Walnut Gulch Experimental Watershed, Tombstone, AZ

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The 150 km^2 Walnut Gulch Experimental Watershed (WGEW) surrounds the town of Tombstone, Arizona and has been extensively studied since 1953. One of two USDA-ARS experimental watersheds in the western US, the WGEW is managed by the Southwest Watershed Research Center (SWRC) in Tucson, Arizona for the purpose of understanding watershed processes. The mission of the SWRC is to develop knowledge and technology to conserve water and soil in semi-arid lands. Our goals are to quantify, understand, and model the effects of changing land use, management practices, and climate on the hydrologic cycle, carbon cycle, soil erosion processes, and watershed resources in a semi-arid rangeland environment. The SWRC also performs research on the 7600 km^2 San Pedro River Basin surrounding WGEW and maintains experimental watersheds on the University of Arizona Santa Rita Experimental Range (SRER), a National Ecological Observatory Network (NEON) core site.

The WGEW is one of the most intensively instrumented semiarid experimental watersheds in the world, with a 10- to 100-year record of abiotic and biotic measurements and photographs. Located in the transition zone between the Sonoran and Chihuahuan deserts (31°430N, 110°410W), the elevation ranges from 1220 to 1950 m. Desert shrubs dominate the lower two thirds of the watershed and desert grasses dominate the upper third. The climate is semiarid, with mean annual temperature of 17.7°C and mean annual precipitation of 312 mm. The land comprising WGEW is under the ownership and control of other federal agencies, the state of Arizona, private landowners and leaseholders.

Hydro-meteorological and soil erosion/sedimentation data are collected from numerous instruments on WGEW. Precipitation is measured with a network of 88 weighing-type recording rain gauges. Surface runoff is measured at a range of scales. To isolate the effects on runoff of interactions of rainfall intensity with soil and vegetation characteristics, runoff is measured at 9 small watersheds (0.002 to 0.06 km^2) by structures including a broad-crested V-notch weir, two H-flumes, and six Santa Rita supercritical flow flumes. Channel network processes and rainfall spatial variability are studied using 11 nested watersheds instrumented with large flumes. Sediment from the small watersheds is sampled either with automatic pump samplers or with total-load automatic traversing slot samplers. Sediment accumulation in 7 stock ponds is measured through periodic topographic surveys of the ground surface of each stock pond. Meteorological, soil moisture and temperature, and energy/water/carbon dioxide flux (eddy covariance) measurements are made at two vegetation/soil complexes. The SWRC has made a concerted effort to make observations, knowledge, and data from its outdoor laboratories readily available via the internet (www.tucson.ars.ag.gov/dap).

The WGEW participates in the Ameriflux, Soil Climate Analysis, Arizona Regional Image Access, Global Fiducial, and EcoTrends networks and falls into the following national categories:

Classification System	WGEW Category
Farm Resource Regions	Fruitful Rim
Major Farm Region	Mountain Region
Hydrologic Unit Codes (HUC-2)	Region 15 (Lower Colorado)
National Ecological Observatory Network (NEON) Domains	D14 (Desert Southwest)
NRCS Major Land - Common Resource Area	41-3 (Arizona Semi-Desert Grassland)

Principal research emphases with other LTAR sites:

1. Remote sensing of production and cover in response to climate
2. Flux Towers
3. Erosion Modeling