

Stormwater Obstacle Course

Dear Presenter,

This activity is 20 to 25 minute presentation and HANDS-ON activity with approximately 24 ten year olds. You must do this activity at home BEFORE you attempt to lead the activity during the water festival.

As each new group of students arrive, introduce yourself, and let the teacher know this is a hands-on activity and you will need assistance from him/her. If you do not ask for assistance, the teacher will assume that YOU are the expert and they are the observer. Plan when you will ask the teacher for assistance. Do not hesitate to call the teacher by name and get him/her involved.

As each session begins, introduce yourself to the students. “Good morning, my name is.....and I work for.., I am a, or simply I am happy to be here today.” Then introduce the topic of the presentation. Each step of this presentation is explained in this packet. These are recommended guidelines and do not have to be followed exactly word for word. However, you may present this material just as written. Feel free to personalize the presentation to suit you.

Thank you for volunteering to present “Stormwater Obstacle Course.” Have fun, enjoy yourself and we hope you will consider volunteering again next year.

Big Sioux Water Festival

Stormwater Obstacle Course

MATERIALS LIST (FOR 6 SESSION WITH 24 STUDENTS PER SESSION)

CONSUMABLES

- Dog waste containment bag - 1 per each student

NON-CONSUMABLES

- Stopwatch
- Whistle
- Thunder sound maker
- Rainstick
- Stormdrain stencil
- 2 mock stormdrains
- 2 spray paint cans
- Stuffed toy fish
- Plastic dog waste
- 2 small garbage cans
- Stuffed dog on leash
- Batteries
- Batteries storage container
- Phony cigarettes
- Various “clean” litter pieces (diapers, cans, plastic containers, etc.)
- Empty motor oil container
- Empty antifreeze container
- Recycling bin
- Paint can
- Bug spray container
- Brake fluid container
- Potting soil
- Whisk broom and dust pan
- Anti-freeze container
- Fischer Price construction site with supplies
- Plastic Rubbermaid container lid for construction site
- Empty fertilizer bag with pretend fertilizer
- Empty pesticide container
- 5 laminated station instruction cards
- 5 laminated station indicator signs on wooden sandwich boards
- Presenter notebook, cue cards, etc.
- 5 small (12" x 12") plywood sandwich boards

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Background information is provided as a basic overview with both general and specific information. Share this information with the students throughout the activity.

In order to keep our cities from flooding during heavy rains, most paved surfaces drain into a system of catch basins, pipes, and canals that efficiently removes the runoff and carries it to a larger body of water. However, nonpoint source pollution results from stormwater runoff that washes the surfaces of city streets, sidewalks, lawns, and parking lots. Some of the things we dump, pour, spray, release, or throw on the ground becomes hazardous waste that ends up in our lakes, streams, and rivers. Then as rain falls in heavily populated areas, it picks up contaminants from the air and land and carries them to our waters.

The first inch of rainfall, called “the first flush,” collects all or some of the following:

motor oil	detergents
gasoline	food
antifreeze	paper
fertilizers	cigarette butts
pesticides	leaves
household chemicals	organic wastes
animals wastes	sediments

Some thoughtless individuals even dump used motor oil and/or antifreeze directly into storm sewers, resulting in over 200 million gallons entering the surface waters of the United States each year. This equals the amount of oil in five oil tankers.

In addition, cracked and broken sewerage systems, or illegally hooked-up sanitary sewers, overflow into runoff drainage systems. This constitutes a health hazard as disease-causing microorganisms from human fecal waste enter an aquatic ecosystem. Also, animal wastes from pets and strays, racoons, rats, etc., as well as bird droppings, contribute to this type of urban runoff.

Greater human population growth and increasing urbanization in this country have resulted in a dramatic rise in urban nonpoint source water pollution. The impact on many waterbodies receiving runoff has been severe enough to demand the attention of federal, state, and local agencies. Management plans are being worked into place to prevent and reduce contaminants in urban runoff, but cooperation of the public is essential to their success. Many individuals see no connection between their daily activities and environmental degradation. Individual efforts will not completely solve the problem of urban runoff, but they can radically stem this toxic tide.

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VOCABULARY WORDS

(When introducing these words, do not assume the students will already know the meaning of them. You will probably need to explain the meaning)

<i>Nonpoint Source Pollution</i>	Pollution sources which are diffuse and do not have a single point of origin or are not introduced into a receiving stream from a specific outlet.
<i>Runoff</i>	Water that flows across land surfaces rather than soaking in; eventually enters a water body; may pick up and carry a variety of pollutants.
<i>Hazardous Waste</i>	Waste or a combination of wastes, that because of its quantity, concentration or physical, chemical or infectious characteristics, may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating illness
<i>Pesticide</i>	Any chemical or biological agent that kills plant or animal pests; herbicides, insecticides, fungicides, and rodenticides, etc., are all pesticides.
<i>Fertilizer</i>	Any one of a large number of natural and synthetic materials, including manure and nitrogen, phosphorus, and potassium.

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**Common Factors of
Stormwater Runoff
Table**

POLLUTANT	SOURCES	PROBLEMS
Sediment	Construction Tree Removal	<ul style="list-style-type: none">• Increases water turbidity• Affects benthic organisms• Can contain toxins
Phosphates Nitrates	Fertilizers Detergents Leaves/Organic Material	<ul style="list-style-type: none">• Algae blooms• Eutrophication
Toxins	Heavy Metals Pesticides Herbicides	<ul style="list-style-type: none">• Disrupts the food chain• Causes cancer• Causes fish kills
Oxygen-using Substances	Animal Wastes Raw Sewage Leaves and Grass Clippings Litter	<ul style="list-style-type: none">• Depletes oxygen• Disrupts the food chain• Causes fish kills
Petroleum Products	Motor oil Gasoline Axle Grease	<ul style="list-style-type: none">• Disrupts the food chain• Uses oxygen• Affects feathers and fur
Disease-causing Microorganisms	Animal Wastes Raw Human Sewage Bird Droppings	<ul style="list-style-type: none">• Health hazards

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AREA REQUIREMENTS

- Large open outside area

PRE-PREPARATION

Pre-preparation can include any or all of the following

- Check supplies against supply list

PREPARATION - Approximately 1 hour to set up

- Set up course grid - **Note: when setting up course, make sure stations are far enough apart that students can't overhear what's happening at other stations**
- Set up stations
- Set out station sandwich boards, marking the location of each station

STATION A

Stopwatch
Whistle
Thunder sound maker
Stormdrain stencil
Mock stormdrain
Spray paint can
Stuffed fish
Rainstick

STATION B

Plastic dog waste
Dog on the leash
Waste containment bags (1
per each student)
Small garbage can

STATION C

Batteries
Battery storage container
Phony cigarettes
Small garbage can
Pop cans, plastic
containers, miscellaneous
litter
Recycling bin

STATION D

Motor oil container
Antifreeze container
Brake fluid
Paint can
Mock stormdrain
Spray paint can
Stormdrain stencil

STATION E

Construction set
Potting soil
Plastic Rubbermaid
container lid
Broom and dustpan

STATION F

Empty fertilizer bag
Pesticide container
Bug spray

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Station Set Up

Station B

1. Place stuffed dog into leash. Straighten out leash so that it appears the volunteer is walking his/her dog.
2. Place plastic dog waste around on the ground.
3. Lay dog waste containment bag and small garbage can toward the back of the station.
4. Set up station sign

Station C

1. Throw litter around on the ground. (**Note:** another suggestion is to have the volunteer throw a few items of litter onto the ground as the students approach)
2. Place recycling bin, small garbage can and battery storage container toward the back of the station.
3. Set up station sign

Station D

1. Set hazardous waste containers up in a row. Volunteer will pretend to pour each of the items into the stormdrain as the students approach.
2. Place stormdrain on the ground
3. Set the can of spray paint and the stormdrain stencil toward the back of the station
4. Set up station sign

Station E

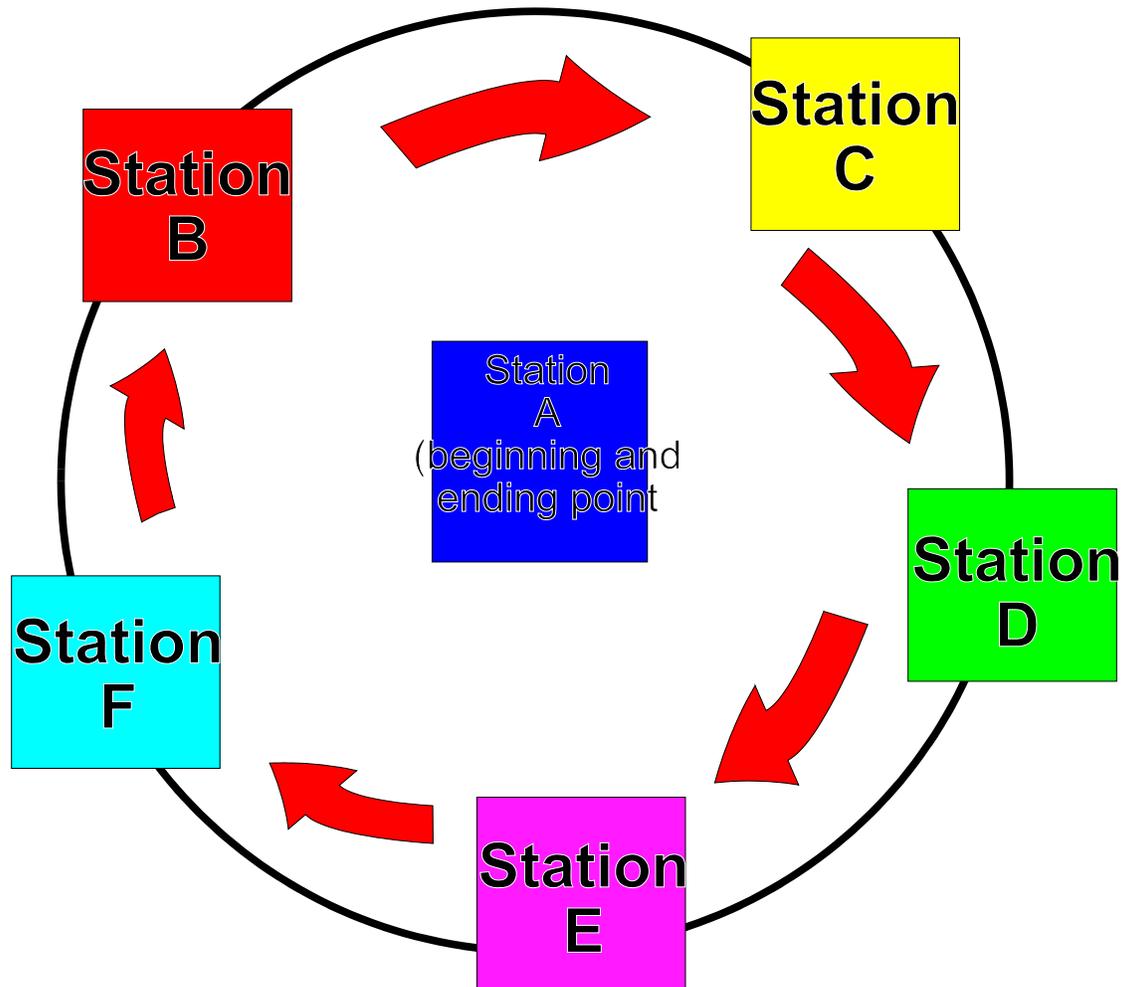
1. Place Rubbermaid container lid on the ground.
2. Pour soil onto the lid.
3. Place construction site on the soil. Set up extra supplies on the construction site.
4. Place the broom and dustpan toward the back of the station.
5. Set up station sign

Station F

1. Line up the chemical containers in a row. Volunteer will sprinkle packing peanuts (in the lawn fertilizer bag) around on the ground as the students approach. **Note:** if it is windy, volunteer will PRETEND to sprinkle fertilizer onto the ground.
2. Volunteer will pretend to spray pesticide around.
3. Set up station sign

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SUGGESTED COURSE SET UP



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INTENDED STUDENT OUTCOMES

By completing this activity the students should be able to:

- Learn about Best Management Practices (BMP) to prevent water pollution
- Learn how to become advocates for water quality
- Learn how water travels in watersheds and the impact of stormwater pollution

PROCEDURE

1. Introduce yourself with enthusiasm to your students. Keep in mind when doing the activity that children will be as enthusiastic as you are and will want to discuss their ideas and concepts. Encourage each student to participate.
2. Briefly discuss with students which pollutants can be picked up by the rain and carried away as stormwater pollution (use examples from the stations). Explain that much of what enters the stormdrain leads straight to the local creeks, rivers, lakes and oceans. Tell students that pollution (in some cases) is an easy thing to eliminate if people know what to do to solve the problem. Display the stormdrain stencil and explain it's function. Pretend to spray paint the stencil. Make sure students understand that this is one tool they can use to make people aware of their behavior and to help the public understand how their behavior affects everyone else.
3. Divide class into groups of 4-5 students. Each group will start at a station. Explain that each group will have 3 minutes to discover what is "wrong" at their station (what pollution is getting into the stormdrain) and "fix" the problem. In some instances, students will have to do an action at their station (sorting recycling, cleaning up pet waste, etc.) and in some instances they will have to explain to the station volunteer what to do to change the behavior of that station (emptying oil into stormdrain will need to be changed to recycling the used oil and taking it to a recycling center). When the students solve the problem at the station, have volunteer tell the group they've determined the Best Management Practice that should be used at that station. At the end of 3 minutes, presenter will blow his/her whistle and the groups will move to the next station. Have groups move in a clockwise manner.
4. Assign each group a specific station. **DO NOT ALLOW THE GROUPS TO GO TO THE STATIONS YET.**
5. Tell students that it is getting ready to rain. At the sound of thunder, each group will go to their station. They will have 3 minutes to identify and rectify the problem at their station. After each group has visited each station (15 minutes), all groups will come back to Station A, touch the stuffed fish (to indicate they've solved all the problems in the course) and listen to the rainstick (indicating rain).

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6. At each station, a volunteer will pollute the environment. Their actions are indicated on the Station Instruction Cards (located at each station). Also on the station cards is information that the volunteer can tell the students concerning the solution to the pollution problem at that station.
7. Students proceed to their assigned station. Make the thunder sound and then start the stopwatch. At the end of 3 minutes, blow the whistle and advise the students to switch stations, moving to their right. Continue this cycle until all groups have gone to all stations. At the end of the 15 minutes, blow the whistle and have students come back to Station A. Advise them that the rain is starting and that water will soon be washing over each station. Ask if the problems were solved at each station. Ask for solutions. Explain to students that when it rains, if the problems hadn't been solved at each station, the fish (hold up fish) in the river would soon die from the pollutants washing down the stormdrain into the stream.
8. Tip rainstick from end to end to make the sound of rain. Indicate to the students that the storm has arrived and that water will be running over the land they've just helped clean up. Advise them that if they hadn't solved the pollution problems at the stations, wildlife that depends on clean water for their survival would become ill or even die. Refer to the Common Factors of Stormwater Runoff Table for information about specifics of each pollutant in the course.
9. Review your main points. Thank everyone for participating, compliment behavior and answer any questions the children may still have.

SET UP FOR NEXT SESSION

- Re-set stations

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FINAL CLEAN UP

Approximately 45 minutes

- Replace all instructions and cue cards in folder
- Gather up all station materials and return to respective storage bags
- Using whisk broom and dust pan, return soil to it's storage bag. Clean Rubbermaid container lid. Place construction site, trucks and supply container into large storage bag.
- Fold station identifier signs and board together and return to storage container
- Return all unused supplies to storage container
- Place presenter instructions, cue cards and unused student handouts in storage container

Station Instruction Card

Station B

- ▶ Volunteer pretends to walk dog. The pet will then produce waste, which the team will address. The team must convince the dog walker to use the plastic bag to pick up waste material and dispose of it in the garbage. They need to “teach” the dog walker, not do it for them.
- ▶ At this station, let each student practice picking up plastic dog waste and putting it in their waste containment bag. When leaving this station, each student will take with him/her their own waste containment bag.

Best Management Practice

Pet wastes can be picked up with a plastic bag and disposed of in an outside garbage can or flushed down a toilet. This prevents bacteria from contaminating rivers when it rains.

Station Instruction Card

Station C

- ▶ Teams discover litter, cigarettes, cola cans, batteries that have been left on the ground.
- ▶ The team place the batteries in a separate container and advise the volunteer to recycle them.
- ▶ The team must pick up the litter and cigarettes and put them in the garbage and place the cans and plastic containers in the recycling bin. Team should try to convince volunteer that recycling is the way to go.

Best Management Practice

Batteries should be stored and then taken to a hazardous waste disposal center in your community. Doing so prevents the battery acids from leaching out into the landfill and eventually into the groundwater.

Cigarettes and litter belong in the garbage can.

Recyclables should be sorted from the garbage for curbside recycling.

Station Instruction Card

Station D

- ▶ Teams discover volunteer pouring oil, paint, antifreeze, and brake fluid into the stormdrain. The team must tell the volunteer to recycle all used motor oil, car fluids, and paint.
- ▶ Teams must also educate volunteer about the stormdrain stenciling program and pretend to spray paint the stencil.

Best Management Practice

In most cities, used motor oil can be put into an empty plastic milk jug and recycled at the curbside. Doing so eliminates the need to dump it down the stormdrain.

Leftover hazardous waste (paint, antifreeze, brake fluid, etc.) can be taken to the local hazardous waste disposal center.

Stormdrain stenciling projects can take place with permission from city officials. In many cases, city officials will furnish students with a map of all the stormdrains. Supplies for the project can be obtained for the State Department of Environment and Natural Resources and from South Dakota Lakes and Streams Association.

Station Instruction Card

Station E

- ▶ Team must figure out what is going on at the construction site. They must identify that when it rains, top soil and dirt, along with any trash laying around the construction zone will wash into the stormdrain. Too much soil in the water system can smother eggs, destroy habitat, obstruct migration, muddy water, etc.

Best Management Practice

Construction companies can construct temporary, small dikes and sediment catch basins to slow and catch runoff. They can also build earth berms and filter runoff before water enters a stream. The best idea is not to strip all green space from the construction site (leaving as many trees and as much grass as possible) to help reduce erosion.

Station Instruction Card

Station F

- ▶ Teams discover volunteer over-applying fertilizer, pesticide and insecticide to the lawn. Teams must convince the volunteer to carefully read all the directions on the packages before applying to lawns and gardens.

Best Management Practice

Carefully read the labels on all packages of chemicals that are put on lawns and gardens. Follow the manufacturer's instructions on application amounts and times.

Use nonchemical fertilizers (compost) on gardens. Place all grass clippings and leaves in the compost pile and use on flowers and gardens.

Try xeriscaping. When planting trees, flowers and shrubs, use plants that are "water-conscious" and that are native to your environment.