Quaternary extinction of large rainforest herbivores on Indonesia's largest island, Sumatra

Julien Louys*[1], Yahdi Zaim[2], Gilbert Price[3], Yan Rizal[2], Aswan Aswan[2], Mika Puspaningrum[2], Agus Trihascaryo[2], Penny Higgins[4], and Patrick Roberts[5]

[1]Australian Research Centre for Human Evolution (ARCHE) – Griffith University, Australia
[2]Faculty of Earth Sciences and Technology – Institut Teknologi Bandung, Bandung, Indonesia
[3]School of Earth and Environmental Sciences – The University of Queensland, Australia
[4]Earth and Environmental Sciences – University of Rochester, Rochester, New York, United States
[5]Max Planck Institute for the Science of Human History – Max Planck Institute, Jena, Germany

Abstract

Sumatra is the world's sixth largest island, and Indonesia's largest. It hosts 201 mammal species, of which nine are endemic to mainland Sumatra, fourteen to Mentawai islands, and 22 found nowhere else in Indonesia. Unlike other major islands in Southeast Asia, it records very few Quaternary extinctions. Here, we report the first globally extinct taxon from the island. *Hexaprotodon,* the Asian hippo, is represented by the anterior portion of a second lower molar as well as some canine fragments. These were recovered from Ngalau Gupin, a cave site in the Padang Highlands. A tapir molar from the same site has been dated to at least 45,000 years old by uranium series dating. Other than the hippo, the banteng, the buffalo, and the Javan rhino became extirpated from the island, probably sometime in the historical period. Examination of carbon and oxygen isotope values from fossil and modern large mammal communities show no significant differences in either isotope (Mann-Whitney U: carbon U=1666, p=0.1704; oxygen U=1855, p=0.759). This suggests there have been no significant ecological shifts over the Pleistocene at the resolution of these proxies. Unlike other Quaternary extinction events on islands, the largest herbivore on the island is still extant, suggesting that anthropogenic overkill alone is unlikely to be responsible. We suggest that an interplay between decreased carrying capacity, increased hunting, and separation from Southeast Asian source populations may have adversely affected the large, but not medium or very large, herbivores on this island.

Keywords: Padang highlands, Asian hippo, fossil, palaeontology, megafauna

*Speaker