

# Tombstone desert is water research hub

By Dana Crudo

THE TOMBSTONE EPITAPH

For many, the monsoon season is a weather change to dread in Arizona. But for a group of scientists collecting ecological data in Tombstone, it's the best time of the year.

The Walnut Gulch Experimental Watershed in Tombstone hosts researchers from around the world who study the impact rainfall has on water runoff and erosion at various scales. The monsoon season, which runs from June to September, is the prime time for research.

"Typically they focus on the monsoon storms since there is high intensity rainfall, which causes most of the erosion," said John Smith, supervisory hydrologic technician at Walnut Gulch. "The center has given Tombstone some clout since people around the world come and see the research we are doing."

Erosion is the removal of rock and soil from land through natural processes. Water plays an important part in erosion because it carries the loose materials down toward rivers, streams and oceans. If the eroded material is contaminated, the water will be polluted.

The watershed, which covers 150 square miles on the east side of the San Pedro Valley, has collected 50 years of precipitation data from its extensive rain gauge network.

The watershed, unique because of its desert location, is involved in numerous studies regarding hydrology, soil erosion, water quality and global climate change concerning areas that are dominated by grasses, forbs and shrubs, also known as rangelands.

"The information gathered is put into a computer to make models that estimate soil erosions," Smith said. "So when we have a storm, the event is plopped onto a

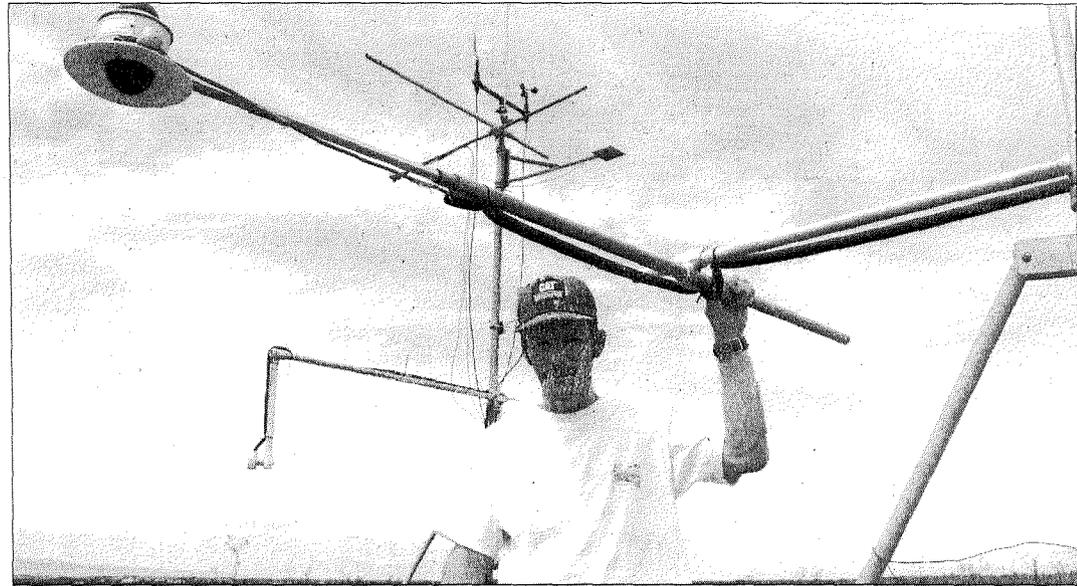


PHOTO BY CASSIE TOMLIN

**John Smith, supervisory hydrologic technician, installed this apparatus which collects data at the Walnut Gulch Experimental Watershed Tuesday.**

computer." Data is collected hourly and transferred to the Arizona Research Service Watershed Research Center in Tucson.

The outside laboratory, contained within the upper San Pedro River Basin that encompasses 7,600 square kilometers in Sonora, Mexico, also contains rain simulators, which allow controlled experiments on land plots when there is no natural rainfall.

Researchers worldwide use the data collected from the watershed, which has 60 to 90 rain gauges, to help create models that predict the erosion process in their own locales. The data gives them the opportunity to test

their own erosion-prediction models.

"The data translates very well to other areas," said Philip Heilman, Southwest Watershed Research Center research hydrologist. "The watershed is representative of a larger area where the models and data can be applied. The data also helps with engineering applications."

Jeffrey Stone, Southwest Watershed Research Center research hydrologist, agreed that Tombstone is a great sample of rangelands around the country.

"Tombstone is representative of semiarid land,"

SEE **GULCH** p5

## GULCH FROM p1

Stone said. "It has the typical vegetation and the typical soil."

"It is the largest and most monitored and automated semi-arid experimental watershed in the world," he said.

The watershed, which was selected as a research facility by the United States Department of Agriculture in the mid-1950s, works in cooperation with the Natural Resource Conservation Service, the local Soil Conservation Districts and the ranchers who own the land.

The laboratory conducts many research projects that have an impact on agriculture in Arizona and the world, according to Smith.

"Most of our information is used for agriculture purposes worldwide in areas of similar climate and vegetation," Smith said. "Cattle grazing is one area that our research benefits."

Tombstone ranchers in particular benefit from the research relating to cattle grazing, Heilman said, because the data collected help them determine how much grass they should harvest and how much they should leave protected. Models help ranchers simulate grassland growth and assist them with day-to-day management decisions.

"Grasslands help feed the cattle as well as bring in biodiversity," Stone said. "It is important to know how it is impacted by erosion and water runoff."

Most nutrients are on the top inch of the grass blade, therefore, it is important to ensure that those nutrients aren't being wiped off, he said.

The research conducted also provides land developers

the opportunity to learn how their housing plans may impact erosion and water runoff.

"When you put in a house, one more impervious surface, it causes problems downstream by sending more water down the stream," Heilman said. "It can cause downstream flooding or erosion."

Heilman noted that these studies are of particular interest to Sierra Vista and Tombstone because of its growing population.

Another reason to note erosion effects is so ecosystems that exist downstream and depend on the San Pedro aren't harmed by poor water quality as a result of increased sedimentation, Stone said.

Researchers are also working with local ranchers to help create water conservation models and to determine the effects of the water conservation efforts that took place in the 1940s.

Remote sensing that enables researchers to characterize the landscape at various scales is also being developed at the watershed.

Tombstone residents are welcomed to visit the Walnut Gulch Experimental Watershed Center and look at the educational materials provided. They are also encouraged to visit the center's Web site-[www.tucson.ars.ag.gov](http://www.tucson.ars.ag.gov)-to view the data collected, publications, and the research obtained from the watershed.

High schools are invited to take field trips to the Walnut Gulch Experimental Watershed. For more information, call (520) 670-6380.