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# Unsustainable in-channel sand mining threatens sand delivery to the Mekong delta

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The world's largest rivers transport ∼19 billion tonnes of sediment to the coastal zone annually, often supporting large deltas that rely on this sediment load. Sand is a vital resource in the construction and maintenance of subaerial delta surfaces. Such sand supply is limited because medium-coarse sand is often predominantly transported as bed material, and it is often assumed that bedload contributes a minor (<10%) fraction of the total sediment load. In recent decades, the extraction of bed material (sand and gravel) from many of the world's rivers has accelerated, following demand for raw materials required for rapid economic development. Bedload is critical for replenishing this resource, but the lack of understanding of the magnitude of bedload in major rivers makes it is difficult to determine whether or not sand extraction is sustainable. For example, in the Vietnamese Mekong delta, it has been estimated that aggregate mining has resulted in the removal of ∼200 Mm3 of bedload since 1998, but estimates of incoming bedload are entirely lacking.

Here, we assess the significant threat of sand extraction to the future sustainability of the Mekong delta by reporting new sediment ratings curves for the Mekong River that combine both bedload and suspended load. Our results indicate that suspended load transport rates for the Mekong River are 87 MT/yr, (over the period 1981 – 2005), while bedload transport accounts for c. < 2% (∼2 Mt/yr) of the total sediment load. Using parametric echo-sounding data to reveal the thickness of the sand deposits across sections of the Mekong River we conclude that, at the current rate of extraction, the availability of sand on the Mekong river bed is extremely limited and that sand transport to the delta is under threat from increased bed sediment extraction.