

History of the USDA-ARS Experimental Watersheds on the Washita River, Oklahoma.

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Extended Abstract

A national experimental watershed network, operated by the Agricultural Research Service of the US Department of Agriculture, was established in 1959 to conduct research on the effects of flood retarding structures, upland soil and water conservation practices, and land management on downstream water quantity and quality. Three large watersheds of this network are on the Washita River in Oklahoma, approximately 50 to 80 kilometers south-west of Oklahoma City. They are the Southern Great Plains Research Watershed (SGPRW; 2,900 km^2), the Little Washita River Experimental Watershed (LWREW; 610 km^2), and the Fort Cobb Reservoir Experimental Watershed (FCREW; 790 km^2).

- Southern Great Plains Research Watershed (1961-1978)
In 1961, the Southern Plains Hydrology Research Center was established in Chickasha, Oklahoma. The mission was to assess the overall effects of the USDA-Soil Conservation Service flood control and watershed protection efforts on the Washita River Basin for the purpose of improving similar programs in the future. In the early years, research addressed issues of rainfall, runoff and sediment measurement techniques and evaluation procedures. Research regarding flood abatement and conservation impacts followed soon afterward.

- Little Washita River Experimental Watershed (1961-2005)
a) 1978-1985: In 1978, the SGPRW was scaled back to include only the LWREW, and the original mission of the Southern Great Plains Hydrology Research Center was refocused on water quality issues. The LWREW was selected as one of seven areas in the United States for the multi-agency Model Implementation Project (MIP). The main objective of the MIP was to demonstrate the effects of intensive land conservation treatments and control of non-point pollution sources on water quality using best management practices in watersheds larger than 65 km^2.

b) 1985-1992: In 1985 at the end of the MIP, the monitoring activity on the LWREW was reduced, and the water quality research shifted from the LWREW to include other watersheds across Oklahoma and the Southern Great Plains. Hydrologic research on the LWREW was then refocused on distributed hydrologic model development and applications to quantify runoff volume, peak flow rates, sediment yield, and water quality parameters.

c) 1992-2004: This was a time of great change and new opportunities for the LWREW. In the early 1990s, the ARS-Global Change, Water Resources and Agriculture program gave impetus for re-activation and instrumentation upgrades on the LWREW. The new research emphasized global change issues and addressed the exchange of water and energy in managed ecosystems, and the effects of land cover and climate on land-surface hydrology. During this period eight multi-agency, multi-disciplinary, watershed-scale hydrologic experiments were conducted on the LWREW to develop new remote sensing systems and associated algorithms for surface soil moisture estimation over large land areas.

- Fort Cobb Reservoir Experimental Watershed (2004-2005)

In 2003, the Conservation Effects Assessment Project (CEAP) was initiated. The multi-agency CEAP is a Natural Resources Conservation Service led assessment designed to quantify environmental benefits of conservation practices implemented on agricultural lands. The objective of ARS' Fort Cobb CEAP study is to assess the effects and benefits of selected conservation practices as they relate to reduction of inputs of suspended sediments to surface water, and the reduction of phosphorus and nitrogen in surface and ground water.

The three USDA-ARS experimental watersheds on the Washita River have served for over 40 years as an important outdoor laboratory for assessing environmental impacts of flood retarding structures, soil and water conservation practices, and land management in the Southern Great Plains. Much of the watershed data supported multi-agency, multi-disciplinary research involving flood reduction, soil and water conservation, agricultural water quality, sedimentation, erosion, energy fluxes, soil moisture, and remote sensing. These watershed investigations recognized early-on the need to link watershed research across a range of scales, as well as target non-point source controls and best management practices to critical source areas. Long term research is essential to properly evaluate land management and climate on water quantity and quality impacts. Expectations are that the Little Washita River Watershed, together with the more recent Fort Cobb Watershed, will continue to provide valuable land use and management information for protecting and utilizing soil and water resources in the Southern Great Plains.