

Morphotectonic analysis of the Zagros Mountains Using High Resolution DEM to Assess Gully Erosion Processes: A case Study in the Fars Province, Southwest of Iran

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Abstract

Tectonic activities in the Zagros Mountain significantly contributed to the formation of the existing drainage systems and hence, to landscape evolution in the Fars province in the Southwestern Iran. Soil erosion and severe gully erosion recently affect large parts of the southwestern parts of the country. Neotectonics (Upper Quaternary) in form of earthquakes and associated uplifting, fracturing and faulting are still active in large parts of the Zagros range. In this paper we focus especially on the assessment of the vulnerability of geologic formations to gully erosion induced by the effects of neotectonic processes. Recent tectonics cause disturbances on the ground surface that propagate through the hydrological system triggering also gully erosion. This research investigates the morphotectonics of the Mazayjan basin, which is part of the Zagros Mountains in the Southwest of Iran, using terrain and stream profile analysis. To the knowledge of the authors the mechanics of stream networks and erosional process related to neo-tectonics are still poorly studied in the Zagros Mountains. The tectonic features extracted from a geological map and validated with field survey in the study area. An investigation on the location of gully features like head cuts and stream profile knickpoints reveals that the highly sensitive areas to gully erosion are related to areas with uplifting and faulting. In this study we utilized the TecDEM software to identify knickpoints showing that the abrupt change in the river profiles are located in the central part (Alluvial deposition) of the catchment. Hence, the location of knickpoints indicates tectonic activity in turn changing the drainage network in the longitudinal profile. We illustrate that severe gully erosion is strongly related to these tectonic processes, especially in the Southwest of the Mazayjan catchment.

Keywords: Morphotectonic analysis, TecDEM, Zagros Mountain, GIS, Gully erosion