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Geotourism in national parks of southern Kenya and northern Tanzania: spectacular landforms associated with basement platforms, the Gregory Rift and Neogene-Recent volcanoes

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The national parks and conservation areas of southern Kenya and northern Tanzania have unparalleled potential for geotourism. Rifting and volcanism reveal spectacular landforms that include regional escarpments, alkaline lakes, plateaus, and giant free-standing mountains. Highlights include the ice-capped peak of Kilimanjaro (5,896 m), Ngorongoro, one of the natural wonders of the world where wildlife is constrained within a huge caldera with steep sidewalls, and the seemingly endless plains of the Serengeti. The dominant geological feature is, however, the Gregory Rift Valley, the eastern branch of the East African Rift System. The partial separation of the African Plate into a western (Nubian) plate, and an eastern (Somalian) microplate, has been accompanied by extensive volcanism (Miocene-Holocene).



The African continent has a long geological record and reveals evidence for major crust-forming events that include cycles of both growth and break-up of tectonic plates. The Tanzania Craton is part of an ancient microcontinent (2,800-2,500 Ma) that crops out in the Serengeti, west of the Rift. Crystalline rocks of the Neoproterozoic Mozambique mobile belt occur on plateaus east of the Rift. Plateaus formed by repeated cycles of uplift and erosion during the Jurassic through Tertiary. Some plateaus are aligned with the African

Erosion Surface (70 Ma), whilst others are ascribed to rift-related uplift.

Internal drainage has resulted in a chain of shallow, alkaline lakes within the Gregory Rift, e.g., Manyara, Natron, Nakuru, Bogoria, and Baringo, some of which are associated with geothermal features. The oldest volcano is Mount Elgon (22 Ma), a giant shield volcano straddling the border between Kenya and Uganda. The Ngorongoro Volcanic Highlands (3.7-1.6 Ma) is a complex of extinct cones, some with giant calderas. Longonot, the Olkaria Volcanic Complex (Hells Gate) and Oldoinyo Lengai with its unusual natrocarbonatite lavas are active volcanoes located within the Rift. The Chyulu Hills, with lava flows that extend into Tsavo West, Kibo, the highest component of Kilimanjaro, and Mount Meru, are active systems located to the east of the Rift. The large concentrations of wildlife on the dry plains of Tsavo West and Amboseli are fed year round by groundwater (including ice melt) from adjacent volcanic uplands.

The palaeoanthropological site of Oldupai Gorge contains hominid fossils, including, for example, *Homo habilis* (1.9-1.6 Ma), buried in volcanic ash derived from Ngorongoro volcanism. Hominids and *Homo sapiens* evolved in and around the Rift during catastrophic levels of geological upheaval (rifting and volcanism). The fall-out of volcanic ash, associated with unusual carbonatite volcanism, may have triggered rapid speciation within East Africa. This hypothesis has arisen to try and account for the great concentrations of wildlife, including localized occurrence of some Great Apes, as well as the great diversity of species, including plains animals and cichlid fish (e.g., in Lake Victoria).

References:

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