



## **Genesis, geomorphology and development of the Puli Basin, Taiwan: Review and new aspects**

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The island of Taiwan arose from the orogeny caused by the convergence between two tectonic plates, so the topography on the island is characterized by lofty mountains. More than ten inter-mountainous basins exist in central Taiwan, and the largest one of these basins is called Puli Basin. Within the Puli Basin, various geomorphic features are observed, which reflect multiple processes successively or simultaneously shaping the landforms in the past.

Since the 1930s, numerous studies on these inter-mountainous basins have been carried out to explain the origin and the evolution of the landforms in the Puli Basin. In order to critically review previous models for the basin genesis and to test new hypotheses, geophysical, geomorphological, remote sensing, and geochronological methods were applied. These methods include borehole data, gravity anomaly measurements, reflection seismology, geodesy (global positioning system, GPS), aerial photography, field investigation, geomorphic analyses, radiocarbon ( $^{14}\text{C}$ ) dating, and optically stimulated luminescence (OSL) dating.

According to the former studies, five genesis hypotheses of the Puli Basin have been proposed: (i) bedrock down warping, (ii) transtension caused by strike-slip fault, (iii) detachment movement under the basin, (iv) piggy-back basin between two thrust faults, and (v) graben resulted from transpression and transtension. Some studies in terms of gravity anomaly and reflection seismology reveal the underground structure and morphology; others, using aerial photography and field investigation infer possible geomorphic deformation resulting from tectonic stress. Based on the geophysical and geomorphic data and features, down warping of the bedrock and overlying sediments seems plausible for the genesis of the Puli Basin.

After the general formation of the Puli Basin, the present-day landforms developed under both fluvial and tectonic influences. Two sets of borehole data show three major different sedimentary phases in the past. The lower sediments were deformed by the tectonic compression, and part of the upper ones were dissected by rivers due to the bedrock uplift triggered by the tectonic compression. Tectonic and fluvial processes, i.e. deposition and incision, gave rise to the formation of tablelands and fluvial terraces. Their material and spatial relations were investigated by the studies applying field investigation and geomorphic analyses. However, their formation time is still not clear within a limited time frame provided by only few radiocarbon and OSL dating results. Therefore, the landform evolution of the Puli Basin can only be inferred by interrelation of geomorphic surfaces and tectonic structures, for the numerical chronology remains unclear.

This study will first review and discuss the results from previous studies. Based on a critical review and including new findings, we will present new viewpoints on the geomorphology and the development of the Puli Basin.