The Water We Waste

From Water: Use Less—Save More*:*

1. Americans now use 127 percent more water than we did in 1950.
2. About 95 percent of the water entering our homes goes down the drain.
3. Running the tap while brushing your teeth can waste 4 gallons of water.
4. Older toilets can use 3 gallons of clean water with every flush, while new toilets use as little as 1 gallon.
5. Leaky faucets that drip at the rate of one drop per second can waste up to 2,700 gallons of water each year.
6. A garden hose or sprinkler can use almost as much water in an hour as an average family of four uses in one day.
7. A water-efficient dishwasher will use as little a 4 gallons per wash cycle, whereas some older models use up to 13 gallons per cycle.
8. Some experts estimate that more than 50 percent of landscape water use goes to waste due to evaporation or runoff caused by over-watering.
9. Many people in the world exist on 3 gallons of water per day or less. We can use that amount in one flush of the toilet.
10. Over a quarter of all the clean, drinkable water you use in your home is used to flush the toilets.

For tips on how to reduce the amount of water you use and waste, see Water: Use Less—Save More, by Jon Clift and Amanda Cuthbert.

Name _____

Research Project 1: Are **You** a Water Saint or Water Sinner?

On Saturday or Sunday, pay attention to your water usage & record the results in the table below. It's best if the day you use for your "water log" is a typical day of water usage, rather than a day that you are striving for aquasainthood.

Bring this chart to class with you you should have at the very least completed the 2nd column ("Times per day") by filling in with whole numbers.

Water use activity	**Times per day**	**Estimated gallons**	**Measured gallons**	**Total per day**	**Total per month**
Bathing					
Showering					
Flushing the toilet					
Washing your face & hands					
Getting a drink					
Brushing your teeth					
Cooking					
Washing dishes					
Washing laundry					
Other					
Totals					

Notes on Water Saint/Water Sinner:

Bathing: avg = 30 gallons. You may actually use more or less water than 30 gallons per bath; for a more precise measurement: 1) you can actually measure the volume of water (approximately) with a tape measure, or 2) you can clock the amount of time you spend filling up your tub. Typical flow through a spigot is about 8 gallons per minute.

Showering: avg = 50 gallons. Clock the amount of time you spend in the shower. As above, the average flow is about 8 gallons/minute. A "low-flow" shower head can actually cut the rate of flow in half.

Flushing: avg = 6 gallons. Some toilets list the size of each flush volume somewhere on the water closet. A water-saver toilet may use as little as 1.5 gallons.

Washing your face & hands: avg = 5 gallons. If you turn the water *off* while you scrub, you might use as little as a quart (= 0.25 gallons).

Getting a drink: avg = 0.25 gallons. You may end up using a little more than a quart if you run the spigot a minute to clear the lines of warmer water so that you can have a ***cool*** drink.

Brushing your teeth: avg = 2 gallons. You may end up using a little less if you turn the water off while you brush your teeth.

Cooking: avg = 10 gallons. This value is highly variable, depending on what food you prepare. If you're particularly ambitious, you might just measure all your cooking water with measuring devices (cups, spoons, &c).

Washing dishes: avg = 30 gallons. If you use a dishwasher rather than washing your dishes in a sink, you might use a third of that amount.

Washing your laundry: avg = 60 gallons. Well, if you wash a large load; your parents may have a high-efficiency washing machine that uses considerably less. Find you what your washing machine uses by consulting your parents (or if you are a model student, looking up flow info on the manufacturer's documentation conveyed to your parents at the time of purchase.

Other: If you use water for other purposes—washing the family car, watering the lawn, making your little brother behave—do your best to estimate the volume & record it on the chart.

For the information above, I am indebted to Michael L. Roa, author of *Environmental Science Activities Kit, 2nd edition* (San Francisco: Wiley, 2009).

Water and Energy Savings

Incandescent Light bulbs **OR**  Compact Fluorescents

Top-loading Washers **OR**  Front-loading Washers

Old Appliances **OR**  Energy Star Appliances

(like clothes washers, dishwashers) (like clothes washers, dishwashers - air dry when possible)

Yards with Lawns **OR**  Xeriscape yards (desert plants)

Old Refrigerators **OR**  Energy Star Refrigerators

(And don't stand there with the door open!)

Long Showers **OR**  Five-minute showers

Albuquerque Bernalillo County
Water Utility Authority

Watershed Abuse—the Effect on a Town

J.T. Columbus

Silver City, New Mexico, founded in 1870, is located in the southwestern corner of the state. It is nestled in a valley at 6,000 feet elevation and is called the Gateway to the Gila National Forest. This forest, which borders the city on the north and west, contains about 3.3 million acres of public owned forest and rangeland rising above the desert of southwestern New Mexico.

Within the Gila National Forest lies the Gila Wilderness, selected by the U.S. Forest Service in June, 1924, as the world's first Wilderness.

Silver City, home of Western New Mexico University, has a population of 12,000. Major industries are mining and ranching. Ten miles east is Kennecott's open pit copper mine, which has been called "the world's most beautiful copper mine."

Watershed Description

The Silver City watershed lies generally north to northwest of town in a pie-shaped segment with a radius of five to six miles with the apex at Silver City. The total watershed area is about 28 square miles with over half on private lands. The Continental Divide forms the northern and western watershed boundary.

Elevation ranges from 8,036 feet at the top of Bear Mountain to 5,800 feet just below the city, but most of the watershed lies between 6,200 and 7,000 feet. The slopes along the Continental Divide and Gomez Peak have steep, V-shaped draws that dissect the landscape, but the slopes of the foothills are moderate. More level country occurs in the bottomlands and alluvial stringers.

The main drainages are Pinos Altos Creek from the east, Little Walnut Creek from the north, and Silva Creek from the west, converging to form San Vicente Creek which flows through Silver City.

The principal rock formation in the watershed is sedimentary, including sandstone, limestone, and shale. The lower elevations are granite. Higher up the granite is overlain with a sandstone bed.

The watershed contains mostly residual upland soils, alluvial soils and a small percentage of soil complexes. These soils are easily eroded if the vegetation cover is lost. On the benches and gentle slopes a few soils are as deep as 25 feet. Generally, the depth ranges from one to six feet with some areas completely devoid of soil.

The watershed lies in four vegetative types: pinyon-juniper woodland, ponderosa pine forest, browse, and grassland. The watershed as a whole is classified as a pinyon-juniper type, since most of the watershed lies in this type. The ponderosa pine forest and grassland types are found in pockets scattered throughout the watershed, with the ponderosa pine forest type concentrated along the Continental Divide. The grassland type consists mainly of blue and sideoats grama. The browse type is generally confined to the higher elevations and consists mainly of liveoak and mountain mahogany.

The average annual precipitation for 55 years in Silver City has been about 16 inches, with the bulk of it falling as torrential rains in July, August, and September.

Early Watershed Abuse

The discovery of rich silver deposits in 1870 marked the beginning of the city's mining industry. Between 1870 and 1887 the area around the city was extensively mined and the timber areas were completely cut over. The timber was used as fuel for steam boilers at numerous mines, to build mining structures, and to feed household fires.

Old photos and other historical records indicate that between 1870 and 1908, the "grazing commons" around Silver City were used indiscriminately by cattle, sheep, goats, mules, burros, horses, and in some places by swine. According to old timers, in dry time before 1900, there would be 1,500 head of cattle grazing near and around the city.

The range became badly overgrazed, and, since most of the available timber was cut, the soil was practically denuded of ground cover.

Result of Watershed Abuse

With the ground cover gone, there was nothing to hold the water back, and the next substantial downpour left Silver City, and mankind, with a sharp reminder of nature's awesome power of retribution—the Big Ditch.

Before 1895, Main Street, the city's main north-south thoroughfare, was the principal artery of commerce, the destination of visitors, the departure point of those who journeyed afar, and an oasis for lonely and thirsty miners, drovers, and freighters. It also served as a modest drainage some two or three feet lower than the ground on either side of the street. There was nothing but this general depression to indicate that nature had ever required any considerable waterway.

But all that was changed after July 21, 1895. On that day torrential rains fell which the denuded watershed was unable to absorb. The exceptionally large runoff created a monstrous ditch, the bottom of which was 35 feet below the street level of the previous afternoon. There were no fatalities, but downtown Silver City was severely damaged.

Subsequent floods, climaxing in a two-day assault in August, 1903, scraped the ditch down to bedrock—55 feet below the old street traffic level. The excavation continued some 15 miles south of town.

J.T. Columbus, 18, Silver City, New Mexico, presented this winning slide presentation at the Youth Range Forum during the 1980 SRM annual meeting, San Diego, California. He plans to enter New Mexico State University at Las Cruces this fall and major in range and wildlife science.

Courtesy of U.S. Forest Service

Photo taken in 1908 looking west across the Silver City watershed.

Photo by J.T. Columbus

Photo taken in 1980 at the same location

The 1895 and 1903 floods were somewhat lighter than rains which were recorded in 1875, 1881, and 1883, but in the earlier floods the upland slopes still had enough ground cover to absorb and delay the runoff.

Initial Watershed Management

Records indicate that about 1890 the people of Silver City became concerned about the flood threat to the town and tried to stop the erosion within the townsite. No attention was given to the root of the problem at the time, the watershed, and it was abused further.

The initial attempt to correct the deteriorated condition of the watershed was made when the Gila National Forest was established in 1908. Immediately, sheep and goats were excluded from grazing on National Forest land. Grazing permits were issued for a specific number of horses and cattle. Several years passed, however, before grazing control became effective since neither the forest boundary nor the private land was fenced. Once the forest land was fenced and control of woodcutting and grazing began to take effect, that portion of the watershed entered a phase of natural restoration.

In 1924, the Town of Silver City and the U.S. Department of Agriculture entered into a joint agreement which provided that the use of National Forest land in the watershed would be restricted: cordwood sales would be eliminated, no other timber would be cut, grazing would be restricted, and the town would provide necessary patrolling and would urge private land owners in the watershed to regulate the use of the lands. In 1927, the U.S. Forest Service closed its land to all grazing.

These restrictions would have allowed the watershed to

Courtesy of U.S. Forest Service

Photo taken in 1891 showing Main Street in Silver City—now the Big Ditch.

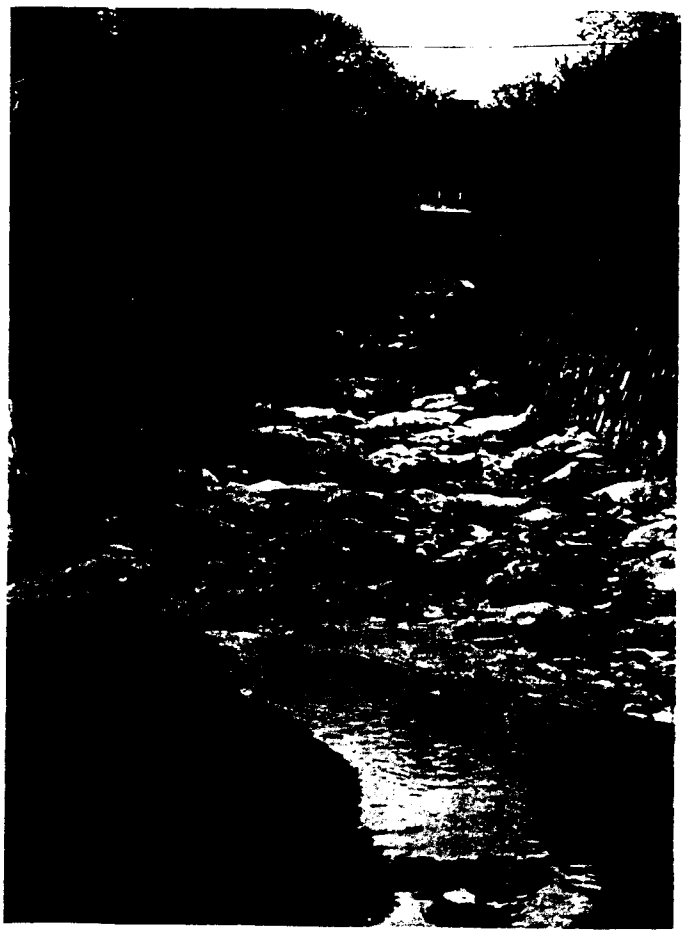

Photo by J.T. Columbus

Photo was taken in 1980 at approximately the same place as photo above. This is the Big Ditch.

recover naturally over a period of time; however, the wells from which the city drew its water supply depended on the watershed, and the supply was none too plentiful. In fact, it often occasioned concern of a water shortage. City officials and foresters agreed that restoration of the watershed cover would enhance the underground water table which the wells tapped. They felt that natural restoration needed to be speeded up, but the cost would be heavy and funds were not available.

The answer came in 1933 when the Civilian Conservation Corps was established. A CCC camp was built in the heart of the watershed and before the camp was closed in 1936, nearly 15,000 gully stabilizers had been installed, most of them using native rock. Cuttings and nursery stock, such as willows and cottonwoods, were planted to supplement the work of the stabilizers.

After the work was completed on National Forest lands within the watershed, the CCC camp force was transferred to the Soil Conservation Service. The SCS then planned and supervised similar work on lands on the watershed outside the Forest, including work on the Big Ditch. The watershed was then allowed to recover naturally, but improvement was slow due to the deteriorated conditions that existed prior to the initial attempts at protection.

Present Watershed Management

The Silver City watershed shows how slowly range recovers after it has been abused. The hydrologic balance was completely upset. The watershed also provides an interesting contrast of rates of restoration. The portion in the Forest has become fairly stable due to enforced restrictions and controls, whereas, the privately owned lands have not been so carefully managed and are recovering much slower.

As the watershed improved, so did the water supply, but not in proportion to the town's needs. Additional water sources were found outside the watershed and used to the point that now the primary purpose of the watershed is flood control with the old CCC structures being constantly maintained or rebuilt by the Forest Service.

Because of nonuse, the National Forest portion of the watershed has become abundant in both grasses and shrubs. Beginning in 1978, the Forest Service instigated a 3-year plan to allow limited grazing on a trial basis. Currently, 50 to 75 head of cattle graze on forest lands throughout the winter months to cut back on the brush and stimulate the grass. Also, a fuelwood cutting area was established two years ago to thin out some of the growth and open up the country to lower the fire hazard and encourage wildlife. For the same purposes the Forest Service will begin thinning brush this year.

Possible Future Watershed Uses

As recently as 1974, attempts have been made to prevent mineral withdrawal on the watershed. Their lack of success poses a danger to the land, particularly considering the elevated prices of silver and gold. On National Forest lands, controlled fuelwood cutting and grazing continue.

On much of the privately owned lands of the watershed, houses are being built to accommodate the rising population. Workshops are being held to educate new homeowners of ways to maintain and improve the current status of the watershed.

In downtown Silver City a project is under way to establish a recreational riverwalk along the sides of the Big Ditch. ●

The Ballad of St. John

Thomas Hatton

There's a legend that's told in the land wet and cold
That lies twixt the Smith and the Eel
Of a terrible weed done a terrible deed
And the beetle that made it a meal

No one knows just when to pasture and fen
Invaded this horrible pest,
But it spread o'er the range like a mischievous mange
A ruefully unwelcome guest.

Like many a crook for its calling it took
More than just one clever feint,
But irony held and with decency felled
Named itself after a saint.

There's hardly an Angus and nary a Brangus
Who's eaten this tortuous plant
That ain't been made to itch like a son of a bitch
And when trying to stop just can't.

Now the ranchers cried out and started to pout,
"Deliver us from this mess!"
But St. John just scoffed and said "Your're all soft.
You'd think I'd just come from Loch Ness!"

But the cattle still died and the ranchers still cried,
The end was clearly in sight;
Till along came a bug with a curious mug
Claiming *he* could handle this blight.

St. John got the word and flipped him the bird.
"Just who do you think you are?
I'm king in this land—thrive on loam, silt, and sand.
What makes you think you are my par?"

"I'm known as quite a diner—my name's Chrysolina—
I hail from your very hometown
And with fork and spoon and the light of the moon
I intend to scarf you down."

Neither leaf nor petal nor dust did settle
For many a month thereafter,
Just occasional pause to wipe off his claws
With some hearty herbivorous laughter.

If there's a happy ending it still may be pending,
Chrysolina continues to munch.
Though Hypericum's sweet there's still plenty to eat
(The bug lacks a good knockout punch).

So when problems arise with forage supplies
Herbicides you need not extol;
Just remember this tale and please do not fail
To consider biologic control.

The author is a range management student, Humboldt State University, Arcata, California.

Editor's Note: Sometimes we take ourselves too seriously. Maybe this enjoyable poem by a college student will lighten the approach.