

## Preventing Erosion

A crucial role of sustainable sites is to reduce erosion, the physical wear of soil and surface rocks by water and wind. Eroded soil, called sediment, is the number one pollutant of our waterways. By taking measures to prevent erosion on your property, you can help alleviate a host of problems caused by erosion in manmade and natural environments.

### What are the effects of erosion?

- **Degrades soil quality.** Erosion washes away the topsoil, the nutrient-rich surface layer that supports all plants, beneficial organisms, and human populations. National Geographic reports that the world's six billion people depend on only 11% of the world's land for all of its food needs—and only 3% of the planet's soils are still fertile, making erosion control essential.
- **Pollutes our water bodies.** As the soil washes away, it carries with it a myriad of pollutants ranging from fertilizers and pesticides to oils, heavy metals, chemicals, and animal waste. This mixture ends up in our natural water bodies with great costs to the environment as well as to public health.
- **Disturbs fragile aquatic and wetland eco-systems.** Sediment clouds the water and reduces the ability of underwater plants and animals to get the light they require for survival. The introduction of high nutrient levels from runoff fertilizer causes dense algae growth, which removes oxygen from the water and exacerbates the problem of inadequate sunlight.
- **Causes sedimentation of waterways and increases the need for dredging.** Sedimentation, (settling of eroded particles) makes waterways shallower. Collapsed banks undercut by erosion make them narrower. Shallow and narrow waterways disrupt water traffic, reducing economic and recreational opportunities. Dredging to ease this problem wreaks havoc on aquatic plant and animal communities.
- **Increases maintenance costs of stormwater management systems.** Sediment clogs storm sewers, making them less effective and prone to overflowing. Increased maintenance translates to increased need for tax dollars.

- **Creates dangerous conditions on pathways and roadways.** Erosion can undercut and cause bank failure on pedestrian and vehicle routes, increasing risk of injury and death.

## Types of Erosion

### Splash erosion

The force of falling irrigation or rainwater displaces soil particles

### Sheet erosion

Impermeable surfaces, compacted soil, or bare soil lets water run across it, washing away disturbed surface particles

### Rill erosion

Sheet erosion wears down soil to establish a definite path, forming rivulets in the soil referred to as rills. Rill erosion is much more visible to humans than splash or sheet erosion.

### Gully erosion

Over time, rills widen and deepen into a gully, accelerating the effects of erosion by creating more and more surface area susceptible to disturbance.

### Bank erosion

Fast water flows (often caused by influx of stormwater from impermeable surfaces) wear away stream sides at an accelerated pace, often causing bank failure.

## What are the main factors contributing to erosion?

- **Removal of natural vegetation as a precursor to soil disturbance.** Plant roots keep soil bound together, and leaves shield the ground from the eroding splash of rain drops. When wind or rain pelts unprotected, un-vegetated soil, it washes away loose particles. Vehicle and foot traffic, construction, landscaping, farming, and other human activities further disturb the soil, making it even more susceptible to erosion. The effects of erosion are accelerated when these activities are carried out on slopes, where the effects of gravity quicken the flow of stormwater runoff.
- **Confluence of stormwater runoff from impermeable surfaces, increasing flood events.** Impermeable surfaces in urban and suburban areas cause rainwater to run off into storm drains and eventually into surface waterways. During large storm events, the influx of large quantities of water from storm drains can cause rivers to flood their

banks. Rapidly flowing floodwaters accelerate bank erosion, eventually causing bank failure.

- **Natural weathering processes.** Erosion does occur naturally due to certain climatic, geologic, topographic, and soil conditions. Human activity, however, accelerates this process, disturbing the delicate equilibrium between erosion and sedimentation.

## Checklist for Erosion Prevention in Your Landscape

- During construction:
  - Undertake only one project at a time to minimize the area of soil disturbance
  - Surround the site with hay bales, a drainage ditch, or silt-fences to catch sediment runoff
  - Preserve existing vegetation as much as possible
  - Cover storm sewer inlets with straw or silt fence to prevent sediment from entering
  - Keep piles of loose soil and gravel covered with a tarp or cover crop
- Increase vegetative cover, especially on slopes and along streambanks.
- Use compost to temporarily stabilize slopes until vegetative cover is established.
- Use mulch to protect bare soil around plantings.
- Reduce amount of impermeable surfaces on your property to reduce runoff.
- Manage stormwater on site by capturing water and promoting infiltration. (For more information, consult the fact sheets on "Harvesting Water," "Rain Gardens," and "Green Roofs," available online at <http://www.ag.udel.edu/udbg/sl/hydrology.html>)
- Use stepping stones or permeable paving to replace turf, vegetative cover, or bare soil in areas that receive vehicle traffic or high amounts of foot traffic. (For more information, consult the fact sheet "Permeable vs. Impermeable Surfaces," available online at <http://www.ag.udel.edu/udbg/sl/hydrology.html>).
- Build pathways perpendicular to slopes. If necessary, use retaining walls on hillsides susceptible to erosion (though vegetative cover is preferable).
- Incorporate wind breaks such as evergreen shrubs, fences, or walls to reduce erosion by wind.

For more information on erosion control methods during construction, consult University of Wisconsin's "Erosion Control for Home Builders," available at <http://clean-water.uwex.edu/> under Publications.

## Additional Resources

Erosion Control for Home Builders

<http://clean-water.uwex.edu/pubs/pdf/storm.erosio.pdf>

Home-A-Syst Environmental Risk Assessment Guide: How to Manage and Control Storm Water Runoff"

<http://extension.missouri.edu/explorepdf/envqual/EQM102f.pdf>

"Our Good Earth" by Charles C. Mann. *National Geographic Magazine*, September 2008, pg. 80-107.

Soil Erosion: Causes and Effects

<http://www.omafra.gov.on.ca/english/engineer/facts/87-040.htm>

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