

RIVER ECOLOGY 101

The value of floods and floodplains

How do floods help a river?

Floods help maintain river health. Like fire in prairies, flooding plays an important role in the health of rivers and riverside lands.

Floodplain plants and animals are specially adapted to the river's "flood pulse" - the annual advance and retreat of floodwaters onto the floodplain.

For many fish species, floods act as a reproductive cue, signaling the time for fish to begin their spawning migrations.



Floods are a natural part of the river ecosystem

Building habitat

The erosive power of floods is also the way rivers build side channels, islands and sloughs - creating a wide variety of places river wildlife need to feed, spawn and reproduce.

On some rivers, high flows import the gravel salmon and trout need in order to spawn. On others, high flows build the sandbars least terns and piping plovers need in order to nest.

Dam releases on the Colorado River were recently increased to build islands and beaches and to scour new backwaters to help young fish.



Floods help carve out new river habitat. Pictured here, a sandbar on the Missouri River.

Maintaining biodiversity

Floods also maintain biodiversity by helping plants and animals migrate to new and existing habitat. As they move downstream, plants colonize new areas or take advantage of the increased light that becomes available when old vegetation is cleared away.

Cottonwoods along western rivers like the Rio Grande and the Yellowstone will only germinate in the fertile soil deposited by floodwaters. When high flows are eliminated, nonnative species such as salt cedar and Russian olive are able to dominate.

Why are floodplains important?

The riverside land that gets periodically inundated by a river's floodwaters is called the floodplain. Floodplains serve important purposes. They:

- temporarily store floodwaters
- improve water quality
- provide important habitat for river wildlife
- create opportunities for recreation



Cottonwood trees on the Yellowstone River. Photo: Carter Gowl

A natural sponge

Natural floodplains help reduce the heights of floods. During periods of high water, floodplains serve as natural sponges, storing and slowly releasing floodwaters. The floodplain provides additional "storage," reducing the velocity of the river and increasing the capacity of the river channel to move floodwaters downstream.

When the river is cut off from its floodplain by levees and dikes, flood heights are often increased. The construction of levees along the Lower Missouri River, for example, has increased flood heights by as much as twelve feet. By contrast, protected floodplain wetlands along the Charles River in Massachusetts store and slowly release floodwaters -- providing as much "storage" as a medium-sized reservoir.

A natural water filter

Natural floodplains also help improve water quality. As water courses through the floodplain, plants serve as natural filters, trapping sediments and capturing pollutants.

Nitrogen and phosphorous (found in fertilizers) that wash off farm fields, suburban backyards and city streets ignite a chemical chain reaction which reduces the amount of oxygen in the water, suffocating fish and other aquatic organisms.



Healthy floodplain vegetation improves water quality.

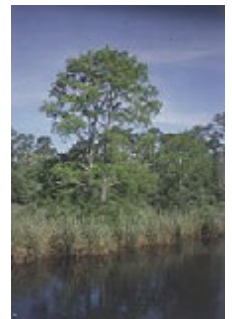
But, many floodplain plants will use nitrogen and phosphorous before they can reach the river, improving water quality. Many cities have built artificial wetlands to reduce water treatment costs.

Studies of heavily polluted waters flowing through Tinicum Marsh in Pennsylvania, for example, have shown significant reductions in phosphorous and nitrogen. The water treatment value of Georgia's 2,300-acre Alcovy River Swamp is more than \$1 million a year. Floodplains are also play an important role in the recharging of groundwater supplies.

Foundation of the food chain

In addition to filtering out pollutants, floodplain trees and plants also anchor the river's banks, preventing bank erosion, and providing shade which reduces water temperatures.

On small streams and creeks, trees and leaves which fall into the water are broken down by aquatic insects and other organisms. On large rivers like the Mississippi River, floods collect leaves, trees and other organic debris. In both cases, floodplain plants serve as the foundation of the river's food chain.



Floodplain trees and plants provide the basis for the food chain

Habitat for fish and wildlife

Floodplains also provide fish and wildlife the places they need to feed and reproduce. Nearly 70 percent of all vertebrate species rely upon the land along the river's edge - called the "riparian" zone by scientists - during their life cycle.

Healthy "riparian" zones create a vegetated transition zone between rivers and upland habitats, providing shelter, food, and migration corridors for river wildlife.

Riparian areas in the western United States -- where water and wildlife habitat are scarce -- are especially important sources of food, shelter, water, shade, forage and cover for both wild and domestic creatures.

For young salmon, floods aid migration to the ocean. Other fish species migrate out of the river during spring floods to spawn in the floodplain, and to feed on decaying vegetation. More than 50 fish species found in the Mississippi River, for example, spawn in the river's floodplain.

Migratory waterfowl and songbirds use forested river corridors and new wetland plants during their annual migration, and floodplain trees serve as important roosting and nesting habitat for raptors like the bald eagle.



The Southwest willow flycatcher depends on healthy riparian zones. Photo: US Fish and Wildlife Service