

The Role of Impoundments in the Sediment Budget of the Conterminous United States.

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Abstract

Previous work on sediment budgets for U.S. agricultural regions has concluded that most sediment derived from accelerated erosion is still on the landscape, primarily in colluvial and alluvial deposits. Here we examine the role of small impoundments in the subcontinental sediment budget. A recent inventory based on 30-meter satellite imagery reveals approximately 2.6 million ponds, while extrapolation from a sample of 1:24,000 topographic quadrangles suggests the total may be as large as 8-9 million. These ponds capture an estimated 21% of the total drainage area of the conterminous U.S., representing 25% of total sheet and rill erosion. We estimate the total sedimentation in these small impoundments using three different methods; these estimates range from 0.22 to $1.78 \times 10^9 \text{ m}^3 \text{ yr}^{-1}$. Total sedimentation in ~43,000 reservoirs from the National Inventory of Dams is estimated at $1.67 \times 10^9 \text{ m}^3 \text{ yr}^{-1}$. Total USLE erosion in 1992 was $2.4 \times 10^9 \text{ m}^3 \text{ yr}^{-1}$, and export to coastal areas is estimated at $0.6 \times 10^9 \text{ m}^3 \text{ yr}^{-1}$. Total sedimentation in impoundments is large in relation to upland erosion, in apparent contradiction to previous studies that have identified colluvial and alluvial deposition as the primary sinks. Several alternative hypotheses that could help explain this result are proposed. Regardless of which of these alternatives may prove to be the most significant in any given setting, it is clear that most sedimentation is now taking place in subaqueous rather than subaerial environments, and that small impoundments are a major sediment sink.

Key words: Reservoirs, sedimentation, sediment budget, erosion, dams.