

# Naked Dirt: Erosion



## What Is the Problem?

### Erosion

Because it affects so much land, farming is Minnesota's greatest source of sediment pollution. Yet highly disturbed lands such as mines and construction sites for roads or buildings have 100 times the potential for erosion.

In fact, any bare soil can wash into streams, lakes, or wetlands. Dirt in the streets

### *Success Story: Minneapolis*

Field Elementary School grades 3-5 planted native grasses and flowers on the banks of Minnehaha Creek to keep bare soil from eroding into the water. Minneapolis Park Board and Minnehaha Creek Watershed District helped organize and supervise the planting. Students watered and maintained plantings through spring and summer, and continue to study the site.

washes into storm drains where it flows into the nearest waterway. Gardens, dirt foot paths, and sparse lawns can also add to erosion. Streams or lakes can undercut their banks, especially where shoreline plants are trampled.

The United States Department of Agriculture developed the Universal Soil Loss Equation (revised in 1993 to RUSLE) to help farmers, landscapers, and architects decide how to prevent erosion. The equation predicts the rate of erosion for a site based on the annual rainfall, soil type, and degree of slope. Tables such as Figure 1 show how different practices affect erosion rates.

### Sediment Pollution

Sediment is mineral or organic solid matter that washes or blows into the water. One billion tons of sediments pollute America's lakes, streams, and wetlands each year.

Sediment pollution makes swimming and boating less fun, clogs city drinking water systems, fills in lakes, and smothers fish and insect habitat. Sediments often float awhile before settling out, making water cloudy or "turbid." These suspended sediments clog fish gills and block light from reaching aquatic plants. They also cause water to absorb more heat from sunlight, which raises overall water temperature. Warm water holds less dissolved oxygen. This too can kill fish.

Soil particles also carry other pollutants into waterways. Nutrients (nitrogen and especially phosphorus) feed algae that become green scum on lakes. When the algae die, they decompose. This uses up all the oxygen, which can kill fish and other aquatic life.

Toxic pollutants such as pesticides and metals also attach to soil particles. These poisons concentrate on the bottom of waterways where they can kill fish, insects, and animals for years.

*Fig. 1: Soil Loss Rates*

<u>Land Use Practice</u>	<u>Multiplier</u>
Bare Soil	1.0
Straw mulch & net (1/2 ton per acre)	0.35
Terracing (if slope is 10%)	0.12
Straw mulch & net (4 tons per acre)	0.02
Grass	0.011

Example: Say a Minnesota school buys a strip of land 50 feet wide, with a slope of 10%. The soil is now bare. The Revised Universal Soil Loss Equation for this site looks like this:

30.0 average inches of rain per year  
x 0.252 factor (from technical tables) to account for soil type and slope  
7.56 tons of soil lost per acre per year

Multiply 7.56 by each factor from the table above. How effectively will each practice reduce erosion?

*Data is from Environmental Resource Guide: Nonpoint Source Pollution Prevention Curriculum, Air & Waste Management Association, (1993).  
Artwork by Hopkins North Junior High 9th Grade Commercial Art Class.*

## What Can We Do About It?

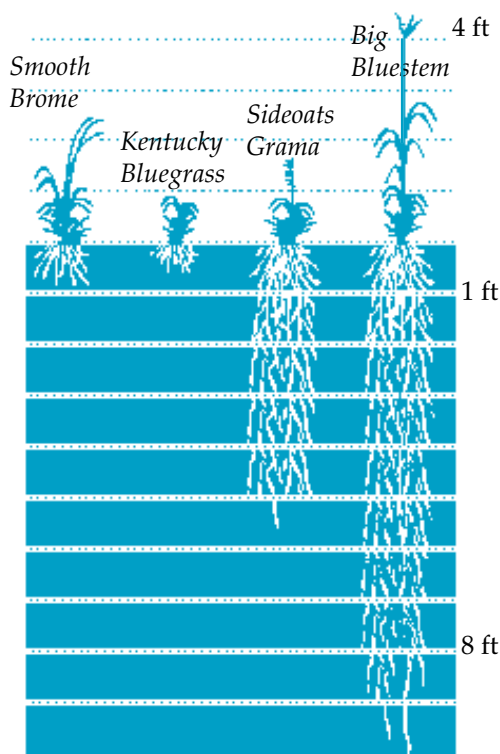
### Erosion-Control Plantings

As Figure 1 shows, healthy plants as ground cover help prevent erosion.

Most American lawns grow grasses from Europe and Asia (such as Kentucky bluegrass). In some places these plants work well. Yet they do not grow well in poor soils. Such grasses start quickly, but have shallow root systems (see Figure 2). They also require fertilizers, pesticides, and frequent watering.

In contrast, hundreds of kinds of native grasses and flowers sink roots as deep as fifteen feet. Deep roots stabilize soils and help runoff filter into the ground. (See Figure 3.) Native plants can grow in poor soils, tapping nutrients and water far below the surface. They out-compete weeds, so do not need fertilizer or pesticides. And they provide wildlife habitat. (Native grasses take years to mature, and may require regular burning and other maintenance.)

*Fig. 2: Root Depths of Grasses*



Graphic from Minnesota Department of Natural Resources & Minnesota Department of Transportation.

*Fig. 3: Water Infiltration Rates*

Type of Plant	Rain Absorbed
Bluegrass Lawn	0-2 inches/hour
2-year-old Native Switch Grass	7.5 inches/hour
Mature Forest Undergrowth	21 inches/hour

*Data from Luna Bharati, "Infiltration Studies Along Vegetated Riparian Buffer Zones," Iowa State University MA Thesis.*

Look for bare or eroding soils in need of erosion-prevention. For a big project (such as a school nature area), you will need expert help. School or city grounds managers may be able to help. There are many excellent organizations that can help. (See "Mo' Info." below.) **You must have the permission of land owners.**

Erosion prevention projects include:

- Check local homes, schools, and parks for sources of erosion. Inform property owners.
- Plant ground cover—ideally native grasses and flowers—to hold soils and stream banks.
- Make sure builders follow practices that keep sediments on site waterways.
- Landscape an area, including retaining walls, settlement basins, and diversion structures.
- Educate the public about erosion and ways to prevent it.

### Mo' Info.

Step-by-step instructions on how to organize service projects: *Pollution Prevention Project Guide*; Call Minnesota Office of Environmental Assistance for a copy (651) 215-0232. In the *Guide*, see:  
- Habitat Restoration & Erosion Prevention (Overview), pages 22-24.

#### Other Resources:

School Nature Area Project (SNAP) helps schools restore native habitat. Their planning guide, *Notes on Benefitting the Biomes*, is available for purchase or free on the Web: [www.stolaf.edu/other/snap](http://www.stolaf.edu/other/snap) The guide provides science background, instructions, and a list of places to buy native seeds. Call (507) 646-3599.

Local Partners & Speakers: [www.bwsr.state.mn.us](http://www.bwsr.state.mn.us)  
- Hit button for "Local Gov'ts," then find your county and/or watershed. Call your city or county parks department, or county Extension Service Master Gardeners. (See the blue pages of the phone book.)