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RESEARCH ARTICLE

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PALEODUNES OF THE SÃO FRANCISCO RIVER AND SUSTAINABLE TERRITORIAL DEVELOPMENT

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ABSTRACT

Discussing territory and sustainable development in paleo environmental territories requires an interdisciplinary perspective from the researcher. The development of the human being on the planet, evidenced by technological advances, has intensified over the last 200 years. During this period, man frantically sought to control nature. However, in current times societies need to reconcile economic development and sustainability, in order to conserve their natural heritage. This article aimed to discuss the relevance of territory for development, seeking to understand the relationship established between society and nature in the researched location with regard to ecosystem conservation and sustainable development. This is an applied, quali-quantitative, exploratory, bibliographic, and field research. The choice of the object of study, the research locus, and the target audience was made by intentionality and accessibility. The collection was carried out through the application of a questionnaire guided by guiding questions. The results indicate that the relationship between the researched society and nature has been complex and sustainable development in these territories has not been effective.

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INTRODUCTION

The development of the human being on the planet, evidenced by technological advances, has intensified over the last 200 years. During this period, man has frantically sought to control nature. From the 1970s on, the disorderly growth of cities and the increase in the population growth rate significantly transformed the natural ecosystems. In the early 1980s, the problems intensified and environmental damage became recurrent (SOUZA; ARMADA, 2017). For these authors, post-modern society is facing the challenge of a new paradigm, since the environmental crisis is also a crisis of civilization, the exhaustion of a way of life based on consumerism. The (in)sustainability of the development process today goes through the conceptual difficulties associated with the categories of growth, development and sustainable development. Territory, on the other hand, has various dimensions and meanings according to each society and how its ways of life are imposed on it, and can be seen as shelter, the place where we live, or as a provider, the place where all the natural resources and raw materials necessary for all forms of survival are found. Discussing the genesis and evolution of paleodune territories requires interdisciplinary knowledge from the researcher,

since it is necessary to delve into various sciences and their subfields to understand the dimension of these environments. It is essential to know about Earth's own history, Aeons, Eras, Periods, Epochs, and Ages, in addition to immersing oneself in knowledge from Geography, Geology, Geomorphology, and Climatology, among others. In this sense, the present article aimed to discuss the relevance of territory for development, seeking to understand the relationship established between society and nature in the researched location with respect to the conservation of paleoecosystems and sustainable development. This is an applied, quali-quantitative, exploratory, bibliographic and field research. The choice of the object of study, the research locus and the target audience was made by intentionality and accessibility (BARDIN, 2016). The results indicate that the society-nature relationship in the paleodune territories has not been satisfactory since most of the inhabitants do not know the genesis, evolution and relevance of the territory they inhabit. Thus, the mobilization around sustainable development, unfavorable to the degradation of natural resources is very large today and society needs to be attentive to develop its role in its place of identity, aiming not only at its survival, but also that of other generations.

THEORETICAL REFERENCE

The multiple dimensions of territory: Territory is born with a double meaning, both material and symbolic, because etymologically it is as close to terra-territorium as to terreo-territor (terror, to terrorize), that is, it has to do with domination, power (juridical-political) of the land and with the inspiration of terror, of fear - especially for those who, with this domination, are excluded from the land, or are censored from entering the "territorium". "At the same time, by extension, we can say that, for those who have the privilege of enjoying it, territory inspires (positive) identification and effective 'appropriation'" [...]. "It concerns both power in the more concrete sense, of domination, and power in the more symbolic sense, of appropriation." (HAESBAERT, 2004, p. 01). Based on these assumptions and aiming at a confluence with what Haesbaert says, we bring the concept of territory from Raffestin (1993), who was one of the first theorists to discuss territory and geographic space. He states that:

It is essential to understand well that space is prior to territory. The territory is formed from the space, it is the result of an action conducted by a syntagmatic actor (actor who carries out a program) at any level. By appropriating a space, concretely or abstractly [...] the actor "territorializes" the space (RAFFESTIN, 1993, p. 143).

From this perspective, it is valid to point out that Haesbaert (2001) conceptualizes territory from three basic aspects:

1) legal-political, when territory is understood as a space delimited and controlled by a power, especially state power; 2) cultural, when territory is seen as a product of appropriation made through the imaginary and/or social identity about space; 3) economic, when territory is seen as a spatial product of the clash between social classes and the class-labor relationship (HAESBAERT, 2001, p. 28).

Thus, Haesbaert (2001), considering the cultural dimension of territory, understands it as an environment endowed with identities, which are intrinsic "territorial identities". In this perspective, the concept of identity becomes more considered within social and/or cultural Geography, when Claval (2001), puts that:

Identity is constructed from the internalization of a tradition, affinities that are established transmitting to the people who experience them the feeling of belonging to certain social groups. Identity can be based on "the idea of a common descent, of a history assumed together, or of a space with which the group assumes links [...]". (CLAVAL, 2001, p.179).

Thus, identity issues are dialogicized in territorial environments, attending to a natural dynamic, because it involves active, thinking, and reflective subjects, who give the territory final characteristics. For Ritter (2011), the anthropological bias presents itself as the most convenient, adapting itself to the prevailing political desires of the moment and, thus, guiding the current "territorial understanding" through the cultural approach, and the consequent policies concerning, especially, the "rural space". Still in the view of this author, the identity issue, after reaching the international legal instances, also becomes part of the national one, mainly in what concerns the contexts related to Sustainable Development and Traditional Communities. Thus, it is relevant to highlight territory as a social construction and not only see it in a political dimension. Souza (2013) establishes that in the analysis of territory, not only the political dimension is an element to be considered, because there are other attributes of social life, which act directly or indirectly on this spatial category, as is the case of culture and economy. Therefore, territorialities do not only produce conflicts, but also propitiate driving exchanges, due to the consolidation of identities forged from these collisions (HAESBAERT, 2006). According to this author, the identities built from the territory, both symbolic and concrete, should be perceived as territorial identities, as is the case of the identities of

the riverside communities. Such identities strengthened by the territories manifest themselves in the most diverse forms, and can be represented in local, regional or national identities (*Ibidem*).

In summary, in the conception of Oliveira and Silva (2017):

[...] currently, the studies about territory in Geography approach this spatial category through the bias of power relations. Be it political, economic, cultural, material or immaterial. In this sense, analyses are presented that go beyond the physical and internal dimension of the territory, also including the representations and relations with external agents, understood as one of the main promoters of territorialities (p. 06).

Thus, the territory should be understood based on associations of power in space, whether material or immaterial. Identity, on the other hand, is a private procedure of identification of social groups in space and territory and a continuous search for a perception of belonging (DUARTE, 2016). Fuini (2017, p. 02) corroborates by stating that territory also adopts a multidimensional bias and that are the territorialities that express themselves with the logic of belonging, use and experience in a space-time cutout, which in contemporary times are enacted more in network aiming to understand the space through time and its events. Obviously, over time there has always been a perspective of territory as domination, with a more material connotation and in the sense of functional dominance, and thus territory is treated as a resource with exchange value. In relation to this, Raffestin, reiterates that "a resource is not a thing", the matter itself, it "is a relationship whose conquest brings out necessary properties for the satisfaction of needs", whether present or future, which will culminate in one of the strands for the development of societies (RAFFESTIN, 1993, p. 08).

Sustainable territorial development: From this perspective, talking about development sometimes confuses us with growth, and it should be noted that they are different elements, although convergent. There are two schools of thought where one sees growth as synonymous with development, while the other understands that growth is an indispensable condition for development, but it is not a satisfactory condition. Thus, development, in any circumstance, must proceed from economic growth accompanied by improvement in people's quality of life (OLIVEIRA, 2002). From this, it is possible to bring the conception of development of the territories from the sustainable premise. Sachs (1993), argues about sustainable development, pointing out five dimensions of sustainability of economic systems that should be considered for development planning: social, economic, ecological, spatial and cultural. Sachs (2002), adds three more, being the dimensions: territorial, political (national) and political (international), thus totaling eight dimensions of sustainability. Thus, the concept of development brought by the World Commission on Environment and Development (WCDDA) is indispensable. According to it, development needs:

Meeting human needs and aspirations [...]. In developing countries, the basic needs of large numbers of people - food, clothing, housing, jobs - are not being met. Beyond these basic needs, people also legitimately aspire to a better quality of life. In a world where poverty and injustice are endemic, ecological and other crises can always occur. For sustainable development to occur, everyone must have their basic needs met and be provided with opportunities to realize their aspirations and a better life (CMMAD, 1991, p.46-47).

In this sense, we realize, therefore, the impossibility of discussing the concept of development without first thinking about the distribution of territories with equity, fair income distribution, sustainable agro practices, access to health, education, a healthy environment, freedom, leisure, among other variables that can affect the quality of life of a society, and if in the future the development is not sustainable, there will be absolutely no significant development (MÉSZÁROS, 2007). In this logic, it is possible to state that the emergence of sustainable development (SD) as a political and social

project of humanity has promoted the orientation of efforts to find ways to sustainable societies (SALAS-ZAPATA et al., 2011). But it was from the 60's, began a worldwide movement to promote strategies aimed at the conservation and preservation of the environment, where it was established the understanding that sustainability is dynamic, being a consequence of progress (LIMA et al., 2011). The first landmark reference of sustainable development was in 1972 with the United Nations Conference on the Urban Environment, also known as the Stockholm Conference. From this meeting was generated the Stockholm Declaration, a document with 26 principles, and 08 proclamations stating that "The protection and improvement of the human environment is a fundamental issue affecting the well-being of peoples and the economic development of the whole world, an urgent desire of the peoples of the world and a duty of all governments. (Proclamation number 2). From this moment the concept of sustainability was presented for the first time, even with much environmental significance (GOMES; BERNARDO; BRITO, 2005, p. 5003).

On this premise, "sustainable development" was suggested as an ideal to be achieved, through a qualitative production process, executed within parameters of respect for environmental and natural limits. (SCHRAMM; CORBETTA, 2015). Thus, the concept of sustainable development has implicit a certain commitment to the societies of the future, in order to ensure the use of natural resources capable of meeting their needs, safeguarding the balanced integration of economic, sociocultural and environmental systems, for present and future generations. Therefore, in sustainable territorial development it is essential to consider, both at the theoretical and practical levels, the elements that make up the territory and territoriality in a reconstructed historical-critical conception, and the expansion as a historical process of struggle for the conquest of better living conditions, whether in the countryside or in the city (SAQUET; BRISKIEVICZ, 2009).

Paleodune territory in Casa Nova/BA: Saguet apud Candiotto (2004), accepts the three strands of interpretation of the concept of territory advocated by Haesbaert (2001) being these strands already mentioned above (legal, political, economic and cultural) and believes in the interdependence between them, besides taking into account the nature strand, which according to this author, is inseparable from territory. In this sense, every territory is at the same time and necessarily, in different combinations, functional and symbolic, since we exercise dominion over space both to perform "functions" and to produce "meanings". In this way, the paleodune territory studied does not diverge in any way from the concept of territory discussed above. Based on this premise, the paleodune territory of Casa Nova is part of the Ecoregion Dunas do São Francisco and the Environmental Protection Area (APA) of Lake Sobradinho, created by Decree 9.957, March 30, 2006, by the Government of Bahia State. The APA has an area of approximately 1,018,000 hectares (BAHIA, 2006). The Decree that created the APA describes in Article 2 its objectives as follows:

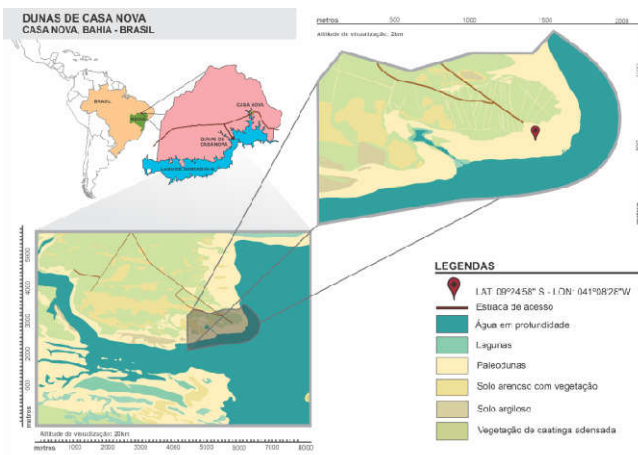
I - to promote the ordering and control of the use of the soil, of the hydric resources and of the other environmental resources of exceptional value, as public goods, including the geological, speleological, archaeological, paleontological and cultural heritage of the region; II - to preserve the quality of the waters of Sobradinho Lake, formed by the multiple use dam, given the importance of the environmental recovery of its tributaries and of its surroundings, especially Permanent Preservation Areas III - to prioritize the social and environmental inclusion of riverside communities and their social, economic and cultural activities; IV - to encourage and organize the growing demand for areas with potential for sports, leisure and ecological tourism (BAHIA/DECRETO 9. 957/2006).

Moreover, in its Art. 3, the Decree brings the guidelines for the administration of the Area of Environmental Protection of Lake Sobradinho that should be exercised by the Secretary of Environment and Water Resources (SEMARH) of the State of Bahia, through the

Superintendence of Biodiversity, Forests and Conservation Units (SFC). The SFC is responsible, among other competencies, for elaborating the Environmental Diagnostic, the Ecological-Economic Zoning and the Management Plan, from which the future zones and restrictive uses within the APA's territorial limits will be defined, observing the pertinent legislation and the dispositions of this Decree. In addition, it is also up to the administration to promote the formation of a Management Council for the Unit and to monitor and support enforcement activities in the area, and it may also enter into agreements with suitable entities that have interests related to the objectives of the APA. Article 5 of Decree 9957/2006, states that aiming at the conservation and preservation of the environment and the environmental resources involved, the APA will be permanently subject to restrictions on the use of its natural resources and soil occupation, in accordance with the local biotic, geological, urbanistic, economic, cultural conditions, among others, in conformity with the corresponding ecological-economic zoning, observing the constitutional and legal provisions concerning the exercise of property rights. These paleoecosystems or paleo-territories "are responsible for allowing discoveries and evidence that the climate we have today is the result of other climates existing in past eras, thus allowing the knowledge of paleoclimates and paleoventos" that influenced the formation of various current environments (PACHECO, 2020, p.31). The studies aimed at understanding the morphogenetic and anthropogenic dynamics of these environments are of great importance, given that these areas are presented as reliquiar and, at the same time, very prone to the process of degradation, natural and anthropogenic. Therefore, the striking characteristic of these paleoenvironments is the occurrence of successive periods of glaciations, making the Quaternary a period of relief modeling, with predominantly mechanical unconsolidated sedimentation, and most of the Quaternary processes are still happening today and will continue to occur over the next million years and, because of this, are called dynamic and continuous (BARRETO, 1996), in need of thorough research aimed at their conservation.

METHODOLOGY

The present article is only a small part of a larger research project carried out in the paleodune territories of the São Francisco River at Casa Nova, Bahia. These territories (figure 1) are located in the geographic coordinates (latitude 9°25'18 "S and longitude 41°08'59" W), at the margins of the São Francisco River and at the borders of the Serra do Frade, in the municipality of Casa Nova, State of Bahia, having about 36,170m² of extension. With regard to the vegetational characteristics, and according to the work "Classificação da Vegetação Brasileira Adaptada a um Sistema Universal" by Veloso, Rangel Filho and Lima (1991), the Northeastern Floristic Region, called by them - Steppic Savanna - or Caatinga of the Semi-arid Sertão is subdivided into three vegetational disjunctions, namely: Ombrophilous Dense and Open Forest; Semidecidual and Deciduous Seasonal Forest and; Savanna. In geological terms, the area of the paleodune fields is located in the peripheral depression of the middle São Francisco River, with altitudes varying between 400 and 800 m, where features related to aeolian sedimentation were analyzed for sedimentological and morphological characteristics, post-depositional modifications, and prehistoric paleovoltage patterns (BARRETO, 1996). These paleoecosystems or paleo-territories "are responsible for allowing discoveries and evidence that the climate we have today is the result of other climates existing in past eras, thus allowing the knowledge of paleoclimates and paleoventos" that influenced the formation of various current environments (PACHECO, 2020, p.31). The studies aimed at understanding the morphogenetic and anthropogenic dynamics of these environments are of great importance, given that these areas are presented as reliquiar and, at the same time, very prone to the process of degradation, natural and anthropogenic.



Source: Research data (2020)

Figure 1. Map of the surveyed municipality

Research Typology and Data Collection: This research is of an applied, quali-quantitative, exploratory, bibliographic and field nature, and the choice of the object of study, the research location and the target audience was made by intentionality and accessibility (BARDIN, 2016). For the results reported in this research to have greater credibility, it was based on the dialectical method, widely used in qualitative research because it considers that the facts cannot be considered outside a social context. The recruitment and data collection were performed by applying questionnaires to 315 members of the Fishermen's Colony Z42 in the municipality of Casa Nova. The questionnaires were applied in the period from October 26 to November 19, 2020, respecting the health standards established by the World Health Organization (WHO) due to the pandemic period. All participating subjects signed the Informed Consent Form (ICF) in order to protect the secrecy and confidentiality of the interviewees. Fishermen and riverbank dwellers of legal age living in the paleodune territories on or near the São Francisco River who agreed to participate in the research by signing the informed consent form were included in the research. Minors and those who did not agree to participate were excluded.

The guiding questions listed were as follows

- Are you aware that you live in the Territory of Sertão do São Francisco?
- Are you aware that the territory you inhabit is considered a "paleodune territory"?
- What do you understand by Sustainable Rural Development?
- Do you evaluate that your relationship with nature has been
- Do you understand that this "paleodune territory" should be preserved and/or conserved for present and future generations?

The data collected in the field were analyzed quantitatively and qualitatively. The qualitative analysis was based on Bardin's Content Analysis. The quantitative analysis was done by tabulating the data collected through the application of questionnaires, using the Statistical Program R10, through the technique of descriptive statistics, also known as exploratory, where the construction of tables of absolute and relative frequencies was carried out.

RESULTS AND DISCUSSION

Based on the guiding questions listed above and on the answers obtained from the questionnaire, it was possible to understand what the researched community understands about territory, sustainable development, and conservation of paleoenvironments. Regarding the first question, Table 1 shows that the majority (74%) of the participants have no knowledge that they live in the territory of the Sertão do São Francisco.

Table 1.

1. Are you aware that you live in the Territory of Sertão do São Francisco?	Frequency	Percentage
Yes	78	26,0%
No	222	74,0%
Total	300	100%

Source: Research Data (2020)

The expression "Territory of Sertão do São Francisco" is something much debated in the media, in social movements in the state of Bahia, mainly, and a terminology much closer to the riverside communities, for bringing up the word "São Francisco". However, when asked, the interviewees, as stated above, chose to state that they do not know they live in the TSSF, but that they know they live in the paleodune territory. When asked whether they knew that the territory in which they live is considered a paleodune territory, Table 2 shows that 77% said no, and only 22.3% said yes, making it evident that certainly the majority who declared to be aware that they live in a paleodune territory simply by correlating dunes - paleodunes - paleodune territory, and not because he has this conviction that the territory in which he lives should be considered a paleodune territory, even because such nomenclature is rare in the academic-scientific milieu and, consequently, non-existent in the media.

Table 2.

2. Are you aware that the territory you inhabit is considered a "paleodune territory"?	Frequency	Percentage
Yes	67	22,3%
No	233	77,7%
Total	300	100%

Source: Research Data (2020)

Regarding the participants' understanding of sustainable rural development, table 3 confirms that the majority (62%) does not know what it refers to; 21% understand sustainable development as an approach concerned with the preservation of the environment; 3.67% understand it as subsistence and organic agriculture; 0.33% believe they are practices without the use of external resources, organic production; and the remaining 0.33% chose "none of the alternatives".

Table 3

3. What do you understand by Sustainable Rural Development?	Frequency	Percentage
Without use of external resources, organic production	39	0,33%
Generation of income for the family (profit)	0	0,00%
Approach concerned with the preservation of the environment	63	21,0%
Subsistence and organic agriculture	11	3,67%
Don't know	186	62,0%
N.A.	1	0,33%
Total	300	100%

Source: Research Data (2020)

Tabla 4

4. Do you evaluate that your relationship with nature has been:	Frequency	Percentage
Complex	200	66,7%
Sustainable	21	7,00%
Needs Adjustment	3	1,00%
Unsustainable	39	13,0%
Nothing to declare	36	12,0%
N.A.	1	0,33%
Total	300	100%

Source: Research Data (2020)

The majority of the participants, that is, 66.7% said (according to table 4) that their relationship with nature has been complex; 13% admitted having an unsustainable relationship with nature; 12%

preferred not to state an opinion; 7% said they have a sustainable relationship with the environment; 1% said their relationship with nature needs adjustments; and 0.33% chose not to state anything. However, it is understood that recognizing this complexity and understanding that this relationship needs adjustments is already a big step towards seeking balance in this relationship and transforming it into a more sustainable relationship. Table 5 shows their concept with regard to the conservation of paleoenvironments, and 81.7% said yes, the environments need to be conserved; 16.97% said that conservation is not relevant; and 1.33% chose to say nothing. Among the participants who indicated that they knew the relevance of conservation for the sustenance of their own community, and showed total interest in participating in courses and training, and some even indicated that they had participated at other times in courses/capacity building offered.

Tabla 5.

5. Do you understand that this "paleodune territory" should be preserved and/or conserved for present and future generations?	Frequency	Percentage
Yes	245	81,7%
No	51	16,97%
N.A.	4	1,33%
Total	300	100%

Source: Research Data (2020)

In general, it is possible to state that the relationship established between the researched society and the local nature has been glimpsed and carried out in an unsustainable way, which hinders the process of sustainable development in this region. On the other hand, recognizing that coexistence with nature has not been healthy already signals a perspective of change in habits and attitudes of the subjects participating in the process of living in the territory.

CONCLUSION

The emergence of the human species has inalienable links with natural history, because their survival depended and will continue to be very much subordinated to nature. In this way, the Quaternary also represents the period of intensification of anthropic activities, where transformations are processed in nature on different time scales, and the most recent ones end up covering up the older ones, which, most of the time, require a more accurate study based on technologies, so that they can be understood and proven. Considering the formation process of these paleoenvironments, which were elaborated by the São Francisco River in another moment of geological history and with local characteristics (soil, rainfall, erosive processes, anthropogenic actions, among other factors), totally different from the current conditions, is what justifies the emergence of management plans and conservation of these territories with a view to maintaining this natural heritage and sustainable development. Therefore, the current model of society is based on the sustainable development of the economy and, truly, has not extrapolated the meaning of economic development, which is not tolerating the pressure exerted by the environmental crisis of global scope. It is, therefore, unavoidable to consider sustainability as an emerging and necessary paradigm. Therefore, sustainable development has been providing an opportunity to rethink the established world order, the economy and the way it is currently practiced, the notion of sovereignty, education and the transmission of knowledge, and the way politics is done.

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