

# ROLLING RIVERS TRAILER USER GUIDE

## Education Programs



Rolling Rivers trailers serve as teaching aids for watershed education programs. The trailers contain sand molded into winding rivers lined with a community or toy machinery, animals, vegetation, and houses. The flip of a pump switch brings the simulation to life as water flows throughout the virtual watershed. The trailers serve as an invaluable resource to explain watershed health principles to students of all ages. Students stand on the trailer's steps while teachers and chaperones peer over their heads as they all watch the river erode a river bank. The trailers are used to enact outreach scenarios that focus on river energy, riparian health, erosion, diversions and dams, nonpoint source pollution and the effects of developments in floodplains and on river banks.

There are four Rolling Rivers trailers in use across the state. This User Guide provides information on setting up specific scenarios and lesson plans. More information on Rolling Rivers Trailer use, from set-up to take-down can be found as a booklet in each trailer. This guide was created in cooperation with Big Sky Watershed Corps, Cascade Conservation District, Lewis & Clark Conservation District, Sun River Watershed Group, Flathead County Conservation District, Richland County Conservation District, and the Montana Association of Conservation Districts.

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# EDUCATION PROGRAMS

## General Guidelines

- Education programs should last between 15 and 30 minutes. A 15-minute program will cover one of the longer Rolling Rivers Trailer Activities.
- A maximum group size of 20 people is recommended.
- Do not let children touch the trailer during your presentation, unless they are performing a specific task as part of the program.
- Check to make sure everything is working before the audience arrives. This includes installed river features.
- Do not use dyes during demonstrations. They are difficult to remove from systems and can impeded future demonstrations.
- Tips for presenting:
  - Speak clearly and loudly
  - Ask the audience questions (Socratic Method of Teaching)
  - Stop if the audience is not behaving

## Introduction

- Welcome audience and briefly introduce yourself.
- Ask the audience for their names (better for smaller groups).
- Address what is going to happen (i.e. theme/ objective of presentation) and how long it will take.
- State what will be required of the audience.
- Give a brief history and background of conservation districts and explain what they do; 310 permits, education, dust bowl, demonstrations, healthy soil, sponsoring today's event etc.
- Get the audience engaged with questions such as:
  - How much does water weigh? 8.34 pounds per a gallon like a gallon of milk!
  - How do we measure flows? Cubic feet per second (CFS)
  - How many gallons in a cubic foot and how much does it weigh? 7.5 gallons per cubic foot, 62 pounds
  - Ask audience to name rivers in the area.
  - Create your own questions based off of your program objectives
- Ask/tell audience what the following features are:
  - River channel
  - Vegetation/Riparian/Wetlands/Oxbows
  - Sediment and erosion
- Transition into discussing your selected trailer activities (listed below). Do not expect to address every activity listed in your timeframe. Keep in mind different Rolling Rivers Trailers will have different available activities.

# Rolling Rivers Trailer Activities

## Channel without vegetation



1. Keep streambanks without vegetation after digging the river channel.
2. *Talking points:* Erosion, riparian areas.

## Healthy River



1. Channel with vegetation- helps to stabilize riverbanks.
2. Oxbow/Wetland- Make sure to talk about groundwater before oxbow/wetland. An oxbow is where the river used to go. Place animals in wetland habitat, i.e. turtles, ducks, moose etc. After the headwaters have been running for a few minutes, use a turkey baster to show groundwater in oxbow.
3. *Talking points:* Wetlands act like a sponge and to let water out after the flood is over. Wetlands filter water. Wildlife habitat. Can look for old oxbows on Google Earth.

## Floodplain



1. Frequently placed near the headwater of the “healthy river”. Build the floodplain bank higher than the riverbank to encourage water retention.
2. Place rocks to help back the water up and funnel the water into the floodplain.  
Encourage audience members to place toy houses in floodplains. Turn headwaters to maximum flow to flood the floodplain.
3. *Talking points:* groundwater, takes energy out of the river, snowmelt, drinking water/wells, differences between floodplains and oxbows, houses in floodplains. Are floodplains good to have? Point out when the floodplain floods, it also recharges the wetlands and filters water out, which leads to: good soils, lower flood heights and velocities. Can have audience place houses in a new area in the floodplain.

## Groundwater Well (all trailers) and Pharmaceutical Model (CCD)



1. On the left is a standard well, on the right is a well with a pharmaceutical model extension.
2. Dig a hole the size of the well you plan to install, until the bottom of the trailer's bed is visible.
3. Place the well in the hole.
4. Bury the well until the only the top is visible. Make sure the bottom of the trailer is still visible from inside the well.
5. *Talking points: Standard Well-* Have audience look inside to see the bottom of the well dry, then after running water, have the audience look inside again and see water. Explain how flooding recharges groundwater.
6. *Talking points: Pharmaceutical model-* Taking prescription medicine when you are sick, do you finish it? If not, where does it go? Toilet water (CCD has a toy toilet you can place near the well's extension). Have audience look into the well (bigger PVC pipe). Take the pill bottle filled with colored sand aka the medicine and empty it into the smaller PVC pipe, "flush" it by emptying the water jug into it. Have audience look at the well again. Talk about groundwater and wells, and how pollutants can enter groundwater and subsequently contaminate wells. Discuss how floodplains/wetlands/oxbows can help filter pollutants?

## Unhealthy River



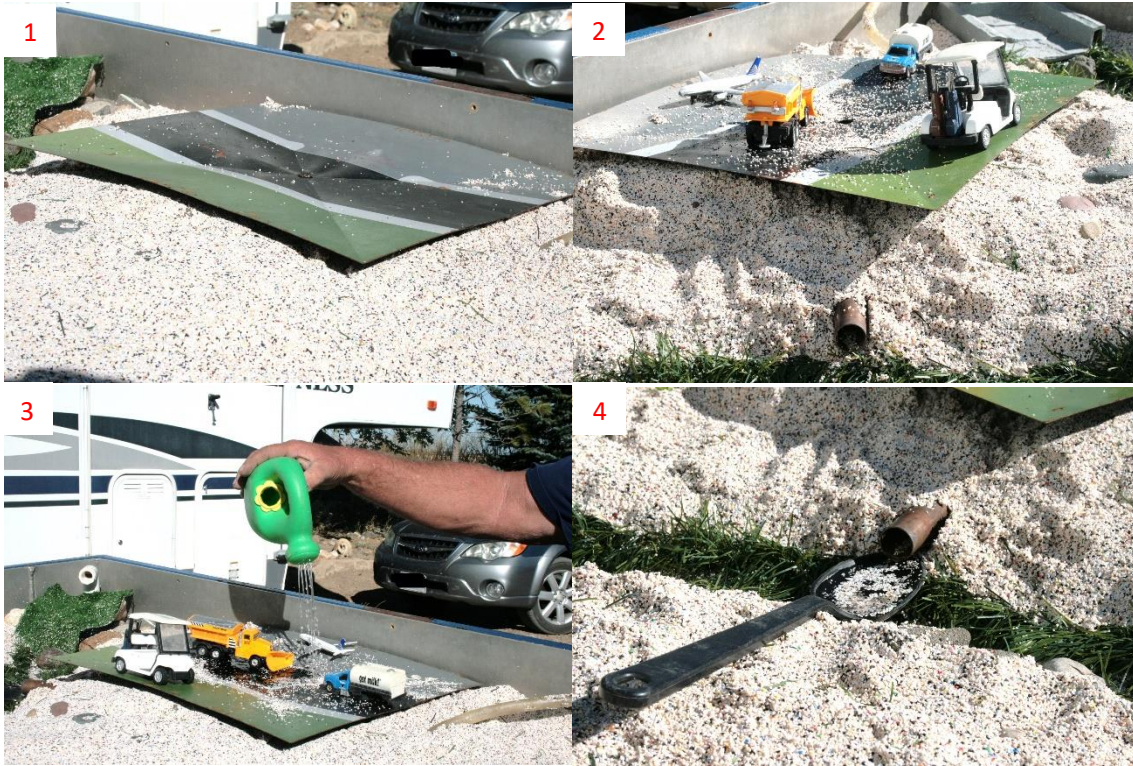
1. Farmyard with animal access to riverbank/riparian area.
2. Zebra mussels (zebra)
3. Dead fish (upside down)
4. Field with riparian fencing and alternative water access, can also make field with a water gap.
5. Car bank/ rock riprap
6. *Talking points:* Livestock trample streambanks, water gap vs. no water gap, fisheries. Discuss how removing animals from the riverbank will help the vegetation on the river to grow.

## House on Hill



1. Make a steep hill on the riverbank about 2x or 3x the width of a piece of garland. Place the house as close to the edge as possible. Tuck ~1-foot piece of garland at the base of the river's hill, directly below the house. Talk about fishing and what can get in the way.
2. Remove the piece of garland below the house. Use a stone to direct the water into the cliff. Turn the headwaters to maximum velocity and wait for the hill to erode and the house to fall in. Check to ensure bank will erode before beginning program.
3. *Talking points:* Talk about fishing and what can get in the way (prior to removing garland). Talk about the importance of leaving vegetation in place (after house falls into the river). Hire a "contractor" and discuss as group how to stop the house from falling into the river i.e. riprap, willows. Discuss the cost of each potential solution. Good land use practices.

## Storm Water Runoff (CCD)



1. Install Storm Water Runoff Model on a level section of sand between the two headwaters. Adjust the sand if necessary so that the model is flat.
2. Bury the runoff pipe in the sand, ensuring the pipe is sloped and will funnel runoff water into the river (this model frequently feeds into the unhealthy river). Place items such as snowplows, golf carts, airplanes, trucks etc. on the flat surface. Sprinkle sand (aka pollutants) from the trailer bed on the flat surface while talking about pollutants. Place the large spoon under the runoff pipe.
3. Use the watering can to “rain” on the flat surface. Demonstrate how the water drains from the flat surface with the pollutants into the culvert.
4. Demonstrate the sand/pollutants from the flat surface have travelled through the runoff pipe into the spoon/river.
5. *Talking points:* Pollutants, Point Source Pollution, Deicing planes (if one is placed in model).

## Plastic cards (LCCD)



1. Prompts audience participation throughout education program.

## Streambank Saturation (CCD)



1. The streambank saturation model should be the first thing to set up if it will be used in your presentation. Plug the adapter PVC pipe into the right headwater.
2. Bury the hose in the sand between the two rivers.
3. Attach the end of the buried hose to the streambank saturation model.
4. Saturation will come from the left of the model. Make sure you vegetate the right side of the model. When the right headwater is turned on, sprinklers will turn on in the model.
5. *Talking points:* Streambank erosion, riparian areas.

## Culverts (LCCD)



1. Plug the small culvert (with a rock) and let the river flow around it, until the culvert washes out. Compare to a larger culvert with vegetation on the side and how it is better at staying in place.
2. *Talking points:* Sizing culverts correctly, why are culverts installed?



## Conclusion

- Summary of topics covered:
  - Erosion. Good or bad?
  - Floodplains. Good or bad?
  - Wetlands
  - Water quality
  - Vegetation removal. Good or bad?
  - Other themes covered
- Thank audience and ask if there are any questions.

## GLOSSARY (OXFORD DICTIONARY)

**Culvert** A tunnel carrying a stream or open drain under a road or railroad.

**Dust Bowl** An area of land where vegetation has been lost and soil reduced to dust and eroded, especially as a consequence of drought or unsuitable farming practice.

**Erosion** The process of eroding or being eroded by wind, water, or other natural agents.

**Floodplain** An area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to flooding.

**Land Use Practices** The human use of land and land management and how they impact natural resources (US EPA).

**Oxbow** The U-shaped bend in the course of a river.

**Pollution** The presence in or introduction into the environment of a substance or thing that has harmful or poisonous effects.

**Point Source Pollution** A single identifiable source of air, water, thermal, noise or light pollution.

**Riparian Areas** Lands that occur along watercourse and water bodies (NRCS, USDA).

**Riparian Fencing** Used to limit the access of cattle or other livestock to waterways (FWS).

**Water Gap** An opening in riparian fencing that allows cattle or other livestock to access waterways.

**Water Quality** The chemical, physical and biological characteristics of water.

**Wells** A shaft sunk into the ground to obtain water, oil, or gas.

**Wetlands** Land consisting of marshes or swamps; saturated land.

## RELATED PROJECT WET (2.0) EXERCISES

1. Back to Future: *p. 308, Grades 6-12*
2. Color Me Watershed: *p. 239, Grades 6-12*
3. Common Water: *p. 249, Grades Pre-K-2, 6-8*
4. Humpty Dumpty: *p. 335, Grades 3-8*
5. Just Passing Through: *p. 163, Grades 3-8*
6. The Long Haul: *p. 273, Grades 3-12*
7. Pass the Jug: *p.447, Grades Pre-K-12*
8. Sum of the Parts: *p. 283, Grades 3-8*