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Methods of **assessing carrying capacity** in **hiking trails**: a systematic literature review

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Abstract | The sustainability of the tourism system has become a growing concern, especially in the last decades. The impact of tourist activity on ecosystems, the overuse of some tourist infrastructures and facilities, and, in many cases, the lack of monitoring of these flows and their impacts, have highlighted the need for better planning and management of resources. Defining the carrying capacity of trails is an essential tool for the sustainable management of tourist flows, particularly in sensitive areas and ecosystems. The aim of this study is, through a systematic literature review, to identify and evaluate the main methods used to assess the carrying capacity of hiking trails, to identify the correction factors used and the main areas of application of the proposed methods. The search carried out in four scientific repositories and the application of the PRISMA methodology allowed the identification of 39 scientific articles to be included in the review process. The majority of the studies identified use the Cifuentes (1992) methodology, which assesses the carrying capacity of hiking trails located in classified and/or protected areas, mainly on the American continent, with a focus on those published in the last four years.

Keywords | carrying capacity, hiking trails, sustainability, tourism, systematic literature review

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1. Introduction

Hiking tourism is an essential part of the global tourism system (Luo & Shang, 2023; Molokáč et al., 2022) and the most important activity within nature tourism (Lukoseviciute et al., 2022; Obradović & Tešin, 2022; Wang et al., 2024). Experienced great popularity and growth (Carvalho & Alves, 2021; Geiger et al., 2023; Gómez-Martín, 2019; Luo & Shang, 2023; Molokáč et al., 2022; Peterson et al., 2018; Quack & Thiele, 2022; Scholl-Grissemann, et al., 2022), it is particularly associated with protected natural areas (Farías & Monserrat, 2014; Fennell, 2008; Newsome et al., 2013; Weaver, 2006) and rural and/or mountain areas (Acevedo-Duque et al., 2022; Kastenholz & Rodrigues, 2007; Mayr et al., 2022; Molokáč et al., 2022; Próchniak, 2022; Vidal-Matzanke & Vidal-González, 2022).

Considering its importance and the growth in the number of users and infrastructure dedicated to hiking trails, concerns arising from their use have grown, with several authors dedicating their attention to the study of the carrying capacity of hiking trails (Alves, 2021; Chang, Hsieh, Yu, Lin, & Lin, 2023; Porto et al., 2013; Rocha et al., 2013; Serrano & Alarte, 2008).

Therefore, given the lack of studies that allow us to understand the main dynamics of studies analysing the determination of carrying capacity on hiking trails, this article attempts to carry out a systematic literature review with the following aims to identify: (1) the chronology of interest in studies on carrying capacity applied to hiking trails; (2) which landscape units and typologies of territory are favoured in the research conducted; (3) the methods used to assess carrying capacity on hiking trails; and (4) the number and type of correction factors applied in determining carrying capacity.

In the light of the results obtained, this study attempts to discuss the trends in the methods used, the most common areas for determining the carrying capacity of trails, the main correction factors applied and their relationship with the types of landscape where trails occur. This study systematises the existing work on determining the carrying capacity of hiking trails, through a systematic literature analysis, based on publications from the last twenty years, and further research is warranted.

2. Literature Review

Hiking tourism is largely considered a 'soft' activity and can be described as a form of slow tourism (Collins-Kreiner & Kliot, 2016; Davies, 2018; Dickinson et al., 2011; Gómez-Martín, 2019; Lumsdon & McGrath, 2011; McGrath & Sharpley, 2016; Obradović & Tešin, 2022) and low-carbon tourism (Dickinson et al, 2011; Scott et al., 2015; Weston & Mota, 2012), which is related to a number of significant ecocultural resources as well as support structures and services (Acevedo-Duque et al., 2022; Gómez-Martín, 2019). Contact with nature, interaction with others and self-awareness, experiencing the social and cultural dimensions of places, adventure, heritage discovery and interpretation, pilgrimage and spirituality, health or physical and emotional well-being (Collins-Kreiner & Kliot, 2016; Cordeiro & Alves, 2022; Davies, Lumsdon, & Weston, 2012; Geiger et al., 2023; Kim, et al., 2022; Obradović & Tešin, 2022; Wang et al., 2024) are considered the main motivations for hiking.

Corresponding to structured and planned tourism and leisure facilities and infrastructures, hiking trails can be implemented at different scales (transnational, international, national, regional, municipal or local), with very different themes, lengths, shapes, levels of difficulty and duration (Lukoseviciute, et al., 2022; MacLeod, 2017; Svobodova et al., 2019; Timothy & Boyd, 2015). In the vast majority of cases, hiking trails are promoted and developed by local authorities, such as municipalities, local development associations or tourism development agencies (Lukoseviciute et al., 2022). Typically, hiking trails have a uniform marking and signposting code and, depending on the region or country, must comply with internationally accepted and agreed markings, codes and standards of conduct, which for Europe are defined by the European Ramblers Association (ERA), with a total of five different marking systems.

Over the last few decades, a number of authors from different scientific fields have studied hiking trails from a variety of perspectives, in particular the environmental impact, risk management, their use in an educational context, the influence of hiking on local populations, the economic impact of hiking, the effects on health and well-being, the experience, satisfaction and profile of the hiking tourist, the importance of hiking in natural areas, the assessment of the condition of trails, destination management or the structuring of the offer, or the carrying capacity of trails (Table 1).

Table 1. Studies on hiking trails (thematic synthesis)

Environmental impact
Atari & Feldman (2023); Cole & Bayfield (1993); Deluca & King (2014); Fang & Ng (2024); Farrell & Marion (2002); Hammitt & Cole (1998); Ivanenko et al. (2022); Kuss & Hall (1991); Kuss & Morgan (1980); Leung & Marion (1999); Li et al. (2005); Liddle (1991); Lynn & Brown (2003); Nepal (2003); Olive & Marion (2009); Özbek et al. (2023); Pickering & Hill (2007); Queiroz et al. (2014); Rangel & Guerra (2013); Sun & Liddle (1991); Vashchenko et al. (2008); Wolf & Croft (2014); Yan et al. (2014)
Risk management
Scholl-Grissemann et al. (2022)
Use in education context
Folmann (2013); Lima (2005)
Influence on local populations
Attali et al. (2023); Kastenholz & Rodrigues (2007); Li et al. (2005); Lu & Campbell (2008); Moscoso-Sánchez et al. (2022); Vidal-Matzanke & Vidal-González (2022); Vizuete et al. (2023)
Economic impact
Lukoseviciute et al. (2022)
Effects on health and well-being
Acevedo-Duque et al. (2022); Azmi et al. (2012); Davies et al. (2011); Lee et al. (2018); Mayr et al. (2022); Muro et al. (2023); Nordbø & Prebensen (2015); Oh et al. (2019); Próchniak (2022); Skaliy et al. (2023); Tangeland & Aas (2011); Wolf & Wohlfart (2014)
Experience, satisfaction and profile of the hiking tourist
Antoušková et al. (2013); Bruno et al. (2011); Chhetri et al. (2004); Cordeiro & Alves (2022); Farías & Monserrat (2014); Geiger et al. (2023); Kastenholz & Rodrigues (2007); Kil et al. (2014); Kim et al. (2022); Luo & Shang (2023); Molokáč et al. (2022); Obradović & Tešin (2022); Ocaña et al. (2013); Quack & Thiele (2022); Tacón & Firmani (2004); Torbidoni (2011); Torbidoni et al. (2005); Wang et al. (2024)
Importance of hiking in natural areas
Arrowsmith et al. (2005); Chhetri & Arrowsmith (2002); Farías et al. (2005); McColl & Reilly (1993); Rollins & Rouse (1992); Wallace & Smith (1997)
Trail condition assessment
Olafsdottir & Runnstrom (2013); Santarém et al. (2015)
Destination management or the structuring of the offer
Crublet & Paget (2022); Fortune & Gomet (2022); Wolf et al. (2012)
Trail carrying capacity
Alves (2021); Chang et al. (2023); Porto et al. (2013); Rocha et al. (2013); Serrano & Alarte (2008)

Source: Author's Elaboration

Given the increasing pressure on natural resources, especially in areas with sensitive ecosystems and biotopes, exacerbated by the current global climate crisis, tourism has a dual role to play. On the one hand, it contributes significantly to the aggravation of climate change, and, on the other hand, it will be one of the sectors most affected by it (Gössling et al., 2024; Lenzen et al., 2018; Peeters et al., 2024). These factors have reignited an old discussion on the sustainability of the tourism system, especially in the environmental field (Hall et al., 2017; Hall et al., 2020; Higgins-Desbiolles et al., 2019; Weaver, 2006). Climate change, pollution and overexploitation of natural resources (Fletcher et al., 2020) are some of the main concerns, leading several authors to consider that this is the right time to bring about changes that will allow greater sustainability of the tourism system or a socio-technical transition (Cohen, 2020; Sarkis et al., 2020; Wells et al., 2020).

Although hiking is considered an ecological or sustainable form of tourism, in many areas, the level of demand and impact on ecosystems has increased significantly, however without proper monitoring and planning (Havlick et al., 2016; Hockett, et al., 2017; Wolf et al., 2012). It is therefore very important to determine and monitor the carrying capacity of hiking trails in order to mitigate their impact on ecosystems, but also on the quality of the tourist experience (Alves, 2021; Barrow, 2007; Fernández-Villarán et al., 2020; Ólafsdóttir & Runnström, 2013; Peterson et al., 2018; Rogowski, 2019).

Among the most important indicators for determining the theoretical limits of use of natural and/or protected areas in general and hiking infrastructure in particular, with a high level of recognition and scientific validation, is the tourist carrying capacity (Buckley, 1999; Cole, Manning, & Lime, 2005; Leung & Marion, 2000; Lime & Stankey, 1971; Marsiglio, 2017; Zejda & Zelenka, 2019).

The assessment of the tourist carrying capacity of trails, considered a very useful tool (Cifuentes, 1992; Lakspriyanti et al., 2020; Sari & Rahayu 2018; Zejda & Zelenka, 2019), makes it possible to determine the maximum number of people that a trail (or set of trails) can support without causing unacceptable impacts and irreversible changes to natural resources (fauna, flora, soil, water, etc.), local communities and their cultural heritage, or the tourist experience of the hiker (García, 2003; Queiroz et al., 2014).

In order to understand the evolution of studies on a given topic, the bibliometric analysis of scientific publications, which has become very popular in recent years (Donthu et al., 2021), is a fundamental tool in the research process and is considered an essential method (Hashem et al., 2023; Magadán-Díaz & Rivas-García, 2022; Moscardi et al, 2017; Snyder, 2019),

which allows the identification, analysis and evaluation of previous studies carried out on a specific topic or field, and is a crucial factor in identifying the main trends and/or gaps in scientific research.

The systematic literature reviews published so far deal with carrying capacity in tourism destinations (Neves & Eusébio, 2021; Li et al., 2021), methods for assessing carrying capacity in tourism and leisure destinations (Ajuhari, Aziz, Yaakob, Abu Bakar, & Mariapan, 2023), its application to geological sites (Santos & Brilha, 2023) or for determining ecological carrying capacity (Wang et al., 2017). However, although the previous systematic literature reviews have made important contributions to the deepening of carrying capacity studies, especially in the field of tourism, none of them has focused on its application in hiking tourism, one of the most important types of tourism and leisure activities in nature tourism worldwide, which is why it is important to understand the main research dynamics in this area of scientific application.

3. Methods

This systematic literature review was conducted according to the Preferred Reporting Items for Systematic Review Recommendations (PRISMA) guidelines (Li et al., 2021; Mundher et al., 2022; Page et al., 2021; Perry et al., 2022; Pickering & Byrne, 2014; Tricco et al., 2016) and adapted for this study. The use of the PRISMA protocol in systematic literature review articles in the field of tourism is common, and there are several examples of its application (Ajuhari, et al., 2023; Bruyn, Ben Said, Meyer, & Soliman, 2023; Cordes, Baumeister, & Käyrä, 2024; Estevão & Costa, 2020; Forero et al., 2023; Nanu et al., 2024; Pahlevan-Sharif et al., 2019; Pásková et al., 2024: Pedrosa et al., 2022; Rogers et al., 2024; Sousa & Leite, 2022; Yanan et al., 2024). Thus, the main reasons for using this protocol (Liberati et al., 2009) over other existing ones are based on the recognition of its scope, its wide use in the field of tourism and its recognition as a consistent tool in systematic reviews of the literature (Forero et al., 2023; Pahlevan-Sharif et al., 2019).

The research articles analysed were obtained by searching four scientific publication repositories: SCOPUS, Web of Science (WOS), MDPI and Google Scholar (Table 2). Considering the concept of propositional logic, through the meanings of words and/or expressions and the inferential relationships between them, the search was carried out using the keywords "carrying capacity and trail" OR "hiking and carrying capacity" OR "tourism carrying capacity hiking" OR "hiking trail carrying capacity" OR "hiking tourism carrying capacity".

Table 2. Electronic search strategy applied

Database	Terms	Searched fields	Filters	Date
SCOPUS	"carrying capacity and trail" OR "hiking and carrying capacity" OR "tourism carrying capacity hiking" OR "hiking trail carrying capacity" OR "hiking tourism carrying capacity"	Title, Abstract and Keywords	Language: English (Not applicable)	January 3rd, 2024
WOS		Topic	Language: English Document type: "Article" and "Journal article"	
MDPI		Title and Keyword	Document type: "Article"	
Google Scholar		(Not applicable)	Patents and Citations not included	

Source: Author's Elaboration

In order to include as many publications as possible, the selection criteria consisted in choosing research articles published up to January 2024, written in any language, but with a title or abstract in English. For each repository, references that did not meet the preliminary criteria were not included. In the case of Google Scholar, the list of articles for each search was saved and downloaded up to page ten. The documentary references collected from the databases were then downloaded, even if they appeared in more than one of the repositories. To ensure that the search was as broad as possible, articles with titles and keywords that did not match the focus of the research were included. An initial total of 654 articles were therefore considered (Figure 1).

The screening process was defined and planned by both authors and carried out by the first author. The first screening process consisted of excluding duplicate articles. The second screening process included original peer-reviewed articles related to the research topic. Dissertations, review articles, methodological articles, conceptual articles, longitudinal studies, technical reports and grey literature were excluded. It should be noted that most of these excluded results were collected from the Google Scholar database. In addition, after the analysis of each article, documents unrelated to the research topics were excluded.

In the final stage, the authors analysed the research together to reach a consensus on the final number of articles to be included in the review. In the third screening process, in which 96 articles were considered valid, those that dealt with carrying capacity but did not apply to hiking trails, were excluded. Fifty-eight articles dealing with carrying capacity assessment in protected areas, parks, beaches, caves, ski resorts, geosites, safaris or mountain bike trails

were excluded as they did not relate to the main focus of this study. As a result of the screening process, 39 eligible articles were considered and included in the systematic literature review.

After selection, the articles were categorised according to year of publication, first author, journal name, country, field of study, method used to assess the carrying capacity of the trail(s), number and type of correction factors applied.

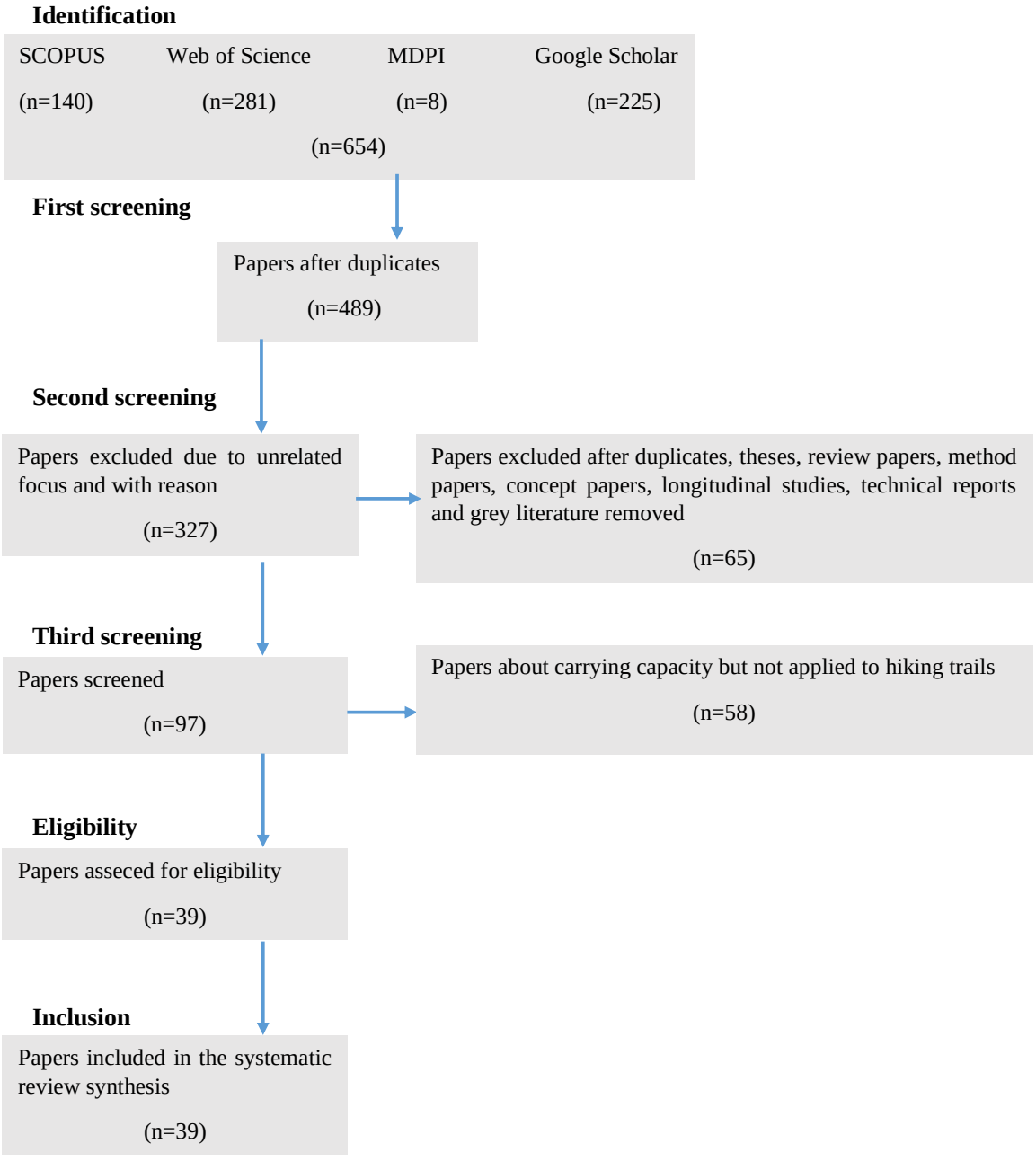

Figure 1. Adapted PRISMA flowchart outlining the process and actions taken to compile research papers (n means the number of research papers)
Source: Adapted from Page et al. (2021)

4. Results and discussion

According to the methodology used, out of the universe of 654 articles, 165 were identified as replicated, 327 articles were not related to the research topic, 65 articles were excluded due to their typology (literature review articles, theses, posters, etc.), 58 were excluded because they dealt with carrying capacity but not related to hiking trails, resulting in a total of 39 articles considered eligible for inclusion in the systematic literature review. The details of the publications, the location of the study, the landscape unit in which they occur, the methods used, the correction factors applied, the authors and the temporal variation are analysed in this section. The analysis of these indicators and their results will be crucial in defining the model for determining the load capacity of hiking trails and the main correction factors to be applied in future studies.

Based on the co-occurrence analysis of the terms included in the titles and abstracts of the articles included in this systematic literature review, using the VOSviewer software, it was possible to obtain a map (Figure 2) representing a network of the terms used and the links between them, made up of 7 clusters and including 112 items or terms. The size of an expression and the proximity of the keywords indicate a stronger relationship between them (van Eck & Waltman, 2023).

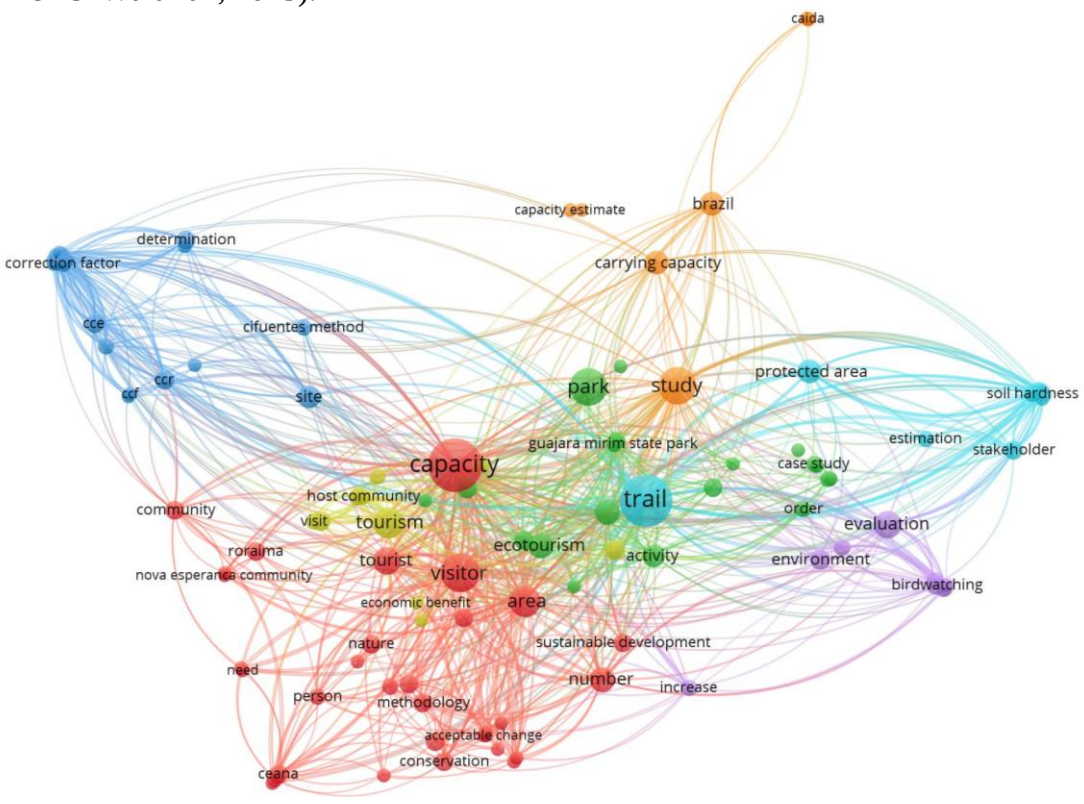

Figure 2. Map of clusters based on article titles and abstracts

Source: Author's Elaboration

4.1. Publication date and authors

The vast majority of referenced publications were published between 2013 and 2023 (89.7%), with 61.5% referring to articles published between 2020 and 2023. Indeed, 2023 was the year with the highest number of publications, a total of nine (23.1%), as systematised in Figure 3.

The distribution of articles by author, considering the first author of each publication analysed, reveals a wide variety of researchers. In fact, in 89.7% of cases, the first author is associated with only one publication. In only two cases, out of a total of four articles, does the same first author appear in this capacity in two different articles, representing 10.3% of the sample (Mota et al., 2021a; Mota et al., 2021b; Soria-Días & Soria-Solano, 2015; Soria-Días & Soria-Solano, 2022).

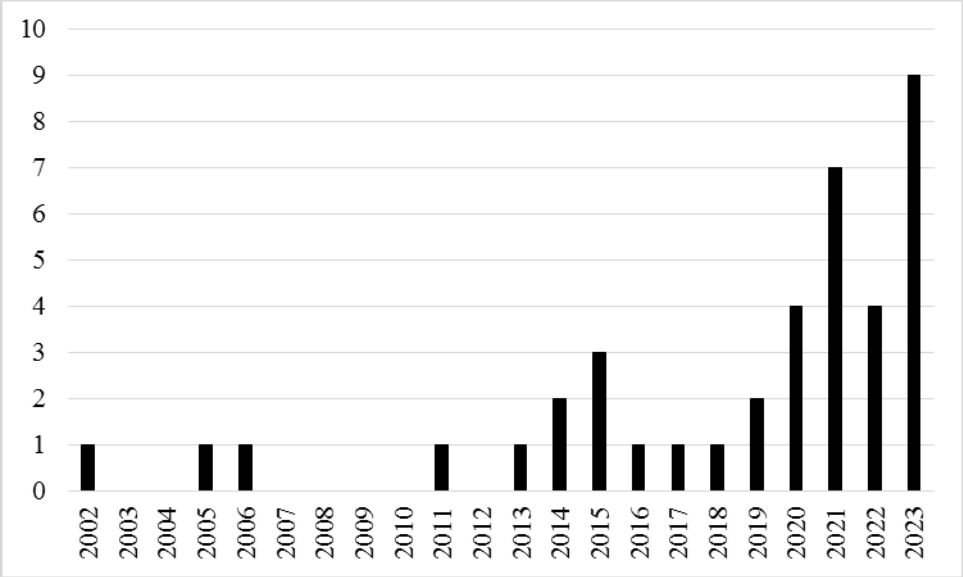

Figure 3. Distribution of publications by year

Source: Author's Elaboration

4.2. Territorial scope

The 39 articles included in this study were applied in 21 different countries, with the majority of studies applied in the American continent (25%), followed by the European continent (8%) and Asia (6%). Brazil (9 articles), Mexico (5), Ecuador (3), Indonesia (3) and Portugal (3) are the countries with the highest number of studies in the sample.

With regard to the geographical setting in which the carrying capacity studies applied to hiking trails are carried out, 69.2% coincide with classified and/or protected areas, of which

38.5% are national parks and 10.3% are natural parks (10.3%). Mountain and/or rural areas that are not part of classified and/or protected areas (20.5%), peri-urban areas (7.7%) or coastal areas (2.6%) complete the remaining landscape units covered by the studies analysed (Figure 4).

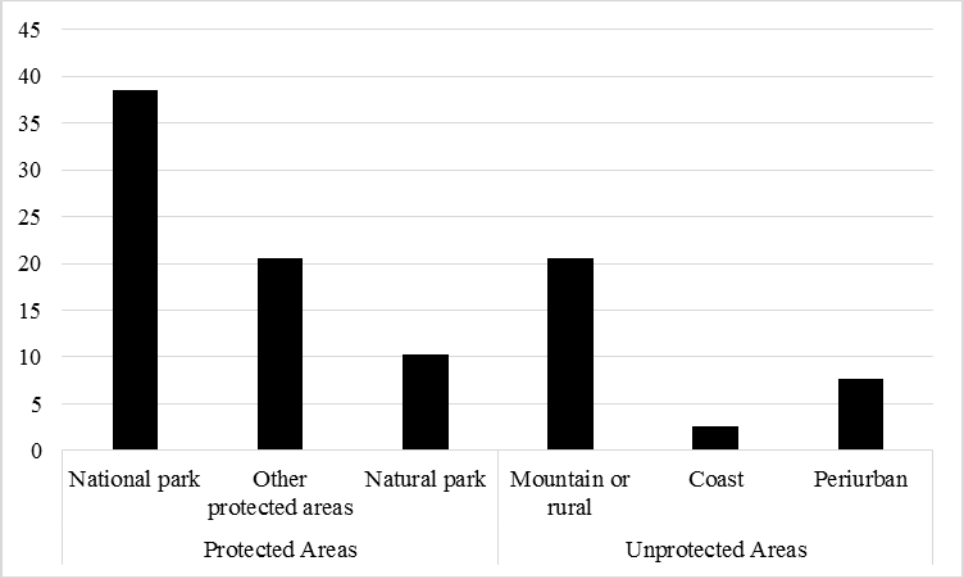

Figure 4. Distribution of landscape units studied by articles, in %

Source: Author's Elaboration

4.3. Methods of carrying capacity determination

An analysis of the methods used to assess the carrying capacity of hiking trails in the 39 articles that were the subject of this study identified the use of eight methods. Their use was studied, and it was possible to divide them into four main categories, three of which use different methodologies and a fourth one that is the result of combining at least two of them.

The first group consists of two articles that address social carrying capacity through the use of questionnaire surveys (Manning et al., 2002; Mota et al., 2021b). The second group, which comprises the majority of publications, is based on the use of the Cifuentes (1992) methodology, with a total of 33 articles using this approach, representing 84.6% of the sample (Albayudi & Tiola, 2022; Anzaldúa-Soulé et al, 2023; Bonillas & Garcia, 2022; Bustamante, 2021; Carvalho, Lemke, Mussury, Corrêa, & Guimarães, 2020; Castellanos, Alvarez, Clemente, Ucha, & Fernández-Truan, 2017; Castro-Barrantes, 2020; Cavalcante et al, 2023; de Sousa Melo, da Costa Silva, Horta, & de Souza Braga, 2020; Eduarte et al, 2021; García-

Trujillo et al, 2021; González-Guerrero et al, 2014; Ledesma et al., 2023; Lee et al., 2019; Maldonado & Montagnini, 2005; Marquez & Falcao, 2021; Mota et al., 2021a; Peihong et al., 2023; Perez, 2016; Queiroz et al., 2014; Ríos-Jara et al., 2013; Rocha et al., 2021; Salazar et al., 2023; Sayan & Atik, 2011; Somarriba-Chang et al., 2006; Soria-Díaz & Soria-Solano, 2015; Soria-Díaz et al., 2022; Teixeira & Oliveira, 2015; Trakala et al., 2023; Veras et al., 2022; Wiyono et al., 2018; Zambrano & Murillo, 2023). In this group, we can also observe three variants in the application of the methodology of Cifuentes (1992). Of this group, 29 articles use the original formula defined by the author, integrating the calculation of the physical carrying capacity (PCC), the real carrying capacity (RCC) and the effective carrying capacity (ECC). Three other articles take a simpler approach, applying the methodology by calculating the physical carrying capacity (PCC) and real carrying capacity (RCC) formula, excluding the calculation of the effective carrying capacity (ECC) (Mota et al., 2021a; Queiroz et al., 2014; Trakala et al., 2023). Finally, one of the publications (Ledesma et al., 2023) defines the methodology as a partial application of the formula, opting only for the calculation of the physical carrying capacity (PCC) (Table 3).

The third group includes only one article, which, although not referenced, adapts the Cifuentes (1992) method to calculate the carrying capacity of a hiking trail using the formula trail resistance (TR) and tourist flow (TF) (Janočkova et al., 2015).

Finally, the fourth set, with a total of three articles, results in the combination of calculating the carrying capacity of hiking trails by combining two different methods: (i) tourism carrying capacity (TCC) and social approach (Rogowski, 2019); (ii) use-impact model (physical carrying capacity and stakeholders survey) (Chang et al., 2023); and (iii) ecological carrying capacity (ECC) and social carrying capacity (SCC) (Aktymbayeva et al., 2023).

These results are in line with the conclusions of other authors using similar approaches, showing that the Cifuentes (1992) method is one of the most prominent methods for determining carrying capacity (Ajuhari et al., 2023), especially when applied to hiking trails.

The articles using the Cifuentes (1992) method were published between 2005 and 2023, with 69.7% between 2018 and 2023. The remaining methods were used in articles published between 2002 and 2023, with the majority (66.7%) after 2019.

Table 3. Methods for carrying capacity assessment

Method	Frequency
Social approach	
Social carrying capacity (SCC) (user surveys)	2
Cifuentes method	
Physical carrying capacity (PCC), real carrying capacity (RCC), and effective carrying capacity (ECC) formula	29
Physical carrying capacity (PCC) and real carrying capacity (RCC) formula	3
Physical carrying capacity (PCC) formula	1
Adaptation of the Cifuentes method	
Trail resistance (TR) and tourist flow (TF)	1
Combined approaches	
Tourism carrying capacity (TCC) and social approach	1
Use-impact model (physical carrying capacity and stakeholders survey)	1
Ecological carrying capacity (ECC) and social carrying capacity (SCC)	1
Total	**39**

Source: Author's Elaboration

4.4. Corrective factors and type of assessment result

In the methods analysed for determining carrying capacity, especially those that use (total or partial) determination of the physical carrying capacity of hiking trails, the application of correction factors varies from zero to 29 indicators, only in cases where at least the real carrying capacity (RCC) is calculated. In the case of the two studies that used the social approach method to determine carrying capacity, no correction factors were applied.

Most studies (41.7%) use three correction factors to calculate the carrying capacity of hiking trails, 13.9% use five or seven indicators, and only 11.1% use the same number of correction factors (6) as in the original study by Cifuentes (1992). At the extremes, one article does not use any correction factors at all (it only determines the physical carrying capacity (PCC) formula) (Ledesma et al., 2023), while another calculates 29 different correction factors (Carvalho et al., 2020) (Table 4 and Figure 5).

Of the 37 articles using the Cifuentes (1992) methodology, adapting it or combining it with other methods, only one uses the same correction factors as in the original study. The remaining 32 articles apply this methodology in an adapted form, including different

correction factors and/or excluding some of those present in the original study. However, in these 37 studies, three (29.7%), five (24.3%), two (18.9%) or four (8.1%) of the six correction factors defined by Cifuentes (1992) are applied, which shows the prevalence of the method originally used. Among the most common correction factors added to the original method for calculating the real carrying capacity (RCC) formula were "waterlogging"/"flooding" (calculated in 14 studies), "exposed roots" (calculated in two studies) or "invasive plants" (calculated in one study).

Finally, 35 studies evaluated the carrying capacity of hiking trails using the ratio of people per route per day (89.7%), one article defined an analytical approach using the ratio of people per hectare per day (2.6%) (Aktymbayeva et al., 2023), another defined results by analysing people per trip per week (2.6%) (Chang et al., 2023) and another study determined carrying capacity by analysing people per trip per year (2.6%) (Ríos-Jara et al., 2013). One of the articles (2.6%) did not specify the relationship between the determined carrying capacity and its temporal approach (Mota et al., 2021).

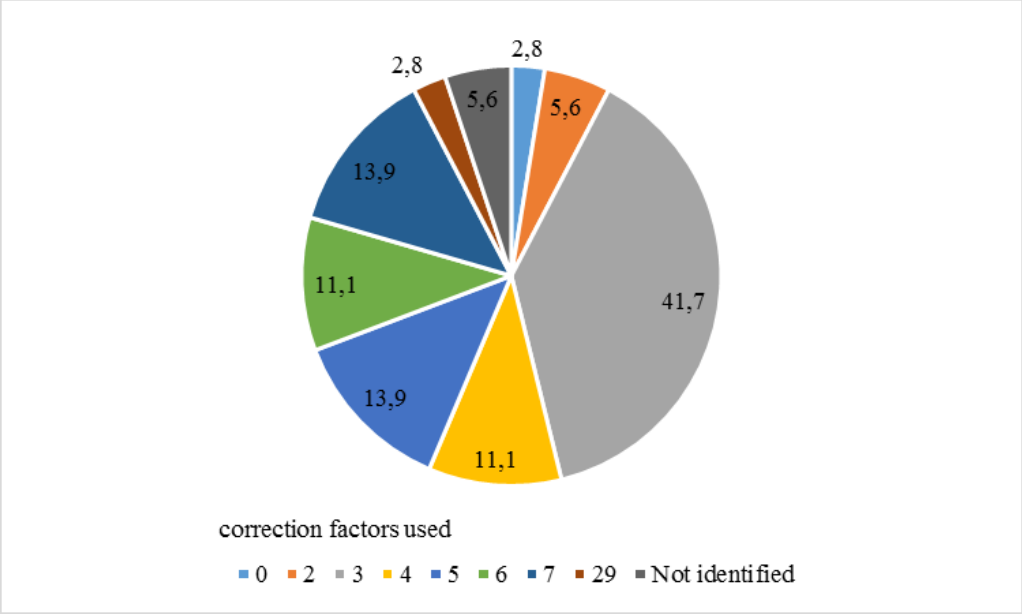

Figure 5. Number of correction factors used in research papers

Source: Author's Elaboration

Table 4. Correction factors referenced in research papers

Correction factor	Frequency	%	Correction factor	Frequency	%
Accessibility	24	17.4	Acceptance	1	0.7
Precipitation	21	15.2	Damage caused by touch	1	0.7
Erosion	20	14.5	Recreational development	1	0.7
Solar exposure	15	10.9	Availability of guides	1	0.7
Temporary closures	14	10.1	Fragility	1	0.7
Flooding	12	8.7	Management	1	0.7
Vegetal cover	3	2.2	Number of plants	1	0.7
Wildlife disturbance	3	2.2	Invasive plants	1	0.7
Flora disturbance	2	1.4	Preference	1	0.7
Exposed roots	2	1.4	Psychocomfort	1	0.7
Rock strength	2	1.4	Dry	1	0.7
Risk	2	1.4	Types of visitation	1	0.7
Satisfaction	2	1.4	Tolerance	1	0.7
Wind	2	1.4	Vulnerability and status of the protected area	1	0.7
Total	**138**	**100**	**Total**	**138**	**100**

Source: Author’s Elaboration

5. Conclusion

This systematic literature review on determining the carrying capacity of hiking trails provides an overview of the subject and its importance in the current framework of tourism system development, identifying the most commonly used methods, the correction factors applied and new trends, the landscape units preferred for their application and the types of approach to determining the carrying capacity of hiking trails.

With the overall aim of providing an overview of the subject for future research, the research carried out aimed to understand the main dynamics of studies analysing the determination of

the carrying capacity on hiking trails, to identify the chronology of interest in studies on the carrying capacity applied to hiking trails, the landscape units and typologies of areas favoured in the research analysed, the methods used to assess the carrying capacity on hiking trails, and the number and typology of correction factors applied in determining the carrying capacity.

The systematic literature review carried out, consisting of 39 articles, identified an increasing trend in studies on the carrying capacity of hiking trails, especially between 2020 and 2023, in line with the growing concern about the environmental sustainability of the tourism system, especially in relation to natural and/or protected areas, which are considered more vulnerable to the negative impacts of overuse of hiking trails (and other recreational activities).

In particular, the method used to determine the carrying capacity of trails is that of Cifuentes (1992), with particular emphasis on determining the physical carrying capacity, favouring the correction factors defined in the original methodology, but with the introduction of other indicators considered important in determining the carrying capacity. However, a large number of studies use only half of the correction factors defined by Cifuentes (1992), which could lead to more permissive results in the use of trails. Among the most common correction factors added to the original Real Carrying Capacity (RCC) formula are "waterlogging"/"flooding", "exposed roots" or "invasive plants". Finally, this research concludes that most studies favour the ratio of people per trip per day to determine carrying capacity.

However, this systematic literature review has some limitations that should be considered. Firstly, the choice of keywords may have excluded a number of studies using other terms that are less common in European and/or Western research for the terms "hiking" and "carrying capacity". Secondly, the restriction to English in article titles or abstracts may have excluded research published in other languages. Finally, the application of the PRISMA protocol and the exclusion of master's dissertations and doctoral theses may have had a negative impact on the number of publications, given the density of a study on the carrying capacity of hiking trails, which usually involves a large number of pages.

Considering the scientific gap that exists in the comparison between the carrying capacity indexes calculated for hiking trails and the effective demand, it is important to carry out this analysis in future studies.

On the other hand, for future research, it would be important to test the methodology most frequently used in carrying capacity studies applied to hiking trails (Cifuentes, 1992), revising

the correction factors according to the area analysed and based on the indicators added to the original methodology. In order to verify the validity of the model and its practical applicability, it is essential to test its application in conjunction with the monitoring of the analysed hiking trails, with the aim of analysing trends and presenting proposals to mitigate overuse (temporary or permanent) of hiking trails.

References

Acevedo-Duque, Á., Llanos-Herrera, G. R., García-Salirrosas, E. E., Simón-Isidoro, S., Álvarez-Herranz, A. P., Álvarez-Becerra, R., & Díaz, L. C. S. (2022). Scientometric Analysis of Hiking Tourism and Its Relevance for Wellbeing and Knowledge Management. *International Journal of Environmental Research and Public Health*, *19*(14). https://doi.org/10.3390/ijerph19148534

Ajuhari, Z., Aziz, A., Yaakob, S. S. N., Abu Bakar, S., & Mariapan, M. (2023). Systematic Literature Review on Methods of Assessing Carrying Capacity in Recreation and Tourism Destinations. *Sustainability*, *15*(4). https://doi.org/10.3390/su15043474

Aktymbayeva, A., Nuruly, Y., Artemyev, A., Kaliyeva, A., Sapiyeva, A., & Assipova, Z. (2023). Balancing Nature and Visitors for Sustainable Development: Assessingthe Tourism Carrying Capacities of Katon-Karagay National Park, Kazakhstan. *Sustainability*, *15*(22). https://doi.org/10.3390/su152215989

Albayudi, A., & Tiola, I. S. (2022). The Carrying Capacity of Ecotourism Hiking Trail Danau Gunung Tujuh National Park Kerinci Seblat. *Jurnal Silva Tropika*, *6*(2), 125-134. https://doi.org/10.22437/jsilvtrop.v6i2.26013

Alves, L. (2021). Avaliação da capacidade de carga em percursos pedestres. Uma análise exploratória na Aldeia do Xisto de Fajão (Centro de Portugal). Conference: ecUI&D 21 – VII Encontro Científíco da Unidade de Investigação & Desenvolvimento do ISLA Santarém

Antoušková, M., Mikulec, A., & Kolářová, A. (2014). Hikers' Motives for Choosing a Hiking Trail - Evidence from the Czech Landscape Protected Areas. *SHS Web of Conferences* 12, 01075, 1-7. https://doi.org/10.1051/shsconf/20141201075

Anzaldúa-Soulé, K. R., Saldaña-Almazán, M., & Almazán-Adame, A. A. (2023). Sustainable tourism carrying capacity. The case of El Veladero National Park, Acapulco, Mexico. *Cienciauat*, *18*(1), 125-140. https://doi.org/10.29059/cienciauat.v18i1.1750

Arrowsmith, C., Zanon, D., & Chhetri, P. (2005). Monitoring visitor patterns of use in natural tourist destinations. In C. Ryan, S. J. Page, & M. Aicken (Eds.), *Taking tourism to the limits: Issues, concepts and managerial perspectives* (pp. 33–52). Elsevier.

Atari, J., & Feldman, J. (2023). Hiking the Via Alpina: Logos, eros and the trails to freedom. *Anthropological Journal of European Cultures*, *32*(2), 23-44. https://doi.org/10.3167/ajec.2023.320203

Attali, M., Fortune, Y., Gomet, D., & Rech, Y. (2023). How hiking reinvented rural areas: Social transformation and leisure activities in Brittany during the 1970s. *Rural History*, *34*(1), 1–17. https://doi.org/10.1017/S0956793322000152

Azmi, D. I., Karim, H. A., & Amin, M. Z. M. (2012). Comparing the Walking Behaviour between urban and rural residents. *Procedia - Social and Behavioral Sciences*, *68*, 406-416. https://doi.org/10.1016/j.sbspro.2012.12.237

Barrow, G. (2007). Recreational Carrying Capacity. 9th Annual Caribbean Sustainable Tourism Conference. Grand Cayman.

Bonillas, N., & Garcia, L. G. (2022). Methods to assess the potencial of birdwatching in Santa Maria, Boyaca, Colombia. *Anuario Turismo Y Sociedad*, *31*, 227-280. https://doi.org/10.18601/01207555.n31.12

Bruno, M., Araújo, R., Rocha, C., de Melo, D., Santos, R. (2011). Perfil dos visitantes do Parque Municipal Fazenda Lagoa do Nado na Região Metropolitana de Belo Horizonte (MG). *e-Scientia*, *4*(1), 12-20.

Bruyn, C., Ben Said, F., Meyer, N., & Soliman, M. (2023). Research in tourism sustainability: A comprehensive bibliometric analysis from 1990 to 2022. *Heliyon*, *9*(8), e18874. https://doi.org/https://doi.org/10.1016/j.heliyon.2023.e18874

Buckley, R. (1999). Tools and indicators for managing tourism in parks. *Annals of Tourism Research*, *26*, 207-10.

Bustamante, P. (2021). Tourist carrying capacity on the trails of the Podocarpus National Park Cajanuma sector. *Alfa Revista de Investigación en Ciencias Agronómicas y Veterinaria, 5(15), 188-198.* https://doi.org/10.33996/revistaalfa.v5i15.139

Carvalho, E. M., Lemke, A. P., Mussury, R. M., Corrêa, A. L., & Guimarães, F. J. (2020). Visitation capacity study of the ecological trail of an Atlantic Forest fragment. *Revista Ibero-Americana de Ciências Ambientais, 11(3), 402-410.* https://doi.org/10.6008/CBPC2179-6858.2020.003.0031

Carvalho, P., & Alves, L. (2021). Pedestrianismo, festivais de caminhadas e turismo de natureza: O exemplo do Pampilhosa da Serra Walking Weekend. *Cadernos de Geografia, 43, 25-38.* https://doi.org/10.14195/0871-1623_43_2

Castellanos, D. C., Alvarez, V. B., Clemente, J. M., Ucha, F. E. G., & Fernández-Truan, J. C. (2017). Limits of acceptable change of ecotourism in Punta del Este, Isla de la Juventud (Cuba). *Investigaciones Turisticas*, *13*, 96-113. https://doi.org/10.14461/INTURI2017.13.05

Castro-Barrantes, L. (2020). Tourism carrying capacity and environmental zoning of CEANA, oriented to visitors management and water resource protection in Cartago, Costa Rica. Revista Florestal MesoAmerica Kuru-RFMK, *17*(41), 47-57. https://doi.org/10.18845/rfmk.v17i41.5283

Cavalcante, F. R. C., de Almeida, F. M., Chaves, C. A. P., Cavalcante, A., Trindade, C. D., Meira, M. C. D., & Aznar, S. (2023). Tourism load capacity as a tool for the sustainable management of the Guajar Mirim State Parque, Rondónia, Western Amazon. *Revista Cientifica da Faculdade de Educação e Meio Ambiente*, *14*(1), 112-136. https://doi.org/10.31072/rcf.v14i1.1238

Chang, H., Hsieh, C., Yu, C., Lin, Y., & Lin, B. (2023). Ecological Carrying Capacity Estimation of the Trails in a Protected Area: Integrating a Path Analysis Model and the Stakeholders' Evaluation. *Forests*, *14*, 2400. https://doi.org/10.3390/f14122400

Chhetri P., & Arrowsmith C. (2002). Developing a spatial model of hiking experience in natural landscapes. *Cartography*, *31*(2), 87-102. https://doi.org/10.1080/00690805.2002.9714208

Chhetri, P., Arrowsmith, C. & Jackson, M. (2004). Determining hiking experiences in nature-based tourist destinations. *Tourism Management*, *25*, 31-43. https://doi.org/10.1016/S0261-5177(03)00057-8

Cifuentes, M. (1992). *Determinación de la Capacidad de Carga Turística en Áreas Protegidas*. Centro Agronómico Tropical de Investigación y Enseñanza (CATIE).

Claire C., & Elodie P. (2022). The market of coastal hiking. An approach based on "market-agencements". *Loisir et Société/Society and Leisure*, *45*(1), 63-96. https://doi.org/10.1080/07053436.2022.2053324

Cohen, M. (2020). Does the COVID-19 outbreak mark the onset of a sustainable consumption transition? *Sustainability: Science, Practice and Policy*, *16*(1), 1-3. https://doi.org/10.1080/15487733.2020.1740472

Cole, D., & Bayfield, N. (1993). Recreation trampling of vegetation: Standard experimental procedures. *Biological Conservation*, *63*, 209-215. https://doi.org/10.1016/0006-3207(93)90714-C

Cole, D., Manning, R., & Lime, D. (2005). Addressing visitor capacity of parks and rivers. *Parks and Recreation*, *40*, 8-12.

Collins-Kreiner, N., & Kliot, N. (2016). Particularism vs. universalism in hiking tourism. *Annals of Tourism Research*, *56*, 132-137. https://doi.org/10.1016/j.annals.2015.10.007

Cordeiro, B. & Alves, L. (2022). Áreas protegidas, turismo e percursos pedestres. O perfil do pedestrianista na Serra da Lousã. *Pasos Revista de Turismo y Património Cultural*, *20*(4), 939-949. https://doi.org/10.25145/j.pasos.2022.20.062

Cordes, H., Baumeister, S., & Käyrä, M. (2024). Factors influencing the willingness to pay for aviation voluntary carbon offsets: A literature review. *European Journal of Tourism Research*, *36*, 3602. https://doi.org/10.54055/ejtr.v36i.2741

das Neves, A. J., & Eusébio, C. (2021). Carrying capacity in tourist destinations. *Journal of Tourism & Development*, *36*(2), 245-258. https://doi.org/10.34624/rtd.v36i2.8537

Davies, N. (2018). Who walks, where and why? Practitioners' observations and perspectives on recreational walkers at UK tourist destinations. *Annals of Leisure Research*, *21*(5), 553-574. https://doi.org/10.1080/11745398.2016.1250648

Davies, N., Lumsdon, L., & Weston, R. (2011). Health motivations for recreational walking. In Gronau, W., Reiter, K. & Pressl, R. (Eds.). *Transport and Health Issues: Studies on Mobility and Transport Research*, *3*, 119-140.

Davies, N., Lumsdon, L.M., & Weston, R. (2012). Developing recreational trails: Motivations for recreational walking. *Tourism Planning & Development*, *9*(1), 77-88. https://doi.org/10.1080/21568316.2012.653480

de Sousa Melo, R., da Costa Silva, C., Horta, B. P., & de Souza Braga, S. (2020). Study of the Recreational Carrying Capacity of the Caída do Morro Trail (Ilha Grande, Piauí State, Brazil). *Journal of Spatial and Organizational Dynamics*, *8*(1), 52-66.

Deluca, W., & King, D. (2014). Influence of Hiking Trails on Montane Birds. *The Journal of Wildlife Management*, *78*(3), 494-502. https://doi.org/10.1002/jwmg.675

Dickinson, J., Lumsdon, L., & Robbins, D. (2011). Slow travel: Issues for tourism and climate change. *Journal of Sustainable Tourism*, *19*, 281-300. https://doi.org/10.1080/09669582.2010.524704

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conducta bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285-296. https://doi.org/10.1016/j.jbusres.2021.04.070

Eduarte, G. T., Andrada, R. T., Galang, M. A., Malabrigo, P. L., Tiburan, C. L., & Dida, J. J. V. (2021). Determination of carrying capacity estimates of ecotourism attractions in the quezon protected landscape, the Philippines. *Philippine Journal of Science*, *150*(3), 635-644. https://doi.org/10.56899/150.03.04

Estevão, C., & Costa, C. (2020). Natural disaster management in tourist destinations: a systematic literature review. *European Journal of Tourism Research*, *25*, 2502. https://doi.org/10.54055/ejtr.v25i.417

Fang, W., & Ng, S. (2024). Trail degradation caused by mountain biking and hiking: Amulti-dimensional analysis. *Journal of Environmental Management*, *351*, 119801. https://doi.org/10.1016/j.jenvman.2023.119801

Farías, E., & Monserrat, S. (2014). Los visitantes del parc natural de L'Alt Pirineu y la práctica de actividades recreativo-deportivas. Una propuesta de segmentación. *Pirineos-Revista de Ecología de Montaña*, *169*, 1-16. http://dx.doi.org/10.3989/Pirineos.2014.169005

Farías, E., Grau, H., & Camps, A. (2005). Trail preferences and visitor characteristics in Aigüestortes i Estany Sant Maurici National Park, Spain. *Mountain Research and Development*, *25*(1), 51-59. https://doi.org/10.1659/0276-4741(2005)025[0051:TPAVCI]2.0.CO;2

Farrel, T., & Marion, J. (2002). Trail impacts and trail impact management related to ecoturismo visitation at Torres del Paine National Park, Chile. *Journal of the Canadian*

Association for Leisure Studies, *26*, 31-59. https://doi.org/10.1080/14927713.2001.9649928

Fennell, D. (2008). *Ecotourism* (3ª ed). Routledge, Taylor & Francis Group.

Fernández-Villarán, A., Espinosa, N., Abad, M., & Goytia, A. (2020). Model for measuring carrying capacity in inhabited tourism destinations. *Portuguese Economic Journal*, *19*, 213-241. https://doi.org/10.1007/s10258-020-00173-5

Fletcher, R., Murray, I., Blázquez-Salom, M., & Asunción, B. (2020). Tourism, degrowth, and the COVID-19 Crisis. *POLLEN Ecology Network*, *24*.

Folmann, A. (2013). A importância das trilhas interpretativas para a educação ambiental, geoturismo e geoconservação – estudo de algumas trilhas do Parque Nacional dos Campos Gerais. *Anais do 2 Congresso Nacional de Planejamento e Manejo de Trilhas / I Colóquio Brasileiro para a Red Latinoamericana de Senderismo*, 1087-1132.

Forero, A., Mejia, A., & León-Gómez, A. (2023). A Bibliometric Analysis and Systematic Review of Dark Tourism: Trends, Impact, and Prospects. *Administrative Sciences*, *13*, 238. https://doi.org/10.3390/admsci13110238

Fortune, Y., & Gomet, D. (2022) Structurer et promouvoir la randonnée en Bretagne: le rôle de l'Association Bretonne des Relais et Itinéraires (années 1970-1980). *Loisir et Société/Society and Leisure*, *45*(1), 14-29. https://doi.org/10.1080/07053436.2022.2052682

García, M. (2003). El conjunto monumental de la Alhambra (Granada). La capacidad de acogida turística como base de la gestión de la visita pública. *Nexus*, *30*, 42-51.

García-Trujillo, Z. H. K., Almeraya-Quintero, S. X., Guajardo-Hernández, L. G., & Torres-Pérez, J. A. (2021). Evaluation of the carrying capacity of firefy trails in Nanacamilpa, Tlaxcala. *Agricultura Sociedad Y Desarrollo*, *18*(1), 127-143.

Geiger, K., Sers, S., Buday, L., & Wäsche, H. (2023). Why hikers hike: an analysis of motives for hiking. *Journal of Sport & Tourism*, *27*(4), 315-329. https://doi.org/10.1080/14775085.2023.2252420

Gómez-Martín, M. (2019). Hiking tourism in Spain: origins, issues and transformations. *Sustainability*, *11*(13), 3619. https://doi.org/10.3390/su11133619

González-Guerrero, G., Pérez, M. E. V., Ibarra, R. M., & de Jesús Osorno Corona, M. (2014). The Carrying Capacity of Trails in the Iztaccíhuatl-Popocatepétl National Park in Mexico. *Journal of Tourism*, *15*.

Gössling, S., Humpe, A., & Sun, Y. (2024). On track to net-zero? Large tourismenterprises and climate change. *Tourism Management*, *100*, 104842. https://doi.org/10.1016/j.tourman.2023.104842

Hall, C., Prayag, G., & Amore, A. (2017). *Tourism and resilience: Individual, organisational and destination perspectives*. Channel View.

Hall, C., Scott, D., & Gössling, S. (2020). Pandemics, transformations and tourism: be careful what you wish for. *Tourism Geographies*, *22*(3), 577-598. https://doi.org/10.1080/14616688.2020.1759131

Hammitt, W., & Cole, D. (1998). *Wildland Recreation: Ecology and Management* (2ed.). Estados Unidos da América: John Wiley & Sons.

Hashem E., Salleh, N., Abdullah, M., Ali, A., Faisal, F., & Nor, R. (2023). Research trends, developments, and future perspectives in brand attitude: Abibliometric analysis utilizing the Scopus database (1944–2021). *Heliyon*, *9*(1), e12765. https://doi.org/https://doi.org/10.1016/j.heliyon.2022.e12765

Havlick, D., Billmeyer, E., Huber, T., Vogt, B., & Rodman, K. (2016). Informal trail creation: hiking, trail running, and mountain bicycling in shortgrass prairie. *Journal of Sustainable Tourism*, *24*(7), 1041-1048. https://doi.org/10.1080/09669582.2015.1101127

Higgins-Desbiolles, F., Carnicelli, S., Krolikowski, C., Wijesinghe, G., & Boluk, K. (2019). Degrowing tourism: rethinking tourism. *Journal of Sustainable Tourism*, *27*(12), 1926-1944. https://doi.org/10.1080/09669582.2019.1601732

Hockett, K., Marion, J., & Leung, Y. (2017). The efficacy of combined educational and site management actions in reducing off-trail hiking in an urban-proximate protected area. *Journal of Environmental Management*, *203*, 17-28. https://doi.org/10.1016/j.jenvman.2017.06.073

Ivanenko, Y., Lobchenko, G., Maliuha, V., & Yukhnovskyi, V. (2022). Spruce forest litter structure, distribution, and water retention along hiking trails in the Ukrainian Carpathians. *Journal of Forest Science*, *68*(7), 241-252. https://doi.org/10.17221/12/2022-JFS

Janočková, J., Koščová, M., & Jablonská, J. (2015). The Ability of Tourist Natural Trails to Resist Tourism Load and Possibilities for Reducing the Environmental Impacts: Case

Study of the Slovak Paradise National Park (Slovakia). *Ekológia (Bratislava)*, *34*(3), 281-292. https://doi.org/10.1515/eko-2015-0027

Kastenholz, E., & Rodrigues, Á. (2007). Discussing the Potential Benefits of Hiking Tourism in Portugal. *Anatolia: An International Journal of Tourism and Hospitality*, *18*(1), 5-21. https://doi.org/10.1080/13032917.2007.9687033

Kil, N., Holland, S., & Stein, T. (2014). Structural relationships between environmental attitudes, recreation motivations, and environmentally responsible behaviors. *Journal of Outdoor Recreation and Tourism*, 16-25. https://doi.org/10.1016/j.jort.2014.09.010

Kim, S., Baah, N. G., Lee, B., & Oh, M. (2022). Hiking tourists' experiential dynamics: amultiple measurement approach. *Asia Pacific Journal of Tourism Research*, *27*(10), 1031-1051. https://doi.org/10.1080/10941665.2022.2152356

Kuss, R., & Hall, C. (1991). Ground flora trampling studies: Five years after closure. *Environmental Management*, *15*, 715-727. https://doi.org/10.1007/BF02589629

Kuss, R., & Morgan, J. (1980). Estimating the physical carrying capacity of recreational areas: A rationale for application of the universal soil loss equation. *Journal Soil Water Conservation*, *35*, 87-89.

Lakspriyanti, A., Ekayani, M., & Sunkar, A. (2020). Carrying capacity assessment of cibeureum waterfall tourism in Gunung Gede Pangrango National Park. *Media Konservasi*, *23*(3), 203-211. https://doi.org/10.29244/medkon.25.3.203-211

Ledesma, R. E., Villarroel, J., & Cardozo, R. (2023). Feasibility study of a hiking project. Terraza Archaeological Site (Cafayate, Salta). *Revista del Museo de Antropologia*, *16*(2), 25-38. https://doi.org/10.31048/1852.4826.v16.n2.38801

Lee, S. A., Manthiou, A., Chiang, L., & Tang, L. R. (2018). An assessment of value dimensions in hiking tourism: Pathways toward quality of life. *International Journal of Tourism Research*, *20*(2), 236-246. https://doi.org/10.1002/jtr.2176

Lenzen, M., Sun, Y., Faturay, F., Ting, Y., Geschke, A., & Malik, A. (2018). The carbon footprint of global tourism. *Nature Climate Change*, *8*, 522-528. https://doi.org/10.1038/s41558-018-0141-x

Leung, Y., & Marion, J. (1999). Acessing trail conditions in protected areas: aplication of a problem-acessment method in Great Smoky Mountains National Park, USA. *Environmental Conservation*, *26*(4), 270-279. https://doi.org/10.1017/S0376892999000399

Leung, Y., & Marion, J. (2000). Recreation impacts and management in wilderness: a state-of-knowledge review. In Cole, D., McCool, F., Cole, D., Borrie, W. & O'Loughlin, J. (eds.), *Wilderness science in a time of change conference*, 5, Wilderness ecosystems, threats, and management. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Li, J., Weng, G., Pan, Y., Li, C., & Wang, N. (2021). A scientometric review of tourism carrying capacity research: Cooperation, hotspots, and prospect. *Journal of Cleaner Production, 325*, 129278. https://doi.org/10.1016/j.jclepro.2021.129278

Li, W., Ge, X., & Liu, C. (2005). Hiking trails and tourism impact assessment in protected area: Jiuzhaigou Biosphere Reserve, China. *Environmental Monitoring and Assessment, 108*, 279-293. https://doi.org/10.1007/s10661-005-4327-0

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P., Clarke, M., Devereaux, P. J., Kleijnen, J., & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *PLoS medicine*, *6*(7), e1000100. https://doi.org/10.1371/journal.pmed.1000100

Liddle, M. (1991). Recreation ecology: Effects of trampling on plants and corals. *Trees, 6*, 13-17. https://doi.org/10.1016/0169-5347(91)90141-J

Lima, D. (2005). *Um itinerário geológico pela Serra do Gerês na promoção da cultura científica. Percurso pedestre interpretativo minas do Borrageiro-Lagoa do Marinho. Um reforço à educação ambiental.* Dissertação de Mestrado, Universidade do Porto, Portugal.

Lime, D., & Stankey, G. (1971). *Carrying Capacity: maintaining outdoor recreation quality*. College of Forestry.

Lu, J., & Campbell, M. (2008). The nature and heterogeneity of perceived constraints of using the trans-Canada trail for hiking/ walking. *Leisure/Loisir*, 183-201. https://doi.org/10.1080/14927713.2008.9651405

Lukoseviciute, G., Pereira, L. N., & Panagopoulos, T. (2022). The economic impact ofrecreational trails: a systematic literature review. Journal of Ecotourism, *21*(4), 366-393. https://doi.org/10.1080/14724049.2022.2030745

Lumsdon, L., & P. McGrath (2011). Developing a conceptual framework for slow travel: a grounded theory approach. *Journal of Sustainable Tourism*, *19*(3), 265-279. https://doi.org/10.1080/09669582.2010.519438

Luo, J. M., & Shang, Z. (2023). Hiking experience attributes and seasonality: an analysis oftopic modelling. *Current Issues in Tourism*, 1-17. https://doi.org/10.1080/13683500.2023.2245955

Lynn, N. A., & Brown, R. D. (2003). Effects of recreational use impacts on hiking experiences in natural areas. *Landscape and Urban Planning*, *64*, 77-87. https://doi.org/10.1016/S0169-2046(02)00202-5

MacLeod, N. (2017). The role of trails in the creation of tourist space. *Journal of Heritage Tourism*, *12*(5), 423-430. https://doi.org/10.1080/1743873X.2016.1242590

Magadán-Díaz, M., & Rivas-García, J. I. (2022). Publishing Industry: A Bibliometric Analysis of the Scientific Production Indexed in Scopus. *Publishing Research Quarterly*, *38*(4), 665-683. https://doi.org/10.1007/s12109-022-09911-3

Maldonado, E., & Montagnini, F. (2005). Carrying capacity of La Tigra National Park, Honduras: Can the park be self-sustainable? *Journal of Sustainable Forestry*, *19*(4), 29-48. https://doi.org/10.1300/J091v19n04_03

Manning, R., Valliere, W., Wang, B., Lawson, S., & Newman, P. (2002). Estimating day use social carrying capacity in Yosemite National Park. *Leisure/Loisir*, *27*(1-2), 77-102. https://doi.org/10.1080/14927713.2002.9651296

Marquez, L. A. M., & Falcao, M. T. (2021). Tourist load capacity on the Kuata trail, Nova Esperanca Community, Indigenous Land Sao Marcos, Pacaraima-Roraima. *Revista Acta Geografica*, *15*(37), 292-317.

Marsiglio, S. (2017). On the carrying capacity and the optimal number of visitors in tourism destinations. *Tourism Economics*, 23, 632-646. https://doi.org/10.5367/te.2015.0535

Mayr, B., Beck, M., Eisenberger, L., Venek, V., Kranzinger, C., Menzl, A., Reich, B., Hornung-Prähauser, V., Oberhoffer-Fritz, R., Böhm, B., & Niebauer, J. (2022). Valorization of Natural Cardio Trekking Trails Through Open Innovation for the Promotion of Sustainable Cross-generational Health-Oriented Tourism in the Connect2Move Project: Protocol for a Cross-sectional Study. *JMIR research protocols*, *11*(7), e39038. https://doi.org/10.2196/39038

McColl, S., & Reilly, M. (1993). Benefit segmentation analysis of state Park visitor setting preferences and behavior. *Journal of Park and Recreation Administration*, 1-14.

McGrath, P., & Sharpley, R. (2016). Slow travel and slow tourism: New concept or new label? In Clancy, M. (Ed.), *Slow tourism, food and cities: Pace and the search for the 'good life'*. Routledge, 11-34.

Molokáč, M., Hlaváčová, J., Tometzová, D., & Liptáková, E. (2022). The Preference Analysis for Hikers' Choice of Hiking Trail. *Sustainability*, *14*(11). https://doi.org/10.3390/su14116795

Moscardi, E., Pinto, M., Gomes, E., & Nakatani, M. (2017). The use of bibliometric, systematic and integrative literature reviews to understand the concept of tourist information. *Journal of Tourism & Development*, *1*(27/28), 1821-1830. https://doi.org/10.34624/rtd.v1i27/28.10249

Moscoso-Sánchez, D., Nasarre-Sarmiento, J. M., Trujillo-Carmona, M., González-Fernández, M. T., Luque-Gil, A., Sánchez-Sanz, V., & Vidal-González, P. (2022). Historic public paths in rural areas: engine of development and origin of new conflicts. *Journal of Cultural Heritage Management and Sustainable Development*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/JCHMSD-01-2022-0010

Mota, L., Franco, M., & Santos, R. (2021a). Island tourism carrying capacity in the UNESCO Site Laurisilva of Madeira. *Island Studies Journal*, *16*(2), 255-269. http://dx.doi.org/10.24043/isj.143

Mota, L., Franco, M., & Santos, R. (2021b). Social Carrying Capacity in Island Destinations: Interpreting Visitors' Opinions in Madeira Island. *European Journal of Tourism, Hospitality and Recreation*, *11*(2), 253-266. https://doi.org/10.2478/ejthr-2021-0023

Mundher, R., Abu Bakar, S., Maulan, S., Mohd Yusof, M. J., Al-Sharaa, A., Aziz, A., & Gao, H. (2022). Aesthetic Quality Assessment of Landscapes as a Model for UrbanForest Areas: A Systematic Literature Review. *Forests*, *13*(7). https://doi.org/10.3390/f13070991

Muro, A., Mateo, C., Parrado, E., Subirana-Malaret, M., Moya, M., Garriga, A., & Sanz, A. (2023). Forest bathing and hiking benefits for mental health during the COVID-19 pandemic in Mediterranean regions. *European Journal of Forest Research*, *142*(2), 415-426. https://doi.org/10.1007/s10342-023-01531-6

Nanu, L., Rahman, I., Ali, F., & Martin, D. S. (2024). Enhancing the hospitalityexperience: A systematic review of 22 years of physical environment research. *International Journal of Hospitality Management*, *119*, 103692. https://doi.org/10.1016/j.ijhm.2024.103692

Nepal, S. (2003). Trail impacts in Sagarmatha (Mt. Everest) National Park, Nepla: a logistic regression analysis. *Environmental Management*, *32*(3), 312-321. https://doi.org/10.1007/s00267-003-0049-7

Newsome, D., Moore, S., & Dowling, D. (2013). *Natural areas tourism: Ecology, impacts and management* (2ª ed.). Channel View Publishing.

Nordbø, I., & Prebensen, N. K. (2015). Hiking as Mental and Physical Experience. *Advances in Hospitality and Leisure*, *11*, 169-186). https://doi.org/10.1108/S1745-354220150000011010

Obradović, S., & Tešin, A. (2022). Hiking in the COVID-19 era: motivation and post-outbreak intentions. *Journal of Sport & Tourism*, *26*(2), 147-164. https://doi.org/10.1080/14775085.2022.2048683

Ocaña, C., Vargas, R., & Rodríguez, S. (2013). Incidencia del senderismo en la economía local. Un análisis empírico a propósito del Parque Natural Sierra de las Nieves (Málaga). *Anales de Geografia*, *33*(1), 161-192.

Oh, M., Kim, S., & Choi, Y. (2019). Analyses of determinants of hiking tourism demands on the Jeju Olle hiking trail using zero-truncated negative binomial regression analysis. *Tourism Economics*, 1-17. https://doi.org/10.1177/1354816619888337

Ólafsdóttir, R., & Runnström, M. C. (2013). Assessing hiking trails condition in two popular tourist destinations in the Icelandic highlands. *Journal of Outdoor Recreation and Tourism*, *3*(4), 57-67. https://doi.org/10.1016/j.jort.2013.09.004

Olive, N., & Marion, J. (2009). The influence of use-related, environmental, and managerial factos on soil loss recreational trails. *Jornal of Environmental Management*, *90*, 1483-1493. https://doi.org/10.1016/j.jenvman.2008.10.004

Özbek, S., Lanzavecchia, A., & Ferrarese, F. (2023). Participatory Geographic-Information-System-Based Citizen Science: Highland Trails Contamination due to Mountaineering Tourism in the Dolomites. *Sustainability*, *15*, 13908. https://doi.org/10.3390/su151813908

Page M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D. et al. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, *372*(71). https://doi.org/10.1136/bmj.n71

Pahlevan-Sharif, S., Mura, P., & Wijesinghe, S. N. R. (2019). A systematic review of systematic reviews in tourism. *Journal of Hospitality and Tourism Management*, *39*, 158-165. https://doi.org/https://doi.org/10.1016/j.jhtm.2019.04.001

Pásková, M., Štekerová, K., Zanker, M., Lasisi, T. T., & Zelenka, J. (2024). Waterpollution generated by tourism: Review of system dynamics models. *Heliyon*, *10*(1), e23824. https://doi.org/https://doi.org/10.1016/j.heliyon.2023.e23824

Pedrosa, A., Martins, F., & Breda, Z. (2022). Tourism routes: a scoping review. *European Journal of Tourism Research*, *32*, 3216. https://doi.org/10.54055/ejtr.v32i.2575

Peeters, P., Çakmak, E., & Guiver, J. (2024). Current issues in tourism: Mitigating climate change in sustainable tourism research. *Tourism Management*, *100*, 104820. https://doi.org/10.1016/j.tourman.2023.104820

Peihong, W., Kai, W., Kerun, L., & Shufang, F. (2023). An evaluation model for the recreational carrying capacity of urban aerial trails. *Tourism Management Perspectives*, *48*, 101152. https://doi.org/10.1016/j.tmp.2023.101152

Perez, R. (2016). Tourism carrying capacity as a basis for sustainable management of the ecotourism activities in the Unidades de Manejo Ambiental (Environmental Management Units) of Baja California Sur (BCS). *El Periplo Sustentable*, *30*, 37-76.

Perry, E. E., Xiao, X., Iretskaia, T. A., Li, P., Manning, R. E., Valliere, W. A., & Reigner, N. P. (2022). A review of digitalization and sustainability in parks and recreation indicators and thresholds research. *Journal of Outdoor Recreation and Tourism*, *39*, 100550. https://doi.org/10.1016/j.jort.2022.100550

Peterson, B., Brownlee, M., & Marion, J. (2018). Mapping the relationships between trail conditions and experiential elements of long-distance hiking. *Landscape and Urban Planning*, *180*, 60-75. https://doi.org/10.1016/j.landurbplan.2018.06.010

Pickering, C. M., & Hill, W. (2007). Impacts of recreation and tourism on plant biodiversity and vegetation in protected areas in Australia. *Journal of Environmental Management*, *85*(4), 791-800. https://doi.org/10.1016/j.jenvman.2006.11.021

Pickering, C., & Byrne, J. (2014). The benefits of publishing systematic quantitative literature re-views for PhD candidates and other early-career researchers. *Higher Education Research & Development*, *33*(3), 534-548. https://doi.org/10.1080/07294360.2013.841651

Porto, P., Fonseca, R., & Reis, J. (2013). Análise da capacidade de carga antrópica e planejamento da trilha da Caverna do Maroaga na área de proteção ambiental (APA) do Maragoa/AM. *Anais do 2 Congresso Nacional de Planejamento e Manejo de Trilhas / I Colóquio Brasileiro para a Red Latinoamericana de Senderismo*, 112-131.

Próchniak, P. (2022). Profiles of Wellbeing in Soft and Hard Mountain Hikers. *International Journal of Environmental Research and Public Health*, *19*(12). https://doi.org/10.3390/ijerph19127429

Quack, H. D., & Thiele, F. (2022). Wandern während und nach Corona – Segmentierungvon Wanderzielgruppen am Beispiel der Sinus-Milieus®. *Standort*, *46*(3), 164-170. https://doi.org/10.1007/s00548-022-00775-5

Queiroz, R. E., Ventura, M. A., Guerreiro, J. A., & da Cunha, R. T. (2014). Carrying capacity of hiking trails in Natura 2000 sites: a case study from North Atlantic Islands (Azores, Portugal). *Revista de Gestão Costeira Integrada-Journal of Integrated Coastal Zone Management*, *14*(2), 233-242.

Queiroz, R., Ventura, M., & Silva, L. (2014). Plant diversity in hiking trails crossing Natura 2000 areas in the Azores: implications for tourism and nature conservation. *Biodiversity and Conservation*, *23*, 1347-1365. https://doi.org/10.1007/s10531-014-0669-7

Rangel, L., & Guerra, A. (2013). O impacto na dinâmica do solo através da utilização da trilha Ponta Negra – Praia de Galhetas na reserva ecológica da Juatinga em Paraty. *Anais do 2 Congresso Nacional de Planejamento e Manejo de Trilhas / I Colóquio Brasileiro para a Red Latinoamericana de Senderismo*, 790-809.

Rihova, I., Buhalis, D., Moital, M., & Gouthro, M.-B. (2014). Conceptualising customer-to-customer co-creation in socially dense tourism contexts. *International Journal of Tourism Research*, *17*(4), 356-363. DOI: 10.1002/jtr.1993

Ríos-Jara, E., Galván-Villa, C. M., Rodríguez-Zaragoza, F. A., López-Uriarte, E., & Munoz-Fernández, V. T. (2013). The tourism carrying capacity of underwater trails in Isabel Island National Park, Mexico. *Environmental management*, *52*, 335-347. https://doi.org/10.1007/s00267-013-0047-3

Rocha, C. H. B., Fontoura, L. M., Vale, W. B. D., Castro, L. F. D. P., da Silva, A. L. F., Prado, T. D. O., & da Silveira, F. J. (2021). Carrying capacity and impact indicators: analysis and suggestions for sustainable tourism in protected areas–Brazil. *World Leisure Journal*, *63*(1), 73-97. https://doi.org/10.1080/16078055.2021.1888000

Rocha, C., Guilarducci, B., Almeida, H., Coelho, N., & Cortat, L. (2013). Análise da capacidade de carga em trilha do parque estadual da Serra do Brigadeiro (MG) através da consideração das raízes expostas. *Anais do 2 Congresso Nacional de Planejamento e Manejo de Trilhas / I Colóquio Brasileiro para a Red Latinoamericana de Senderismo*, 882-898.

Rogers, A., Pantelaki, E., Gilroy, R., Weston, R., Spencer, B., Holland, C., & Yazdanpanahi, M. (2024). A systematic review of older adults' travel behaviourand mobility during COVID-19 pandemic: lessons learned for sustainable transport provision and healthy aging. *Transport Reviews*, *44*(2), 405-433. https://doi.org/10.1080/01441647.2024.2303746

Rogowski, M. (2019). Assessing the tourism carrying capacity of hiking trails in the Szczeliniec Wielki and Błędne Skały in Stołowe Mts. National Park. *Forest Research Papers*, *80*(2), 125-135. https://doi.org/10.2478/frp-2019-0011

Rollins, R., & Rouse, J. (1992). Segmenting backcountry visitors by setting preferences. In J. Willison, S. Bondrup-Nielsen, C. Drysdale, T. Herman, N. Munro & T. Pollock (eds.). *Science and the Management of Protected Areas*. Elsevier Science, 485-497.

Salazar, D. P., Suntasig, L. J., Calvopiña, C. E., & Núñez, J. L. (2023). Determinación de la capacidad de carga turística del sendero cascada el Rocío, Guasaganda: Determination of the tourist carrying capacity of the El Rocío waterfall trail, Guasaganda. *LATAM Revista Latinoamericana de Ciencias Sociales y Humanidades*, *4*(5), 168-189. https://doi.org/10.56712/latam.v4i5.1310

Santarém, F., Silva, R., & Santos, P. (2015). Assessing ecotourism potential of hiking trails: A framework to incorporate ecological and cultural features and seasonality. *Tourism Management Perspectives*, *16*, 190-206. https://doi.org/https://doi.org/10.1016/j.tmp.2015.07.019

Santos, P. L. A., & Brilha, J. (2023). A Review on Tourism Carrying Capacity Assessment and a Proposal for Its Application on Geological Sites. *Geoheritage*, *15*(2), 47. https://doi.org/10.1007/s12371-023-00810-3

Sari, C., & Rahayu, S. (2018). Carrying Capacity of Gancik Hill Top for Ecotourism Development in Boyolali District. *E3S Web of Conferences*, *73*, 1-5. https://doi.org/10.1051/e3sconf/20187302008

Sarkis, J., Cohen, M., Dewick, P., & Schröder, P. (2020). A brave new world: Lessons from the COVID-19 pandemic for transitioning to sustainable supply and production. *Resources, Conservation and Recycling*, *159*, 104894. https://doi.org/10.1016%2Fj.resconrec.2020.104894

Sayan, M. S., & Atik, M. (2011). Recreation carrying capacity estimates for protected areas: a study of Termessos National Park. *Ekoloji*, *20*(78), 66-74.

Scholl-Grissemann, U., Peters, M., Bichler, B. F., & Happ, E. (2022). Hiking tourism: educating hikers through the interpretation of on-site information and predicting precautionary behavior. *Tourism Review*, *77*(6), 1436-1454. https://doi.org/10.1108/TR-01-2022-0029

Scott, D., Gössling, S., Hall, C., & Peeters, P. (2015). Can tourism be part of the decarbonized global economy? The costs and risks of alternate carbon reduction policy pathways. *Journal of Sustainable Tourism*, *24*, 1-21. https://doi.org/10.1080/09669582.2015.1107080

Serrano, M., & Alarte, A. (2008). Determinación de la capacidad de carga turística en tres senderos de pequeño recorrido en el municipio de Cehegín (Murcia). *Cuadernos de turismo*, 22, 211- 229.

Skaliy, A., Mulyk, K., Ban, Z., Ostrowski, A. & Anosova, O. (2023). Assessment of the functional state of the cardiovascular system of students during a mountain hiking trip. *Slobozhanskyi Herald of Science and Sport*, *27*(3), 158-165. https://doi.org/10.15391/snsv.2023-3.007

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*, 333-339. https://doi.org/https://doi.org/10.1016/j.jbusres.2019.07.039

Somarriba-Chang, M., Garnier, M., & Laguna, V. (2006). Estimation of the tourist carrying capacity of the Natural Reserve Mombacho Volcano, Granada, and the Natural Reserve Datanlí-El Diablo, Jinotega, Nicaragua. *WIT Transactions on Ecology and the Environment*, *97*, 341-351. https://doi.org/10.2495/ST060321

Soria-Díaz, H. F., & Soria-Solano, B. (2015). Determination the carrying capacity of tourism in the visit sites of the National Reserve of Allpahuayo-Mishana, Loreto, Peru. *Ciencia Amazonica*, *5*(1), 25-34. http://dx.doi.org/10.22386/ca.v5i1.87

Soria-Díaz, H. F., de Graça, P. M. L. A., & Soria Solano, B. (2022). Analysis of the carrying capacity of tourist attractions in Central Amazonia, Brazil. *Investigaciones Geograficas* (108), Article e60531. https://doi.org/10.14350/rig.60531

Sousa, A., & Leite, O. (2022). Island tourist (dis)satisfaction Systematic Literature review. *Journal of Tourism & Development*, *38*, 297-314. https://doi.org/10.34624/rtd.v38i0.27490

Suana, I. W., Ahyadi, H., Hadiprayitno, G., Amin, S., Sukmaring, L. A. T. T. W., & Sudaryanto, F. X. (2020). Environment carrying capacity and willingness to pay for bird-watching ecotourism in Kerandangan Natural Park, Lombok, Indonesia. *Biodiversitas journal of biological diversity*, *21*(5). https://doi.org/10.13057/biodiv/d210557

Sun, D., & Liddle, M. (1991). Field occurrence, recovery and simulated trampling resistance and recovery of two grasses. *Biological Conservation*, *57*, 187-203. https://doi.org/10.1016/0006-3207(91)90138-Y

Svobodova, K., Monteiro, L., Vojar, J., & Gdulova, K. (2019). Can trail characteristics influence visitor numbers in natural protected areas? A quantitative approach to trail choice assessment. *Environmental & Socio-economic Studies*, *7*(2), 10-20. https://doi.org/10.2478/environ-2019-0008

Tacón, A. & Firmani, C. (2004). *Manual de senderos y uso público.* Chile: CIPMA

Tangeland, T., & Aas, Ø. (2011). Household composition and the importance of experience attributes of nature-based tourism activity products – A Norwegiancase study of outdoor recreationists. *Tourism Management*, *32*(4), 822-832. https://doi.org/https://doi.org/10.1016/j.tourman.2010.07.005

Teixeira, P. R., & Oliveira, L. T. (2015). Cifuentes method of load and evaluation on the trail 'Serrinha'. São João da Baliza, Roraima, Brazil. *Rosa dos Ventos*, *7*(1), 120-132.

Timothy, D., & Boyd, S. (2015). *Tourism and trails: Cultural, ecological and management issues.* Channel View Publications.

Tobias Lee, L., do Carmo Silva Carvalho, L. C., Riquete Coelho, C., de Souza Quintanilha Carvalho, L., Aires Garcia, S., da Fonseca Porto, M. V., & Kiffer de Freitas, W. (2019).

Determination on the carrying capacity in the Main Trail of Cicuta's ARIE, Volta Redonda-Barra Mansa, Rio de Janeiro, Brasil. *Revista de la Facultad de Agronomía*, *118*(2), 1-10. https://doi.org/10.24215/16699513e021

Torbidoni, E. (2011). Managing for recreational experience opportunities: the case of hikers in protected areas in Catalonia, Spain. *Environmental Management*, *47*, 482-496. https://doi.org/10.1007/s00267-010-9606-z

Torbidoni, E., Grau, H., & Camps, A. (2005). Trail preferences and visitor characteristics in Aigüestortes i Estany de Sant Maurici National Park, Spain. *Mountain Research and Development*, *25*, 1-59. https://doi.org/10.1659/0276-4741(2005)025[0051:TPAVCI]2.0.CO;2

Trakala, G., Tsiroukis, A., & Martinis, A. (2023). Eco-Cultural Development of a Restored Lake Environment: The Case Study of Lake Karla (Thessaly, Greece). *Land*, *12*(6). https://doi.org/10.3390/land12061227

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., Lewin, S., Straus, S. E. (2018). PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Annals of internal medicine*, *169*(7), 467-473. https://doi.org/10.7326/M18-0850

van Eck, N. J., & Waltman, L. (2023). *Manual for VOSviewer version 1.6.20.* Retrieved from https://www.vosviewer.com/documentation/Manual_VOSviewer_1.6.20.pdf (Accessed on 22.02.2024)

Vashchenko, Y., Biondini, D., & Favaretto, N. (2008). Erosão causada pela prática do montanhismo na trilha para os picos Camapuã e Tucum – Campina Grande do Sul (PR). *Floresta*, *38*(1), 71-87.

Veras, A. S. S., Vidal, D. G., Barros, N. A., & Pimenta Dinis, M. A. (2022). The davi trail in Mucajaí, Roraima, Brazil: An experience to (re) connect and protect nature. *GeoJournal*, *87*(5), 4061-4075. https://doi.org/10.1007/s10708-021-10484-5

Vidal-Matzanke, A., & Vidal-González, P. (2022). Hiking accommodation provision in the mountain areas of Valencia Region, Spain: a tool for combating the depopulation of rural

areas. *Journal of Sport & Tourism*, *26*(2), 165-184. https://doi.org/10.1080/14775085.2022.2053563

Vizuete, D. D. C., Montoya, A. V. G., & Santamaría, G. E. R. (2023). Evaluation of the Importance of rural tourist attractions in Riobamba Canton, Ecuador. *Environment Systems and Decisions*, *43*(2), 200-210. https://doi.org/10.1007/s10669-022-09871-1

Wallace, G., & Smith, M. (1997). A comparison of motivations, preferred management actions, and setting preferences. *Journal of Park and Recreation Administration*, *15*, 59-82.

Wang, E., Wang, Y., & Yu, Y. (2017). Assessing recreation carrying capacity of the environment attributes based on visitors' willingness to pay. *Asia Pacific Journal of Tourism Research*, *22*(9), 965-976. https://doi.org/10.1080/10941665.2017.1357638

Wang, Y., Zhou, L., Chen, H., Wang, L., & Wu, X. (2024). Framing memorable hiking tourism experiences through embodiment: The case of Mount Huangshan, China. *Journal of Outdoor Recreation and Tourism*, *45*, 100710. https://doi.org/10.1016/j.jort.2023.100710

Weaver, D. (2006). *Sustainable Tourism: Theory and Practice*. Elsevier Butterworth-Heinemann.

Wells, P., Abouarghoub, W., Pettit, S., & Beresford, A. (2020). A socio-technical transitions perspective for assessing future sustainability following the COVID-19 pandemic. *Sustainability: Science, Practice and Policy*, *16*(1), 29-36. https://doi.org/10.1080/15487733.2020.1763002

Weston, R., & Mota, J. (2012). Low carbon tourism travel: Cycling, walking and trails. *Tourism Planning & Development*, *9*, 1-3. https://doi.org/10.1080/21568316.2012.658168

Wiyono, K. H., Muntasib, E. K. S. H., & Yulianda, F. (2018). Carrying capacity of Peucang Island for ecotourism management in Ujung Kulon National Park. *IOP Conference Series: Earth and Environmental Science*, *149*. https://doi:10.1088/1755-1315/149/1/012018

Wolf, I., & Crof, D. (2014). Impacts of tourism hotspots on vegetation communities show a higher potential for self-propagation along roads than hiking trails. *Journal of Environmental Management*, *143*, 173-185. https://doi.org/10.1016/j.jenvman.2014.04.006

Wolf, I., Hagenloh, G., & Croft, D. (2012). Visitors monitoring along roads and hiking trails: how to determine usage levels in tourist sites. *Tourism Management*, *33*, 16-28. https://doi.org/10.1016/j.tourman.2011.01.019

Yan, X., Bao, X., Pang, X. (2014). Indirect effects of hiking trails on the community structure and diversity of trunk epiphytic bryophytes in an old-growth fir forest. *Journal of Bryology*, *3*(1), 44-55. https://doi.org/10.1179/1743282013Y.0000000076

Yanan, L., Ismail, M. A., & Aminuddin, A. (2024). How has rural tourism influenced the sustainable development of traditional villages? A systematic literature review. *Heliyon*, *10*(4), e25627. https://doi.org/10.1016/j.heliyon.2024.e25627

Zambrano, R. F. F., & Murillo, J. F. M. (2023). Carrying capacity tourism and limit of acceptable exchange as a base for the sustainable management of tourism activities in the Cotacachi Cayapas National Park - Ecuador. *Cuadernos de Turismo, 51*, 125-162. https://doi.org/10.6018/turismo.571491

Zejda, D., & Zelenka, F. (2019). The Concept of Comprehensive Tracking Software to Support Sustainable Tourism in Protected Areas. *Sustainability*, *11*, 1-18. https://doi.org/10.3390/su11154104