



Monitoring Sediment Transport in an Ephemeral Stream

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A state-of-the-art research facility to monitor sediment flux during monsoonal storm event has been collecting data for three years on the Arroyo de los Pinos near Socorro, New Mexico.

Mission Issue

Understanding the contribution of sediment from ephemeral streams to the rivers that fall under the purview of Reclamation is fundamental to managing and protecting water related projects in an environmentally and economically sound manner.

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Problem

Quantifying the mass, size, and frequency of sediment delivery from tributaries is requisite for understanding fluvial characteristics and geomorphic processes of a river reach. Perennial tributaries can be quantified fairly well using standard methods; ephemeral streams prove to be more difficult.

Any project on or along a river needs to be designed with knowledge of likely future flood events as well as potential changes in river form, shape, and alignment. Reclamation projects are design to withstand some specific flood event (say, the 25-year return interval storm) but they typically do not consider geomorphic processes This has led to habitat restoration projects being filled with sediment, surface water intakes becoming abandoned, and levees becoming compromised.

Solution

A state-of-the-art research facility has been established in the Arroyo de los Pinos watershed near Socorro, New Mexico. This facility samples the bed load and suspended load using both direct physical techniques, as well as a variety of surrogate techniques.

The Pinos Research Station not only advances the state of the art regarding acoustics, seismometers, and other surrogate techniques, it adds to the growing body of knowledge that methods to estimate sediment flux in perennial streams are not applicable to ephemeral streams, and that new equations or relationships need to be developed for these unique but ubiquitous systems.



Flow in the Arroyo de los Pinos during a July 2020 monsoon event (photo credit: K. Stark).

"We look forward to continuing the collaboration at this site. It is an important site in the US for sediment research, which will move us forward in our understanding of sediment transport."

Jonathan AuBuchon
Sediment Specialist
U.S. Army Corps of Engineers,
Albuquerque District

More Information

<https://www.usbr.gov/research/projects/detail.cfm?id=1871>

Application and Results

Once a reliable relationship between physical and surrogate methods is defined, the surrogate method (cheaper than physical) can be deployed in many other ephemeral streams.

With improved estimates of sediment delivery from ephemeral streams, the design of an instream or along-stream structure will account for geomorphic processes and ensure the facility provides the intended service. The advancement of reliable surrogate techniques can allow for deployment across many ephemeral streams to improve confidence in baseline data and therefore design.

Future Plans

The Arroyo de los Pinos site will continue to operate if additional funding can be secured. The continuous monitoring of events at this site is requisite for advancement of the reliability of surrogate techniques. Some funding is currently provided by NSF, and new lines of funding are being pursued from Reclamation and U.S. Army Corps of Engineers.

Discussions have begun with the Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) to potentially deploy instruments at one or more of their existing facilities. Leveraging additional research dollars against this entities existing infrastructure will benefit both parties at minimal cost, and will improve the development of reliable surrogate techniques for estimating sediment flux.