

Far beyond Covid-19: The negative impacts of other tourism crisis in Corumbá, Mato Grosso do Sul – Brazil

Muito além da Covid-19: Os impactos negativos de outras crises turísticas em Corumbá, Mato Grosso do Sul – Brasil

Mucho más allá del Covid-19: Los impactos negativos de otras crisis turísticas en Corumbá, Mato Grosso do Sul – Brasil

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Abstract

Crisis in tourism are sufficient of motivating adverse behaviors and situations, since concerns about the negative economic impacts generated are inevitable, and some destinations suffer concomitantly with other crisis. Therefore, the present study aims to present that the impacts of the climate crises in the years 2018 to 2021 in Corumbá have important practical implications for the tourist system of Mato Grosso do Sul. In order to answer the research question and achieve the proposed objective, this study presents a theoretical sampling, which addresses the main axes of this research, added to the climate/rainfall variable, which served to explain that an entire chain suffers from drought, in especially tourism, the region's main economic activity, which may continue to undergo further changes due to the rainy season. Furthermore, this study used the quantile statistical technique, adapted from Monteiro, Rocha and Zanella (2012) to analyze climatic factors and their interrelations with tourist activity, comparing with periods of higher incidence of fires in the Pantanal biome. As a result, a major negative impact was observed, with fires and long periods of drought in the Pantanal region that remain to this day, thus damaging navigation, fishing and the entire tourist system in the region. The relevance of this research is justified, considering the difficulty of updating data and discussing a developing topic. However, it is hoped to contribute to and facilitate an increasingly broader and necessary debate on the negative impacts of crises that go beyond Covid-19.

Keywords: Covid-19; Tourism; Crisis.

Resumo

As crises no turismo são capazes de motivar comportamentos e situações desfavoráveis, uma vez que a preocupação com os impactos negativos econômicos gerados são inevitáveis, e ainda alguns destinos sofrem concomitantemente com outras crises. Dessa forma, o presente estudo tem como objetivo apresentar que os impactos das crises climáticas nos anos de 2018 a 2021 em Corumbá têm implicações práticas importantes para o sistema turístico de Mato Grosso do Sul. Para responder à questão de pesquisa e atingir o objetivo proposto, este estudo apresenta uma amostragem teórica, que aborda os principais eixos desta pesquisa, somada à variável clima/precipitação, que serviu para explicar que toda uma cadeia sofre com a seca, em especialmente o turismo, principal atividade econômica da região, que poderá continuar a sofrer novas alterações devido à época das chuvas. Além disso, este estudo utilizou a técnica estatística quantílica, adaptada de Monteiro, Rocha e Zanella (2012) para analisar os fatores climáticos e suas inter-relações com a atividade turística, comparando com períodos de maior incidência de queimadas no bioma Pantanal. Como resultado, foi observado um grande impacto negativo, com queimadas e longos períodos de seca na região do Pantanal que permanecem até hoje, prejudicando a navegação, a pesca e todo o sistema turístico da região. A relevância desta pesquisa justifica-se, considerando a dificuldade de atualização dos dados e discussão de um tema em

desenvolvimento. No entanto, espera-se contribuir e facilitar um debate cada vez mais amplo e necessário sobre os impactos negativos das crises que vão além da Covid-19.

Palavras-chave: Covid-19; Turismo; Crises.

Resumen

Las crisis en el turismo son capaces de motivar comportamientos y situaciones desfavorables, ya que las preocupaciones por los impactos económicos negativos que se generan son inevitables, y algunos destinos sufren concomitantemente con otras crisis. Para dar respuesta a la pregunta de investigación y lograr el objetivo propuesto, este estudio presenta un muestreo teórico, que aborda los ejes principales de esta investigación, sumado a la variable clima/lluvia, que sirvió para explicar que toda una cadena sufre sequía, en especialmente el turismo, principal actividad económica de la región, que puede seguir sufriendo mayores cambios debido a la temporada de lluvias. Además, este estudio utilizó la técnica estadística cuantil, adaptada de Monteiro, Rocha y Zanella (2012) para analizar los factores climáticos y sus interrelaciones con la actividad turística, comparándolos con períodos de mayor incidencia de incendios en el bioma Pantanal. Como resultado, se observó un impacto negativo importante, con incendios y largos períodos de sequía en la región del Pantanal que persisten hasta el día de hoy, dañando la navegación, la pesca y todo el sistema turístico de la región. La relevancia de esta investigación se justifica, considerando la dificultad de actualizar datos y discutir un tema en desarrollo. Sin embargo, se espera contribuir y facilitar un debate cada vez más amplio y necesario sobre los impactos negativos de las crisis que van más allá del Covid-19.

Palabras clave: Covid-19; Turismo; Crisis.

1. Introduction

In the last decade, the impact of epidemic outbreaks on the tourism industry has received a considerable boost due to its negative multiplier effect, thus, from March 2020 to May 2023, a pandemic of unprecedented global restrictions caused the most serious crisis in the economy global since the Second World War. With international travel bans and widespread restrictions on public gatherings and community mobility, virtually all activities, including tourism, have ceased (Gössling et al., 2020).

In this way, the tourism industry is recognized for its vulnerabilities to crises or disasters, as they suffer various influences that do not occur under controlled conditions. This is because tourism emerges from continuous interactions that simultaneously influence and are influenced by its environment (Cró & Martins, 2017).

In this sense, following the evolution of Covid-19 in the state of Mato Grosso do Sul, the impacts were on all sectors of the economy. In the tourism sector, this impact was more significant, since its product requires the tourist to travel in times of reduced mobility and social distancing for consumption.

For Lutz and Lutz (2020), existing literature recognizes that tourists' risk perceptions and attitudes towards destinations are strongly affected by a crisis, leading to a change in travel plans, or even avoiding visiting a destination. Therefore, it is believed that crises harm the tourism industry by reducing revenue from the activity due to the reduction in inbound tourism, even more so when local development is entirely dependent on this sector.

Given the vulnerabilities, interactions and influences, crises affecting tourism can present a decline significant enough for the sector to show major concerns about the long and medium term prospects. But despite the immediate and adverse effects of crises on tourism, in most cases destinations recover as people's needs, desire and motivation to travel make the effect of the crisis non-permanent. (Seabra et al., 2020).

However, the tourist system of Mato Grosso do Sul suffered concomitantly with the climate crisis in the Pantanal, where the lack of rain increased the concentration of fires and fires, which generally occur between the months of July and November, in the state's Pantanal biome, characterized by the dry season, where climatic elements strongly contribute to the vegetation combustion process (Viganó et al., 2017). However, National Institute for Space Research [INPE] satellites recorded a large abnormality in the number of fires (much above average) in the rainiest months in the years 2020 to 2021, mainly due to the low average rainfall in the Pantanal region, mainly in the city of Corumbá.

Thus, currently the fires in the Pantanal Sul-Mato-Grossense represent a real threat for every month of the year, in one of the most preserved biomes and rich in biodiversity in the world, and can cause serious consequences for the maintenance of ecological processes, with repercussions on the activity tourism and even the permanence of man in this natural habitat (Santos & Nogueira, 2015).

Therefore, this study focuses on the negative impacts of other crises on Corumbá's tourism system, which go far beyond Covid-19. In this sense, crises must be seen through multiple perspectives, as they provide substantial analyzes on how tourist destinations can suffer various unfavorable situations concomitant with other crises, lasting longer, making them more impactful than the pandemic itself. (Reddy et al., 2020). Therefore, this study aims to present that the impacts of climate crises in Corumbá have important practical implications for the tourist system of Mato Grosso do Sul.

2. Crisis in Tourism

The consequence of crises in the tourism system is a rapid decline in the total number of tourist arrivals and occupations in accommodation facilities, restaurants, tour operators, airlines, among others. This is because most of the time tourists decide to cancel and/or postpone their trips.

Generally, a crisis that affects the tourism system manifests itself as an event or set of circumstances that compromise or harm the market potential and reputation of a company or an entire region (Pata, 2011).

Beni (2017) cites as examples, occurrences that affect the activity, such as economic, political and social crises; exchange rate fluctuations; seasonal instabilities in demand; geological and meteorological hazards; operational conflicts in modes of transport, air traffic control or failure in computerized reservation systems; terrorism; and epidemic risks.

The World Tourism Organization United Nations Agency [UNWTO] (2011, p. 15) divides tourism crises into five categories: 1. environmental, including geological and extreme weather events, and human-induced situations, such as climate change and deforestation; 2. societal and political, including riots, crime waves, terrorist acts, rights abuses, coups, violently contested elections; 3. health-related, such as disease epidemics that affect humans or animals; 4. technological, including transport accidents and IT system failures; 5. economic, such as large exchange rate fluctuations and financial crises; in addition, specific events may affect individual companies, such as: 6. accidents that affect customers in the public area, eg traffic accidents, robberies, drownings; 7. accidents or events within an individual company, eg fire, injury, food poisoning.

For Kim and Lee (1998), there are two major categories of crises related to tourism: those that are beyond the control of managers, public and private, such as natural disasters, disease epidemics and sudden global economic events, and those resulting from a failure of management and government to deal with foreseeable risks. This includes (within a company), mismanagement or leadership, financial fraud, loss of data, destruction of the place of business due to fire, flooding with inadequate or no insurance coverage; and (at the level of a region or country), acts of war or terrorism, political upheavals, crime waves and climate change.

In the last 20 years, the tourist activity has gone through several significant crises, which invariably led to reductions in tourist arrivals and income. Misrahi (2016) notes that the September 11, 2001 attacks on New York led the US government to close airports with thousands of flights cancelled; and even when they reopened, flight demand dropped 30% during the initial period of shock, and New York hotels took nearly three years to recover from the attacks.

Changes and reductions in the number of tourists were also observed with the terrorist attacks in 2004 and 2005, in Madrid and London (of smaller proportions), respectively. Thus, for Gouveia, Guerreiro and Rodrigues (2013) "the terrorism presented was understood as a psychological war, and consequently a trend was generated that favored short-distance tourist flows".

With the global financial crisis of 2008/09, the tourism system also suffered a significant decline and changes in travel habits, including a decrease in long-haul travel in favor of interregional and domestic travel (UNWTO, 2011). In addition, between 2009/2010, the first pandemic of the 21st century emerged, H1N1.

Segund Beni and Mazarro (2012), in 2011 the economic crisis emerged with greater intensity in the US, which for the first time lost the maximum score of international investment agencies. This crisis also affected indebted European countries, such as Portugal, Spain and Italy. Between 2014 and 2015, again some European countries suffered terrorist attacks, as well as Africa and the Middle East (Vieira, 2016).

As seen, the tourism industry has faced numerous crises in the past, however, the crisis resulting from the Covid-19 outbreak remains by far the most damaging. A pandemic of unprecedented global travel restrictions has caused the most severe crisis in the global economy since World War II. With international travel bans and widespread restrictions on public gatherings and community mobility, virtually all activities, including tourism, have ceased (Gossling, Scott & Hall, 2020).

The evidence on the impacts of Covid-19 on air travel, accommodation and food away from home is devastating, however, after two years of crisis, activities have gradually resumed with easing measures due to the mass immunization of the world's population.

Despite all the adversities, the sector was resuming its activities after a long period, when in the first half of 2022, another crisis arises, this time, caused by the war between Russia and Ukraine. This has global effects in political, economic, humanitarian terms and impacts the world and tourism, generating disturbing and lasting consequences. Both destinations do not have a significant international tourist demand, however, Russia is a country of great geopolitical magnitude, a characteristic that can and is generating immeasurable negative impacts on the aviation sector (fuel and exchange rate), causing increases in ticket prices and until a drop in demand for Eastern European destinations, even those that are absent in the war (Panrotas publishing company, 2022).

As seen, the crises that affect tourism are increasingly constant, with very particular reasons and characteristics. But they convey similar challenges, due to their sensitivity that affects the ability of the tourism system to operate normally.

3. Characterization of the Study Area

Porto, Philippi and Vendramin (2020), state that the Pantanal is the largest floodplain in the world and a World Heritage Site according to United Nations Educational, Scientific and Cultural Organization [UNESCO], which includes ecotourism among its tourist activities, seeking to carry out its activities in a sustainable way, preserving and conserving the beauties natural.

However, for Martins (2018), tourism in the Pantanal, despite being presented primarily as ecotourism, offers in most cases Nature Tourism activities. The Ecological Economic Zoning of the State of Mato Grosso do Sul [ZEE/MS], corroborates the author and recognizes the Pantanal as one of the most relevant tourist regions and uses the term Nature Tourism (Mato Grosso do Sul, 2014).

The municipality of Corumbá, Mato Grosso do Sul is located in the northwest region of the state of Mato Grosso do Sul, under a limestone plateau on the left bank of the Paraguay river at the geographic coordinates: Latitude: 19° 0' 35" South, Longitude: 57° 39 ' 17" West. The municipality is the third largest in the state, with an estimated population of approximately 96,268 inhabitants, according to estimates by the Brazilian Institute of Geography and Statistics [IBGE] for the year 2022.

Located predominantly in the Pantanal plain, the municipality has a particular physiographic landscape of undulating topography and low slope that varies from 80 to 200 meters in altitude, with a complex hydrographic network consisting of 12 rivers, with the Paraguay river as its main drainage axis, with a period subject to flooding in the months between October and March (Mato Grosso do Sul [MS], 2014). For Padovani (2010), this region presents a great diversity of environments, resulting

from its hydrological and phytogeographic heterogeneity, however, according to Soriano (1997) the climate of this region is marked by well-defined seasons, such as dry winter and rainy summer, according to the climate classification. Köppen, which is based on thermal and rainfall records and the distribution of phytogeographical associations, the climate of Corumbá, Mato Grosso do Sul can be classified as AWa, tropical high-altitude climate, megathermal (average temperature of the coldest month is higher than 64,4° F).

As it covers 60% of the Pantanal in the Mato Grosso do Sul, Corumbá is known as the capital of the Pantanal, as some segments of tourism are developed, such as cultural tourism related to festivals and cultural events in the state and sport fishing tourism, due to of the fluvial richness of the Paraguay river and its tributaries. And it is through the Paraguay river that the flow of ores and agricultural products from the Brazilian Midwest is transported to consumer markets in other countries (National Department of Transport Infrastructure [DNIT], 2023).

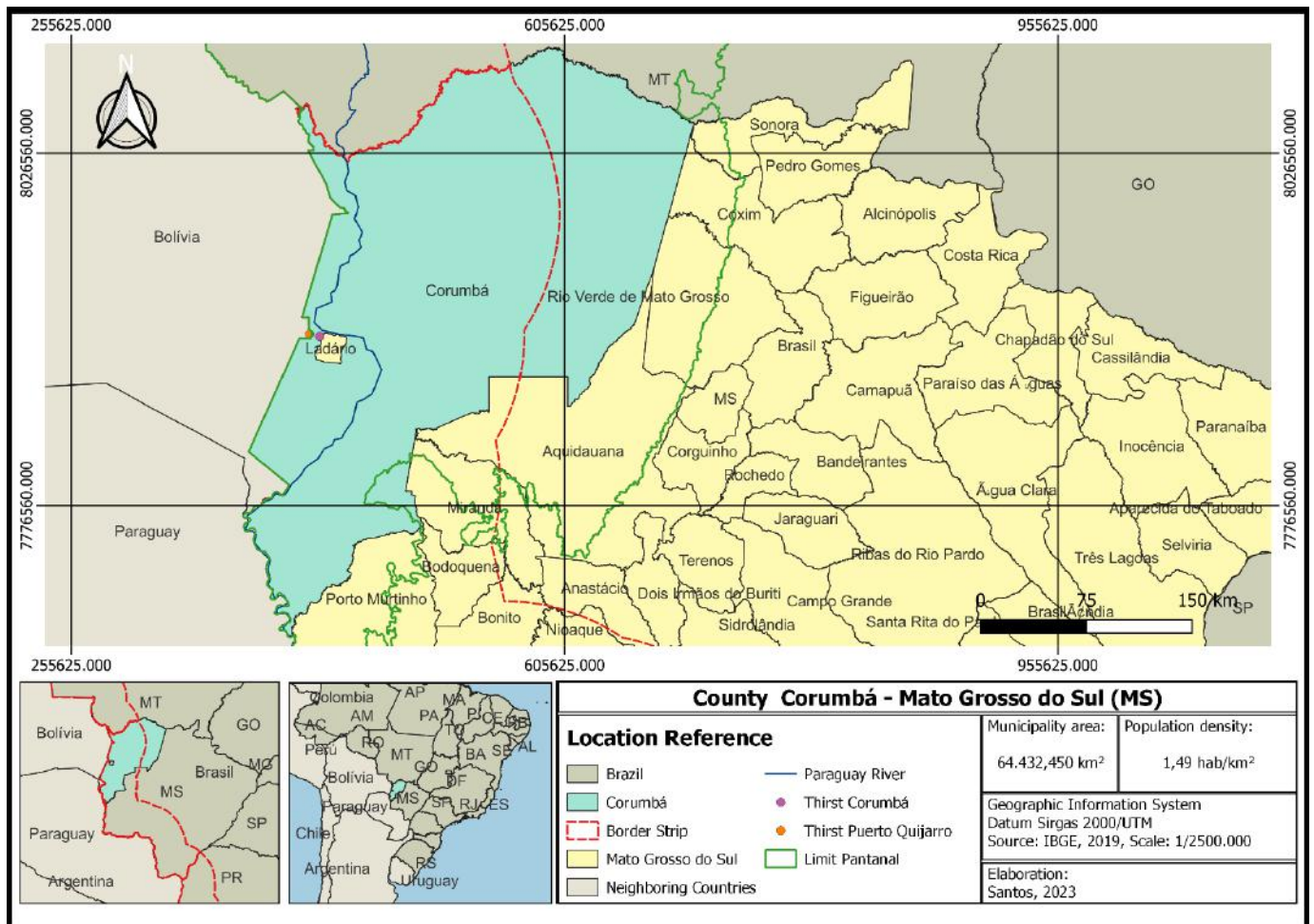
In addition, the Pantanal region is conducive to the contemplation of fauna and flora, boat rides along the rivers of the Paraguay river hydrographic basin, observation of birds typical of the region, safaris and scenic flights (Mariani, Cardozo, Arruda & Silva, 2020). Due to these characteristics, most of the members of the tourist trade in Corumbá are structured to offer alternative tourist products eminently linked to the theme of fishing, since this activity is affected by the piracema period, when fishing in the rivers of the state is prohibited. (Oliveira et al., 2009). This region is also affected by the natural phenomenon of decoada, which occurs in the initial hydrological phase of the flood of the plain, causing physical and chemical changes in the river waters, affecting the quality and proving in extreme cases the mortality of ichthyofauna due to the low availability of dissolved oxygen (DO), a typical phenomenon of floodplains with an abundance of herbaceous vegetation (Brazilian Agricultural Research Company [EMBRAPA], 2013).

However, according to Machado and Costa (2017), a major obstacle to the increment of new alternatives for tourism products are the tourism policies themselves in the municipality and in the state of Mato Grosso do Sul, which have the purpose of stimulating fishing tourism, a since there is a naturalized belief that this segment of tourism is the great potential source of income generation and occupation of Corumbá.

In addition, a criticism that implies the centralization of fishing tourism in Corumbá is that generally the itineraries and packages marketed and offered to tourists have little or no contact between tourists and other tourism products in the municipality, since normally, the tourist arriving in Corumbá (by air or land), is immediately taken to a hotel boat, which offers all the necessary infrastructure to stay for days sailing the Paraguay river, involved only in the practice of sport fishing. Thus, there is no need to consume other tourist products until your return trip, thus, the concern to offer other possibilities and/or complementary ways to fishing tourism (Centurião et al., 2013).

It is also important to point out that in the state of Mato Grosso do Sul, 39 municipalities (48% of the territory) are located in the so-called border strip; of these, 12 are located on the border line, including the municipality of Corumbá, which borders the Bolivian city of Puerto Quijarro (forming a conurbation in the region), a location permeated by intense traffic of people looking for different types of services, but mainly shopping tourism (Oliveira, 2005).

Figure 1 - Location map of the study object.



Source: Santos (2023).

According to Wearing and Neil (2014), the offer and diversification of tourism products are considered alternatives for job creation, since the attraction of tourists to the region can be reflected in other economic sectors, helping to generate income and development local and regional.

4. Tourist System of Mato Grosso do Sul

Tourist activity in Mato Grosso do Sul began even before its division, mainly with the local exploitation of water resources with sport fishing, in the 1960s/70s. Considering that, historically, this region has a flow of fishing activities, this is attributed to the first phase of the development of tourism in Mato Grosso do Sul, whose service provision was related to municipalities such as Corumbá, Aquidauana, among others (Violin & Alves, 2017).

In the 1980s, there was a slight increase in visitors, who were in search of the natural beauties of the Pantanal, however, there were still no tourism professionals to accompany them. In the mid-1980s, with a greater frequency of demands, there was an awakening of farmers to the economic exploitation of tourist activity by charging fees/admission to enter their properties (Barbosa & Zamboni, 2000).

Also for the authors, from 1990 onwards, favorable scenarios for the orderly development of tourism in the state began to emerge, mainly with the rise of tourist activity in Bonito. The United Nations Conference on Environment and Development in 1992, in Rio de Janeiro, Brazil (ECO 92), for example, contributed to the institutionalization of disciplinary

procedures, which in 1993 took place with the beginning of the professionalization of tourism, with the 1st Training Course for Guides in the municipality of Bonito, Mato Grosso do Sul, Brazil.

Therefore, the tourist reality of the state is very recent, and this recent history also reflects a certain delay or immaturity in the way public and private policies for tourism in Mato Grosso do Sul were managed. The need to use tools that minimize the risks and impediments to the development of tourism in the state arises at a time when one of the most important instances of state tourism governance, the State Tourism Forum, is maturing. Thus, the members of the Forum were encouraged to think about tourism in the state in a professional, participatory and technical way, and with that, guide decision-making, pointing out plans and programs for the development of the tourist regions of the State in the medium and long term. (Lunas & Silva, 2016).

However, still for the authors, it was only from 1994 with the National Program for the Municipalization of Tourism [PNMT], that the National Tourism Policies began to establish development guidelines for tourism in the interior of the country, stimulated, above all, by the growing wave of tourist interest in natural attractions.

In this sense, in 1995, with the creation of important municipal laws (No. 689/95; 695/95), Bonito establishes the obligation of accompanying guides on tours, in addition, the Municipal Tourism Council [COMTUR] is created and, consequently, the voucher, which is issued and controlled by the Secretary of Tourism and Environment of Bonito. Marketed by tourism agencies in the municipality, which, on a weekly basis, transfer portions of the proceeds from the sale of tickets to owners, guides and the city hall, for the collection of ISS (Tax on Services). According to the operational procedure adopted, the city hall centralizes the control of the number of people per tour, through a computerized system. Before selling the voucher, the agencies consult this center, which authorizes the release of the visit according to the support limit of each attraction (Barbosa; Zamboni, 2000). Thus, the single voucher adopted in Bonito is the result of the organization of the tourist trade in associations, as well as its effective participation in the municipal management of tourism (Mariani, 2003; Grecchi, Lobo, Martins, Lunas, 2010).

In addition to the beginning of the organization of tourist activity in Bonito, the presentations of some documentaries were also important for the national and international visibility of Mato Grosso do Sul as a tourist destination focused on the segments of rural tourism, adventure and ecotourism (Moretti, 2001; Martins & Martins, 2010; Banducci Júnior, 2001).

Thus, for Mariani, Sorio and Arruda (2008), the potential of the state of Mato Grosso do Sul stands out for its significant tourist potential, especially in the ecotourism segment, given the exuberance of its natural riches, especially in the Pantanal and Serra da Bodoquena, where the municipalities of Corumbá and Bonito are located, respectively.

In addition to these elements, the vegetation cover of the transition between the Atlantic Rainforest, the Cerrado and the Pantanal (Zavala et al., 2017), three of the most important Brazilian biomes. With this, the profusion of species of fauna and flora becomes another attraction for tourists visiting the region. If, on the one hand, the Bonito region presents a privileged landscape, on the other hand, it is necessary to recognize its intrinsic fragility.

The main tourist destinations in Mato Grosso do Sul mentioned so far have different peculiarities, often linked to seasonal factors, so that the main attractions are those linked to natural resources, and the population recognizes the importance of this economic activity for the generation of employment and income (Fagundes & Ashton, 2016).

According to Bernardo and Farinha (2018), this evidence is given, as 40% of the tourist attractions in the State are natural and ecological. It is believed that investments in tourist activities can contribute to the diversification of the economy of the state of Mato Grosso do Sul.

Thus, for Mato Grosso do Sul Tourism Foundation [FUNDTUR/MS] (2006), tourism in the state is linked to environmental issues, more than any other way. Several locations in the state have become refuges for people who seek to live with nature.

However, for Fagundes and Ashton (2016), the state seeks greater diversity in its tourist offer, in order to remain competitive and attract increasing numbers of visitors. To this end, it seeks diversification by investing in different forms of tourism; seeking even better structure to receive the most demanding visitors, specializing in new activities for quality hospitality. For this, the state has invested in infrastructures that meet the demands of tourists, in addition to being present on the route of the Latin American Integration Route [RILA] (Leonel et al., 2017).

One of the diversifications for the state is in the border line (composed of 12 municipalities), where we can highlight Ponta Porã, the municipality integrates with Pedro Juan Caballero-Paraguay, and this integration is facilitated by the dry border line that unites the side Brazilian with the Paraguayan, where shopping tourism developed parallel to this movement across the border line, attracting people from all parts of Brazil (Santos, Silva, Moreira Júnior, 2015; Baptista, Pereira & Sonaglio, 2016).

Furthermore, we should mention the municipalities of Campo Grande and Dourados that are not located in the same mesoregion. And they have different tourist activities from the other municipalities presented here, as they generally have more infrastructure (accommodation, restaurants and other services) than tourist resources. Thus, they have sought to invest in the diversification of economic activities, in which one of their bets is tourism, mainly in activities linked to business and event tourism.

In addition, Campo Grande is the main warehouse in the logistics corridor that connects the western portion to the eastern portion of Mato Grosso do Sul, and Dourados, in turn, is the stopping point for those heading from Campo Grande to Ponta Porã and, consequently, neighboring Paraguay (Barbosa & Zamboni, 2000).

The tourist activity in Mato Grosso do Sul, as seen, has several limitations, however, it exists and has been developing much more centered in isolated regions, such as Campo Grande, Serra da Bodoquena and Corumbá, than as a result of an effective public policy and private for the state as a whole. This contributes to generating and maintaining deficiencies, which, if more effective actions (public and private) were adopted, could be eliminated, contributing to integrate the various segments and increase competitiveness.

Currently, the state of Mato Grosso do Sul is made up of 79 municipalities, in a territorial area of 357,145.534 square kilometers, with an estimated population of 2,839,188 people (IBGE, 2021).

In this sense, presenting the characteristics of tourism in Mato Grosso do Sul meets the evolution of the activity in the state context, but also in the national context, proving to be a primordial step for the effective organization and development of the tourist activity. Therefore, it is intended, therefore, to contribute to increasing the competitiveness and sustainability of the tourist destination of Mato Grosso do Sul in relation to other Brazilian destinations, through the identification of the potential of the municipalities, making it possible to present the main characteristics aimed at consolidating tourism as one of the main economic activities of the state.

5. Methods

When we start a research and its systematization for the elaboration of scientific knowledge, we know that there will be a need to use several methods of analysis, which will provide a basis and protection for the study that is intended to be carried out, making clear, in this way, the direct relationship between methods and scientific knowledge. Thus, the choice and adequacy of each method to the different phases of the research facilitate its development and future directions.

This article is based on the theoretical and methodological support of the general theory of systems, and its main authors, who will be cited throughout this work. Thus, the methodological theoretical support, based on systemic theory, provides an integrative analysis of different environmental systems, allowing elucidation of changes in the aquatic system and their consequences on climate patterns, especially rainfall.

The identification of locations that are experiencing a meteorological trend makes it possible to estimate the possible damage from these changes in socioeconomic activities, helping decision makers regarding the risk if no action is taken (Salviano et al., 2016, p. 65).

In this sense, this research aims to present the environmental crises in the municipality of Corumbá in the state of Mato Grosso do Sul, verifying the changes in the behavior of rainfall patterns, the high rates of fires and their consequences for society and tourism. Such methodological analysis starts from the specialization of the different themes, converging to their integration, in a systemic way, a necessary condition for the articulation and understanding of the study area.

Therefore, you should follow the following steps included in the methodological guide: 1) a brief theoretical discussion based on systemic theory; 2) collection of information about the natural and anthropic environments, and also the legal provisions related to the theme of analysis; 3) survey, analysis and diagnosis of the behavior of rains and fires; 4) bibliographic and bibliometric research with the main axes of this research.

Consequently, it is intended to demonstrate how the integration of the different open systems, that is, those that interact with the rain system, and the input (input) of energy and exchange of materials that may alter natural cycles such as, for example, that of rain. Such systems can and are also affected by human action.

The General Systems Theory can be considered a relatively new vision with great potential within the most diverse scientific areas, being considered by many scientists as indispensable for understanding the world as a whole.

The main authors of such an approach include: Ludwing Von Bertalanffy (1968), Helmut Toppmair (1986 and 2002), Sothava (1977 and 1978), Fritjof Capra (1982, 1983 and 2006), Charles West Churchman (1972), Kenneth John Gregory (1992), Bertrand (1965), among others who contributed to the dissemination of systemic thinking in the various spheres of thought.

In this way, the general theory of systems is presented in this research to support the assumption that the modification made by man in the systems will interfere with the progress of the others, thus serving to help explain both issues related to crises related to tourism and likely changes in rainfall patterns.

The rains are responsible for better representing the climate variability of a certain portion of the territory and help in identifying the performance of the main atmospheric systems, the rains assume an essential role in the analyzes focused on the organization and territorial and environmental planning (Lima & Silva, 2011, p. 88).

Thus, we moved on to the more technical analyzes of the research, which correspond to the stages of investigation in the database, to verify the rainfall station and consistent data from the study area. Such steps being essential for the conclusion of the work, which is configured in the stages of analysis of the collected data and in the confirmation or not of the hypothesis raised, a priori, for the development of this article.

Given the above, we began work by delimiting the study area. In this way, the 5-year period (2018 – 2022) was defined as a time frame, a fact that became inconsistent after the last data collection (until the completion of this article), where the entire year 2022 was not included. After such delimitation, the study area received a more detailed analysis, checking the possibility of climate trends using data from the rainfall and temperature monitoring table recorded by the automatic meteorological station installed by the National Institute of Meteorology [INMET] in the center of the city of Corumbá. Thus, the station's data were accessed via the database of the Weather and Climate Monitoring Center of the state of Mato Grosso do Sul [CEMTEC/MS].

The analysis of the climatic elements of the municipality of Corumbá/MS took into account the historical series of monthly minimum temperature, monthly maximum temperature and total monthly rainfall recorded in the years 2018 to 2021. The data was systematized through electronic spreadsheets in Microsoft Excel software, where it was possible to apply the quantile statistics technique.

According to Monteiro et al. (2012, p.237):

Quantiles are the measures of separation for the sample distributions. A quantile of order “p” is a numerical value that divides the distribution into two parts, allowing a sample to be separated into two masses of numerical observations, with 100xp% of the elements located to the left of the “sample” quantile and the remaining 100x(1-p)%, on the right. The choice of quantiles to be calculated is made by the researcher himself, and may vary according to the objective of the research”.

The quantile statistics technique is widely used in research in the area of climatology. Pinkay (1996) used the method to evaluate periods of drought and rain, primarily in the United States. Monteiro, Rocha and Zanella (2012) applied the quantiles to characterize the dry and rainy years in the region of the lower course of the Apodi-Mossoró RN (Brazil) river. In all these studies, the quantiles Q(0.15), Q(0.35), Q(0.50), Q(0.65) and Q(0.85) were applied. Therefore, to obtain the quantiles, the following formula was used:

$$Q(P)=y_i+\frac{[P-P_i]}{[P_{i+1}-P_i]}*[y_{i+1}-y_i]$$

Q(P) = Quantile (Ex: Q(0.15) is the quantile that corresponds to the quantile order P = 0.15);

i = order number for each value (order ascending);

y = value corresponding to each number of order i (in this case, it would be the total rainfall in mm);

Pi = Quantile order (Pi=i/(N+1))

N= Number of elements in the series; the product is the result of dividing the quantile order Pi.

To qualitative determination the climate classes observed in the historical series of precipitation, minimum and maximum temperature data in the municipality of Corumbá, the same quantile intervals used by Monteiro, Rocha and Zanella (2012), whose probability values are 15%, 35%, 65% and 85%.

Frame 1 - Quantile classes for the historical series.

Quantile classes for the historical series of Corumbá-MS (2018 - 2021)					
Quantis	15 % <-----	35 % <----->	50% <----->	65% <----->	85% ----->
Class	Very cold	Cold	Standart	Warm	Too hot
Quantis	15 % <-----	35 % <----->	50% <----->	65% <----->	85% ----->
Class	Very dry	Dry	Standart	rainy	Very rainy

Source: Monteiro et al. (2012, p.239), adapted by the authors.

To prepare the cartographic products, the free open source software QGIS was used in version 3.28.11 LTR. For the hypsometric map (altitude), the Digital Elevation Model - MDE from the Topodata project made available by the National Institute for Space Research - INPE was used. Finally, for the maps of geomorphological units, biomes and location, shapefile files (SHP) available on the official page of the Brazilian Institute of Geography and Statistics [IBGE] were used.

It is worth remembering that like any other scientific research, this article also used bibliographic and bibliometric research which, according to Andrade (1997), can be developed as a work in itself or constitute a stage in the preparation of articles, monographs, dissertations and theses. In this way, we searched the main databases: Scielo, EBSCO, Periodicals and Catalog of Theses and Dissertations Capes, the main axes of this research.

6. Presentation of the Crisis in Tourism in Corumbá, Mato Grosso do Sul

The consolidation of fishing tourism in Corumbá took place between the 1980s and 1990s, with the construction of sophisticated hotel boats to take tourists to fish in the Pantanal, thus, from the structuring and development of the activity, the segment begins to have its due recognition and attention from public authorities (Paixão, 2005).

Currently, fishing tourism is in great demand and has an important economic representation for Corumbá through the tourist flow, which involves other municipalities, many professional fishermen and an entire production chain. However, in recent years the activity has gone through disturbing challenges, generating several negative impacts on the local economy.

One of the biggest challenges was the long periods without rain, which impacted navigation on the Paraguay river, both for the transport of cargo (mainly iron ore to Argentina and Uruguay), and for hotel boats that carry out fishing trips through the region. Thus, cargo transportation was compromised (the cost of freight via waterways is 70% lower than via highways, in addition to being more efficient) and some hotel boats that attempted to sail were stranded on sandbars due to the low river level, damaging the economy and tourism. In 2020, the Paraguay river went through the worst drought in the last 50 years, according to the Geological Survey of Brazil [SGB] (2021), remembering that it is the eighth largest watercourse in South America, passing through Bolivia, Paraguay and Argentina.

Furthermore, the restriction on the sale of minhocoçu, one of the baits most sold and sought after by fishermen (this is because minhocoçu is capable of attracting different species of fish). This restriction has caused great losses for bait traders, even with the payment of taxes, invoices and acquisition of minhocoçu from the states. Therefore, the radical ban on the sale of bait implies problems for families and communities that depend on this activity for income.

However, until February 2021, the commercialization that until then took place freely was prohibited, with intensified inspections by environmental agencies. Because this species is protected by federal law, being part of the balance of the ecosystem, therefore, commercialization can only be carried out through special authorization issued by the Brazilian Institute of the Environment and Natural Resources [IBAMA]. Therefore, the capture of earthworms is classified as an activity characterized as “fauna management” and depends on environmental authorization, as well as storage, marketing and transportation, which can only be carried out accompanied by such authorization.

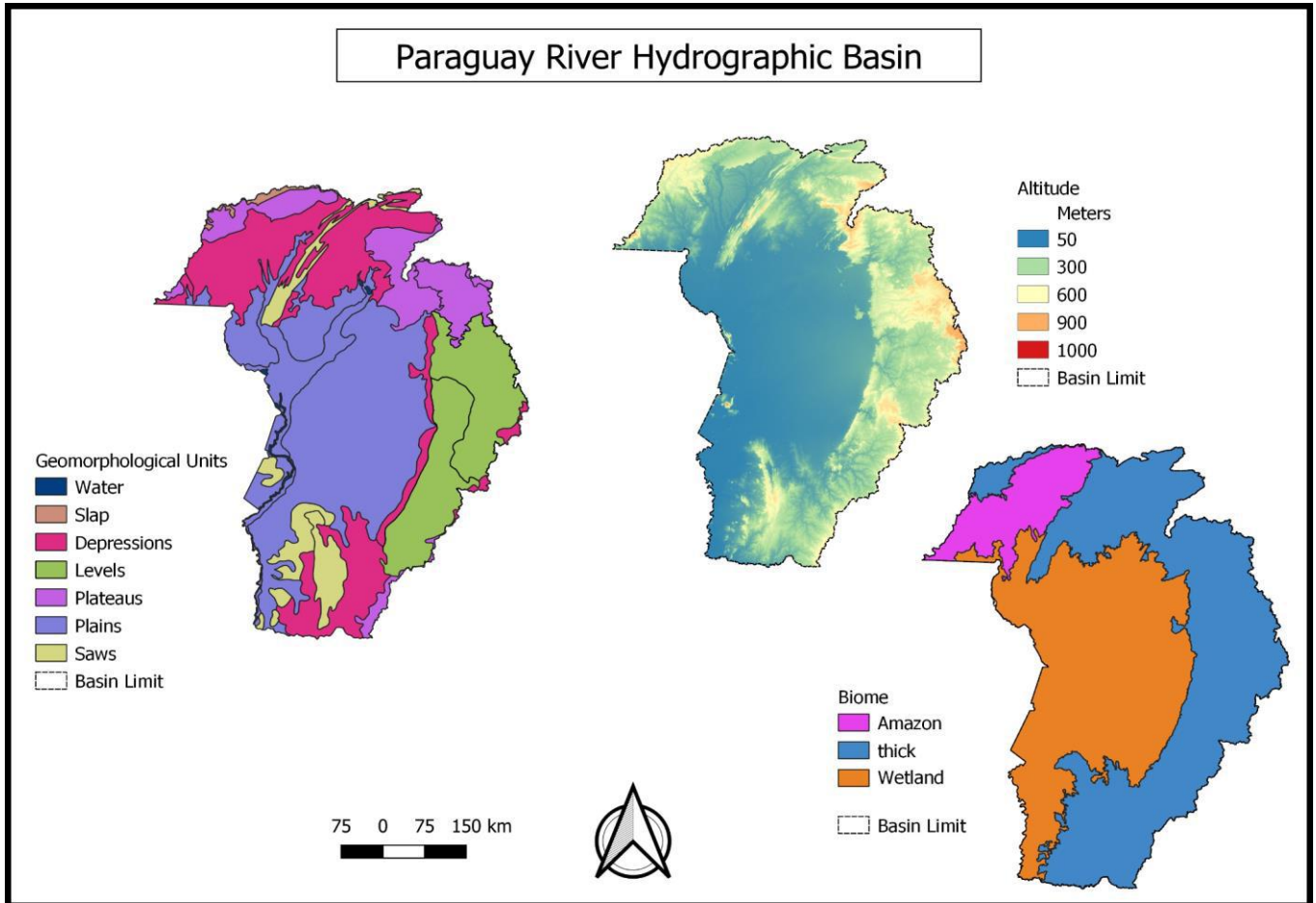
Thus, in the absence of environmental authorization for fauna management, any and all activities involving earthworms (selling, exhibiting for sale, transporting, storing, keeping in captivity or using) must be supervised and framed in accordance with Federal Law No. 9.605/98. However, according to Secretariat of Economic Development, Production and Agriculture [SEMAGRO] (2023), there is no state legislation regarding the topic and inspections are carried out exclusively by IBAMA.

Not to mention that every year fishermen must respect the closed season for fish reproduction (when fishing is prohibited in all rivers in Mato Grosso do Sul), which begins in the first week of November and runs until the end of February. subsequent year. In these almost four months, the main species of the state's rivers have been protected for reproduction, which in the Tupi language means piracema (fish outlet).

However, deforestation, irregular soil management, agricultural exploitation and mining have also caused negative impacts on the geosystemic balance of the Paraguayan river basin and consequently on the Pantanal plain. This region is configured under a strong relationship of interdependence in the processes of exchange of energy and matter in maintaining the ecological balance between its geomorphological units: Plain Pantaneira and Plateau, it is on the plateau that the greatest rainfall occurs, providing the greatest volume of water flow. waters that flood the Pantaneira plain in the period between October and March and, consequently, due to the types of land use predominant in the plateau region, a favorable environment is provided for the sediment transport process, resulting in silting and elevation of the bottom of the river beds that drain this region (Cruz, 2018).

In Figure 2 it is possible to observe the spatialization of geomorphological units, biomes and variations in altitude of the terrain of the Paraguay River hydrographic basin.

Figure 2 - Paraguay river hydrographic basin.



Source: Santos (2023).

In this sense, in order to contribute to a more robust research, we analyzed the distribution of air temperatures in Corumbá-MS, where the lowest temperatures occurred in the months of June, July and August were between 65.32°F and 69.89°F. °F, falling into the quantile (Q 0.15) very dry, the highest temperatures were recorded between the months of September, October and November, which fell into the quantile (Q 0.85) very hot with temperatures equal to or greater than 95.70°F, followed by the months of November, December and January, which presented temperatures between 92.07°F and 95.68°F, frequently remaining in the hot quantile (Q 0.65), as shown in Frame 2.

Frame 2 - Minimum temperature in Corumbá.

Minimum Temperature in Fahrenheit Corumbá-MS (2018 - 2021)												
year	jan	fab	mar	apr	may	june	july	aug	sept	oct	nov	dec
2018	75,74	76,18	76,30	76,06	74,08	64,00	63,54	64,71	68,74	76,12	76,55	76,95
2019	77,04	75,56	75,33	73,60	69,78	68,43	64,53	68,11	73,36	74,55	75,96	75,18
2020	76,86	75,83	75,45	70,21	64,38	66,69	65,70	67,66	70,07	75,60	73,94	75,52
2021	74,82	73,92	73,71	71,19	66,74	64,13	61,03	65,73	75,27	77,76	65,30	75,92
Subtitle												
Q(0,15) Very cold		Q(0,35) Cold			Standart		Q(0,65) Warm			Q(0,85) Too hot		

Source: Weather and Climate Monitoring Center of the state of Mato Grosso do Sul (2023)

Even in a season considered rainy, there was a significant increase in the burned area due to the very high temperature and strong winds in the region. Frames 3 and 4 show the occurrence of the AWa climate type, a tropical, high-altitude, megathermal climate (average temperature of the coldest month is above 64.4°F), with well-defined seasons.

Frame 3 - Maximum temperature in Corumbá.

Maximum temperature in Fahrenheit Corumbá-MS (2018 - 2021)														
year	jan	fab	mar	apr	may	june	july	aug	sept	oct	nov	dec		
2018	89,52	88,85	88,92	88,61	84,69	74,88	78,75	80,71	82,42	88,81	89,40	89,19		
2019	94,21	90,57	92,17	89,13	84,40	85,75	80,65	87,82	94,14	95,11	96,37	92,79		
2020	95,27	92,53	96,64	91,81	86,41	85,46	88,50	92,23	96,04	97,75	97,99	95,20		
2021	88,54	91,96	91,63	90,77	87,37	83,14	88,07	92,44	100,00	95,94	94,64	92,53		
Subtitle														
Q(0,15) Very cold			Q(0,35) Cold			Standart			Q(0,65) Warm			Q(0,85) Too hot		

Source: Weather and Climate Monitoring Center of the state of Mato Grosso do Sul (2023)

It is wrong that these high temperatures presented in frame 4 were restricted only to the months of September, October and November of 2020 and 2021. In October 2023, cities in Mato Grosso do Sul dominate the ranking of the highest temperatures recorded in the country, with maximums above 104°F, including Corumbá, which recorded the second highest temperature with 108.5°F and a sensation of 114.8° F. The data was recorded by INMET on October 17, 2023, highlighting that high temperatures are continuous in the municipality.

However, high temperatures also directly reflect on the drop in the volume of water in the rivers, especially in the region that interrupted or reduced navigation in one of the country's main waterways, the Paraguay river, which is responsible for transporting iron ore from Corumbá to the ports of Argentina and Uruguay. According to National Federation of Waterway Navigation Companies [FENAVEGA], the cost of freight via waterways is 70% lower than via highways, in addition to being more efficient. Thus, the drought has a cascading effect for the entire region, as there is damage to the energy supply and the flow of iron ore production, through smaller vessels, as the larger ones do not pass due to the low volume of water or decrease your load to become lighter.

The Paraguay river is essential for life in the region, as in addition to being a bed of biodiversity, it is a waterway, a source of water and energy, but the prospects for recovery are bleak, given the consequences of phenomena such as El Niño and the climate crisis.

The Paraguay river is the eighth longest river in South America. It is around 1615,565 mi long. It originates in the municipality of Alto Paraguai, 136,8 mi from Cuiabá, and borders four countries, at its source in Brazil, passing through Bolivia, Paraguay and reaching its mouth in Argentina. With its sources located in Mato Grosso, the river also flows through Mato Grosso do Sul, following its course and entering international waters, it passes through Bolivia, Paraguay, flows into the Paraná river and ends at the sea in Argentina.

The river is experiencing the worst drought in the last 50 years. Without rain, the level continues to fall and according to data from the Brazilian Geological Survey [CPRM], the river has already reached the lowest level in history, reaching 27 centimeters at the level of Ladário, a neighboring city of Corumbá. In normal years, at this same time of year, the river exceeds three meters.

Frame 4 - Precipitation in Corumbá.

Precipitation Corumbá-MS (2018 - 2021)														
year	jan	fab	mar	apr	may	june	july	aug	sept	oct	nov	dec		
2018	237,4	288,6	5,6	60,8	0,8	9,8	2	1,2	49,4	46,4	105,2	52,8		
2019	6,8	146	57,8	149,2	31,2	28	7,4	17	19,8	11,4	52	72,4		
2020	101,8	123	49,6	76,2	59,2	19,2	0,2	22,2	6,4	120,8	11,4	153,2		
2021	344	42	70	36,4	10,6	0,4	5,6	5	5,8	25	153	137,9		
Subtitle														
Q(0,15) Very dry			Q(0,35) Dry			standard			Q(0,65) rainy			Q(0,85) Very rainy		

Source: Weather and Climate Monitoring Center of the state of Mato Grosso do Sul (2023)

If we compare the rainfall data from the rainfall and temperature monitoring table, with that of fire outbreaks in the Pantanal biome, it is observed that the months that presented the highest quantities of fire outbreaks are also those that record the lowest rainfall rates and, on average, temperatures above 86°F, between the months of June, July, August and September, which is the region's winter period. It can be seen that in addition to the impacts of human actions in the Pantanal biome, natural factors such as rain and high temperatures that cause water stress in the vegetation are also factors that contribute to fire.

And this water stress is somewhat impactful for Corumbá, as the destination attracts a large number of tourists, the vast majority of whom use equipped and sophisticated hotel boats (with suites, swimming pool) for sport fishing on the Pantanal rivers. This great demand for Corumbá is due to its privileged location, on the banks of the Paraguay river.

However, recently this activity has received major impacts due to the low level of the Paraguay River, where several vessels/hotel boats that carried out sport fishing became stuck on sandbanks, further aggravating the crisis, as fishing tourism is one of the activities most important economic factors for the municipality.

Frame 5 - Fires in the Pantanal Biome.

Fires in the Pantanal Biome (2018 - 2022)													
year	jan	fab	mar	apr	may	june	july	aug	sept	oct	nov	dec	Total
2018	23	8	14	19	28	46	190	275	785	120	20	163	1691
2019	337	211	93	33	68	239	494	1690	2887	2430	1296	247	10025
2020	265	164	602	784	313	406	1684	5935	8106	2856	778	223	22116
2021	41	35	50	87	60	98	508	1505	2954	2515	257	148	8258
2022	83	61	45	25	188	115	294	96	242	48	201	239	1637

Source: Monitoring of Active Spots by Biome - INPE (National Institute for Space Research)

Source: Monitoring of Active Spots by Biome, Nacional Institute for Space Research (2023).

The fires devastated a gigantic area, destroying fauna, flora and the natural habitat of several species of fish, mammals, amphibians, reptiles and birds. In addition to the impacts already mentioned in the first group (fish), the fires also caused losses in the last group (birds), as the Pantanal is a region that attracts a large number of foreign tourists looking for birdwatching. The development of this segment (birdwatching tourism) is highly positive for destinations, as tourists have a conscious socio-environmental profile, in addition to greater financial resources available.

The data is clear in showing that the 2020 fires in the Pantanal were the worst in history, taking into account the historical data not presented and the current ones, resulting in more than 26% of its territory consumed by fire in 2020 alone. The sad scenes of burned animals and huge areas of burning native forest drew the world's attention to this biome in the heart of Brazil, known for its droughts and floods, in addition to the enormous biodiversity it houses. However, it is not just fire that threatens the largest floodplain in the world.

It is worth highlighting that a large proportion of fires are caused by human actions (agricultural exploitation), resulting from the lack of inspection, prevention, combat and monitoring by environmental protection bodies. In this sense, there is no denying that the Federal Government in the 2019 to 2022 administration was silent in the worst crisis of the last 40-50 years in the Pantanal, as it sent military personnel and aircraft late to fight the fires in this important biome.

7. Final Considerations

Although expected the arrival of the pandemic in Brazil found a country economically weakened, politically unstable and with a lack of public investment in health and education when compared to other countries. With so much negative evidence and public authorities' disbelief regarding the seriousness of this virus, the pandemic spread at an impressive speed in all Brazilian states and the Federal District.

As in other destinations, Covid-19 had a major negative impact on the tourist system in Mato Grosso do Sul, because the state faced this pandemic at the same time as other crises, such as fires and the dry period in the Pantanal region. This crisis in the Pantanal was the topic of discussion during the 27th United Nations Conference on Climate Change [COP27], which took place between November 6th and 18th, 2022, in Sharm El Sheikh, Egypt.

The discussion revolved around the silting of the Taquari river, which originates in the extreme south of Mato Grosso, and runs through a large part of the Pantanal in Mato Grosso do Sul, flowing into the Paraguay river. The silting of the Taquari river is considered by experts to be one of the biggest environmental disasters in Brazil. According to professionals, the river will only be recovered if there are continuous actions, which is 528.166 mi long. The most serious and worrying situation is in the Corumbá region, where almost 62.1371 mi have completely dried up, in the place where water should have flowed, all that was seen was a sandy road. It is also important to highlight that illegal deforestation, whether for the management of local roads or for the expansion of agriculture, is identified as one of those responsible for the silting of the Paraguay River.

However, the state public authorities, through the FUNDTUR, have taken some actions to minimize the negative impacts caused by the climate crisis that is devastating the state. Proof of this is that during COP27, the CEO of FUNDTUR signed the document for the first manual on climate change for tourist destinations and companies in the sector in the world, that is, the state is a signatory of the first manual in the world focused on climate change of tourist destinations.

Opposing these actions is the Corumbá Pantanal Tourism Foundation, which established, in 2013, the Pantanal Studies and Research Observatory, with the aim of systematically gathering data and monitoring the development of tourism in the municipality. However, there is no information or data regarding the municipality on the official page of this observatory, which makes it difficult to develop research and studies related to tourism and related activities in the municipality and region.

In this way, the process of understanding and analyzing tourism is explained through a complex system formed by multiple interest groups. Therefore, the functioning of a tourism system depends on the management of the relationships that occur between its different components.

Schein (2001) corroborates the idea and highlights that evaluating a crisis alone and/or in isolation can be useless. On the other hand, analyzing the impact that it causes on the perspective of all the elements that make up the tourism system is not only useful but extremely necessary, as it allows for a better understanding of the nature of such a system, adopting measures to ensure that it has a more efficient and assertive recovery.

It is important to emphasize that the climate crisis is still devastating the Pantanal and the region, with absolutely adverse weather conditions, high temperatures, strong winds and severe drought. Furthermore, the fires are inside properties that do not have access roads to reach the outbreaks. Therefore, concerned to avoid a tragedy like that of 2020, combat teams are always on alert throughout the year, even more so with the effects of El Niño overheating the oceans reflecting on the continent.

According to INPE, in the month of September 2023 alone, the Pantanal recorded 43 fires, and the most affected municipalities are Corumbá (30), Aquidauana (9) and Porto Murtinho (4). In this sense, this crisis is related to major impacts and changes are difficult or often irreversible for the biome.

Given this, the changes were inevitable, but difficult, as they directly affected the behavior of tourists and their choices for certain destinations. Therefore, the choice to travel and visit a destination depends on tourists' perceptions regarding its safety and security.

However, there is still a lack of research that addresses economic fragility in relation to climate phenomena, such as the current crisis that is plaguing the local and global economy, as well as surveying its consequences for the market and managers.

Of course, we know that research into the impacts of Covid-19 is essential to tackling the crisis. But it is also important to understand the impacts beyond Covid-19, for example, climate change and its impacts on tourist activity. This can help us design more effective policies to address these challenges and minimize impacts next time (because, inevitably, there will be a next time). We know that the economy will recover, but how long will it take and what are the most efficient actions and strategies to support the recovery of the tourism system in the state of Mato Grosso do Sul?

Although the situation is changing negatively in many destinations, including Corumbá, and the duration of such climate crises may be even longer lasting, the need to not keep updated data from the country's main climate bodies certainly contributes to putting tourist activities at risk. In the municipality, new challenges are emerging, increasingly requiring the search for efficient strategies to face these crises.

In this way, the pandemic provided other reflections to rethink studies applied to crises, highlighting the internalization of the climate theme in the production of knowledge, contributing to filling gaps in the area and, in parallel, expanding discussions on facing different crises in destinations touristic.

The practical nature of this study makes it difficult, mainly due to the lack of updated data from the responsible bodies, but it is necessary to increase the validity of research related to crises that affect tourism, including climate change, which in the year 2023 will have generated major disruptions. From the center-west (severe drought) to the south (excessive rain) of the country. Therefore, future studies are recommended to constantly update data, which could be useful to mitigate the impacts of crises, and consequently, tourist activity.

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