

## EXTENDED ABSTRACT

# A STATUS REPORT ON STUDIES OF TOURISM CARRYING CAPACITY IN PROTECTED NATURAL AREAS IN LATIN AMERICAN COUNTRIES

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### 1. INTRODUCTION AND THE PROTECTED NATURAL AREAS (PNA) PARADIGM

Protected Natural Areas (PNA) have established themselves as the most powerful tool for global biodiversity conservation, being a priority on government agendas to protect critical ecosystems and endangered species. According to the International Union for Conservation of Nature (IUCN), these areas are essential legal entities for preserving habitats that are home to endemic species, currently covering more than 11.5% of the land area in South America. Historically, the management of these areas has evolved from a classic approach of total exclusion—where human activity was prohibited in order to keep nature in its pristine state—to a socio-environmental paradigm. The latter approach advocates for an ethical and equitable relationship, integrating local communities into the administration of the areas.

### 2. THEORETICAL FRAMEWORK: EVOLUTION AND CONCEPT OF CARRYING CAPACITY

The concept of Tourist Carrying Capacity (TCC) is fundamental to the management of PNAs. Its origins date back to 1838 in the livestock sector, but it was in the 1960s that it was adapted to national park conservation to measure the impact of tourism. TCC is defined as the maximum number of visitors a destination can receive without deteriorating the quality of the environment or the satisfaction of the visitor experience. For effective management, two approaches are distinguished: the ecological-physical approach and the perceptual-social approach, which focuses on the user experience and the tolerance of the local community. The literature highlights that Cifuentes' methodology (1992) remains

the most widely used in Latin America due to its practicality in identifying indicators of sustainable development. In the region, countries such as Mexico, Costa Rica, Colombia, and Peru use regulated tourism as an economic lever that simultaneously supports conservation and rural development.

### 3. RESEARCH METHODOLOGY

The study uses a narrative review to examine the evolution of the CCT concept and its operational application. Unlike systematic reviews, this method allows for a critical and evolutionary synthesis of available knowledge. The process was divided into phases that included a comprehensive literature search, the selection of 30 representative articles published in peer-reviewed journals, and a comparative analysis to identify current patterns and trends in the management of PNAs.

### 4. RESULTS AND TRENDS IN TOURIST CARRYING CAPACITY (2020-2023)

Analysis of recent scientific output reveals that Tourist Carrying Capacity (TCC) is no longer a simple numerical calculation but has become a multidimensional axis of various management approaches.

Trend 1: Relationship between tourist carrying capacity, environmental zoning, and sustainable management. This trend establishes that the calculation of carrying capacity must necessarily result in the territorial organization of the protected area. As Castro-Barrantes (2020) points out, in Cartago, Costa Rica, the CCT is the basic tool for environmental zoning, prioritizing the protection of water resources over the flow of visitors. In Ecuador, Gálvez and Mendoza (2020) apply this approach to beaches such as Montañita to ensure sustainable coastal development. For their part, Ponce *et al.* (2021) emphasize that in emerging destinations such as the Huagapo Cave in Peru, planning must be comprehensive (social, economic, and cultural) to prevent degradation due to overload. Finally, Matos and Falcão (2021) introduce the environmental dimension in indigenous lands in Brazil (Trilha do Kuatá), suggesting that policies should restrict visitor numbers to protect heritage.

Trend 2: Methodological Update and Inclusion of Multi-Criteria Approaches. The authors agree that tourism dynamics are changing and require periodic assessments that go beyond traditional methods. Bocanegra and Caicedo (2021) point out that in Playa Palomino (Colombia) it is imperative to update load studies considering the informality and economic changes in the industry. Gutiérrez and Martínez (2021) propose a multi-criteria methodology for biological reserves, allowing for a more accurate assessment of carrying capacity. Fernández and Martínez (2023) introduce the concept of Acceptable Change Limit (ACL) in Cotacachi Cayapas National Park (Ecuador), an indicator that rates the degree of non-permanent damage before impacts become irreversible. In the field of bird-watching tourism, Betancur (2022) demonstrates how specialized tourism can be aligned with the Sustainable Development Goals for biodiversity conservation.

Trend 3: Historical Heritage Management and Biodiversity Protection. Managing mass tourism has become a priority in order to save cultural resources and sensitive species. Esquivel Ríos (2022) analyzes the impact of mass tourism on the Historic Center of San

Miguel de Allende (Mexico), proposing direct regulations on tourist flows and specific funding for conservation. In Peru, Castillo (2022) advocates for a model where community participation is decisive in the planning of the El Niño destination to ensure its protection. Pavón (2022) highlights the importance of establishing strict usage limits in Cozumel for sensitive activities such as sea turtle release, integrating species protection into load measurements.

Trend 4: Economic Sustainability, Identity, and Business Models. The last trend focuses on how profitability can coexist with environmental ethics. Muñoz de Escalona (2023) argues that tour operators should abandon conventional models in favor of alternative and responsible schemes. Similarly, Liberal (2023) argues that reinforcing the cultural and natural identity of the landscape is a key factor in competitiveness that attracts more conscious tourism. To optimize capacity without compromising the destination, authors such as González (2023) and Fernández (2023) suggest implementing “yield management” strategies, effectively adjusting supply to demand to reduce environmental pressure.

## **5. CONCLUSIONS AND FUTURE OF CONSERVATION**

The document concludes that Tourist Carrying Capacity should not be understood as a static restrictive limit, but rather as methodological support for decision-making. Successful management of PNAs depends on inclusive governance involving social groups, ensuring that tourism is a tool for improving local life and not just a source of economic income. It emphasizes the need to implement environmental education and awareness programs for local communities, which would mitigate the impacts of tourist overload in a sustained manner. Ultimately, the sustainable development of a destination is only possible if ecological thresholds are respected and local identity is strengthened in the face of mass tourism in different tourist destinations around the world.