

Tourist Loading Capacity – A Review of Methodologies and Applications in the Management of Tourist Resources

Angélica Rosio Castillo Galeano^{1*}, Hernando Castro Garzón²,
Juan Pablo Rodríguez Miranda³

¹ Ingeniera Forestal, Estudiante del Doctorado en Ciencias Ambientales y Sostenibilidad, Universidad Jorge Tadeo Lozano, Cra. 4 #22-61, Santa Fé, Bogotá, Cundinamarca, Colombia

² Escuela de Administración y Negocios, Facultad de Ciencias Económicas, Universidad de los Llanos, kilómetro 12 Vía a Puerto López, Vda. Barcelona, Villavicencio, Meta, Colombia

³ Universidad Distrital Francisco José de Caldas Bogotá, Cl. 13 #31-75, Localidad de Chapinero, Bogotá, Cundinamarca, Colombia

* Corresponding author's e-mail: amgelicar.castillo@utadeo.edu.co

ABSTRACT

Over the years, the use of the Tourist Loading Capacity (TLC) as a planning and management tool has been intensifying, due to the large influx and overcrowding of tourist destinations, as well as the misuse of the resources found in them by visitors, which causes the degradation of natural or cultural resources, owing to lack of control and regulation of the number of visits. This study carries out a systematic review of the use that has been given to the Tourist Loading Capacity, to which specific destinations it has been applied and which methodologies have been used, in order to gather the existing information regarding this particular topic. The RS was carried out through a documentary analysis of academic literature related to the use and implementation of the Tourist Loading Capacity in different places and the adaptation and modification of the methodologies used. In general, the Tourist Load Capacity tool has become essential to efficiently plan and manage tourist destinations and has been widely used throughout the world, being the Cifuentes (1992) methodology the most widely used and adapted to different contexts.

Keywords: loading capacity, tourism, sustainability, tourist destination.

INTRODUCTION

The great boom that the tourism sector has had, added to the tourist demand, mainly caused by the increase in the interest of tourists for the practice of recreational activities in open settings without altering the environment (Tudela Serrano and Giménez Alarte, 2009) has led to the fact that the nations interested parties, strengthen their actions in favor of taking advantage of the potential of rural natural areas, related to some protection or management scheme (Ibañez Pérez, 2016).

For this reason, a useful tool has been created that allows determining the maximum number of people that a given site can support, it is

the tourist loading capacity (TLC), also considered as the type, quantity and distribution of the use that can be made of a site without leading to unacceptable impacts, on physical biological resources or on available recreational experience (García Hernández, 2001). Therefore, this indicator is very useful, in addition, it is associated with sustainability, since it not only tries to set a limit number of visitors, but at the same time allows generating alternatives to improve the understanding of the relationships between the number of visitors and the impact that they generate (Ibañez Pérez, 2016).

For the new world framework, being a responsible tourist destination and having sustainable

development is one of the preponderant objectives in accordance with the Millennium Goals, in its 2030 agenda (Naciones Unidas – Cepal, 2018). This is where the consideration of a tourist loading capacity arises, where it seeks to “rationalize the abusive use and deterioration of the resources that support the activity (...) the optimal use of existing natural resources and a distribution of tourist activity based on the physical and biological characteristics of the environment” (Matos and Pérez, 2018). Stands out the socio-economic importance of tourism in the communities surrounding to those tourist destinations and through the TLC methodology it is sought to find the limit that the tourist area can support, determining the number of visits that can be managed in a given time, without causing the loss or degradation of the resources present in the ecosystem, and provide a degree of satisfaction to the tourist. Humanity has made use of natural resources without returning anything that is extracted and this has made it unsustainable, there is no rational use of soil or water, this occurs especially in Latin America where these resources are misused (Gutiérrez-Fernández and Rodríguez Torres, 2019; Montalvo Vargas and Castillo Ramiro, 2018; Arancibia Arce, 2017).

For this reason, the systematic review of the use of Tourist Loading Capacity in tourist destinations is important because it allows finding the gaps in the analyzed information and the way in which this tool has been used as an element in planning and managing tourism resources where this instrument has been applied. Some authors have carried out different types of bibliographic reviews on this topic, addressing it in a different way or analyzing it from points of view different than those presented in this article (Baños Castiñeira, 2020; Castillo Galeano et al., 2019; Universidad Complutense de Madrid, 2015).

The present manuscript aims on determining what types of tourist destinations that has been applied Tourism Loading Capacity (TLC) and methodologies that have been used to set this indicator. Likewise, it is intended to verify whether in effect the places where this tool has been applied the most are tourist beaches and if the most applied methodology is the one proposed by Cifuentes.

The objective of this manuscript is to identify and analyze some factors and characteristics of the tourist loading capacity, in terms of the tourist system, the methodologies and the applications

used for the optimal performance of a sustainable tourism according to the destination of host tourism, in the framework of balancing the supply, demand and conservation of the natural resources adjacent to it.

METHODOLOGY

The orderly procedure of the observation of the object of study and the facts of interest of this manuscript, considers that, from the field of synthesis and analysis, the deductive method is applied, because it establishes the abstractions of the significance of the phenomenon analyzed, from the general to the particular, based on the relationships of the empirical, logical reasoning and mental maps, consisting of a solid conceptualization according to elements of judgment and premises of the concrete and of the modification and decomposition in the parts of the event analyzed, being this, the climatic variability and sustainable tourism (Vergel Cabrales, 2010; Balustrini, 2001; Creswell, 2007).

According to the scope and analysis of the results obtained, the type of research considered, is of the descriptive order, since some cause – effect relationships are significantly described, as well as some characteristics of the homogeneous phenomenon studied. Based on the pre-established construct, the data collection is conceived, according to the level of abstraction of the operationalization of the variables analyzed in the object studied, that is, the climatic variability in sustainable tourism, according to the characteristics, situations and behavior of the empirical referent and the previous theories foreseen, consider a review of secondary, pertinent, current, exhaustive and adequate information to demonstrate the causal relationships in the order of the abstract and their corresponding analysis (Hurtado de Barrera, 2000; Vergel Cabrales, 2010; R. Hernández, 2010).

It was carried out through an analytical-documentary perspective, since it was done through the systematic review of academic literature and the analysis and comparison of antecedents on the use of methodologies to determine which is the most used, how the use of this tool and finally this indicator in which types of tourist settings it has been used, be they natural or cultural landscapes.

The development of the manuscript was carried out by means of a matrix in Excel where the

information found in the different articles found in the databases was organized in order to be able to analyze the data in a better way, as well as with the help of the Mendeley platform.

DISCUSSION

The concept of loading capacity

The concept of Loading Capacity comes from the 70s. It was used to analyze the potential of use through direct development indexes, there are two very different fields; a) resource management, and b) development management. Two interpretations are distinguished; the one that refers to the optimal density of users for the enjoyment of the space, and according to the activity that generate a physical deterioration of the receiving space (Clark, 1990; Roig and Munar, 2003). Likewise, the load capacity refers to the maximum number of people that can be in a space, this has been commonly used from volume and density indicators (Anton, 1997; Roig and Munar, 2003).

The first references, from an environmental perspective, established that the reception capacity of an area of public use in a protected natural space was determined at the level of recreational use that would ensure the minimum environmental quality while ensuring an adequate quality of the lived experience (Wagar, 1964). But when the concept of loading capacity began to be applied to different tourist destinations (beaches, mountains, cities, etc.), some authors such as Butler (1991, 2004) indicate that tourist loading capacity is determined both by market dynamics tourism, as well as the behavior of demand and potential users. Under this premise, the perception of visitors is fundamental in the concept of loading capacity (O'Reilly, 1986; Shelby, 1986; López Bonilla and López Bonilla, 2008).

For this reason, the load capacity, seen from a perceptual analysis, refers to the user's perception of the greater or lesser influx of other users in an area of public use, it also incorporates their perception of the lived experience, from several aspects:

1. From the enjoyment of the infrastructures, activities and services;
2. From the point of view of the environmental quality inherent to the protected area (Sowman, 1987).

Therefore, it is a subjective assessment that depends on the action-reaction of users to the characteristics of the public use area, generally those directly related to the perception of overcrowding (Leco Berrocal et al., 2013). The appreciation of overcrowding will be fickle since it is a function of personal factors linked to the user (search for tranquility, peace, silence, etc.), but also of other aspects related, for example, with the number of users with whom the participate in the experience. In short, the perceptual load capacity (social, psychological or behavioral), referring to the perception of the presence or absence of other visitors at the time of observation, implies the relationship of three objectives, such as the objectives of the management, the attitudes of the visitors and the impact of the recreational activity (Leco Berrocal et al., 2013).

The size of the ecosystem and the configuration of the space in relation to the fragmentation and connectivity of habitats are also interesting; the smaller the size, the greater the fragility of the ecosystem. Social constraints refer to visitors and are related to the quality of the recreational experience. Viñals et al. (2014) identify elements linked to physical and psychological comfort, a series of elements that determine the well-being of the visitor according to the physical and physiological requirements, with the environment, and with the equipment and services available. Among the limiting physical factors are bioclimatic and safety factors. Others such as natural hazards, the lack or poor state of equipment, the lack of information and signage or the lack of emergency plans can cause insecurity, although this depends on the perception of the risk of each individual (Viñals and Planelles, 2016).

Likewise, the level of attendance can affect the quality of the experience; for example, congestion produces dissatisfaction in those visitors' seeking solitude. In this case, the availability or not of equipment and services is not a determining factor, since visitors are aware of the limitations that these spaces may have and because they are in search of other experiences (Viñals and Planelles, 2016).

Likewise, other indicators of the quality of the experience have to do, according to Manning et al. (1996) and Manning (2011), with the number of visitors who frequent a place at the same time (PAOT) and the number of people present in a visual space. The studies by Stankey and McCool (1984) and Siles (2003) referring

to the number of encounters with other groups or people along an itinerary have also been considered (Viñals and Planelles, 2016).

In recent years the demands and needs of visitors have change, because at present there is a greater purchasing power and therefore a greater number of visitors to protected natural spaces, which makes planning and management of public use urgent. For this reason, the person in charge of the administration of the protected area must necessarily evaluate the reception capacity or recreational load capacity that these areas can support in all aspects, such as equipment, services and physical-ecological conditions. All of this is due to the growing demand vs. pressure that protected natural spaces have had in recent times (Leco Berrocal et al., 2013).

If recreational use of a certain area is allowed to grow uncontrollably, the loading capacity threshold could cause severe damage to the environment, measurable both in visitor experience and environmentally. The problem resides in the definition of the threshold of use (Stankey and Cool, 1983), from which the tourist exploitation of a resource/area of public use is unsustainable because it is harmful (García Hernández, 2001).

It is well known that tourism constitutes a great source of wealth for a large number of places, but it does not at the same time produce harmful effects on the environment, affecting economic, social, cultural and environmental aspects. For this reason, those responsible for managing these areas must identify the inconveniences caused by tourist activity to correct and avoid them, as far as possible, based on adequate planning (López Bonilla & López Bonilla, 2008).

The growing increase in cultural tourism and the large influx of visitors highlights in the elements of the historical-cultural heritage the need to plan and manage tourism from sustainability, that is, it raises the responsible use of resources that are exploited for tourism, sustainable use being understood as that use that guarantees its conservation and transmission to future generations. Thus, it is necessary to know the limits of a resource for its tourist exploitation, that is to say, to know its reception capacity. For this reason, the load capacity or reception of a space with respect to its tourist use is one of the most important concepts in the management of the activity itself and the impacts that it can generate. It is not considered as an end in itself, but a useful means to improve the conditions of the visitor experience and

to guide the decisions that have to be made in this regard (García Hernández, 2001)

The loading capacity in search of sustainable tourism

The literature dedicated to tourism provides a good part of the effort to forecast the future, due to the risk that this line represents in environmental management. In this activity the resources that are committed are many and reversibility is difficult and expensive. For this reason, the concern for the sustainability of tourism in the framework of global sustainability is decisive (M. González & León, 2010). The World Tourism Organization - WTO defines sustainable tourism as that “which takes into account the current and future economic, social and environmental repercussions to satisfy the needs of visitors from the industry, the environment and the host communities” (Organización Mundial del Turismo. Sustainable Development of Tourism. Definition). All tourism modalities, especially nature tourism, must embrace the principles of sustainability for the development and management of tourist destination areas, the socio-cultural authenticity of the host communities and the participation of all agents (Martínez Quintana, 2017).

Tourism is one of the most dynamic activities in the world. It occupies the third line of international trade, with 10.4% of gross domestic product (GDP) and is responsible for 313 million jobs worldwide, in addition, this sector has proven to be of great importance in the economy, in the social and environmental aspect, because its development is reflected in employment, income and opportunities for progress for the regions, for this reason, it is said that the tourism sector makes a great contribution to achieving the Sustainable Development Goals (SDG) (WTO & ITC, 2015). It is important to bear in mind that technological advances, the influence of the Internet and Information and Communication Technologies (ICT) in tourism is considerable. The intensity of the information conditions everything. And just as the past decade showed, in the future of hardware and software of Internet nothing is predictable, nor is it predictable in the influence of this tool on tourism events (González and León, 2010).

It is well known that tourism is not a harmless activity for the spaces where it takes place. Its rapid growth affects the natural environment, the local economy and the host society. It is the duty of

today's society to ensure the transmission to future generations of a natural heritage and a level of responsibility to maintain harmony between tourism development and nature within the search for sustainability. This has progressed through the years, since it began with the identification and measurement of the impacts caused by tourist activity on different resources and destinations where an academic discussion is developed around the development of indicators of tourist pressure and the concept of "tourist loading capacity" (Universidad Complutense de Madrid, 2015).

Consequently, the ambivalent nature of tourism is evident, because it allows "to bring great advantages, especially in the economic sphere, but it can also be sociocultural corrosive, contribute to environmental degradation and the loss of local identity" (Serrano, 2011).

Tourist destinations where the load capacity methodology has been applied

The TLC has been applied in different types of ecosystems seeking sustainability, but it has been mainly concentrated in those tourist sites where there is a high concentration of tourists or overcrowding (García Hernández, 2001). According to the bibliographic review carried out, the tourist destination that has been the most object of the Load Capacity is the beaches, because tourism is its main economic activity. Including within its analysis two more components to the tourist carrying capacity, to ensure a holistic vision; one of them is the urban equipment that ensures a level of comfort and safety on the beaches in the development of tourist activity.

The second is the services related to sun and beach tourism, which allow the visitor to have the basic services for an adequate tourist experience (Botero Salterén et al., 2008; Prieto Campos and Díaz Cuevas, 2021; Moris et al., 2021). Likewise, other ecosystems associated with beaches such as fjords (Tapia and Giglio, 2010), islands (Arif et al., 2018; Wiyono et al., 2018; Jung et al., 2018) and island cities (Ye et al., 2020). Likewise, the reefs, the diving service and the sea in general have also been the object of analysis of the Loading Capacity evaluating the impact of tourism on biodiversity and the maximum intensity that can be given to recreational activities in marine ecosystems, this is done in order to plan strategies for these scenarios in the future (Costa and De

Miranda, 2016; Miyakuni et al., 2018; Junaid and Nur Fauziah, 2018).

Other aquatic but freshwater ecosystems where TLC has been applied are lakes (F. Gutiérrez Fernández and Sierra Escribas, 2015), reservoirs (Echaniz and Vignatti, 2009) and cenotes (G. Blanco et al., 2020; Mondragón Mejía et al., 2019; R. Blanco et al., 2019). Likewise, the increase in tourist interest in natural destinations makes it necessary to plan these resources through the TLC in order to be able to carry out a sustainable management of these destinations. Among the sites to which this planning tool has been applied we find natural parks (Moriah, 2019; Zumbardo Morales, 2017; Perruolo Laneti & Camargo Roa, 2017). We can make tourism a threat or an ally in the protection of conservation areas, depending on the compatibility with the proposed objectives.

Natural aspects such as the environment in general (Zhang et al., 2020), the economic aspect of a river (Bao et al., 2020), the agro ecotourism route of coffee cultivation (M.J. González et al., 2020), a botanical garden (Arancibia Arce, 2017) and emerging tourist destinations (Matos and Pérez, 2018) have also been studied by TLC. Tourist roads or trails have also been object of this tool, given their ease of agglomeration and massing of tourists due to the way they present (Castro Barrantes, 2020; Martín Duque and Morère-Molinero, 2019; Contreras and Salas, 2017).

The TLC was applied to tourist - cultural destinations (museums, monuments, temples) and has been encouraged because the tourist influx to these sites has increased in recent years. This tool has become necessary since there is tourist overload in some of the area's most sought what cultural motivates managers to control high influx of visitors on these assets (García Hernández and De la Calle Vaquero, 2012; Gamero Huarcaya et al., 2021; Zhongbin, 2018). Finally, urban centers have been the object of TLC study due to the overcrowding of demand for these tourist destinations and the need to manage and plan resources and services to prevent them from being insufficient for both the local population and tourists (Melchor and Lazovski, 2018; Mirtaghian and Gharibi Naji, 2018; Liu et al., 2018).

Some applied methodologies

According to the bibliographic review carried out, it was found that the most used methodology

Table 1. Studies where the methodology proposed by Cifuentes has been applied

Year	Country	Magazine	Title	Author
2020	Colombia	Investigaciones Turísticas	Cálculo de la capacidad de carga y capacidad de acogida turística multicriterio para la reserva biológica El Encenillo, Guasca, Cundinamarca, Colombia	Gutiérrez Fernández Luis Fernando; Martínez Daza Sofía; Gómez Acosta Camilo; Gil Pérez Verónica; Cabezas Pinzón Laura; Gutiérrez Fernández Luis Fernando
2020	México	KIKAME. Revista Digital de Divulgación e Investigación Turística.	Capacidad de Carga Turística de una Ruta Agroecoturística en Cultivos de Café en Cumbres de Huicicila, Compostela, Nayarit	María José González Lizárraga, Susana Lorena Marcela Flores, Oyolsi Nájera González.
2019	Ecuador	Revista caribeña de Ciencias Sociales	Capacidad de carga turística para el desarrollo sostenible en senderos de uso público: un caso especial en la reserva de producción de fauna Cuyabeno, Ecuador	Carlos Mestanza, Daniela Llanos y Ramiro Vicente Herrera Jaramillo
2019	Ecuador	TESIS - UPEC Universidad Politécnica Estatal de Carchi	Capacidad de carga turística en el sendero de la Finca Pedagógica San Francisco de la ciudad de Huaca para la conservación de los recursos naturales turísticos que se encuentran en el mismo	Johnatan Hernández
2019	Indonesia	IOP Conference Series: Earth and Environmental Science	Loading Capacity of Diving Tourism in Dampier Strait Marine Conservation Area – District of Raja Ampat	Renoldy L Papilaya, Paulus Boli, Victor P H Nikijuluw
2019	México	CIMEXUS	Capacidad de carga turística de la Playa Punta Perula y Playa Isla Cocinas como estrategia para un uso turístico sustentable	Jose Luis Cornejo Ortega, Rosa María Chávez Dagostino, Myrna Leticia Bravo Olivas
2019	Indonesia	Jurnal Segara	Tourism Loading Capacity to Support Beach Management at Tanjung Bira, Indonesia	Maryono, Hefni Effendi, Majariana Krisanti
2019	Ecuador	Turismo, Desarrollo y Buen Vivir	Capacidad Biofísica del Sendero Ecológico "El Agua y la vida" del Páramo de Papallacta, como medida de control turístico.	Jefferson Damián Almeida Peñaherrera
2018	México	Estudios y Perspectivas en Turismo	Estimación de la capacidad de carga turística en Agua Selva (Tabasco-México)	R. Montalvo Vargas y J.J. Castillo Ramiro
2018	Indonesia	LISAT - IOP Conf. Series: Earth and Environmental Science 149	Loading capacity of Peucang Island for ecotourism management in Ujung Kulon National Park	K H Wiyono, E K S H Muntasib, and F Yulianda
2018	India	Atna Journal of Tourism Studies	Assessment of Loading Capacity of Tourist Destinations in Dakshina Kannada District, Karnataka	Tiriveedhi Dileep Kumar, Hatkar Sathish Kumar
2018	Ecuador	Tierra Infinita	Capacidad de Carga turística una herramienta para la gestión sostenible en áreas protegidas	Carlos Mestanza Ramón, Maritza Carolina Sánchez Capa y Mirian Jiménez Gutiérrez
2017	Bolivia	Utepsa Investiga	Capacidad de carga turística para el Jardín Botánico Municipal de Santa Cruz	Luisa R. Arancibia Arce
2017	Costa Rica	RiAT - Revista Interamericana de Ambiente y Turismo	Manejo de visitantes y atención del turista en áreas protegidas costeras. Estudio de la capacidad de carga en el Parque Nacional Marino Ballena, Costa Rica	Félix Zumbardo Morales
2017	Venezuela	Researchgate.net	Capacidad de Carga del Sendero de Interpretación "Pedro Manuel Dávila" del monumento Natural Cerro Santa, Península de Paraguaná, Estado Falcón, Venezuela	Francisco Contreras, Vanessa Salas
2017	Cuba	Revista Investigaciones Turísticas	Límites en la capacidad de carga de visitantes de ecoturismo en Punta del Este, Isla de la Juventud (Cuba)	Crispin Castellanos, D.; Berovidez Álvarez, V.; Marín Clemente, J.; García Ucha, F.E.; Fernández-Truan, J.C.

Table 1. Cont.

2017	Venezuela	Cuadernos de Geografía: Revista Colombiana de Geografía	Estimación de capacidad de carga turística en el área Chorro El Indio, estado Táchira, Venezuela	Perruolo, Gustavo, y Christopher Camargo
2016	España	Cuadernos de Turismo	La Capacidad de Carga Recreativa en pequeñas islas del Mediterráneo	Viñals, María José; Planelles, Mario; Alonso-Monasterio, Pau; Morant, Maryland
2016	México	El Periplo Sustentable	Capacidad de carga turística como base para el manejo sustentable de actividades ecoturísticas en Unidades de Manejo Ambiental (UMA) de Baja California Sur (BCS)	Reyna Ibañez Pérez
2016	Colombia	Tesis	Determinación de la Capacidad de Carga Turística en la Reserva Biológica del Encenillo Municipio - Guasca Cundinamarca	Leidy Carolina Bonilla Torres, Leidy Marcela Romero Salcedo
2016	Brasil	Cuaderno Virtual de Turismo	Análise dos estudos de capacidade de carga turística para os recifes de Picãozinho, Seixas (João Pessoa-PB) e Areia Vermelha (Cabedelo-PB)	Cost A.R.J; Miranda G.E.
2016	México	Tesis	Capacidad de Carga Turística por Buceo y Snorkel en los Islotes, Parque Nacional, Archipiélago Espíritu Santo.	Alexia Paulette Buchoul
2015	Bolivia	Revista Luna Azul	Capacidad de Carga Asignable al Agroecoturismo en Áreas Protegidas de Bolivia	Mariana Meave Acuña, Diosey Ramón Lugo-Morin
2015	México	Tesis	Capacidad de Carga Turística del Sendero del Proyecto Apatlaco en el área de Influencia del Parque Nacional Iztacchuatl – Popocatepetl	Ana Karen Olivares Robles
2015	Colombia	Revista de Tecnología	Cálculo de la capacidad de carga turística del lago Tarapoto – Puerto Nariño (Amazonas- Colombia)	Fernando Gutiérrez-Fernández - Sergio Andres Sierra Escribas
2015	México	2o. Encuentro Nacional de Gestión Cultural	La Capacidad de Carga Turística como Herramienta de Gestión de Sitios Patrimoniales	Martín Cruz Aragón
2015	Perú	Universidad Científica del Perú - Ciencia amazónica	Determinación de la capacidad de carga turística en los sitios de visita de la Reserva Nacional Allpahuayo-Mishana, Loreto, Perú	Henry Francisco Soria-Díaz, Benjamín Soria-Solano
2015	Cuba	Centro de Investigaciones de Ecosistemas Costeros (CIEC)	Incidencia del buceo autónomo y capacidad de carga en sitios de buceo del Parque Nacional Jardines de la Reina, Cuba	Leslie Hernández Fernández, Yunier M. Olivera Espinosa, Tamara Figueredo Martín, Raúl Gómez Fernández, Leander Brizuela Pardo y Fabián Pina Amargós
2014	Colombia	Gestión y Ambiente	Estudio de Capacidad de Carga Recreativa y Ordenación de las Playas de Sprat Bight, Rocky Cay y Johnny Cay.	Botero, Camilo
2014	Colombia	Turismo y Sociedad	Capacidad de Carga Física y Real para atractivos turísticos priorizados y vías de acceso en el casco urbano de Puerto Nariño, Amazonas.	Morales Betancourt Diana
2011	México	Quivera	Capacidad de Carga en Senderos Turísticos del Centro de Cultura para la Conservación Piedra Herrada, México	Santos Puente Daniel Eduardo; Ramírez Pérez Alberto Carlos; Barrón Solís Iván Christian
2009	España	Revista Electrónica de Medio Ambiente	Capacidad de Carga Turística en Cuatro Senderos de Caravaca de la Cruz (Murcia)	Mª Luz Tudela Serrano, Ana Isabel Giménez Alarte

Table 2. Cont.

Year	Country	Magazine	Title	Author
2020	México	Universidad de Murcia	Percepción de congestión y dimensión social de la Capacidad de Carga en Cenotes de Yucatán	Fernando Enseñat-Soberanis, Rocío Blanco-Gregory, Johnathan Alexander Mondragón-Mejía
2020	China	Sustainability	Analysis of Early Warning Spatial and Temporal Differences of Tourism Carrying Capacity in China's Island Cities	Fang Ye, Jaepil Park, Fen Wang, Xihua Hu
2020	Korea	Sustainability	Mitigating the Impact of Touristification on the Psychological Carrying Capacity of Residents	Yoonku Kwon, Jihyun Kim, Jiyoung Kim, Chan Park
2019	Francia	Boletín de la Asociación de Geógrafos Españoles	La evaluación de la capacidad de carga perceptual en el Camino de Santiago Francés: una aproximación cuantitativa	Martín Duque, C., and Morère-Moliner, N.
2019	México	Cuadernos de Turismo	La Capacidad de Carga psicosocial del turista: instrumento de medición para el desarrollo sostenible en la turistificación de los Cenotes.	Rocío Blanco Gregory Fernando; Enseñat Soberanis Johnathan Alexander Mondragón Mejía.
2019	México	PASOS. Revista de Turismo Patrimonial	La percepción de multitud como indicador de gestión sostenible de los cenotes de uso turístico en Yucatán, México	Mondragón Mejía, Johnathan Alexander Enseñat Soberanis, Fernando Blanco Gregory, Rocío
2018	Japón	P- CORIE - Palau Coral Reef Island Ecosystem Project	Developing Carrying Capacity for Marine Tourism: The Case of the Republic of Palau	Kaoruko Miyakuni, Yoko Fujita, Lincy Marino, Geraldine Rengii
2018	Malasia	Masyarakat	The carrying capacity for the development of marine ecotourism	Ilham Junaid and Andi Nur Fauziah
2018	Francia	Journal of Tourism & Hospitality Research	Host-Guest Attitudes toward Socio-Cultural Carrying Capacity of Urban Tourism in Chalus, Mazandaran	Najmeh Gharibi
2016	México	Tesis	Estudio de la Capacidad de Carga Social Percibida por los Turistas que Visitan Playa Ventura, Guerrero	Adolfo Lucero Álvarez
2013	España	Papeles de Geografía	Uso público y capacidad de carga perceptual en espacios naturales protegidos	Leco Berrocal Felipe; Pérez Díaz Antonio; Mateos Rodríguez Beatriz

Table 3. Studies where the Tourist Load Capacity Methodology and perceptual analysis were applied

Year	Country	Magazine	Title	Author	Methodology
2021	Perú	Revista Científica Guacamaya	Turismo y desarrollo sostenible en el santuario histórico de Machupicchu - Perú	Gamero Huarcaya Valery Kimiyo, Yépez Peña Miguel Ángel Cornejo Pumacchua Mecha Nohelia.	TLC
2021	Chile	Sustainability	Impact of Population Growth in the Central Coastal Zone of Chile: Factors for Estimating Tourism Carrying Capacity Based on the Case Study of One Latin American Seaside Resort	Roberto Moris, Kay Bergamini, Horacio Gilabert, Rodrigo Culagovski, Daniela Zaviezo, José Ignacio Medina, Andrea Alarcón, Piroška Ángel	TLC
2020	Ecuador	Revista Empresarial	Capacidad de carga turística como herramienta para el desarrollo sostenible de playas: Caso Montañita, provincia de Santa Elena, Ecuador	Gálvez-Izquieta, P., and Mendoza-Tarabó, A.	TLC
2008	España	Revista de Análisis Turístico	La capacidad de carga recreativa en la gestión de los visitantes. El caso del Parque Natural del Carrascal de la Font Roja (Alicante, España)	Maryland Morant González y María José Víñals Blasco	CCF and CC Perceptual
2003	España	Investigaciones geográficas	Análisis de la relación entre capacidad de carga física y capacidad de carga perceptual en playas naturales de la isla de Menorca	Roig i Munar Frances Xavier	CCF and CC Perceptual
2001	España	Dossier: Turismo en Ciudades Históricas	Capacidad de acogida turística y gestión de flujos de visitantes en conjuntos monumentales: el caso de La Alhambra	García Hernández María	CCF and CC Perceptual

Table 4. Studies where Geographic Information Systems were used

Year	Country	Magazine	Title	Author
2021	España	Boletín de la Asociación de Geógrafos Españoles	Aproximaciones a la capacidad de acogida de las playas como recurso turístico en tiempos de la COVID-19: el caso de la costa atlántica andaluza	Antonio Prieto Campos, Pilar Díaz Cuevas
2020	Costa Rica	Revista forestal mesoamericana KURÚ	Capacidad de carga turística y zonificación del CEANA, con miras al manejo de visitantes y protección del recurso hídrico en Cartago, Costa Rica.	Leonardo Castro-Barrantes
2018	China	EURASIP	Coastline carrying capacity monitoring and assessment based on GF-1 satellite remote sensing images	Anning Suo, Hongwei Ma, Fang Li, Baoquan Wei, Yong Lin and Jianhua Zhao
2018	China	Sustainability	Sustainable Land Urbanization and Ecological Carrying Capacity: A Spatially Explicit Perspective	Yu Liu, Chen Zeng, Huatai Cui, Yanhua Song
2018	China	Sustainability	A Coupling Relationship between the Eco-Environment Carrying Capacity and New-Type Urbanization: A Case Study of theWuhanMetropolitan Area in China	Min Song, Can Hu
2018	China	Sustainability	Land Spatial Development Based on Carrying Capacity, Land Development Potential, and Efficiency of Urban Agglomerations in China	Zhenbo Wang

Table 5. Application of own methodologies

Year	Country	Magazine	Title	Author
2020	Cuba	Monteverdia	Capacidad de carga y resiliencia de los sistemas socio-ambientales desde un enfoque sostenible	Zúñiga Igarza, L.M., Molinas Roja, J.M., Cohen Egler, T.T.
2020	China	Sustainability	Resources and Environmental Pressure, Carrying Capacity, And Governance: A Case Study of Yangtze River Economic Belt	Haijun Bao, Chengcheng Wang, Lu Han, Shaohua Wu, Liming Lou, Baogen Xu, Yanfang Liu
2020	China	Sustainability	Evaluation and Forewarning Management of Regional Resources and Environment Carrying Capacity: A Case Study of Hefei City, Anhui Province, China	Guiyou Zhang, Shuai Luo, Zhuowei Jing, Shuo Wei, Youhua Ma
2020	Tunez	Sustainability	Assessment of the Overtourism Phenomenon Risk in Tunisia in Relation to the Tourism Area Life Cycle Concept	Monika Widz, Teresa Brzezinska-Wójcik
2019	Colombia	Revista Interamericana de ambiente y turismo	Cálculo de acogida turística multicriterio (catum), caso de estudio Haynes cay, ubicado en el Archipelago de San Andrés- Colombia	Gutiérrez-Fernández, Fernando Rodríguez Torres, Sandra
2018	Indonesia	ICFAES - IOP Conference Series: Earth and Environmental Science	Pattern of land use change based on environmental carrying capacity in small island: a case of Weh Island	A.A. Arif, I. Machdar, B. Arifin, A. Ashfa
2018	España	International Journal of Scientific Management and Tourism	La Capacidad de Carga de un Municipio Turístico a Través de la Estimación del Tamaño "Real" de la Población: Dificultades y Propuestas	Melchor Fernández Fernández, Oleg Lazovski
2018	Korea del Sur	Sustainability	Analysis of Environmental Carrying Capacity with Emery Perspective of Jeju Island	Chanhoon Jung, Chanwoo Kim, Solhee Kim, Kyo Suh
2018	China	China Geology	Geological resources and environmental carrying capacity evaluation review, theory, and practice in China	Rui-min Lia, Zhi-qiang Yina, Yi Wang, Xiao-lei Lia, Qiong Liua, Meng-meng Gaoa
2009	Uruguay	Researchgate.net	Determinación del Estado trófico y de la Capacidad de Carga del Embalse Casa de Piedra	Echaniz Santiago y Alicia Vignatti
2008	Colombia	Gestión y Ambiente	Metodología de cálculo de la capacidad de carga turística como herramienta para la gestión ambiental y su aplicación en cinco playas del caribe norte colombiano.	Botero Saltarén, Camilo Hurtado García, Yuri González Porto, José Ojeda Manjarrés, Mayle Díaz Rocca, Luz Helena

to determine the Tourist Loading Capacity, for its simplicity is the one proposed by Cifuentes (1992) based on the physical loading capacity (PLC) of the place, understood as “the maximum limit of visits that can be made to a site with a defined space in a given time” (Cifuentes, 1992). Using a mathematical equation that considers other factors such as accessibility, precipitation, erodability, temporary closures and wildlife disturbances, it finally calculates the Effective or Permissible Loading Capacity (ELC) which is defined as “the maximum limit of visits that can be allowed given the ability to order and handle them” (Cifuentes, 1992).

Another of the methodologies used is the determination of the Perceptual Load Capacity, which is done through two approaches, the traditional narrative and numerical approach (Shelby and Heberlein, 1986), and the visual approach (Manning, Lime, Freimund and Pitt, 1996). Both approaches are carried out through surveys in which tourists and visitors are asked the acceptability of how many people they are willing to see at the same time in a given place (R. Blanco et al., 2019).

In other studies, it is possible to find methodologies that combine the Tourist Load Capacity and the perceptual approach where social participation and Recreation Opportunities (EOR) are promoted, which establishes differentiated experiences for users based on current uses and the conservation goals of the ANP (Segrado Pavón et al., 2017).

In some cases, measurements were used through photointerpretation and Geographic Information Systems to provide greater accuracy to the study.

It has also been found that there is a tendency to modify or combine existing methodologies, adapting them to different needs, involving different dimensions, such as physical, social, and perceptual to complement both qualitative and quantitative appraisals and each author proposing their own methodologies. in search of sustainability.

CONCLUSIONS

According to the findings of this bibliographic review, it can be concluded that the Tourist Load Capacity tool has become essential to efficiently plan and manage a tourist destination.

It was found that the methodology to find the TLC that has been used the most is the one proposed by Cifuentes in 1992 and has been modified and adapted to different contexts, as well as, enriched with modern techniques such as Geographic Information Systems and Photointerpretation to make it more precise, this has been used at different times and in different parts of the world, secondly, it is occupied by the perceptual methodology since the tourist’s perception of the experience of a particular visit is very important to encourage tourism in said region. Other authors have adapted or combined the existing ones and have formulated their own methodologies for calculating the Load Capacity, according to the needs of the context and in search of sustainable tourism and integrating the three main aspects of sustainability: ecological, social and economic, which is considered a great contribution to enrichment in this area of knowledge.

Regarding the types of ecosystems to which marine ecosystems have been applied, they are the most studied with this tool, due to the high tourist interest they represent, secondly, there are natural ecosystems due to the boom that tourism has acquired of nature and despite the effort to conserve them, the destruction of habitats, overexploitation and the consequent loss of resources have become evident. Among the freshwater aquatic ecosystems, lakes, reservoirs, cenotes and the economic aspect of a river were found, but it is important to note and arouses special interest the fact that the Loading Capacity has not been applied to tourism in Rivers, according to the bibliographic review carried out.

Acknowledgments

The authors express their full gratitude to the General Directorate of Research of the Universidad de los Llanos (Villavicencio, Meta, Colombia), for the full support for the publication of this manuscript, derived from the research project funded and approved with the code C09-F05-007-2019. Analysis of rural community tourism as a productive reconversion alternative for rural farms settled in the San Juanito municipality (Meta, Colombia). In addition, the authors express their gratitude to the doctorate in environmental sciences and sustainability. University Jorge Tadeo Lozano.

REFERENCES

1. Almeida Peñaherrera, J.D. 2019. Capacidad Biofísica del Sendero Ecológico “El Agua y la vida” del Páramo de Papallacta, como medida de control turístico. *Turismo, Desarrollo y Buen Vivir*.
2. Arancibia Arce, L.R. 2017. Capacidad de carga turística para el Jardín Botánico Municipal de Santa Cruz. *Utepsa Investiga*.
3. Arif, A.A., MacHdar, I., Arifin, B., Ashfa, A. 2018. Pattern of land use change base on environmental carrying capacity in small island: A case of Weh Island. *IOP Conference Series: Earth and Environmental Science*, 216(1). <https://doi.org/10.1088/1755-1315/216/1/012033>
4. Balestrini, M. 2001. Cómo se elabora el proyecto de investigación (BL Consultores Asociados, Ed.).
5. Baños Castiñeira, C.J. 2020. Saturación turística en destinos costeros. Consideraciones en relación a las necesidades de espacio en las playas y la gestión de la demanda de agua. *Researchgate.Net*, January 2020. <https://doi.org/10.7419/162.10.2020>
6. Bao, H., Wang, C., Han, L., Wu, S., Lou, L., Xu, B., Liu, Y. 2020. Resources and environmental pressure, carrying capacity, and governance: A case study of Yangtze River Economic Belt. *Sustainability (Switzerland)*, 12(4). <https://doi.org/10.3390/sul2041576>
7. Blanco, G., Enseñat, F., Mondragón, A. 2020. La Capacidad de Carga psicosocial del turista: instrumento de medición para el desarrollo sostenible en la turistificación de los Cenotes. *Cuadernos de Turismo*, 93–112.
8. Blanco, R., Soberanis, F., Mondragón, J. 2019. La capacidad de carga psicosocial del turista: instrumento de medición para el desarrollo sostenible en la turistificación de los cenotes. *Cuadernos de Turismo*, 43, 169–186. <https://doi.org/10.6018/turismo.43.07>
9. Bonilla Torres, L.C., Romero Salcedo, L.M. 2016. Determinación De La Capacidad De Carga Turística En La Reserva Biológica Del Encenillo Municipio - Guasca Cundinamarca. Universidad Distrital Francisco José de Caldas.
10. Botero, C. 2014. Estudio de Capacidad de Carga Recreativa y Ordenación de las Playas de Sprat Bight, Rocky Cay y Johnny Cay.
11. Botero Saltarén, C., Hurtado García, Y., González Porto, J., Ojeda Manjarrés, M., Díaz Rocca, L.H. 2008. Metodología de cálculo de la capacidad de carga turística como herramienta para la gestión ambiental y su aplicación en cinco playas del caribe norte Colombiano. *Gestión y Ambiente*, 3, 109–122.
12. Buchoul, A.P. 2016. Capacidad de carga turística por buceo y snorkel en Los Islotes, Parque Nacional Archipiélago Espíritu Santo. Centro de Investigaciones Biológicas del Noroeste.
13. Castellanos, D.C., Berovidez Álvarez, V., Clemente, J.M. 2017. Límites en la capacidad de carga de visitantes de ecoturismo en Punta del Este, Isla de la Juventud (Cuba). *Investigaciones Turísticas*, 13, 96–113.
14. Castillo Galeano, A.R., Espinosa Romero, A.P., Rodríguez Miranda, J.P. 2019. Carrying Capacity - a Revision and Applications in Tourism and Water. *International Journal of Mechanical Engineering and Technology - IJMET*, 10(12), 229–235.
15. Castro Barrantes, L. 2020. Capacidad de carga turística y zonificación del CEANA, con miras al manejo de visitantes y protección del recurso hídrico en Cartago, Costa Rica. *Revista Forestal Mesoamericana Kurú*, 17(41), 47–57. <https://doi.org/10.18845/rfmk.v17i41.5283>
16. Chen, Y. 2019. Prediction Method of Ecological Carrying Capacity of Scenic Spots in Nanjing under the Concept of Sustainable Development. *Ekoloji Dergisi*, 28(108), 2225–2229.
17. Cifuentes, M. 1992. Determinación de Capacidad de Carga Turística en Areas Protegidas. Centro Agronómico Tropical de Investigación y Enseñanza. CATIE.
18. Contreras, F., Salas, V. 2017. Capacidad de Carga del Sendero de Interpretación “Pedro Manuel Dávila” del Monumento Natural Cerro Santa, Península de Paraguaná, Estado Falcón, Monumento Natural Cerro Santa, Península de Paraguaná, Estado Falcón, Carrying capacity in the Interpret. *Researchgate.Net*, June 2020.
19. Cornejo Ortega, J.L., Chávez Dagostino, R.M., Bravo Olivas, M.L. 2019. Capacidad de carga turística de la Playa Punta Perula y Playa Isla Cocinas como estrategia para un uso turístico sustentable. *Revista Cimexus*, 14(2), 11–26. <https://doi.org/10.33110/cimexus140201>
20. Costa, R.J., De Miranda, G.E.C. 2016. Análise dos estudos de capacidade de carga turística para os recifes de Picãozinho, Seixas (João Pessoa-PB) e Areia Vermelha (Cabedelo-PB). *Caderno Virtual de Turismo*, 16(1). <https://doi.org/10.18472/cvt.16n1.2016.1005>
21. Creswell, J. 2007. *Qualitative inquiry & research design: choosign among five approaches*. (Publications SAGE, Ed.).
22. Cruz Aragón, M. 2015. La capacidad de carga turística como herramienta de gestión de sitios patrimoniales. 2o Encuentro Nacional de Gestion Cultural, June, 14.
23. Danely Poot Quintal, M.D., Segrado Pavón, R.G. 2019. Tendencias de Investigación Científica en la Capacidad de Carga Turística. *TURyDES. Revista Turismo y Desarrollo Local*, 12, 1–8.

24. Del Valle, L., Murray, I., Pons, G.X., Calvo, J. 2017. Capacidad de carga socioambiental de la isla de Eivissa. In *Monografies de la Societat d'Historia Natural de les Balears*, 2017(26).
25. Echaniz, S., Vignatti, A. 2009. Determinación Del Estado Trófico Y De La Capacidad De Carga Del Embalse Casa De Piedra. *Researchgate. Net*, 2(1), 41–51.
26. Gálvez-Izquieta, P.C., Mendoza-Tarabó, A.E. 2020. Capacidad de carga turística como herramienta para el desarrollo sostenible de playas: Caso Montañita, provincia de Santa Elena, Ecuador. *Revista Empresarial*, 14(1), 1–7. <https://doi.org/10.23878/empr.v14i1.171>
27. Gamero Huarcaya, V.K., Yepes Peña, M.Á., Cornejo Pumacchahua, M.N. 2021. Turismo y desarrollo sostenible en el santuario histórico de Machupicchu - Perú. *Revista Científica Guacamaya*, 5, 106–113.
28. García Hernández, M. 2001. Capacidad de acogida turística y gestión de flujos de visitantes en conjuntos monumentales : el caso de La Alhambra. *Dossier: Turismo En Ciudades Históricas*, 124–137.
29. García Hernández, M., De la Calle Vaquero, M. 2012. Capacidad de carga en grandes recursos turístico-culturales. *Anales de Geografía de La Universidad Complutense*, 32(2), 253–274. https://doi.org/10.5209/rev_aguc.2012.v32.n2.39720
30. González, M.J., Marceño, S., Nájera, O. 2020. Capacidad de Carga Turística de una Ruta Agroecoturística en Cultivos de Café en Cumbres de Huicicila, Compostela, Nayarit. *KIKAME. Revista Digital de Divulgación e Investigación Turística.*, 53(9), 1689–1699.
31. González, M., León, C. 2010. *Turismo Sostenible y Bienestar Social* (Erasmus Ediciones, Ed.; 1a Edición).
32. Gutiérrez Fernández, F., Sierra Escribas, S. 2015. Calculo de la capacidad de carga turística del lago Tarapoto – Puerto Nariño (Amazonas- Colombia). *Revista de Tecnología*, 14(1), 85–96. <https://doi.org/10.18270/rt.v14i1.1850>
33. Gutiérrez Fernández, L.F., Martínez Daza, S., Gómez Acosta, C., Gil Pérez, V., Cabezas Pinzón, L. 2021. Cálculo de la capacidad de carga y capacidad de acogida turística multicriterio para la reserva biológica El Encenillo, Guasca, Cundinamarca, Colombia. *Investigaciones Turísticas*, 21, 224. <https://doi.org/10.14198/inturi2021.21.11>
34. Gutiérrez-Fernández, F., Rodríguez Torres, S. 2019. Cálculo de acogida turística multicriterio (catum), caso de estudio Haynes cay, ubicado en el Archipelago de San Andrés- Colombia. *Revista Interamericana de Ambiente y Turismo*, 15(1), 28–45. <https://doi.org/10.4067/s0718-235x2019000100028>
35. Hernández Fernández, L., Olivera Espinosa, Y.M., Figueredo Martín, T., Gómez Fernández, R., Brizuela Pardo, L., Pina Amargós, F. 2016. Incidencia del buceo autónomo y capacidad de carga en sitios de buceo del Parque Nacional Jardines de la Reina, Cuba. *Revista Ciencias Marinas y Costeras*, 8(2), 9. <https://doi.org/10.15359/revmar.8-2.1>
36. Hernández, J. 2019. Capacidad de carga turística en el sendero de la Finca Pedagógica San Francisco de la ciudad de Huaca para la conservación de los recursos naturales turísticos que se encuentran en el mismo. *UPEC Universidad Politécnica Estatal de Carchi*, 1(5).
37. Hernández, R. 2010. *Metodología de la Investigación* (Mc Graw Hill, Ed.).
38. Hurtado de Barrera, J. 2000. *Metodología de la Investigación Holística* (Fundación SYPAL, Ed.).
39. Ibañez Pérez, R. 2016. Capacidad de carga turística como base para el manejo sustentable de actividades ecoturísticas en Unidades de Manejo Ambiental (UMA) de Baja California Sur (BCS). *El Periplo Sustentable*, unknown, 30, 37–76. <https://doi.org/10.21854/eps.v0i30.3534>
40. Junaid, I., Nur Fauziah, A. 2018. The carrying capacity for the development of marine ecotourism. *Masyarakat, Kebudayaan Dan Politik*, 31(2), 190. <https://doi.org/10.20473/mkp.v31i22018.190-200>
41. Jung, C., Kim, C., Kim, S., Suh, K. 2018. Analysis of environmental carrying capacity with emergy perspective of Jeju Island. *Sustainability (Switzerland)*, 10(5), 1–12. <https://doi.org/10.3390/su10051681>
42. Kumar, T.D., Kumar, H.S. 2018. Assessment of Carrying Capacity of Tourist Destinations in Dakshina Kannada District, Karnataka. *Atna - Journal of Tourism Studies*, 13(2), 1–8. <https://doi.org/10.12727/ajts.20.1>
43. Leco Berrocal, F., Pérez Díaz, A., Mateos Rodríguez, B. 2013. Uso público y capacidad de carga perceptual en espacios naturales protegidos. *Papeles de Geografía*.
44. Liu, Y., Zeng, C., Cui, H., Song, Y. 2018. Sustainable land urbanization and ecological carrying capacity: A spatially explicit perspective. *Sustainability (Switzerland)*, 10(9), 1–16. <https://doi.org/10.3390/su10093070>
45. López Bonilla, J.M., López Bonilla, L.M. 2008. La capacidad de carga turística: Revisión crítica de un instrumento de medida de Sostenibilidad. *El Periplo Sustentable*, July. <https://doi.org/10.21854/eps.v0i15.938>
46. Lucero Alvarez, A. 2016. Estudio de la Capacidad de Carga Social Percibida por los Turistas que Visitan Playa Ventura, Guerrero.
47. Martín Duque, C., Morère-Molinero, N. 2019. La evaluación de la capacidad de carga perceptual en el Camino de Santiago Francés: una aproximación cuantitativa. *Boletín de La Asociación de Geógrafos*

- Espanoles, 82, 1–33. <https://doi.org/10.21138/bage.2682>
48. Martínez Quintana, V. 2017. El Turismo de Naturaleza: Un Producto Turístico Sostenible, 193.
 49. Maryono, H., Krisanti, M. 2019. Tourism Carrying Capacity for Supporting Beach Management at Tanjung Bira, Indonesia. *Jurnal Segara*, 15(2), 119–126. <https://doi.org/10.15578/segara.v15i2.6790>
 50. Matos, L., Pérez, S. 2018. Revisión sobre Capacidad de Carga Turística y la prevención de problemas ambientales en destinos emergentes. *Turismo y Sociedad*, 24, 77–100.
 51. Meave Acuña, M. 2015. Capacidad de Carga Asignable al Agroecoturismo en Áreas Protegidas de Bolivia. *Luna Azul*, 42, 89–104. <https://doi.org/10.17151/luaz.2016.42.8>
 52. Melchor, F., Lazovski, O. 2018. La Capacidad De Carga De Un Municipio Turístico a Través De La Estimación Del Tamaño “Real” De La Población, 93–108.
 53. Mestanza, C., Llanos, D., Herrera, V. 2019. Capacidad de carga turística para el desarrollo sostenible en senderos de uso público: un caso especial en la reserva de producción de fauna Cuyabeno, Ecuador. *Revista Caribeña de Ciencias Sociales*, 5(1), 5. <https://doi.org/10.32645/26028131.823>
 54. Mestanza, R., Sánchez, M., Jiménez, M. 2019. Capacidad de Carga turística una herramienta para la gestión sostenible en áreas protegidas. *Tierra Infinita*, 5(1), 6–22.
 55. Ministry of Information Culture Tourism and Sports. (2014). *Kwanini Carrying Capacity Assessment* (Issue September).
 56. Mirtaghian, R.S.M., Gharibi Naji. 2018. Host-Guest Attitudes toward Socio-Cultural Carrying Capacity of Urban Tourism in Chalus, Mazandaran. *Journal of Tourism & Hospitality Research*, December 2018.
 57. Miyakuni, K., Fujita, Y., Marino, L., Rengiil, G. 2018. Developing Carrying Capacity for Marine Tourism : The Case of the Republic of Palau. March, 1–28.
 58. Mondragón Mejía, J.A., Enseñat Soberanis, F., Blanco Gregory, R. 2019. La percepción de multitud como indicador de gestión sostenible de los cenotes de uso turístico en Yucatán, México. *PASOS. Revista de Turismo y Patrimonio Cultural*, 17(6), 1143–1158. <https://doi.org/10.25145/j.pasos.2019.17.079>
 59. Montalvo Vargas, R., Castillo Ramiro, J. 2018. Estimación de la capacidad de carga turística en agua selva (Tabasco – México): base para la planificación y el desarrollo regional. *Estudios y Perspectivas En Turismo*, 27(2), 295–315.
 60. Morales Betancourt, D. 2014. Capacidad de Carga Física y Real para atractivos turísticos priorizados y vías de acceso en el casco urbano de Puerto Nariño, Amazonas. *Turismo y Sociedad*, 15, 167–186.
 61. Morant González, M., Viñals Blasco, M.J. 2008. La capacidad de carga recreativa en la gestión de los visitantes. El caso del Parque Natural del Carrascal de la Font Roja (Alicante, España). *Revista de Análisis Turístico*.
 62. Moriah, H. 2019. Capacidad de Carga y Estrategias de Compensación en la Quebrada Ulta – Parque Nacional Huascarán. Universidad Nacional Agraria.
 63. Moris, R., Bergamini, K., Gilabert, H., Culagovski, R., Zaviezo, D., Medina, J.I., Alarcón, A., Ángel, P. 2021. Impact of population growth in the central coastal zone of Chile: Factors for estimating tourism carrying capacity based on the case study of one Latin American seaside resort. *Sustainability (Switzerland)*, 13(6). <https://doi.org/10.3390/su13063527>
 64. NACIONES UNIDAS - CEPAL. 2018. La Agenda 2030 y sus Objetivos de Desarrollo Sostenible. In *Publicación de las Naciones Unidas*, 10. <https://doi.org/10.5354/0719-4633.2018.52077>
 65. Noriega, E., Arnaiz, S. 2020. Análisis bibliométrico acerca de las investigaciones de Capacidad de Carga de Playa. *Acta Pesquera*, 11.
 66. Olivares Robles, A.K. 2015. Capacidad de Carga Turística del Sendero del Proyecto Apatlaco en el área de Influencia del Parque Nacional Iztaccíhuatl – Popocatepetl, 2015. Universidad Autónoma del Estado de México.
 67. Papilaya, R.L., Boli, P., Nikijuluw, V.P.H. 2019. Carrying Capacity of Diving Tourism in Dampier Strait Marine Conservation Area - District of Raja Ampat. *IOP Conference Series: Earth and Environmental Science*, 246(1). <https://doi.org/10.1088/1755-1315/246/1/012060>
 68. Perruolo Laneti, G.J., Camargo Roa, C.E. 2017. Estimación de capacidad de carga turística en el área Chorro El Indio, estado Táchira, Venezuela. *Cuadernos de Geografía: Revista Colombiana de Geografía*, 26(2), 77–90. <https://doi.org/10.15446/rcdg.v26n2.59259>
 69. Prieto Campos, A., Díaz Cuevas, P. 2021. Aproximaciones a la capacidad de acogida de las playas como recurso turístico en tiempos de la COVID-19: el caso de la costa atlántica andaluza. *Boletín de La Asociación de Geógrafos Españoles*, 88, 1–46. <https://doi.org/10.21138/bage.3012>
 70. Roig, Munar, F.X. 2003. Análisis de la relación entre capacidad de carga física y capacidad de carga perceptual en playas naturales de la isla de menorca. *Investigaciones Geográficas*.
 71. Santos, P., Daniel, E., Ramírez, P., Alberto, C., Barrón, S., Iván, C. 2011. Capacidad de Carga en Senderos Turísticos del Centro de Cultura para la Conservación Piedra Herrada, México. Quivera.
 72. Segrado Pavón, R.G., González Baca, C.A., Arroyo Arcos, L., Quiroga García, B.A. 2017. Capacidad de

- carga turística y aprovechamiento sustentable de Áreas Naturales Protegidas. *Espacio Del Divulgador*, 24(2), 164–172. <https://doi.org/10.30878/ces.v24n2a8>
73. Serrano, S.G. 2011. El Turismo en las Áreas Protegidas como medio para lograr el desarrollo Sustentable en Centroamérica. Universidad Nacional del Mar del Plata.
74. Song, M., Hu, C. 2018. A coupling relationship between the eco-environment carrying capacity and new-type urbanization: A case study of the Wuhan Metropolitan Area in China. *Sustainability (Switzerland)*, 10(12). <https://doi.org/10.3390/su10124671>
75. Soria Díaz, H.F., Soria Solano, B. 2015. Determinación de la capacidad de carga turística en los sitios de visita de la Reserva Nacional Allpahuayo-Mishana, Loreto, Perú. *Ciencia Amazónica (Iquitos)*, 5(1), 25. <https://doi.org/10.22386/ca.v5i1.87>
76. Suo, A., Ma, H., Li, F., Wei, B., Lin, Y., Zhao, J. 2018. Coastline carrying capacity monitoring and assessment based on GF-1 satellite remote sensing images. *Eurasip Journal on Image and Video Processing*, 2018(1). <https://doi.org/10.1186/s13640-018-0325-3>
77. Tapia, F., Giglio, S. 2010. Modelos para la Evaluación de la Capacidad de Carga de Fiordos Aplicables a Ecosistemas del Sur de Chile Fjord Carrying Capacity Assessment Models Applicable to Ecosystems in Southern Chile. *WWF*, 1–22.
78. Tudela Serrano, M.L., Giménez Alarte, I. 2009. Capacidad de Carga Turística en Cuatro Senderos de Caravaca de la Cruz (Murcia). *Revista Electrónica de Medio Ambiente*, 1–20.
79. Universidad Complutense de Madrid. 2015. Proyecto de Investigación Capacidad de Carga Turística. <https://www.ucm.es/capacidadcargaturistica/casos-de-referencia>
80. Vergel Cabrales, G. 2010. Metodología. Un manual para la elaboración de diseños y proyectos de investigación. *Compilación y ampliación temática*. (Publicaciones Corporación UNICOSTA, Ed.; Cuarta Edición).
81. Viñals, M.J., Planelles, M. 2016. La Capacidad de Carga Recreativa en pequeñas islas del Mediterráneo. *Cuadernos de Turismo*.
82. Wang, Z. 2018. Land spatial development based on carrying capacity, land development potential, and efficiency of urban agglomerations in China. *Sustainability (Switzerland)*, 10(12). <https://doi.org/10.3390/su10124701>
83. Widz, M., Brzezińska-Wójcik, T. 2020. Assessment of the overtourism phenomenon risk in Tunisia in relation to the tourism area life cycle concept. *Sustainability (Switzerland)*, 12(5), 1–13. <https://doi.org/10.3390/su12052004>
84. 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(1). <https://doi.org/10.1088/1755-1315/149/1/012018>
85. WTO & ITC. 2015. *Tourism and trade: A global agenda for sustainable development*.
86. Ye, F., Park, J., Wang, F., Hu, X. 2020. Analysis of Early Warning Spatial and Temporal Differences of Tourism Carrying Capacity in China's Island Cities. *Sustainability (Switzerland)*, 1–16.
87. Zhang, G., Luo, S., Jing, Z., Wei, S., Ma, Y. 2020. Evaluation and forewarning management of regional resources and environment carrying capacity: A case study of hefei city, Anhui province, China. *Sustainability (Switzerland)*, 12(4), 1–15. <https://doi.org/10.3390/su12041637>
88. Zhongbin, W. 2018. Construction of Evaluation Index System of Tourism Carrying Capacity of the Jokhang Temple Scenic Spot. *Journal of Landscape Research*, 10, 860000.
89. Zumbardo Morales, F. 2017. Manejo de visitantes y atención del turista en áreas protegidas costeras. Estudio de la capacidad de carga en el Parque Nacional Marino Ballena, Costa Rica. *Revista Interamericana de Ambiente y Turismo*, 13(1), 68–90. <https://doi.org/10.4067/s0718-235x2017000100068>
90. Zuñiga, L., Molinas, J., Cohen, T. 2020. Capacidad de carga y resiliencia de los sistemas socio-ambientales desde un enfoque sostenible. *Monteverdia*, 13(2), 51–56.