



Restore the riverbed with reservoir sedimentation: A case study for the Dahan Creek in Taiwan

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Decreasing riverbed threatens hydraulic infrastructures, bridges, and ecosystems in the Dahan Creek, northern Taiwan. The riverbed of the Dahan Creek descended 3.24 m in two decades (1969-1989) due to sand mining. After 1989, the activity of sand mining was banned, but the topography was not restored over time. The elevation of riverbed even kept decreasing and dropped approximately 0.58 m from 1989 through 2010. This result implied that both sediment dynamic and river flow regime were obviously affected. The Shihmen Reservoir, one multiple-purpose and 233 million m³ of effective storage capacity reservoir, was established between 1956 and 1964 and located at the upstream of the Dahan Creek. Sediments were trapped by the Shihmen Reservoir and only released with floods during typhoon season. Sediments have occupied 29.76% of effective storage capacity of the Shihmen Reservoir (sediment volume was approximately 92,000,000 m³) based on a bathymetry survey on February 2013. For sustainable management, these reservoir sediments are releasing to the downstream region through the desilting tunnel. However, these sediments were difficult to deposit in the Dahan Creek and went directly to the downstream, because of steeper slope, finer grain size, and larger river discharge. During the same period (1989-2010), the downstream riverbed, namely the Tanshui River, ascended 1.61 m. In addition, during Typhoon Soulik in 2013, sediment of 0.58 million m³ was released with larger discharge (the peak flow was approximately 4,950 m³/s). Most of sediments were directly transported to the downstream or estuary, instead of refilling the riverbed materials for the Dahan Creek. Therefore, not only for reservoir sustainable management (reduce reservoir sediments) but also for river restoration (refill riverbed materials), an optimal strategy of artificial flood releasing is necessary.