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GEODIVERSITY OF PARAHYBA IN THE COLONIAL PERIOD

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ABSTRACT:

The natural landscape of João Pessoa and its surroundings are among the most beautiful in the country, and has a historic centre with buildings that feature among the oldest in the country. Consequently, the privileged nature associated with the important cultural heritage result in the appropriation of this coastal environment with the consequent urban evolution dating from the sixteenth century. The objective of this work is to present the perception of the several writers, who were present in the Captaincy of Parahyba, during the colonial period, on the elements of geodiversity that were primordial for the consolidation and urban expansion of its capital, Nossa Senhora das Neves. In order to achieve this, several historical documents, elaborated by these travellers, during the aforementioned historical period, were used not only to divulge the geodiversity of the Captaincy but also to encourage the communities to rediscover their roots and identity, linked to the physical elements of this space.

KEYWORDS: Geodiversity, João Pessoa, Colonial period, Wwriters.

RESUMO:

GEODIVERSIDADE DA PARAHYBA NO PERÍODO COLONIAL A paisagem natural de João Pessoa e arredores estão entre as mais belas do país, além de possuir um Centro Histórico com edificações entre as mais antigas. Assim, a natureza privilegiada, associada ao patrimônio cultural importante, resulta na apropriação deste ambiente costeiro, com a consequente evolução urbana que data do século XVI. O objetivo deste trabalho é apresentar a percepção que diversos literatos que estiveram na Capitania da Parahyba, durante o período colonial, possuíam acerca dos elementos da geodiversidade que foram primordiais para a consolidação e expansão urbana de sua capital, Nossa Senhora das Neves. Para isto, foi recorrido a uma farta documentação histórica envolvendo relatos, crônicas e correspondências, com o intuito de não apenas divulgar a geodiversidade da Capitania, mas de instigar as comunidades atuais a uma redescoberta de sua identidade e raízes que estão vinculadas aos elementos físicos do espaço.

PALAVRAS-CHAVE: Geodiversidade, João Pessoa, Período colonial, Literatos.

RESUMEN:

GEODIVERSIDADE DE LA PARAHYBA EN EL PERÍODO COLONIAL

Una paisaje natural de João Pessoa y los alrededores están entre más belas del país y posee un Centro Histórico con edificaciones entre las más antiguas del país. Así, la naturaleza privilegiada, asociada al patrimonio cultural importante, resulta en la apropiación de este ambiente costeiro, com la consiguiente evolución urbana que data del siglo XVI. El objetivo de este trabajo es presentar la percepción que diversos literatos que estuvieron en la Capitania de la Parahyba, durante el período colonial, poseían acerca de los elementos de la geodiversidad que han sido primordiales para una consolidación y expansión urbana de su capital, Nossa Senhora das Neves. Para esto, fue recurrido a una abundante documentación histórica elaborados por estos

AUTHOR NOTES

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viajeros durante el referido período histórico, com el proposito de no solo divulgar la geodiversidade de la Capitanía, así como instigar a las comunidades actuales a un redescubrimiento de su identidad y raíces que están vinculadas a los elementos físicos del espacio.

PALABRAS CLAVE: Geodiversidad, João Pessoa, Periodo colonial, Escritores.

INTRODUCTION

The letter from Pero Vaz de Caminha, dated from 1st May 1500, Porto Seguro and sent to His Highness King D. Manoel I, began the description of the natural landscape of the newly discovered territory, after an almost three-month exhausting sea voyage. Considering the interests behind the great maritime navigations, launched by Portugal, Spain and other European powers in search of new colonies, could the land known at the time as Vera Cruz possess the same exploration potential that other territories had? In a context of a mercantilist doctrine, in which the accumulation of metals and a positive trade balance were primordial elements for the capitalist phase in force at the time, always under absolutist intervention, these terras novas (new lands) were enveloped in a veil of mystery that the Lusitanian Crown had no reservations in deciphering. While it maintained the possession of the Estado do Brasil (State of Brazil) for more than three centuries, the management regulation of the colonized territory advocated the exploration of natural resources at all costs, as well as a production system that would increase the public coffers of the Metropolis. It was crucial that the King received, whenever possible, information about the new achamento desta terra (discoveries of this land),¹ resulting from the mapping of its potential.

To this end, some people accompanied the expeditions on the service of the King or the Church, and recorded, through written data (texts and letters), all pertinent information for the Kingdom, from the perspective of “knowing in order to explore”.

From “various social classes and of diversified professional and intellectual formation, they described aspects of Brazil through chronicles, travel accounts, correspondence, memoirs, journals, drawing albums. The body of work they left integrates the so-called travel literature and constitutes a literature of testimonies [...]” (CALDEIRA, 1991, p.17, free translation). It is also relevant to mention the importance of the foreign travellers who were here, whether as invaders, like the French and Dutch, or allies of the Portuguese Crown, like the Spanish at the time of the Iberian Union, or the English, after the “opening of the ports”, in 1808, who also left a legacy of supreme importance for the historical knowledge about a special period in the formation of our territory. In the historical context of colonization, the objective of most of these travellers was to document information that ensured the best possible coverage of this new territory, including, among others, the cultural habits of indigenous peoples and the characteristics of the fauna and flora present, in other words, its biodiversity.

Considering this, the geodiversity, as abiotic diversity, involving geological (rocks, minerals and fossils), geomorphological (relieves and processes), hydro(geo)logical (especially freshwater streams) and pedological elements (SERRANO; RUIZ-FLAÑO, 2009), was also the object of analysis of these writers, since it was the Crown’s foremost interest to explore the rocky substratum of the colony for minerals that would enrich the Kingdom as well as, at a later date, to settle in the recently “discovered” territory. Thus, these writers were valuing, without even knowing it, the geodiversity of the conquered land and spreading it beyond the sea, although these actions went against geo-conservation. That is, their interest was knowledge in order to exploit and not for conservation purposes.

Other travellers during the colonial period had the opportunity to visit the northeast, as well as the Royal Captaincy of Parahyba and its capital, Nossa Senhora das Neves. They produced abundant documentation about the geodiversity of this captaincy, at first restricted to the urban nucleus and the surroundings of the capital, and subsequently, with the increased occupancy inland, towards the sertões (countryside). Analysing from this perspective, the objective of this paper is to describe the results of these documents, especially after

the conquest of the Captaincy of Parahyba, dissociated from the Captaincy of Itamaracá and posteriorly elevated to the status of Royal Captaincy, as well as during the period in which this captaincy was part of the colony's economic context, when it got rid of the control of the Metropolis, in 1822, prioritizing the information obtained within the capital and its surroundings. These accounts will be prioritized, taking into consideration the four elements of geodiversity: geology, geomorphology, water resources (freshwater streams and estuaries, especially the Parahyba River) and soils, with the purpose of recognizing the economic and functional value of the geodiversity.

The sum of these elements, which will be detailed below, associated with the cultural apparatus of that historical period, makes it possible to measure the cultural context of the region. After all, its constructions, human settlements, land and sea use, cultural traditions, among other cultural apparatuses, which later became part of the heritage, are consequences of certain ideal natural conditions, particularly geological and geomorphological, and their processes, for the creation of human labour, which resulted in the urban expansion of João Pessoa.

METHODOLOGY

This study will address aspects of a quantitative nature (MINAYO, 2000), classified as an exploratory research, a type of investigation that allows it to be classified as a case study (GIL, 1991), through detailed bibliographical research about the cultural, economic and functional value of geodiversity, when related to the establishment and the evolution of the municipality. Due to this, it was necessary to resort to the publications of chroniclers, travellers and historians of the colonial period, especially from the sixteenth to the nineteenth centuries, in the form of travel diaries, books and historical documents (provisions, licenses and royal letters) present in several archives and libraries, both in Brazil and Portugal. It should be noted that most of the historical documentation researched in these archives has an eminently administrative nature, containing very little information pertinent to the line of investigation. Thus, a careful evaluation of this documentation was necessary so that the way of 'looking' at geodiversity based on the travellers who visited Nossa Senhora das Neves, currently known as João Pessoa, could fill this gap and become relevant to

In order to reach the results proposed for this research, a number of strict scientific methodological criteria were followed in order to understand the reality, its problems and specificities; the conclusions proposed also act as suggestions.

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ASSOCIATING GEODIVERSITY WITH THE HISTORY OF THE CAPTAINCY OF PARAHYBA

Originally part of the old Captaincy of Itamaracá, the consolidation of the Captaincy of Parahyba coincides with the construction project of the city of Nossa Senhora das Neves, in the year 1585, arising from the need for territorial occupation of the right bank of the lower course of the Paraíba River (native denomination of Tupi-Guarani origin, with *pa'ra*, meaning “river” and *iba*, meaning “bad, impracticable”), from the decade of 1530, and also due to the innumerable incursions, ordered by the colonial administration, against the Potiguaras who settled in the region that presently corresponds to the border between Parahyba and Rio Grande do Norte (ALMEIDA, 1978). The region, occupied since 1534, was the scene of great indigenous resistance and French incursions. The unexpected deaths of the first two Captains-Majors, together with difficulties controlling the natives and repelling invaders made its effective occupation difficult. This occupation only took place when João Tavares reached an agreement with the Tabajaras, who accepted the Portuguese settlement and joined them in the fight against other native tribes and the French. We reaffirm that the geographical location of the city was of extreme importance (PEREIRA; AMARAL, 2014).

Additionally, the city became the capital of a royal Captaincy that was directly subordinated to the King of Portugal and resulted from a new distribution of the territory. This measure was linked to the need to preserve the possession of the colony, since its coastline was threatened (ALMEIDA, 1978). A similar decision was taken regarding the Captaincy of São Vicente, which integrated the present location of the city of Rio de Janeiro, also threatened at the time by native resistance and French incursions.

The experience of occupation and exploration of sugarcane in the Captaincy of Pernambuco allowed both the transfer of production methods and the occupation of spaces, notably by settlements that used wood as a raw material (palisades and houses) and constructions made of wattle and daub, clay and plaited wood. The first consideration that concerns the geographical position of the city. Since it is a historical period marked by Portuguese colonization, two aspects must be taken into account on this point: 1) the strategic concern with the defence of the territory; 2) the construction of the city occurs during the period of the Iberian Union, at which time Portuguese practices were influenced by Spanish culture and forms of administration (PEREIRA; AMARAL, 2014). These two factors allow us to understand the choice of the site where the city was built and the shape of its urban layout. The city's position was determined by factors such as the threat of French invasion and the need to guard against indigenous groups that resisted contact. Portuguese colonial cities mimicked the building patterns existing in Portugal since the thirteenth century, which means that they had a two-part layout comprised of a lower city (downtown) and an upper city (uptown), whose division mirrored the political-economic activities of the period: the lower city was destined for commercial activities while the upper city functioned as the administrative centre (TEIXEIRA; VALLA, 1999). Thus, the geographic positioning was the result of a plan. Located on the plain between the Atlantic Ocean and the Parahyba River, on the banks of the Sanhauá River, was the lower city, where the products destined for the overseas market were shipped; the administrative centre was built on the closest elevation to the river, from where a full view (and therefore control) of the outskirts of the city was possible.

At the top of the hill, full of leafy trees from the Atlantic Forest, 18 km inland in relation to the mouth of the Parahyba River, was the beginning of the urbanization of Nossa Senhora das Neves. Its precursory street was the Ladeira de São Francisco (slope of Saint Francis), which connected the fort, in Varadouro, to the first church built, the Main Church of Nossa Senhora das Neves, which was in fact a chapel. Transversal to the slope, in front of the chapel, houses of stone and lime marked the beginning of the second street, named Rua Nova (New Street), and currently called General Osório. They all overlooked the fluvial terrace of the Parahyba River. Sugarcane plantations spread in this fertile soil, stimulating the economy of this small town, which at the end of the sixteenth century had no more than 1000 inhabitants (MACHADO, 1977).

From the aforementioned reports, it is possible to understand the role of the elements of geodiversity in the consolidation and expansion of the primitive nucleus of Nossa Senhora das Neves. For this research, we

consider the definition of geodiversity proposed by Serrano and Ruiz-Flaño (2007, page 144), which consists in the

variability of abiotic nature, including lithological, tectonic, geomorphological, soil, hydrological, topographical elements and physical processes on the land surface and the in the seas and oceans, together with systems generated by natural, endogenous, exogenous and human processes, which cover the diversity of particles, elements and places.

For Serrano and Ruiz Flaño (2009), geodiversity is not a complement to biodiversity, but an individual part of natural diversity, which cannot be separated from it. The fact that it is individualized gives it a geographical character, where scale has a fundamental role (local, district, regional, continental or planetary), forming a hierarchical network that goes from the particle to the gigantic landscapes that shelter natural and cultural elements.

In addition, the authors consider the importance of geological and historical time in the natural (geological, geomorphological and hydrological) and anthropic processes that cause changes and variations in the Earth's dynamics and elements. Thus, the amplitude of elements, systems and processes involved is widened, which also shows the elements correspondingly belonging to biodiversity.

In this way, rocks (with their minerals, ores, fossils and structures, such as gaps, faults and joints), soils, water resources (superficial or subsurface, fresh or salt water) and the relief (forms and deposits) will be considered as elements of geodiversity. This paper will attempt to perceive the point of view that the writers of the colonial period held about these elements and their role in the urban expansion of the city.

WRITERS' ACCOUNTS REGARDING ELEMENTS OF GEODIVERSITY

The conquest of Parahyba was a result of the Portuguese Crown's increased intentions to expand northwards, with the Captaincy of Parahyba, as previously mentioned, playing a fundamental role. Meanwhile, before their conquest, for about thirty years, expeditions had moored on the colony's eastern and southern coasts, essentially exploring the pau de tinta (ink wood) and creating the first cycle of this pre-colonial era, the Pau Brasil (brazilwood) Cycle (MACHADO, 1977; SALVADOR, 2010).

These expeditions back and forth to the colonial territory and to other Lusitanian colonies scattered around the world, formed hypothetical candidates to become Captains-Major of the lands the King started to donate, from 1531. These lands were called "hereditary captaincies". From this moment, an effective colonization began, with the captaincies of the northeast, especially Pernambuco and Itamaracá, entering the agenda of the discussions regarding the colonial economic structure.

Therefore, the elements of the geography of the coastline of Parahyba, as well as its biodiversity, began to be documented by dozens of other travellers (MACHADO, 1977). In this case, the accounts of the elements of biodiversity (fauna and flora), quantitatively exceed those of the abiotic environment.

Shortly after the "handshake" that sealed the peace agreement between the Tabajara Indians and the Portuguese, which symbolized, according to historians, the conquest of the Parahyba Captaincy (MACHADO, 1977) at the foot of the rift of the Sanhauá, separating the upper city from the lower city, the local leaders began the reconnaissance of the surrounding landscape, in order to assess the real possibilities of establishing a human settlement and future urban expansion. After all, the reconnaissance of the site that would become the location of the seat of the Royal Captaincy was necessary, considering that the instructions given to Captain João Tavares were part of the Ordinances of the Kingdom. All the cities founded within the colony followed a pattern that took into consideration some conditions pertaining to geodiversity, such as the salubriousness of the site, land, ease of accessibility and communication, proximity to rivers, an upwind sheltered harbour, among others, in addition to the procedures of the land division, the hierarchical organization of administration, and others (TEIXEIRA; VALLA, 1999). Consequently, Martim Leitão, leader of the armadas that attained the conquest, as will be seen below, travelled around the area, from the

Jaguaribe Stream to Cabo Branco, returning with the confidence that the place previously chosen was the best place, since it had limestone outcrops that could supply stone for stonework and lime, an upwind sheltered harbour, fresh water, gushing from the rocks, and an elevation that made it possible to overlook much of the fluvial plain located at the base of the site. At a distance of six leagues from the coast, at that moment unguarded by any defensive systems, the only fort built at that time, the Fort of São Filipe e São Tiago, had been abandoned (MACHADO, 1977). Considering that these elements of geodiversity were responsible for the site's successful urban expansion and its role in the local and regional economy, an analysis will be made regarding how these elements were described and recorded in the various specific documents throughout the historical colonial timeline.

Concerning the lithology present in the study area, from the analysis of the historical documents exchanged between the Captaincy and the Crown, it is possible to observe that they practically did not mention the geodiversity, since they were basically administrative in nature, even if it was an important geo-resource used in the construction of the flourishing urban nucleus. In an unclear sequence, the historical heritage of the city began to rise. After the Main Church, the Convent of São Francisco (St. Francis), at the top of the hill that had the same name, the Monastery of São Bento (St. Benedict) and the Convent of Nossa Senhora do Carmo (Our Lady of Carmo, both unfinished during the first decades of the seventeenth century), the Church of Misericórdia (Mercy) and the Chapel of São Gonçalo punctuated the top of the hill, defining the city's outer limits (MACHADO, 1977; ALMEIDA, 1978). The material used in the construction of these first historical landmarks was taken from the local landscape, from which were extracted the various components that corresponded to the different periods and varied intentions that determined the works.

The mapping of this architectural heritage in the Historical Centre, together with the meagre documentation, allow us to infer that during the colonial period only limestone was used as raw material. Key reports on this subject are present in the works entitled *Summario* and *Orbe Seráfica*, which will be detailed below.

The French harassment of the northern coast of the Captaincy of Itamaracá, combined with the Potiguares, on the outskirts of the Parahyba River "alluvium", who were becoming more and more daring, compelled the general Ombudsman Martim Leitão, authorized by the King D. Sebastian, to organize and even participate in some expeditions to conquer the captaincy's northern strip of land, after the foundation of the Royal Captaincy of Parahyba, whose date remains controversial. Between 1574 and 1585, four expeditions tried to conquer these lands but only the fifth was successful. All these expeditions were narrated in the work *Summario das armadas que se fizeram, e guerras que se deram na conquista do rio Parayba; escripto e feito por mandado do muito reverendo padre em Christo, o padre Christovam de Gouveia, visitador da Companhia de Jesus, de toda a provincia do Brasil*, or, in a simplified form, *Summary of the Armies*, whose authorship and publication date remain the subject of discussion and investigation, although the Parahyba historiography advocates the name(s) of the priests Jerônimo Machado and/or Simão Travassos, of the Society of Jesus, who participated in the expeditions of February and October of 1585, the latter being made after the conquest and both with the participation of Martim Leitão. The work, the first specifically associated with the Royal Captaincy of Parahyba, is divided into 24 chapters and covers a timeline between 1574, the year of the first expedition, and the beginning of 1587, after Parahyba was conquered and at the beginning of the city of Nossa Senhora das Neves.

According to Almeida (1978), the original manuscript remained unknown until mid-1848 or 1849, when it was published, in chapters, by Rio de Janeiro's literary newspaper *Íris* and, later in 1873, in volume 36, part 1 of the *Revista do Instituto Histórico Brasileiro* (Magazine of the Brazilian Historical Institute). In 1983, using the prints from the newspaper *Iris*, the first version of the book, consulted for the purpose of this work, was published in Parahyba. It is a work of priceless historical value since its author considers himself a "witness of the events", presenting details not only about the conflicts inherent in the Portuguese/Native/

French relationship in that historical context but also about the natural landscape that surrounded it. In this perspective, the abiotic environment, especially the water resources, the relief, the soil and the rocks are some of the elements of the landscape that were inserted with thorough detail into the accounts of the Summario and that will be divulged herein from this perspective.

The chapter 15 of this book, entitled “A segunda jornada do Ouvidor- Geral e como se fez o forte” (The second day of the General Ombudsman and how the fort was made), is emblematic, since it refers to the long-awaited conquest of the Royal Captaincy of Parahyba and the preparation of the site for the establishment of its headquarters, Nossa Senhora das Neves. Accordingly, the chronicler’s attention turns once again to the elements of geodiversity, especially the geomorphology and the rocks, which comprise the substrate of the future urban site, without forgetting the qualities of the Sanhauá River, nowadays an affluent of the Parahyba. From this perspective, the author is emphatic in describing the physical characteristics of the surroundings and the site itself, stating that “sobre o porto onde agora está a cidade, planície de mais de meia legoa, muito chá de todas as partes cercada de água. [...] a natureza ali pos com maravilhosa arte e muita pedra de cal, onde logo mandou fazer hum forno della e tirar pedra um pouco mais asima” SUMMARIO, 1848, pp. 66).

In addition, the fort’s construction activities were systematically planned, with geodiversity contributing, in a useful and functional way, to the urban development and building of monuments, with the use of rocks from this substrate. It is important to point out that the limestone outcrop was located in the highest portion of the terrain, where the upper city was posteriorly formed. This outcrop did not resist the anthropic action.

All the historical heritage built in the colonial period basically used limestone as the building material. The author tells us that he “e partia huns na cal outros no mato com os carpinteiros, outros nas pedreiras e com os serradores, barro e taipas, porque os alicerces e cunhais só o heram de pedra e cal ...” (SUMMARIO, 1848, pp. 66).

To help clarify the geo-resources used in the construction of Saint Anthony’s Convent, as well as their origin, the most relevant work is the *Novo Orbe Seráfico Brasílico* (New Brazilian Seraphic Orb) or *Crônica dos Frades Menores da Província do Brasil* (Chronicle of the Minor Friars of the Province of Brazil), written by Friar Antonio de Santa Maria Jaboatam in the eighteenth century and printed in Lisbon in 1761. It is a work of priceless artistic and religious value as it is the record of the Franciscans’ participation in the conquest and settlement of the colonial territory. Although much of the information, especially of an historical nature, was specifically about the Franciscan buildings scattered throughout Brazil, the work presents very valuable information.

The work was initially published in Brazil by the Instituto Histórico e Geográfico Brasileiro (Historical and Geographical Institute of Brazil), in 1858, and its First Part was divided into two volumes. Subsequently, a second edition, entitled Part Two circulated and it was divided into three volumes, published in 1859, 1861 and 1862 respectively. Each volume was divided into numerous books that in turn were divided into chapters. Both parts overlap and complement each other, referring to the foundation of several convents scattered throughout the country, such as Santa Clara do Desterro, in Bahia; São Francisco, in the town of Serinhaém; Santo Antônio (Saint Anthony), in Recife, Ipojuca and Rio de Janeiro, among others. Meanwhile, the First Part, Volume I, ‘Stanza XI’ is dedicated to the history of the conquest and settlement of the Captaincy of Parahyba, while chapters IX to XIV, of Volume II, Book III, Second Part refer both to the details of the construction of Saint Anthony’s Convent and issues involving geo-politics, the work of religious orders, the economy, the Third Order, among others.

The land where the Saint Anthony’s Convent was built is described highlighting elements of geodiversity, such as the presence of fresh water springs and limestone outcrops. About the freshwater streams that originated the St. Anthony’s Fountain, friar Jaboatam wrote that “já pegado pela bayxa, aos Mangaes do rio, corre o muro, e cerca do convento [...]. Tem dentro uha fonte nativa, de boa, e salutifera agoa, a qual brota das entranhas duras de uha pederneyra, e esta com o tempo se tem averiguado ter principio nas bayxas, e beiras deste rio Paraiba” (JABOATÃO, 1861, p. 357).

To help to clarify the origin of the rocks that served as raw material for most of the buildings that are part of the current Historic Centre of João Pessoa, the accounts mentioned by the friar were of priceless geological value, especially considering that there was practically no documentation addressing such matters in that period. The friar reports the presence of a vast limestone outcrop inside the St. Anthony's Convent and briefly mentions, with the help of an "art master", the textural characteristics of the rock needed for its use, stating that

nesta da cerca do Convento se tirou, e se tira, ainda que já hoje com algum trabalho desmontar a terra pelos seus altos, toda a pedra, assim de cantaria, como a mais, que He necessária a qualquer obra, ou edificio. Consta de vários bancos, como explicão os mestres de arte. Do primeyro, que se cobria ao princípio, e pelas bayxas de poucas terras, e em muitas partes descuberto, se tira a perda e tosca, e dura de alvenaria, do segundo, outra menos áspera, mas forte, de que se faz perfeita e forte cal, do terceyro cabeços para fortalecer as paredes, e do quarto a que serve para se lavrarem portaes, e outras semelhantes peças, não tão dura, e áspera, como as primeiras, mas muito mais alva, solida e Liza, da qual se fazem perfeitas lavrages (JABOATÃO, 1861, p. 367).

The property built in the colonial period, according to the aforementioned accounts, had as lithic material limestone from the Gramame Formation, which is a sedimentary sequence belonging to the geological substrate of the municipality. For example, despite the numerous restorations that the Church of the "Santa Casa" (Holy House) underwent, archaeological research indicates the presence of limestone in all phases of the ground plan's evolution.² The Gramame Formation corresponds to the first maritime carbonate unit of the Parahyba Basin, of Maastrichtian age (72.1-66 m.a.), when the sea covered the ramp that characterizes the Basin, in a high sea system, representing the peak of maritime transgression in a period of tectonic calmness (BARBOSA, 2007).

Historical records mention the presence of limestone quarries and outcrops at the top of the hill between the Main Church and the Convent of St. Francis, in the middle of the seventeenth century, according to Schmalz (1966). The author presents the figure of the first vicar of the Main Church of Nossa Senhora das Neves, named João Vaz Salem dos Santos, arriving in the city one year after its founding. He was a controversial figure because, among his many activities and possessions, he was the discoverer of a quarry behind the Main Church, near the site of St. Francis' Convent. This quarry was probably located in the old Caminho das Pedreiras (Path of the Quarries), mentioned in the copies of the sesmarias published by Lira Tavares, in 1712. Through this path it was possible to arrive at the modern Gouveia da Nobrega, in the Baixo Roger, which goes behind St. Francis' Convent (RODRIGUEZ, 1962). Curiously, the aforementioned priest formerly owned the land where the Benedictine Convent and part of its property were located and which was subsequently confiscated by the Crown (PINTO, 1977, page 31).

These accounts are essential as historical geological documentation, since these outcrops were buried by anthropic action and by the high density of urbanization to which the area was exposed.

It is important to note the detailed description of the limestone facies, which are herein called "banks", separated into four, from a sandy limestone on top, considered rough and hard, followed by a less sandy one, in other words, coarse, perfect for making lime, a third used on the walls, culminating, at the base, with a solid, compact and smooth limestone which is perfect for masonry works. This account allows us to deduce that there was a differentiation between what was used in the construction according to the limestone facies present in the outcrop.

It is known that historically created architectural complexes can take centuries before their edification is complete. This observation leads to the inference that various artistic styles, political interests and cultural shifts influenced their final appearance, just as the human and natural resources employed changed according to the behavioural modifications, the acquisition of new techniques / technologies and new intentions. The historical documentation analysed in this work shows that, at first, the residences of Nossa Senhora das Neves basically used taipa (lath - local wood mixed with clay),³ and that, soon after, constructions using limestone began to appear. Some details of the city, especially those contained in the accounts of Barleus and Nieuhof,

allies of Maurice of Nassau, contrast, curiously, with the classic urban descriptions formerly contained in documents.

Maurice of Nassau, as governor of Brazil during the Dutch invasion in the northeast, was responsible for the first scientific and artistic expedition to the north-eastern lands; his entourage included the participation of doctors, astronomers, cartographers, naturalists, and architects. Gaspar Barleus and Johan Nieuhof, while not participating in this entourage, were responsible for the elaboration of two important historical accounts of the north-eastern coast dominated by the Dutch.

The humanist Gaspar Barleus, at the request of Count Nassau, published, in 1647, the work *Rerum per octennium in Brasilia et alibi nuper gestarum, sub praefectura illustrissimi comitis. I. Mauritii Nassoviae, etc... Amstelodami*, translated into Portuguese by Claudio Brandão, in 1940, with the title *História dos feitos praticados no Brasil, durante oito anos, sob o governo do Ilustríssimo Conde João Maurício de Nassau, etc., ex-governador e capitão geral de terra e mar ali e ora tenente-general da cavalaria das províncias-unidas da Holanda, sob o Príncipe de Orange* (MORAES; BERRIEN, 1998). This work is the result of the inventory carried out by Nassau's entourage, especially the works of the physician and naturalist Guilherme Piso and the German naturalist George Marcgrave, illustrated by the painter Frans Post, as a record of the years of Nassau's administration (GALINDO; LODEWIJK, 2001).

Barleus' work was uninterrupted, without subdivisions. In the majority of his work, he praises the achievements of Nassau's government, portraying the geo-political moment experienced by Brazil through information that includes history, economics, anthropology and demography, as well as some geodiversity elements, which were common to the writers of the time, such as the potential of the soils, the water resources, and the geo-resources associated with the monuments, among others. At one point, the author reports on Frederica, presently João Pessoa, stating that "the city itself contains some beautiful buildings, made of stone, whose corners and windows are of white marble, while the rest of the walls are of masonry" (BARLEUS, 1942, p. 93, free translation).

Regarding the geo-resources used in the city, together with its contemporary Nieuhof, mentioned below, this is the only historical source that refers to the presence of marble in some of the city buildings, which leads to the question as to whether the information that the author received may not have been the result of confusing limestone with white European marble.

Historian Johan Nieuhof lived in the northeast between 1640 and 1649, learned Portuguese and became the historian of the events that succeeded Nassau, preceding the popular revolt that resulted in the expulsion of the Dutch. The result of his research was a work, published in the Netherlands in 1682, entitled *Gedenkweerdige Brasiliaense Zeem Lantreize*, translated from an English edition into Portuguese, without a specific date,⁴ by the Biblioteca Histórica Brasileira (Brazilian Historical Library), in 1942, with the title *Memorável Viagem Marítima e Terrestre ao Brasil* (Memorable Maritime and Terrestrial Travel to Brazil). Very faithful to historical events, Nieuhof also described the physical aspects of the captaincies between the São Francisco River and Maranhão, beginning with an account of the voyage to Brazil and the geographic information about the destination, regarding extension, location and from a morphologic and historic point of view.

At one point in the account, the captaincies under the management of the West India Company are described in historical, economic, demographic and natural terms. Concerning the city of Frederica, the author reports that "it was of recent construction and boasted several imposing buildings with marble columns, with the remainder of the construction made of ordinary stone", as Barleus had described.

Another element of geodiversity that was primordial for the success of the urban consolidation and expansion was the terrain chosen for the colonizer's settlement, an element emphasized in many reports of the time, among them the accounts of the aforementioned humanist Barleus and the work entitled *Livro que dá Razão do Estado do Brasil* (Book that gives the Reason of the State of Brazil).

Barleus mentions the geomorphological structure on which the city stands upon, with the lower part associated with the river valley and the higher part, whose lands extend towards the coast, smoothly rounded, intersected by hills and valleys, since “the regions near the river are flat; the furthest, intersected by mountains and valleys, are remarkable for their complete amenity” (BARLEUS, 1942, p. 93).

After a second regiment was sent by King Phillippe II of Portugal, on 31st August 1612, to Gaspar de Sousa, the governor-general of Brazil at that time, the sergeant-general Diogo de Campos Moreno conducted, between 1612 and 1613, an impressive cartographic survey of all Brazilian captaincies under the administration of D. Diogo de Menezes (1608 to 1612), presenting statistical, economic, military and geographic data (MOURA FILHA, 2003),⁵ interspersed with details of its geodiversity, contributing to the recognition of the occupation, settlement, defence and economy of the territory, under the context of the Iberian Union. From this survey result the following works: *Relação das praças fortes e coisas de importância que Sua Majestade tem na costa do Brasil* (Relation of the strong places and things of importance that His Majesty has in the coast of Brazil), of 1609, and *O livro que dá razão do Estado do Brasil*, published in 1616, whose cartographic representation was the responsibility of the cosmographer João Teixeira Albernaz, the Older, who did not participate in the expeditions and inserted the maps afterwards. The maps in this book were written on parchment, painted in watercolour, with dimensions of 0.566 m by 0.400 m (PINTO, 1977). According to Almeida (1978, pp. 163-164, free translation), Varnhagen published scattered extracts from this book, and the full edition was published “by the Public Archive of the State of Pernambuco, with introduction and notes written by Hélio Viana.”

On describing the city of Filipéia de Nossa Senhora das Neves, the name given to João Pessoa during the Iberian Union, he refers to the urban site, which “está situado em hua llanura [planície], q se faz em alto desabafada, viltosa e de bons ares, e agoas com sua fonte particular, q a sua agoa é remedio notavel contra o mal da pedra [...]”⁶ (LIVRO, 1968, p. 72). He covers the demographic composition, with eighty white neighbours, and the architecture of the city, with “tres mosteiros e hum delles de aspecto mui sumptuoso com outros edificios nobres e pedra e cal, q quada dia se aumentão”⁷ (LIVRO, 1968, p. 72). At the end, he highly praised the Captaincy, as it “será este hum dos mais favorecidos povos particulares de toda a costa”, even more so if there were a union with Itamaracá, foretelling what would happen 150 years later, with the annexation of Parahyba by Pernambuco. It ends with the concern of fortifying the city, which would bring good profits to the King, resulting from the exploration of brazilwood and taking into account that the city was a Royal Captaincy and not a donation (LIVRO, 1968, p. 72).

There is no unanimity in the evaluation of the water quality that supplied the population in the mid-seventeenth and eighteenth centuries, despite Moreno’s accounts, as seen in the underlined portion of the previous paragraph, which described the presence of good quality freshwater sources scattered throughout the city.

The Tambiá fountain, one of the most important in the city, for example, was criticized by the Ombudsman of the “Fazenda Real da Paraíba”, Jorge Salter de Mendonça, according to a letter addressed to King João V, dated 1736, in which he stated that

se necessita uma fonte chamada do Tambiá que há nos arrabaldes desta cidade e sem a qual se nam pode passar por se estar bebendo de hum xarco exposto as imundícias de que nem pode deixar de resultar prejuízo aos seus moradores que nam duvido com corram também com os seus escravos pella utilidade que se lhes segue.⁸

In addition, on the eve of the conquest of Parahyba, the author of the *Summario* also emphasizes the difficulties in finding good quality water, specifically on the left bank of the Parahyba River.

The closing sentence of the first chapter of this book is “me paçarei atratar das armadas que para a conquista se fizerão e guerras que nella houve”, predicting what would be reported in chapters 2 to 15, regarding all the events related to the expeditions that culminated in the conquest of the Royal Captaincy of Parahyba. Meanwhile, interspersed with the existing outcomes, the author points out data on geodiversity, such as water

supply difficulties, considered in various locations as of poor quality, for example in the third chapter, entitled *Como Frutuoso Barbosa foi encarregado da Parahiba* (How Frutuoso Barbosa was in charge of Parahiba), during the second expedition, dating from 1582, which described the difficulties of settling on the south bank of the Parahyba River, “por ser mau sítio e não ter água” (SUMMARIO, 1848, p. 37). The water that existed was extracted from small *cacimbas* (water holes) on the beach. Once the Old Fort was founded, during the third expedition, in 1584, on the left bank of the river, in front of Restinga Island, there were more reports of the terrible quality of the freshwater on this bank, belonging to chapter four, denominated *Como chegando Diogo Flores a Bahia de ordenou vir ao Parahiba* (How Diogo Flores, when arriving at Bahia, was ordered to come to Parahiba; SUMMARIO, 1848, p. 43).

Thinking about the water resources, especially the details of the Parahyba River estuary, with its fertile terraces where sugarcane plantations abounded, flowing into an ocean where reefs formed a natural obstacle with the presence of sandbanks, ended up inspiring most of the existing accounts of the colonial period, such as those that will be analysed below.

The work *Summario*, in its first chapter called *Ideia particular destas partes e geral do Brasil* (Particular and general idea of these parts of Brazil), can be subdivided into three parts: in a first part, the author describes the geological and geomorphological elements of the Parahyba River estuary where, according to the author, the river runs “até a ponta de Cabedelo que he já dentro” (SUMMARIO, 1848, p.25), this point being an extensive peninsula that separates the Parahyba River from the Atlantic Ocean, corresponding to a Holocene maritime terrace, formed in the last maritime transgression, which occurred 5,100 years AP (SUGUIO; BITTENCOURT et al., 1979). It records the width of the river bar, the presence of sandbanks that surface at low tides, Restinga Island, the possibility of good draft for large vessels, always in comparison with the ports of Itamaracá and Pernambuco, and mentions the presence of reefs tangential to the coast. These reefs are of the rocky type, “beach rocks”, which extend for up to 8500 meters, and are characterized for being consolidated deposits resulting from the calcite lithification of sediments in the intertidal zone, typical of tropical, warm and photic coasts (TURNER, 2005), according to Suguio (1998). These reefs are formed by sandstones and conglomerates, cemented with calcite, containing fragmented or whole mollusc shells. Since the top of these reefs may rise above the present average sea level, and considering these rocks were dated between 4830 to 6200 years AP (DOMINGUEZ et al., 1990), it is possible to infer that there was a decrease in the sea level in the second half of the Holocene, which made it possible for the author of the *Summario* to see the top of these reefs, even about 1300 meters from the coastline. This decrease may be related to the beginning of the Little Ice Age, which dates from this time, extending into the mid-nineteenth century.

The second and third parts of the *Summario* are intertwined, they present similarities in content, since they refer to the habits of the Potiguares clan, exalting their warlike personality, at the same time as referring favourably to the functionality of the geodiversity, especially of the soil and geomorphology of the fluvial plain. They emphasize the quality of the floodplains, providing a flooded soil in the proper measure for the abundance of dense mangrove vegetation and brazilwood that the author considers “as matas das arvores são muito maiores e muito mais altas e grapas” (SUMMARIO, 1848, p. 26), and “ter mais pau brasil que Pernambuco he muito melhor porque quanto mais para o norte tanto melhor [...] O pau desta Capitania he o mais e o melhor [...] mais de lei que todas as outras [...]” (SUMMARIO, 1848, p. 26- 31), as well as all types of food, such as manioc “tão grossa como grandes nabos maz com raízes compridas com muitas pernas e tenras” (SUMMARIO, 1848, p. 27), and its derivative the “beiju, que são redondos como mangueas, [...] pouco mais grossos que hóstias he muito bom comer” (SUMMARIO, 1848, p. 27) and the potential for sugarcane cultivation in the portion of the Cabedelo peninsula, whose floodplain is “toda retalhada de esteiros e rios caudais de água doce que podem dar mais de quarenta engenhos de açúcar por toda a terra [...] por ser Rio morto e pelo menos no inverno todo navegável” (SUMMARIO, 1848, p. 26). In this subtext, it is possible to identify the author’s perception of the functional value of geodiversity, since the terrain’s morphology is favourable to the formation of alluvial soils that represent the last sedimentary package deposited in the

area, in the form of fluvial channel alluvial deposits. Clays, gravel, and a lot of decomposed organic matter were deposited in the Quaternary, acting as a habitat for the biomes described in the Summario, such as the Atlantic forest, its brazilwood and the coastal formations, in this case, the mangroves. All this coastal and river environmental system being considered was the result of an interaction between the atmosphere, whose meteorological variations generated a tropical coastal climate with rainfall concentrated in the winter; the biosphere and the biotic environment, in this case, particularly the flora; the lithosphere, represented by alluvial deposits and; the hydrosphere, through the singularity of an estuary richly described by the author, where the fresh water from the river was harmoniously mixed with the sea's salt water during high tides. The natives of the area knew how to take advantage of what this auspicious environment provided, as the author well explains in this first chapter.

The landscape of the Parahyba River estuary was also described by the Portuguese Diogo de Campos Moreno. Initially, considering the Parahyba River estuary while emphasizing its military aspect, the author refers to the Fort of Cabedelo, where

está o forte, q dizem do Cabedello, fundado sobre área de taipons e entulhos de lamarão, entre grossas vigas de pau ferro com hua estacada no modo que se vê na sua pranta. E é todo hoje até os parapeitos cuberto de telha, e fica como hua casa forte defendida no modo melhor, q dá lugar ao sitio (LIVRO, 1968, fl 71).

This fort was one of the most important historical and architectural monuments in the area, as a result of the historical valuation of the Holocene maritime terrace, near the Parahyba River estuary, whose site was strategically selected as a defensive point since it offered an excellent overview over the lower course of the river, its valley and a panoramic view of the ocean in front of it.

Meanwhile, the breaking of the waves on the walls resulted in natural wear, which caused concern in the Captaincy, according to letters exchanged with the King. One of the answers to these letters, dated from 1709, referred to the situation in the fort, where the King emphasized that

haveis um defeito no princípio cujo remédio haverá ser custoso, mas preciso por se evitar o perigo da ruína que lhe consideraria com o bater do mar na muralha que lhe podia começar pelo alicerce não ser feito sobre grade para o que e para o mais que faltava fazerse necessitarmos de Engenheiro diante e de que as consignaões se cobrem.⁹

In another letter between the governor of Parahyba, Colonel Luis Antonio de Lemos de Brito and King D. José I, in 1755, the problem persisted because “hé certo que a Fortaleza do Cabedello não foi feita para ter fosso aquático porque foi fabricada muito distante do mar; porém, com a continuação dos annos estenderão as agoas aos seus limites e comerão de sorte a terra, que vem hoje bater lhe na muralha, na maré cheya ou em agoas vivas”.¹⁰

At the end of Dutch rule in Parahyba (1634 to 1654), their main legacy regarded the written and iconographic records of this period, with a precision of detail whose interests ranged from gathering information about the situation of the plantations to the mere description of the characteristics of Frederica and its surroundings. In this context, besides the aforementioned Johan Nieuhof and Gaspar Barleus, the records left by Elias Herckmans, deserve to be highlighted.

Elias Herckmans was appointed third director of the Royal Captaincy of Parahyba, between 1636 and 1639. During this time, he elaborated a detailed report on various aspects of the Captaincy of Parahyba, such as the physical characteristics of its main basins, Frederica's urban aspects and the daily habits of the Tapuias Indians, inhabitants of the interior of the Captaincy. This report, written in 1639, was only printed in 1879, in the “Chronicle of the Institute of Utrecht”, in the Netherlands, and made known in Brazil by the historian from Pernambuco, Jose Higino, in 1887, when it was published with the title “Descrição Geral da Capitania da Parahyba” (General Description of the Captaincy of Parahyba), in the magazine of the Archaeological Institute of Pernambuco, volume 5, number 31, pages 239 to 288. Meanwhile, in Parahyba, this book was only published in 1911, in the “Almanaque do Estado da Paraíba” (Almanac of the State of Parahyba; (HERCKMANS, 1982), from which this text was extracted.

Divided into three parts, in the first and denser, without a title, the author initially made a complete survey of the basin of the Parahyba River, through its mouth and tributaries, advancing further into the city of Frederica and, later, moving upstream, describing the countless mills associated with the river terraces. By stating that “Em águas, ares e fertilidade é esta a Capitania uma das regiões mais saudáveis do Brasil” (HERCKMANS, 1982, p. 9), the author anticipated the praise of the natural aspects of the Captaincy that permeated throughout the account, as well as stating that “fora do Varadouro, subindo o rio durante os Barreiros, que quer dizer sítio onde há muito barro, e aí se costuma cozer muitos vasos e telhas para as cobertas das casas” (HERCKMANS, 1982, p. 17).

At the end of this edition, in notes developed by Odilon Coutinho (HERCKMANS, 1982), there is the account that Barreiros, until 1944, was the name of the municipality adjoining João Pessoa. This was altered at that time to Bayeux. The presence of extensive clay reserves favored to the development of a processing industry in the vicinity, also in Santa Rita, and of potteries, generating large quantities of bricks and tiles.

The Parahyba River estuary was also analysed by Nieuhof, who reported the presence of an extensive range of reefs, from the mouth of the Parahyba River to Cabo Branco, as well as some elements of the estuary, such as sand banks and islands, emphasizing the quality of the soils of its floodplains for the cultivation of sugar, barley, potato, coconut, and melon, among other products (NIEUHOF, 1942).

Another important reference on the physical aspects of Brazil and Parahyba, in the early seventeenth century, was the work “Diálogo das Grandezas do Brasil” (Dialogue Concerning the Treasures of Brazil), of unknown authorship and probably written in 1618. Initially discovered by the historian Varnhagen, it was first published, in sparse chapters, in the “Revista do Instituto Arqueológico e Geográfico Pernambucano” (Magazine of the Pernambuco Archaeological and Geographic Institute) between the years of 1883 and 1887. The complete book was first published in 1930, by the Brazilian Academy of Letters, with an introduction by Capistrano de Abreu and interpretative notes by Rodolfo Garcia (ALMEIDA, 1978).

Most of the Parahyba historiography acknowledges Ambrósio Fernandes Brandão as the author of the work, although there is no unanimity about this. In the signed Introduction, in the first Brazilian edition, by Capistrano de Abreu, Parahyba is said to be the place where the texts were composed (BRANDÃO, 1977). In favour of the Portuguese Ambrósio Brandão is the fact that he lived in Brazil for 25 years, mostly in Pernambuco, and, after participating in several armadas to conquer Parahyba, he moved to Nossa Senhora das Neves, where he acquired two mills.

The dialogues alluded to in the text occur between Brandônio, “um português residente no Brasil desde 1583” (a Portuguese that resides in Brazil since 1583), perhaps an autobiographical character of Brandão, and Alviano, “um reinól” newly arrived at the colony. Brandônio presents himself as an educated man, acquainted with details of various sciences, who tries to convince the other of the qualities of this land. The conversation digresses through discussions involving geography, history, archaeology, botany, economics, and anthropology, among other topics. Just like the chroniclers of his time, the author also emphasized geodiversity elements such as water resources, geomorphology, mineral and gemmological resources and edaphology. Well ahead of his time, the author discusses the topic of “Sustainable Development” and soil misuse, especially on the river terraces of the Parahyba River, stating that:

Por maneira que este pressuposto que têm todos em geral de se haverem de ir para o reino, com a cobiça de fazerem mais quatro pães de açúcar, quatro cóvas de mantimento, não há homem em todo este Estado que procure nem se disponha a plantar árvores frutíferas, nem fazer as benfeitorias acerca das plantas, que se fazem em Portugal, e por conseguinte se não dispõem a fazerem criações de gados e outras; e se algum o faz, é em muito pequena quantidade, e tão pouca que a gasta toda consigo mesmo e com a sua família. E daqui nasce haver carestia e falta destas coisas, e o não vemos no Brasil quintas, pomares e jardins, tanques de água, grandes edifícios, como na nossa Espanha, não porque a terra deixe de ser disposta para estas coisas; donde concluo que a falta é de seus moradores, que não querem usar delas (BRANDÃO, 1977, p. 34).

Frei Vicente do Salvador was also responsible for describing the potential of the soil for sugarcane cultivation and the exuberance of brazilwood in his work, dated from 1627, and entitled “History of Brazil”, whose dedication, dated from 20th December 1627, revealed that it was written at the request of his Portuguese friend, the priest Manuel Severim de Faria Chantre, a “tratado das coisas do Brasil” (a treatise about the things of Brazil; SALVADOR, 2010). Capistrano de Abreu points out, in the “Preliminary Note” that the manuscript of this work had become public in 1881, in an exhibition held at the National Library in commemoration of King D. Pedro II’s anniversary. Subsequently, in 1889, the complete work was published in volume 13 of the Annals of the National Library.

This record is in fact a dense history book, as the title itself indicates, beginning with the discovery of Brazil, in 1500, and extending to the Dutch invasion of Bahia, in 1626. Thus, this information, especially in the final part, is supported by the author’s own experience at the time of the occurrence. Almeida (1978) suggested, without citing the source, that the friar had lived in St. Anthony’s Convent in 1603, when he came to work on the catechism of the Tabajaras. The work is divided into five books, entitled as follows: First Book – About the Discovery of Brazil, divided into 17 chapters; Second Book - At the time of its discovery, divided into 14 chapters; Third Book - About the time when Tomé de Souza governed it, divided in 26 chapters; Fourth Book - About the time when Manuel Teles Barreto governed it up to the arrival of Governor Gaspar de Souza, divided in 47 chapters; and Fifth Book - About the time that Gaspar de Souza governed it up to the arrival of Governor Diogo Luiz de Oliveira, divided in 48 chapters.

In the second book, there were already indirect references to Parahyba, on the eve of its conquest, which would be reported, in detail and uninterruptedly, in chapters 22 to 27 of the Third Book and in the first 16 chapters of the Fifth Book, although much of the information about the expeditions of conquest and foundation of the Parahyba territory was taken from the accounts of the “Summario”. In chapter 33 of the Fourth Book, Friar Vicente do Salvador confided that “[...] cria-se na terra [Rio Grande do Norte] muito gado vacum, e de todas as sortes, por serem para isto as terras melhores que para os engenhos de açúcar, e assim não se hão feito mais que dois, nem se puderam fazer, porque as canas-de-açúcar requerem terra massapés e de barro, e estas são de areia solta [...]” (SALVADOR, 2010, p. 360). This fragment indicates the extent of the author’s knowledge of edaphology; the dark clayey soil, formed by the decomposition of limestone and gneiss, was conducive to sugarcane cultivation, unlike sandy soil, which is low in mineral salts.

The irregular coastal terrain, whether the current portion of the urban coastline or the southern coast of the State, with their associated elements, was described by Herckmans. In his wanderings, that resulted in the book “Descrição geral da Capitania da Parahyba” (Overview of the Captaincy of Parahyba), Herckmans covered the south coast along some of its basins and irregular coastline. Regarding the basin of the Gramame River, which flowed to the south of the city of Frederica, the author described a relevant element of the geomorphology, which he called the “campina”, explaining afterwards that it was a plain or a plateau.

According to the author, “do Gramame segue um caminho pelas campinas o qual passa meia légua à mão direita por diante desta aldeia [...] Campina é a terra alta ou tabuleiro do Gramame que do mesmo rio ao Taperubu tem quatro léguas de largo” (HERCKMANS, 1982, p. 24). This area, recognized in later geomorphological studies by Herckmans, was found to contain the highest terrains of the Parahyba coast, as a consequence of post-Cretaceous tectonic events.

These plains, also called low plateaus, developed on the crystal shields and present, on the side facing the sea, cliffs, such as Cabo Branco. From a geomorphological point of view, they have flat or gently undulating tops that abruptly end on the adjacent plains, in the form of relatively steep slopes. In the coastal plain, these slopes are called cliffs, which are either active or inactive and formed by the Barreiras Formation, interrupted either by cliffs or fluvial carvings, in the form of open or enclosed valleys forming vast amphitheatres. They give sequence to the sedimentary deposits of the coastal lowlands, with their beaches, terraces, river plains, sand dune fields, among others. The plains have a gentle inclination to the east and average heights that reach 40 to 50 m and an extension of up to 40 km of the coastline (FURRIER, 2007; REIS, 2008).

In the text, Herckmans (1982) referred to the ‘Ponta de Cabo Branco’, currently known as Ponta do Seixas, the most eastern point of the Americas, where “quatro ou cinco léguas desta baía [Popoca] para o norte se acha o Cabo Branco; é uma ponta que se faz mui branca a quem vem do mar, e por isso assim se chama. Daí até o Cabedelo ou barra do Paraíba se contam diretamente quatro léguas pelo mar, mas por terra contam-se seguramente seis por causa da grande curva que faz a costa, a modo de meia lua” (HERCKMANS, 1982).

By stating that the distance by land from Cabo Branco to Cabedelo is greater than by sea, the author was referring to Frederica’s coastal cliffs and the Cabedelo sandbanks, formed by the coves of Cabo Branco, Tambaú, Manaíra, Bessa, Intermars, Ponta de Campina, Poço and Camboinha.

One of the last accounts regarding the geodiversity of the city of Parahyba, named João Pessoa since the expulsion of the Dutch (1654), was the responsibility of the Portuguese Henry Koester, son of English nationals, who in the twilight of the colonial period, more specifically in December of 1809, arrived in Recife aboard the ship Lucy. For about ten years, Koster lived in Recife on the recommendation of his family, due to health issues, and, in the meantime, between 1810 and 1811, in an uninterrupted manner, he explored the north-eastern “sertões”, from Recife to Fortaleza, where he “viaja anotando tudo, os homens, as raças, as paisagens, os animais bravos, a natureza dos terrenos atravessados, crianças, tarefas agrícolas, produtos, pecuária, almas de outro mundo, costumes, indumentária, alimentos, ...” (KOSTER, 1942, p. 9- 17).

The result of these explorations was the publication of the work, in 1816, in London, entitled “Travels in Brazil”. There were several other editions in England, Germany and France. The Brazilian edition is the eighth, dated from 1898, published from number 51 to 150, by the Pernambuco Archaeological Institute, whose source was the previous French edition of 1846. The translation used in this research corresponds to the one made by Luiz da Câmara Cascudo, published in the 5th Series, volume 221, in 1942, of the Brazilian Pedagogical Library.

Thus, virtually all the geodiversity elements mentioned so far were the subject of reports by the author, including information on the city of Parahyba, in the early nineteenth century, which is of major historical importance. In October 1810, Koster stayed at Colonel Matias da Gama’s residence and for a few days he wrote some notes about the city, including information about local geodiversity. For example, about the paving, he mentioned that “a principal rua [sem citar qual] é pavimentada com grandes pedras, mas devia ser reparada” (KOSTER, 1942, p. 85), while he mentioned that the public fountains “foram as únicas obras desse gênero que encontrei em toda a extensão da costa por mim visitada. [...] tem várias bicas e é muito bonita. A outra que se está fazendo é bem maior”¹¹ (KOSTER, 1942, p. 85).

Probably one of the fountains visited by the author was the Gravatá, with its seven spouts which, according to the reports of the governor of Parahyba Jerônimo de Melo e Castro, dated from 1785, was a reason for the population’s satisfaction as it became a public walking place, where

nobreza e povo estão muito satisfeitos por verem hum chafariz de sete bicas de agoa abundantes, em hum lugar que antes era um paul e charco indecente, onde os escravos brigavao pela pouca agoa de uma casimba, servindo hoje de passeio publico pela situação amena, e mais deliciosa pelas arvores silvestres, que na melhor ordem mandei plantar.¹²

Through the window of a public building, the author described the natural scenery of the Port of Varadouro and its surroundings, with the canals flowing into a large bay and the fertile soils. The density of the mangroves was mentioned as belonging to a fluvial-marine system, since the author referred to “salty rivers” that were usually covered by mangroves (KOSTER, 1942, pp. 86-87).

The following fragment was elaborated in Koster and his companion’s return to Goiana, before restarting his journey.

Pelas três horas percebemos estar numa vasta praia de areia, cercada de rochedos a pique, nos quais víamos a marca das enchentes. A maré ainda estava de vazante. Fizemos o guia montar num cavalo que vinha à nossa frente e apressamos o passo, mandando que nos acompanhasse. A maré estava ainda a pouca distância das rochas. Descobrimos uma mais destacada das outras, interceptando a passagem. Paramos e saltamos dos cavalos, grimpendo pelas penedias. O guia, por esse tempo, conduzia as cavalgadas por dentro d’água. Felizmente essas tomaram a direita, passando longe dos rochedos para descobrir,

do outro lado, a terra, para onde se dirigiram. Trependo nas pedras, escorreguei um pé e caí numa fenda, com os dois pés, descendo até os braços, que felizmente me sustentaram o corpo. Reerguendo-me, saltando para outra banda justamente quando vinha uma vaga, esta me fez tomar um banho frio até a cintura. Podíamos esperar que a maré baixasse, mas tínhamos ser surpreendidos pelo crepúsculo, o que, malgrado todos os esforços, devia acontecer. A terra, além do rochedo saliente, era baixa, arenosa e inculca (KOSTER, 1942, p. 89).

In several beaches of the south coast, between the cliffs and the sea, the presence of limestone outcrops from the Maria Farinha Formation are common, creating an obstacle when approaching the cliffs and hindering the passage at high tide. The “rocks” referred to by the author allude to these limestone outcrops, while the ‘protruding rocks’ are the active cliffs of the Barreiras Formation.

All these examples serve to show to a wider audience the connection between the cultural dimension and the various geodiversity elements through different forms of personal experience at a particular historical time, turning a natural landscape into a cultural landscape, which is reflected in the built cultural heritage. This patrimonial value is justified as this landscape, of diverse aesthetics, impregnated with historical events, ensures the identity and meaning of the local populations.

FINAL CONSIDERATION

In addition to the role of the landforms, resulting from the modelling of rocks and elements embedded in it, like fossils and minerals, as well as of the soil, derived from its fragmentation, and of the water resources, in reconstructing and explaining the evolution of the Earth’s crust, a place of interaction for the various organic spheres in an open system of energy and mass exchange, there is an axis of connection inherent to the evolution process of a civilization, whether ancient or modern, that interweaves it to the abiotic environment, conferring a particular degree of importance to geodiversity. Geodiversity also supports economic development and the quality of life and it can be inserted into recreation and tourism activities, in its geo-heritage form, providing the connection between geology, landscape and leisure activities.

The integrated evaluation of the various geodiversity elements and the municipality of João Pessoa was exuberantly documented during the colonial period in the form of texts and letters, however, this relationship has been very little researched and divulged in the context of an interdisciplinary dialogue, where geodiversity is an object of study for the Geo-sciences and culture.

After all, if the natural landscape and its geo-features have served as inspiration for literature and the arts since the beginnings of the colonial period, in the present times it has basically been a tool for scientific studies, which has restricted the possibility of reaching a broader audience other than the academic one. Thus, through this analysis of the correlation of the physical environment with the cultural aspect, we also seek to rediscover a sense of geo-consciousness through the aesthetic appeal that this landscape instigates and its importance to the primitive society.

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DOUMENTOS HISTÓRICOS

Arquivo Histórico Ultramarino, referência A.H.U.- ACL_CU_014, Cx 10, doc. 791, fl 3.

Arquivo Histórico Ultramarino, referência A.H.U.- ACL_CU_014, Cx 18, doc. 1432, fl 3.

Arquivo Histórico Ultramarino, referência A.H.U.- ACL_CU_014, Cx 29, doc. 2144, fl 3- 4.

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Ministério do Reino, Coleção de plantas, mapas e outros documentos iconográficos, doc. 8, Torre do Tombo, referência PT-TT-GAV-8-2-8_m0009.

Ministério do Reino, Coleção de plantas, mapas e outros documentos iconográficos, doc. 8, Torre do Tombo, referência PT-TT-MR-1-68_m0020.

NOTES

- 1 Ministry of the Kingdom, Collection of plants, maps and other iconographic documents, doc 8, Torre do Tombo, reference PT-TT-GAV-8-2-8_m0009
- 2 CANTO, A. C.de L. Archeology in the Church of Santa Casa da Misericórdia de Paraíba. Available at . Accessed on: April 28, 2013.
- 3 For example, present in the letter that Diogo de Campos Moreno sent the King, reference PT-TT-MR-1-68_m0020, from Torre do Tombo.
- 4 In *Crítica Bibliográfica* (Bibliographic Criticism) contained at the end of the Brazilian edition, José Honório Rodrigues states that the Biblioteca Histórica Brasileira (Brazilian Historical Library) has English copies of 1732, 1746 and 1813, but it does not mention from which of these editions the book has been translated (NIEUHOFF, 1942).
- 5 The authorship of this book was discussed for the first time by the Instituto Arqueológico Histórico e Geográfico Paraibano (Paraibano Archaeological Historical and Geographical Institute) and published in volume XLII, pp. 175-246, in 1964, by historian José Américo Gonçalves de Mello (see MENEZES, 1985).
- 6 “Stone disease” referring to the problem of kidney stones, so common at that time which extended to the present day.
- 7 This “sumptuous” building probably is a reference to the St. Anthony’s Convent, corroborated a few years later by Ambrósio Fernandes, when he considered it “the best of the order in the whole State of Brazil” (cf. BRANDÃO, 1977, pp. 49).
- 8 A.H.U.- ACL_CU_014, Cx 10, doc. 791, page 3
- 9 Handwritten colonial documents – Royal orders – Book 02, page 03.
- 10 A.H.U.- ACL_CU_014, Cx 18, doc. 1432, page 3
- 11 In the literature, there is no reference of which would be the aforementioned great fountain under construction. In regards to the paved street, there is no more evidence of its location, buried beneath the cobblestone and asphalt.
- 12 A.H.U.- ACL_CU_014, Cx 29, doc. 2144, pages 3 – 4