

Table 3. Annual income from fishing and social benefits in the communities: Vila dos Pescadores, Vila do Castelo and Vila do Taperaçu.

Income	N	Fishing	Social benefit
Overall	251	5,506.56 ± 3,905.85	3,345.06 ± 2,734,99
Vila dos Pescadores	85	4,352.24 ± 2,849.09	3,436.95 ± 3,149.90
Vila do Castelo	96	6,050.47 ± 4,193.39	3,143.00 ± 2,029.89
Vila do Taperaçu	70	6,454.89 ± 4,451.45	3,376.79 ± 2,453.36

Source: The authors (2021).

Table 4 shows the income sources of the interviewed fishermen that, when asked about financial assistance, social benefits were presented as a priority and split into retirement, family allowance, and green allowance.

The most expressive number of social benefits is the Green Allowance which covers (n= 124), 64.58% of the total number of respondents. The Green Allowance program is a Federal Government income transfer program developed by the Ministry of the Environment, aimed at low-income families, constituting one of the

alternatives found by the government to encourage communities living in environmental reserves to care for and use resources in a sustainable way, instituted by Law 12,512 of October 14, 2011, and regulated by Decree No, 7,572, of September 28, 2011.

Preceded by Family Allowance which was (n=64) 33.33%. What draws attention is that the results show that even the largest number of fishermen involved in fishing activity are at an advanced age. The three communities do not differ significantly concerning to income from fishing (Table 3), as well as income from social benefits related to the three main benefits: retirement, Family Allowance, and Green Allowance (Table 4).

Supplementing the fishermen's family income is associated with the remunerated activity carried out in the off-season, which is the period when certain fish species are reduced. Only 38 of the interviewees have another source of income linked to agriculture, commerce, and general services, corroborating Santos et al., (2018).

The relationship between the sale of fish and the figure of the "middleman" is clear (Table 4), with 86.85% of the interviewed fishermen having a relationship of bribery and loyalty with the "middlemen", considered "bosses". This close relationship is established by selling the fish to a single buyer who is responsible for producing and supplying the "ranch", that is, the supply of food, water, and fuel for the next fishing trip.

This relationship of buying and selling can also be observed in Pontinha do Bacuriteua, a neighboring community of the assessed communities, which also has artisanal fishing and similar characteristics to the study in question, as evidenced by the study by Oliveira and Maneschy (2014).

In terms of housing, 92.03% declared owning their own home. Since it is worth paying attention to the specificities of the location of each community, as they present diversification from one house to another, in this case, we have the example of Vila dos Pescadores, which exposes the largest number of wooden houses, with 74 of the total number of respondents, 87.06% live in wooden houses with fiber

cement roofs. Diverging from the other communities that mostly have masonry houses Vila do Castelo has 89.58% and Vila do Taperaçu with 80% (Table 5).

Table 4. Income source of the artisanal fishermen in the communities of Vila dos Pescadores, Comunidade do Castelo and Taperaçu.

	Overall		Vila dos Pescadores		Vila do Castelo		Vila do Taperaçu	
	N	Descriptive mean	N	Descriptive mean	N	Descriptive mean	N	Descriptive mean
Financial aid (%)								
Yes	192	76.49	62	72.94	78	81.25	52	74.29
No	57	22.71	21	24.71	18	18.75	18	25.71
No Answered	2	0.80	2	2.35	0	0.00	0	0.00
If yes, which one,? (%)								
Retirement	4	2.08	3	4.84	1	1.28	0	0.00
Family allowance	64	33.33	20	32.26	24	30.77	20	38.46
Green Allowance	124	64.58	39	62.90	53	67.95	32	61.54
Paid activity (%)								
Yes	38	15.14	10	11.76	13	13.54	15	21.43
No	207	82.47	73	85.88	80	83.33	54	77.14
No Answered	6	2.39	2	2.35	3	3.13	1	1.43
If yes, What type?								
Farming	2	5.26	0	0,0	1	7.69	1	6.67
Trade	18	47.37	5	50.00	5	38.46	8	53.33
Others, general services	18	47.37	5	50.00	7	53.85	6	40.00
Place where Fishing is traded (%)								
Middleman	218	86.85	70	82.35	91	94.79	57	81.43
House	10	3.98	5	5.88	2	2.08	3	4.29
Delivery Port	22	8.76	9	10.59	3	3.13	10	14.29
Livelihood	1	0.40	1	1.18	0	0.00	0	0.00

Source: The authors (2021).

It is important to highlight that the characteristics of the families' residences are directly linked to the location of the community, such as Vila dos Pescadores, located closer to the sea and showing the coastal dynamics, characterized by being a

transition zone between the continental domain and the maritime domain (Ranieri et al 2018). And the residents of Vila dos Pescadores are still subject to the erosive power of the tides (Alves and El-Robrini, 2003). In this way, the building material for the wooden house becomes more dynamic for possible changes.

Table 5. House type of the artisanal fishermen in the communities: Vila dos Pescadores, Vila do Castelo and Vila do Taperaçu.

Residence (%)	Overall		Vila dos Pescadores		Vila do Castelo		Vila do Taperaçu	
	N	%	N	%	N	%	N	%
Granted /Borrowed	9	3.59	6	7.06	0	0.00	3	4,29
Owner	231	92.03	78	91.76	93	96.88	60	85.71
Other condition	11	4.38	1	1.18	3	3.13	7	10.00
Construction material (%)								
Masonry	152	60.56	10	11.76	86	89.58	56	80.00
Mud	16	6.37	0	0.00	8	8.33	8	11.43
Wood	81	32.27	74	87.06	1	1.04	6	8.57
Straw	1	0.40	0	0.00	1	1.04	0	0.00
Not answered	1	0.40	1	1.18	0	0.00	0	0.00
Roof material (%)								
Asbestos cement	85	33.86	57	67.06	14	14.58	14	20.00
Mixed	1	0.40	0	0.00	1	1.04	0	0.00
Other	2	0.80	1	1.18	0	0.00	1	1.43
Clay tile Barro	162	64.54	26	30.59	81	84.38	55	78.57
Not answered	1	0.40	1	1.18	0	0.00	0	0.00

Source: The authors (2021).

There are several relationships established with the environment, including the use of natural resources for a healthy survival condition, which includes the use of water for consumption, which is acquired through the following means of supply: Well and/or spring or general network of distribution. Because of this, the largest number of users consisted of 80 families (94.12%) using the first form of supply (Table 6), which corroborates Guimarães et al. (2009).

The supply of water through the system of wells dug in the residences or the spring, carried out by the majority of the population, shows that the families used it collectively, as it was shown that even those who had a general distribution network, chose the supply of wells dug for (drinking) and cooking) they "fetched water" (a

term used by fishermen to capture water from neighbors and relatives) who had this type of supply.

Table 6. Environmental aspects: water supply, sewage and solid waste systems of the communities, Vila dos Pescadores, Vila do Castelo, and Vila do Taperaçu.

	Overall		Vila dos Pescadores		Vila do Castelo		Vila do Taperaçu	
	N	Descriptive mean	N	Descriptive mean	N	Descriptive mean	N	Descriptive mean
Water supply (%)								
Well or spring	149	59.36	80	94.12	34	35.42	35	50.00
General Distribution network	101	40.24	4	4.71	62	64.58	35	50.00
Not answered	1	0.40	1	1.18	0	0.00	0	0.00
Sewage (%)								
Rudimentary pit	49	19.52	25	29.41	20	20.83	4	5.71
Septic tank	123	49.00	46	54.12	55	57.29	22	31.43
Mixed	43	17.13	10	11.76	21	21.88	12	17.14
Not answered	36	14.34	4	4.71	0	0.00	32	45.71
Solid residue (%)								
Urban Cleaning Service								
Buried On The Property								
Played in Wasteland								
Burned On The Property								
Did not answer								
Urban Cleaning Service	142	56.57	44	51.76	72	75.00	26	37.14
Buried on the property	9	3.59	3	3.53	3	3.13	3	4.29
Litter in vacant plots	1	0.40	0	0.00	1	1.04	0	0.00
Burned in the property	66	26.29	37	43.53	20	20.83	9	12.86
Not answered	33	13.15	1	1.18	0	0.00	32	45.71

Source: The authors (2021).

Considering the sanitation system referring to sanitary sewage, 49% make use of a septic tank, and the other numbers are divided between rudimentary forms of

rudimentary pits 19.52% and mixed systems 17.13%. When dealing with the disposal of solid waste generated in communities, three main destinations were considered: urban cleaning service, buried on the property, and buried on the property associated with burning.

There is an urban collection service provided by the city hall at least once a week, and 51.76% of the families interviewed carry out this type of disposal, the other 47.06% practiced burning associated with burying on the property, as shown in Table 6. Thus, the fact that sometimes irregular discarding cannot be disregarded. It is worth mentioning, however, the fact that the waste is mostly organic, as it was found to be the largest generation of waste, corroborating Guimarães et al., (2009) who states that these populations have the highest production of organic waste when compared to inorganic waste production.

The knowledge generated works as a basis for the generation of subsidies that involve the implementation of public policies that are directed to this type of population, since the need for governmental effectiveness was evident, in addition to giving visibility and demonstrating the communities that are inserted in this fishing scenario in the Amazon, including in Marine Extractive Reserves, thus seeking to improve better conditions for the quality of life of these populations.

In general, the assessed communities have great social importance through the fishing trade, as they involve actors of different age groups and educational levels. However, they lack greater involvement in the search for a better social organization, which includes being linked to representativeness, through associations and cooperatives, among other ways, so that they can claim rights and their local cultural appreciation.

It is noticeable the importance that artisanal fishermen demonstrate for the maintenance and encouragement of the cultural conservation of the riverside community, which can be seen through the relationship established with natural resources and community interaction. Because they still value the ways of life that were passed on by generations and are in their daily lives even today, demonstrated

through their daily chores, making it extremely important to elucidate this way of life and value it.

CONCLUSION

The communities inhabited by artisanal fishermen, despite the few conditions, still manage to generate a certain income to support the families of Vila dos Pescadores, Castelo community, and Taperaçu community, which are formed by individuals where the family's livelihood is linked to local production, primarily through the fishing trade, associated with multiple functions to earn an income, to the detriment of the low conditions of schooling and employability in these localities.

ACKNOWLEDGEMENTS

The authors thank the support of the "Technical Assistance and Rural Extension Project- ATER", and the Coordination for the Improvement of Higher Education Personnel/Capes for the Master's Scholarship given to the first author.

REFERENCES

ALVES, R. J. M.; GUTJAHR, A. L. N.; SILVA, J. A. E.; Caracterização socioeconômica e produtiva da pesca artesanal no município de Marapanim, Pará, Brasil. **Revista Observatório de lá Economia Latino-americana**, Brasil, jul. 2015. Disponível em: http://www.eumed.net/cursecon/ecolat/br/15/pesca-artesanal.html. Acesso em: 10/09/2018.

ALVES, M. A. M. da S.; EL-ROBRINI, Mamar. Morfodinâmica da praia de Ajuruteua – NE do Pará. *In*: Congresso sobre Planejamento E Gestão Das Zonas Costeiras Dos Países De Expressão Portuguesa, 2.; Congresso da Associação Brasileira de Estudos do Quaternário, 9.; Congresso do Quaternário dos Países de Língua Ibéricas. Local: UFC 2003. p. 236-241.

BALDIN, N.; MUNHOZ, E. M. B. Educação Ambiental Comunitária: Uma experiência com a técnica de Pesquisa Snowball (Bola de Neve). **Revista Eletrônica do Mestrado em Educação Ambiental**, v. 27, p. 46-60, 2011.

BARBOSA FILHO, M. L.; COSTA NETO, E. M. Conhecimento ecológico local de pescadores artesanais do sul da Bahia, Brasil, sobre as interações tróficas de tubarões. **Biotemas**. UFSC, Florianópolis, SC, Brasil, v. 29, n. 3, p. 41-52 set. 2016.

BRASIL. Decreto de 20 de maio de 2005. Dispõe sobre a criação da reserva extrativista marinha de Caeté-Taperaçu, no Município de Bragança, no Estado do Pará, e dá outras providências. Disponível em: http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2005/Dnn/Dnn10531.htm. Acesso em outubro de 2017.

BRASIL. Lei Federal Nº 9.985, de 18 de julho de 2000. Regulamenta o art. 225, § 1o, incisos I, II, III e VII da Constituição Federal, institui o Sistema Nacional de Unidades de Conservação da Natureza e dá outras providências. Disponível em: http://www.planalto.gov.br/ccivil_03/LEIS/L9985.htm. Acesso em: 20 out. 2018.

CAMPOS, A. G; CHAVES, J. V; Perfil Laboral dos Pescadores Artesanais no Brasil: Insumos para o programa seguro defeso. Política em Foco. Mercado de trabalho. 60f. abr. 2016.

CHAVES, G. P.; FURTADO, L.G. Entre rios, furos e igarapés: o ambiente aquático no imaginário social dos ribeirinhos de uma sociedade amazônica. Revista Contribuciones a las Ciencias Sociales, V Junho, p. 1-13, 2017.

DAADDY, M. D. V.; SANTOS, C. BRANDÃO, R. M. L.; AMANAJÁS, R. D.; RIBEIRO, A. B. N; Pesca do apaiari, Astronotusocellatus (Agassiz, 1831), e perfil socioeconômico dos pescadores artesanais de uma região da Amazônia brasileira. Boletim Museu Paraense Emílio Goeldi. Ciencias Humanas, Belém, v. 11, n. 2, p. 363-378, maio-ago. 2016. Disponível em http://www.scielo.br/pdf/bgoeldi/v11n2/1981-8122-bgoeldi-11-2-0363.pdf. Acesso 26 dez. 2018.

FREITAS, A. C; FURTADO-JÚNIOR, I.; TAVARES, M. C. S.; BORCEM, E. R. Análise socioeconômica e esforço de pesca na captura do caranguejo-uçá – *Ucidescordatus* (Crustacea: Ucididae) – na Reserva Extrativista Maracanã Costa Amazônica do Brasil. Boletim do Museu Paraense Emílio Goeldi. Ciências humanas, vol.10, n.3, pp.711-722. 2015. Disponível em: http://www.scielo.br/scielo.php?script=sci_abstract&pid=S1981-81222015000300711&lng=pt&nrm=iso&tlng=pt. Acesso: 26 dez. 2018.

FURTADO, L. F. G. Pescadores do Rio Amazonas: um estudo antropológico da pesca ribeirinha numa área amazônica. Publicação do governo, Publicação de governo nacional. Livro. Belém: CNPq: MPEG, 1993. 486p.

GOUVEIA, N. A.; LIMA, F. A.; SOUSA, M. C. SANTOS, M. A. S. S..; O seguro defeso do pescador artesanal: evolução dos recursos e beneficiários no estado do Pará. Revista Monografias Ambientais, Santa Maria, v. 14, n. 2, mai-ago., p. 75-85, 2015.

GUIMARÂES, D. O.; PEREIRA, L.C.C.; MONTEIRO, M. C.; COSTA R.M.; Aspectos Socioeconômicos e Ambientais das comunidades Rurais da Bacia Hidrográfica do Rio Caeté (Pará Brasil), Revista da Gestão Costeira Integrada v. 9, n. 2, p. 71-84, 2009.

IDESP. **Estatística municipal de Bragança**, 2013. Secretaria de Planejamento e Instituto de Desenvolvimento Econômico, Social e Ambiental do Pará, 2013.

LIMA, M. A. L.; DORIA, C. R. C.; FREITAS, C. E. C.; Pescarias artesanais em comunidades ribeirinhas na Amazônia brasileira: perfil socioeconômico, conflitos e cenário da atividade. **Revista Ambiente & Sociedade**, São Paulo, v. 15, n. 2, p. 73-90, maio/ago. 2012. Disponível em: http://www.scielo.br/pdf/asoc/v15n2/05.pdf. Acesso em: 28 dez. 2018.

MMA, MINISTÉRIO DO MEIO AMBIENTE. Instituto Chico Mendes de Conservação da Biodiversidade Diretoria de Criação e Manejo de Unidades de Conservação; **Plano de Manejo da Reserva Extrativista Marinha de Caetétaperaçu (Pa)** Volume I: Diagnóstico, 2012.

MME, Ministério de Minas e Energia Secretaria de Minas e Metalurgia Informação Básica Para Gestão Territorial - Gate Programa de Integração Mineral em Municípios da Amazônia Primaz. **Mapa Geológico e Mapa de Favorabilidade para Tipos de Jazimentos Minerais Município de Bragança,** 1998.

OLIVEIRA, M. V; MANESCHY, M. C. A. Territórios e territorialidades no extrativismo de caranguejos em Pontinha de Bacuriteua, Bragança, Pará. **Boletim do Museu Paraense Emílio Goeldi**. **Ciencias Humanas**, Belém, v. 9, n. 1, p. 129-143, 2014.

OLIVEIRA, G. F; NASCIMENTO, S. F.; MELLO, A. H. PEREIRA, D.N.; MENDES, A. S.; Caracterização Econômica e Social dos Pescadores do rio Tocantins em Marabá-Pará. **Revista Agroecossistemas**, v. 3, n. 1, p. 18-23, 2011.

OLIVEIRA, J. F.; NOVAES, J. L. C.; SEGUNDO, A. L. N. M.; PERETTI, D. Caracterização da pesca e percepção de pescadores artesanais em uma Reserva de Desenvolvimento Sustentável no Nordeste brasileiro. **Revista Natureza** (on line). v. 14, nº 01, p. 048-054, 2016.

PIMENTEL, M. A. S.; RIBEIRO, W. C. Populações tradicionais e conflitos em áreas protegidas. Geousp – **Espaço e Tempo** (Online), v. 20, n. 2, p. 224-237, mês. 2016.

PEREZ, Luana Castro Alves. **"Analfabetismo funcional"**; Brasil Escola. Disponível em https://brasilescola.uol.com.br/gramatica/analfabetismo-funcional.htm. Acesso em 11 de abril de 2019.

RANIERI, A.; CANTO, O. do; ALVES, M. A.; BASTOS, R. A Gestão Costeira na Zona Bragantina Paraense: O caso de Ajuruteua, Bragança, PA. V **Seminário Internacional em Ciências do Ambiente e Sustentabilidade na Amazônia,** Campus Universitário da UFAM, Manaus, 14 a 17 de agosto de 2018.

R Core Team (2016). **R: A language and environment for statistical computing.** Vienna: R Foundation for Statistical Computing. Avaliable in: https://www.R-project.org. Acesso em: 10 de Junho de 2020.

SANTOS, M. C. F.; SANTOS, C. F.; BRANCO, J. O.; BARBIERI, E.; Caracterização Da Pesca e dos Pescadores Artesanais de Camarões Penaeidae em Salina No Município De Macau - Rio Grande do Norte. **Boletim. Instituto Pesca**, São Paulo, v. 42, n. 2, p. 465-478, 2016.

SANTOS, R. F.; MONTEIRO, E. P.; NASCIMENTO, J. C. S.; SANTOS, W. J. P.; A pesca artesanal no nordeste paraense, município de Viseu – Pará. **Acta of Fisheries and Aquatic Resources** v. 6, n. 1 p. 35-43, 2018.

SANTOS, A. Z.; SCHIAVETTI, A. Reservas Extrativistas Marinhas do Brasil: Contradições em ordem legal, sustentabilidade e aspecto ecológico. **Boletim Instituto Pesca**, São Paulo, v. 39, n.4, p. 479 – 494, 2013.

SILVA, J. T., BRAGA, T. M. P.; Caracterização da Pesca na comunidade de Surucuá (Resex Tapajós Arapiuns) **Biota Amazônia**, Macapá, v. 6, n. 3, p. 55-62, 2016. Disponível em http://periodicos.unifap.br/index.php/biota. Acesso 26 dez.2018.

SOUZA Filho, P. W. M., M. El-Robrini, M. Morfologia, processos de sedimentação e litofácies dos ambientes morfo-sedimentares da Planície Costeira Bragantina, Nordeste do Pará, Brasil. **Revista Geonomos**, v. 4, n. 2, 1996.

VIEIRA, N. C.; MORAES, S. C. NUNES, Z. M. P.; A study of fishing and education al level of Young fishers on the Bonifácio village, Bragança, Pará, Northern coast of Brasil. **Boletim Instituto Pesca**, São Paulo, v. 39, n. 2, p. 195 – 204, 2013.