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The real process of river capture in mountainous regions

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The theory on river capture by headward erosion has been introduced for more than 100 years [1-2]. A long-time dispute on this theory is evident in China [3-5]. Great progress has been achieved, such as the idea of the leading roles of sub-erosion and mass movement within river capture in mountainous regions [5-6]. However, in depth and follow up studies on the process of river capture are significant.

This paper suggests that the watershed between two rivers cannot be eradicated by the headward erosion from surface water and that capture is realized through a complex process. This process includes the river-charged-groundwater runoff with rock mass dissolution or argillization, rock mass caving, rock mass cave-in, and debris transportation in watershed. Consequently, a gorge linking the two rivers is developed along the cave-in zone. Finally, the river at a high altitude is captured by the river at a low altitude via the link gorge (Figure 1).

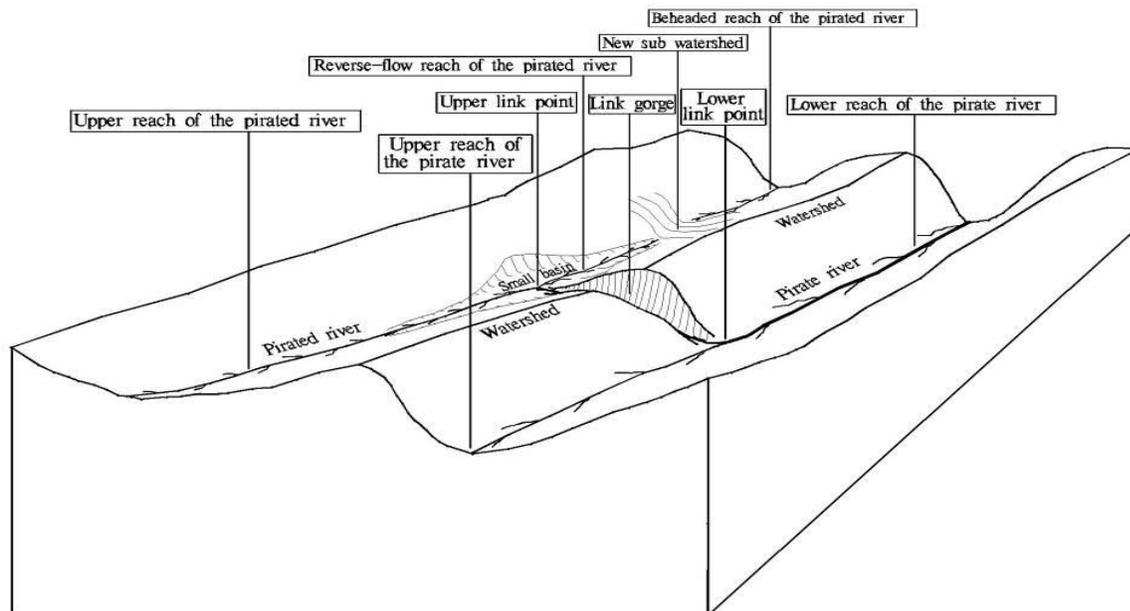


Figure 1: Spatial diagram of the river framework after river capture

The popular style of river capture is between two parallel rivers at different altitudes (Figure 1). The special styles of river capture are between one river and one lake, between two lakes, or among a moniform lake group with outlet mouths [7]. The key factors affecting river capture include lithological type, rock mass structure, and neotectonic movement. Various examples are found and investigated on the Yunnan-Guizhou-Sichuan Plateau, including the Jinshajiang River along the zigzag sector across the First Bend of Yangtze River in Yunnan Province.

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