

Vegetation change and paleoclimate in the Kathmandu Valley during the Early Pleistocene

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The Kathmandu Basin in the Central Himalaya is located in the best place to reveal the history of the uplift of Himalaya and monsoon climate. We carried out academic drillings in central and southern marginal area of the basin (RB core and LD core respectively), under the name of Paleo-Kathmandu Lake Project (2000 & 2001). In order to reveal the vegetation changes and paleoclimatic records in the southern slope of the Central Himalaya, In this paper, we report a part of pollen analyses on the samples taken from RB core of 218m-long and LD core of about 100m-long.

RB core is lithologically divided into three parts in ascending order: gravel dominated beds of 38m, 170m-thick muddy lacustrine bed and overlying fluvial sandy bed. We took samples at 1m interval from 218m to 30m, and at 10cm interval from 30m to 0m in depth section of the core, and conducted pollen analysis.

Result of RB core: Quercus and Pinus are predominant taxa among tree genera. Picea and Castanea / Castanopsis show occasional short-term increase. Alnus, Gramineae show cyclic repetition of increase and decrease. The fluctuation is distinctive in the section from 167m to 90m. Besides the total amount of pollen and frequency of Gramineae show reciprocal correlation. We constructed the following nine pollen zones.

Zone I (218-202m): Cyperaceae, Artemisia, spores are present, but forest taxa are rare.

Zone II (202-177m): This zone is divided into three subzones.

Ia (202-195m): Pinus is low (1%) and relatively high percentage values of Mallotus (around 10%) characterize this zone.

Ib (195-188~182m): Pinus and Gramineae are present at high percentage values(at the maximum 55% and 60%, respectively).

Ic (188~182-177m): This zone is similar to zone Ia, but Gramineae is higher (30-40%).

Zone III (177-166m): Alnus is low, Gramineae is high (15-30%).

Zone IV (166-153m): Alnus is relatively high (at the maximum 30%), Gramineae is low (less than 5%).

Zone V (154-142m): The high percentage of Gramineae (20-40%) characterizes this zone. Picea is low (1-2%).

Zone VI (142-137m): Castanea / Castanopsis is present at 10-20%. Alnus shows constant occurrence (around 15%).

Zone VII (137-116m): This zone is similar to zone III, but percentage of Pinus is much higher (maximum 70%).

Zone VIII (116-104m): This zone is similar to zone VI, but the percentages of Pinus are higher.

Zone IX (104-90m): This zone is similar to zone V.

The following taxa are used as indicator of paleoclimate: Quercus, Castanea / Castanopsis as warm climate, Pinus as cold climate, Alnus as wet climate, and Gramineae as dry climate. We recognized four warm / cold climate cycles and four dry / wet cycles. Warm and cold phases roughly coincide with wet and dry phases respectively.

LD core is divided into two parts; the upper Itaiti Formation, showing branded-river facies, and the lower Lukundol Formation, showing marginal lacustrine facies.

Based on the paleomagnetic study, LD core ranges in age from about 1.6 to 0.8Ma (Yahagi, 2003MS).

Results of LD core: In Itaiti Formation, spores, Gramineae and Artemisia are common, but tree taxa are rare, and the total amount of pollen and spores is small. In Lukundol Formation, forest tree taxa such as Pinus, Quercus are common, and the total amount of pollen and spores is large. These differences of pollen assemblage between Itaiti Formation and Lukundol Formation may be related to the change of the depositional system or the change of the source area of pollen and spores.

We compare the result of pollen analysis of the RB core with that of LD core, and discuss on the history of vegetation changes and paleoclimate in the central and marginal areas of the Kathmandu Basin. We also compare these results with the previous studies reported from Arabian sea and Baikal region.