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# The geodiversity of Mustang Graben (Nepal Himalayas): what protection in a context of climate change and economic development?

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The Mustang basin appears as a key area for understanding the geodynamics evolution of the Northern Himalayan Range, and as such it represents a hotspot of geodiversity, including dramatic wilderness, sceneries and environments. In addition, its northern part appears as the easiest pass connecting the arid, cold uplands of the Tibetan Plateau and the densely populated areas of south Nepal and Indian subcontinent. This is why it has been selected by the Chinese Government as an annex of the "New Silk Road" called "the Kali Gandaki corridor", despite the fact that the Mustang area is included in the Annapurna Conservation Area (ACA), being protected because of its exceptional, wild fauna and bio-environment.

Firstly, we present the main geodiversity characteristics of Mustang, which until now were quite ignored by the ACA regulations. (i) Structural landforms at all scales, related to the Dangardzong-Thakkhola fault dynamics and evolution; (ii) Contrasted types of material, both in texture and in color, corresponding to the 800m-thick filling of the graben, and to the underlying bedrock; (iii) Present landforms and processes, characterized by deep gorges, Quaternary deposition and dramatic gullies cut into yellow-orange-grey materials. (iv) The existence of strong links between geodiversity and cultural heritages, as expressed by the hermit caves, the Buddhist temples and monuments.

Secondly, we focus on two major threats that may affect geodiversity. The first one is related to the impacts of climate change. Erratic rainfall, increasing hailstorms, decreasing snow cover, melting of permafrost, glacier recession, all may trigger more frequent episodic flashflood, debris flows and Glacial lake Outburst Floods (GLOF), and destroy significant testimonies of the geological evolution, together with traditional irrigation patterns. The second concern is related to the current dirt road, planned to become soon a 2-way tarred road. If it is good to boost the economy, in offering more facilities to geo-tourism and increasing the opportunities to export local products and/or imports international products, it can also be a real danger to geodiversity, in destroying the aesthetics of landscape, the quality of environment (noise, dust, pollution) and eventually the exceptional combination of both geo- and bio-diversity, as shown by different examples. Clearly, a good balance has to be found between the three goals: geodiversity, conservation and tourism (the main income/industry in Nepal). This remains a very delicate, debated issue among the different partners either living or having economic interests in the area.