EXTENDED ABSTRACT

THE PSYCHOSOCIAL LOAD CAPACITY OF THE TOURIST: INSTRUMENT OF MEASUREMENT FOR THE SUSTAINABLE DEVELOPMENT IN THE TOURISTIFICATION OF THE CENOTES

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The Yucatan peninsula in Mexico is full of cenotes[1] that are located, generally, in natural and rural areas. Cenotes, like many other rural spaces, are going from having an agricultural-livestock use to having a more tourist-recreational use in recent years. The intensity of this tourist-recreational use in the cenotes is affecting in a negativa way the environment, local communities and the experience of visitors and/or tourists.

The estimation of the limit in the number of visitors/tourists that can be in a natural space simultaneously has proved to be an effective tool for a sustainable management of the space. However, most of the studies focus on the traditional concept of Tourist Load Capacity, prioritizing impacts to the environment rather than the impacts perceived and suffered by the user or tourist. Given the difficulty in establishing a cause-effect relationship between the excess of tourists and the damage to nature, other tools are more appropriate.

In this way, this research proposes the use of a psycho-social (perceptual) load capacity indicator that estimates the maximum number of people that a tourist is willing to see simultaneously in a cenote and that, if it increases, will begin to experience a level of negative acceptance or rejection.

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[1] Cenotes are natural lagoons that have been formed in very special circumstances: the bed is limestone and the lake is fed by groundwater. Although the most famous are those mentioned in Mexico, there are other places. The term "cenote" comes from the Mayan word "dzonot" or "ts'onot", which means sacred well or abyss. For this culture, they represented the main source of fresh water in a region that does not have lakes and suffers long periods of drought. Currently, a large majority of these cenotes of the Yucatan Peninsula have become an important tourist attraction.

The study has been carried out in the cenotes of Ejido de San Antonio Mulix, Yucatán. The results reveal that local, national and foreign tourists have different levels of tolerance regarding the maximum number of people who are willing to meet simultaneously in a cenote.

In the peninsula, the main tourist attraction is centered in the State of Quintana Roo, where a traditional tourism of sun and beach is offered: "*All inclusive*".

As for the State of Yucatan, its main tourist attractions are focused on an adventure tourism that requires a tourist profile different from that of Quitana Roo. This generates that the tourism of Yucatan does not compete for the same market as that of Quintana Roo, but complements the tourist offer of the region.

In the last 10 years the use of cenotes in the Yucatan has gone from being exploited for agricultural and livestock activities such as grazing fields for irrigation and drinking troughs for livestock to be used for tourism and recreation. As the use of these places for tourist use is promoted, this tendency of the communities to change their economic activities towards activities focused on tourism becomes more evident.

However, this tourism is increasing, more and more, and is going from low-impact tourism to mass and traditional tourism, turning these magical places into complete spas with attractions such as zip-lining, abseiling and climbing, among others , in addition to other services such as restaurants and cabins to stay.

As for the object of study of this research, there is a host of authors that define Tourist Load Capacity (TLC). However, for the purposes of this study the definition of García Hernández, De la Calle Vaquero and Mínguez García (2011) is taken, since they are among the few authors that take into account the *perceptual load capacity* to determine the TLC of a place . So we would take into account these 3 indicators:

- *Physical load capacity*, refers to the total volume of people that the extension of the conditioned space for the visit can contain at a certain moment without endangering the conservation of the elements.
- *Perceptual load capacity* that refers to a psycho-social dimension that is related to the quality of the visit experience of all those people who come to know the place.
- *Management load capacity* has to do with the availability of resources (human and economic) that are available to manage visitor flows at the destination.

This type of study has been carried out previously in National Parks in which activities such as hiking are carried out, but it has never been applied in such particular systems as cenotes. It is very difficult to establish cause-effect relationships between the massive visit of tourists and the direct impact to the environment, however: identifying the maximum number of visits can be seen as a basic indicator for the sustainable management of the cenote visitor and generates a baseline for the management of cenotes.

Currently, SEDUMA (Environment and Urban Development Secretary of Yuacatán) is working on the development of a methodology to determine the tourist load capacity of these unique environments, which is based on that described by Cifuentes et al. (1999) .

The study focuses on the municipality of San Antonio Mulix in the state of Yucatan, specifically in the Tumben Zazil Kin Zonot Cooperative which is an ecotourism complex managed by the local community, with the support of the ejido commissioner, who provides recreation in natural environments (Cenotes), bicycle rental, hiking, restaurant service, among other low impact activities. It is located 49 kilometers from Mérida, capital of the State of Yucatán. This ejido, San Antonio Mulix, has two cenotes for tourist use and, in this case, the cenote on which the current research work is presented is the Dzombakal cenote.

Dzombakal is a cenote of semi-open type of free fall, with sediment composed mainly of gravel and rock. It has an area of 202 square meters plus a platform of 18 square meters, which gives a total area for recreation of 220 square meters.

To carry out this study, an adjustment was made to the methodology proposed by Alazaizeh et al. (2015). For this, it was necessary to determine the Physical Load Capacity (PLC) of the cenote, which was calculated by dividing the cenote area between the comfort zone of the visitors (it was determined in a diameter of 4 square meters, according to previous studies in western countries where the variation is not significant), to obtain the maximum number of people who can be in the cenote simultaneously.

Six photographic slides were made showing the empty cenote and, later, with the help of Photoshop, people were added in a scale of 11 in 11 to reach the value of the PLC, which was 55 people. A non-probabilistic sampling was used for convenience and the sample size was determined by statistical formula, resulting in a sample of 191 tourists. The sample is representative of the total population of tourists who visited the ejido during 2016, obtaining the total visitors per month that are recorded in the San Antonio Mulix guestbook.

In the survey that was applied to the tourists, the distinction was made between the place of origin of the visitor or tourist: local, national or foreign, in order to differentiate the perception that each one has about the amount of people they see in each of the 6 images that are shown of the cenote and how it affects the quality of the experience and their willingness to pay for it, based on their origin or place of residence. For this, the responses were recorded on a Likert scale with 9 levels of acceptability, from +4 to -4.

Regarding the results obtained from the survey, we highlight that the different levels of acceptance differ with respect to the type of visitor, local, national or foreign. In general, they indicate that there is an inversely proportional relationship between the number of visitors and the level of acceptability. In the case of *local* visitors it was found that an empty cenote does not present the highest level of acceptability, as it was the case of *national* and *foreign* visitors or tourists. Therefore, one of the conclusions to be highlighted is that the level of acceptance in the number of visitors simultaneously in a cenote varies depending on the origin of the tourist: for the local reaches 40, for nationals to 33 and foreign visitors tolerate a maximum of 23 people at a time in the cenote.

For example, according to the scale mentioned above (+4 to -4), in the case of *local* visitors, as the number of tourists increased from 0 to 55 in the photos of the research study, the average scores of acceptability in these visitors decreased from 2.06 to -1.41 in the response scale.

With regard to the implications of the results for the management of cenotes: The results could help to make decisions about the type of tourist or visitor that is wanted to attract: although, few tourists that pay a lot or many that pay little.

On the other hand, there is a constant in that: fewer visitors simultaneously in the cenote, it will be greater the willingness to pay. The difference reflects buying power of visitors: locals are less sensitive to the increase of visitors with respect to their willingness to pay.

However, both in the case of locals, nationals and foreigners, there is an inversely proportional relationship between the amount willing to pay and the number of tourists they see in the photos, having a greater impact in the case of nationals and foreigners.