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Decades of quaternary research in Eastern Africa: Implications for sustainable future

Julius B. Lejju and Andama Morgan

5th EAQUA Workshop, Mukono, Uganda, 4-7 July 2017

The 5th East African Quaternary Research Association (EAQUA) workshop was themed "Decades of Quaternary Research in Eastern Africa: Implications for Sustainable Future". It was intended to foster ways of integrating the long-term scientific information of various paleo studies in eastern Africa from the last six decades to address future environmental challenges in the region. In addition, the workshop was meant to integrate the rich paleo information into practical applications to address the social and environmental challenges affecting the region.

The workshop was attended by over 60 research scientists from Eastern Africa, Ethiopia, Malawi, West Africa, Southern Africa, Europe and USA. More than 40 research papers were presented under several sub-themes that addressed the rich Quaternary environments of eastern Africa. The sub-themes included Regional Climate Dynamics for Eastern Africa; Quaternary Human-Environment interactions in Eastern Africa; Anthropology, Archaeology and Paleontology in Eastern Africa; Natural and Cultural Heritage in Eastern Africa; and Paleoscience in other regions of Africa. The keynote papers reviewed the long-term environmental dynamics of the region, and presented the output of 30 years of paleontological research in Eastern Africa, in particular from the Napak region in Uganda, which yields immense paleo information with significant deposits of fossil records spanning the last 20 Ma. While the region is

covered by Savanna nowadays, geological studies have revealed evidence of patchily distributed flowing rivers and streams, including swamps 20 Ma ago. Furthermore, the discovery of remains of the extinct genus of hominoid primate *Ugandapithecus* and the assemblages of land snails indicate the presence of a tropical rainforest. Aquatic fossil remains suggest the presence of fresh water bodies.

East Africa is believed to be the origin place of humankind, as most of the early hominid fossils were found in this region. When East Africa became drier in the Late Miocene, animals already adapted to a drier environment in the South dispersed to East Africa. The development of the Cenozoic East African Rift System, which greatly re-shaped the landscape of the region, triggered the early hominin evolution and also led to the formation of isolated rift lakes and development of amplifier lakes (Trauth et al. 2010) in the basins three million years ago. The tectonic activity significantly contributed to the exceptional sensitivity of Eastern Africa to climate change, compared to other parts of the African continent. Thus, the last two Ma in East Africa are characterized by variable climate conditions with high fluctuating lake levels (Fig. 1) and complete desiccation of Lake Victoria during the late Pleistocene. The West Nile sector of the Albertine Rift contains fossiliferous Mio-Pliocene deposits, similar in age to parts of the succession

in Kenya, where early evidence of bipedal hominids was discovered.

Climate change in the past and the consequential ecosystems changes have been seen to play a critical role in shaping the evolution trajectories in East Africa. Recent climatic variations in the region at decadal and centennial scales are characterized by strong rainfall seasonality resulting from the annual migration of the Intertropical Convergence Zone. This interannual variability is also linked to other mechanisms such as sea-surface temperature anomalies attributed to the Indian Ocean Dipole and El Niño/Southern Oscillation. The East African region is also known for the existence of rock art sites coupled with lithic fragments and pottery - an indication of the presence of hunter-gatherer systems.

The paleo data of this workshop will be integrated in the assessment of future issues in the region and the proceedings of this workshop will be published as a special issue in a peer-reviewed journal.

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Figure 1: Source of the Nile at Jinja, Uganda.