Rolling Rivers

Description:

Rolling Rivers is a hands-on interactive watershed model with focus on watershed processes and function, land-uses with Best Management Practices (BMPs), and in conjunction with human and salmonid coexistence.

Goal:

Properly functioning fish habitat consisting of healthy riparian areas, land-use with Best Management Practices (BMPs), clean water, and unimpeded travel. Students implement various land uses by implanting BMPs that conserve fish and wildlife habitat, healthy riparian areas, water quality, and ensure unimpeded travel.

Objectives:

1) **River water is energetic and powerful**. It literally can move mountains. Rivers carry along sediment, sand and gravel, rocks and water.

> -**How-to**: Ask what a watershed is? Give explanation – water drains into same water body. Begin the flow from the top of the trailer. Watch as the river finds its path downstream. Add a handful of alluvium (ground sand) at the inlet and watch it being carried along. Turn the water pressure up and watch the effects of increased flow. Slow it down and watch the flow decrease. Ask students what might make a river run faster or slower. (Sudden storms, snow melt-off, river diversions). Mention sediment movement.

2) **A change in one part of a river affects the rest of the river**. There are consequences when water is diverted from its natural flow. You don't always know what will happen until it is too late.

> -**How-to**: Remove vegetation (garland) from the various sections in the river; the erosion will cause the river bank to collapse. Remove garland from outside of the meander and observe the effects downstream. Divert some of the water into an "irrigation ditch;" less water flows downstream. Ask students to suggest other ways to alter the river flow and tell what they think the effects will be.

3) **Healthy riparian areas protect rivers**. Riparian areas slow the flow of water, trap and filter sediments, and provide streambank stability.

-**How-to**: Ask what is a riparian area and explain. Vegetation along the water, important for bank stabilization and shade for fish. Ask students to observe the water flowing in the streambed. Add a small amount of alluvium and observe it move along. Then, remove garland from various parts of the river and observe the results. Ask students why they think the streambed is breaking down. (no tree or plant roots to hold water or soil along the bank) Ask if they know any examples from where they live.

4) **Structures along a river bank change the river's channel and meander**. Geography, soil resistance and change people make to rivers change the migration pattern of the river's flow. Bridges, jetties, drop structures, water diversions, culverts, rip-rap, and fish rocks all affect the direction the river flows.

-**How-to**: Use accessories to make changes in the river channel; a bridge, a diversion channel, culvert (PVC pipe). Put several rocks in one section. Dam up the river. As you to make these changes, ask students to predict what they think will happen. Re-channel the river and form an oxbow. Observe what happens when the river breaks through and makes a new channel.

5) **Non-point source pollution affects river systems**. A river can be contaminated by pollutants that are put on the ground far away from the river.

-**How-to**: Use the stair tread "parking lot" mat and the sprinkling can to "rain" water on the cars and construction vehicles. Ask students to predict where the contaminated run-off will go (non-point pollution). Trace its flow into the river. Observe where the water comes out and how it looks. Describe percolation and permeable for the water that seeps into the ground as it moves toward the river. Point out the "non-point pollution" is different from a sewer pipe pouring waste into a river at one location. The source of non-point pollution is often hard to find.

Vocabulary:

Alluvium: Clay, silt, sand or gravel carried by water

Best Management Practices (BMPs): structural or nonstructural methods that prevent or reduce the movement of sediment, nutrients, pesticides, and other pollutants from the land to surface or ground water

Culvert: Metal pipe that allows water to flow under a road

Diversion Channel: Use of part of a stream flow as water supply. A channel with a supporting ridge on the lower side constructed across a slope to divert water at a non-erosive velocity to sites where it can be used and disposed of.

Erosion: When the riverbank collapses, falls into the river and is carried downstream

Fry: Young fish at the stage they begin to move in schools and feed in the river

Habitat: The place where a population (e.g. human, animal, plant, microorganism) lives and its surroundings, both living and non-living.

Large Woody Debris: Logs, branches, or sticks that fall or hang into rivers. This debris gives salmon places to hide and provides food for insects and plants which salmon feed upon.

Non-point Source Pollution: Diffuse pollution sources (i.e. without a single point of origin or not introduced into a receiving stream from a specific outlet). The pollutants are generally carried off the land by storm water. Common non-point sources are agriculture, forestry, urban, mining, construction, dams, channels, land disposal, saltwater intrusion, and city streets.

Riparian: The area of vegetation along a river, streambank or lake

Rip-rap: Rock or other material used to armor shorelines, streambeds, bridge abutments, pilings and other shoreline structures against scour, water or ice erosion.

Redds: A nest for egg deposition which the female salmon digs in the gravel on the river bottom using her tail.

Run-off: The water from rain or snow that runs across land and then into streams and rivers.

Sediment: The sand, gravel, rock or other materials (alluvium) that settle down to the bottom of the river.

Velocity: The speed of water flowing downstream.

Watershed: The area of land that is drained by a river or stream system, or the total area that lies up slope from any point on that river or stream. Also called drainage basin.

Hands-on Activities:

Two watershed – build healthy, happy fish habitat (see instructions for presentation on next page)

1) Each group is given a land-use scenario (some examples include: logging activities, a dam, agriculture – livestock in river, diversion – need to irrigate orchard)

-The group sets up their land-use then see if the salmon can make it through

2) Divide into two groups -one group set their watershed up correctly, the other incorrectly, observe differences

Presentation:

-Welcome

-What is a watershed? Drains into same water body

-Salmon life cycle – stream to ocean and back to spawn

-Build healthy, happy habitat:

-Shade: salmon like cold water. How do you stay cool?
Plant trees on banks

-Shelter: protection from predators and pools for rest
Logs and rocks into river

-Food: Pizza? Ice cream? No insects – put in river

-Travel Barriers: place bridges, culverts, dams – make sure fish can get through

-Race #1 – 2 rivers, can't jump or fly – must stay in contact w/water

-Play 2-5 minutes – build habitat their way

-Review what learned – make sure they have all elements
Look for livestock in river – water quality – do you want to drink/swim in water a cow, horse, pig, etc has been in? Fence them out

-Race #2

-Play time

Rolling Rivers

Habitat
Spawning / Rearing / Migration

Juvenile (Fry)

Shade
- Riparian Area (trees/shrubs)
- Shade – like air conditioning in our homes

Shelter – protect from predators
- Riparian Vegetation
- Large woody debris
- Large rocks
- Reds – gravel for egg laying

Food - What do Fry/Juvenile Salmon feed on?
- (Insects, Smaller fish), found in the sediment, in the water, and on trees and shrubs from the riparian vegetation
- Shelter - Protection from predators (Large woody debris, snags, and large rocks)

Water quality
- Exclusion Fence (water quality), nobody wants cows or other livestock
- Shelter Lower water velocity
- Riparian Vegetation - Keeps soil/silt from falling in river and smothering the eggs

Travel
- Travel barriers (dams), what can we do to reduce travel barrier? Culverts, bridges, dam removal, side channels
- Inadequate water flow (water diversions for irrigation)