



compost & soil quality

What happens to rainwater as we develop land?

Building soil quality with compost

Human activity has changed soil quality

Settlement of Iowa altered the soils through the activities of tillage for farming and grading for the development of towns and cities. Tilled and graded soils end up compacted and have difficulty functioning normally.

Tilled land now has lost half of the original top soil and 60% to 80% of its original organic matter content.

And grading for development often includes the removal of topsoil, leaving only compacted subsoils. Just like areas with impervious surfaces such as concrete and asphalt, graded areas are forced to shed rainfall as surface runoff.

Changes in soil — changes in organic matter

All these changes result in soil with depleted organic matter content. Today, many areas where the richest soils existed have declined to as low as 2% or less organic matter — down from 10% - 20% when the Iowa prairie was first plowed.

What was once a functioning, natural system based on water utilization and infiltration has been radically altered into a developed drainage system where runoff is encouraged. Runoff-driven development designs create high

volumes of storm water runoff. They also contribute to flooding, and deliver pollutants to surface waters. And they do little to retain moisture for landscape use, biotic activity, or to recharge groundwater supplies.

What is compost?

When many people hear 'compost,' they think in terms of throwing yard waste in a corner and letting nature have its way. There are more complex approaches to the process of composting, but the goal is usually the same — producing a rich, organic material that can boost *soil quality* and protect water quality.

soil quality — the capacity of soil to function in ways that benefit people, plants and the environment.

The link between soil quality and water quality

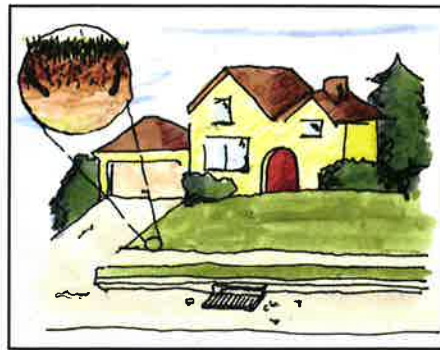
Historically, soil quality in the midwest was very high. The native ecosystem of tallgrass prairie stabilized soils and rendered erosion relatively nonexistent. Most precipitation was retained where it fell, to be used by plants or percolated downward through the porous soil profile to recharge the groundwater supply.

Restoring soil quality with compost

A great way to restore soil quality in urbanized areas and regain some natural functions of soils is to use compost. Microorganisms in compost recycle nutrients and make them available to plants.

Microorganisms can also fight pests and diseases that attack plants. Because it improves fertility and pest resistance, compost reduces the need for pesticides and fertilizer. The end result is the creation of a healthier, more attractive landscape that is easier to maintain.

Compost-amended soils are also better at breaking down or filtering pollutants — such as hydrocarbons and heavy metals from cars, pesticides or soluble fertilizers. Finally, compost can reduce maintenance costs by improving soil moisture retention and plant rooting depth, reducing the need for irrigation.



compost on the lawn | a close look

Compost improves lawn and landscape health by breaking down nutrients and making them available to plants, improving plant hardiness and vigor, and retaining more water in the landscape.

When runoff is prevented from moving off the landscape, eroded soil, nutrients, and other pollutants do not enter surface waters.

Amending soils with compost

Amending soils with compost or other decomposed organics will help restore many of the native soil functions:

- Increased evapotranspiration, natural stormwater detention and infiltration
- Decreased surface water runoff, erosion and pollutants
- Improved plant nutrient availability, plant appearance, and savings in water, fertilizer and pesticide usage

Compost helps at construction sites

Those involved in construction have a lot to gain by using compost-based practices in compliance with environmental rules.

By using compost blankets to absorb the force of falling raindrops and prevent soil particles from being dislodged, the process of erosion can be stopped at its start. Similarly, compost socks can act as barriers to runoff.

Making the comparison | naturally-functioning soils and human-impacted soils

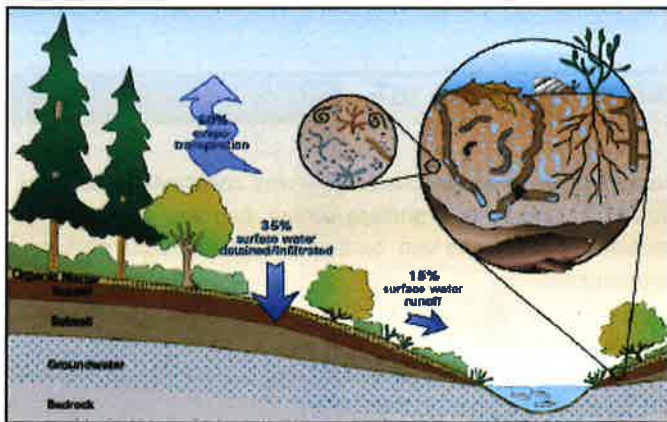


Illustration courtesy of King County, Washington

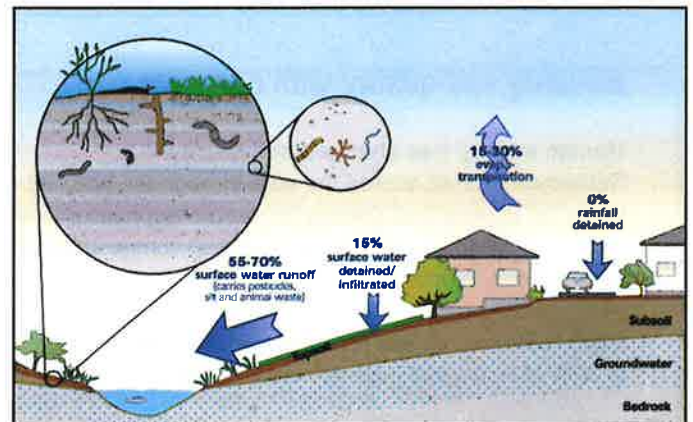


Illustration courtesy of King County, Washington

Naturally-functioning soils

A healthy, vigorous soil and vegetation structure provides valuable plant nutrients, holds and retains water and oxygen, and binds and breaks down pollutants.

Characteristics of healthy soils:

- many air and water pockets
- numerous micro and macro organisms
- deep plant root growth
- high evapotranspiration, surface water infiltration, and stormwater detention
- low water runoff, minimal erosion

Human-impacted soils

A soil structure impacted by human activity, compaction, and development cannot perform its natural functions, resulting in negative impacts.

Characteristics of disturbed soils:

- few air and water pockets
- limited beneficial micro and macro organisms; more pests
- shallow plant root growth
- low evapotranspiration, surface water infiltration, and stormwater detention
- high water runoff and erosion

Compost in new residential construction

Polk County homeowner Lynn Betts

"I was ready to sod my yard, like so many people do. But a friend said I would be happier with it if I seeded with compost instead of sodding. So I gave it a try.



Photos by Lynn Betts

The seeding company came with a big truck and long hoses about six inches in diameter and they used that to blow the seed and compost onto the yard about an inch thick. The compost does just what the conservationist said it would. It holds moisture longer, keeps the grass greener, and it just looks healthier.

An inch of compost under the grass is the key — it's like having a layer of good topsoil, rich in organic matter, that the seed takes root in very quickly. And it sustains it over time. Now, my footprints are left in the yard each time I mow, because the grass is thick like a carpet. That's been the case from the beginning, when my yard stood out from the others because of the color and dense grass cover.

I also had to deal with heavy rains that washed some of the compost and seed off my sloping yard early on — you have to be careful with what comes off your roof, concentrated from downspouts. But those issues were manageable.

My yard is healthy and neighbors and strangers alike say it's got a beautiful green color. And it was established at less expense by seeding with compost rather than sodding. I would seed again with compost without a doubt, and recommend it to anyone who wants a healthy, beautiful yard for years to come."

*(top left — compost treatment at the home of Lynn Betts.)
bottom left — Betts' yard after grass cover is established)*

Compost also works as 'retrofit'

Polk County homeowner Paul Miller

"Over time, we watched as water ran across the sidewalk from under the sod. Year after year, we witnessed sandy, compacted clay subsoil, and dried-out conditions dominate our yard.

After a couple years, the grass started to give up, and it looked like we would have to start from scratch. But rather than re-seed and start from the beginning again, we decided to try a compost amendment.

The results were easy to see six months later. And we have only watered twice, while others watered much more often.

After applying compost over the top, I wished that we could have taken the money that was spent on sod and done it right the first time. We would have had a more sustainable yard that didn't need so much 'babying.'"

*(top right: fall treatment of Miller's yard with compost)
(bottom right: Miller's lawn "greens up" first in the spring)*



A little rain — a big problem?

One inch of rain doesn't seem like much in a rain gauge or a drinking glass. But every inch of rain that falls on one acre delivers 27,150 gallons of water. As much as 60% of that (16,000 gallons per acre) runs off impervious and compacted urban landscapes.

Instead of infiltrating into the soil to restore groundwater baseflow and recharge aquifers, that water is sent rushing into creeks and rivers.

Rather than a nuisance that needs to be quickly diverted off property, home owners and developers should think about rainfall as a natural resource to be retained, infiltrated, and utilized to sustain our landscapes, restore groundwater baseflow and recharge natural aquifers.

Soil Quality BMP's for Construction Sites

- Minimize construction footprint to protect soil from compaction.
- Where grading must occur, stockpile topsoil and respread it as part of final grading.
- Restore compacted soils with tillage that breaks up the soil profile to a depth of one foot or deeper.
- Till or apply 2 - 4 inches of a well-cured, quality compost in the upper 8 inches of soil, or apply 2 inches on the surface with seed.



Compost seeding being applied to a commercial site.

Amended soils will help restore soil functions, decrease storm water runoff and erosion, and save on watering, fertilizer and pesticide usage.

For more information

Resources for advanced information about compost and soil quality

www.iowastormwater.org
<http://soils.usda.gov/sqi/>
www.eng.iastate.edu/compost
www.compostingcouncil.org
http://www.epa.gov/npdes/pubs/nps_urban-facts_final.pdf
<http://www.iowadnr.com/waste/recycling/organics/>



URBAN

contact | Jennifer Welch
address | 1513 North Ankeny Blvd., Suite 3
Ankeny, IA 50023
phone | 515.964.1883 ext. 3
fax | 515.964.8613
web | www.urbanwaterquality.org
email | Jennifer.Welch@ia.nacdnet.net



Application of compost to a storm water basin improves water holding capacity and infiltration.

Created by URBAN for the Iowa Storm Water Education Program with assistance from the USDA-NRCS (Natural Resources Conservation Service), and Washington's 'Soils for Salmon' project. This summary was prepared with the support of the Iowa Department of Natural Resources (IDNR) contract number 04-G550-09. However, any opinions, findings, conclusions or recommendations expressed herein are those of the author and do not necessarily reflect the views of IDNR.