

Soil Conservation Benefits Offset by Climatic Variations?

A. What is this research project?

Effectiveness and benefits of soil conservation programs are traditionally measured over time in terms of decreased cropland erosion, reduced sediment loading of streams, and increased downstream water quality. However, in the presence of climatic variations, these measures of conservation impacts invariably also include effects of changes in runoff and soil erosion due to the climatic variations, thereby concealing the actual effectiveness of conservation programs. This research enabled accurate assessment of downstream sediment yield reduction attributed to extensive upstream soil conservation efforts implemented over a 50-year time period in the Fort Cobb watershed, OK, despite sizeable changes in runoff and soil erosion produced by two decades of above-average mean annual precipitation. It was found that the conservation benefits were essentially offset by increased runoff and soil erosion due to the increased precipitation.

B. What problem does it address?

A number of confounding factors, including climate variations, make it very difficult to identify observable downstream benefits that are associated with upstream soil conservation efforts. While on-site benefits of soil conservation are evident at field and farm scales, continued political and financial support for large conservation programs depends on clear evidence that these programs have also off-site benefits for downstream water users.

C. How is the project different from or how does it enhance other projects?

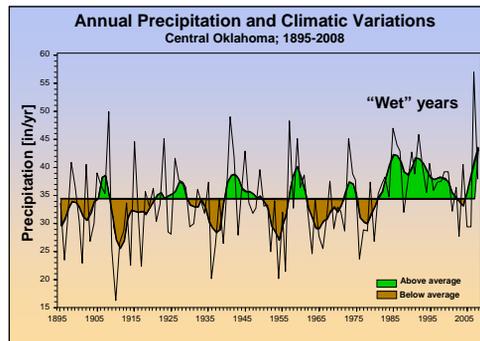
This project takes advantage of a unique water and sediment data base for the Fort Cobb Reservoir watershed in west central Oklahoma. Water and sediment observations go back to the 1940s and cover a period of extensive conservation work, as well as a climatic variation lasting over two decades. The research enable distinction of downstream sediment yield effects due to conservation efforts and climate variations.

D. What are the potential benefits of partnering with ARS on this research?

The research team can share expertise in identification of climatic variations and interpretation of long term flow and sediment yield records for medium sized watersheds (10 to 1000 km²).

E. Who are the potential customers?

Conservation agencies and organizations, universities, reservoir managers, and downstream water users in general.



Stage of Development

The phase of the research is essentially completed.

Moving Forward

Additional flow and sediment observations over recent years will be integrated into the study, and potential sedimentation rate of the Fort Cobb Reservoir will be estimated for various combinations of conservation efforts and climatic conditions. This in turn determines when reservoir sedimentation is likely to encroach on reservoir functions, and identifies the need for conservation targets that extend the useful life and functionality of the reservoir.

Researchers

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