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# Archaeological sites and historical monuments as refuges for threatened species: a call for integrated conservation management

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## 1 Introduction

Archaeological sites and historical monuments are well-known as preferential habitats for reptiles (Calderón-Mandujano et al., 2008; Báez et al., 2016; Simbula et al., 2019). There are numerous examples of the high diversity of reptiles within and around these sites. For instance, Somaweera et al. (2001) discovered a rich herpetofauna diversity in the Archaeological Reserve of Menikdena (Sri Lanka). Báez et al. (2016) reviewed the significance of the ancient city of Kaunos (modern-day Dalyan city, Muğla, Turkey) and found that a small area contained 13% of Turkey's reptile species. At the Machu Picchu Historic Sanctuary, two new species from the genus *Proctoporus* (Squamata: Gymnophthalmidae), *P. machupicchu* and *P. optimus*, have been described from individuals collected in the area (Mamani et al., 2015; 2022). Similarly, López-Vila et al. (2018) reported high herpetofaunal diversity in the Archaeological Park of Iglesia Vieja (Chiapas, Mexico), identifying 61 species (12 amphibians and 49 reptiles), with 35% of these species listed as threatened.

The main reasons speculated for this high species richness in archaeological sites include the availability of refuges and cavities provided by the ruins. The walls and large stones offer protection from predators (Márquez-Rodríguez, 2014; Báez et al., 2016). Additionally, many archaeological sites such as Machu Picchu are internationally renowned tourist attractions. The presence of visitors may deter potential predators, making these sites preferential habitats for animals seeking refuge in the ruins' crevices (Márquez-Rodríguez, 2014; Báez et al., 2016).

This phenomenon could extend to other threatened animal groups that also seek shelter in the ruins' crevices. For example, in the ruins of Machu Picchu, the Short-tailed Chinchilla (*Chinchilla chinchilla*) (personal observation)—listed as Endangered according to the IUCN Red List (Roach and Kennerley, 2016)—and the Andean Bear (*Tremarctos ornatus*)—classified as Vulnerable (Velez-Liendo and García-Rangel, 2017; CNN, 2021)—have been

observed, among other species such as the cryptic Machu Picchu Arboreal Chinchilla Rat (*Cuscomys oblativa*) (Ochoa et al., 2020).

López-Vila et al. (2022) also documented a high diversity of bird species in the Iglesia Vieja archaeological site in Chiapas, Mexico. Similarly, Ayutthaya's ancient pagodas in Thailand are home to various bat species (personal observation), emphasizing the importance of wildlife conservation in the management of these sites. These examples highlight the need for an integrated approach that combines archaeological expertise with ecological knowledge to ensure the protection of both cultural landmarks and the species that inhabit them.

This article advocates for an integrated conservation approach that combines the management of Archaeological sites with biodiversity conservation.

## 2 Minimizing the impact of tourism

Paradoxically, tourism contributes to the loss of biological diversity at the local level (Peña-Candia et al., 2019; Jones, 2022). Tourism can promote the establishment of invasive and generalist species (Cambray, 2003; Loss et al., 2013) that compete with and prey on local species. Moreover, infrastructure supporting tourism, such as roads could further disrupt habitats (Colino-Rabanal and Lizana, 2012), and locally increase noise levels (Sordello et al., 2020). To address these challenges, it is crucial to implement sustainable tourism practices that minimize environmental impacts.

These practices should include increased research on the biological diversity of archaeological sites to prioritize the species which should be protected. Limiting the number of visitors, as is being considered at Machu Picchu where concerns about the degradation of both the site and its surrounding ecosystem have arisen, is also critical. Measures such as restricting daily visitor numbers, enforcing designated pathways, and promoting less impactful tourism can help mitigate these effects.

Educating the public about the ecological significance of archaeological sites is essential for their conservation. Visitors often focus solely on the cultural aspects of these sites, unaware of their role in biodiversity conservation. Public awareness campaigns can highlight the need to protect these habitats, not only for their cultural value but also for the species they support. Training professional guides at archaeological sites to convey the natural values of the environment is equally important for raising awareness. Furthermore, restricting food consumption to designated areas can help keep generalist species such as rodents away from sensitive habitats.

## 3 Discussion

Archaeological sites and historical monuments are not only cultural treasures but also vital refuges for threatened species. Therefore, the conservation of these sites must go beyond the preservation of historical artifacts to include biodiversity protection. By fostering interdepartmental cooperation, implementing sustainable tourism practices, and raising public awareness, we can

ensure that these sites continue to serve as sanctuaries for both cultural and natural heritage. The examples of Machu Picchu, Ayutthaya, Iglesia Vieja and Kaunos demonstrate the potential for heritage sites to contribute to biodiversity conservation, provided their ecological significance is fully recognized and integrated into their management.

Effective conservation of biodiversity within archaeological and historical sites requires coordinated efforts across multiple inter-governmental departments, including those responsible for cultural heritage, environmental conservation, and tourism. Traditionally, these inter-governmental departments have operated independently, often overlooking the synergies between cultural and natural resource management (Rahman et al., 2017). To protect the ecological value of these sites, it is essential to establish frameworks for interdepartmental collaboration. One of the potential actions for intergovernmental cooperation between departments could involve conducting joint studies on biodiversity and the impact of tourism at archaeological sites. Additionally, developing and implementing unified legislation with mutually agreed-upon regulations would be essential. The primary challenge in this context may be institutional funding. To address this, intergovernmental working groups could be established, with equitable contributions to a common fund designated for such initiatives. This approach underscores the importance of cooperation across departments that may operate at different levels—national, regional, or local—to ensure effective conservation and management strategies both biodiversity and archaeological sites and historical monuments.

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