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Contemporary pollen-rain patterns and their associations with natural vegetation in the Banni Plain, Kachchh Basin, western India

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Abstract
Understanding the relationship between present-day pollen rain and natural vegetation provides a valuable analogue for interpreting fossil pollen records. In this study we obtained modern pollen assemblage data from 24 samples, collected from eastern, central and western parts of the Banni Plain, Kachchh Basin (Gujarat), India. The primary objective was to examine the relationship between the modern pollen-rain, extant vegetation and geomorphic surfaces in order to construct a reliable analogue for interpreting fossil pollen records with the aim of understanding the vegetation history and contemporary climate change within a defined area. The results showed over-representation of *Rhizophora* spp. (cf. *Rhizophora mucronata*), likely due to its anemophilous nature, whereas *Sonneratia* spp. (cf. *Sonneratia apetala*) and *Avicennia* spp. (cf. *Avicennia marinata*) are comparatively under-represented, suggesting their local presence. *Aegiceras* spp., and *Bruguiera* spp. (core mangrove taxa), as well as *Nypa* as a peripheral mangrove taxon and mangrove associates, have also comparatively lesser frequencies owing to entomophily. Herbaceous taxa like Poaceae, Cerealia and cultural pollen taxa are more prominent than arboreal taxa, suggesting human activity, soil erosion and grazing supported by cultural pollen and fungal spores (*Sordaria*, *Podospora*, and *Glomus*). These findings highlight the impact of both anthropogenic and ecological factors on western India's landscape facilitating palaeoecological research.

Keywords: *palynology, modern analogue, climate change, (palaeo) herbivory, Gujarat, India*

Palynology (the study of organic walled microfossils, especially pollen grains and spores) has proved to be a potent tool for the reconstruction of vegetation dynamics and contemporary climate change, especially for the Quaternary Period (2.58 Ma) (Erdtman 1954; Faegri & Iverson 1964, 1989; Birks & Berglund 2018; Kar & Quamar 2019, 2020; Quamar 2022; Quamar et al. 2023, 2024a; Mohanty et al. 2024, and references cited therein). Pollen grains and spores are small in size (5–250 μm) (Walker & Doyle 1975) and have resistant exines because of the presence of sporopollenin ($(C_{90}H_{115–154}O_{10–44}/(C_{90}H_{142}O_{36})_n$) (Brooks 1971; Brooks & Shaw 1968, 1978). Therefore, they are better preserved in sediments compared to other plant parts (Erdtman 1954; Faegri & Iverson

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