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COMMUNITY BASED TOURISM AND TRADITIONAL PRACTICES: ELICITATION OF ECOSYSTEM SERVICES HARNESSED BY A TRADITIONAL COMMUNITY IN BRAZILIAN NORTHEASTERN

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Abstract

Human beings depend on nature's resources to ensure their well-being and even to survive. The correct management of natural resources allows all people to have access to these goods of nature, in this way the theme of Ecosystem Services (ES) was developed, seeking to realize an appreciation of the benefits that human beings extract from nature. During this work, a participatory map was built together with the local community, pointing to ES in a Conservation Unit (UC). This CU, located in the northeast of Brazil, is home to several traditional and indigenous communities of fishermen who live in close connection with nature and traditional knowledge inherited by generations, it is home to fragments of the Atlantic Forest, a rich expanse of mangroves, the estuary of the Mamanguape River and beaches suitable for leisure. Among the methods and techniques used, we found tools such as observation, interviews, questionnaires and a manual participatory mapping with an intensive focus on the local community, this information was complemented with interviews with policy managers and a questionnaire addressed to tourists. The results identified that policy managers, tourists and the community cite different ES as the main ones, however, the main ES that support both the community's livelihood and tourist activities, the interactions between the provision ES with the cultural ES, as well as point to the loss of ES supply due to anthropic activities outside the traditional community. In conclusion, we highlight the importance that ES obtained from the estuary represent for the community and the role of traditional knowledge for the conservation of ES. Greater participation of public bodies is needed both to supervise and to carry out participatory planning that involves the three spheres of government and guarantees the well-being of communities.

Keywords: Artisanal fishing. Ecotourism. Environmental Protection Area. Ethnotourism. Traditional communities.

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1 Introduction

Ecosystem Services (ES) classification is a widely used theoretical approach nowadays, both for designing conservation strategies as well as for creating social development policies (Rasheed, 2020). ES are the benefits that ecosystem processes provide directly or indirectly to humans. There are four categories of SE, these being: (i) Provisioning Ecosystem Services (PES), (ii) Cultural Ecosystem Services (CES), (iii) Regulating Ecosystem Services (RES), and (iv) Supporting Ecosystem Services (SES) (Costanza et al., 2017; MEA, 2005). Through this approach, aspects of Traditional Communities (TC) can be identified, such as the natural resources that sustain economic activities and cultural characteristics (Nahuelhual et al., 2016).

From the perspective of ES, the interactions humans perform in nature enable survival, even if they are not adequately recognized (Costanza et al., 2017; Haines-Young, Potschin, 2012; MEA, 2005). Therefore, scientific work on ES indicates the direct dependence that humans have on the environment, highlighting the importance of sustainability beyond the classical vision of exclusively increasing profit (Rasheed, 2020). The research work is focused on identifying the Cultural and Provisioning ES, being the types of ES of direct perception and that represent the benefits resulting from economic activities.

In Brazil it is common for traditional communities to inhabit Conservation Units (UC) of the Sustainable Use type (Brazil, 2011). This groups have cultural traits and values different from the utilitarian view that considers human beings above nature, since these communities have ties formed with nature through their daily interactions (Diegues, 1993). Traditional fishing, subsistence farming, fruit and wood gathering, among other activities, are the interactions that allow these communities to enjoy the Provisioning ES, such as food and wood. Thus, the proper functioning of ecosystems is necessary to ensure the quality of these ES (MEA, 2005).

Thus, the welfare of traditional communities does not depend exclusively on economic growth, but rather on social development and conservation of the environment in which they live. This makes it possible, by understanding these communities' perceptions of ES, to understand their views on what they consider a life of dignity and well-being (Rasheed, 2020). Several studies demonstrate the importance of attending to this reality during the construction of public policies for traditional communities inhabiting different protected areas around the world (Chakraborty et al., 2020; Rasheed, 2020; Rakotomahazo et al., 2019).

Another research work (Armstrong de Oliveira et al., 2010) propose the construction of participatory maps as a valuable tool for understanding the spatial distribution of Traditional Practices (TP) and natural resource use in territories. This methodology is generally used to represent the spatial distribution and concentration of ES social values (Nahuelhual et al, 2016), giving to cartography social foundations, different from the traditional construction of maps from the hegemonic vision, used as a strategy of domination and social control (Lacoste, 2005).

The UC are also spaces used for tourism, allowing for activities such as recreation, leisure, and rest (Diegues, 1993). Still according to the author, these activities create conditions that can transform the socioeconomic dynamics of the traditional communities that inhabit these spaces. The activities that make up the tourist product, are also possible through ES, being contemplated within Cultural ES (CES) (Costanza et al., 2017; MEA, 2005). Research papers that analyze tourism interfaced with Cultural ES consider elements, such as: cultural heritage, landscape, biodiversity, among others (Arbieu et al., 2017; Ghermandi et al., 2020; Smith, Ram, 2017; Taff et al., 2019).

In the Environmental Protection Area and Area of Relevant Ecological Interest Barra de Mamanguape (APA and ARIE BRM) there is an overlap of Conservation Units in which it is possible to see a variety of ES, due to its natural diversity. Initially, the demarcation of the ARIE of Mangrove Swamps Mamanguape River Mouth was declared by Decree No. 91,890 (Brasil, 1985), aiming at the sustainable use of mangrove resources. Subsequently, the APA Barra of Mamanguape River (Brasil, 1993) was created, encompassing a territorial fragment and maritime waters and seeking to conserve the marine manatee (Trichechus manatus) and improve the quality of life of the traditional resident populations, who depend mainly on extractive practices linked to the estuary.

Given the socioeconomic dynamics happening in the study area already described by several authors (Barbosa, Crispim, 2015; De Oliveira Soares et al., 2020; Temoteo et al, 2018), the following hypothesis was outlined: the Ecosystem Services linked to traditional production systems such as artisanal fishing, natural resource harvesting, handicrafts and the tourism activity that has developed in recent years in the BRM APA, allow this communities that depend on the natural resources of the Mamanguape River estuary to have economic independence in relation to social programs of income complementation, social assistance and food security.

The present work aimed as general objective to elicit the cultural and provisioning ecosystem services and their importance for Community-Based Tourism (CBT) and Traditional Practices (TP) in the Barra de Mamanguape and *Lagoa de Praia* communities. To achieve this purpose, the following specific objectives were outlined: (i) classify the ecosystem services from traditional practices and tourism developed in the community; (ii) design the mapping of the ES that support the socioeconomic activities in the Mamanguape River estuary; and (iii) analyze the importance that the ES have for the sustainable development of the community.

2 Methodology

Study Area

The Environmental Protection Area and Relevant Ecological Interest Area Barra do Rio Mamanguape (APA and ARIE BRM) is the territory of seventeen rural communities (Rodrigues et al., 2008). The UC is located within the territory of four municipalities in the State of Paraíba — Rio Tinto, Marcação, Lucena and Baía da Traição —, in which 65% of its territory corresponds to the municipality of Rio Tinto.

The UC is characterized by having mainly a coastal marine biome and having the occurrence of the marine manatee (ICMBio, 2014), this being the main reason for the existence of the UC. Nine different landscapes are found in the region, three of which are aquatic: sea, rivers, and estuary; two transitional: mangroves and beaches; and four terrestrial -dunes, sandbanks, cliffs, and Atlantic rainforest (ICMBio, 2014). Thus, the presence of a significant manatee population and the diversity of ecosystems (Figure 1), promote the offer of tourism activities focused on interaction with the environment (Da Costa et al., 2012).



Figure 1. BRM Landscapes: (A. Mangrove, B. Sunset, C. Sand Dunes Trail, D. Maritime area and sandstone reefs). Source: Research data/Isaza Valencia, 2020.

The residents engage in three main traditional practices: "artisanal fishing, extraction of mollusks and crustaceans, and subsistence family farming"(ICMBio, 2014; p. 224) and are termed "local communities" in this paper. Some residents of the UC also work in private companies in the surrounding area, such as alcohol/sugar mills; sugar cane plantations, carciniculture nurseries, public institutions, the third sector, and small traders/entrepreneurs (Barbosa, Crispim, 2015).

Methodological Path

This research is exploratory in nature and involves several information collection techniques, approaching a mainly qualitative treatment of the data. The methodological techniques and tools used for the fieldwork were: (i) literature research, (ii) direct observation, (iii) digital questionnaires forwarded via email to tourists, (iv) online interviews with Public Policy Managers (PPM), (iv) semi-structured interviews with community members who carry out socioeconomic activities in the territory, and (vi) Participatory Social Cartography during interviews with the community.

It is important to highlight that during the stage prior to data collection, the research project was socialized and the first contacts with the community were made. The present project was licensed by SISBIO No. 71795-1 to conduct research in UC and the Consent Opinion of the Ethics Committee No. 3.722.083, to conduct research with humans.

The elicitation of the ES that sustain the socio-economic activities were carried out from participant observation in the studied communities including the monitoring of tourism activities that take place in the region. This type of observation makes it possible to understand the characteristics of daily life in the researched community (Richardson, 2017). The first field visit was conducted in August 2019 and the last in April 2021, during this period the different collection tools were applied, with periodic visits of one week each month.

Initially, the researcher made two visits to establish initial contacts and observe the daily life of the community, aiming to allow the residents to learn more about the research project. After the first socializations of the project, the researcher actively participated in fishing and tourism activities with the community during October 2019 and February 2020, all of this information was recorded in the researcher's field diary. It is worth noting that, visitations to the UCs managed by ICMBio in the Brazilian territory were suspended between the months of March and October 2020, as a mechanism to prevent community transmission of Sars-Covid19 (ICMBio, 2020). This situation delayed the schedule seven months, especially in the data collection stage in the estuary with community members and the observations.

It was necessary to perform a last data collection in April 2021, during the rainy period of the year, in order to identify the different influences of weather and climate on SE utilization.

Stakeholders Selection and Data Analysis

Tourists and visitors: During October 2019 and February 2020, tourists and visitors were invited to complete a digital questionnaire sent by e-mail. It is worth explaining that tourists are considered, individuals who have spent at least one night at the destination (OMT, 2019). The questionnaires were not applied in loco, to avoid inconveniencing the tourists. A total of one hundred and sixteen (116) individuals responded to the questionnaires out of a total universe of one hundred and fifty-five (155) questionnaires sent out, showing a return rate of seventy-five percent (74.84%). For data analysis, 'packing circle' diagrams were constructed to observe the hierarchy of the mentioned ES (Wang et al., 2006), using RAWGraphs data visualization framework.

Community members: Residents of two communities in the APA area were interviewed for the research: Barra de Mamanguape community and Lagoa da Praia community. These two communities were specifically selected because they are formed primarily by fishermen and fisherwomen who depend on the resources of the estuary to survive and have socioeconomic ties with the tourist activity, which makes this group the one that has the most contact with tourists and visitors.

The community of Barra de Mamanguape is inhabited by 256 people who make up 85 families, ten families more than those reported in the survey developed in the area in 2014 (Cruz, 2014). The main activity of this community is traditional fishing, complementing its income with the following activities: tourism, the social aid program bolsa família (family allowance), and the annual closed season allowance for those who professionally carry out fishing activities in an artisanal way, according to Law nº 10.779 (Brazil, 2003). The community of *Lagoa de Praia* is located two kilometers from the Mamanguape River estuary and has 376 inhabitants that make up 118 families.

This group participated in the research with the application of semi-structured interviews. Thirty members between the two communities who met the inclusion criteria were interviewed, contacted in the estuary area, and invited to participate in the research while practicing their activities. They were identified with the codes from E1 to E30, selected in such a way that they represented different socio-demographic traits such as occupation, age group, gender, and socio-economic activity.

The inclusion criteria for the selection of interviewees were: (a) being born in the *Lagoa de Praia* or BRM community, (b) living or having lived during the last three decades in the communities, (c) being of legal age, (d) performs or carried out traditional practices in the estuary area, and (e) works or has worked with tourism activity in the region. According to the mentioned inclusion criteria, the sample was rationally selected according to a non-probabilistic parameter, identifying the individuals benefiting from ES and meeting the research objectives and the formulated hypothesis (Richardson, 2017).

Thus, among those selected, the presidents of the Antonio de Brito Fishing Colony Z13 and of the Association of Artisans and Ecotourism Guides of the BRM APA Region (AGEAPA) were also included, organizations that represent the two main economic activities of the territory. The goal of choosing individuals who met the inclusion criteria, was to obtain a purposive sample that represented the study population (Richardson, 2017) allowing for understanding the diverse perspectives and perceptions of ES beneficiaries through tourism and traditional practices and elaborate de participatory map.

The interviews were recorded with the notebook's audio recorder and were later transcribed using the notebook's audio player and word processor. The content analysis technique (Bardin, 1979) was employed, which allowed categorizing the information that the people interviewed have by selecting units of analysis. Each unit of analysis was selected from Cultural ES categories presented by the Millennium Ecosystem Assessment (MEA, 2005).

Aiming to analyze the importance of ES for the development of the community, the natural resources indicated most frequently by the interviewees during the construction of the maps were classified. During the interview, the individuals were asked to indicate on a map the places where they develop their socio-economic activities - traditional practices and community-based tourism - explaining which natural resources sustain these activities. For this, the interviewees were shown a satellite image of the area surrounding the community, comprising the different ecosystems of the estuary. To reference the places where the ES are "provided", the interviewee was situated on the map, describing the territory represented on the banner and explaining in detail how the presented image should be interpreted.

Employing content analysis (Bardin, 1979), the ES mentioned most frequently during the interviews with community members were ranked hierarchically on the participatory map. These participatory maps made it possible to understand the use of the territory and the perceptions that community members have about the cultural elements most representative of the ecosystems of the BRM.

The interviews were guided by the Millennium Ecosystem Assessment (MEA, 2005), allowing the community's perception to be compared with the results obtained through participant observation and the questionnaires answered by tourists and visitors. As a final result of the Participatory Social Cartography, a map was built, highlighting hierarchically according to the frequency with which the ES were mentioned.

Public policy managers: During the months of March and April 2020, interviews were scheduled with the tourism public policy managers with territorial competence in the UC, these were conducted by phone since the social confinement conjuncture, caused by Sars-Covid19, prevented access to all public institutions. The sampling of this second group, was selected using the snowball method (Biernacki, Waldorf, 1981), (ICMBio, 2020). In this way, at the end of each interview, the contact of another PPM working in the region was requested, repeating this request until in the new indications, the same individuals already interviewed appeared (Biernacki, Waldorf, 1981).

The public policy managers interviewed represent the institutions: (i) State Executive Secretariat of Tourism, (ii) ICMBio, (iii) Aquatic Mammals Foundation (FMA), (iv) Municipal Secretariat of Tourism of Rio Tinto, and (v) Superintendence of Environment Administration of the State of Paraiba. For the purpose of the quotations of the individuals' speeches, they were identified from M1 to M5 respectively. It is important to point out that the facilities of the ICMBio and FMA agencies are located within the UC, bringing the representatives of these institutions closer to the territory and the community. Regarding the inclusion of the Aquatic Mammals Foundation, although it belongs to the third sector, it is important in the formation and implementation of actions in the region.

3 Results and Discussion

Tourists' perception of the SEC

The management of the APA 'Barra de Mamanguape' or the state or municipal authorities do not contemplate the official monitoring of the flow of tourists, for this reason, for the research we carried out a documentary analysis of the 'visitors book' of the marine manatee project, made available at the ICMBio facilities, information that does not reflect the totality of tourists in this territory. Another limitation found, is the inconstancy of the information in this book, since only the records from December 2019 were found and interrupted in March 2020, resumed in November 2020 and interrupted again in February 2021, this because of the confinement caused by the Covid-19 pandemic. Thus, an average of 210 visitors per month was recorded between December 2019 and March 2020, and an average of 142 monthly visitors between November 2020 and February 2021. Previous research (Cruz, 2014), evidenced in this same book a monthly stocking of 251 tourists between the months of November 2010 and September 2014, significantly higher than the one found. The CES with the highest relevance for tourists is landscape appreciation, classified in the group "physical and experiential interactions" being mentioned seventy-two (72) times, corresponding to 61.8% of the interviewed tourists (Figure 2). About these results, the geographic and biological diversities existing in the APA Barra de Mamanguape allow the existence of different CES and consequently a variety of possible leisure and tourism practices. In this case, 'physical and experiential interactions' was the CES most cited by tourists, as mentions of enjoying the landscapes far outweighed visiting the manatee and contact with the local culture.

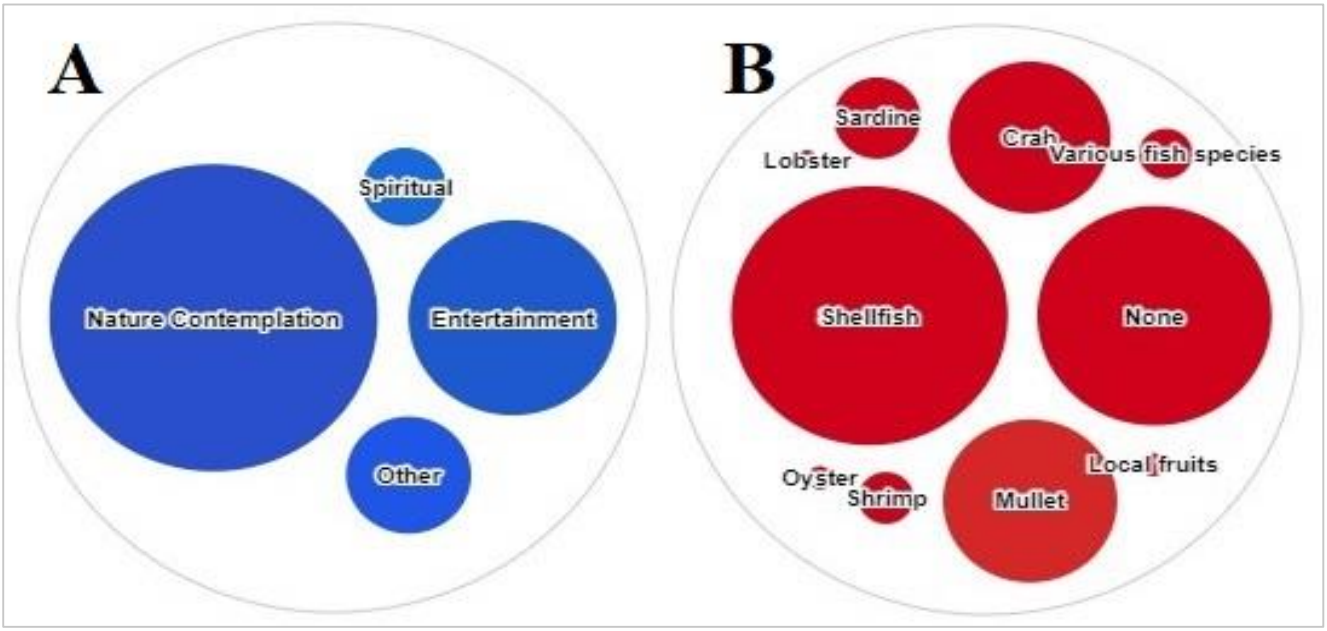

Figure 2. Ecosystem services mentioned by tourists: A. Cultural; B. Provisioning. Source: Research data/Isaza Valencia, 2020.

A case study of Community-Based Tourism (CBT) conducted in a coastal area of Turkey (Batman et al., 2019), points to the existence of a niche market for tourists who prefer areas with historical and cultural identity situated in rural areas rich in resources of natural value. There are activities in common between these two studies, such as landscape contemplation and resting in calm and quiet areas mentioned by the interviewees when answering that they like BRM because it is a destination with moderate tourist visitation.

Another major attraction for tourists visiting BRM is the CES 'nature appreciation', represented in the observation of turtles and corals in the reefs, and in the visitation of the marine manatee, which although it is the flagship identified by the managers, was not so referred to by the tourists. In reference to wildlife tourism in protected areas, the promotion of key species as promoters of the tourism product offered by destinations is common (Arbieu et al., 2017; Willemen et al., 2015). There are several studies addressing ecological and behavioral aspects of the marine manatee in the BRM (Alves et al., 2016; Iespa et al., 2017; Normande et al., 2015), highlighting its reproduction and the project for the conservation of the species.

Studies on the niche market of ecological tourism (Chand et al., 2015) suggest that this activity aims at natural conservation and create opportunities to make visitations, a vehicle for environmental education. During the participant observations and interviews with the community residents, it was possible to see that the tourists are guided by applying and sharing the traditional knowledge inherited by the local population.

Another prominent aspect about tourists' preferences, is the importance of gastronomy as a Cultural Ecosystem Service. Through the tourists' opinions, it was sought which species native to the estuary represent the local cuisine (Figure 3). Thus, the most frequently mentioned species was the shellfish (*Anomalocardia brasiliana* (Gmelin, 1791)), with sixty-three citations (60.57% of the tourists). Other important species are the crab (*Ucides cordatus* (Linnaeus, 1763), *Aratus pisonii* (Milne Edwards, 1837)) (25.96%) and the mullet (Mugilidae) (14.85%).

It can be said that the regional gastronomy of the BRM community is linked to the tourism product. Being an artisanal fishing village, its regional culinary tradition is based on marine species common to the ecosystems of an estuary. In this way, the gastronomic element has the potential to be a driver for the development of cultural tourism offered by the TC that play the leading role in the management and supply of the activity (Moira et al., 2015), bringing tourists closer to the local culture through community participation in the tourism product, providing ethnographic features to this activity (Barbosa, Crispim, 2015).

Public Policy Managers' view on Cultural ES and tourism

The social, economic, and environmental contexts of the BRM demand the articulation of different institutions to execute an adequate public policy management (ICMBio, 2014). In this way, the Management Plan (MP) distinguish the work of different actors: the municipal government to give attention to rural communities, the state government in the implementation of policies to promote tourism, the Ministry of the Environment (MMA) to manage the conservation actions of the UC, and the FMA, which develops actions for the preservation of aquatic mammal species, especially the manatee.

M1 and M3 highlight the ecological knowledge of the community, mentioning the need to intensify the "sensitization, for them to empower themselves and be proud of the things they know how to do" (M1), "learnings that they know, of their knowledge, [...] that we are wanting them to value" (M3). This highlight arises from the cultural ecosystem service of the educational class that is present in the tourism offer of the territory "conscious driving, you know, protecting the environment" (M1), "there are people who hire the boys to pull fishing nets, collect shellfish, then they show how the crab is handled in the mangrove" (M3).

The ecological knowledge mentioned by the mentioned PPM, can promote the development of the tourist activity and collaborate with the improvement of the mechanisms for making social, economic, and ecological decisions. Studies show that different stakeholders have diverse interests in marine APA (Noble et al., 2020), with both extractive and non-extractive species, and it is essential to involve communities in planning over decision-making processes.

The PPM also highlight the Cultural ES of the religious class "a party that has a very strong religious stamp and has been held for many years" (Figure 3). At the time of the interviews with this group, the celebration of the *Nossa Senhora dos Navegantes* festival was taking place, a traditional festivity that consists of the transfer of the religious symbol on a ship through the estuary, followed by a fleet of ships with worshippers.

M3 pointed out that it was looking at developing policies on defining the carrying capacity in each UC area "so many people in the reefs, so many people in the mangroves, so many people in the manatees, and so on. So, in the planning that we are building, we are foreseeing this" (M3). The land use plan that is being developed has as one of its objectives to determine the load capacity for each of the tourist attractions in the estuary.



Figure 3. Religious Cultural Ecosystem Service (Procession of *Nossa Senhora dos Navegantes*). Source: Research data/Isaza Valencia, 2021.

This situation indicates that, despite special situations, such as the mentioned religious activity (Figure 3), which goes beyond any measure and generates a considerable environmental impact, this festivity has not been regulated since the moment of its creation. Studies in this regard (Majumdar et al, 2015) show that awareness and inspection are necessary to minimize contaminant emissions and give a sustainable character to religious festivities, which are important events to conserve local cultural traits and promote regional tourism (Zanirato, Tomazzoni, 2015).

The perception evidenced during the interviews with the APA managers about the cultural ecosystem services, determines the public policy planning that will be built. By analyzing studies conducted in UC in several countries (Chakraborty et al., 2020; Manolaki, Vogiatzakis, 2017; Retka et al., 2019), it can be stated that CESs can be classified to identify information to assist in the adoption of sustainability and biodiversity conservation policies. This implies the need to involve managers and communities in the creation of indicators for the development of public policies compatible with their characteristics and the recognition of their riches (Arregui, 2013).

Cultural ES from the perspective of community members

This methodological stage was carried out between November 2020 and May 2021, after more than a year of contact with the community, when the relationship of trust between the researcher and the community was stronger. Thus, seeking to contextualize the importance of the territory (Figure 4) for this community's identity formation and resource use, two classes of cultural ecosystem services were initially identified: 'sense of place' and 'cultural heritage value'.

According to information obtained in interviews with the residents, the first houses located in the current subdivision inhabited by the BRM community were built during the 1980s. Before this period, they lived in mud houses on the edge of the estuary currently called "old street" and located 300 meters from the current location.

The aforementioned street is currently the main beach visited by bathers and the place where today some ‘caiçaras’ are built, in which the local keep their work tools (fishing gear). The real motivation for the move was inconclusive, but the interviewees cite reasons such as the advancing tide or even the purchase of the land they lived on by a third outside the community. For the community, the coastal erosion action caused by the tide is evident, observed through the transformation that the riverside has experienced, the fall of the coconut trees, the disappearance of the community's old cemetery, and the emergence of the beach called 'pontal' (Figure 4).

The traditional practices that make up the CES, ecological knowledge, and spiritual values, are cultural heritage transmitted from generation to generation through observation and orality (Diegues, 1993; Rocha et al., 2008). According to a survey conducted in a Natural Protected Area (NPA) in southern Iran, cultural heritage allows public policy managers to guide planning and decision-making, allowing them to be flexible and adaptable to local practices, valuing social, economic, and cultural aspects (Esfehani, Albrecht, 2018). The definition of the manatee visitation activity considered the needs of the boaters, but there is no documentary evidence that the managers of BRM Protection Area used this information in the management of the other resources.

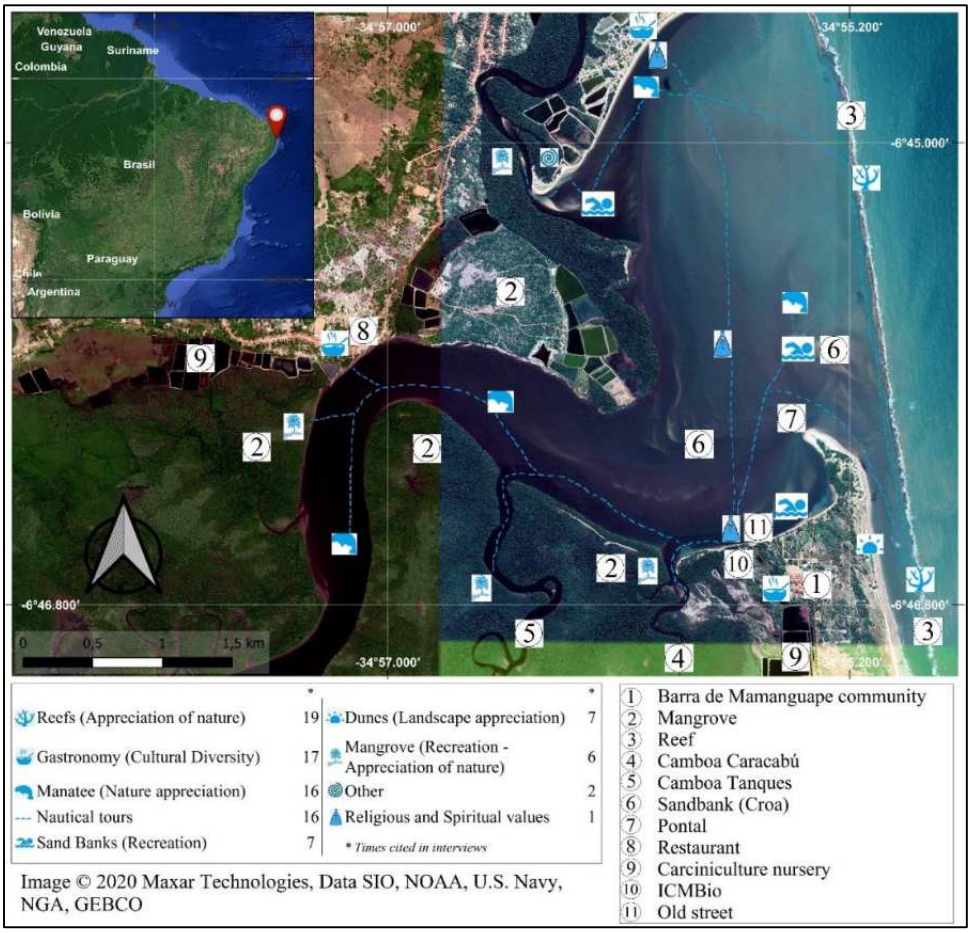

Figure 4. Social Cartography of Cultural Ecosystem Services of the Barra de Mamanguape estuary. Source: Research data / Isaza Valencia, 2021.

Cultural heritage enables the strengthening of a broader framework for natural conservation and can potentially be a promoter of regional sustainable tourism (Esfehani, Albrecht, 2018). It is worth noting that this aspect is presented in a complementary way in the tourism offer of the BRM, because the so-called cultural heritage is represented in tourism, through the application of knowledge of ecological processes in guiding tourists, gastronomy, and the demonstration of traditional practices "if (tourists) are curious about digging a shellfish, I also go there and show them how it is done" (E29).

The community members indicate Cultural ES “nature appreciation class” as the inducer for the development of regional tourism, referring to the specimens of the marine manatee that inhabit the estuary. Community members act as guides for the species and educate tourists about the functioning of the ecosystems in the territory and expose the importance that the preserved environment holds for tourism practice in the UC. There is also a need to educate tourists about the behavior of the species, because they believe that the manatee remains in a single space "there are some that come very angry, we explain that it is not 100% because it is a natural environment, today we see it here, soon we won't see it anymore because it moves around" (E5).

By employing participatory social cartography, the knowledge that members of the BRM and *Lagoa de Praia* communities hold about the territory they occupy can be re-signified, allowing them to identify the potentials and threats that may put their livelihoods at risk (Armstrong De Oliveira et al., 2010). In addition, it is possible to describe the socioeconomic dynamics, allowing the identification of the strategic points in the socioeconomic life of the residents and the importance these have for their social development (Rakotomahazo et al., 2019).

This technique was used with the understanding that participatory research is an effective tool that facilitates communication from communities and prioritizes the needs of locals during scientific work (Rakotomahazo et al., 2019). In this regard, Costanza (2017) in his discussion of ES, highlights the importance of developing methods that allow natural resources to be classified, mapped, and managed.

Provisioning ES and traditional practices

The elicitation of the ES Provision was carried out only with the members of the local communities and directed especially to the traditional practices carried out by these groups, specifically artisanal fishing.

The Mamanguape River estuary has several *croas* and *camboas*[1], allowing for the presence of several ES supplies in the estuary, used by the community through the praxis of traditional wisdom. Twenty-four individuals expressed having learned these techniques in their childhood, guided by their parents and other adults in the community while the remaining six learned during adolescence. Emphasizing the relation of local community with nature and the activities in the estuary, the other two interviewees affirmed "I learned from nature" (E1), "here no one taught anyone, and so I learned, and people do things face to face you do things" (E3) and "if you go to the 'croas' you learn, you see people using their hands and you learn" (E24). The relationship of these individuals to ecosystems alludes to SEC 'knowledge systems, inherited cultural values, cultural diversity, and educational values'.

For fishing there are necessary techniques such as how to make and mend a net, how to tie a knot, and tools are also used, such as the 'jerere' to catch shellfish, the net to catch crab and fishing nets such as the 'tarrafa', the mullet, and the trawl, as well as other fundamental knowledge such as installing the nets to catch crab (Da Silva Mourão et al., 2020; Gomes et al., 2019; Nascimento et al., 2016). Thus, the techniques and tools vary according to the species that will be captured, for this reason the participatory map shows several species captured in the same geographical points (Figure 5), composing an information structure that allows the sustainable development of this traditional community.

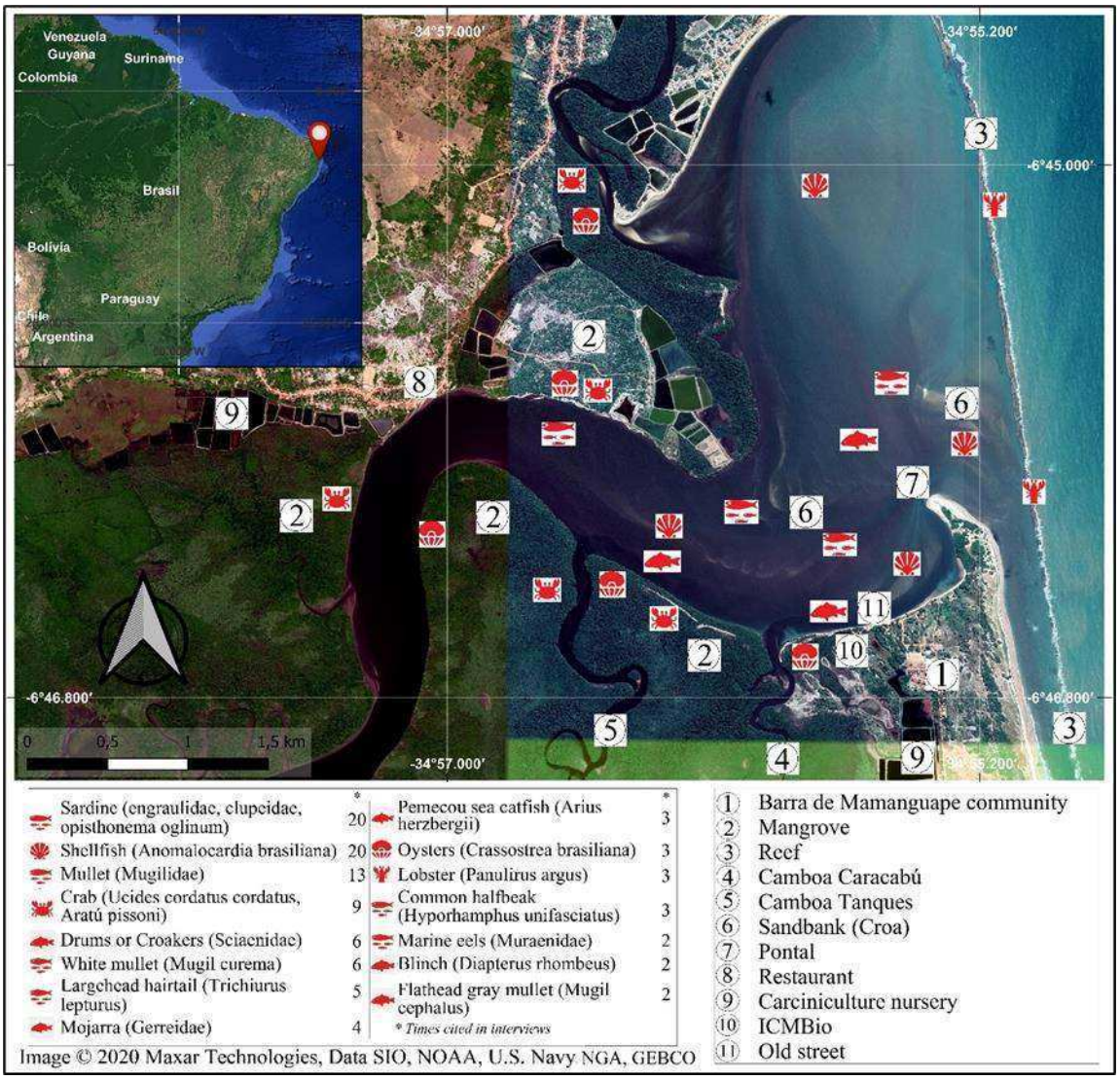

Figure 5. Social Cartography of the Ecosystem Services Provisioning of the Barra de Mamanguape estuary. Source: Research data / Isaza Valencia, 2021.

[1] *Croa* is the term used for sandbanks and *camboa* refers to the tributaries of the Mamanguape River surrounded by mangroves.

Addressing the possible threats and possible protection mechanisms of the points indicated in the social cartography, it is essential to attend to the importance that mangroves have as ecosystems responsible for the presence of marine species in the estuary and consequently, for the subsistence of these communities (Rocha et al., 2008). In this way, the mentioned research points to the community as an inducer of sustainable practices and a source of information about the current state of the resources.

It is worth noting that while communities living in large urban centers need various intermediaries to access certain types of ES, traditional communities give ecosystem services a different intrinsic value. This value changes in significance due to the direct connection they hold with natural processes and due also, to the influence these ecosystems represent for the livelihoods of these populations (Chakraborty et al., 2020). This proximity is fundamental to the construction of conservation strategies, being coherent with the statement: "it is necessary to protect and preserve nature strictly for its value in itself, that is, for its intrinsic value" (Costanza et al., 2017; p. 7). The participatory map elaborated (Figure 5) demonstrates the level of socioeconomic importance that each species inhabiting the Mamanguape River estuary has for this fishing village.

There are several researches conducted in the region that study the socioecological aspects and ethnoecological knowledge of traditional fishing (Da Silva Mourão et al., 2020; Mourão, Nordi, 2018; Rocha et al., 2008), the evolution of techniques used for crustacean extractivism (Do Nascimento et al., 2012; Do Nascimento et al., 2018), estuarine and marine biodiversity (Medeiros et al., 2018; Soares et al., 2020), and studies about medicinal properties (Alves et al., 2013), among others. Nevertheless, a gap was identified regarding studies that integrate the economic sciences to a level of environmental dimensions in the BRM; that is, that recognize the direct dependence of local social and economic well-being, with the proper functioning of ecosystems.

Other studies conducted with this methodology (Nahuelhual et al., 2016), indicate the need to pay attention to the values that individuals assign to the resources identified in the maps, this according to the representation proposed in the research work. During the rainy season data collection, the community reported a decrease in the number of species in the estuary.

Previous studies indicate that the rainy season in the northeast region of Brazil causes a reduction in shellfish numbers (De Oliveira et al., 2014), possibly influenced by high rainfall, decreased salinity and water temperature. According to the opinions of the community member interviewed, this situation also reduces the presence of sardines "there is a time when the water gets cold and there are no sardines in the river" E17.

When asked about the provisioning ES of the class 'land-based cultivation of plants for nutrition', respondents older than 60 years (E2, E28, E30) reported that previously, community members planted yam, cassava, corn, among others. However, currently no member of the BRM community practices agriculture, revealing a main perception about the causes of the absence of this traditional practice: "it is useless [...] after they put the nursery, it contaminated the water and has been filtering underneath" (E2), alluding to the shrimp production ponds installed in an adjacent location to the community (Figure 6).

A total of eight interviewees mentioned the loss of ES caused by the carciniculture activity and loss of territory "before it was a beautiful bush, this was a river for us to bathe in fresh water there in front, today you get there you only see the mud" (E8) and "there is nowhere to plant [....] we only planted rice, potatoes, cassava, beans on this side; then the nursery came and ended it all up" (E10). The loss of ES from the group 'terrestrial cultivation of plants for nutrition', is a situation that compromises the well-being of the community and constitutes an environmental liability from the perspective of the natural capital of ES (Costanza et al., 2017; MEA, 2005).

The activity of carciniculture has already been pointed out as a socio-environmental problem in the region of the BRM APA (Silvestre et al., 2011), being indicated the need to make effective enforcement and compliance with environmental legislation, the indication of soil and water salinization may reveal a serious environmental problem. Understanding that the studied territory is located in a UC, the presence of shrimp farms and their impacts such as soil salinization, loss of habitats, deterioration of water quality, contamination of aquifers, is not in accordance with the objectives of nature conservation (Dias et al., 2012). For this reason, it is necessary that control agencies address socio-environmental problems by prioritizing the needs of local populations, as a measure to address their vulnerability to this risk. It is important to point out that the operation of this enterprise is licensed by the environmental management entity.

Finally, during the interviews other provisioning ES were elicited, corresponding to the class 'food and fiber': wood as a source of energy and construction, and wild fruits. The community collects/cuts wood only for the ‘caiçaras’ own repair, they burn dry wood to 'thresh' seafood, and they collect local fruits, mainly cashew (Anacardium occidentale). According to the regulations of the UC, the community is not allowed to hunt animals "people only burn firewood when they go for shellfish and they don't want to burn gas" E28.

The importance of traditional practices is linked to the direct contact of these communities with nature, employing traditional practices, have allowed them to conserve their cultural and social values, ensuring their continuity as a traditional population until today (Temoteo et al., 2017).

Hypothesis Corroboration

The hypothesis outlined for this paper suggests the economic independence of local communities guaranteed by their economic activities. According to the results of the interviews, it is possible to point to the need to guarantee the well-being of the communities through the management and formulation of public policies, since the provision of ecosystem services is not enough. The profit generated by cultural ES is seasonal due to ecological cycles with rainy seasons in the middle of the year that make access to the territory difficult.

In the same way, the supply SEs manage to partially meet their needs, being non-estuary through traditional fishing or the collection of fruits. The sociocultural threat due to the negative effects on the land and the consequent loss of ES of the class 'land cultivation of plants for nutrition", produced for the shrimp farming represents a threat to the dignified people's life.

Considering the loss of this ES and the dependence on the cycles of nature to ensure food security, it is not possible to affirm that the community has 'economic independence from social income supplementation programs'. Thus, according to the results found, it is possible to conclude that the use of ES as an exclusive source of subsistence for the communities studied is not enough, denying the proposed hypothesis.

4 Conclusions

Analyzing the perceptions of the ES of the three groups - tourists, managers, and community - it was possible to observe that the Cultural ES "nature appreciation", evidenced in the observation of the manatee, was hardly mentioned by the tourists, in comparison with the community members and managers.

The perception of this Cultural ES by the community and the managers can be explained by the importance that the manatee species has, both for the conformation of the UC and for its sustainable management. Since Cultural ES "landscape appreciation" is most often mentioned by tourists, the UC management policies and tourist activity must take into account the dynamics that this type of tourism entails.

The tourism activity in the Environmental Protection Area and Area of Relevant Ecological Interest Barra de Mamanguape, offers tourists a wide diversity of CES, establishing an association between ecological tourism and ethnographic tourism, since the community participates actively through gastronomy and conscious driving, applying traditional knowledge. The use of the traditional ecological knowledge in the tourism product favors the preservation of the ES, because the conservation of species depends directly on the application of this knowledge, and tourism depends on a preserved environment.

About the managers of public policies, the absence of planning related to the sustainability of the tourist activity, of joint planning, and of inspection emerge as challenges that must be met. On the role played by PPM, it is necessary that they attend to the problems caused by the impediment of this traditional rural community, not to enjoy the Provisioning ES of the class 'land cultivation of plants for nutrition'. Paying attention to this situation can be critical to the sustainable development of the community.

The correct management of ES, linked to the accompaniment of the managers, is fundamental in order to guarantee this economic independence so necessary for rural communities. All the elements linked to the use of ES, are fundamental for the creation of public policies that favor the autochthonous people of this region.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

Conceptualization, C.I.V. and G.M.C.; methodology, C.I.V. and G.E.C.; writing—original draft preparation, C.I.V.; writing—review and editing, C.I.V., G.N.C. and G.E.C. All authors have read and agreed to the published version of the manuscript.

DECLARATION OF INTEREST

The authors declare that no funding is applicable for this research.

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