Introduction to Storm Water: Impacts to Solutions

approximately 20 minutes

From the *Storm Water Curriculum & Teaching Guide*, January 2006
Adapted from "The Value of Rain Gardens,"
Wisconsin Rain Garden Educator's Kit, April 2004

Introduction to Storm Water: Impacts to Solutions is designed to be part of a curriculum unit including related activities and resources. It covers the topic of storm water relatively thoroughly without going into specific rules and regulations.

We encourage you to add local interest and information. Depending on your knowledge of the topic, you may want to expand the script to include regional examples.

Many of the slides are designed to have an animated picture or a bulleted script – coming in on a mouse click. Anytime you see an asterisk (*), hit your mouse button for the next bullet/picture to come up.

Information in parentheses/italics is extra information for the presenter.

Introduction slide	1. We all live in a watershed and play a role in the health of its land and water. One way to take part in a healthy watershed is to understand storm water issues and take positive steps to improve water running over the land in our communities. Storm water has become one of the greatest problems to the watershed environment. Today we will learn about storm water impacts and how to reduce those impacts.
Definition of storm water	2. What is storm water, anyway? *(read or have students read the definition)*
Watertown building mural "It's Our Water"	3. Water – clean, good tasting water is important to all of us. You may not realize it, but more than 80% of everyone in Wisconsin drinks water from wells. We depend on having a reliable supply. We also value surface water: our lakes, rivers, streams and wetlands. These two things--water from the ground and our surface waterways--are connected.
Stormy lake	4. When it rains, we usually think – "rain, rain go away, come again another day." But we often don't think about what that rhyme really means.
Water cycle graphic	5. Do you remember learning about the water cycle? It rains; water flows down into streams and lakes, evaporates, forms clouds, and then becomes rain again. What is often not seen is the critical part where rain or snowmelt soak into the ground to become groundwater. *(point out the various parts of the water cycle in the graphic)*
Two prairie photos and one root illustration.	6. Here, it can do just that. * This natural prairie landscape has deep root systems that direct rainwater into the ground.

Stream with curve to the left	7. Water moves underground, becoming groundwater and eventually moving to our streams, rivers, lakes or wetlands.
Culver springs, Dane County Spring water leaving the spring Spring flow with Token Creek	*8.* We can see this quite clearly at springs, such as this one, where * water pours out with such a volume * that it is the headwaters for Token Creek, a major tributary to the Madison lakes. Springs also provide water for wet prairies, fens, and other wetlands.
Roadway with grass clippings	9. In our cities, rain falls on our roads, parking lots, * roofs and other hard surfaces…
parking lot and storm drain	10. running off into storm drains or ditches instead of soaking into the ground.
Water flowing from storm sewer pipe	11. Storm water is usually not treated but instead pours out of storm sewers directly into lakes, rivers or streams, often with great force, carrying all sorts of pollutants with it.
Water balance graphics	12. Let's go back to the water cycle. Before land is developed with houses, businesses and roads, 50% of the water soaks in, and only 10% runs off. (*point to the red and blue arrows*) Then as development takes place more and more water runs off instead of soaking in. In a typical community, 35% soaks in, and 30% runs off. In a commercial area with large roofs and parking lots, very little water soaks in -- only 15% -- just about a reverse of what happens naturally.
Aerial photo conservation subdivision	13. This wasn't as great a problem when cities and the amount of impervious or hard surfaces were small. *(This aerial photo is of a conservation subdivision where special practices have been put in to encourage infiltration; point out the green space areas.)*
Aerial urban	But as cities grew, the problem grew. *(note the increased built areas)*
Hydrograph	14. This graph represents water levels in a stream after a rain. The green curve represents a stream in an undeveloped watershed. The red line is a developed watershed. You can see that in a natural watershed *(point to green curve),* * the water level in the stream will gradually rise and then fall after a rain. This is because much of the water from the rainstorm soaks into the ground and gradually enters the stream from underground. * In contrast, look what happens after the watershed has been developed, and impervious surfaces have increased *(red curve).* The water runs off in tremendous volumes and with great force. Then it quickly drops down. Very little water soaks into the ground to later feed the stream. Therefore, in many parts of our state, streams that once flowed year-round now have extreme floods in the spring and then dry up.

Car in water under viaduct	15. The change in how water flows in streams causes many problems. As mentioned, flooding is a problem, not just for cities but for farmland, too. Many farmers who are downstream from cities are finding their fields flooding more often, not only in the spring but sometimes several times a year.
Tree toppling, Lincoln Creek, Milwaukee, 2000,	16. The great force causes massive erosion along stream banks. This erosion occurred in the Milwaukee area after two large storms. The line of rocks shows where the original stream bank was and how much land eroded away.
Storm drain with muddy water Oily water in parking lot	17. Too much water isn't our only concern; it's also what's in the runoff. In urban areas, runoff contains a smorgasbord of organic matter such as leaves and grass clippings, soil, fertilizers, oil, and chemicals that flow through the storm drains directly to our lakes, rivers and streams. In rural areas, runoff erodes soil, which carries manure, fertilizers, and nutrients like phosphorus into lakes and rivers.
Cobble bottom stream	18. These pollutants--especially soil--impact habitats, which are the areas where animals live. A healthy stream will have a bottom rich with cobbles, gravels or sand…
Rusty crayfish and Mayfly	19. which is the home for critters, large * and small …the foundation of the water food chain.
Sediment plume Six Mile Creek, Dane County	20. But every year when the snow melts and spring rains come, blankets of soil wash off the land and into our waterways.
Sediment covered stream	21. The soil fills in the spaces between the rocks eliminating important habitat. What was once a vibrant stream with deep holes, rocky riffles and clean bottoms * degrades to a muddy bottom where little can live except for very hardy worms and insects.
Sunfish in abundant aquatic plants	22. Soil and fertilizer do in water the same thing they do on land - grow plants. These plants can cause significant problems for aquatic life, like fish, when they grow excessively.
Boats on a pristine lake Algae swirl, in front of the UW-Madison Hoofers Sailing Club	23. Keeping our water clean is good for aquatic life and important to our economy, too. Water-based tourism brings $12-15 billion to Wisconsin every year. * When our waterways become choked with algae, it impacts boating, fishing, swimming…all those things that our tourist economy depends on.
Vilas Beach, Madison	24. What can we do to protect water?
Arial view Woods in Southern Kettle Moraine	25. These are the reasons why changing storm water management is critical. The goal for change is to have our cityscapes function more like natural landscapes. In this way, water will again be clear, clean and healthy for wildlife, plants and people.

Photos of a rain garden and rain barrel	26. There are many actions we can take to make positive change. One way is to encourage water to soak into the ground rather than running over hard surfaces picking up dirt and pollutants and funneling into underground pipes. Directing water into a rain garden or rain barrel are two ways to keep water close to where it falls and to help it soak into the soil.
Redesigned parking lot 2 photos of green roofs	27. Removing hard pavement such as redesigning parking lots to add green islands or building green roofs with soil and plants, both will catch, hold, and filter water. * Even dogs can get into the act. These dogs seem pleased with their green roof!
Improve water quality; photos of signage	28. Practicing low-input lawn care reduces excess fertilizer and keeps nutrients from entering the water. Keeping leaves and grass clippings off sidewalks and out of gutters will help improve water, too.
Conserve water Photos of a lawn, native landscape and dripping faucet	29. Something that you may not think about automatically is using less water. Conserving water means less water is pumped out of the ground. Having native plant garden is one way to reduce water use and add natural beauty to a landscape.
Community members planting a rain garden	30. Stormwater is a problem. But there are many solutions. In fact, we are the solution to storm water pollution. With everyone taking an active role, we can make a difference to reduce stormwater impacts and improve water quality.
Credits	