

Estimating sediment trapping efficiency from Landsat images: a case study of the Yellow River basin

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Abstract This paper is concerned with the man-made reservoirs constructed in the Yellow River basin. Given the shortcomings of conventional approaches to assessing reservoirs constructed in large river basins, remote sensing techniques offer several benefits. Remote sensing data can provide high-resolution synoptic and repetitive information at short time intervals. Based on the results of reservoir delineation and storage capacity estimation, in this study the Yellow River basin was divided into 12 sub-basins for which the water residence time and potential sediment trapping efficiency were explored. Water cycling in the basin has been greatly regulated and its residence time increased to 3.97 years during 2006–2009. The basin-wide sediment trapping efficiency is 95.2%, indicating that most sediment entering the channels would be trapped by the reservoirs. With more reservoirs to be completed, it is expected that flow regulation will become much more important and that the sediment flux reaching the ocean will further decrease.

Key words water residence time; sediment trapping efficiency; Landsat; Yellow River basin