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THE POSSIBILITIES OF REMOTE SENSING IN RESEARCH ON TOURISM URBANIZATION

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ABSTRACT

Purpose: The paper aims to establish the contributions of the use of remote sensing for the analysis of tourism urbanization.

Methodology/Approach: This study is characterized as exploratory and descriptive supported by bibliographic research as a data source. For this, the databases Science Direct, Scientific Electronic Library Online - Scielo, Portal de Periódicos CAPES, EBSCOhost Online Research Databases - EBSCO, Google Scholar, Emerald, SAGE, SCOPUS and Web of Science were consulted. Published research gathered the studies on tourism urbanization through the use of geotechnologies, specifically remote sensing.

Originality / Relevance: This study meets the research gap in the analysis of the methodologies used in the study of tourist urbanization. Theoretical studies should be carried out to make it possible to identify the scenario of academic production concerning the subject under investigation, to elaborate the state of the art of this theme.

Findings: Between the eleven articles identified, only six precisely addressed the topic of this research. From the few studies found, it was possible to observe that tourism researchers have not yet mastered geotechnologies for the study of tourism urbanization, signalling a gap that deserves attention, as it indicates new research possibilities on the subject.

Theoretical contributions: The research carried out offers an overview of research that is supported by remote sensing as a methodological tool demonstrating the feasibility for incorporating geotechnologies in future research on the topic.

Keywords: Tourism. Tourism Urbanization. Research Methodology. Geotechnologies. Remote sensing.

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AS POSSIBILIDADES DO SENSORIAMENTO REMOTO NAS PESQUISAS SOBRE URBANIZAÇÃO TURÍSTICA

RESUMO

Objetivo: O artigo tem como objetivo estabelecer as contribuições do uso do sensoriamento remoto para a análise da urbanização turística.

Metodologia/abordagem: Esse estudo se caracteriza como exploratório e descritivo apoiado na pesquisa bibliográfica como fonte de dados. Para isso foram consultadas as bases de dados Science Direct, Scientific Electronic Library Online – Scielo, Portal de Periódicos CAPES, EBSCOhost Online Research Databases – EBSCO, Google Acadêmico, Emerald, SAGE, SCOPUS e Web of Science. Foram reunidas pesquisas publicadas em que foi constatado o estudo da urbanização turística por meio do uso de geotecnologias, especificamente o sensoriamento remoto

Originalidade/Relevância: Esse estudo vai ao encontro da lacuna de pesquisa na análise sobre as metodologias utilizadas no estudo da urbanização turística. Convém a realização de estudos teóricos que possibilitem identificar o cenário da produção acadêmica sobre o tema, visando elaborar o estado da arte dessa temática.

Principais resultados: Foram identificados 11 artigos, sendo que somente 6 abordavam exatamente o tema dessa pesquisa. A partir dos poucos estudos encontrados, foi possível observar que os pesquisadores do turismo ainda não dominam as geotecnologias para estudo da urbanização turística, sinalizando uma lacuna que deve ser considerada, possibilitando novas pesquisas sobre o tema.

Contribuições teóricas: A pesquisa realizada oferece uma visão geral de pesquisas que estão apoiadas no sensoriamento remoto como ferramenta metodológica demonstrando a viabilidade para incorporação das geotecnologias em pesquisas futuras sobre urbanização turística.

Palavras-chave: Turismo. Urbanização turística. Metodologia de Pesquisa. Geotecnologias. Sensoriamento Remoto.

INTRODUCTION

Although the attractions are a necessary condition for tourist activity, they are not a sufficient condition for their performance. Tourism depends on the existence of tourist and support infrastructure, which encompasses everything that serves the resident population, but at the same time will be used by tourists. The production and consumption of the territory - for tourism or not - don't exclude other uses and appropriations. The spatial incidence of tourism coincides with other contemporary social practices, with different uses and territorial appropriations, in addition to the territorial pre-existence of historical heritage (Paiva & Vargas, 2013). The tourist activity, therefore, involves different processes of formation of the territory through tourist urbanization. Since tourist flows are more consistent where material and infrastructure conditions are, that is urbanized areas.

But, not only does urbanization cause tourism, but tourism also causes urbanization. Mullins (1991) referred to tourism urbanization as the process in which cities or part of cities, enclaves, are built and rebuilt to meet the needs of tourists. It is important to emphasize that urbanization and tourism urbanization are not exclusive processes; both can influence the same tourist destination.

Contemporary urbanization, supported by tourism urbanization, highlights the relevance of seeking ways to identify, monitor and manage urban dynamics. To do so, better understand the issues that arise in the territory, as they are diversified and constantly changing processes. The use of remote sensing is in line with research on urbanization, achieving fundamental advances, which allow, in addition to the observation of urban spots and if inserted in a Geographic Information System - GIS, they can generate even more complete results.

GIS is widely used today and offers a significant contribution to urban correlation studies, as it manages to combine data from different sources and georeferenced this information on a map, for example (Leite, 2011).

The last few decades increased the development and propagation of the possibilities of applying geotechnologies in studies of the analysis of the urban structure. The use of new techniques, within the scope of geotechnologies, can offer new approaches to deal with urban planning issues and, in

the same way, to investigate tourist urbanization. It is providing an expansion of intra-urban understanding, especially with remote sensing images that have achieved high-quality resolutions of objects such as the urban fabric.

Given the above, the question that guided this research was: What are the possible contributions of the use of remote sensing for research on tourism urbanization? The aim is to establish the contributions of the use of remote sensing for the analysis of tourism urbanization.

The elaboration of this study is justified by the research gap in the analysis of the methodologies tourism urbanization investigations. Theoretical studies should be carried out to make it possible to identify the scenario of academic production concerning the subject under investigation, to elaborate the state of the art of this theme.

THE STUDY OF TOURIST URBANIZATION

The discussion on tourism urbanization seeks to understand the social forces that act in tourism and their specificities. For this, it is essential to critically understand the urban processes that work in the urbanization triggered by the tourist activity.

The first studies that addressed the concept of tourism urbanization started with Mullins (1991). The author presents initial thoughts on the conceptualization and relations of tourism urbanization. To make his explanations, clear Mullins (1991) researched with a case study applied to the Australian coast, in the Sunshine Coast and Gold Coast. At the time, secondary data, such as employment index, income, job distribution, main economic sectors, among others, were used to support their analyzes.

Based on Mullins (1991), Gladstone (1998) also developed some research on tourism urbanization and elaborated a case study in North American cities, highlighting Las Vegas, Reno, Atlantic City and Orlando. The main difference between these studies was the choice of the object of study in which cases of cities planned for entertainment were the target (Gladstone, 1998). Despite this difference, both studies rely on the same types of data. However, they present divergent conclusions.

In Brazil, the theme of tourism urbanization gained prominence with Silva (1997) from a theoretical analysis of the appropriation of the

territory by tourist activity. The author discusses the relationship between tourism and urbanization and points out that its consequences are more significant in cities and predominantly tourist centres, resulting in less significant repercussions where there is a diversified economic base.

Lopes Jr. (1997) developed his thesis analyzing the case of Natal / RN from the perspective of the symbolic and concrete dimensions of the process of transforming cities, in this case, into cities of pleasure. For this, Lopes Jr. (1997) used documentary and field research, conducting on-the-spot interviews with the actors involved in tourist activity.

Luchiari (1999) presented his thesis on tourism urbanization and added some specificities to the concept, which made it possible to relate tourism urbanization not only to the tourist phenomenon but also to the phenomenon of the second residence. The author conducted a case study in the city of Ubatuba / SP rethinking some of Mullins' (1991) propositions, establishing a conceptual framework for the relationship between the place and the world. Luchiari (1999) relied on documentary research and added field research that made it possible to conduct interviews with social groups of interest.

Based on these pioneering studies, several pieces of research were developed on tourism urbanization that contributed to the discussion of the concept. Also, it made it possible to understand the characteristics of this phenomenon. However, as it is a social phenomenon and in constant transformation, there are still aspects to be addressed, not exhausting the research theme.

Other authors who studied tourism urbanization relied on seminal concepts and gave new approaches. Çevirgen and Kesgin (2007) observed from public managers and members of civil society organizations point of view on the consequences of tourism urbanization. In the same way, Araújo and Vargas (2013) analyzed the contribution of the State and the market in the process. Tourism urbanization was also studied from the relationship with the existing urban space (César, 2010; César & Viana, 2013; Nepal, 2017), as a dynamic producer of tourist enclaves (Araújo & Pereira, 2011; Körössy; Cordeiro & Simões, 2014), and positive and negative impacts (Aires & Fortes, 2010; Mascarenhas, 2004). Still, Soto and Clavé (2017) addressed the relevance of urban planning tools in the management of coastal territory in regions urbanized by tourism.

Studies on tourism urbanization have gaps in terms of research methodology, as the diversity of methodological procedures is small.

Current scientific production related to the study on tourism urbanization suggests how researches focus on similar data collection and analysis processes, in which the use of bibliographic and documentary sources prevails in addition to interviews (Çevirgen & Kesgin, 2007; Aires & Fortes, 2010; Araújo & Pereira, 2011; Araújo & Vargas, 2013; César & Vianna, 2013; Körössy; Cordeiro & Simões, 2014; Silveira & Rodrigues, 2015; Dedekorkut-Howes & Bosman, 2015; Nepal, 2017). On the one hand, it suggests the feasibility and validity of studies in this methodological design. However, in secondary analysis, it motivates the proposal of new researches that bring a density of information that allows the crossing of variables and correlations that are still little used, through other research methodologies, such as the use of geotechnologies and the analysis of the landscape.

THE USE OF REMOTE SENSING FOR THE STUDY OF URBAN TERRITORY

The geographic information technologies, also known as geotechnologies, provided gains for society, by promoting the use of instruments to assist in the management and planning of the use of the territory and its resources. Optical sensors developed to offer data from the Earth's surface are increasingly available.

The LanSat sensor and the Aster sensor are mentioned, both optical sensors, which were placed at the orbital level to obtain images of the planet's surface, and deserve to be highlighted because they offer a historical series of data. Luchiari (2001) states that these sensors allows the representation of the terrain at a given time, and make it possible to monitor the dynamics of a phenomenon at annual intervals or longer intervals. These monitoring are related to changes in land use, urban expansion, deforestation of forest areas, among others. The analysis of images from a historical series supports the development of forecasts, future scenarios and trends for a given area (Luchiari, 2001).

Kurkdjian (1988) has already demonstrated the relevance of using Orbital Remote Sensing as an auxiliary instrument to monitor urban growth, notably concerning its physical space. For the author,

"artificial satellites for surveying natural resources offer great potential for monitoring natural features and produced by human action, on the Earth's surface" (Kurkdjian, 1988, p.1). In 1973, the National Institute for Space Research - INPE started some studies of urban growth based on the use of the technique of registering orbital images. Another advance was the dissemination of Geographic Information Systems, with emphasis on the processing and analysis of georeferenced data, with the ability to generate maps quickly and accurately.

Advances in geotechnologies are in the interpretation of the data obtained, especially about information technology, which has become essential for the processing and analyzing images. "Through digital image processing techniques, it is possible to apply a series of computational routines to the data, to allow the extraction of specific information about certain features of interest to the researcher" according to Luchiari (2001, p.49).

According to Leão (2012), it is interesting to emphasize how geographic information systems have enabled the integration and manipulation of various urban data with different scales and formats.

The apprehension of the different elements in the territory and their relations, the synoptic and multispectral vision of the urban land, and the rapid identification of the new areas incorporated into the built territory, through the production of a multitemporal coloured image of the city in which the growth areas appear, allows evaluating the urban formation process in a way that is difficult to be carried out exclusively by conventional methods of field survey (Kurkdjian, 1988).

Even though it is a dynamic process, it can be useful for urban planning and management to analyze the way a city has at a given moment in its history (Leão, 2012). In this case, one can assess the relationship between the shape of the town and issues existing in the territory.

Currently, it is feasible to obtain information about the urban territory through satellite images with different spatial resolutions organized in Geographic Information Systems - GIS. These systems open the possibility of integrating and crossing various data from urban land with different scales and formats (Leão, 2012).

Therefore, the power of integrating the techniques that makeup geotechnologies is

highlighted here, highlighting the relationship between remote sensing and GIS. As Leite (2011) puts the first as a data source, it is fundamental for understanding the territory. In contrast, the GIS uses the data provided by remote sensing, being able to cross it with data from other sources, to generate diverse information from the area of study.

The various satellite products currently offer an adequate temporal frequency and spatial resolution over the urban territory. And about the cost of obtaining the images, it is noteworthy that today many images are available in online databases free of charge. Noteworthy is the access to the content provided by the National Institute for Space Research - INPE, NASA and the European Space Agency.

This proposal refers to the visual interpretation and discrimination of the elements of the urban surface. According to Kurkdjian (1988), the applications of remote sensing (orbital or not) in the urban territory, occur in two lines. The first focused on knowledge and action on the urban system in general concerning the full city and regional spaces; the second focused on intra-urban studies.

METHODOLOGY

The research developed is characterized, according to its aim as exploratory and descriptive. It presents the bibliographic universe as a research source, following the qualitative approach.

In the exploratory stage, through consultation with secondary sources, studies using remote sensing for the analysis of tourist urbanization were identified, through the survey in the databases Science Direct, Scientific Electronic Library Online - Scielo, Portal de Periódicos CAPES, EBSCOhost Online Research Databases - EBSCO, Google Scholar, Emerald, SAGE, SCOPUS and Web of Science. For the search, two keywords were used: "tourist urbanization" and "remote sensing" in Portuguese, English and Spanish.

The data found was described, showing the characteristics of the papers found regarding the contributions of the use of remote sensing as a procedure for collecting and processing data for the research of tourism urbanization.

The findings are organized in a combination of descriptive statistical techniques, using Microsoft Excel to produce the graphs and qualitative analysis

of the information, which enabled the interpretation of what was found in the searches.

This type of research is widely used in the academic environment, mainly as an initial stage of some research project, as it offers a survey of the state of knowledge on the chosen subject. Thus, it is possible to cite some research with similar methodological design as Rejowski (2010), Milito, Marques and Alexandre (2013), Godoy and Leite (2019)

Between the eleven articles identified, only six precisely addressed the topic of this research, on repeated cases which counted only one entry.

Therefore, the research covered the period from April to May 2018. When identifying the data, all articles were read to verify compatibility with the research interest, and contribution to meeting the aim. The contributions of each paper and the relations with the categories of tourism urbanization that have spatial implications spatially were analyzed.

RESULTS AND DISCUSSION

The analysis of articles published in the databases for scientific research establishes the contributions of the use of remote sensing for the study of tourist urbanization.

In the first analysis, the results identified the following information: title, journal, published year and authors (Chart 1).

Among the twenty-two articles identified in the research, three address precisely the research and analysis of tourism urbanization through the use of remote sensing and three other publications use terms similar to tourism urbanization that denote its meaning as urbanization related to the increase in activities related to tourism (Murali, Vethamony, Saran & Jayakumr, 2006), urban growth in response to the expansion of the tourism industry (Kityuttachai, Tripathi, Tipdecho & Shrestha, 2013) and tourism land use and land cover (Vijay et al., 2016). These six were chosen for analysis of this study.

About the other articles, one was not possible to access in full, therefore discarded, the remainder only cited the term “tourism urbanization” once in its text, referring as an example of the type of research theme. There were also cases in which the keywords included titles of bibliographic references cited in the text body, which does not necessarily imply that the article dealt with the subject in a specific way. One result dealt with the theme of tourism urbanization, but did not use remote sensing. And, finally, some articles had nothing to do with tourism urbanization.

In the following are the contributions of each article to the development of research on tourist urbanization.

Title	Journal	Year	Authors
Change detection studies in coastal zone features of Goa, India by remote sensing.	Current Science	2006	R. Mani Murali; P. Vethamony; A. K. Saran; S. Jayakumar
CA-Markov Analysis of Constrained Coastal Urban Growth Modeling: Hua Hin Seaside City, Thailand.	Sustainability	2013	Kritsana Kityuttachai; Nitin Kumar Tripathi; Taravudh Tipdecho; Rajendra Shrestha
Spatiotemporal simulation of tourist town growth based on the cellular automata model: the case of Sanpo town in Hebei Province.	Abstract and Applied Analysis	2013	Jun Yang; Peng Xie; Jianchao Xi; Quansheng Ge; Xueming Li; Fanqiang Kong
Turismo, produção do espaço e urbanização: evolução do uso e ocupação do solo de Lavras Novas, Ouro Preto-MG	Caderno de Geografia	2014	Guilherme Fortes Drummond Chicarino Varajão; Alexandre Magno Alves Diniz
Assessment of tourism impact on land use/land cover and natural slope in Manali, India: a geospatial analysis	Environ Earth Sci	2016	Ritesh Vijay; Vikash K. Kushwaha; Ardhendu S. Chaudhury; Kasturi Naik; Indrani Gupta; Rakesh Kumar; S. R. Wate
Tourism sectorization opportunity spectrum model and space partition of tourism urbanization area: a case of the Mayangxi ecotourism area, Fujian province, China	Journal of Mountain Science	2017	Hui Tao; Jia-ming Liu; Yu Deng; Ao Du

Table 1: Articles published using remote sensing to address the tourism urbanization
Source: elaborated by the author with research data, 2018.

As can be seen in Table 1, the articles are in journals from different areas of knowledge, and none is in a specific journal in the field of tourism. It is noticed that tourism urbanization is still little addressed by researchers in the field of tourism. On the other hand, this absence of publications in

journals specialized in tourism research is attributed to the use of remote sensing as a research methodology more common in Geography, Urban Planning, Architecture and Urbanism, making this methodological procedure most frequently used by researchers from areas other than tourism.

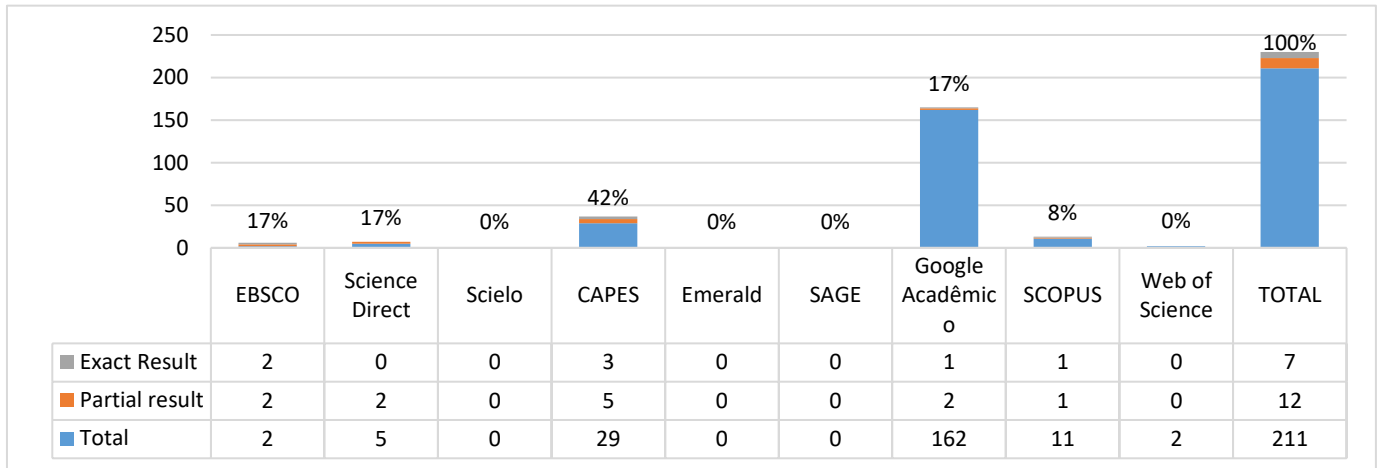


Figure 1. Distribution of published articles according to the research databases
Source: elaborated by the authors with research data, 2018.

Figure 1 shows the databases in which are the identified articles, it is possible to notice that although the searches return a considerable number of results, in the case of multidisciplinary databases, the results followed this same line, that is, presented research from different areas of knowledge. When proceeding to verify the results, the studies from other areas were listed, and because they did not address tourism, were rejected.

Although figure 1 indicates the total of seven specific articles, only six papers were considered, since one refers to a repeated result. The study “Tourism sectorization opportunity spectrum model and space partition of tourism urbanization area: a case of the Mayangxi ecotourism area, Fujian province, China” by Tao, Liu, Deng and Du (2017) was found both in the SCOPUS database and in CAPES Journal Portal.

The Scielo, Emerald and SAGE databases did not show any results for keyword searches in any language. In the Web of Science database, the search returned two articles that did not meet the criteria. In the Science Direct survey of the five results, two papers partially met the requirements, and after reading, it was found that they were not specific results.

According to the articles highlighted in this research, a diversity of themes was identified below: changes in the coastal zone related to tourist activity (Murali et al., 2006); the dynamics of horizontal urban expansion due to the expansion of tourism (Kityuttachai et al., 2013); development trends and growth model of tourist urbanization (Yang et al., 2013); the evolution of land use and occupation related to human actions aimed at economic activities (Varajão & Diniz, 2014); the impact of tourism on land use and land cover (Vijay et al., 2016) and; a spatial partition model for tourist urbanization (Tao, Liu, Deng & Du, 2017).

Among the six articles analyzed, it is possible to observe the distribution regarding the location of the study objects on only two continents, five in Asia and only one in South America (Figure 2). The surveys by Murali et al., (2006) were in Goa, India, as well as the surveys by Vijay et al. (2016) in the Province of Manali, India. Still, on the Asian continent, Yang et al. (2013) studied Sanpo Town in Hebei Province, China and Tao, Liu, Deng & Du (2017) analyzed the Mayangxi ecological area in Fujian, China. And Kityuttachai et al. (2013) presented Hua Hin in Thailand as an object of study. The only case outside Asia is the research by Varajão and Diniz (2014) in the state of Minas Gerais in southeastern Brazil.

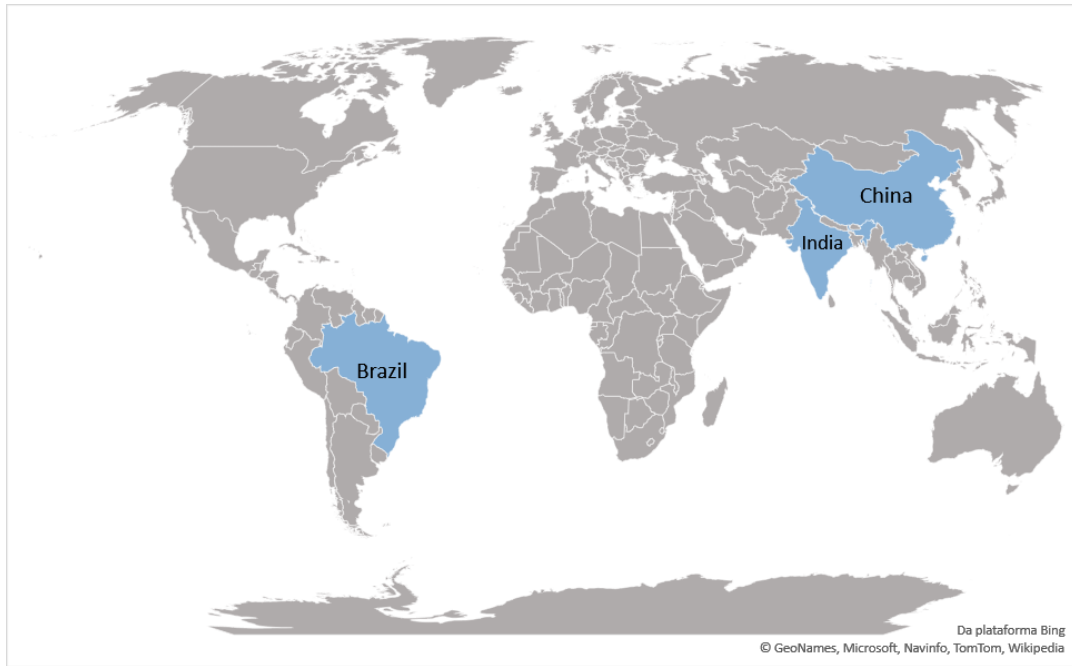


Figure 2: Location of the study cases of the analyzed papers
Source: elaborated by the authors with research data, 2018.

The diversity of themes represents the research possibilities allow associate remote sensing as a data collection procedure and the tourism urbanization process present in the territory.

Murali et al. (2006) seek to carry out an analysis of detection of changes in the coastal zone of Goa, India. From this research, they concluded that the changes in urbanization are attributed to the increase in activities related to tourism. As a methodological strategy, remote sensing data was acquired, which, submitted to digital processing, provided information on soil cover. After mapping the characteristics of land use and land cover in the study area for three different years, it was possible to detect the changes that occurred in the study region for thirteen years.

The research by Kityuttachai et al. (2013) focuses on examining the association between the type of land use and changes in its use as a contribution to sustainable land use planning. For this, the authors integrated geographic information, a statistical model and Markov's cellular automaton (CA) analysis. The results show that the dynamics of horizontal urban expansion of the coastal city of Hua Hin is limited by the coast, making the sustainability of this tourist destination a problem.

When analyzing the research by Yang et al. (2013), the authors choose the application of the cellular automaton to simulate the urbanization of tourist

cities. From the selection of the appropriate and limiting elements based on the needs of tourist cities for the development and protection of tourist resources, the expansion of the traditional CA parameters system was processed and the CA model for tourist city was established to simulate the form of development Sanpo 2010 to 2020.

In Varajão and Diniz (2014) the research developed presents the evolution of use and occupation, from the 1960s, in the Lavras Novas region, Ouro Preto district - MG, establishing, when possible, the causal relationships between the transformations identified with human activities and related to the economic activities of each era. From the GPS information collected, images acquired from satellites for the preparation of hypsometric maps, aerial photographs and orthophoto, it was concluded that the urban expansion of Lavras Novas was due to tourism. Mainly from buildings, such as lodging establishments and restoration, aimed at a floating population over local inhabitants.

Vijay et al. (2016) developed a survey to assess changes in land use and land cover in the Manali region and to discover the impact of tourism on land use and slopes. The study used images from 1989, 2000, 2005 and 2012 to detect changes, and also used the ASTER digital elevation model for slope analysis. The research suggests that the impact of tourism assessed the study area through variations in

construction and its expansion at various levels of the slopes over the years. The built-up areas increased, indicating rapid growth in the area. At the same time, the exponential increase in the number of tourists confirms the excessive pressure from tourism in the study area.

Concerning the study by Tao et al. (2017), presented a model of spatial partition for tourism urbanization. The authors associated the Recreation Opportunity Spectrum (ROS) theory with the Geographic Information System to develop Tourist-town Sectorization Opportunities Spectrum (TSOS) to assess areas for tourism production and

consumption, urban area and ecological conservation area. Through the TOSOS model, the authors concluded that it provides a scientific basis for the reconstruction of the space of the new urbanization area and a useful tool to optimize the spatial partition of a tourism urbanization area.

Given the above, it is possible to analyze the interface of each analyzed paper and its contribution to the research of tourism urbanization, from the contribution in the methodological category, enabling general methodological procedures to contributions with tools for the analysis of the theoretical analysis categories (Figure 3).

Authors	Category
Murali et al. (2006)	History
Varajão e Diniz (2014)	
Vijay et al. (2016)	
Murali et al. (2006)	Land use and land cover
Kityuttachai et al. (2013)	
Vijay et al. (2016)	
Varajão e Diniz (2014)	Territory production
Kityuttachai et al. (2013)	Dialectical
Yang et al. (2013)	Methodological implicatiom
Tao et al. (2017)	

Table 2: List of the analyzed articles regarding the theoretical-methodological contribution
Source: elaborated by the authors with research data, 2018.

The research by Yang et al. (2013) and Tao et al. (2017) present replicable models providing theoretical and methodological contributions to the study of tourism urbanization. Regarding the analysis of the historical category of tourism urbanization, the research by Murali et al. (2006), Varajão and Diniz (2014) and Vijay et al. (2016) contribute to the use of time series to identify the development of the urbanization process provided by tourism over the years. The land use and occupation category are also

present in Murali et al., (2006), Vijay et al. (2016) as well as in Kityuttachai et al. (2013) as they address the relationship of transformations from the actions of appropriation of tourist activity with the territory. Varajão and Diniz (2014) highlight, besides the historical category, the production of the territory for tourism consumption, inferring in yet another possibility of a category of analysis of tourist urbanization. And finally, the dialectical category representing the dynamics inherent to tourist

urbanization is analyzed in the research by Kityuttachai et al. (2013), as it seeks to explain changes in land use and urban growth in response to the expansion of tourism activity.

CONCLUSIONS

This study met the proposed objective of establishing the contributions of the use of remote sensing for the analysis of tourism urbanization in research published in scientific journals and available in the databases for research. In all, eleven scientific articles were found, of which only six corresponded to the exact results when researched with the keywords "tourism urbanization" and "remote sensing" and checked their content.

The research on tourism urbanization with remote sensing includes categories of fundamental analysis for understanding the phenomenon since they serve the purpose of seeking to identify, monitor and manage urban dynamics such as history, land use and occupation, production and consumption of the territory and dialectic.

From the few studies found, it is clear that tourism researchers have not yet mastered geotechnologies for the study of urbanization made possible by tourism.

Still, this result signals a gap that should be considered by researchers in tourism and related areas, as it indicates new possibilities for research on the topic. Although remote sensing is a research methodology capable of providing broad product possibilities for the study of urban phenomena, it is worth mentioning that this information does not constitute a result in itself. Any research that incorporates remote sensing must also combine qualitative data to interpret the phenomena and gain an understanding from a socio-spatial perspective.

As an inherent aspect of all scientific research, this work has some limitations since it analyzed only scientific articles published in journals. It is indicated for future research the extension of this research to annals of prominent events in the tourism area. Likewise, future research on dissertations and theses from the Postgraduate Programs in tourism and related fields can help enlarge these results.

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