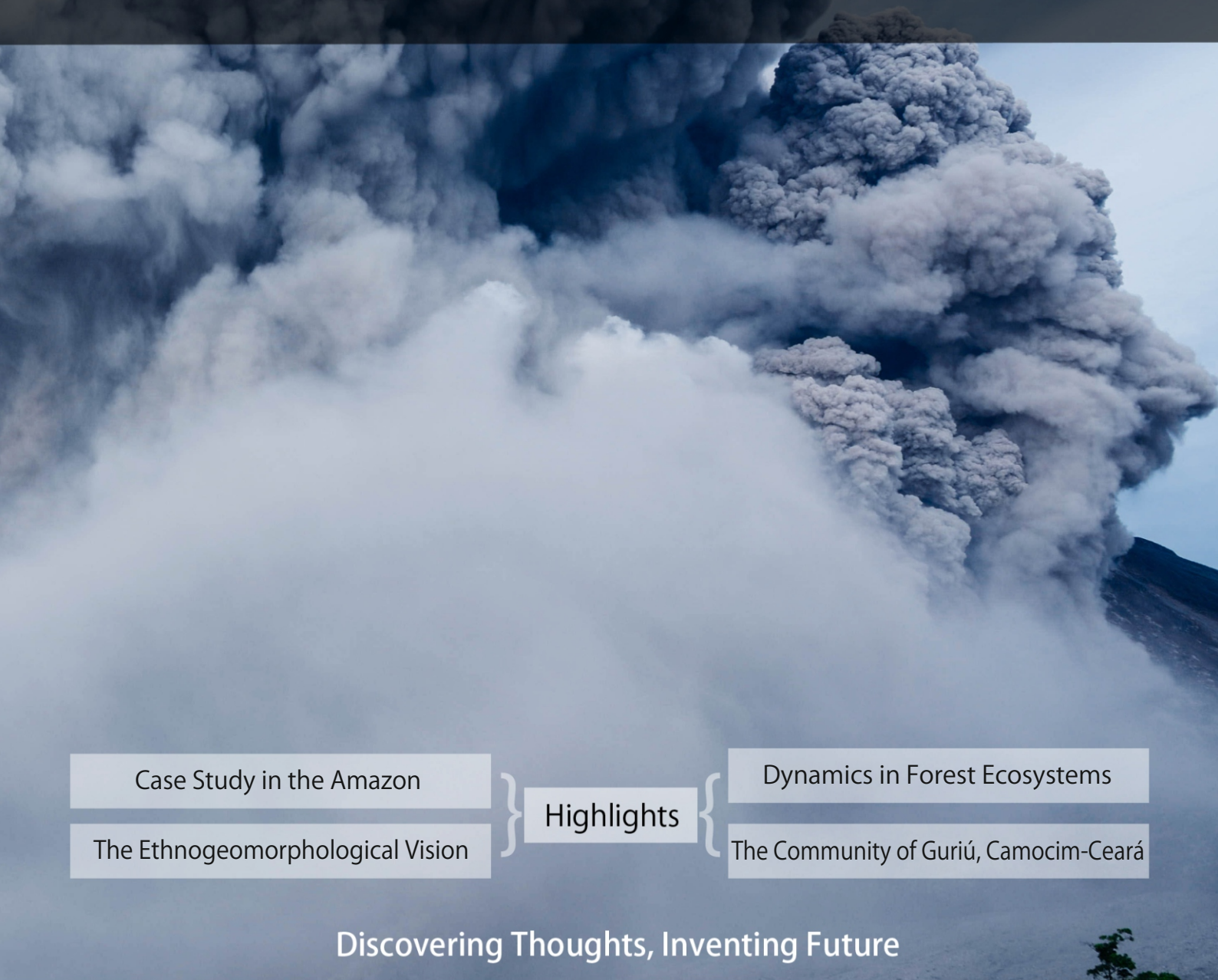
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Case Study in the Amazon

The Ethnogeomorphological Vision

Highlights

Dynamics in Forest Ecosystems

The Community of Guriú, Camocim-Ceará

Discovering Thoughts, Inventing Future

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Unlocking Community Engagement in REDD+ Initiatives: Insights from a Case Study in the Amazon

By Sérgio Castro Gomes, Luis Fernando Cardoso e Cardoso, Eugênia Rosa Cabral, Antônio Cordeiro de Santana, Keila Regina Mota Negrão & Pablo Queiroz Bahia

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Abstract- The literature on national plans to reduce emissions from deforestation and forest degradation (REDD+) shows that the stakeholders present in the territory, especially the communities, are the focus of these actions. The article questions the level of community engagement in a proposed REDD+ project in the Amazon by private companies, with the aim of analyzing the socio-economic and environmental aspects of community residents. The theoretical framework integrates stakeholder theory and community participation theory to support the analysis of the level of engagement. 338 small rural producers were chosen from among the residents of 23 communities in four municipalities in the state of Pará. The sociodemographic characteristics were collected and structured in tables and graphs. The results reveal that the communities are socially disjointed, with problems defining property rights and access to government goods and services, which makes it difficult to achieve the benefits declared by the REDD+ project.

Keywords: community participation; socio-economic and environmental conditions; social organisation; greenhouse gas emissions.

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Unlocking Community Engagement in REDD+ Initiatives: Insights from a Case Study in the Amazon

Sérgio Castro Gomes [α], Luis Fernando Cardoso e Cardoso [σ], Eugênia Rosa Cabral [ρ], Antônio Cordeiro de Santana [ω], Keila Regina Mota Negrão [¥] & Pablo Queiroz Bahia [§]

Abstract- The literature on national plans to reduce emissions from deforestation and forest degradation (REDD+) shows that the stakeholders present in the territory, especially the communities, are the focus of these actions. The article questions the level of community engagement in a proposed REDD+ project in the Amazon by private companies, with the aim of analyzing the socio-economic and environmental aspects of community residents. The theoretical framework integrates stakeholder theory and community participation theory to support the analysis of the level of engagement. 338 small rural producers were chosen from among the residents of 23 communities in four municipalities in the state of Pará. The sociodemographic characteristics were collected and structured in tables and graphs. The results reveal that the communities are socially disjointed, with problems defining property rights and access to government goods and services, which makes it difficult to achieve the benefits declared by the REDD+ project.

Keywords: community participation; socio-economic and environmental conditions; social organisation; greenhouse gas emissions.

I. Introduction

Over the last three decades, environmental changes have been occurring rapidly and frequently on the planet, with long-term effects on temperature and climate, largely due to human activities (Souza et al., 2020). The main drivers of climate change are the burning of coal and fossil fuels and deforestation, which lead to an increase in the emission of greenhouse gases (GHGs) on the planet (Shivanna, 2022). In this context, there are traditional communities living in the Amazon who survive by sustainably using natural resources and suffer from the negative externalities caused by deforestation and the increase in the area planted with monocultures such as palm and soy.

Reducing the impacts of climate change requires the use of strategies that lead to the adoption of sustainable production practices, such as the policy of reducing emissions from deforestation and forest degradation (REDD+) in developing countries, resulting from discussions on climate change that took place at COP13, in Bali, Indonesia (Streck, 2020). In this strategy, traditional populations, indigenous peoples, and quilombolas have a central role in the success of this type of action, as their settlement in these areas, through the adoption of inclusive policies, will largely ensure the achievement of GHG emission reduction targets in the long term, which will occur as these people benefit from the actions foreseen in the REDD+ implementation projects (Nhem et al., 2017).

Implementing and incentivising a REDD+ project with t h e aim of maintaining forest areas and recovering degraded areas for carbon retention requires an understanding of the motivations of residents in the communities under study to continue reproducing within a production system based on temporary crops that guarantee subsistence and the commercialisation of surpluses. It is therefore important to highlight the incentives for changes in land use, the direct costs of production and the opportunity cost for the environmental service provided and envisaged in REDD+ projects. It is also important to consider the level of social organisation of the communities (Bruk Molla, 2019; Santana, 2021; Wunder *et al.*, 2020).

In 2015, the Brazilian government established the National REDD Strategy. In operational terms, the action plan for the prevention and control of deforestation in the biomes is the main instrument presented by the federal government to articulate REDD+ initiatives in the country (MMA, 2016). With regard to state jurisdiction, the Secretariat for the Environment and Sustainability (SEMAS) is making progress on building the REDD+ jurisdictional system, which is expected to be finalised in 2024 (SEMAS, 2023). In these cases, as the instruments guiding REDD+ policy have not been defined and regulated, this makes it difficult to fulfil the safeguards for the communities involved in REDD+ projects, even if the private projects present the actions for the community to receive the benefits provided by the project.

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The conditions for the participation of rural communities located in the area of influence of a REDD+ project to be proposed by a large palm oil production company in the state of Pará are then questioned. Analyzing the socioeconomic and environmental aspects of the residents in the communities that enhance the participation of residents is the objective of this work.

The theoretical framework combines *stakeholder* theory with the theory of community participation as a way of analysing socio-economic and environmental patterns, and the evidence that guides the definition of the level of participation of residents in communities, according to Choguill (1996) and Dirgantara (2021).

The methodological approach follows the mixed model, with the application of a questionnaire containing closed questions and single or multiple answers. The sample is made up of community residents, chosen intentionally. In addition to the questionnaire, in-depth interviews were carried out among residents who participated or participate in the management of community associations.

The study was carried out in 23 communities where 338 residents were interviewed, 12 of whom took part in the in-depth interviews. The communities are located in four municipalities in the Tocantins Integration region, which are territories affected by the expansion of oil palm cultivation in the region and are part of the area of interest of the REDD+ proposal to be developed by a large company in the oil palm production sector in the state of Pará.

The article is structured in five sections, including this introduction and the conclusion. The theoretical aspects are presented and discussed in the second section. The research methodology is described in the third section. In the fourth section, the results of the study are presented and analysed in the light of the theoretical framework.

II. Theoretical Framework

a) *The REDD+ policy for tackling climate change*

The latest report from the Intergovernmental Panel on Climate Change, released in March 2023, once again brought alarming conclusions about the increase in global levels of greenhouse gas (GHG) emissions, mainly as a result of traditional forms of land use, the use of fossil fuels, forest degradation and agricultural activity (Fearnside, 2008). Controlling GHG is a challenge for governments in terms of institutionalising effective public policies against the accelerating consequences of climate change.

The Brazilian Amazon is well placed to face this challenge, as it has the second largest forest cover in the world and plays a central role in carbon stocks, as well as providing other ecosystem services, such as climate regulation and balancing energy and water flows (Fearnside, 2008; Toledo *et al.*, 2022). In 2013, after almost a decade of rounds of negotiations, the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) defined an international architecture to provide incentives to developing countries for REDD (Streck, 2020).

REDD+ is a mechanism created to incentivise the conservation of forests in developing countries, based on the payment-by-results logic of the carbon market. Its central objective is to reduce GHG emissions through conservation actions and sustainable forest management. In a context of climate change mitigation, REDD+ values the ecosystemic role played by standing forests, proposing local development through a combination of reducing deforestation and encouraging sustainable economic activities that are appropriate to the territories and local reality.

Seven guidelines were drawn up by the UNFCCC, also known as the "Cancun Safeguards", to ensure that REDD+ initiatives adequately address sensitive issues, especially considering the rights of groups that are impacted and must be taken into account when implementing projects: legal compliance with applicable international agreements and legislation; respect for the tenure rights of traditional communities and peoples; fair, equitable and transparent distribution of benefits that result from REDD+ actions; economic and sustainable diversification of natural resources; environmental conservation and recovery; ensuring the broad participation of stakeholders involved in and affected by projects; monitoring and transparency of data on initiatives (Christen *et al*., 2020).

However, as Toledo et al. (2022) point out, the implementation of REDD+ in Brazil has faced various challenges, mainly related to governance and the distribution of benefits among different actors involved. Numerous critiques have been formulated identifying flaws in the implementation process of REDD, highlighting the possibility that projects may result in violations of territorial and cultural rights, compromising the rights of local communities (Skutsch & Turnhout, 2020).

REDD+ is an important tool for encouraging forest conservation and sustainable development, especially in countries like Brazil. Its implementation can contribute to poverty reduction and the promotion of social justice when carried out in a participatory, inclusive, and dialogical manner, involving local communities and respecting their rights (Cabral, 2022; Hupffer et al., 2011). The involvement of communities (stakeholders) in the REDD+ program is a central necessity to ensure forest conservation and climate change mitigation.

The way in which the projects have involved the population has been criticised for perpetuating

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socio-environmental inequality and excluding local communities from decision- making (Newton *et al*., 2015; Skutsch & Turnhout, 2020), showing that the programme may not be taking into account the needs and interests of local communities, resulting in conflicts and socio-environmental injustices (Reed, 2008; Streck, 2020). In addition, there are concerns about the effectiveness of the mechanisms that lead to achieving the proposed objectives, as well as governance and transparency issues in the implementation of REDD+ projects (Christen *et al.*, 2020; Luttrell *et al.*, 2013; Nhem et *al*., 2017). The lack of community participation in the REDD+ process can result in social injustices and human rights violations, in other words, the reproduction of a system that has historically been present in Brazil (Streck, 2020).

The studies by Newton *et al.* (2015) and Skutsch and Turnhout (2020) point out that communities are often considered only as "beneficiaries" of projects, without their effective participation and involvement. There is also a lack of transparency and clear information about REDD+ projects for local people, which can hinder community participation (Streck, 2020). Another critical point is that local communities often lack the technical knowledge needed to effectively participate in projects, which can result in conflicts or a failure to understand the benefits of the initiative (Hupffer *et al.*, 2011; Reed & Stringer, 2016; Sathler *et al.*, 2015).

Several authors have emphasised the fundamental role of local communities, as they are the main users and guardians of forests and have knowledge and practices that are essential for the sustainable management of these resources and for the sustainability of the initiative itself (Christen *et al.*, 2020; Luttrell *et al.*, 2013; Newton et al., 2015; Sathler *et al.,* 2015; Vijge et *al.*, 2016). In addition, the inclusion of communities in the programme can bring social benefits, such as improving the living conditions of residents and strengthening local governance (Dirgantara, 2021).

The literature therefore highlights the importance of the REDD+ programme taking into account the needs and demands of local communities, ensuring their effective participation in decision-making and in the management of forest resources. This shared management should be made possible by constant and effective dialogue between the various *stakeholders* involved in REDD+ projects, especially local communities, so that they are seen not just as suppliers of information, but as actors who directly influence the implementation of the programme, which will enable a fairer distribution of the benefits generated by the initiatives (Skutsch & Turnhout, 2020; Souza, 2013).

b) Stakeholder participation theory

Freeman (1984) defines *stakeholders* as a group or individuals who affect the internal decisions of organisations so that they achieve their objectives or are affected by them. According to Andrade and Rossetti (2004), *stakeholders* can be classified into four groups: investors, made up of the organisation's owners; internal, those directly involved in generating and monitoring results; external, those integrated or not integrated into the business chain; local society, the government and its regulatory agents. According to Reed (2008), *stakeholder* participation increases the chances of securing the interests of secondary actors, guaranteeing benefits for society in general.

The success of REDD+ policies lies, to a large extent, in the incentives for the multiple actors (*stakeholders*) who participate in the sustainable management of forests and in the information and knowledge generated by exchanges of experience that improve the quality of environmental decisions. However, Reed (2008) states that this quality depends on the nature of the process that guides decisions.

As environmental problems are complex and uncertain, affecting multiple actors, decision-making must take into account the diversity of *stakeholders*' knowledge and values, assuming that their participation is a democratic right (Reed & Stringer, 2016). For Reed (2008, p. 12), "participation is defined as a process in which individuals, groups and organisations choose to take an active role in making decisions that affect them". In this case, participation is restricted only to those interested in the issue, and does not extend to the general public.

In this context, Redd (2008) states that *stakeholder* participation brings a set of benefits that improve the formation of environmental governance: increased public confidence in decisions; empowerment from the knowledge produced; greater likelihood of environmental decisions being understood as holistic and fair; promotion of social learning; learning generated from new relationships. In effect, participatory processes improve decision-making, since they are based on complete information, relationships of trust, reciprocity and co-operation.

Community participation in governmental and non-governmental programmes plays a central role in the viability of social projects, since the practices developed in the community and the knowledge produced in internal and external relations influence political decisions (Choguill, 1996).

According to Choguill (1996), Arnstein's so-called "ladder of citizen participation" is used to analyse community participation in developed countries, but does not apply to developing countries. A provisional classification was proposed by Choguill (1996, p. 22), "based on the degree of external institutional involvement in terms of facilitating/realising community mutual aid projects". Reed and Stringer's (2016) proposal to build a theoretical framework to explain the motivation for participation by communities and public

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agents considers context, process design, management of power dynamics and scalar adjustment as essential components to explain the degree of participation (engagement) in a natural environment.

Dirgantara (2021) adopts the model developed by Choguill (1996) to identify local community participation in the implementation of REDD+ in the Meru Betiri National Park on the island of Java in Indonesia, developed from a collaborative perspective between the government, neighbouring local communities and the International Tropical Timber Organisation (ITTO).

In Dirgantara's (2021) logical construction, the attributes of participation have been aggregated into four dimensions, each of which contemplates the additionality of the attributes of Choguill's (1996) original proposal, as a way of showing the level of government and community involvement.

Table 1 summarises Choguill's (1996) idea of the attributes that define the level of community participation in government actions and expresses the formation of residents' behaviour in participating or not in government projects and those of non-governmental institutions. The last column of the table presents the authors' understanding of the model for analysing the results of the research carried out by Dirgantara (2021), which contributes to the examination of socio-economic and environmental characteristics in the context of the REDD+ project proposal of interest to the research.

The dimensions of Choguill's (1996) proposal are: empowerment, considered the highest degree on the scale in which community members have the majority of seats or powers; partnership, with shared responsibilities; conciliation, arising from government action ratified by the people; dissimulation, expressed by apparent participation; diplomacy, also understood as a manipulation of the community; information, concerning the flow of information from officials to the community with no room for negotiation; conspiracy, in which no participation in decision-making takes place; self-management, in which the public authority abdicates from solving local problems.

Chart 1: Ladder of community participation/non-participation (Choguill, 1996).

Hierarchy in the level of participation	Attributes	Dimension	Understanding from the theoretical- empirical perspective of Dirgantara (2021)
Higher level	Strengthening	Support	Community members are proactive in making alliances with the government.
	Participation		Sharing responsibilities; informal problem- solving mechanisms. Co-operation between communities and public and private institutions.
	Conciliation		This occurs when solutions to problems are drawn up by the government or by consensus between *stakeholders*, taking into account the economic power of large estates. Adequate waste disposal and concerted action in communities
	Dissimulation	Manipulation	Communities are provided with secondary actions made possible by the public sector. Councils or committees are created to act in a symbolic way.
	Diplomacy		Community improvements are carried out with the participation of residents and non-governmental institutions. The government is oblivious to internal changes and acts opportunistically. The NGO trains residents to form a labour force to be employed in the community's internal transformation actions.
	Information		Information about its decisions to residents without the possibility of negotiation. The realisation of actions in the community is defined and planned with little evidence of the reality experienced by the residents, without taking into account the successful or unsuccessful experiences of the community's residents.
	Conspiracy	Rejection	Little or no aid to the community is decided by the government, either because political issues benefit rival political groups or because there are no programme competences in the community. The most vulnerable are the groups on the margins of government social policies.

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Lowest level	Self-management	Negligence	NGOs provide financial, social and psychological assistance through specific projects among the residents. There is an absence of public authorities in the community, where internal demands are neglected. The community needs to make a greater effort to (re)build the social fabric.

Source: Adapted from Choguill (1996) and Dirgantara (2021).

c) *Characteristics of relationships between residents of communities located around large oil palm projects in the state of Pará*

Academic research on oil palm cultivation in the Para Amazon has revealed profound socio-environmental and economic transformations in traditional communities, highlighting the complexity of the interactions between agriculture, sustainability and rural development. Studies by Costa and Teles (2022), Mota *et al.* (2019), Nahum and Santos (2013) and Souza and Macedo (2020) offer important clues about these dynamics, each addressing different aspects of the influence of oil palm cultivation in the region.

Souza and Macedo (2020) investigate peasant territoriality in north-eastern Pará, revealing that peasants have diversified their economic activities beyond subsistence farming. Oil palm cultivation has emerged as a significant economic alternative, although this dependence has led to a series of survival strategies, such as migration and wage labour, reflecting the adaptability of peasants in the face of economic challenges.

Costa and Teles (2022) analyse the socio-environmental consequences of the introduction of oil palm cultivation in the Nazaré Settlement, highlighting negative impacts such as the degradation of streams and a reduction in the availability of natural resources. The expansion of this monoculture has reconfigured the socioeconomic and environmental fabric of rural communities, affecting traditional farming practices and the sustainability of farming families.

Nahum and Santos (2013) highlight the environmental damage caused by oil palm cultivation, such as the contamination of water resources by the intensive use of pesticides, and the social impacts, including the concentration of land and the threat to food security. They conclude that, despite being a source of economic development, oil palm cultivation presents significant challenges for environmental sustainability and the well-being of traditional communities.

Mota *et al.* (2019) focus on the organisation of family labour in oil palm cultivation in Tomé-Açu, noting a significant reduction in the cultivation of annual crops due to the volume of work required by oil palm cultivation. The research points to a change in the management of family farm labour and a trend towards self-exploitation of the workforce, reflecting the socio-economic transformations induced by oil palm cultivation.

These studies collectively illustrate the complexity of the changes caused by oil palm cultivation in the Para Amazon, highlighting the need for integrated approaches that respect local dynamics and the environment in order to tackle socio-environmental challenges and promote sustainable rural development.

III. Methodology

This article followed, in part, the guidelines outlined by Dirgantara (2021). The research benefited from both qualitative and quantitative methods to produce the necessary information for the development of the analyses. Based on the results of the qualitative research, it was possible to understand the underlying factors in the social organization process of the communities. Through the use of quantitative methods, the systematization of variables and the generation of the necessary descriptive statistics were carried out to obtain the patterns of the sociodemographic characteristics and social organization of the communities.

Next, a literature review was carried out in order to obtain information related to the central aspects of the discussion on the design and implementation of REDD+ projects. The literature review is an important stage in the production of knowledge on a given research topic. A questionnaire with objective questions was developed based on the authors presented in the literature review on stakeholder theory and social participation, aiming to capture the residents' perceptions about various situations. This type of instrument is recommended by Rowley (2014) for research related to stakeholders.

The estimated number of families and residents in the 23 communities is 7,221 and 29,095, respectively. The sample size was determined in proportion to the distribution of families in each community. The research sample is non-probabilistic and utilized the purposive selection process, as participation was a decision made by the community resident. This type of sampling has limitations and introduces biases such as the inability to generalize the results to the population, the self-selection process, and selection bias, which were minimized by conducting interviews with the presidents and directors of the community associations, and seeking residents of different ages, genders, and lengths of residence in the community.

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In the sample, 338 family representatives were interviewed, chosen because they were responsible for the family. In cases where those chosen were people who participated or participate in the management of the community association, an in-depth interview was carried out to obtain information on the dynamics of cooperation, collaboration and reciprocity between the participants in the organisation. In this format, 12 residents were interviewed.

Data was collected in the field from 8 to 14 February 2022. Collection in the communities was carried out by nine researchers, three groups with a field supervisor and two collectors, all of whom took part in the application of the questionnaires and interviews.

The administration of the questionnaires in the field followed these steps: a) the community residents were approached at their homes, and the Informed Consent Form (ICF) was presented to them – if the resident agreed to participate in the research, the interview was conducted, and the Form was signed; b) if the resident had been involved in the management of the community association, an in-depth questionnaire was administered; c) the average time for administering the questionnaire ranged between 20 and 30 minutes, and this time extended to 50 minutes for interviews with the managers. Some criteria were used for conducting the interviews: the participant had to be at least 18 years old; the administration of the interviews had to be gender-balanced; there was an effort to achieve the greatest variability of respondents based on the variable of length of residence in the community.

The Statistical Package for the Social Sciences (SPSS) *software* was used to systematise the data and produce the information. Frequency distribution tables and descriptive statistical measures were drawn up to find patterns of occurrence among all the interviewees. The aspects considered for discussion are related to the historical context of the communities, infrastructure services, the social articulation of associations and cooperatives, land use, commercialisation and the interviewees' perception of environmental services and externalities. The level of participation was classified according to the typology developed by Choguill (1996), applied by Dirgantara (2021).

IV. Results and Discussions

a) *Sociodemographic characteristics*

The average number of people per household was 3.94±1.8 SD (standard deviation). The average age was 46.9±14.34 SD, with the lowest age being 18 and the highest 87. The length of residence is 24.3±15.9 SD, which guarantees that the interviewees are representative enough to talk about the history of the formation of the communities, the transformations that have taken place, the stage they are at and their participation in the actions carried out. According to Conceição *et al.* (2019), who studied generational succession in oil palm integration in the community of Arauaí, in the municipality of Moju, state of Pará, the main reason for migrating to this community was the realisation that oil palm cultivation would provide income and improve the family's standard of living.

Men are the majority in the research (55.0%). The predominant level of education is incomplete elementary school (52%), which, together with those who completed it, represents 61% of the respondents. It is important to note that 2% of the research participants declared themselves illiterate. This low level of education among residents in the communities poses the greatest challenge to initiating the process of transforming these individuals, as the transfer of knowledge about sustainable production and marketing practices requires skills developed through basic education. In this case, the low level of schooling among children and young people will affect the development of these individuals' intellectual capacities and will restrict future opportunities for access to work and income, as discussed by Sen (2000). Moreover, the transfer of sustainable and low carbon emission agricultural production technologies is compromised, due to the limited capacity of small rural producers to assimilate this knowledge (Santana, 2021).

The predominant family income is up to one minimum wage (46%), followed by more than one to two minimum wages. This totals 83.0% of the community's residents, which highlights the income vulnerability of the majority of families. In the Arauaí community, one survey participant claimed to have an income of between five and ten minimum wages. In this case, the interviewee is part of a group of 50 small producers living in the community, integrated into the Arauaí family oil palm production system, which maintains a partnership with the Agropalma agro-industry. According to the findings of Santos et al. (2014) and Conceição et al. (2019), this partnership provided higher income to the participating families and the application of sustainable production practices, differentiating from communities where subsistence crops were predominant such as cassava, rice, beans, and small animal husbandry.

The main productive activity for 40.7% of the families living in the communities is subsistence farming, followed by salaried work, for 14.8% who work to receive per diems, and15% receive social security benefits or income transfer programmes from the federal government. This structure of income generation shows that the producers interviewed are on the margins of the palm's income-generating potential, as they lack access to credit, land and skilled labour, as pointed out by Brandão *et al.* (2018).

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b) Satisfaction with public services in communities

Given the socio-economic conditions of those interviewed, which leave some of them out of the initial links in the palm value chain, small producers come to depend on the services offered by public authorities as a way of gaining access to education, health, sanitation, electricity, security and technology, information and communication services. Table 2 shows the interviewees' perception of the quality of these services for all 23 communities - rated as non-existent, insufficient, fair and good.

In 56.5 per cent of the 23 communities, health services were classified as insufficient or non-existent by the majority of those interviewed. Residents of the communities of Arauaí, Calmaria I, Cipoteua, Gonçalves, Jandira, Jupuuba and Nazaré-Auí-Açu, Nova Paz and Urucuré reported that they seek care in other municipalities, as the health care provided by the community's health units is precarious and is most often carried out by community health workers from other communities. An interviewee living in Vila Gonçalves says: "There used to be medical care at DENPASA, but it was abolished, so nowadays health care takes place in Tailândia, in other words, it's necessary to travel when you need medical attention."

Chart 2: Interviewees' perceptions of the public services they have access to in their communities.

Community	Health	Education	Sanitation	Electricity	Security	Mobile telephony	Payphone	Radio and Television
Arauaí								
Betânia								
Boa Esperança								
Calmaria I								
Calmaria II								
Cipoteua								
Forquilha								
Gonçalves								
Igapó-Açu								
Ipiranga								
Jandira								
Jupuuba								
Nazaré-Auí-Açu								
Nova Esperança								
Nova Paz								
Olho D'Água								
Palmares								
Santo Expedito								
São Francisco de Assis								
Sempre Alegre								
Soledade								
Turi-Açu								
Urucuré								

Source: Data compiled by the authors.

Colour representation: Nonexistent Insufficient Regular Good

For 73.9 per cent of those interviewed, basic education services in the communities were classified as regular or good. This satisfaction shows, in part, the presence of school units in the communities, but it does not guarantee the quality of education, as one interviewee from the Cipoteua community said: "Basic education is poor, as are the facilities at the only public school and the negligence towards the students, since they don't even have water to drink".

Sanitation services were classified as inefficient or non-existent by 74.0% of the 23 communities, which shows the absence of a sewage system. Where there was access to a drinking water network, the interviewees lived in communities along the PA-150 (Betânia, Vila Boa Esperança, Jupuuba, Nova esperança, Olho D'Água and Palmares).

For 82.5% of the 23 communities, the electricity service was considered good or regular, which reflects the reach of the actions of the Federal Government's Light for All Programme. It is worth emphasising that, according to Angelo *et al.* (2009), access to electricity has a positive correlation with human development.

From the degree of dissatisfaction of those interviewed with the public services offered, it can be

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inferred that these people have a high level of vulnerability that prevents them from taking advantage of future opportunities that may arise with the increase in agricultural production and agro-industry and with the downstream and upstream multiplier effects in the palm production chain. The reduction in this vulnerability is largely due to the implementation of social programmes designed by the Federal Government under the Ministries of Cities, Social Development and Integration.

c) Socio-economic organisation and the environment in communities

Of all those interviewed, 80% do not take part in associative organisations. This can be seen as a weak point for the inclusion of these residents in the area of influence of the REDD+ project, as the lack of coordination between rural producers makes it difficult to define actions of collective interest and implement projects. The survey data shows that this interest group is dispersed; there is a low level of trust between producers, representatives of the associations, governments and the company, which form the group of stakeholders in the project.

This context is evidenced by the fact that a large majority of those interviewed, 80 per cent, are not affiliated to any association. This situation indicates a vulnerability for the inclusion of these farmers in REDD+ projects, because the lack of articulation between them makes it difficult to define and implement such initiatives. The dispersion of this group - combined with a varied level of political organisation, both formal and informal, between farmers, associations, governments and companies - constitutes a significant challenge. This political configuration of farmers in the Para Amazon is marked by a diversity that involves participation in rural unions, community associations, agricultural cooperatives and social movements dedicated to the defence of land rights and rural workers (Souza & Macedo, 2020).

Some interviewees said that in the past there had been greater political organisation in the community, but this had never been a highlight in that space, since it depends on the initiative and motivation of a leader who takes the lead in the process. In fact, the culture of social organisation is neither strong nor perceived as a possibility for resolving everyday problems in dialogue with government bodies.

According to Costa and Teles (2022), in contrast to areas of territorial conflict, regions where land ownership is legally guaranteed show a distancing of farmers from formal structures of social representation, due to the absence of demands perceived as essential and the lack of local leaders.

This scenario differs significantly from contexts in which struggles for territory are taking place, led by landless farmers, quilombola communities and indigenous peoples, whose demands for recognition and rights are more visible and assertive (Costa & Teles, 2022). In the communities surveyed, 59 per cent of those interviewed said they owned rural property; 55 per cent of them have a deed of ownership, 17 per cent have no document, 14 per cent are registered in the Rural Environmental Registry and 11 per cent have a purchase and sale document. This distribution of land ownership conditions without deeds weakens residents' participation in the REDD+ project.

On rural properties, açaí, manioc, flour, black pepper, rice and palm oil are sold, which are produced in monoculture or agroforestry systems. Cassava production in the communities is used to guarantee flour to be consumed by the families, and the surplus is commercialised. In short, agricultural production is basically for their own consumption, and commercialisation, when it takes place, is carried out in the community itself.

Most of the producers who sell their products use middlemen to get their produce to neighbouring communities or to the municipal headquarters. The main difficulties faced by producers are the high price of agricultural inputs, the lack of technical assistance and the low qualifications of the labour force. Transport and the poor condition of the roads make it difficult to transport production and receive inputs purchased elsewhere.

This land tenure structure in the communities under study guides the distribution of the benefits of a REDD+ project to different land tenure categories, considering the contribution of each category to maintaining carbon stocks and reducing deforestation (Guerra & Moutinho, 2020). This aspect is pointed out as a challenge for the implementation of REDD+ projects and ends up influencing the decision on the participation of community residents, who stated that they have low participation in decision-making (Pham *et al.*, 2021).

The attributes of cooperation and reciprocity, which underpin the formation of networks, are present when there are interactions between community groups with the aim of collaborating with producers from neighbouring communities in production activities and the transfer of agricultural practices, such as the mutual help in flour production reported by the interviewees. The main actions carried out by the interaction between the Palma production companies and the communities were rural technical assistance and improvements to the infrastructure of roads and bridges.

There is concern for the environment in the process of producing crops such as açaí, manioc, cocoa, black pepper and palm oil. This combination of products has the potential to create an agroforestry system that enables the recovery of degraded areas and ensures income generation for a period of one year, which corresponds to a short cycle. In effect, residents feel motivated to make changes in land use with a view

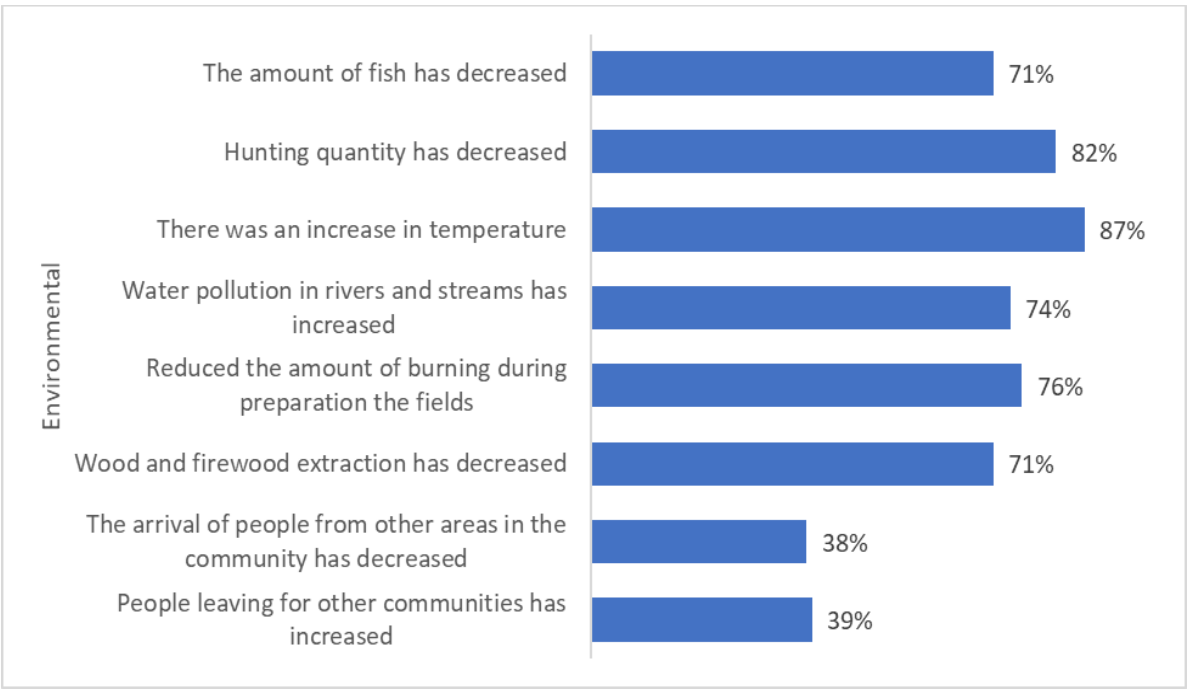
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to participating in global value chains that make it possible to increase family income, improve well-being and reduce impacts on the environment (Santana, 2021).

The burning of forest areas is carried out by 69 per cent of the producers taking part in the survey. The practice is observed in all the communities, with the exception of just two: Jandira and Soledade. Slash and burn is the most common technique used to prepare land for use. However, 70% of those interviewed used fire to prepare the land in the following communities: Jupuuba, Nova Esperança, São Francisco de Assis, Gonçalves, Turi-Açu, Ipiranga, Betânia, Calmaria I and Igapó-Açu. The practice of firebreaks to prevent the expansion of the burnt area is carried out by producers in the following communities: Ipiranga, Sempre Alegre, São Francisco de Assis, Igapó-Açu, Gonçalves, Turi-Açu, Calmaria II, Urucuré, Betânia, Calmaria I, Forquilha, Jupuuba and Nazaré-Auí-Açu.

Figure 1 shows the producers' perception of environmental issues related to their experience in the community over the last five years. There is agreement with the statement that there has been an increase in temperature (87%). In their perception, deforestation and fires were central to explaining this increase.

In the opinion of 82% of those interviewed, the amount of hunting has decreased. 76% of them agree that there has been a reduction in the amount of burning when preparing the fields. The explanations for this, according to the producers, were the increase in population in the communities, which increased the demand for animals, and the reduction in burning, partly as a result of increased inspection by Ibama and monitoring by Semas, the Pará state government.



Source: Survey results.

Figure 1: Interviewees' environmental perceptions.

For 74 per cent of the survey participants, there has been an increase in water pollution in the rivers and streams, which can be explained in part by the insecticides used by the oil palm companies, which reach the rivers with the rains or by contamination of the water table. The average perception of a decrease in wood and firewood extraction was expressed by 71 per cent of the interviewees. However, it was observed that the dynamics of timber extraction continue in these communities. In fact, it was possible to verify in the field - and in reports - the passage of lorries with logs from 6pm onwards. There are also reports of charcoal being produced from the wood that remains after burning.

The residents of the communities also say that the communities are abandoned, that there has been an increase in the number of people in these places, that the extraction of hardwoods persists, that young people prefer to work for the companies as day labourers and that the inputs for production are expensive. The effect of this combination of factors is explained by one interviewee: "this community is going through a process of emptying of residents due to the lack of job opportunities in the region and the difficulties of road access".

d) Degree of participation

Table 3 summarises the main evidence that guided the definition of the level of community participation, according to the dimensions presented by Choguill (1996) and Dirgantara (2021).

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The Support dimension includes the attributes strengthening, participation and conciliation and reflects the level of articulation in the communities. It was observed that the absence of community leaders weakens internal and external coordination to take advantage of opportunities. Cooperation and reciprocity actions, in turn, take place in small groups of neighbours, without the incentive to expand the capillarity of actions and families. In this respect, Toledo *et al.* (2022) emphasise that the concentration of decision-making in small groups makes governance fragile and therefore violates communities' territorial and cultural rights (Skutsch & Turnhout, 2020).

According to the results of the survey, the attributes of the Manipulation dimension - dissimulation, diplomacy and information - reflect the effects of the isolated actions carried out by NGOs that aim to meet specific demands according to the degree of social fragility in the community, particularly actions to reduce poverty, guarantee access to water and provide adequate sanitary sewage disposal. The lack or insufficiency of public basic sanitation services perceived by the survey participants is met by non-governmental institutions.

This fragility of the social fabric jeopardises the construction of REDD+ projects and requires developers to make a high level of commitment so that the Cancun Safeguards (Christen *et al.*, 2020) are met, especially ensuring the broad participation of the communities affected by the project, the monitoring and transparency of the actions established between the parties in order to guarantee the benefits to residents and the fulfilment of the carbon capture deliveries promised by the project.

Analysing the data relating to the Rejection dimension emphasises the existing conflicts between some communities (traditional, indigenous and quilombola) and oil palm companies due to the lack of definition of land ownership rights, which has transformed the socio-economic and environmental fabric of communities and altered traditional cultivation and commercialisation practices (Costa & Teles, 2022), with direct effects on the increase in GHG levels, the reduction and degradation of forest areas and climate change (Fearnside, 2008).

The participation of indigenous and quilombola communities in these conflicts requires the project's designers to develop actions that include these communities as REDD+ beneficiaries (Streck, 2020). As a result, there would be no profound changes in the organisation of family work, in traditional production systems that do not make intensive use of pesticides, and in guaranteeing food security - which is consistent with the socio-bioeconomic production model in which the social, economic and environmental dimensions are considered in an integrated manner (Mota *et al.*, 2019; Nahum & Santos, 2013; Santana, 2021).

As for the Negligence dimension, there is evidence of the absence of public authorities as an important agent in delivering services and encouraging community residents to organise themselves, present their demands and create mechanisms to monitor the implementation of public policy. In this type of situation, where the public authorities abdicate the solution to problems, in some cases transferring it to non-governmental institutions or leaving residents to their own devices, Choguill (1996) and Dirgantara (2021) emphasise that there is no degree of social empowerment in communities. This type of situation will lead to a lower level of community participation, with a direct effect on the viability of the REDD+ project, since it is these people who cultivate sustainable production practices and who need to be included in the programmes to reduce deforestation and payments for environmental services (Christen *et al.*, 2020; Luttrell *et al.*, 2013).

Dimension	Research Evidence
Support	• According to Chart 1, the services offered by the public authorities to the communities are considered non-existent or insufficient. • The interviewees' low level of participation in associative organisations indicates incipient social capital, which does not support deliberations based on solidarity processes.
Manipulation	• Some interactions are stated, such as the organisation of training courses, workshops and lectures by companies and the city council, but there is no continuity in these activities. • NGOs are developing social inclusion projects and sustainable agricultural production alternatives, such as structuring agro forestry production systems. • Improvements in the community are carried out with the participation of residents and NGOs; in some cases, the government participates by providing machinery and equipment to free up side roads that are important for transporting produce. • Little information is produced and disseminated among the parties involved in commercial transactions and relations with the government. • High transaction costs due to the lack of information for decision-making, with greater bargaining power for middlemen.

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Rejection	• The conflicts arising from the lack of definition of property rights reflect, to a large extent, the lack of an effective policy for resolving land problems in the state. • The effect of this lack of definition weakens the participation of community residents, as it makes it impossible for them to access the direct benefits of REDD+ projects. • Among the indirect benefits of the REDD+ project, we highlight the realisation of actions to define property rights through the sharing of actions and common interests.
Negligence	• Interviewees say that NGOs provide technical assistance and training for new sustainable business models based on co-operative processes. However, the frequency of occurrence is low. • The disarticulation of the social fabric in communities weakens the definition of actions, and the search for shared solutions is made impossible by the absence of social capital.

Source: Survey results.

Considering the objectives of a REDD+ project, the participation of communities and state or non-state agents is understood to be decisive in mitigating climate change, reducing emissions, increasing the carbon stock and ensuring the credibility of the project, in line with the reality in the communities (Nhem *et al.*, 2017).

However, the results presented show that, given the precarious conditions of income, education, agricultural production, and the absence of an organized social fabric in the communities, it is to be expected that any REDD+ proposal from a private organization, which includes the population of these areas affected by the project, must include actions to rebuild human, social, physical, and environmental capital in these communities, so that the benefits are equitable, and not only the REDD+ proponent takes advantage of the incomes provided by the carbon market.

V. Conclusion

In the case under study, the low level of political organisation in the communities of interest to the REDD+ project could compromise the participation of a greater number of residents, who could benefit from the project's incentives in various ways: by strengthening property rights, enforcing environmental legislation and transferring technologies. Inclusion through participation can ensure that they take advantage of future opportunities created by a sustainable development process guided by structuring projects focused on agricultural activities in the municipalities that include the communities surveyed.

The research indicates the situation of economic, environmental and social vulnerability of community residents, aggravated by conflicts between palm oil companies and communities, which has led to the adoption of production processes that lead to the degradation of forest areas and deforestation.

When analysing the dimensions of Choguill's (1996) and Dirgantara's (2021) model, considering the factors representing the socio-economy as necessary conditions for the development of the social fabric in the communities, it was observed that, given the low level of participation and organisation, the communities will contribute little to the process of building the REDD+ project being developed by a large oil palm company. In effect, the safeguards to ensure that the project's initiatives guarantee the rights of the most impacted communities and promote a fair, equitable and transparent distribution of the benefits are jeopardised by the low level of human development, the weakening of the social fabric and the lack of coordination between communities.

The article contributes to expanding the body of empirical research that shows the need to produce knowledge about the conditioning factors that affect the effectiveness of the REDD+ strategy and guide the formulation of economic, financial, social and environmental actions that benefit the communities that are part of a REDD+ project.

Among the limitations, the short period of time for data collection in the communities, the small number of interviewees with historical knowledge about local productive development, and the non-generalization of the results to the population of residents in the communities stand out.

Future research should shed light on the underlying factors to the implementation of the REDD+ strategy with the aim of qualifying the elements that act on the dimensions of the social participation of the communities and to describe the mechanisms of integration among the different stakeholders. Similarly, longitudinal studies are needed to assess changes in the organizational structure of the communities.

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Understanding Vegetation Dynamics in Forest Ecosystems of the AES Region: A Comprehensive Review

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Abstract- Under similar geopolitical conditions and facing the same political contexts, Burkina Faso, Mali, and Niger have decided to pool their efforts through the creation of the Sahel States Alliance (AES). This organization, which aims to defend the territorial integrity of its member countries, also advocates for their independence and economic development, dominated by rural activities, particularly agriculture and livestock. These activities are heavily dependent on natural resources, especially forests. However, the forest ecosystems of these three countries are marked by continuous degradation due to climate precariousness and human activities. The present study aims to understand the dynamics of vegetation cover in the forest ecosystems of the AES region and to analyze the factors. To achieve this, secondary data was collected through a corpus of 41 documents, including 71% scientific articles, 7% doctoral theses, 10% master's theses, and 12% study reports. Themes such as "forest ecosystem dynamics," "humans and forests," and keywords such as "vegetation formation," "anthropogenic actions," "climate variability," "Burkina Faso," "Mali," and "Niger" guided the selection of these documents.

Keywords: vegetation cover dynamics, forest ecosystems, anthropogenic determinants, alliance of sahel states.

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Understanding Vegetation Dynamics in Forest Ecosystems of the AES Region: A Comprehensive Review

Tiamiyu Kasimou

Abstract- Under similar geopolitical conditions and facing the same political contexts, Burkina Faso, Mali, and Niger have decided to pool their efforts through the creation of the Sahel States Alliance (AES). This organization, which aims to defend the territorial integrity of its member countries, also advocates for their independence and economic development, dominated by rural activities, particularly agriculture and livestock. These activities are heavily dependent on natural resources, especially forests. However, the forest ecosystems of these three countries are marked by continuous degradation due to climate precariousness and human activities. The present study aims to understand the dynamics of vegetation cover in the forest ecosystems of the AES region and to analyze the factors. To achieve this, secondary data was collected through a corpus of 41 documents, including 71% scientific articles, 7% doctoral theses, 10% master's theses, and 12% study reports. Themes such as "forest ecosystem dynamics," "humans and forests," and keywords such as "vegetation formation," "anthropogenic actions," "climate variability," "Burkina Faso," "Mali," and "Niger" guided the selection of these documents. The analysis of these documents reveals a dynamic that is sometimes strongly regressive and sometimes progressive in the vegetation cover of the forest ecosystems of the AES region. This analysis also highlights agriculture, vegetation fires, logging, and overgrazing as human activities responsible for the decline in vegetation cover in the region. The effectiveness of local forest management committees, the practice of assisted natural regeneration, the establishment of nurseries, and the production of reforestation campaign plans all contribute to improving forest cover in the study area. These practices, therefore, deserve to be improved and popularized in the AES region for more sustainable management of forest ecosystems in the area. One limitation of this study is the lack of information on the endogenous strategies for protecting the forest ecosystems in the study area.

Keywords: vegetation cover dynamics, forest ecosystems, anthropogenic determinants, alliance of sahel states.

I. Introduction

The Sahel experienced two chronic droughts in 1972-1973 and 1983-1984, leading to ecological imbalance (Le Barbé and Lebel, 1997; Lebel and Ali, 2009; Nicholson, 2013). Besides compromising production systems, these drought events made the populations of the Sahelian region vulnerable (Karambiri and Gansaonré, 2023). Although some studies suggest a trend towards more abundant rainfall (Karambiri and Gansaonré, 2023) and greening (Seaquist et al., 2009; Bégué et al., 2011; Bagganian et al., 2021), the current observation reveals an evolving dynamic of vegetation cover in the forest ecosystems of certain Sahelian countries (Sangaré et al., 2020 in Mali; Tiamiyu et al., 2023 in Burkina Faso; Aboubacar et al., 2023 in Niger).

These three countries, sharing similar climatic realities, also face an unprecedented security crisis threatening their territorial integrity. Under comparable geopolitical conditions and navigating the same political contexts, they decided to pool their efforts through the creation of the AES (Alliance of Sahel States). This organization, aiming to defend the territorial integrity of its member countries, also advocates for their independence and economic development, predominantly driven by rural activities, particularly agriculture and livestock farming (Thomas and Samassekou, 2003 ; MEEVCC, 2018). These activities heavily rely on natural resources, especially forests. Forests are indeed referred to as a "giant sponge" (CIFOR, 2012), absorbing water during rainy seasons and redistributing it during drought periods, benefiting sectors such as agriculture and livestock farming (Tiamiyu, 2023). Forests also contribute to improving and/or maintaining soil fertility by protecting against erosion, thereby enhancing agricultural yields. Beyond the significance of forests for agricultural and pastoral sectors, forests have socio-economic and environmental importance unanimously acknowledged by scientists. Socioeconomically, forests serve as a source of food and income for populations, providing edible products such as fruits, seeds, and leaves of forest species used in their diet. Some of these products are processed and/or traded, constituting a significant source of income for many rural households. In Burkina Faso, Tiamiyu (2020) and Yanogo et al. (2023) revealed that a large portion of the population, especially in rural areas, derives their livelihood directly from natural resources, including forest resources. For the Burkinabe state, forest resources, through only timber products, contribute to 5.88% of GDP, while activities related to non-timber forest products generated over 25 billion CFA francs in 2008 (MEDD, 2012). In Mali, the forestry sector, through timber products, contributes 4.6% to GDP and accounts for 25% of export products. The trade of wood fuels generates a turnover of 21 billions CFA francs annually (https://www.fao.org/3/ab571f/AB571F05.htm). Beyond the revenues generated by this sector, it provides employment for both rural and urban

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populations, with the FAO estimating over 400,000 temporary or permanent jobs created by this sector for Malians (https://www.fao.org/3/ab571f/AB571F05.htm). In Niger, woody species from forest ecosystems are highly sought after by the population, serving as the primary source of income, medicinal products, food, energy, and materials essential for the production of everyday items (Abdou Habou et al., 2020). Forests also harbor plant species whose parts are harvested for medicinal recipes for the curative or preventive treatment of certain diseases. Tiamiyu (2023) highlighted the harvesting of roots, leaves, seeds, and bark of forest species for the treatment of diseases such as diarrhea, body aches, abdominal pains, malaria, and cough. On the environmental front, forests contribute to improving and/or maintaining soil fertility by protecting against soil erosion in watershed management and desertification control efforts (Thomas and Samassekou, 2003). They also constitute excellent biotopes for the flourishing of a diversity of plant and animal species.

However, the forest ecosystems of these three countries are continually marked by degradation due to climatic precariousness and human activities. Numerous studies conducted across the AES countries have highlighted the spatiotemporal dynamics of these ecosystems, revealed the determinants of this dynamics, and modeled the evolution of vegetation cover in these ecosystems. The synthesis and dissemination of the results of these studies constitute a major step in diagnosing the dynamics of vegetation cover in forest spaces and understanding the determinants for the development of a common strategy to promote forest ecosystems. The aim is not only to understand the dynamics of vegetation cover in the forest ecosystems of the AES region, but also, and above all, to analyze the factors. Thus, what is the dynamics of vegetation cover in the forest ecosystems of the AES region ? What are the factors involved ? The ultimate goal of this study is to harmonize endogenous strategies for promoting forest spaces through the sharing of successful examples.

a) The Geographical Space of the Study

The geographical scope of the present study is the AES (Alliance of Sahel States) region, formed by Burkina Faso, Mali, and Niger. It is bordered to the North by Algeria, to the Northeast by Libya, to the East by Chad, to the South by the Republics of Nigeria, Benin, Togo, and Côte d'Ivoire, to the Southwest by Guinea Conakry, and to the West by Senegal and Mauritania (Figure 1). All landlocked countries, Burkina Faso, Mali, and Niger are located in the Sahelian belt, covering respective areas of 274,200 km^2, 1,240,190 km^2, and 1,267,000 km^2. They have respective populations of 20,505,155 in habitants (INSD, 2022), 22,395,485 in habitants (INSTAT, 2023 https://rgph5.instat-mali.com/site/), and 23,591,983 in habitants. The AES thus covers a total area of 2,781,390 km^2 with a total estimated population of 66,492,623 in habitants.

In terms of climate, the AES is influenced by a dry tropical climate in Burkina Faso, a Sudanian-Sahelian climate in Mali, and a Sahelian continental climate in Niger, all characterized by two seasons, with a dry season lasting longer than the rainy season. The annual average rainfall varies between 175 mm and 1,066.66 mm, from less rainy to more rainy areas.

Regarding vegetation, the AES is composed of steppe, savanna, and forest formations. The forested area of this space is estimated at 19,343,000 ha, with 5,649,000 ha in Burkina Faso, 12,490,000 ha in Mali, and 1,204,000 ha in Niger, according to the regional report on the assessment of forest resources in the ECOWAS (Economic Community of West African States) region (Ngom, 2015), representing a forest cover of 6.95% of the total area.

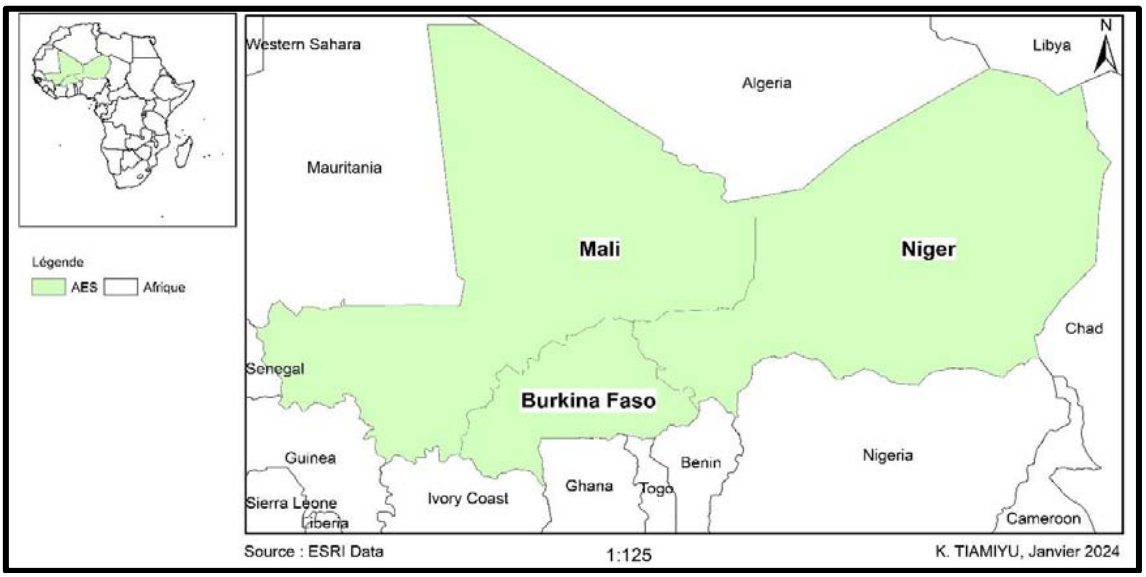


Figure 1: Geographic location of the study area

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b) Research Methodology

This study relied primarily on secondary data gathered from scientific publications across all categories. A thematic reading sheet was designed for this purpose, enabling the identification of relevant documents whose analysis led to the results presented in this study.

c) Identification of Documents

Documentary research was primarily conducted in virtual scientific databases such as ResearchGate, Academia, Google Scholar, and in the archives of scientific journals, including the International Journal of Biological and Chemical Sciences, Ecosystems and Landscapes, Africa Sciences, Revue Marocaine des Sciences Agronomiques et Vétérinaires, among others. In addition to these virtual documentation centers, the libraries of Norbert ZONGO University and Joseph KI-ZERBO were consulted. The themes guiding this documentary research included "dynamics of forest ecosystems," "factors influencing the evolution of vegetation cover in forested areas," "human and forest," and "dynamics of land use in forested areas." Keywords such as "vegetation formation," "anthropogenic actions," "climate variability," "Burkina Faso," "Mali," and "Niger" were used to refine the search. This resulted in the compilation of a document corpus consisting of scientific articles, doctoral theses, research papers, and work reports.

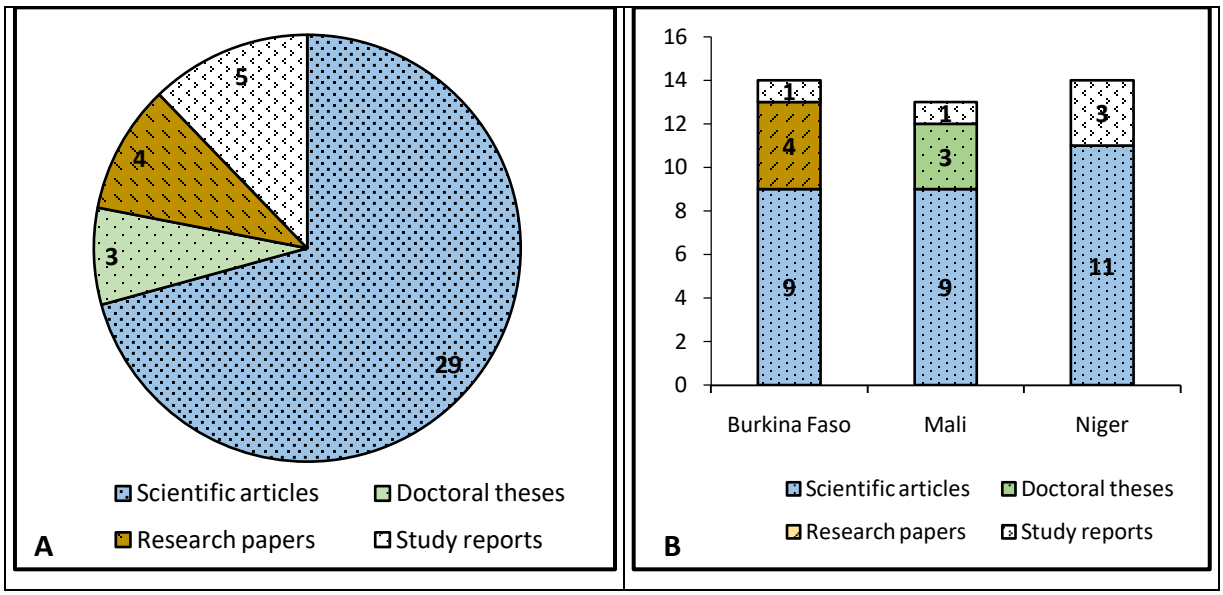
d) Analysis of Documents

This analysis focused on four elements: the nature of the identified documents, the study area, the methodology used, and the addressed themes.

II. Results

a) Nature of the Documents Used

A corpus of 93 documents addressing the theme in one of the three countries of the AES was identified. The criterion of the year of publication prior to 1972, the year marking the beginning of the chronic drought that struck the Sahel, led to the elimination of 52 documents, leaving only 41 documents retained. These documents are of diverse nature, including scientific articles, doctoral theses, research papers, and study reports (Figure 2).



Source: Laboratory work

Figure 2: Nature of Documents Used by Country

Figure 2 illustrates, through its section 'A,' that the documentary range used in this study is predominantly dominated by scientific articles. In section 'B,' this figure highlights the nature of the documents used by country.

b) Methodology Adopted

The studied documents primarily adopted two methods to highlight the dynamics of vegetation cover in the studied forested areas. The first method is based on the diachronic analysis of satellite images using remote sensing and GIS coupled with field data and questionnaire surveys (peasant perception). It allows for the identification and clear description of the various land use zones in a specific ecosystem (Betbeder, 2015). It also helps to understand how vegetation cover evolves over time, the rate of change between different periods, and the transformations of the different land use zones. However, it does not take into account the knowledge of farmers on the subject. The second approach, based on questionnaire surveys addressing farmers' perceptions, is used by 36.59% of these documents. It has the advantage of placing the endogenous knowledge of the studied phenomenon at the heart of the study. The remaining 9.75% of the

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documentation, composed of reports, utilized secondary data.

In addition to these documents, others addressing the same theme but focusing on different geographical areas from those of the present study were downloaded. These documents served for the discussion of the results of the current research.

c) Determinants of Vegetation Cover Dynamics

The synthesis of the results of the analyzed works reveals a dynamic, sometimes regressive, sometimes progressive, of the vegetation cover in the forest ecosystems of the AES space. Whether progressive or regressive, this dynamic has always been the result of several determinants. The present synthesis highlights two main categories: natural determinants and anthropogenic determinants.

d) Determinants of the Progressive Dynamics of Vegetation Cover in Forested Areas

Gray literature has revealed a positive evolution of vegetation over time in certain locations within the AES countries. This progressive dynamic is mainly linked to human actions. These actions include the practice of assisted natural regeneration, more prevalent in Niger (Baggnian et al., 2021), the organization of reforestation campaigns, and the strengthening of forest area surveillance by local forest management committees in Burkina Faso (Tiamiyu et al., 2023). In addition to these actions, the establishment of nurseries and the production of plants for reforestation campaigns in Mali (Dembélé et al., 2022) contribute to the positive dynamic. Beyond these practices, the variable rainfall, with an evolving tendency at times, somewhat promotes the flourishing of vegetation cover, often leading to a positive dynamic in the area of plant formations in forested spaces (Tougiani et al., 2023).

e) Determinants of the Regressive Dynamics of Vegetation Cover in Forested Areas

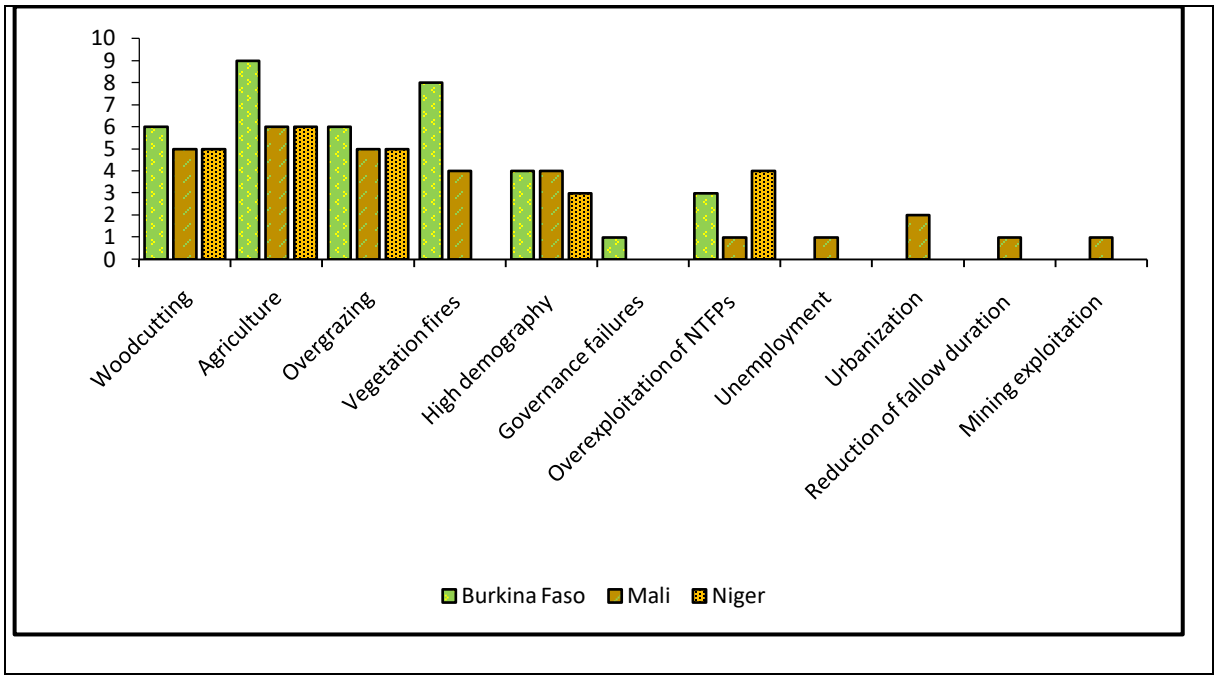
- Natural Determinants

The natural determinants of the regression of vegetation cover in forested areas are mainly climatic. They are characterized by the recurrence of drought sequences (Soulma et al., 2015), the aggressiveness of heavy rains on the soil (Kaboré, 1999), variations in atmospheric humidity (Ouédraogo, 1992), a decrease in rainfall (Hamidou et al., 2012 ; Sangaré et al., 2020), the prolongation of dry periods (Kéita et al., 2023), and the increasing aridity of the climate (Diallo et al., 2011).

Although climatic fluctuations negatively impact vegetation cover, humans, through their activities, remain the primary cause of the regressive dynamics of plant formations in the AES space.

- Anthropogenic Determinants

These determinants are related to human actions and activities. In total, eleven (11) determinants have been identified through the consulted documents, with variable citation numbers from one determinant to another and from one country to another (Figure 3).



Source : Laboratory work

Figure 3: Determinants of the Regressive Dynamics of Vegetation Cover by AES Member Country

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Figure 3 categorizes these determinants into three groups:

- Determinants Common to All Three Countries

Woodcutting (Assoumane, 2014)
Agriculture (Mariko, 2003)
Overgrazing (Mamane et al, 2018)
High demography (Saidou and Ambouta, 2020)
Overexploitation of NTFPs (Non-Timber Forest Products) (Abdou et al., 2019)

- Determinants Common to Two Countries

Vegetation fires (Burkina Faso and Mali)

- Determinants Specific to Each Country

Governance failures (Tiamiyu et al., 2023) (Burkina Faso)

Unemployment, urbanization (Maiga et al), reduction of fallow duration (Sangaré et al., 2020), and mining exploitation (Traoré et al., 2022) (Mali).

This figure also highlights agriculture as the most dominant, followed respectively by vegetation fires, woodcutting, and overgrazing.

III. Discussion

a) Natural Factors in the Dynamics of Forest Vegetation Cover

i. *The impact of climate on vegetation cover*

Climate is a key factor that conditions the state and evolution of forest vegetation cover. It influences the dynamics of vegetation cover through precipitation and temperature (V. Djoufack-manetsa, 2011; Jiagho, 2018). A decrease in precipitation and an increase in temperatures compromise the growth and regeneration of woody plants. According to Yonkeu et al., a precipitation deficit negatively affects vegetation cover. When pronounced, this deficit increases the mortality of woody plants, makes natural regeneration difficult, and destroys grasses that are very sensitive to water absence. Sanson and Parde (1951) also argue that a precipitation deficit damages the density of vegetation by harming nurseries intended for reforestation campaigns and by limiting the growth of young seedlings. Thus, precipitation fluctuations weaken the plant biodiversity of tree and shrub layers (Pallo and Sawadogo, 2010).

A constant increase in temperature also deeply disturbs forest cover (GEIEC, 2001). Forest cover stands are destroyed by the recurrence of heatwaves, including the older ones. Prolonged absence of water in the soil leads to the drying of adult subjects (Sanson and Parde, 1951). Conversely, good precipitation promotes a better expression of vegetation cover. Tra Bi et al. (2013) note that wet periods induce significant vegetation cover on the ground. Mahamané et al. (2012) revealed high diversity and productivity indices of vegetation cover in areas with a marked precipitation gradient from South to North in Niger. Pallo and Sawadogo (2010) also argue that relatively abundant precipitation and a mild annual average temperature promote biological diversity in tree and shrub layers. The variability of precipitation significantly influences the photosynthetic activity of plants (Lebrat, 2016). Beyond climate, other natural determinants can influence the vegetation cover of forested areas.

ii. *The impact of soil on vegetation cover*

The composition and spatial distribution of woody vegetation are influenced by soil types. In a study on the vegetation dynamics in the peripheral zone of Waza National Park in Cameroon, Jiagho (2018) found that the landscape unit dominated by ferruginous soils contains a relatively high specific (36 species) and genetic (29 genera) diversity compared to other landscape units dominated by hydromorphic soils and clayey plains, which have 29 species distributed in 24 genera. The landscape unit dominated by vertic soils, on the other hand, hosts 34 species and 26 genera. According to César (1978) cited by Devineau et al. (1997), sandy-clayey soils would be conducive to the good growth and high density of woody resources. For hydromorphic soils, Devineau et al. (1997) argue that they offer favorable conditions for phorbs to develop comfortably, unlike woody flora and herbaceous strata that flourish less. Argillolimonosandy soils, in turn, favor the development of species in shrubby formations. Deep sandy to sandy-clayey soils, often hydromorphic, ensure significant diversity of woody plants. However, they limit the development of herbaceous plants, which are weakly characterized there. Herbaceous and shrubby strata are remarkably diverse on non-gravelly or shallow soils. Gravelly soils are characterized by the presence of herbaceous and woody species. They support vegetation formations such as wooded savannas or clear forests with diverse woody species.

b) Anthropogenic Factors in the Dynamics of Forest Vegetation Cover

i. *Expansion of Agriculture, a Factor Limiting the Flourishing of Vegetative Cover*

Agricultural activity alone is responsible for 80% of global deforestation (FAO, 2016). It is the main driver of deforestation, forest cover degradation, and the resulting reduction in forest biodiversity (FAO, 2020). According to Jiagho (2018), extensive agriculture is the most important factor in the degradation dynamics of the flora and woody vegetation in the peripheral zone of Waza National Park in Cameroon. N'guessan et al. (2019) highlighted anthropogenic pressure as an explanatory factor for the regression of vegetation cover in the classified forest of Agbo1 in Benin. For these authors, this anthropogenic pressure is manifested by the expansion of cash and subsistence crop fields. In a similar vein, Houndagba et al., 2007, cited by G. L. Djohy et al. (2016), noted an annual average destruction of vegetation cover estimated at 100,000 ha in 1991 for

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the benefit of crop fields in Benin. Djohy et al. (2016) also revealed a progressive evolution of crop and fallow units at the expense of vegetation formations in the Sinendé commune between 1990 and 2010. According to these authors, the area of fields and fallow increased from 25.95% of the study area in 1990 to 39.25% in 2010. In contrast, the area of vegetation cover, which initially represented 68.74% of the study site in 1990, occupies only 58.73% in 2010. They conclude that the regression of vegetation cover is linked to the remarkable expansion of agricultural lands. In Benin, Biaou et al. (2019) note the conversion of a portion of the vegetation cover of the classified forest of Ouénou-Bénou in Northern Benin into mosaics of crops and fallows between 1990 and 2014. Covering only 8% (2998 ha) of the total forest area in 1990, crop fields and fallows represent up to 32% (11,945 ha) in 2014. In the AES region, agriculture is revealed as the main anthropogenic activity causing the degradation of forest ecosystem vegetation cover in the region. Hence, there is a concordance of these different results with those of the present study.

ii. *Vegetation Fires: a Factor of Destruction or Vegetative Cover Restoration?*

Vegetation fires are often cited as a determinant limiting the expansion of vegetation cover. Practiced by various actors for various reasons, bushfires contribute to the degradation of forest potential. They lead to a reduction in vegetation cover, loss of biodiversity, erosion, and soil leaching by exposing them to erosion agents, as well as an increase in atmospheric temperature (Lompo). They negatively impact productivity and disrupt the floristic composition of forest cover (Kaboré, 1989 and Sawadogo, 2009 cited by MEEVCC, 2018). Jiagho (2018) revealed uncontrolled bushfires as one of the most threatening anthropogenic factors in the degradation of flora and woody vegetation in the peripheral zone of Waza National Park in Cameroon.

The extent of the impact of fire on vegetation cover is not systematic. It depends on the nature of the burned biotope (vegetation cover and its floristic composition) and its frequency (Jaffre et al., 1997). If controlled, they "play an important role in maintaining or modifying the morphology and specific composition of the cover" (Gueguim et al., 2018). However, if they occur frequently, they reduce forests to forest relics (Morat et al., 1981 cited by Jaffre et al., 1997 ; Louppe et al., 1998). Unlike foresters who have always argued that fire is a destructive factor of vegetation (Louppe et al., 1998), farmers advocate the benefits of fire in the restoration of vegetation cover. For them, burning promotes soil fertility through ash and allows the development of new shoots. In the same vein, Balle et al. (1998) argue that early fires remain a prevention tool to fight against late fires and are used on fertile soils. They consider them as a forest management tool. However, they acknowledge that it is essential for management actors to understand the behavior of different species towards fire while taking into account the objectives of management for its effectiveness. Ballouche, 2005 cited by Ouattara et al. (2016), supports that fire promotes the flourishing of herbaceous and especially grass species by creating a sufficiently airy space for their development, benefiting from sufficient sunlight. The impact of vegetation fires on vegetation cover should, therefore, be nuanced. In the AES region, vegetation fires are identified as a factor leading to a decline in vegetation cover. Specifically in Burkina Faso and Mali, late fires, often caused by the carelessness of fire users (smokers, hunters) in the vicinity and sometimes within the forest area, consume a significant portion of the vegetation cover.

iii. *Overgrazing*

Pastoral activity is responsible for approximately 14% of deforestation globally (FAO, 2016). Defined by the FAO as the practice of grazing a high number of animals on land that cannot support the restoration of its vegetation cover for an extended period, overgrazing is a factor in the regression of forest formations (Kéita et al., 2023). It is manifested by increased browsing of forage trees for animal feed and trampling of the soil (Tidjani et al., 2009), hindering the growth of new shoots. This practice is believed to be the cause of 36% of degraded lands according to the FAO. Jiagho (2018) identified extensive pastoralism as one of the practices that contribute to the degradation of flora and woody vegetation in the peripheral zone of Waza National Park in Cameroon. Pastoral activity is also mentioned by Tra Bi et al. (2013) as a factor responsible for the decrease in vegetative mass in the Bouregreg watershed in Morocco. The phenomenon of overgrazing is a reality in the Sahelian region, which is a pastoral area. The three countries in the region, especially Niger, have a significant livestock population that requires a high availability of forage resources. The shortage of forage is compensated for by forest species, which contributes to their degradation. These results are therefore consistent with those of the present study.

iv. *Mining Activity*

Mining activity leads to the destruction of vegetation cover and exposes the soil to often intense erosion phenomena (Maradan et al, 2011 cited by Bamba et al. 2013; Mesmin et al, 2015). It is responsible for 6% of global forest losses (FAO, 2016). This activity contributes to soil impoverishment through the use of toxic substances (acids, mercury, cyanide) for ore processing and other non-biodegradable solid wastes (Bamba et al. 2013). Once impoverished, the soil, an essential support for terrestrial ecosystems, is no longer able to provide the nutrients necessary for the flourishing of vegetation cover. This has consequences

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on natural resources in general and forest cover in particular. Mining activity disrupts the forest ecosystem by causing the loss of natural vegetation, wildlife habitat, and biological diversity, as well as soil and vegetation cover degradation (Ouédraogo). This activity poses a serious threat to forest resources. It is a consumer of wood, with cutting occurring in two stages: clearing for the temporary development of the mining site, including the installation of various actors in the chain, and cutting wood for site expansion. Wood is also used as supports or poles in mining shafts. The high human concentration around mining sites puts strong pressure on trees, which are cut for use as an energy source (Cissé, 2019; Messina, 2014). All of this contributes to exacerbating deforestation. In Mali, mining is cited as a factor in the degradation of vegetation cover in forest formations.

IV. Conclusion

The vegetation cover of forest ecosystems in the AES region is significantly disturbed by anthropogenic factors, prioritized in order of importance as agriculture, vegetation fires, logging, and overgrazing. Alongside these factors, there are practices that contribute to the protection and improvement of vegetation cover in these ecosystems : the effectiveness of local forest management committees, the practice of assisted natural regeneration, the establishment of nurseries, and the production of plans for reforestation campaigns. The identification of the main anthropogenic factors of degradation and effective management practices represents a significant step in the development of an endogenous strategy for the protection of forest ecosystems. It indeed helps to inform policy decisions aimed at conserving and restoring forest ecosystems in the AES region. Therefore, policymakers, communal authorities, and all stakeholders must prioritize the adoption and dissemination of these practices in the AES area for more sustainable management of forest ecosystems in the region.

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The Ethnogeomorphological Vision of Artisan Fishermen from the Guriú Community, Camocim-Ceará

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Abstract- Ethnogeomorphology, which is the understanding of relief through the knowledge of traditional communities, has been increasingly required within geographic science when the approach takes into account man's dialectical action on his environment. In the search for an understanding of coastal ethnogeomorphology, we chose to research the coast of Ceará which, among its morphological features, contains river mouths, fixed and mobile dunes, cliffs, lake environments, fluviomarine plains and all interconnected in an interaction of landscape dynamics. All the compartmentalizations expressed in the relief make the coastal landscape a space of great natural expressiveness within the space of Ceará. Added to these is anthropic action, forming geographic space, the object of study in Geography, which is formed by the dialectical interaction between man and the space that surrounds him. The present work is the result of qualitative research carried out on Guriú beach located in the municipality of Camocim-Ceará. This work aims to survey the traditional knowledge of artisanal fishing workers in the Guriú district about the local relief and the way they interact with the environment.

Keywords: *ethnogeomorphology, landscape and traditional communities.*

GJHSS-B Classification: *LCC Code: GF50*



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The Ethnogeomorphological Vision of Artisan Fishermen from the Guriú Community, Camocim-Ceará

A Visão Etnogeomorfológica dos Pescadores Artesanais da Comunidade do Guriú, Camocim-Ceará

Rejane Maria Lima de Sousa [α], José Falcão Sobrinho [σ], Ernane Cortez Lima [ρ] & Raimundo Lenil de Araújo [ω]

Resumo- A Etnogeomorfologia, que é o entendimento do relevo através dos conhecimentos das comunidades tradicionais, tem sido cada vez mais requisitado dentro da ciência geográfica quando a abordagem leva em conta a atuação dialética do homem sobre seu meio. Na busca do entendimento da Etnogeomorfologia litorânea, escolhemos pesquisar sobre o litoral cearense que, dentre as suas feições morfológicas, contém foz de rio, dunas fixas e móveis, falésias, ambientes lacustres, planícies fluviomarinha e todos interligados em uma interação da dinâmica da paisagem. Todas as compartimentações expressas no relevo tornam a paisagem litorânea um espaço de grande expressividade natural dentro do espaço cearense. Junta-se a essas a ação antrópica, formando o espaço geográfico, objeto de estudo da Geografia, que é formado pela interação dialética entre o homem e o espaço que o cerca. O presente trabalho e o resultado de uma pesquisa de cunho qualitativo desenvolvido na praia do Guriú localizada no município de Camocim-Ceará. Este trabalho tem por objetivo realizar o levantamento dos conhecimentos tradicionais dos trabalhadores da pesca artesanal do distrito do Guriú sobre o relevo local e a forma de interação com o meio. A metodologia da pesquisa foi dividida em levantamento bibliográfico e cartográfico, pesquisa de campo, entrevista semiestruturada e análise de dados.

Palavras chave: etnogeomorfologia, paisagem e comunidades tradicionais.

Abstract- Ethnogeomorphology, which is the understanding of relief through the knowledge of traditional communities, has been increasingly required within geographic science when the approach takes into account man's dialectical action on his environment. In the search for an understanding of coastal ethnogeomorphology, we chose to research the coast of Ceará which, among its morphological features, contains river mouths, fixed and mobile dunes, cliffs, lake environments, fluviomarine plains and all interconnected in an interaction of landscape dynamics. All the compartmentalizations expressed in the relief make the coastal landscape a space of great natural expressiveness within the space of Ceará. Added to these is anthropic action, forming geographic space, the object of study in Geography, which is formed by the dialectical interaction between man and the space that surrounds him. The present work is the result of qualitative research carried out on Guriú beach located in the municipality of Camocim-Ceará. This work aims to survey the traditional knowledge of artisanal fishing workers in the Guriú district about the local relief and the way they interact with the environment. The research methodology was divided into bibliographic and cartographic survey, field research, semi-structured interview and data analysis.

Keywords: ethnogeomorphology, landscape and traditional communities.

Resumen- La etnogeomorfología, que es la comprensión del relieve a través del conocimiento de las comunidades tradicionales, ha sido cada vez más requerida dentro de la ciencia geográfica cuando el enfoque tiene en cuenta la acción dialéctica del hombre sobre su entorno. En la búsqueda de una comprensión de la etnogeomorfología costera, optamos por investigar la costa de Ceará que, entre sus características morfológicas, contiene desembocaduras de ríos, dunas fijas y móviles, acantilados, ambientes lacustres, llanuras fluviomarinas y todos interconectados en una interacción de dinámicas paisajísticas. Todas las compartimentaciones expresadas en el relieve hacen del paisaje costero un espacio de gran expresividad natural dentro del espacio de Ceará. A estos se suma la acción antrópica, formando el espacio geográfico, objeto de estudio de la Geografía, que se forma por la interacción dialéctica entre el hombre y el espacio que lo rodea. El presente trabajo es resultado de una investigación cualitativa realizada en la playa de Guriú ubicada en el municipio de Camocim-Ceará. Este trabajo tiene como objetivo relevar los conocimientos tradicionales de los trabajadores pesqueros artesanales del distrito de Guriú sobre el relieve local y la forma en que interactúan con el medio ambiente. La metodología de investigación se dividió en levantamiento bibliográfico y cartográfico, investigación de campo, entrevista semiestructurada y análisis de datos.

Palabras clave: etnogeomorfología, paisaje y comunidades tradicionales.

I. Introdução

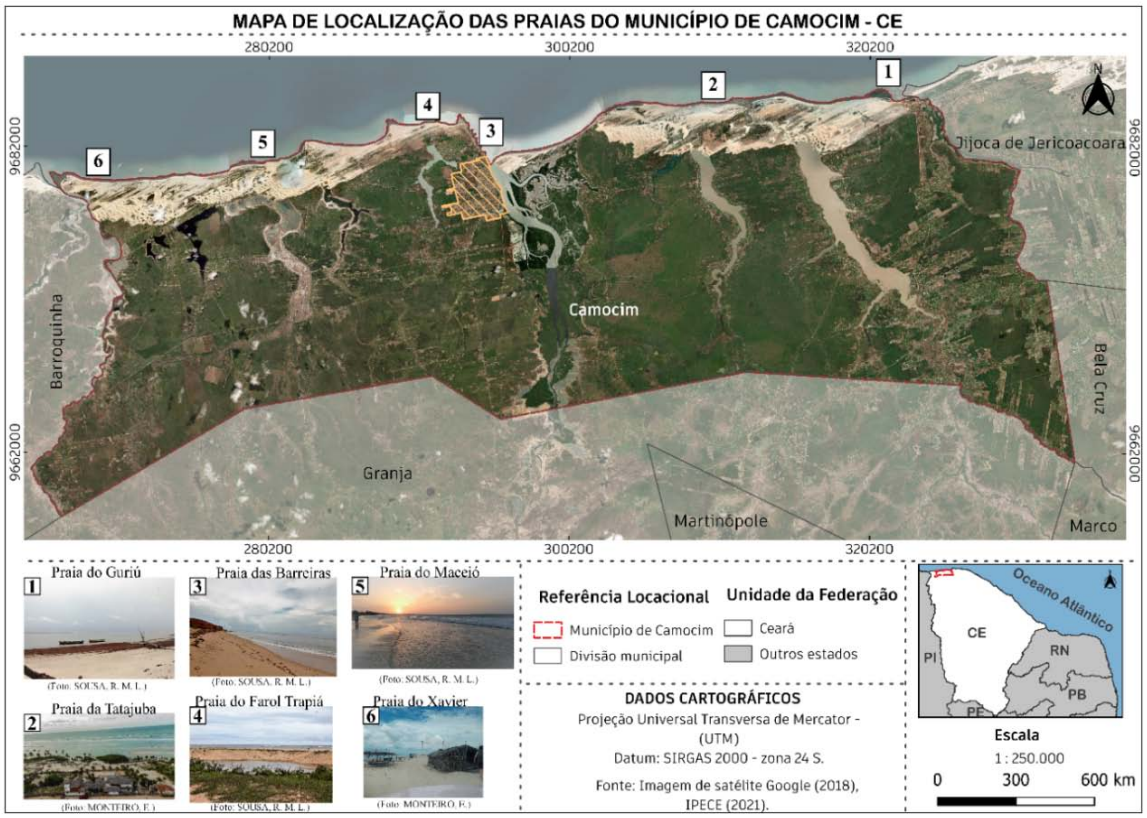
O município de Camocim localiza-se no litoral extremo-oeste do estado do Ceará. Segundo Viana (2017), ele localiza-se a 2° 5' 8'' latitude S e 40° 50' 28'' longitude W. Suas medidas territoriais são de 1.123,94 km², correspondendo a 0,76% do território cearense e uma altitude de 8,1 m. O litoral cearense apresenta uma faixa de 573 km de extensão e desses, 62 km pertencem ao município de Camocim, colocando-o com o título de município de maior

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extensão de linha de costa do Estado do Ceará, equivalente a 12% da costa do estado.

Com uma faixa litorânea tão extensa, procuramos pontuar nossa pesquisa na primeira praia encontrada no sentido leste-oeste do município (Mapa 1). Esta praia se chama Guriú, onde também residente uma comunidade de pescadores artesanais que aprenderam os conhecimentos de forma oral passado pela comunidade sobre as formas de interagira, trabalhar e tirar o sustento do litoral.



Fonte: Sousa, R. M. L. (2024)

Mapa 1: Mapa de localização das praias do município de Camocim – CE

O distrito do Guriú localiza-se na foz do rio que recebe o mesmo nome, rio Guriú. Este rio é limítrofe entre o território camocinense e o Parque Nacional de Jericoacoara que pertence ao município de Jijoca de Jericoacoara. Na paisagem do Guriú destaca-se a planície flúvio-marinha, os campos de dunas fixas e móveis, os manguezais, e a praia. É nesse cenário que trabalhadores da pesca artesanal aprenderam a conviver e interagir de forma dialética para que possam adquirir o seu sustento.

Nosso trabalho tem por objetivo realizar o levantamento dos conhecimentos dos trabalhadores da pesca artesanal sobre o relevo local e a forma de interação com o meio. A metodologia aplicada foi de cunho qualitativo e a pesquisa foi dividida em levantamento bibliográfico e cartográfico, pesquisa de campo, entrevista semiestruturada e análise de dados.

II. Referencial Teórico

A história nos mostra que povos antigos, como os incas, desenvolveram um vasto império na região andina. Esses povos desenvolveram um sistema agrícola com eficientes obras de irrigação na região montanhosa dos andes. Podemos observar que a convivência e interação do homem com a natureza proporciona ao homem um conhecimento formado a partir da vivência. Assim, os povos em diversos tempos e lugares construíram seus mundos de maneira distinta, graças às inúmeras visões de mundo oriundas de cada cultura (Tuan, 1980).

Uma vez que os temas da Geografia acompanham e fazem parte do cotidiano das pessoas à história, aos povos incas. Esse povo, mesmo estando estabelecidos em uma região montanhosa, conseguiu desenvolver um sistema de irrigação que ajudou na cultura do milho. Esse e outros fatos nos mostram que não precisamos frequentar a escola para comungar com a Geografia. Nós a percebemos e a aprendemos por força do nosso próprio cotidiano nas suas diversas faces (Moreira, 2007).

> A geografia é um saber vivido e apreendido pela própria vivência. Um saber que nos põe em contato direto com nosso mundo exterior, com o seu todo e com cada um dos seus elementos a um só tempo. Se nisto reside sua

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> peculiaridade, da qual deriva sua natural popularidade, reside nisto igualmente seu amplo significado político (Moreira, 2007, p. 58).

O conhecimento empírico[1] das comunidades tradicionais sobre o espaço e as suas formas de atuações sobre esse espaço faz com que a vivência seja levada em conta quando se estuda paisagens, afinal, as paisagens se sucedem à medida que o indivíduo atua em sua realidade que o lugar apresenta em sua natureza dos aspectos culturais e econômicos e em sua natureza enquanto elemento físico e biológico (Falcão Sobrinho, 2020).

Relevo e paisagem se encontram claramente vinculados através de relações integradas e dinâmicas, e essa relação é visivelmente percebida por essas comunidades, as quais conseguem descrever uma série de processos geomorfológicos de maneira coerente e integrada aos demais elementos ambientais da paisagem, mostrando assim a detenção de uma concepção holística ambiental (Lopes; Ribeiro, 2016).

O aprofundamento do estudo do relevo evidencia cada vez mais a necessidade de se ter uma visão holística, não excluindo a ação antrópica. É nesse entendimento que surge a Etnogeomorfologia (Sousa et al, 2023).

Segundo Ribeiro (2012), a Etnogeomorfologia surge exatamente no contexto de uma nova diretriz na área da Geomorfologia, sendo considerada um ramo da Etnoecologia, sendo coirmã da Etnopedologia, que buscar desvelar o conhecimento humano intrínseco sobre o relevo e os processos morfoesculturadores destes, para melhor organização das paisagens pelos agrupamentos humanos.

> No longo e infindável processo de organização do espaço o Homem estabeleceu um conjunto de práticas através das quais são criadas, mantidas, desfeitas e refeitas as formas e as interações espaciais. São as práticas espaciais, isto é, um conjunto de ações espacialmente localizadas que impactam diretamente sobre o espaço, alterando-o no todo ou em parte ou preservando-o em suas formas e interações espaciais (Corrêa *in* Castro; Gomes; Corrêa, 2011, p. 35).

A citação supracitada reforça a importância do homem enquanto agente que interage com os espaços através de práticas diversas. Essas práticas espaciais perpassam pelo fato de que, independentemente da intensidade da intervenção espacial, o homem deve ser levado em consideração nos estudos espaciais, no caso desta pesquisa, nos estudos do relevo.

A Etnogeomorfologia é uma área recente, ainda em construção (Matos e Falcão Sobrinho, 2022). Tem suas origens por volta da década de 2010, mas que tem evoluído nos últimos tempos devido ao maior interesse dos pesquisadores em entender, valorizar e sistematizar as sabedorias tradicionais (etnoconhecimento) como forma de entender a realidade (Ribeiro, 2012). O trabalho mais antigo que se tem registro sobre esse tema foi encontrado nos anais do VI Simpósio Nacional de Geomorfologia - SINAGEO, ocorrido em 2006, em Goiânia/GO, escrito por Nunes Júnior *et al.* (2006), com o título "Etnogeomorfologia: aplicações e perspectivas". Nesse trabalho, destacou-se a importância da Etnogeomorfologia para o manejo ambiental e práticas etnoconservacionistas.

O marco da consolidação da Etnogeomorfologia se dá no Brasil, com a publicação da tese de doutorado de Ribeiro (2012), intitulada "Etnogeomorfologia Sertaneja: proposta metodológica para a classificação das paisagens da sub-bacia do rio Salgado/CE". A autora construiu uma base teórica e metodológica que serve de aporte para as pesquisas desenvolvidas nessa área. Na sua tese, a autora identificou o etnoconhecimento de agricultores tradicionais de quatro áreas da região do Cariri Cearense (Crato, Barbalha, Mauriti e Aurora), e provou que esses indivíduos possuem um repertório de conhecimentos acerca das formas de relevo e processos erosivos. Discorrendo sobre o conceito de Etnogeomorfologia, Ribeiro (2012, p. 94) afirma que

> O estágio tecnológico e os saberes empíricos e "hereditários" sobre o meio ambiente próximo são fatores essenciais das modificações implementadas pelas ações antrópicas sobre as entradas, caminhos e saídas de matéria e/ou energia no sistema ambiental produtor de sua subsistência. A forma como o produtor rural maneja os recursos solo, água e vegetação em suas áreas de produção vai alterar de maneira direta e indireta a dinâmica dos elementos constituintes do geossistema local. Os estados deste geossistema vão se alterar em tempos e formas diferentes do que aconteceria sem a ação antrópica, e essa velocidade e esse formato estão relacionados diretamente com as alterações na dinâmica morfológica do relevo.

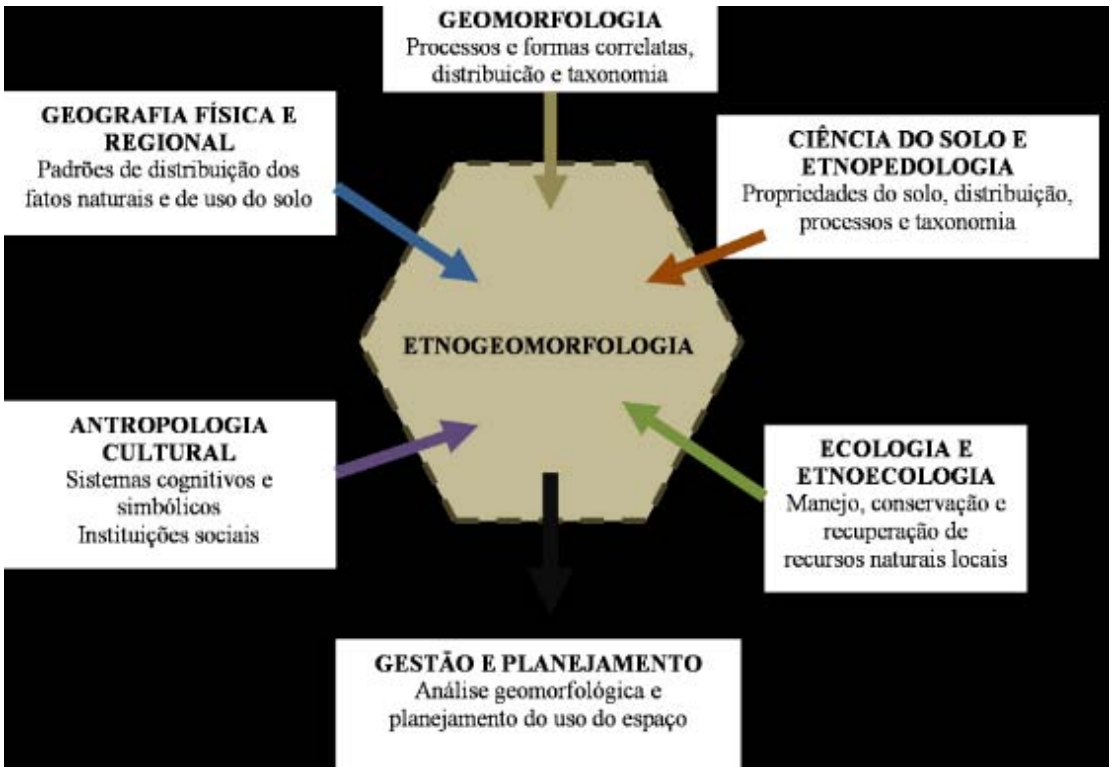
Segundo Ribeiro (2012), a Etnogeomorfologia foi definida como sendo uma ciência híbrida (posto que está na interface entre ciência natural e social), que estuda os conhecimentos de uma comunidade acerca dos processos geomorfológicos, considerando os saberes sobre a natureza, valores culturais e tradições locais. O trabalho de Ribeiro (2012) centrou-se na região sertaneja do Cariri, no Estado do Ceará. Esta pesquisa será centrada na paisagem litorânea, também do mesmo Estado. A Etnogeomorfologia, como novo campo de investigação, traz uma proposta muito desafiadora diante do que se vem sendo trabalhado na geomorfologia (fluxograma 1), através da busca dos conhecimentos tradicionais sobre os aspectos geomorfológicos locais (Ribeiro, 2012).

A percepção ambiental tem fortes raízes culturais e os filtros culturais e individuais são totalmente decisivos nas atitudes perceptivas. São eles que definem a percepção que por sua vez é

[1] Conhecimento adquirido através da observação e da experiência, é um conhecimento popular.

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determinante na forma como o homem vê, interpreta e interfere no seu meio (Corrêa, 1995; Oliveira, 2009). As diversas comunidades tradicionais de diversos espaços têm percepções diferentes, por esta razão os estudos da Etnogeomorfologia não são iguais na perspectiva de resultados.



Fonte: Ribeiro (2012).

Fluxograma 1: A Etnogeomorfologia e sua base epistemológica

A diversidade cultural é tão vasta quanto a história humana, refletindo assim na cultura de cada sociedade. Essas manifestações culturais são um produto histórico construído da interação social e com a natureza. Segundo Santos (2006), a cultura não é um sistema fechado e nem estática, mas ao contrário, está sendo modelada e remodelada constantemente. O tempo é um elemento essencial nessa construção.

A cultura é então a principal ferramenta utilizada na relação do homem com o meio, e se torna muito evidente na prática dos povos de comunidades tradicionais. Esses grupos se adaptaram a um meio ecológico altamente complexo graças aos saberes acumulados sobre o território e às diferentes formas pelas quais o trabalho é realizado. A variedade de práticas muitas vezes complexas assegura a reprodução do grupo, possibilitando uma construção da cultura integrada à natureza e formas apropriadas de manejo (Castro, 2000).

As culturas nascem e se consolidam no espaço próximo, ou seja, no lugar. Carlos (1996, p.26) ressalta que o lugar é a base da produção da vida e pode ser analisado na tríade "habitante-identidade-lugar". O lugar é o espaço próximo onde se estabelece a vivência. Citando Tuan (1979), Corrêa (2011) afirma que o lugar possui um "espírito", uma personalidade", havendo um "sentido de lugar" que se manifesta pela apreciação visual ou estética e pelos sentidos a partir de uma longa vivência. Para Heidegger (2005), lugar é a morada do homem, sem exceção. Ele contém e conserva o advento a que o homem pertence em sua essência.

A construção do lugar se faz de forma coletiva em qualquer espaço. Segundo Lopes (2017), o lugar é produto das relações humanas, entre homem e natureza, tecido por relações sociais que se realizam no plano do vivido, o que garante a construção de uma rede de significados e sentidos que são tecidos pela história e cultura civilizadora, produzindo a identidade, posto que é aí que o homem se reconhece, porque é o lugar da vida. Para Nogueira (2013), é na própria vivência que se constrói o enraizamento do homem com o lugar. Nessa vivência nascem os conhecimentos que são repassados, ao longo dos anos, de forma oral, tornando a memória um recurso importantíssimo.

A etnociência se firma na ligação entre o natural e o social, utilizando como metodologia a investigação das nomenclaturas designadas pelas populações tradicionais para os elementos e fenômenos naturais, assim como os valores culturais inerentes a esses grupos. As investigações etnocientíficas proporcionam o levantamento de conhecimentos sobre a natureza,

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acumulados no decorrer de longas gerações e raramente registrados por meios escritos, mas que ainda assim ultrapassam muitas vezes os conhecimentos adquiridos pelas sofisticadas metodologias da ciência ocidental (Pereira; Diegues, 2010).

Esse conhecimento construído socialmente dentro de uma comunidade tradicional não deixa de ter sua importância pelo fato de não ter nascido na academia, embora sendo posteriormente apropriado pela academia. Segundo Castro (2000) e Diegues (1995), o conhecimento dos pescadores com relação aos mares, rios e outros ambientes aquáticos, resultante das atividades de navegação e pesca, constituem-se na base do conhecimento científico atual.

Colaborando com o discurso sobre a importância do saber tradicional, Toledo e Marrera-Baasols (2009) afirmam que, enquanto sistemas culturais, as sabedorias tradicionais baseiam-se nas experiências que se têm sobre o mundo, seus feitos e significados, e sua valorização, de acordo com o contexto natural e cultural onde se desdobram. Os saberes ambientais são apenas uma parte ou fração essencial da sabedoria local.

III. Metodologia

Para uma pesquisa etnogeomorfológica, acreditamos que o método qualitativo é o que melhor retrata a realidade que se quer estudar. Para Pessoa (2012), a forma de abordagem é qualitativa, quando o pesquisador procura, na sua elaboração, seguir a tradição compreensiva ou interpretativa. É importante a sua imersão no contexto de interpretar e interagir com o objeto estudado, além da adoção de uma postura teórico-metodológica para decifrar os fenômenos. Ainda corroborando com esse pensamento, Minayo (2001, p. 21) afirma que "a pesquisa qualitativa trabalha com o universo de significados, motivos, aspirações, crenças, valores e atitudes, o que corresponde a um espaço mais profundo das relações, dos processos e dos fenômenos que não podem ser reduzidos à operacionalização de variáveis".

Para o desenvolvimento da pesquisa com a comunidade tradicional do Guriú, tivemos como base, mediante algumas adaptações para a pesquisa com o pescador artesanal, o procedimento metodológico apresentado por Ribeiro (2012). A primeira fase consistiu na elaboração de material básico – levantamentos de dados bibliográficos e cartográficos que deram suporte inicial para a elaboração e confecção de roteiro para as entrevistas feitas junto aos produtores pescadores, assim como para a análise geossistêmica da área pesquisada.

Os dados empíricos foram coletados através de observações de campo diretas e intensivas e extensas entrevistas não estruturadas feitas *in loco*, com pescadores tradicionais nascidos e/ou criados no próprio distrito, e escolhidos a partir do grau de conhecimento que têm sobre o local. E finalizando com a análise de dados na terceira fase.

a) Levantamento bibliográfico

Em uma pesquisa, há necessidade da realização de uma consulta bibliográfica, tanto para a definição do sistema conceitual da pesquisa e da sua fundamentação teórica, como para identificar o estágio em que se encontram os conhecimentos acerca do tema que está sendo investigado (Gil, 2008).

Para nosso levantamento bibliográfico utilizamos como levantamento bibliográfico para a pesquisa, livros, artigos científicos, dissertações, teses, documentos oficiais de instituições governamentais, todos eles acessados via internet por site ou via material impresso.

Para o estudo teórico-metodológico a partir da natureza, selecionamos alguns autores: Humboldt e Ritter, discutidos a partir das obras de Moraes (2014); Carvalho (2003); Pedras (2000); Falcão Sobrinho (2020). Depois, foi feita a leitura da paisagem como perspectiva metodológica na Teoria Geral de Sistemas, especificamente na Teoria Geossistêmica, considerando as obras de Bertallanfy (1975); Bertrand (1968); Casseti (2001); Monteiro (2001); Troll (1997); Christofoletti (1999); Vale (2012) e Ab'Saber (2003); Marques (2001); Ross (1992); Florenzano (2008), entre outros. E, para a paisagem na perspectiva perceptiva, utilizamos as ideias de Oliveira (2009) e Tuan (1980). Ainda dando prosseguimento, porém numa abordagem de como a paisagem pode ser percebida pelos seres humanos, utilizamos os textos de Tuan (1980); Rangel (2012); Verdum (2012) e, principalmente, Sauer (1925).

Para o embasamento teórico acerca do tema etnogeomorfológico, fizemos uso dos textos de Diegues (1996); Toledo (2001); Nunes Jr. *et al. (*2006); Toledo e Barrera-Bassols (2009); Wilcock (2011); Ribeiro (2012); Corrêa; Marçal; Ribeiro (2015); Lopes; Ribeiro (2016); Ribeiro (2016a, 2016b); Lopes (2017); Lopes; Costa; Ribeiro (2013); Ribeiro *et al.* (2019); Ribeiro; Albuquerque; Barros (2020), entre outros.

Complementando a base teórica de pesquisa, juntamente com a produção literária, recorrendo aos mapas oficias para a coleta de informações sobre a área, bem como desenvolvendo a elaboração de mapas físicos dos espaços selecionados, levando em conta o espaço físico-natural local.

b) Reconhecimento do campo

A categoria de análise utilizada por esta pesquisa foi a da paisagem na perspectiva geossistêmica de Sotchava (1977). Nesta perspectiva geossistêmica, os conjuntos de elementos são integrados e indissociáveis e estão em constante evolução.

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A pesquisa em campo foi desenvolvida em três etapas. A primeira etapa foi destinada ao aprofundamento da observação da paisagem e coleta de dados sobre ela. Para esse levantamento de dados, foi necessário o registro fotográfico da paisagem e anotações sobre os elementos físico-naturais que foram, posteriormente, utilizados no trabalho de gabinete, na elaboração de mapas e produção textual.

A segunda etapa da pesquisa de campo foi desenvolvida com os pescadores artesanais da comunidade. Essa fase da pesquisa teve por objetivo fazer o levantamento dos conhecimentos da comunidade sobre o relevo em que está inserida, inclusive a sua forma de atuação sobre esse espaço, de como são sujeitos ativos e passivos no seu meio ambiente. As entrevistas semiestruturadas foram feitas com quatorze pescadores artesanais do distrito do Guriú.

Nesta segunda fase do trabalho de campo, estivemos por uma semana em campo, hospedados dentro das comunidades. Para esse momento, colocamos em prática as recomendações de López (1999) para uma pesquisa etnográfica: 1. *Caráter holístico* (descrever os fenômenos de maneira global em seu contexto natural); 2. *Condição naturalista* (estudar as pessoas em seu ambiente natural); 3. *Usa a via indutiva* (se apoia nas evidências para suas conceitualizações e teorias); 4. *caráter fenomenológico* (os significados se estudam desde o ponto de vista dos agentes sociais); 5. *Os dados aparecem contextualizados* (as observações se inserem dentro de um contexto amplo), e 6. *Livre juízo de valor* (não se deve emitir juízo de valor sobre as observações).

c) Levantamento cartográfico

O levantamento cartográfico é imperativo na pesquisa geográfica. O estudo envolvendo a cartografia oportuniza informações de extrema importância dos espaços geoambientais que compõem a paisagem litorânea do município de Camocim. Os mapas representam partes particulares das regiões selecionadas, como também do todo, ou seja, mapas que representem o sistema ambiental do espaço municipal.

Para a elaboração dos mapas, foram utilizados como base de dados secundários dados do Instituto Brasileiro de Geografia e Estatística (IBGE), do Instituto de Pesquisa e Estratégia Econômica do Ceará (Ipece), da Agência Nacional de Águas e Saneamento Básico (ANA), do Departamento Nacional de Infraestrutura e Transporte (DNIT). Para localização e recortes de estudo, os mapas foram desenvolvidos de forma digital em Sistema de Informação Geográfica (SIG), no software de código livre Qgis, versão 3.16 Hannover.

d) Entrevistas

Para a entrevista fizemos uso da metodologia utilizada por Ribeiro (2012), sendo adaptada para o homem do litoral. Os critérios levantados para a escolha os entrevistados foram os mesmos utilizados por Ribeiro (2012): pessoas nascidas e/ou criadas no próprio distrito, e escolhidos a partir do grau de conhecimento que têm sobre o local. Segundo Lopes (2017), na pesquisa etnogeomorfológica é substancial que as entrevistas sejam semiestruturadas. A vantagem da entrevista semiestruturada é que ela consiste em um modelo de entrevista flexível, ou seja, por mais que se tenha um roteiro prévio, ela permite que o entrevistado tenha espaço para falar além do que foi perguntado, formando assim um diálogo natural e dinâmico.

Para a pesquisa na comunidade, fizemos uso de roteiro de entrevista e mapa do Google Earth do espaço da comunidade. Após as respostas da entrevista, os moradores receberam um mapa da sua área em uma folha de ofício A4 para que identificassem a localização no mapa dos elementos naturais e culturais que foram citados na entrevista. O mapa com a localização dos elementos naturais citados pelos moradores foi confeccionado trazendo uma legenda com os nomes utilizados na comunidade. Os mapas foram compilados com o objetivo de produzir apenas um mapa completo para cada uma das comunidades pesquisadas.

Nenhum dos entrevistados foi identificado nominalmente. Os moradores da comunidade foram identificados por códigos nos momentos de citações das falas.

e) Análise de dados

A análise de dados foi concluída de forma minuciosa, à luz do embasamento teórico levantado para a pesquisa. A análise do conteúdo constitui-se como uma técnica de cunho qualitativo, segundo Bardin (2016).

Para atingir o objetivo deste trabalho, foram analisados mapas geoambientais, fotografias do campo, análise das entrevistas, tabulação de dados, construção de um mapa etnogeomorfológico utilizando como fonte os mapas que foram completados pela comunidade.

IV. Resultado e Discussões

No Guriú há o turismo sazonal, que é aquele muito requisitado nos períodos secos devido aos fortes ventos, essencial para práticas esportivas como o kitesurf e o windsurf. Há o turismo de pessoas que se hospedam na localidade procurando mais tranquilidade e preços mais acessível em comparação à famosa praia de Jericoacoara, e há o grupo que compõem de fluxo turistas que utilizam o Guriú como passagem para as praias e lagoas do município de Camocim ou para a Rota das emoções que vai do Parque Nacional de Jericoacoara aos lençóis maranhenses. A travessia pelo rio é feita por meio de balsas (figura 01) que, tanto transporta pessoas como veículos de passeios.

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Fonte: Sousa, R. M. L. (Abr/2023)

Figura 01: Balsas do rio Guriú

Por mais que tenha uma vocação turística, no Guriú esse setor econômico não foi o motivo para o nascimento e crescimento desta comunidade. No distrito do Guriú, encontra-se primordialmente uma comunidade tradicional que tem o seu sustento do setor primário da economia, da pesca artesanal e em segundo plano, da agricultura de subsistência. O nosso trabalho no distrito do Guriú se resumiu aos profissionais da pesca artesanal. Esses pescadores, ricos em conhecimentos empíricos, aprenderam a conhecer, interagir e viver no e do litoral. Como citado anteriormente, esses conhecimentos tradicionais adquiridos através das interações direta com o relevo é chamado de conhecimento etnogeomorfológico.

Para o levantamento desses conhecimentos etnogeomorfológicos, desenvolvemos entrevistas com quatorze pescadores locais em idades que vão de setenta e cinco anos até trinta e um anos, sendo a maioria pertencente ao grupo dos quarenta anos, fazendo assim uma média geral de cinquenta e um anos de idade. Dos entrevistados, apenas um não nasceu na comunidade do Guriú embora já resida há sessenta ano nesse lugar. Seu lugar de nascimento foi uma comunidade vizinha chamada Baixa Grande, também pertencente ao município de Camocim.

Suas origens também estão ligadas aos conhecimentos tradicionais etnogeomorfológicos, todos os seus pais estiveram ligados aos conhecimentos da atividade a pesqueira ou da atividade agrícola e todos os nativos da comunidade do Guriú. Dos entrevistados, seis afirmaram que os seus pais pescavam no turno da manhã e no turno da tarde trabalhavam na agricultura. Cinco afirmaram que seus pais somente pescavam e três declararam que seus pais somente plantavam.

A transmissão de conhecimentos para a atividade pesqueira foi repassada de forma oral nos momentos de práticas desenvolvidos pelos pais, de acordo com nove entrevistados, e por parentes, de acordo com cinco dos entrevistados.

Na comunidade pesqueira do Guriú há uma associação de pescadores que conta, inclusive, com sede própria (figura 02). Tal sede está localizada na praia de porto das canoas e que serve tanto para guardar material dos pescadores como para as reuniões ordinárias e extraordinárias da comunidade pesqueira. Todos os pescadores da comunidade são membros da associação, mas nem todos estão ligados à Colônia de Pesca e Aquicultura Z1. Onze deles afirmaram que continuam ligados à Colônia e três declaram que pararam de fazer os devidos pagamentos ao sindicato. A continuação dos pagamentos é o que possibilita ao pescador o recebimento do benefício do Seguro Defeso da lagosta, que é um recurso do governo federal, pago ao pescador artesanal no período da proibição da pesca da lagosta, desde que sua única renda individual ou familiar seja a pesca.

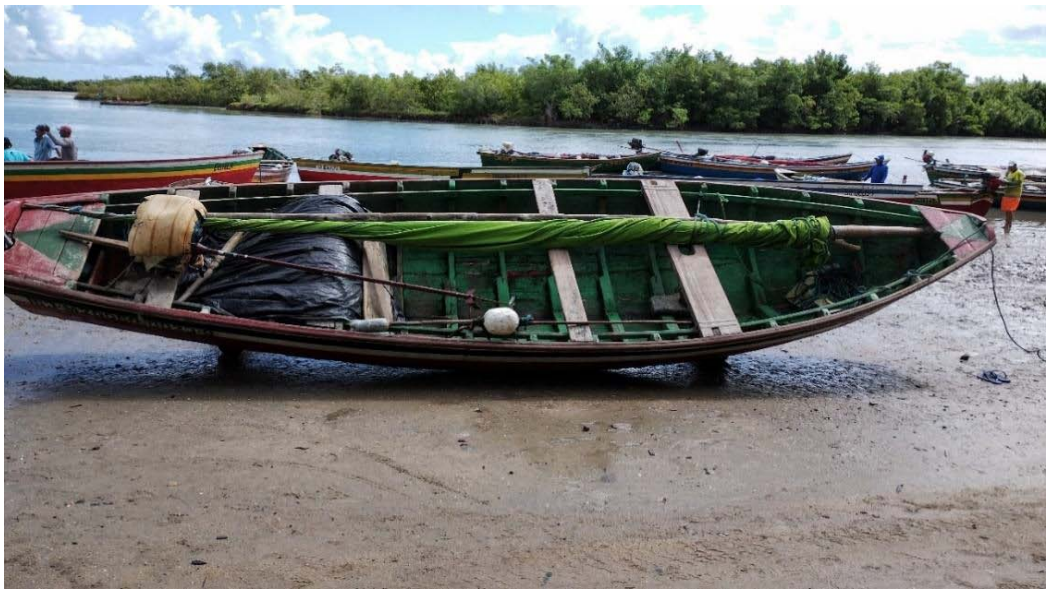
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Fonte: Sousa, R. M. L. (Abr/2023)

Figura 02: Associação dos pescadores da comunidade do Guriú

As canoas (figura 03), como são chamadas as pequenas embarcações de madeiras, chegam a passar até três dias no mar, no entanto apenas seis pescadores responderam que passavam três dias no mar. Oito responderam que tem o deslocamento diário no que eles chamam de "ída e volta". Todos afirmaram que suas embarcações trabalham com três homens, independente do tempo passado no mar.



Fonte: Sousa. R. M. L. (Abr/2023). Imagem demostrando o interior de uma canoa organizada para ir para o mar. Vela de pano enrolada, motor e redes protegidos por uma lona e boias demarcadoras. Pela a ausência de caixa de gelo, essa canoa é de "ída e volta".

Figura 03: Canoas do rio Guriú

Há uma grande diferença entre os tipos de peixes capturados pelas grandes embarcações de ferro e as pequenas embarcações artesanais. Essa diferença se dá primordialmente pelo local de pesca, ou seja, a distância da praia de cada embarcação e isso interfere no tipo e tamanho de peixe.

Enquanto as embarcações maiores, que conseguem passar um mês no mar e pescar peixes grandes como o atum, se deslocam na plataforma continental até a Zona Contígua com 24 milhas náuticas (Nm). Já as embarcações pequenas de pesca chamada por eles de "ída e volta" (vai na madrugada e volta pela manhã do mesmo dia), se deslocam pelo Mar Territorial que vai até 12 milhas náuticas, ou seja, 22 quilômetros. Sobre os tipos de energia utilizados para o deslocamento, os pescadores entrevistados, doze afirmaram fazer uso de velas de pano e pequenos motores movidos à combustível fóssil, um falou que faz

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uso exclusivo de motor e outro falou que faz uso exclusivo de vela.

Os peixes capturados pelos pescadores artesanais (quadro 1) são, na sua maioria, peixes pequenos e, de acordo com dez pescadores entrevistados, essa produção está diminuindo. Dos que acreditam que está diminuindo, quatro citam da pesca predatória como causadora da diminuição da disponibilidade do pescado, dois afirmaram ser o aumento da quantidade de embarcações e um afirma ser a implantação das redes de pesca, sendo que anteriormente a pesca nas canoas se davam exclusivamente de linhas de pesca e anzol.

As redes de pesca, linhas de pesca e manzuás (armadilha em forma de gaiola para a captura da lagosta) são utilizadas por nove dos entrevistados, dois responderam que utilizam rede e linha, um respondeu que utilizava rede e manzuá e apenas um afirmou fazer uso exclusivo da rede de pesca. Todos afirmaram que, mesmo tendo a rede como prioridade, chegam a fazer pequenas pescarias de linha e anzol enquanto passa o tempo afinal eles colocam a rede e esperam por um tempo para puxá-la.

Para esse trabalho exclusivamente com a linha e o anzol, doze dos pescadores afirmaram utilizar o peixe sardinha, pescada por eles mesmo, como isca, um afirmou utilizar camarão de viveiro e pedaços de outros peixes e um disse utilizar como isca exclusivamente pedaços de peixes, de preferência, o peixe bonito.

Quadro 1: Produção pesqueira da comunidade do Guriú

Avaliação do pescado				
PEIXE	Número de citações			
	Mais pescados	Mais valioso	Menos valioso	Priorizado para o consumo
Serra	13	10	-	11
Garajuba	8	1	-	7
Cavala	6	9	-	2
Bonito	6	-	6	2
Ariacó	4	2	-	-
Coró	2	-	-	-
Caíco	2	-	6	-
Biquara	1	-	-	-
Carapeba	1	-	1	
Pescada Branca	1	-	-	3
Camurupim	1	-	-	1
Sardinha	1	-	1	1
Cavalinha	-	-	-	1

Fonte: Sousa, R. M. L. (2023). Copilado dos relatos feitos pelos pescadores

Sobre a percepção ambiental notou-se um amplo conhecimento sobre os elementos naturais do seu lugar. Perguntados sobre a forma de orientação noturna quando estão no mar, onze pescadores afirmaram que se baseiam pelos "gaisames", que são reflexos das luzes dos espaços urbanos, e houveram cinco menções aos planetas. Para a localização diurna, foram citados igualmente, os ventos, os serrotes de Jericoacoara e da Tiaia e os ventos. Levando em conta a massificação dos eletrônicos, três dos pescadores entrevistados (46, 48 e 49 anos) falaram que, mesmo fazendo uso dos elementos da natureza, fazem uso do Sistema de Posicionamento Global - GPS dos celulares para a se localizarem.

Questionados sobre a percepção de mudanças no nível do mar, todos os pescadores afirmaram ter notado a mudança, afirmaram que perceberam um aumento no nível do mar. Muitos, inclusive, afirmaram que seus pais já relatavam sobre a mudanças do nível do mar no sentido de aumento. Relatando sobre as experiências dos seus pais, o pescador MG01 (75 anos) afirma que "há uns 100 anos houve um nível alto, baixou e agora está voltando a crescer novamente", esse entendimento vai de encontro com o relato do pescador MG14 (49 anos) que diz que "onde o mar botou, ele bota de novo" e completando esse conhecimento, focando na relatividade das dinâmicas naturais, o pescador MG04 – 45 anos diz que "tem lugares que ele entrou mais e tem lugares que ele entrou menos". Para os pescadores, esse aumento do nível do mar tem vários fatores, estamos em destaque citado por nove pescadores, a causa de fenômeno natural, dois pescadores citaram a poluição, e com uma citação, estão a degradação ambiental, o turismo e o aquecimento global. Diante das afirmações, poderíamos sintetizar dizendo que nove pescadores citaram que o aumento do nível no mar se dá por questões naturais e cinco afirmaram que era devido a ação antrópica.

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Objetivando captar o grau de percepção dos entrevistados sobre a paisagem local, foi perguntado aos pescadores sobre quais elementos da paisagem ele percebia no seu lugar (mapa 02). Os maiores números de menções foram para rio, dunas e mangue, sete cada uma. Em seguida, mar e praia receberam seis menções, lagoas de dunas e ilhas receberam uma, cada. A camboa foi citada por três pescadores, camboa é um estreito por onde a água entra no período de mará alta, chagando a seca totalmente nas marés baixas, e eles chamam de camboa, o próprio rio Guriú.



Fonte: Sousa, R. M. L (2023)

Mapa 02: Elementos geoambientais da paisagem do Guriú

Sobre outras mudanças percebidas na paisagem todos os pescadores foram unânimes em afirmar que a maior mudança percebida na paisagem do Guriú está relacionada a quantidade de sedimentos que são lançados anualmente pela força eólica sobre o rio e sobre os mangues locais (figura 04). Segundo eles, os sedimentos estão aterrando o leito do rio fazendo com que fique mais raso na sua foz, matando manguezal e realocando a foz do rio. Corroborando com essa afirmação, todos afirmaram que as forças naturais mais atuantes nos processos ambientais locais seriam o mar e o vento. Essa interligação segundo o pescador MG07 (45 anos) ocorre porque "é tudo o mesmo sistema".



Fonte: Sousa, R. M. L. (Abr/2023). Foto tirada na margem esquerda do rio Guriú enfatizando as consequências da força eólica sobre as dunas da margem direita do mesmo rio.

Figura 04: Dunas da foz do rio Guriú

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A figura acima retrata as consequências da dinâmica eólica nessa paisagem. Levando em conta esse cenário, os pescadores afirmam que os mangues são divididos em dois, um que "morreu por conta da areia" de acordo com MG06 (56 anos) e o outro preservado encontrado mais distante da foz.

Atualmente o mangue aterrado pelos sedimentos trazido pelo vento, é um dos principais pontos turísticos no distrito do Guriú (figura 05). É a porta de entrada do território camocinense para quem entra por Jijoca de Jericoacoara. Nesse mangue suas árvores mortas provocam uma visão única da paisagem litorâneas cearense, sendo ponto de instalação de várias barracas de praia e passagem de veículos. Esse espaço do mangue aterrado recebeu o nome de "mangue seco do Guriú".



Fonte: Sousa, R. M. L. (Abr/2023). Imagens do mangue atingido pelas areias das dunas trazidas pelo vento da margem direita do rio Guriú.

Figura 05: Mangue seco do distrito do Guriú.

Como supracitado, os pescadores afirmam que o rio Guriú é na verdade uma camboa. Buscamos resolver essa questão em três frentes, através de pesquisa no Eart google, através de pesquisa de campo e através dos próprios relatos dos pescadores com perguntas no decorrer da pesquisa (figura 06).

Figura 06: Percurso do rio Guriú



Elaborado por Sousa, R. M. L. Fonte: https://earth.google.com/web/search/Camocim+Cear%c3%a1+Brasil/@-2.87220042,40.55620518,20.07787748a,15433.61704763d,35y,0h,0t,0r/data=CigiJgokCWDIrnhfVQfAEYQRa0ZilQfAGSK880BKgUTAIQtOdenMiUTA. Acesso 14 de abril de 2023

Figura 06: Percurso do rio Guriú

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Após a afirmação de alguns pescadores de que o rio seria apenas um braço de mar, resolvermos fazer uma averiguação dos fatos (figura 07). Nessa investigação, primeiro ser buscado foi a imagem de satélite do rio, posteriormente, demarcamos no mapa os lugares que seriam visitados para os registros de elementos mostrasse a natureza desse recurso hídrico. Por último foi feito um estudo de campo para observação *in loco* e registros fotográficos. Os elementos pesquisados foram: solo, vegetação, relevo e leito do rio.



Fonte: Sousa, R. M. L. (Abr/2023). A – Solo argiloso das margens do rio; B – Vegetação de carnaúba encontrada nas margens de mananciais de água doce; C – Planície fluvial; D – ponte sobre o leito estreito do rio.

Figura 07: Anexo da imagem do percurso do rio Guriú

Nos relatos dos pescadores, todos afirmaram que o rio vai até o "Córgo" (Córrego) da Forquilha, ou seja, eles reconhecem este como sendo um dos mananciais que alimentam o rio, eles também sabem que esse córrego pertencente ao território de Jijoca de Jericoacoara. Todos afirmaram também que no "inverno" (período chuvoso) a água do rio muda, ficando amarelada e muito barrenta inclusive, deixando o solo do rio bem mais lamoso e barrento.

A pesquisa de campo juntamente com o relato dos moradores e averiguação de todos os dados levantados nos leva a concluir que, o que os pescadores do Guriú chamam de camboa é, de fato, um rio.

Neste e em outros casos, é nítido o entendimento dos pescadores de forma geossistêmica. Por mais que tenham uma visão equivocada de algo, como é o caso acima citado, eles entendem que existem uma interligação entre vários elementos onde um consegui interferir no outro em proporções diferentes e no tempo e no espaço.

Como foi supracitado, no levantamento das informações sobre o rio, os pescadores citaram o mangue como elemento natural que se destaca. O mangue nasce exclusivamente da junção da água doce com a salgada de uma mistura de elementos como silte, argila e matéria orgânica que estão sob a influência das marés. A maioria dos pescadores consideram que a maior destruição do mangue era o aterramento provocado pelas areias transportadas das dunas de Jericoacoara e que esta é uma dinâmica natural dos ventos. Segundo eles, a sequência desse processor será o carregamento desses sedimentos sobre o mangue através da dinâmica das marés. Eles acreditam que a maré se encarregará de levar a areia do extrato superior deixando que o mangue renasça novamente em um processo cíclico.

Sobre a extração animal nos mangues do Guriú, os relatos mostram que a pesca do caranguejo é pequena, assim como a destruição da vegetação através da aquisição dos madeira. Como o fato de maior impacto ambiental sobre o mangue, os pescadores apontam a carcinicultura local. Eles relatam que há a liberação de resíduos provenientes dos tanques de criação de camarão e teme que possa a vir a prejudicar a pesca sendo que eles reconhecem a importância do manguezal enquanto berçário dos peixes.

Segundo o Departamento Nacional de Produção Mineral - DNPM (2000) levando em conta a suscetibilidade a processos condicionantes de riscos geológicos, na região do Guriú, existe a presença de

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uma intensa dinâmica sedimentar, com processos de mobilização eólica de areias (migração de dunas) e erosão da linha da costa, e ainda e considerado um trecho do litoral que experimenta acelerado processo de recuo da linha da costa (erosão marinha). Essas afirmações fruto de pesquisas do DNPM vão de encontro aos conhecimentos empíricos dos pescadores aqui relatados, provando que a vivência e interação com os elementos naturais do lugar, também promovem o conhecimento (figura 08).

Além dos etnoconhecimentos abordados, os pescadores artesanais do Guriú também conseguem fazer a leitura das interligações entre luas, marés e pescaria. Segundo o pescador MG03 (43 anos) "As luas Cheia e Nova formam marés grande e ela é ruim porque a maré corre demais", o pescador MG11 (31 anos) afirma que "A lua no meio do céu é melhor para pescar", ou seja, de acordo com a fala dele, ele estava se referindo às fases da lua quarto crescente e quarto minguante. Além de saberem a melhor fase da lua para a pescaria, eles também relataram que o melhor tempo para pescar é no "inverno", que na verdade eles se referem ao período chuvoso do primeiro semestre do ano. Segundo eles, o "inverno" é bom porque tem menos ventos e o mar fica menos agitado e com ondas menores. Houveram vários relatos de colegas dos entrevistados que se "alargaram" no mar do período dos ventos fortes, "alargar" quer dizer, sofrer um naufrágio.



Fonte: Sousa, R. M. L. (Abr/2023). A foto mostra o momento em que uma canoa chega do mar e é cercada por curiosos, comerciante e consumidores em busca de comprar peixe fresco.

Figura 08: Os pescadores do porto do Guriú

As comunidades tradicionais desenvolvem um linguajar próprio para se referirem a elementos e os fenômenos da natureza, esse linguajar é natural entre os trabalhadores do mar (quadro 2). Esses conhecimentos fazem parte do acerco repassado oralmente por gerações pela comunidade tradicional. Abaixo, apresentaremos um quadro contendo uma coluna com os elementos e fenômenos conhecidos pela ciência e na segunda coluna, a forma como esse elemento ou fenômeno é chamado pelas comunidades.

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Quadro 2: Etnoconhecimentos do Guriú

CIENTÍFICO	ETNOCONHECIMENTOS
Fartura de Peixe	Correição
Corrente Marítima	Correnteza, Carreira d"água
Foz de rio	Boca da barra, Quebra mar
Depósito de sedimentos no rio	Crôa
Máre alta	Maré cheia
Maré baixa	Maré seca
Vento matinal	Terral
Vento vespertino	Vento do mar
Ventos fortes	Leste, Ventos de cima
Elevação do nível do mar	Mar brabo

Fonte: Sousa, R. M. L. (2023).

Averiguando a opinião deles sobre os impactos da indústria turística sobre a paisagem do Guriú, eles afirmaram que o turismo proveniente do Parque Nacional de Jericoacoara não destrói a natureza, afinal a areia que está aterrando parte do mangue é trazida por conta da força dos ventos e não por conta dos carros de passeios eles acreditam que o turismo beneficia o lugar com um bom fluxo financeiro (figura 09), pois eles passaram a vender mais pescados com o aumento do fluxo turístico para as hospedagens do lugar e para barracas de praia.

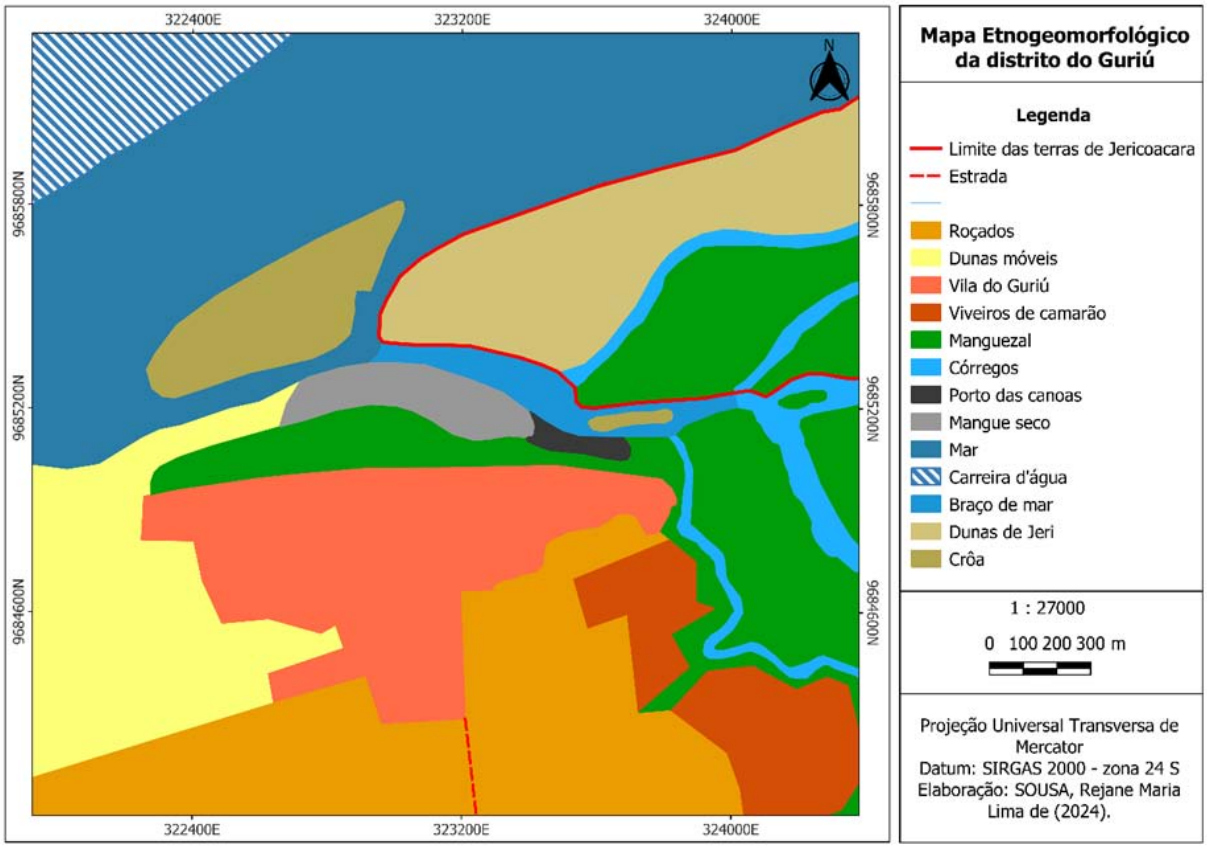


Fonte: Sousa, R. M. L. (Abr/2023). A imagem mostra o único hotel do distrito.

Figura 09: Hotel localizado nas margens do rio Guriú

Fazendo parte do segundo momento das entrevistas, os pescadores nomeavam os elementos geográficos locais com a ajuda de uma imagem da região adquirida através do Google Earth. Na tabulação dos dados colhidos surgiu o mapa etnogeomorfológico abaixo que materializa a renomeação dos elementos geográficos locais.

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Fonte: Sousa, R. M. L. (2023)

Mapa 03: Mapa etnogeomorfológico do Guriú.

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Preferred Author Guidelines

We accept the manuscript submissions in any standard (generic) format.

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from https://globaljournals.org/Template.zip

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Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

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Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.



Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

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The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

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Tips for writing a good quality Social Science Research Paper

Techniques for writing a good quality homan social science research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of homan social science then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.



6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.
Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

19. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

20. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

21. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

22. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

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Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.



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Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.



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Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

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Figures and tables:

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Discussion:

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Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

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- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

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References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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