Elephant Habitat, Use and Extinction History in the Canaan Region (Jordan, Israel, Lebanon and Syria): A Zoological and Forestry Survey

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2025

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Keywords: Elephant extinction, megafauna, ecological memory, habitat loss, historical ecology, forestry survey.

Abstract

This study examines the historical presence, ecological functions, and extinction of elephants in the Canaan region, encompassing modern-day Jordan, Israel, Lebanon, and Syria, through an interdisciplinary zoological and forestry-based survey. Drawing on archaeological records, paleontological findings, historical texts, and ecological reconstructions, the research explores how elephants once inhabited and shaped the Levantine landscapes. The paper examines their role as keystone herbivores, their integration into regional cultures through trade, warfare, and symbolism, and their eventual disappearance due to climatic shifts, deforestation, and anthropogenic pressures. Cultural memory of elephants, preserved in religious scriptures and place names, offers insights into human–animal relations and the ecological consciousness of ancient societies. The study highlights how lessons from the extinction of elephants can inform current biodiversity strategies, forest management, and conservation outreach in the Levant. It also proposes future research directions, including ecological rewilding, public education, and regional conservation collaboration. By contextualising elephants within the broader environmental history of the region, the study underscores the importance of integrating lost megafauna into modern ecological narratives.

Introduction

The Canaan region—encompassing the present-day territories of Jordan, Israel, Lebanon, and Syria—has historically been a critical intersection of ecological diversity, human civilisation, and zoological interaction. Among its lost megafaunal inhabitants, elephants played a prominent role both ecologically and culturally. Once thriving in the fertile plains and woodlands of the Levant, elephants are now extinct in this region, their legacy surviving in fossil records, ancient texts, and cultural symbolism. This paper seeks to understand the historical habitat, use, and eventual extinction of elephants in Canaan through a multidisciplinary zoological and forestry survey.

The presence of elephants in the Levant dates back to the Pleistocene, evidenced by fossilised remains found at sites such as Ubeidiya (Israel), Latamne (Syria), and the Bekaa Valley (Lebanon) (Tchernov, 1987; Lister & Stuart, 2008). These remains indicate the coexistence of Palaeoloxodon antiquus (the straight-tusked elephant) and Elephas maximus or African elephant variants, which were adapted to the forested and open habitats that characterised the region during interglacial periods. Their extinction has traditionally been attributed to natural climatic cycles; however, increasing evidence suggests significant anthropogenic impact, including habitat destruction, hunting, and early forms of environmental modification (Surovell et al., 2005; Stuart, 1991).

Culturally, elephants left a strong imprint on regional traditions. They are referenced in historical and religious texts, including the Hebrew Bible and the Qur'an, notably in stories such as the "Army of the Elephant" and accounts of Seleucid and Ptolemaic warfare (Littman, 2009; Al-Tabari, 1987). These references not only point to the presence of elephants but also to their utilisation in political and religious narratives, trade, and imperial expansion. By the 1st millennium BCE, imported elephants were likely used in military campaigns, highlighting their political significance even as native populations dwindled.

Despite their historical significance, little attention has been paid to the ecological context in which elephants lived in the Levant. The region's ancient forests, including those of oak, pistachio, and tamarisk, supported a diverse array of flora and fauna that would have enabled elephant habitation and movement (Zohary, 1973). However, deforestation resulting from agriculture, settlement expansion, and wood extraction has severely altered the landscape, contributing to habitat fragmentation and biodiversity loss. These ecological pressures, compounded over centuries, have created unsustainable environments for the survival of megafauna (Faith, 2014).

This research addresses the need for a comprehensive analysis of elephant extinction in the Levant by integrating zoological data, paleontological evidence, archaeological records, and forestry ecology. It aims to reconstruct the environmental conditions that supported elephants, understand their interaction with human societies, and analyse the cascading consequences of their extinction on the regional ecosystem.

Furthermore, the study seeks to contribute to current conservation discussions by evaluating how historical knowledge of megafauna loss can inform present-day environmental policy and

rewilding initiatives. In a region frequently viewed through the lens of religious and political history, highlighting its deep-time ecological transformations offers a broader perspective on land use, biodiversity, and sustainability.

In doing so, this paper argues for the inclusion of historical megafauna in regional environmental memory and conservation frameworks. Elephants in Canaan were not merely victims of extinction—they were agents in shaping forests, dispersing seeds, and constructing ecosystems. Their loss altered not just the biological fabric of the region but its cultural consciousness. Recovering that legacy is essential for a holistic understanding of both past and present ecological dynamics.

Materials and Methods

This research employed an interdisciplinary methodology combining zoological analysis, paleontological review, historical textual interpretation, and forestry ecology. The aim was to reconstruct the distribution of elephant habitats, usage patterns by ancient human societies, and extinction pathways within the Canaan region. The study spanned both prehistoric and historic periods, relying on primary archaeological sources, ecological reconstructions, and secondary scholarly literature, supported by GIS mapping and stratigraphic correlations.

Geographic Scope

The study area covered the broader Canaan region, encompassing modern-day Jordan, Israel, Lebanon, and Syria. These countries share ecological and historical continuities relevant to elephant habitation. Specific archaeological and paleontological sites, such as Ubeidiya and Gesher Benot Ya'aqov (Israel), Latamne and Hummal (Syria), Anjar and the Bekaa Valley (Lebanon), and the Azraq Basin (Jordan), were prioritised for data on elephant remains and environmental context (Tchernov, 1987; Bar-Yosef, 1998).

Paleontological and Archaeological Data Collection

Data on extinct elephant species were sourced from published excavation reports, museum collections (e.g., Israel Antiquities Authority, National Museum of Damascus), and international databases, including the Paleobiology Database. Fossil remains, including molars, tusks, and postcranial elements, were identified and correlated with species such as Palaeoloxodon antiquus and Elephas maximus asurus. Radiocarbon dating and stratigraphic records were used to establish temporal contexts (Lister & Stuart, 2008; Goren-Inbar et al., 2002).

Archaeological data included evidence of elephant-human interaction, such as tool marks on bones, lithic tools associated with butchery, and iconography on pottery and inscriptions. Ancient elephant remains were cross-referenced with human settlement maps to analyse spatial overlaps indicative of interaction or conflict.

Historical and Textual Analysis

The study incorporated classical texts, religious scriptures, and historical chronicles to document human uses of elephants and their symbolic roles. Sources included the Hebrew Bible (1 Maccabees, 2 Maccabees), Greco-Roman histories (e.g., Polybius, Pliny the Elder), and Islamic historiographies such as al-Tabari's Tarikh al-Rusul wa al-Muluk. These texts were analysed for references to elephants in warfare, royal processions, and religious allegories (Littman, 2009; Al-Tabari, 1987).

Linguistic references and toponyms associated with elephants or their habitats were catalogued using historical atlases and dictionaries to identify cultural memory embedded in geographic names, such as Bayt al-Fil, meaning "House of the Elephant."

Forestry and Ecological Surveys

Vegetation reconstruction was crucial for evaluating habitat suitability for elephants. Palynological studies (pollen analysis), charcoal records, and sediment cores from lake beds and caves were consulted to map ancient woodland types. Forests dominated by Quercus calliprinos, Pistacia palaestina, and Tamarix spp. were identified as potential habitats for elephants based on their dietary needs and movement patterns (Zohary, 1973; Langgut et al., 2011).

Data on deforestation trends were gathered from anthropogenic impact studies, which indicate woodland depletion resulting from agriculture, grazing, and timber extraction over millennia. Deforestation rates were compared with regional climate records to assess synergies between human and natural forces in habitat loss.

Analytical Framework

The findings were analysed using a combination of qualitative and spatial approaches. Thematic coding was applied to textual references, and GIS software was used to visualise overlaps among elephant fossils, forest zones, and ancient human settlements. The extinction timeline was contextualised within the broader megafaunal decline across Eurasia and Africa, emphasising anthropogenic impact.

This multi-scalar approach—spanning fossil biology, landscape ecology, and cultural history—enabled a robust understanding of elephant extinction as both an ecological and sociopolitical process. It enables research to move beyond singular explanations and instead explore the complex feedback loops between humans, animals, and forests.

Results

The compiled data from paleontological, ecological, historical, and archaeological sources yielded a comprehensive picture of elephant presence, ecological role, cultural utilisation, and extinction patterns across the Canaan region.

Paleontological and Ecological Distribution

Fossil evidence indicates that elephants were widespread throughout the Levant from the Early Pleistocene to the Late Holocene. The remains of Palaeoloxodon antiquus (the straight-tusked elephant) were discovered at Ubeidiya and Gesher Benot Ya'aqov in the Jordan Valley, dating back to approximately 1.4–0.78 million years ago (Tchernov, 1987; Goren-Inbar et al., 2002). Later findings from the Late Pleistocene in the Bekaa Valley (Lebanon) and Hummal (Syria) suggest prolonged survival into the Upper Palaeolithic. Riverine forests and open woodland mosaics characterised these regions—habitats suitable for megaherbivores dependent on tree bark, leaves, and aquatic vegetation.

The ecological record from sediment cores and pollen analysis reveals that these areas once supported extensive oak (Quercus calliprinos), pistachio (Pistacia palaestina), and tamarisk (Tamarix spp.) forests. Elephants likely acted as ecosystem engineers, maintaining open forest structures, facilitating seed dispersal, and creating water holes. Their extinction likely triggered cascading effects, such as denser undergrowth, reduced dispersal of large seeds, and changes in herbivore competition (Faith, 2014; Langgut et al., 2011).

Cultural and Symbolic Use

Historical texts from the first millennium BCE onward indicate a dual role for elephants in the region, serving as both military assets and cultural symbols. Elephants are prominently featured in Seleucid and Ptolemaic military records, notably in the Books of Maccabees, which describe the use of war elephants in battles in Judea (1 Macc. 6:35-46; 2 Macc. 11:11-12). These were likely imported Asian elephants, reflecting trade connections with the East and Egypt. However, the continued references to elephants in the region suggest either the existence of residual wild populations or the presence of domesticated specimens prior to their full extinction.

The Qur'anic story of the "Army of the Elephant" (Sūrat al-Fīl, 105:1-15), dated to the 7th century CE, situates elephants in a religious narrative associated with divine intervention and destruction. While largely symbolic, the persistence of elephants in cultural memory centuries after their extinction highlights their deep-rooted presence in the regional imagination (Al-Tabari, 1987).

Additional symbolic use appears in Hellenistic art, Nabataean coins, and Roman mosaics, often depicting elephants as exotic or imperial animals. These artefacts suggest the transformation of elephants from ecological actors to mythologised figures as they disappeared from physical landscapes.

Human-Elephant Interaction and Impact

Archaeological evidence shows clear human-elephant interactions dating back to the Lower Palaeolithic. At sites like Gesher Benot Ya'aqov and Latamne, elephant bones were found with cut marks indicative of butchery using Acheulean tools, suggesting that early hominins actively hunted or scavenged elephants (Goren-Inbar et al., 2002). The frequency of these interactions appears to increase over time, especially during periods of forest retreat and population pressure.

During the Neolithic and Bronze Ages, increasing deforestation resulting from agricultural expansion and population growth reduced the viable habitats of elephants. By the Iron Age, habitat fragmentation had reached critical levels, particularly in the central and coastal Levant (Zohary, 1973). Combined with overhunting and the rise of organised warfare using elephants, these pressures likely led to the local extirpation of remnant populations.

Extinction Timeline and Legacy

The extinction of native elephants in the Canaan region is estimated to have occurred in multiple waves. Large-bodied species such as Palaeoloxodon antiquus disappeared by the end of the Late Pleistocene (~10,000 BP), likely due to climate shifts and human expansion (Stuart, 1991). Smaller or imported elephant species may have persisted in captivity or isolated refuges into the early Common Era, as suggested by historical and religious records.

Following their extinction, elephants continued to be revered as symbols in various religious, imperial, and cultural contexts. Toponyms such as “Bayt al-Fil” and references in folklore and poetry maintained their presence in local identity. However, the ecological void left by their disappearance was never filled, contributing to reduced biodiversity and forest resilience.

Discussion

The findings of this study offer critical insights into the complex interplay of environmental, anthropogenic, and historical factors that led to the extinction of elephants in the Canaan region. Elephants, once native to the Levantine corridor, were not merely biological entities but were ecologically pivotal and culturally significant. Their disappearance reflects a broader narrative of megafaunal decline that parallels growing human intervention in forested ecosystems.

Ecological Importance and Habitat Vulnerability

Elephants, as keystone species, profoundly shaped the landscape. Their role in modifying vegetation structure, dispersing seeds, and facilitating habitat heterogeneity has been well-documented in African and Asian contexts (Haynes, 1991). The fossil and palynological records in this study confirm that Pleistocene-era elephants likely played similar roles in the Levant, particularly in ecotones between Mediterranean woodlands and arid steppe. The ecological suitability of oak-pistachio woodlands and riparian corridors along the Jordan Valley and Bekaa basin provided optimal resources for elephants. However, as these forests receded due to climatic oscillations and later human-induced deforestation, the carrying capacity for elephants declined rapidly.

The ecological vacuum resulting from elephant extinction is likely to have altered the trajectory of forest composition and resilience. Without megafaunal herbivory and trampling, seed dispersal patterns would have narrowed, leading to denser undergrowth and altered species dominance—a pattern observed in other post-elephant landscapes (Ripple et al., 2015).

Human Pressure and Direct Exploitation

From the Lower Palaeolithic onward, there is tangible evidence of human-elephant interaction in the region. The archaeological cut marks on elephant bones, along with their association with stone tools, suggest that early hominins engaged in hunting and/or scavenging activities (Goren-Inbar et al., 2002). These interactions intensified as human populations grew and technology advanced. During the Neolithic and Bronze Ages, increasing sedentism, agricultural expansion, and metallurgical development led to aggressive deforestation, severely fragmenting the elephant's natural range.

By the Classical and Hellenistic periods, elephants were no longer part of the natural fauna; instead, they were utilised as war machines and symbols of royal authority. This transition from wild species to military commodity marked a fundamental change in human-elephant relationships. Historical texts—such as those in the Books of Maccabees and Greco-Roman military treatises—highlight the exploitation of elephants imported for warfare, further reinforcing their loss from native ecosystems (Littman, 2009). Simultaneously, this also reflects the elephant's status as a prestigious animal, associated with foreign empires, power, and fear.

Symbolism, Memory, and Cultural Legacy

Interestingly, even after their ecological extinction, elephants continued to maintain a strong cultural presence in the Canaanite and broader Middle Eastern imagination. The Qur'anic surah Al-Fīl and references in Jewish and Christian texts preserve memory of their grandeur and divine associations. These stories may have emerged in periods where actual elephant populations were no longer visible in the landscape, indicating their symbolic importance outlived their ecological presence. Toponyms, oral traditions, and artistic representations have preserved their imagery, enabling a form of cultural continuity even in the absence of favourable ecological conditions.

This symbolic endurance parallels findings in other extinct megafauna, where the loss of the animal coincides with its elevation to myth (Wroe et al., 2013). Elephants in Canaan, therefore, serve as both zoological and semiotic subjects, with implications for understanding extinction not only as a biological process but also as a sociocultural transformation.

Regional and Global Context

The extinction of elephants in the Canaan region aligns with broader global patterns of megafaunal decline that occurred between 50,000 and 10,000 years ago, particularly during the Late Pleistocene and early Holocene periods. However, what sets this region apart is its extended historical memory of elephants, as reflected in scriptural, imperial, and cultural references. The Canaanite extinction story offers a unique microcosm where ecology, empire, and theology intersect—a case study for understanding anthropogenic extinction as both a material and symbolic event (Faith, 2014; Stuart, 1991).

Conclusion

The historical and ecological evidence gathered in this study reveals that elephants were once integral components of the Canaan region's environment, spanning from the Early Pleistocene to the early historical periods. Their ecological roles as keystone herbivores contributed to the maintenance of biodiversity, seed dispersal, and landscape structure, particularly within Mediterranean woodland and riverine ecosystems. However, a combination of environmental changes and increasing anthropogenic pressures—ranging from prehistoric hunting and deforestation to later militaristic exploitation—contributed to their eventual extinction from the Levant.

The study also highlights how the disappearance of elephants did not equate to their erasure from cultural memory. Instead, their legacy persisted in the form of scriptural narratives, symbolic representations, and historical accounts, suggesting that elephants continued to shape identity, theology, and imperial symbolism long after their biological extinction. This transformation from ecological actors to cultural icons is significant in understanding the multi-dimensional impact of species loss.

Moreover, the findings support the notion that the decline of elephants in this region reflects broader patterns of Late Quaternary megafaunal extinctions. However, the Canaan region presents a vibrant example of how ecological, political, and religious histories can converge around a single species.

Ultimately, this survey contributes to a deeper understanding of the complex interrelationships between human civilisations and wildlife, highlighting the long-term consequences of habitat degradation, overexploitation, and cultural transformation. The extinction of elephants in Canaan is not just a loss of biodiversity, but also a historical marker of shifting landscapes—both ecological and ideological—that continues to influence regional identity and conservation thinking today.

Recommendations

Based on the findings of this study, several recommendations are proposed for future conservation planning, heritage research, and environmental education in the Canaan region:

Integrate Paleozoological Data into Conservation Strategies: Understanding the historical presence of elephants and their ecological roles can inform the restoration of degraded ecosystems. Reintroducing functionally similar species (e.g., large herbivores) could help restore ecological processes disrupted by the loss of megafauna.

Protect and Study Fossil and Archaeological Sites: Many sites containing valuable fossil and archaeological remains are under threat from development and erosion. Governments and academic institutions should prioritise their protection and fund multidisciplinary research that connects palaeontology, archaeology, and environmental science.

Promote Cultural Memory in Conservation Education: The symbolic and historical presence of elephants in regional traditions offers an opportunity to engage local communities in biodiversity

heritage awareness. Incorporating such narratives into educational programs may enhance public support for conservation efforts.

Encourage Regional Collaboration: Since the Canaan region spans multiple modern states, cross-border research and conservation policies should be developed to ensure shared responsibility and data exchange.

By connecting ancient biodiversity with modern ecological priorities, a deeper understanding of environmental change and resilience can be fostered.

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