v. 67, p. 677-700, Jan./Jun. 2026 http://doi.org/10.5380/dma.v67i.98570 e-ISSN 2176-9109

DMA Desenvolvimento e Meio Ambiente

UFPR Biblioteca Digital de Periódicos BDP | UFPR revistas.ufpr.br

Second home tourism in Lagoa Nova-RN: climate comfort as a resource for recreation in the Brazilian semi-arid region

Turismo de segunda residência em Lagoa Nova-RN: conforto climático como recurso para o vilegiaturismo no semiárido brasileiro

Francisco Ronnieplex de Moura CRUZ[1], Rebecca Luna LUCENA[1]*, Thiago Adriano MACHADO[1], Mabel Simone de Araújo Bezerra GUARDIA[1]

1 Universidade Federal do Rio Grande do Norte (UFRN), Natal, RN, Brazil.

* Contact email: rebeccaosvaldo@yahoo.com.br

Article received on **February 19, 2025**

Final version accepted on **July 22, 2025**

Published on **June 26, 2026**

Abstract: The main objective of this research was to study the role of weather-climate amenity resources in the municipality of Lagoa Nova-RN, located in a mountainous area of the Brazilian semi-arid region. To this end, the methodological procedures adopted were a literature review, secondary data analysis (evolution of private households with occasional use), meteorological data collection, documentary analysis of the municipality's tourism inventories and interviews with municipal public officials. The results point to a conversion of the mountain climate into a resource that promotes tourism and property activity over the last twenty years. There has therefore been a significant acceleration in property expansion in the countryside over the last fourteen years, resulting in a gentrification of rural areas. It was also noted that there is a need to increase planning mechanisms and expand physical and social infrastructure in order to align tourism activity with regional development and climate change mitigation objectives.

Keywords: high altitude climates; climatic amenity; touristic potential; Serra de Santana; Rio Grande do Norte.

Resumo: O objetivo principal dessa pesquisa foi realizar um estudo do papel dos recursos de amenidade tempo-clima no município de Lagoa Nova-RN, município localizado em área serrana do semiárido brasileiro. Para tanto, foram adotados como procedimentos metodológicos a revisão da literatura, análise de dados secundários (evolução dos domicílios particulares de uso ocasional), coleta de dados meteorológicos, análise documental dos inventários turísticos do município e entrevista com agentes públicos municipais. Os resultados apontaram para uma conversão do clima serrano em recurso promotor da atividade turística e imobiliária nos últimos vinte anos. Ocorreu, portanto, uma sensível aceleração da expansão imobiliária sobre a zona rural nos últimos quatorze anos, resultando em uma gentrificação do espaço rural. Também foi observada a necessidade incremento dos mecanismos de planejamento e ampliação da infraestrutura física e social para alinhar a atividade turística aos objetivos de desenvolvimento regional e mitigação das mudanças climáticas.

Palavras-chave: climas de altitude; amenidade climática; potencial turístico; Serra de Santana; Rio Grande do Norte.

1. Introduction

The climatic characteristics of a given place are a quality that defines a large part of tourist destinations, depending on the interests of tourists and the activities involved (Fernandes, 2017). Currently, several places in the world

are experiencing second-home tourism fueled by people's desire to have a closer connection with nature, outdoor recreation, or contemplation (Adie & Hall, 2023; Ericsson et al., 2022). In Brazil, a predominantly tropical country, sun and sea tourism is an international attraction and shapes the advertising discourse of private operators and government agencies in promoting tourism in the country. However, mountain destinations are highly valued, such as the mountainous region of Rio de Janeiro (Petrópolis and Teresópolis) and the Serra Gaúcha region (Gramado, Canela, etc.), mobilizing internatinal and domestic flows. The practice of second home tourism (spending time away from one's residential area) or second home tourism in which tourists acquire a property, or part of it, visiting it more frequently or seasonally, is associated with this dynamic. In the case of mountain destinations, decision-making tends to consider the climate and its amenities, seeking to combine moments of leisure and rest with a change from the urban environment to one closer to nature.

Climate interferes, and has always interfered, in various aspects of life, including economic activities, cultural aspects, comfort and well-being, leisure, and health, whether directly or indirectly (Sette & Ribeiro, 2011; Aragão, 2009). Its relevance is increasingly recognized due to the introduction of the topic of climate change into public debate and the consensus built in the scientific arena (Painel Intergovernamental Sobre Mudanças Climáticas [IPCC], 2021). From this perspective, temperature measurements taken in Brazil show that 2019 was among the four hottest years on record, and that since 2012, the average air temperature has fluctuated around 0.9°C above the Climatological Normal (historical average defined by the World Meteorological Organization). The Sixth Assessment Report on Climate Change (AR6) from the Intergovernmental Panel on Climate Change (IPCC) indicates that a global temperature increase of 1.5°C above the current level causes significant changes not only in the climate but also imposes major difficulties in the practice of sustainable development and efforts to eradicate poverty (IPCC, 2021). This scenario also implies changes in how tourism activities interact with a changing climate. However, the relationship between climate and tourism is not deterministic, so that a climatic characteristic or meteorological condition can be an attractive factor for one place and a dispersive factor for another destination. Furthermore, climate amenity resources can be perceived differently over time and by different individuals, often promoted by local, regional, or global agents seeking to highlight one or another characteristic derived from the climatic heterogeneity of the regions. Thus, thermal (cold) and aesthetic (fog, panoramic landscapes, etc.) attributes of mountainous areas in the semi-arid Northeast (Guaramiranga-CE, Lagoa Nova-RN, Gravatá-PE, Areia-PB) have been valued in the promotion of real estate developments aimed at second homes (Oliveira, 2018).

Considering the climatic context of the Brazilian Semi-Arid region, the

driest and hottest region of the country (Ab'Saber, 2003), such weather-climate amenity resources acquire greater relevance. The Northeast Region of Brazil is located very close to the equator and, in addition to its low altitude, presents high levels of radiation and air temperature throughout the year (Lucena, 2023; Sá & Silva, 2010). This region has a large semi-arid climate polygon and has historically been associated with socioeconomic and environmental problems stemming, among other factors, from the water crisis (Ab'Saber, 2003; Malvezzi, 2007; Girão, 2012). However, it should be noted that there are "areas of exception" in the Semi-arid region, that is, humid enclaves existing on the summits of mountains, plateaus and highlands (Medeiros & Cestaro, 2018; Lucena et al., 2022a). These locations are characterized by milder climates due to the altitude factor and, in some cases, more humid climates, depending on their proximity to the ocean and other geographical factors.

The scope of this research is therefore directed towards conducting a study on the role of weather-climate amenity resources in the municipality of Lagoa Nova-RN, located in Serra de Santana, in the semi-arid region of the state of Rio Grande do Norte. Situated in the Seridó tourist region, the municipality has experienced a significant expansion of real estate developments in recent years, especially gated communities, aimed at second-home tourism or "vilegiatura". Benefiting from spatial factors such as proximity to important regional centers (Currais Novos and Caicó) and the state capital, Natal, the municipality has leveraged its cold climate attributes as an attraction for these tourist flows. The socio-spatial transformations are evident in the encroachment of such developments on rural areas and the increased value of land near viewpoints, modifying the economic dynamics in a municipality traditionally dedicated to family farming, notably the importance of cashew production (Davi, 2016).

2. Theoretical Framework

2.1. The importance of climate in tourism activity

The impact of climatic factors on tourism activities has been the subject of study by climatologists since the 1970s (Crowe et al., 1977; Singh, 1977; Danilova, 1974). Interested in exploring how climate affects economic activities, including tourism, such research sought to use climatic information to consider how it could be employed in the planning of tourism activities (Rutty et al., 2021). After a period of decline, the topic was revived in the 1990s within the context of discussions on climate change, culminating in the report entitled *"Climate Change and Tourism: responding to Global Challenges*", published in 2008 by the World Tourism Organization, the World Meteorological Organization (UNWTO) and the United Nations Environment Programme (UNEP) (UNWTO & UNEP, 2008).

Because of these concerns, a research area called *Tourism Climatology* has emerged, the result of a study group (*The Commission on Climate, Tourism and Recreation* – CCTR) was created in 1999 during the 15th International Congress of Biometeorology and is intended to identify and value environmental information for strategic planning and decision-making in the tourism industry (Matzarakis et al., 2004). Thus, research encompasses various themes, such as weather and climate as limiting factors for tourism; concepts and methods in Tourism Climatology; economic effects of climate on the tourism industry; adaptation of tourists and the industry to climate variability and change (Freitas, 2017).

One result of the increasing complexity of this area of study is methodological development, overcoming the view that the role of climate in attributing tourist quality to places or regions is self-evident. In this sense, indices have been developed to measure optimal or unacceptable climatic conditions, such as the Tourism index. The Climate Index (TCI) (Mieczkowski, 1985) and the Holiday Climate Index (HCI) have been criticized. Regarding the TCI, criticisms were made concerning the overestimation of the thermal comfort factor, the underestimation of the rain and wind factors, the inappropriate monthly time scale for activities with daily variation, and the excessive generalization of the index to diverse types of tourism activities (Scott et al., 2016). However, the different quantitative approaches tend to point to an apparent non-linearity in the climate-tourism relationship, suggesting an inverted U-shaped curve to represent the relationship between temperature and tourism demand, revealing the existence of conditions considered optimal (Roselló-Nadal, 2014).

Despite the excessive pursuit of quantification, the importance of systematizing climate resources for tourism has been recognized in order to inform tourists' decisions and support the planning of activities. To this end, a distinction is made between *the impacts of climate on the tourist* and *the impacts on the tourism industry*, which can also be understood through methods for evaluating the influences of climate on the demand side, relating to push factors (avoiding winter or excessive heat) and pull factors (attractiveness of the destination for travelers); and influences on the supply side (air temperature, humidity, sunlight, climate extremes and seasonality) (Freitas, 2017).

Thus, Freitas (2017) acknowledges the multidimensionality of the key attributes of the climate-tourism relationship, which makes it difficult to identify criteria for climatic and meteorological conditions considered "acceptable", "unacceptable", or "ideal". However, he suggests three attributes: thermal; physical and aesthetic. The evaluation of thermal aspects would involve, among other steps, the integration of physical factors that influence the thermal state of the body:

(i) human body exposure attributes (metabolic rate, posture, clothing);

(ii) functional attributes of the environment (albedo, exposure etc.);

(iii) amplitude of atmospheric variables (air temperature, humidity, ventilation, solar and long wave radiation).

Physical aspects, in turn, would recognize the existence of specific meteorological elements (rain, snow, wind) that influence the perceived temperature, while aesthetic aspects related to the atmospheric component would take into account the *natural aesthetic environment*: weather factors such as visibility, sunlight or cloudy weather, associated with prevailing synoptic conditions such as "sunny day", "beautiful day", "clear weather". Table 1 presents aspects of the climate-tourism relationship.

The systematization proposed by Freitas (2017) is useful for constructing qualitative methodologies for the analysis of empirical cases, especially when considering the nature of individual climate perception, since people may react differently to thermal, physical, and aesthetic aspects. However, the evaluation of the behavioral dimension must be combined with an analysis of how such climatic and environmental attributes are mobilized as resources for promoting tourism, referring to the *marketing strategies* used in each geographic context.

However, methodological challenges are aggravated by climate change and the need to research the role of extreme and catastrophic weather events (droughts, floods, cyclones, heat waves) in the tourism system, as well as to assess the mitigation and adaptation measures that the tourism industry should adopt. Regarding economic impacts, Velasco et al. (2014) point to the uneven way in which climate change will impact tourism flows in different regional economies, highlighting Western Europe (particularly the Mediterranean), China, India, the Caribbean region, tropical countries, and energy exporters as "losers". Rosselló-Nadal (2014), in turn, suggests that climate changes should lead tourists to gradually shift to destinations

Table 1 Aspects of weather-climate amenity resources.

Aspects of the Climate	Significance	Impact
Aesthetic		
Sunny/Cloudy	Quality of experience	Pleasure, attractiveness of the place
Visibility	Quality of experience	Pleasure, attractiveness of the place
Day length	Convenience	Hours of sunlight
Thermal		
Integrated effects of air temperature, wind, solar r adiation, humidity, long-wave r adiation, and metabolic rate.	Thermal comfort	Environmental stress Physiological tension Hypothermia Hyperthermia
	Therapeutic, restorative	Potential for recovery

SOURCE: adapted from Freitas (2017).

at higher latitudes, to which Hamilton et al. (2005) would add higher altitudes, and expand domestic travel, especially in colder countries, possibly reducing international tourism.

Climate change has thus become an explicit concern for the various agents involved in tourism activities at the beginning of the 21st century, given its impact on destination choices, geographical patterns of tourism demand, the competitiveness and sustainability of tourist regions, and tourism's contribution to international development (Scott et al., 2012). In the Brazilian context, Grimm (2019) warns of projections of decreased rainfall in the North and Northeast regions and a significant increase in floods and inundations in the South of the country, in addition to the repercussions of sea level rise in coastal areas traditionally associated with sun and sea tourism. A possible outcome would be the expansion of tourism in protected areas, rural areas, and inland regions, in order to disencumber areas more vulnerable to events resulting from climate change.

The issue of climate change also needs to be addressed in the context of the ecological impacts caused by the tourism industry. Velasco et al. (2014) draw on the work of Gössling (2002) to point out repercussions on vegetation cover and land use; energy use; the extinction of wild species; the spread of diseases; and changes in travelers' perception and understanding of the environment. However, greenhouse gas emissions have been the privileged data point in measuring the ecological footprint of tourism activity. Yang and Jia (2022) highlight the volume of carbon emissions into the atmosphere resulting from the growth of the tourism industry, responsible for increasing the demand for energy from supply, accommodation, and transportation services, thus expanding the burning of fossil fuels.

The World Tourism Organization (UNWTO, 2023) itself acknowledges that total CO_2 emissions resulting from tourism may have reached 8% in 2013. However, it points to methodological difficulties in measuring emissions, resulting from low participation, little standardization, and lack of consensus on tools, especially regarding the performance of small and medium-sized enterprises. The 60% growth in CO_2 emissions from tourism activities between 2005 and 2016 motivated the creation of a climate action commitment, the *Glasgow Declaration*, by tourism industry stakeholders, aiming to reduce emissions by 2030 and establishing the goal of net-zero carbon emissions by 2050 (One Planet Sustainable Tourism Programme, 2021). Among the measures to be adopted are better measurement of emissions related to the sector; decarbonization of tourism activities (transport, infrastructure, accommodation, food and waste management); regeneration of ecosystems to retain carbon; sharing of risk evidence and solutions among stakeholders; and funding of organizational resources for training, research and implementation of effective tools.

It is possible to assess that the accumulated reflection on the theme of the relationship between climate/weather and tourism activity offers

a useful set of methodological elements and case studies that point to the relevance of new research on the subject and to adjustments and adaptations to be implemented in strategic planning. However, the need for more studies directed at specific regions of the Global South, such as the Semi-Arid region, where tourism activity presents specificities directly related to the climatic factor, is noticeable.

2.2. Second-home tourism and climate amenities: dynamics of the inland expansion of tourism activity.

Among the multiple activities that incorporate climate as a tourism resource or that are susceptible to its environmental dynamics, second-home tourism is gaining increasing importance due to the role of real estate developments in stimulating the enjoyment of natural amenities in areas adjacent to large urban centers. Although the municipalities receiving second-home users offer social attractions (museums, festivals, routes, etc.), Pereira et al. (2024) highlight the centrality of natural amenities: "water resources (lakes, lagoons and rivers), areas of high topography and mild temperatures and, especially, coastal areas". Despite the predominance of second homes in sun and sea tourism areas (Gonçalves, 2018; Santos & Vilar, 2018; Oliveira, 2016), mountain landscapes are significantly influenced by climatic amenities, constituting attributes of historical relevance for these spatial practices that some authors prefer to call "vilegiatura" or second-home tourism" (Oliveira, 2018).

Ambrósio (2005) attributes to tourism a social practice linked to the production of commodities, with travel becoming an end in itself, while second home tourism would have its origin in the aristocratic country house, associated with leisur**e** and creativity. Both concepts, however, are now intertwined in the construction of the second home as a practice of the bourgeoisie or the middle class, in order to incorporate second-home tourism into the economy of tourist spaces, especially through real estate speculation. This process leads to considering the "second home" not as a unitary category, but as an "umbrella" concept, focusing on the unequal impacts of its use (Back & Marjavaara, 2017).

Thus, the persistence of the original meaning of second-home tourism associates the rural space to which the mountain landscape is linked with the idea of returning to nature, inverting the daily routine, routine and novelty, emotional connection with places, elitism and aspiration, among others (Cobuci & Kastenholz, 2011). The overlapping of social and environmental elements therefore reveals a trend of architectural typologies that communicate class distinction, associating second homes with the urbanization of peri-urban areas or the gentrification of rural localities (Hall, 2014). The same author also points to impacts on the pressure on the supply and accessibility of land and housing, conflicts between permanent and temporary residents, deficiencies in housing policies, and land scar-

city due to real estate speculation. Back and Marjavaara (2017) highlight the need to emphasize the "invisible population" of second-home tourism, which should impact the demand for local public services, the conversion of second homes into primary residences, the interaction between the local population and second-home tourists, and involvement in local planning. It is because of this ambiguity that one of the leading publications on this topic in international literature asks in its title whether second homes are a "curse" or a "blessing" (Coppock, 1977).

The international context of interest in this topic arose in the post-war period, with the increasing personal mobility associated with the automotive industry (Hall & Müller, 2018). Similar processes began to take shape in Brazil as a result of national-developmentalist policies from the 1950s onwards, which promoted the use of automobiles through the installation of road infrastructure (Becker, 1995). While health resorts were previously valued for health treatments, especially for respiratory diseases, from that decade onwards a trend emerged for second homes in regions accessible to the large urban centers of the Central-South of the country, including mountainous regions, whose valued environmental attributes attracted a type of tourism that Bertha Becker (1995) argues is often "predatory and disorderly". With the intensification of globalization in the 1990s, the discussion incorporated the processes of property acquisition around the world, and in Brazil, a territorial expansion of second-home tourism occurred, particularly in coastal second home tourism in the Northeast. More recently, new real estate strategies have been attracting attention, such as the replacement of single-family homes with multi-family units in the form of condominiums, timeshare models, and the reconfiguration of *resorts* and tourist complexes (Pereira et al., 2024).

In turn, second-home tourism in mountainous areas has an important spatial dynamic to the inland expansion of tourism in Brazil, frequently associated with rural tourism, despite the absence of specific programs, projects, or actions for these destinations by federal tourism policies (Fonseca et al., 2022). It thus contradicts the historical image of the inland and the hinterland as sparsely populated or inhospitable spaces with low levels of economic development, by combining a mild climate with proximity to large urban centers, lodging and food services, and activities in contact with nature.

The natural exuberance provided by the characteristic relief and vegetation, in contrast to the semi-arid landscape surrounding it, constitutes an important attraction for visitors and/or second residents interested in enjoying the amenities, even if only for short periods of the year (Gomes & Oliveira, 2021, p. 126).

Several studies have examined second-home tourism in mountain towns of the semi-arid Northeast of Brazil. Oliveira (2018) focuses his analysis on Guaramiranga-CE, Lagoa Nova-RN, and Gravatá-PE, high-

lighting the transformation of the urban morphology of these small towns interconnected to the metropolitan urban network, reinforcing the metropolis (primary residence) and mountain (second residence) nexus and the tendency towards the formation of enclaves resulting from the pattern of real estate developments centered on the condominium model. The analyses of Valença (2015) and Galvão (2017) focus on Gravatá-PE, whose urban *marketing* associates the mild climate with the idea of a "Pernambuco Switzerland". This fetishization of space tends to transform the "rural" and the mild climate into objects of consumption, mediating the relationship with nature by seeking to control and idealize it. For the context of Rio Grande do Norte, Costa et al. (2017) explore this tourism dynamic for the mountain town of Portalegre-RN, while Taveira (2018), Davi (2016), Moura et al. (2015) and Macêdo (2013) focused on Lagoa Nova-RN , which is analyzed in more detail later.

Considering climate studies that have proven an increase in Earth's temperature and projections of temperature increases in various regions of the globe, including the Brazilian semi-arid region (Marengo, 2008; Painel Intergovernamental Sobre Mudanças Climáticas [IPCC], 2021; Prado, 2021; Marengo et al., 2021), it should be noted that the elevated areas, plateaus, mountain ranges, and tablelands of the region will gain even more importance as refuges of thermal amenity and should be prioritized from the point of view of their environmental preservation/conservation (Lucena et al. , 2022a). These projections pose new challenges for mountain destinations, requiring greater planning in the management of water resources and the dynamics of land use and occupation.

3. Methodology

This study aims to analyze the relationship between high-altitude climate and second-home tourism in the municipality of Lagoa Nova/RN. A literature review was conducted on *Google Acadêmico* platform and on the *Biblioteca Digital Brasileira de Teses e Dissertaçõe*s, using the following terms as descriptors: second-home tourism, climate, Lagoa Nova. In addition, the study relied on document analysis of the *Inventários Turísticos de Lagoa Nova* of 2023 and 2016 (Taveira, 2016; 2023), and the 2023 Report on Tourism Activities of Lagoa Nova-RN , available in the Brazilian Tourism Map Information System, in order to verify how these documents record the role of the climate/weather interface as a tourism resource for the municipality.

As an indicator of the importance of second-home tourism, secondary data were collected from the IBGE Demographic Censuses for the years 2000, 2010, and 2022, relating to the absolute and relative values of private dwellings for occasional use in Lagoa Nova and other municipalities in the Seridó tourist region. Tulik (1995) explores the importance of this data since

the 1980 census, allowing for an assessment of the second-home phenomenon, although it should be noted that this is not exclusive to second-home tourism, also allowing for analyses of migratory processes for study and work. In any case, the Instituto Brasileiro de Geografia e Estatística (IBGE, 2024, p. 20) defines it as "a permanent private dwelling that occasionally served as a residence on the reference date, that is, it was the dwelling used for weekend rest, vacations, or other purposes, even if, on the reference date, its occasional occupants were present".

In order to understand the perspective adopted by relevant territorial agents in the municipality of Lagoa Nova regarding the theme investigated, three semi-structured interviews were conducted with the former municipal tourism secretary; the current municipal tourism and economic development secretary; and the secretary of management and human resources (Gomes, 2021; Silva, 2021; Moura, 2021). Conducted between November 17, 2021, and December 14, 2021, these interviews sought to gather information about the emergence and development of tourism in the municipality, the initiatives undertaken by the municipal public administration, and the economic impacts of second-home tourism in terms of fiscal policy, infrastructure, and job and income generation.

Finally, as a fifth methodological procedure, secondary air temperature data and primary data generated in the months of July, August, and September (winter) of 2018 for the municipality of Lagoa Nova were used. For this purpose, an Instrutherm HT-70 automatic thermo-hygrometer programmed with a datalogger to collect data 24 hours /day in order to gather information on air temperature and humidity was installed. For a comparative analysis with data related to cities located in the hinterland depression of the Seridó region of Rio Grande do Norte, data were collected from the Seridó meteorological station located in the municipality of Caicó. The collected data were analyzed with descriptive statistics where calculations of measures of position and dispersion were performed for a better understanding of local thermal conditions.

3.1. The municipality of Lagoa Nova/RN/Brazil

According to data provided by Instituto de Desenvolvimento Sustentável e Meio Ambiente (IDEMA, 2021), the municipality of Lagoa Nova is located 198 km from Natal, the capital of the state of Rio Grande do Norte, and has an area of 176.30 km^2, equivalent to 0.33% of the state's surface area. The altitude of the municipal seat is 686 meters. Figure 1 shows the location of the Serra de Santana microregion in the central part of the state of Rio Grande do Norte and the outline of the municipality of Lagoa Nova.

Serra de Santana and the municipality of Lagoa Nova are located in the Brazilian semi-arid region, in the central part of the state. Barros (1998) reports that the relief of Serra de Santana is characterized by residual Cenozoic plateaus exhibiting a flat and high relief, with remnants of

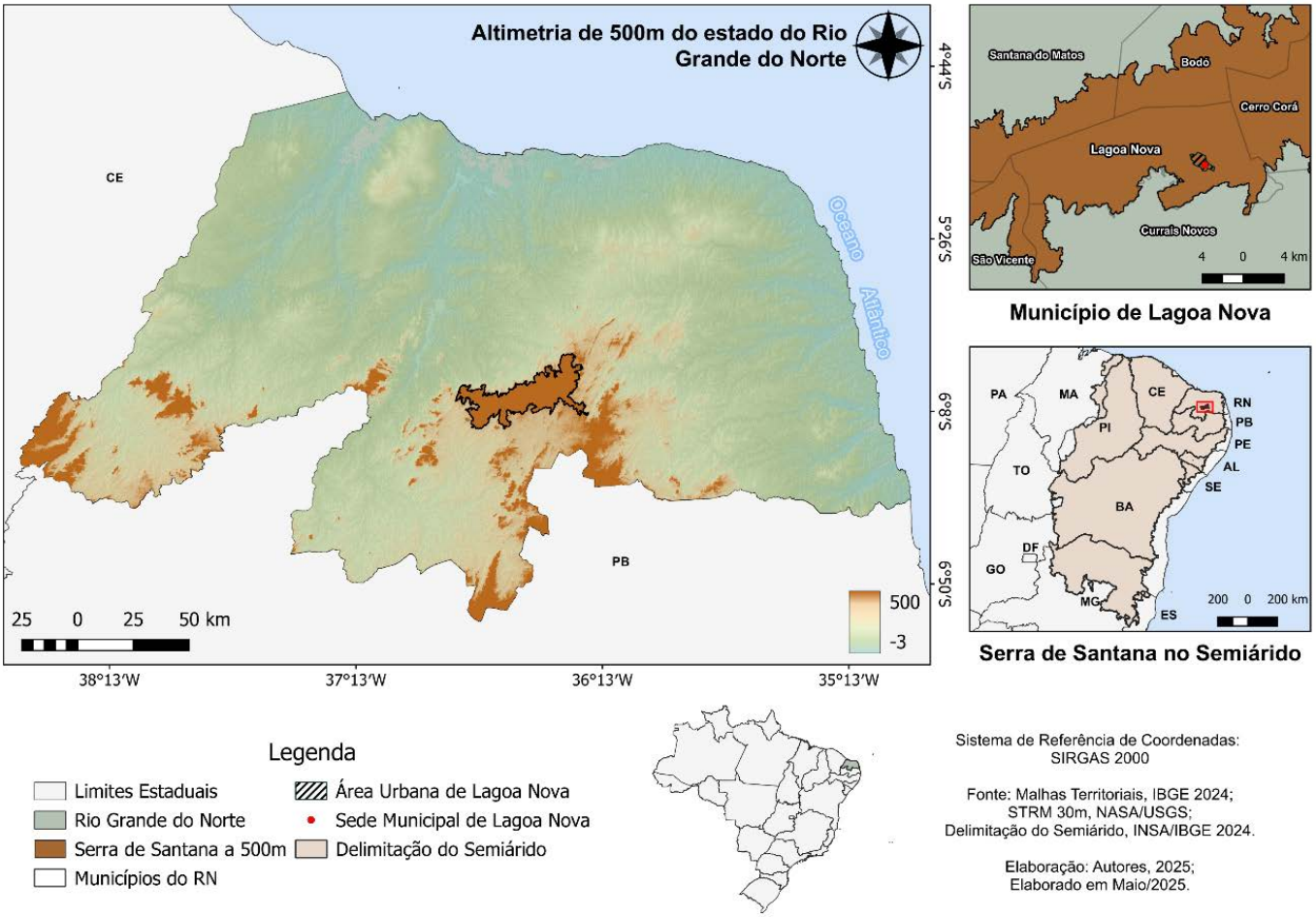


Figure 1
Satellite image of the state of RN (altimetry) highlighting Serra de Santana in the Brazilian semi-arid region and the municipality of Lagoa Nova.

sedimentary cover, easily perceived by the rectilinear aspect of the mountain tops with altitudes ranging between 500 and 700 meters. The predominant climate in the semi-arid region of the state of Rio Grande do Norte is hot, with average rainfall around 600 mm and average annual temperatures ranging between 24ºC and 30ºC, in addition to a high rate of insolation and evaporation and a negative water balance (Silva et al., 2022). These climatic conditions are reflected in the Caatinga-type vegetation (deciduous), intermittent rivers, rocky outcrops, and shallow, stony soils (Nunes, 2006). However, Serra de Santana, situated at higher elevations, has milder temperatures and a more frequent presence of orographic phenomena, as well as more developed soils (Lucena et al., 2023). The altimetric condition of the Santana mountain range contributes to climatic and environmental distinctions in the semi-arid domain of the dry hinterlands (Ab'Saber, 2003), which makes it an exceptional area with great tourism potential.

The municipality of Lagoa Nova was integrated into the Brazilian Tourism Map in 2006, as part of the Federal Government's Tourism Regionalization Program, established in 2003. It thus belongs to the Seridó Polo tourist region. Lagoa Nova is categorized as a type D municipality, on a scale from A to E, indicating its low performance in the variables of number of lodging establishments, number of jobs in lodging establishments,

estimated number of domestic and international visitors, and federal tax revenue from lodging establishments.

4. Results and discussion

In the state of Rio Grande do Norte, the second-home tourism movement first occurred on the coast, as there is a tradition of summer vacations in which people with higher purchasing power enjoy this leisure time during holidays and for this purpose use beach houses as second homes (Oliveira & Nascimento, 2023; Lopes et al., 2018; Fonseca et al., 2016; Pereira et al., 2016).

However, there has been a growing process of inland tourism in recent decades, especially associated to second home tourism in mountainous regions of the state, such as Serra de Martins (Bicalho, 2022; Costa et al., 2017; Santos et al., 2013), Serra de São Bento (Bicalho, 2022) and Serra de Santana (Oliveira, 2018; Taveira, 2018; Costa, 2017; Davi, 2016). The association of these spaces with the common characteristic of a mild and pleasant climate, compared to surrounding semi-arid areas, mobilizes aesthetic, physical and thermal attributes in a process of social construction of the landscape aimed to encourage the appreciation of the space (Davi, 2016). In the case of Serra de Santana, its location in the central region of the state of Rio Grande do Norte gives it a locational advantage due to its relative proximity to the state capital, Natal, less than 200km away. This makes it attractive for the construction of second homes and a competitive factor compared to other more distant mountain ranges, such as the Martins mountain range.

For comparative purposes, Table 2 shows the municipalities of Caicó and Lagoa Nova, located respectively in the Hinterland Depression and the Serra de Santana, both areas in the Brazilian Semi-Arid region, in the state of Rio Grande do Norte. Located on the same latitudinal band and 70 km apart (straight line), Caicó has an altitude of 160 meters, while Lagoa Nova reaches an altitude of 700 meters. The temperature differences between the two are evident. Climate data recorded and analyzed during this research demonstrate the milder climate generated by the altimetric gradient in Lagoa Nova, when compared to municipalities in the Hinterland Depression, such as Caicó (Table 2).

The municipality in the mountain region recorded an average temperature of 23.6ºC, while the municipality in the Hinterland depression recorded an average of 28.6ºC, a difference of 5ºC for the same period. In Lagoa Nova, the absolute minimum temperature was recorded at 15.7ºC, and the maximum temperature recorded was 34.8ºC. The following values were also recorded: 733 temperatures below 20ºC; 229 temperatures below 18ºC; and 75 temperatures below 17ºC. For the same period in Caicó, there

Table 2 Geographic factors and climatic data recorded during the winter (July, August and September) in Lagoa Nova and Caicó, Rio Grande do Norte.

Geographic Characteristics and Descriptive Statistics	Lagoa Nova	Caicó
Latitude	6° 05′ South	6° 27′ South
Altitude (meters)	700	160
landscape unity	Mountain range	Depression
Average (ºC)	23.6	28.6
Maximum Value (ºC)	34.8	38.9
Minimum Value (ºC)	15.7	18.1
Standard Deviation (ºC)	4.6	6.7
Coefficient of Variation	19%	23%
Amplitude (ºC)	19.1	20.8
Temperature records < 20ºC	733	2
Temperature records <18ºC	229	0
Temperature records <17ºC	25	0

SOURCE: research data.

were only two records of temperatures below 20ºC and no records of temperatures below 18ºC or 17ºC. Also, the absolute maximum temperature of 38.9ºC and the minimum of 18.1ºC in Caicó prove that if we evaluate the maximum, average, and minimum temperatures during the winter, we will find that they are ~3.5ºC lower in the mountain region than in the Hinterland depression, considering Lagoa Nova and Caicó, respectively. The minimum temperatures recorded in both municipalities occurred at times close to dawn (~05:00) and the maximum temperatures always after noon (~14:00). According to previous studies conducted in the region, the main factor in the decrease in temperature is altitude, which promotes a vertical temperature gradient (Cardozo et al., 2019; Lucena et al., 2022a; 2022b).

The fact that the climate is pleasant is constantly reaffirmed in research and documents related to tourism in Lagoa Nova. In the Tourism Activities Report of the municipality, linked to the Tourism Regionalization Program (MTur, 2022), Lagoa Nova is characterized by its "mild climate", its "natural beauty", and for being a "second home tourism" destination. This institutional recognition of climate as a tourism resource, in addition to its link to leisure activities, is also present in the two tourism inventories built within the scope of extension projects of Universidade Federal do Rio Grande do Norte entitled "Tourism Inventory of the Municipalities of the Seridó Polo Tourism Council" and "Qualistur – Tourism, Professional Qualification and Regional Development of the Seridó Potiguar" both coordinated by Marcelo Taveira, Professor of the Course in Tourism. In the survey conducted in 2016, "cold climate" was highlighted as the main attraction of the municipality, followed by the open-air market, an aspect reaffirmed in the

2022 inventory, but now associated with the geosites (Santa Rita Viewpoint and Tanque dos Poscianos) present in the municipality as a result of it being part of the Seridó Geopark.

However, the mere presence of cold weather does not automatically transform it into a tourist attraction. Davi's work (2016) recovers the historical relationship of the local population and visitors in previous periods with the perception of cold, highlighting that it was not seen as a special attribute, being intolerable for some. An elderly resident of the rural area, interviewed in the research, said that in the past people were "afraid" to visit Lagoa Nova in winter because of the excessive cold (Davi, 2016). It might be interesting, therefore, to understand how a reversal of the social value given to weather-climate amenity resources operates, for which the author examines the social construction of the landscape. This is expressed in the way space is organized and in the dynamics of its production, such as the constructions of the local population that faced the "chãs" (flat and fertile areas where the fields are located), turning their backs on the "beiras de grota", areas now called "mirantes" (Figure 2), and converted into the most valued lands.

The process of reversing the social value of the cold and mountainous landscape dates back to the early 2000s, when a segment of the Seridó elite, notably from Currais Novos, began investing in second homes in the Serra de Santana. The emblematic case of the Pousada Chalé dos Cajueiros (Taveira, 2018) is a prime example. The conversion of hotel beds into residential units in a second-home condominium is interpreted by Oliveira (2018) as a predominance of second-home tourism over tourism in the municipality. Integrating with real estate speculation, second-home tourism has incorporated the edges of the terrain, previously undervalued by the local population, and expanded the predominance of subdivisions and gated communities in the rural area, contrasting, according to Oliveira (2018), with the rural landscape of small farms and extensive cashew orchards. Thus, what Davi (2016) calls the restructuring of rural space occurs

Figure 2

In 2a, a view of the landscape from the escarpment of the Serra de Santana (south viewpoint), during the rainy season, municipality of Lagoa Nova, and in 2b, a view from the southeast viewpoint during the dry season, municipality of Lagoa Nova.

SOURCE: research data.

A

B

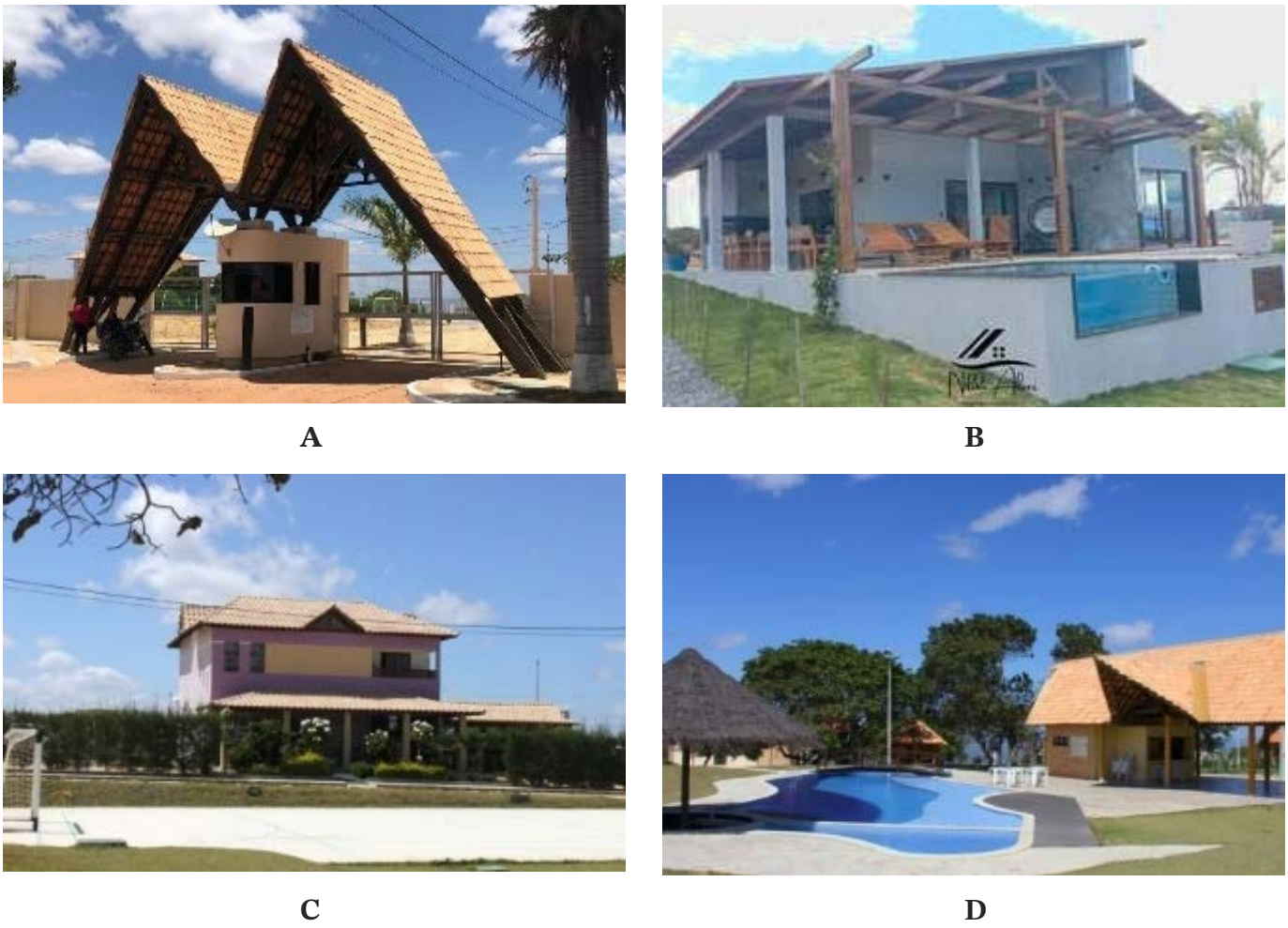
through a process of gentrification, based not only on the material aspect, but also on the symbolic construction of the mountain climate as "mild" and "refreshing", and of an idealized landscape as "clean", free from pollution and noise.

It can be affirmed that the representation of the "mild cold" is constructed and fostered by some agencies and agents (city hall, tourism department, business owners, part of the local population, and the media). These individuals create the "mountain range" as possessing attributes and characteristics (climate, diversity of landscape elements) that enable the accumulation of a social and collective representation of a special place to visit and live in (Davi, 2016).

Thus, we can perform the exercise of operationalizing the aspects of weather-climate amenity resources discussed by Freitas (2017) for the case of Lagoa Nova. The restructuring of rural space and the social construction of the landscape have come to value the *aesthetic* attribute of fog and the perspective landscape from viewpoints; air quality and contact with aspects of rural life, associated with health and well-being, constitute the *physical* attribute; while the *thermal* attribute, the cold of the mountain climate in the midst of the semi-arid region, is associated with thermal comfort and a restorative therapeutic sense. Together, these weather-climate amenity resources become support for tourism and real estate economic activities that come to compose the local economic landscape along with other recent dynamics, such as the installation of companies linked to wind energy production, and traditional ones, such as family farming and cashew cultivation. Second-home condominiums therefore become the evident spatial form of this process (Figure 3).

Research conducted in the municipality and interviews with representatives of the municipal tourism department during the last two administrations (Gomes, 2021; Silva, 2021; Moura, 2021) reveal a dual trend: a predominance of condominiums in rural areas; and an acceleration in the growth of real estate development aimed at expanding the supply of land or second-home projects. Indeed, the tourism department complains about the low collection of property taxes (IPTU) because most developments are located in rural areas, which imposes fiscal limitations on local tourism planning. Regarding the growth of real estate developments aimed at second homes, this can be estimated by analyzing the number of private dwellings for occasional use and their proportion in relation to the total number of dwellings in the municipality. Table 3 presents such data for the municipalities in the Seridó tourist region for the years 2000, 2010, and 2022, extracted from the respective IBGE Demographic Censuses.

Considering that private dwellings for occasional use may indicate the presence of student residences, residences used occasionally for work convenience, or second homes of natives of one municipality who reside in an



A **B**

C **D**

Figure 3

(a) main entrance of a gated residential community; (b) house in a gated community; (c) house in a gated community and (d) leisure area within a residential community.

SOURCE: Mgfimoveis, 2023; Natalonline, 2023.

other (usually the state capital), this is a suitable indicator to assess trends in second-home tourism or "vilegiatura" in the municipality of Lagoa Nova. The data systematized in Table 3 point to a clear growth in dwellings for occasional use in Lagoa Nova in the last two decades. With 1,093 private dwellings for occasional use out of a total of 7,193 private dwellings in 2022, Lagoa Nova is currently the municipality with the highest proportional number of dwellings in this category (15.2%) among those belonging to the Seridó region, especially if we consider that the values referring to Caicó and Currais Novos should include other uses linked to the fact that these cities are university centers.

Furthermore, the analysis better highlights the trends when we calculate the annual growth of private homes for occasional use. Between 2000 and 2010, the decade in which the construction of houses and second-home condominiums began in Lagoa Nova, the growth was 3.63% per year, low for the average of the municipalities in the Seridó region, but slightly above the annual growth of the total number of private homes (3.31% per year). However, an acceleration of this process is noticeable in the period from 2010 to 2022, when the annual growth was 8.45%, above the other municipalities in the region, indicating the rapid expansion of

Table 3 Evolution of private dwellings for occasional use in the Seridó region in recent decades.

Municipalities of the Seridó Region	Private Dwellings for Occasional Use (2000)	Percentage of households used occasionally (2000)	Private Dwellings for Occasional Use (2010)	Percentage of households used occasionally (2010)	Private Dwellings for Occasional Use (2022)	Percentage of households used occasionally (2022)
Acari	245	7.41%	308	7.84%	447	9.41%
Caicó	453	2.71%	978	4.49%	2157	7.93%
Carnauba dos Dantas	122	5.99%	245	8.95%	403	11.22%
Cerro Corá	150	4.79%	285	7.22%	630	12.09%
Currais Novos	414	3.47%	652	4.51%	1281	7.04%
Florânia	146	5.29%	336	10.46%	410	9.62%
Jardim do Seridó	149	3.99%	396	8.58%	567	10.08%
Lagoa Nova	289	8.47%	413	8.74%	1093	15.20%
Parelhas	379	6.39%	578	7.90%	1353	13.01%
São João do Sabugi	193	10.56%	331	14.66%	417	14.43%
Tenente Laurentino Cruz	77	5.50%	102	5.48%	235	9.31%
Timbaúba dos Batistas	5	0.82%	51	6.41%	92	8.94%

SOURCE: IBGE Demographic Censuses of 2000, 2010 and 2022.

condominiums, given that the annual growth of the total number of private homes remained stable, corresponding to 3.56% per year in the same period.

One factor that may help in understanding this acceleration is the incorporation of second-home tourists whose primary residences are located in Natal into a process initiated by the elite of the Seridó region, mainly from Currais Novos, but also from Caicó (Gomes & Oliveira, 2021). Members of what Davi (2016) preferred to characterize as "urban middle classes" tend to belong to classes B (38.5%) and C (38.5%), according to data collected and systematized by Oliveira (2018). Although comparatively with lower purchasing power in relation to other mountain vacation areas, such as Guaramiranga and Gravatá (Oliveira, 2018), these agents boost the local economy (Taveira, 2018), expanding local business opportunities and monetary flow in traditional commerce, such as the open-air market (Macêdo, 2013).

The economic impact is also relevant due to the frequency of return visits by second-home tourists, which Oliveira (2018) characterizes as a "non-seasonal cyclical mobility", favoring the maintenance of economic dynamics throughout the year. In this context, a comparative analysis of the tourist inventories of Lagoa Nova from 2016 and 2022 indicates that, despite the stability in the number of food and beverage services and equipment (26 and 24, respectively), the seating capacity (from 1,182 to 1,430) and the number of employees hired (from 51 to 95) in these establishments increased during this period (Taveira, 2016; 2023).

However, it is important to consider the social and environmental ef-

fects of the accelerated process of real estate development and second-home tourism. The tourism secretaries interviewed (Gomes, 2021; Silva, 2021; Moura, 2021) acknowledge the decrease in vegetation cover, associated with the expansion of gated communities and subdivisions into rural areas and the introduction of wind energy production. This finding can be confirmed in the research by Lucena et al. (2023), which accounts for land use types over a historical period and points to a decrease in forest cover in the municipality. Furthermore, Davi (2016) identifies a change over the years in the productivity of cashew trees and in the perceived temperature (reduction of the coldest days) based on reports from the local population. It is therefore necessary to consider the repercussions of real estate speculation on the traditional lifestyles of family farmers, so that the local population is not rendered invisible in the face of other agents considered more dynamic and economically relevant.

5. Final considerations

This study reinforces the importance of weather-climate amenity resources for similar contexts, namely mountainous municipalities, especially those located in semi-arid regions. However, it is worth recognizing that climate and weather do not automatically become resources for economic activities. There is a dynamic of converting climatic amenities into "spatial capital" activated by agents in a given place, which denotes the political and economic nature of a process of social construction of the landscape. This convertibility suggests the mobilization of local or regional agents in the promotion of economic interests that may result in territorial and environmental conflicts.

In the case of Lagoa Nova, it can be seen that the accelerated expansion of second-home condominium developments has encroached upon the municipality's rural area over the last fourteen years, tending to impact land values and the local economic dynamics based on small family farms, suggesting a process of gentrification of the rural space. Documentary analysis demonstrated that weather and climate amenities are institutionally recognized and promoted as a tourist attraction. Moreover, the literature review highlighted research indicating a shift in the perception of the aesthetic and thermal attributes of the place, expressed in the appreciation of hillside areas and panoramic views, and in the appreciation of the mountain climate as an attraction.

Further research can help refine analyses regarding the impact on rural communities and the expansion of the municipality's service sector. While the literature on second homes focuses on highlighting the effects of visitors as an "invisible population" in these localities, it is important to avoid making the local population itself invisible, along with their traditional ways of life and the landscape with which they have historically interacted.

Finally, it is fundamental that tourism activity can better utilize management and planning tools, oriented towards a diversification of tourism that incorporates the local community and integrally values the basic natural resources (mountain climate and geodiversity; nature tourism and rural tourism), locational factors (accessibility and proximity to regional and metropolitan centers), and cultural factors (thematic itineraries, gastronomy, local history, festivities, etc.). Furthermore, planning is important to mitigate the effects of climate change, both to preserve the region's status as a climate refuge and to sustain traditional activities such as family farming and cashew cultivation. In this regard, investments in physical and social infrastructure are essential for the inland expansion of tourism activity to be directed towards an effective regional development policy.

References

Ab'Sáber, A. N. (2003). *Os domínios de natureza no Brasil: Potencialidades paisagísticas*. Ateliê Editorial.

Adie, B. A., & Hall, C. M. (Eds.). (2023). *Second homes and climate change*. Routledge. https://doi.org/10.4324/9781003091295

Ambrósio, J. (2005). Viagem, turismo e vilegiatura. *GEOUSP*, 18. https://doi.org/10.11606/issn.2179-0892.geousp.2005.73975

Aragão, M. J. (2009). *História do clima*. Interciência.

Back, A., & Marjavaara, R. (2017). Mapping an invisible population: The uneven geography of second-home tourism. *Tourism Geographies, 19*(4), 596–611. https://doi.org/10.1080/14616688.2017.1331260

Barros, S. D. S. (1998). *Aspectos morfo-tectônicos nos platôs de Portalegre, Martins e Santana/RN* (Dissertação de mestrado, Universidade Federal do Rio Grande do Norte). Repositório Institucional da UFRN. https://repositorio.ufrn.br/server/api/core/bitstreams/32684d46-d333-4bc4-909c-09a9fd996c86/content

Becker, B. K. (1995). *Levantamento e avaliação da política federal de turismo e seu impacto na região costeira* (v. 3). MMA.

Bicalho, D. M. (2022). *O turismo em áreas serranas do Nordeste Brasileiro no contexto da pandemia de Covid-19* (Dissertação de mestrado, Universidade Federal do Rio Grande do Norte). Repositório Institucional da UFRN. https://repositorio.ufrn.br/handle/123456789/49983

Cardozo, A. da S., Oliveira, I. R. D. de, Aprígio, T. R. de M., & Lucena, R. L. (2019). Análise climatológica comparativa entre as cidades de Caicó e Lagoa Nova/RN. In L. S. Pinheiro & A. Gorayeb (Orgs.), *Geografia física e as mudanças globais* (pp. 148–152). Editora UFC.

Cobuci, L., & Kastenholz, E. (2011). Turismo de segunda residência em meio rural. *Rosa dos Ventos, 3*(2), 125–132. https://sou.ucs.br/etc/revistas/index.php/rosadosventos/article/view/1234

Coppock, J. T. (1977). *Second homes: Curse or blessing?* Pergamon.

Costa, A. J. da, Lopes, R. M. R., & Rodrigues, J. F. (2017). Segunda residência urbana e turística da cidade de Porto Alegre (Rio Grande do Norte/RN, Brasil). *Turismo & Sociedade, 10*(1), 1–21. https://doi.org/10.5380/tes.v10i1.49229

Costa, E. R. P. (2017). *Análise dos resultados do Projeto de Inventariação Turística do Polo Seridó* (Monografia de graduação, Universidade Federal do Rio Grande do Norte). Repositório Institucional UFRN. https://repositorio.ufrn.br/server/api/core/bitstreams/c3c506db-b935-42f1-b230-b5c580b85d0c/content

Crowe, R., MacKay, G., & Baker, W. (1977). *The tourist and outdoor recreation climate of Ontario: vol. II: The summer season* (Project Report No. REC-1-73). Atmospheric Environment Service, Environment Canada.

Danilova, N. A. (1974). *A recreational evaluation of the climate of the Black Sea Coast* (Report No. 25). Atmospheric Environment Service, Department of the Environment, Meteorological Translations.

Davi, M. L. (2016). *"A serra é meu refúgio": Uma etnografia sobre o uso de casas de campo em Lagoa Nova/RN/Brasil* (Dissertação de mestrado, Universidade Federal do Rio Grande do Norte). Repositório Institucional UFRN. https://repositorio.ufrn.br/jspui/handle/123456789/24599

Freitas, C. R. de (2017). Tourism climatology past and present: A review of the role of the ISB Commission on Climate, Tourism and Recreation. *International Journal of Biometeorology, 61*(1), 107–114. https://doi.org/10.1007/s00484-017-1389-y

Prado, M. I. do (2021). Comunicação aplicada à proteção e defesa civil: Algumas reflexões. In *44º Congresso Brasileiro de Ciências da Comunicação*. Brasília, DF.

Ericsson, B., Øian, H., Selvaag, S. K., Lerfald, M., & Breiby, M. A. (2022). Planning of second-home tourism and sustainability in various locations: Same but different? *Norsk Geografisk Tidsskrift – Norwegian Journal of Geography, 76*(4), 209–227. https://doi.org/10.1080/00291951.2022.2092904

Fernandes, A. S. (2017). *Relação clima-turismo: Um contributo para o planejamento de destinos turísticos* [Dissertação de mestrado, Universidade de Brasília]. https://repositorio.unb.br/bitstream/10482/24151/1/2017_AlissonSilvaFernandes.pdf

Fonseca, M. A. P., Todesco, C., & Silva, R. C. da. (2022). *A interiorização do turismo no Brasil*. Letra Capital.

Fonseca, M. A. P. da, Bastos, M. L., & Lima, R. M. M. de. (2016). Segunda residência e a construção dos vínculos afetivos e territoriais no Polo Costa das Dunas. *PASOS: Revista de Turismo y Patrimonio Cultural, 14*(5), 1229–1240. https://doi.org/10.25145/j.pasos.2016.14.08

Galvão, P. (2017). Uma discussão sobre turismo e gentrificação no meio rural de Gravatá, Pernambuco, Brasil. *Revista Turismo & Desenvolvimento, 27/28*. https://doi.org/10.34624/rtd.v1i27/28.8533

Girão, O. (2012). Reconstrução do clima no Nordeste brasileiro: Secas e enchentes no século XIX. *Finisterra, 48*(93), 29–47. https://doi.org/10.18055/Finis1256

Gomes, I. R., & Oliveira, P. R. A. (2021). As pequenas cidades, a vilegiatura e a urbanização no Nordeste brasileiro. *Geosaberes, 12*(1), 124–138. https://doi.org/10.26895/geosaberes.v12i0.1169

Gomes, J. (2021, dezembro 6). *Levantamento de informações sobre o turismo de segunda residência no município de Lagoa Nova/RN* [Entrevista concedida a Francisco Ronnieplex de Moura Cruz].

Gonçalves, S. (2018). Internacionalización turística y migratoria en el litoral de Rio Grande do Norte/Brasil y las implicaciones en la producción de nuevos territorios y territorialidades. In T. M. M. Martínez (Coord.), *Turismo residencial: Nuevos estilos de vida: De turistas a residentes* (pp. 385–402). Publicacions de la Universitat d'Alacant.

Gössling, S. (2002). Global environmental consequences of tourism. *Global Environmental Change, 12*, 283–302. https://doi.org/10.1016/S0959-3780(02)00044-4

Grimm, I. J. (2019). Impactos das mudanças climáticas no sistema turístico: O caso brasileiro. *Caderno Virtual de Turismo, 19*(1). https://doi.org/10.18472/cvt.19n1.2019.1392

Hall, C. M. (2014). Second home tourism: An international review. *Tourism Review International, 18*(3), 115–135. https://doi.org/10.3727/154427214X14101901317039

Hall, C. M., & Müller, D. K. (2018). *The Routledge handbook of second home tourism and mobilities*. Routledge.

Hamilton, J. M., Maddison, D. J., & Tol, R. S. J. (2005). Effects of climate change on international tourism. *Climate Research, 29*, 245–254. https://www.int-res.com/articles/cr2005/29/c029p245.pdf

Instituto Brasileiro de Geografia e Estatística. (2024). *Censo demográfico 2022: Características dos domicílios: Resultados do universo*. IBGE.

Instituto Brasileiro de Geografia e Estatística. (2022). *Censo demográfico 2022*. https://sidra.ibge.gov.br/pesquisa/censo-demografico/demografico-2022/inicial

Instituto Brasileiro de Geografia e Estatística. (2010). *Censo demográfico 2010*. https://sidra.ibge.gov.br/pesquisa/censo-demografico/demografico-2010/inicial

Instituto Brasileiro de Geografia e Estatística. (2000). *Censo demográfico 2000*. https://sidra.ibge.gov.br/pesquisa/censo-demografico/demografico-2000/inicial

Instituto de Desenvolvimento Sustentável e Meio Ambiente. (2008). *Lagoa Nova: Perfil do seu município*, *10*, 1–22. http://adcon.rn.gov.br/ACERVO/idema/DOC/DOC000000000014994.PDF

Painel Intergovernamental Sobre Mudanças Climáticas. (2021). *Mudança do clima 2021: A base científica* (M. A. R. de Oliveira, Trad.). WMO/UNEP. https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/publicacoes/relatorios-do-ipcc/arquivos/pdf/IPCC_mudanca2.pdf (Obra original publicada em outubro de 2021)

Lopes, E. B., Ruiz, T. C. D., & Anjos, F. A. dos (2018). A ocupação urbana no litoral norte do Rio Grande do Sul, Brasil, e suas implicações no turismo de segunda residência. *Urbe: Revista Brasileira de Gestão Urbana, 10*(2), 426–441. https://doi.org/10.1590/2175-3369.010.002.AO03

Lucena, C. Y. S., Souza, J. J. L. L., Silva, B. Q., Reis, J. S., & Lucena, R. L. (2023). A Serra de Santana no semiárido nordestino: Aspectos geográficos e possibilidade de práticas sustentáveis. *Revista Geográfica de América Central, 70*, 449–476. https://doi.org/10.15359/rgac.70-1.17

Lucena, R. L. (2023). Semiaridity and rainfall variability in Northeastern Brazil. *International Journal Semiarid, 6*, 87–97. https://doi.org/10.56346/ijsa.v6i6.164

Lucena, R. L., Silva, F. E. B. da, Aprígio, T. R. M., & Cabral Júnior, J. B. (2022a). The influence of altitude on the climate of semiarid areas: Contributions to conservation. *The International Journal of Climate Change: Impacts and Responses, 14*(2), 81–93. https://doi.org/10.18848/1835-7156/CGP/v14i02/81-93

Lucena, R. L., Faria, R. M., Lima, R. K. A., Aprígio, T. R. M., Silva, A. D. G. da, & Souza, S. F. F. (2022b). Temperatura e sensação térmica na depressão sertaneja: Análise da região do Seridó no semiárido brasileiro. *Revista Ibero-Americana de Ciências Ambientais, 12*, 85–97. https://doi.org/10.6008/CBPC2179-6858.2021.011.0009

Macêdo, F. I. P. (2013). *Os impactos econômicos ocasionados pela turistificação na cidade de Lagoa Nova – RN* (Monografia de graduação, Universidade Federal do Rio Grande do Norte). Repositório Institucional UFRN. https://repositorio.ufrn.br/handle/123456789/37591

Malvezzi, R. (2007). *Semiárido: Uma visão holística*. Confea.

Marengo, J. A. (2008). Vulnerabilidade, impactos e adaptação à mudança do clima no semiárido do Brasil. *Parcerias Estratégicas, 13*(27), 149–176. https://seer.cgee.org.br/parcerias_estrategicas/article/view/329

Marengo, J. A., Rodrigues-Filho, S., & Santos, D. V. (2021). Impacts, vulnerability and adaptation to climate change in Brazil: An integrated approach. *Sustainability in Debate, 11*(3), 14–23. https://doi.org/10.18472/SustDeb.v11n3.2020.35624

Matzarakis, A., Freitas, C. R. de, & Scott, D. (2004). *Advances in tourism climatology*. Berichte des Meteorologischen Institutes der Universität Freiburg.

Medeiros, J. F. de, & Cestaro, L. A. (2018). Os brejos de altitude no contexto das áreas de exceção do Nordeste brasileiro. *Revista de Geociências do Nordeste, 4*, 126–146. https://doi.org/10.21680/2447-3359.2018v4n0ID16088

MGF Imóveis. (2023). *Casas em condomínio à venda em Lagoa Nova no Rio Grande do Norte*. https://www.mgfimoveis.com.br/venda/casa-em-condominio/rn-lagoa-nova

Mieczkowski, Z. (1985). The tourism climatic index: A method of evaluation of world climates for tourism. *Canadian Geographer, 29*(3), 220–233. https://doi.org/10.1111/j.1541-0064.1985.tb00365.x

Moura, E. F. S. de, Araújo, M. V. P., & Oliveira, P. W. S. (2015). A relevância do planejamento turístico sustentável para o fomento da atividade turística na cidade de Lagoa Nova/RN. In *Anais do XII Seminário Anual da Associação Nacional de Pesquisa e Pós-Graduação em Turismo*. ANPTUR.

Moura, E. F. S. de. (2021, novembro 17). *Levantamento de informações sobre o turismo de segunda residência no município de Lagoa Nova/RN* [Entrevista concedida a Ronnieplex de Moura Cruz via WhatsApp].

MTur. (2022). *Relatório de atividades turísticas: Lagoa Nova – RN*. https://www.mapa.turismo.gov.br/mapa/init.html#/home

Natal Online. (2023). *Lagoa Nova*. https://www.natalonline.com/interior/lagoa-nova

Nunes, E. (2006). *Geografia física do Rio Grande do Norte*. Imagem Gráfica.

Oliveira, E. J. de. (2016). A dinâmica do setor de serviços em áreas de turismo e lazer: Uma análise do litoral sul potiguar (Brasil). *CaderNAU, 9*(1), 44–67. https://periodicos.furg.br/cnau/article/view/6579

Oliveira, P. R. A. (2018). *Vilegiatura e urbanização em cidades serranas do Nordeste brasileiro* (Tese de doutorado, Universidade Federal do Ceará). Repositório Institucional UFC. https://repositorio.ufc.br/handle/riufc/37029

Oliveira, V. L. L., & Nascimento, C. R. T. (2023). O aquecimento turístico de Tibau/RN: Um estudo de caso sobre segunda residência. *Research, Society and Development, 12*(9), 1–18. https://doi.org/10.33448/rsd-v12i9.40696

One Planet Sustainable Tourism Programme. (2021). *Glasgow declaration: A commitment to a decade of climate action*. https://www.oneplanetnetwork.org/programmes/sustainable-tourism/glasgow-declaration

Pereira, A. Q., Dantas, E. W. C., & Gomes, I. R. (2016). *Lazer na praia: Segunda residência e imobiliário turístico no Nordeste*. Imprensa Universitária.

Pereira, A. Q., Dantas, E. W. C., & Vieira, K. D. (2024). Brasil, país das segundas residências metropolitano-litorâneas. *Confins: Revista Franco-Brasileira de Geografia, 62*. https://doi.org/10.4000/confins.57002

Rosselló-Nadal, J. (2014). How to evaluate the effects of climate change on tourism. *Tourism Management, 42*, 334–340. https://doi.org/10.1016/j.tourman.2013.11.006

Rutty, M., Steiger, R., Demiroglu, O. C., & Perkins, D. R. (2021). Tourism climatology: Past, present, and future. *International Journal of Biometeorology, 65*, 639–643. https://doi.org/10.1007/s00484-020-02070-0

Sá, I. B., & Silva, P. C. G. (2010). *Semiárido brasileiro: Pesquisa, desenvolvimento e inovação*. Embrapa Semiárido.

Santos, J. E., Fernandes, M. J. C., & Soares, M. M. (2013). Turismo, (re)produção e expansão urbana em pequenas cidades: Uma leitura geográfica sobre Martins-RN/Brasil. *Revista de Geografia (UFPE), 30*(1), 279–300. https://periodicos.ufpe.br/revistas/index.php/revistageografia/article/view/229061

Santos, P. P., & Vilar, J. W. C. (2018). A territorialização da segunda residência no litoral de Sergipe (Brasil). *Revista de Geografia (UFPE), 35*(3), 197–218. https://periodicos.ufpe.br/revistas/revistageografia/article/view/229404/30004

Scott, D., Hall, M., & Stefan, G. (2012). *Tourism and climate change: Impacts, adaptation and mitigation*. Routledge.

Scott, D., Rutty, M., Amelung, B., & Tang, M. (2016). An inter-comparison of the holiday climate index (HCI) and the tourism climate index (TCI) in Europe. *Atmosphere, 7*(80), 1–17. https://doi.org/10.3390/atmos7060080

Sette, D. M., & Ribeiro, H. (2011). Interações entre o clima, o tempo e a saúde humana. *InterfaceHS: Revista de Saúde, Meio Ambiente e Sustentabilidade, 6*(2), 37–51. https://www3.sp.senac.br/hotsites/blogs/InterfacEHS/wp-content/uploads/2013/08/3_ARTIGO_vol6n2.pdf

Silva, A. D. G., Santos, A. L. B., Santos, J. M., & Lucena, R. L. (2022). Balanço hídrico climatológico e classificação climática do estado do Rio Grande do Norte. *Revista Brasileira de Climatologia, 30*, 798–816. https://doi.org/10.55761/abclima.v30i18.15240

Silva, R. S. A. da. (2021, dezembro 15). *Levantamento de informações sobre o turismo de segunda residência no município de Lagoa Nova/RN* [Entrevista concedida a Francisco Ronnieplex de Moura Cruz].

Singh, T. V. (1977). Climatology of recreation: An appraisal of climate as resource-input in Indian tourism. *Tourism Recreation Research, 2*(1), 1–12. https://doi.org/10.1080/02508281.1977.11014935

Taveira, M. S. (2023). *Inventário turístico: Lagoa Nova/RN – Edição 2022 – 2023.* UFRN/FELCS.

Taveira, M. S. (2018). Fenómeno de segunda residencia y actividad turística en Brasil: La realidad del Seridó Potiguar. In T. M. M. Martínez (Coord.), *Turismo residencial: Nuevos estilos de vida: De turistas a residentes* (pp. 275–286). Publicacions de la Universitat d'Alacant.

Taveira, M. S. (2016). *Inventário Turístico: Lagoa Nova/RN – Edição 2016.* EDUFRN. https://repositorio.ufrn.br/jspui/handle/123456789/23416

Tulik, O. (1995). Residências secundárias: As fontes estatísticas e a questão conceitual. *Revista Turismo em Análise, 6*(2), 26–34. https://doi.org/10.11606/issn.1984-4867.v6i2p26-34

World Tourism Organization. (2023). *Climate action in tourism sector: An overview of methodologies and tools to measure greenhouse gas emissions*. UNWTO. https://doi.org/10.18111/9789284423927

World Tourism Organization, & United Nations Environment Programme. (2008). *Climate change and tourism: Responding to global challenges*. UNWTO. https://doi.org/10.18111/9789284412341

Valença, M. R. A. (2015). A apropriação mercadológica da natureza na produção do espaço pelo turismo de segunda residência em Gravatá. *Revista Movimentos Sociais e Dinâmicas Espaciais, 4*(1), 129–149. https://periodicos.ufpe.br/revistas/index.php/revistamseu/article/view/229873

Velasco, S. M., Garcia, M. O., & Barquín, R. C. S. (2014). Cambio climático y turismo: Uma aproximación a su estado de conocimiento. *Turismo em Análise, 25*, 527–551. https://doi.org/10.11606/issn.1984-4867.v25i3p527-551

Yang, G., & Jia, L. (2022). Estimation of carbon emissions from tourism transport and analysis of its influencing factor in Dunhuang. *Sustainability, 14*(21). https://doi.org/10.3390/su142114323