



Arizona Riparian Council

Fact Sheet

No. 2 • 2004

RIPARIAN FUNCTIONS AND VALUES

We often hear it said that riparian ecosystems have many “functions and values.” What do these terms really mean? Function, according to *Webster’s Ninth New Collegiate Dictionary*, is defined as “the action for which a thing exists.” In other words, a purpose.

Some of the many functions or purposes of riparian ecosystems are listed below:

- Improve water quality by filtering out toxic compounds
- Stabilize water supply and moderate floods
- Reduce soil erosion and stabilize streambanks
- Increase *biodiversity* by providing plant and animal habitats
- Provide recreation sites

Value is defined as relative worth, utility, or importance to humans. People place a high value on many of the above functions. Riparian areas must be properly managed in a healthy condition to maintain these important functions.

WATER QUALITY

One function of riparian areas is improvement of water quality. Many human activities release pollutants into the environment. Water flowing over the landscape eventually carries these pollutants into streams. For example, chemicals such as pesticides, herbicides, or toxic metals can wash into streams from farms, urban areas, or industrial areas. When pollutants are too abundant in the water, they can be harmful to humans or other species that drink or live in the water.

Quality and Quantity

Bank Stabilization

Biodiversity

Recreation

Riparian areas help maintain the balance of the ecosystem. For example, streams that are surrounded by a riparian forest often have high water quality, meaning that they have low concentrations of harmful chemicals or pollutants. The riparian forests help *buffer* the stream from some sources of contaminants, in addition to reducing the potential for these contaminants to reach the water table. Through root absorption, these elements are kept from entering the aquatic system. Plants also absorb nutrients, which in



Tavasci Marsh, Cottonwood, Arizona



Velvet Mesquite

large amounts may decrease water quality. For example, roots of riparian forests absorb nutrients, such as nitrogen and phosphorus, from the groundwater or soil water, and transport the nutrients to the atmosphere or the soil surface. This occurs through the plant's process of metabolism or photosynthesis. Oxygen is released as a by-product of photosynthesis into the atmosphere. The nutrients are returned to the soil surface through decomposing plant litter (i.e., leaves, branches). This natural filtration function is valuable because water purification by artificial means can be expensive.



Chiricahuas, Arizona



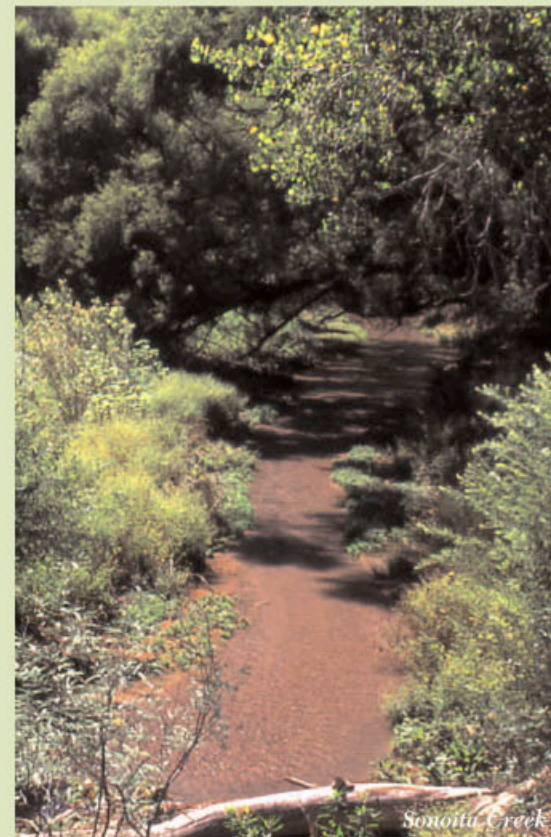
Nutsedge

WATER SUPPLY AND FLOOD MODERATION

Riparian forests consume water, but at the same time contribute to a more stable water supply in the stream. The water consumed by riparian plants allows them to stay cool, to grow tall shady canopies, and to produce food for animals. The dense vegetation also aids in the development of sponge-like soils that serve to retain water. The stems of the plants help to trap small, fine-textured soil particles on the floodplain, while the leaves add organic matter to the soil as they fall and decompose. The leaves that fall into the water also provide food for aquatic wildlife. The vegetation itself serves as a shield or creates a boundary layer over the stream and soil, preventing the wind from carrying the moisture away through evaporation. The abundant root systems of riparian plants prevent the streamside soil from washing downstream. The sponge-like soils store water when it is abundant during floods and rains, and slowly release it back into the stream during drier parts of the year. This function is called **bank storage** of water, and helps ensure a more stable supply of water in the river.

Riparian areas also moderate flood flows. The dense vegetation in the

floodplain helps to slow the velocity (speed) of the floodwaters, and to reduce the destructive power of the water to downstream areas. Vegetation also can force the waters to spread laterally from the stream; thus, it is important to minimize the amount of human development within the floodplain, even on high floodplain **terraces** that flood only infrequently. A very good example of why floodplains should not be extensively developed is the 1993 flood of the Mississippi River. Clearing of the floodplain and construction of levees along the river only made the floodwaters travel faster and more destructively downstream.



Sonoita Creek

STREAMBANK STABILIZATION

The roots of riparian plants help stabilize streambank soils and prevent soil from washing downstream during floods. The large, wide-spreading roots of riparian trees work together with the dense network of grass roots to stabilize the soils. At high elevation areas, the coverage by grasses, sedges, and rushes helps keep banks warmer during the winter. These warmer conditions prevent the banks from being sloughed off

as easily by freezing and fracturing. Without this functional role of the riparian vegetation, channels become wide and unstable, and much soil and sediment is washed downstream. If you see a stream that has soil stabilization structures (such as *riprap*) along its banks, this is a sign that something is preventing the riparian zone from performing its natural functions.

BIODIVERSITY

Providing habitat for animals, plants, and other life forms is one of the many important functions provided by riparian ecosystems. In semi-arid regions such as much of Arizona, dry conditions and high temperatures make for harsh living conditions. Several types of animals and plants are specialized to live in such arid conditions, but many others need cooler, wetter places in which to live. Riparian areas provide these conditions and serve as home to a great variety of organisms.

Over one-half of all animal species in Arizona depend on riparian areas for their existence. Some animals such as frogs, otters, beavers, some lizards, and birds live in riparian areas year round and are considered to be *obligate riparian species*. Many others such as



Great Blue Heron



Date Creek, Yavapai County

javelina and deer occur in the surrounding desert but also rely on the riparian area as a source of water, food, and cover. These animals are *facultative riparian species*.

There are also many types of obligate riparian plants—cottonwood trees, for example—that naturally grow nowhere else but in riparian areas. Others such as mesquite trees grow both in the desert and the riparian zone. Because riparian areas provide such a diversity of growing conditions—with varying types of soils, varying amounts of moisture, and varying amounts of sunlight—they host a large diversity of plant species. For example, along a five-mile stretch of the Hassayampa River in central Arizona, there are more than 300 different types of plant species! Because each riparian area is somewhat different, each contains a somewhat different assemblage of plant species. Just as no two snowflakes are alike, no two riparian areas are exactly alike.

RECREATION

Humans are attracted to riparian areas for many of the same reasons as animals. During the hot summer, we appreciate the shade and cooler temperatures of riparian forests, and year round, we appreciate their beauty. Riparian areas are used recreationally for bird watching, picnicking, hiking,

and many other activities. Some recreational activities if done in excess can damage riparian areas, such as indiscriminately driving off-road vehicles.

Riparian areas are for all of us—humans and wildlife alike. We all rely on them for water and must respect and maintain them for the present and future.



Sycamore Canyon

HOW TO LEARN MORE AND GET INVOLVED

Please visit and enjoy our riparian areas but take care of them.

- Go to several different riparian areas and observe how people use them recreationally.
- Pick your own stretch of a stream to study. Take note of how it is used and how the vegetation and channel change over time.
- Keep a photographic diary of a stream by taking pictures of the exact same locations several times a year for several years.



Sycamore Creek

- Don't drive off-road vehicles indiscriminately.
- Don't hack branches off trees for firewood or use them for target practice.
- Make sure you pick up all your trash and dispose of it properly. Riparian areas are not dumpsites. Don't dump used chemicals, abandon cars, etc. in them. Remember it will eventually affect your water supply!

OTHER AVAILABLE FACT SHEETS

Call the Arizona Riparian Council at (480) 965-2490 or write to us at:

Arizona Riparian Council
Center for Environmental Studies
Arizona State University
Box 873211
Tempe, AZ 85287-3211
<http://azriparian.asu.edu>

Printing and design courtesy of



www.PrescottCreeks.org

The Arizona Riparian Council was formed in 1986 by individuals interested in the conservation of riparian areas in Arizona and throughout the West. Its members are from various academic, private, and state and federal agencies. Anyone interested in helping preserve and protect Arizona's riparian areas is invited to become a member.

GLOSSARY

Bank Storage

Soaking up of excess available water in the banks of a stream, which is then slowly released back into the stream.

Biodiversity

The wide variety of different life forms that occur in an area.

Buffer

To lessen the impact, cushion.

Ecosystem

The complex of living organisms and their environment functioning as a unit in nature.

Facultative riparian species

Plants and animals that use riparian areas, but are not restricted to spending their entire life there.

Obligate riparian species

Plants and animals that must remain in the riparian zone in order to survive.

Riprap

A foundation or sustaining wall made of stones, or chunks of concrete thrown together randomly on a streambank to prevent erosion.

Terrace

A relatively level plain usually with a steep front bordering a river, stream, or lake.

Please feel free to copy these materials for educational purposes. Funding for these materials has been provided in part by the USDA Forest Service, Rocky Mountain Station, Fort Collins, CO, and the Center for Environmental Studies, Arizona State University. Reprinting funded by the Arizona Water Protection Fund Commission (Grant # 04-122). All of the views within are those of Arizona Riparian Council &/or Prescott Creeks, and not necessarily those of the Commission, the State, or the Arizona Department of Water Resources.

Photos courtesy of Walt Anderson © 2004.