Building Soil:
Market Opportunities for Compost in Stormwater Management, Water Conservation, and Erosion Control





David McDonald
david.mcdonald@seattle.gov
www.SoilsforSalmon.org

Presentation to USCC/EPA-sponsored
Working Toward a Sustainable Tomorrow: Understanding and Expanding Compost Infrastructure, Atlanta 9/28/2009

Seattle Public Utilities
and the
Washington Organic Recycling Council

Building Soil
Foundation for Success

“Never doubt that a small group of committed individuals can change the world.

Indeed, it is the only thing that ever has.”

Margaret Mead

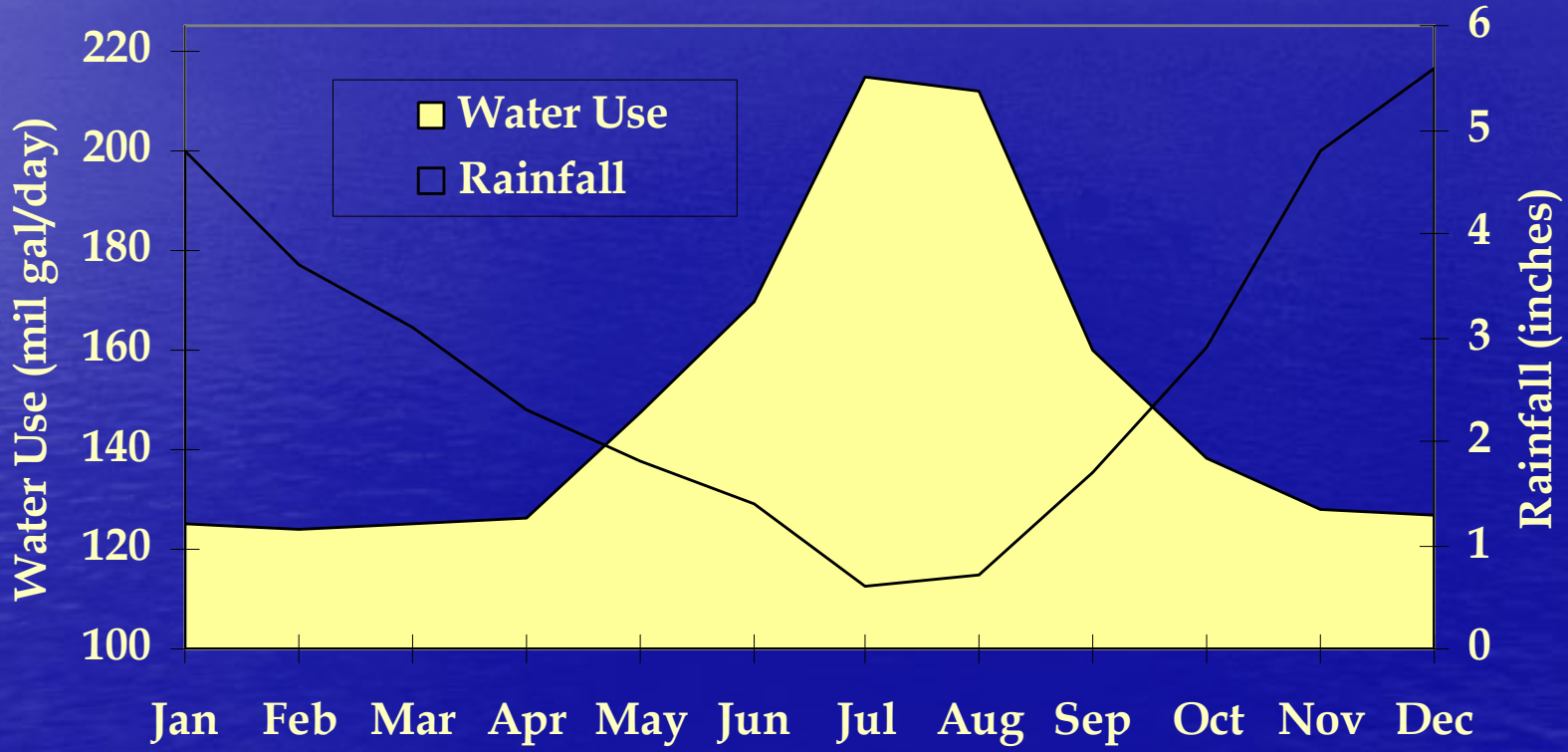
Drivers: Stormwater & Erosion Control

- Clean Water Act – NPDES Phase I & II regs
  - Large cities (Phase I) already required to comply
  - Phase II affects small/mid-sized cities
  - In Washington, Dept. of Ecology guides compliance through State Stormwater Manual
    - S4S team wrote “Post Construction Soil BMP T5.13” and other Low Impact Development BMPs using compost.

- Erosion Control
  - EPA’s NPDES menu of BMP’s now includes compost blankets, berms, and socks.
  - Builders must have erosion control training.

Drivers: Water Conservation

- Peak summer water demand is landscape irrigation
- Population is growing, supplies are limited

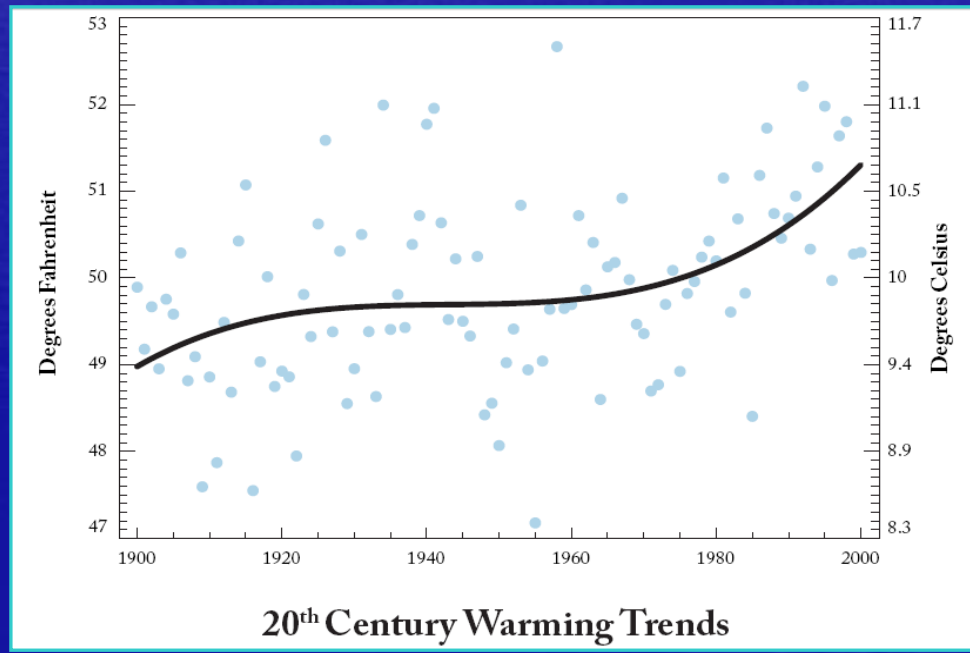


Compost soil amendment and mulching can cut summer irrigation needs by up to 50%.

Drivers: Climate Change

- Less snowpack (less to store for summer use), more variable rainfall in the Pacific northwest
- Warmer more energetic atmosphere creates potentially more frequent intense, local storms, and more chance of rain-on-snow flooding
- Potential for several “wet” or “dry” years in a row?
- Flood or drought, or both, or just warmer winters & wetter or dryer summers?

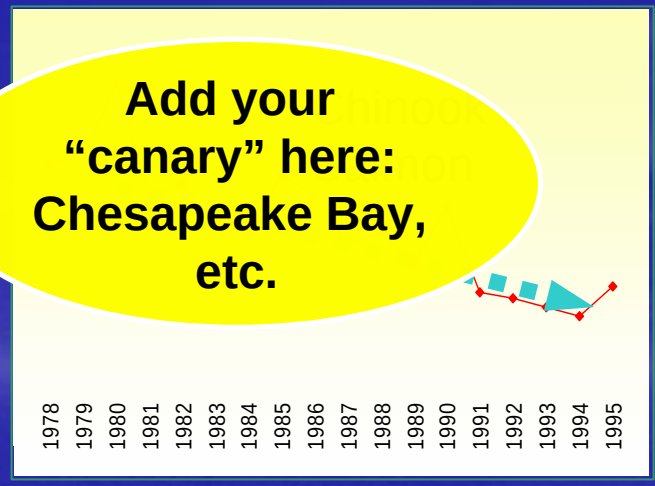
We don’t know yet, but…
Compost can help “climate-proof” our landscapes.



Learn more:

Google “UW Climate Impacts Group” or
http://cses.washington.edu/cig/

Drivers: Salmon decline



- 1998 Salmon in the City conference brought scientists and policy makers together, recognized:
  - Conventional land development degrades soil functions, including stormwater infiltration, so degrades stream habitat.
  - Existing stormwater detention structures are not enough

- Soils for Salmon team formed. Goal: restore soils, to restore aquatic health.
- 2000 Endangered species listing of Puget Sound salmon populations raised public, regulator awareness.

Compost can help slow and clean runoff.

Science informs Policy

Stormwater research:

- Incorporate 15-30% compost (by volume) into soil before planting
- Compost amendment builds soil structure, moisture-holding capacity
- Increases surface porosity

UW trials, turf on glacial till soil

Compost-amended till soil – up to 50% reduction in storm water runoff

Building a Soil Quality Movement

- One-on-one with policy makers, industry leaders
  - Partner with professional org's, "green" leaders, & regulators
- Engage (fund!) scientists in meaningful research
- WORC sponsored Soils for Salmon technical "how to" seminars around the state for design professionals
- Soil quality starts to appear in policy statements, priorities for watershed restoration, stormwater mgmt.
- Write soil BMPs for State Stormwater Manual.
- Local gov'ts and WsDOT prove it works, cost-effective
- Education, education, education!
- Effective web-based resources – *link it up!*
- NPDES regulations push "Low Impact" BMPs, incl. soil
- Builder outreach through erosion control classes, etc.

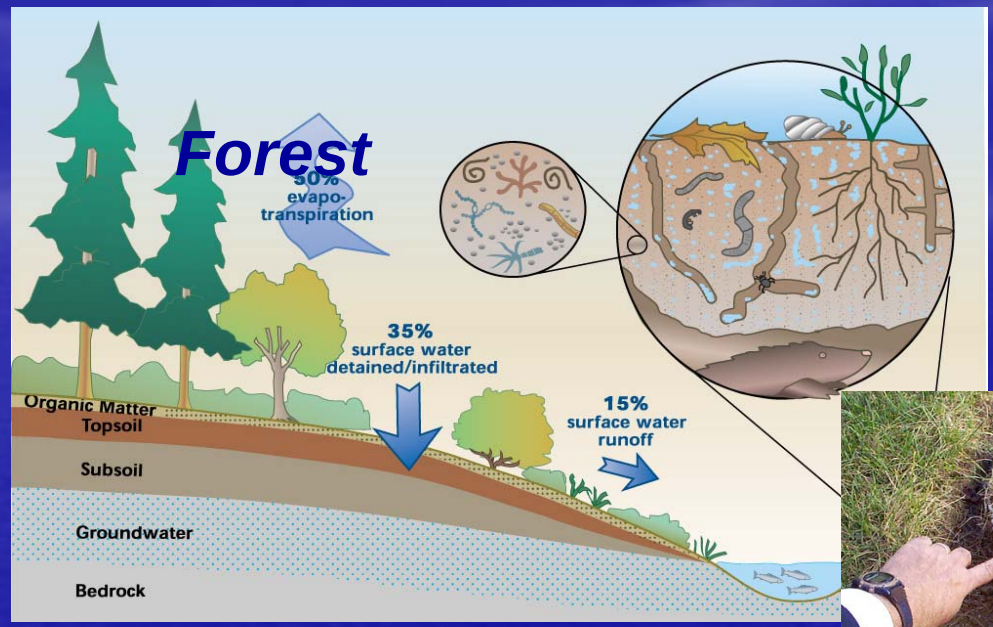
The Connection Between Soil and Water

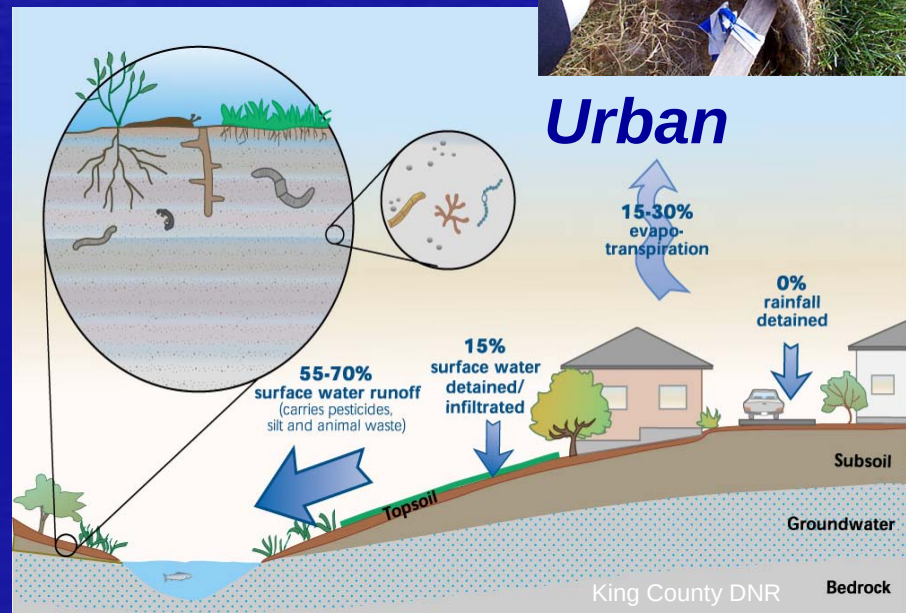
What happens to soils and streams, as we turn forests into cities?

↑compaction
↑erosion
↑loss of topsoil
↓soil organisms
↓soil structure
↓natural fertility & disease prevention
↑impervious surface

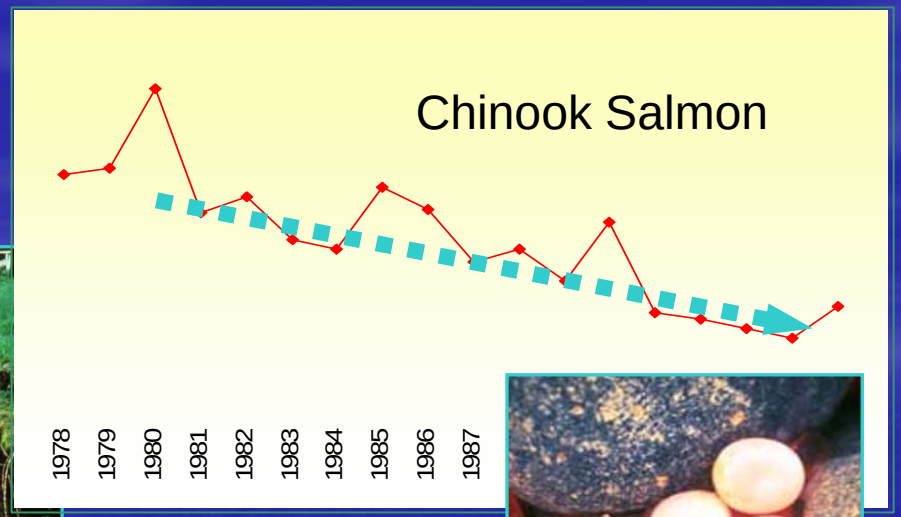
cause:

↑winter runoff, ↓summer flows
↑need for irrigation & chemicals
↓biofiltration of pollutants





What are the impacts?



- Pollution
- Erosion
- Salmon decline

- Flooding & property damage

- Failing landscapes = <u>Unhappy customers</u>

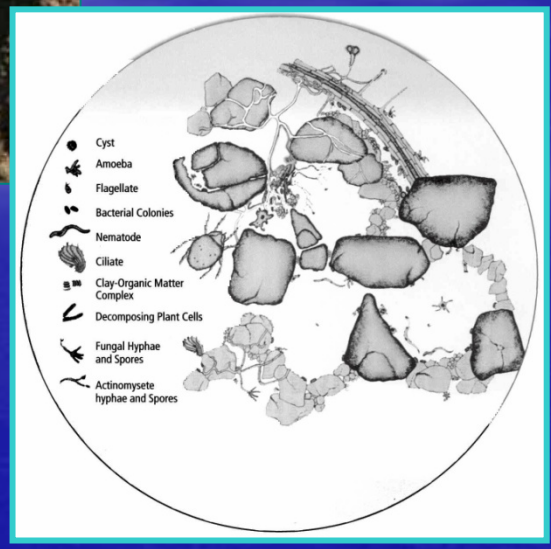
How can we restore soil functions, to improve plant growth, water quality, and reduce runoff?

- Prevent /reduce compaction
  - keep heavy machinery off where possible
  - rip compacted soils to loosen

- Incorporate compost into soil to feed soil life

organic matter + soil organisms + time
creates ⇒
soil structure, bio-filtration, fertility, & stormwater detention

It’s the Soil!



Value of Healthy Soil -

Billions of soil organisms:

- Support healthy plant growth, fertilize, protect plants from disease
- Create soil structure, resist compaction
- Provide stormwater infiltration
- Prevent erosion (sticky, larger structure)
- Reduce summer water needs (deeper roots, higher moisture holding capacity)
- Filter out pollutants (oil, metals, pesticides, etc.)
- Reduce need for landscape chemicals

Compost works!

Increasing acceptance and specs by regulators, designers, engineers, developers, builders, citizens as part of “Low Impact Development”

Seattle’s “Natural Drainage System” projects

Erosion Control Applications in the wet Northwest

- Blankets
- Berms
- “Socks” (compost-filled tubes)

Builders get 2-for-1 value when compost is used for erosion control, and then tilled in to meet the Soil BMP!

Combine methods as needed for best water quality and flow control

WsDOT - Protecting Wetland Area from I-5 Runoff

Prove it!
Keep doing the science

WsDOT: 10 ft wide compost strip treats stormwater from 2 lanes of roadway

Parameter	Untreated Runoff	Compost filter strip treated	% Concentration Reduction	% Load Reduction
	mg/l			
TDS	52.7	55.5	-5	63
T. Phosphorus	0.089	0.26	-192	-2
COD	73.5	49.6	33	76
TSS	81	23	72	90
	ug/l			
Total Copper	28.18	9.14	68	89
Dissolved Copper	7.85	5.77	26	74
Total Lead	12.62	3.54	72	90
Dissolved Lead	0.5	0.05	90	97
Total Zinc	129.70	31.57	76	91
Dissolved Zinc	64.22	20.71	68	89

TDS=Total Dissolved Solids, COD=Chemical Oxygen Demand, TSS=Total Suspended Solids

Redmond Ridge
(Quadrant Corp.)

Issaquah Highlands

- Erosion control on slopes
- Long-term landscape success

Selling compost for (stormwater/landscape/ water conservation/hort/erosion etc.) uses: Quality matters!

- particle size
- C:N ratio
- pH
- maturity/stability
- contaminants
- weed seeds
- nutrients
- biodiversity (mycorrhizae, etc.)
- plant growth tests –
  fit product to intended use:
  physically, chemically, horticulturally

Know your market!

Bioretention soil mixes - for Low Impact Development (LID) stormwater swales and "rain gardens"

- 30-40% compost – ¾-½ screen, few particles smaller that ¼
  - Stable, mature, dependable quality (STA), fits plants to be used
  - Low contaminants (esp. concern with biosolids compost: need low metals, low soluble P, low soluble endocrine disruptors; yard/food waste compost needs low pesticides, low plastic)
- 60-70% coarse sand
  - Few fines (<5% passing #200 sieve)
- Dependable infiltration
  - & detention volume (pore space)
- Dependable plant growth
  - fit compost nutrient profile to plant needs

Selling compost as landscape Soil Amendment
(for stormwater, water conservation, plant growth benefits)

- Maturity – dependable enhanced plant growth (STA!)
- Nutrient levels:
  - Low soluble nutrients for water quality, but
  - Turf needs N (with adequate P)
  - Trees & shrubs need C (stable N, P, K)
  - Balanced pH, high CEC

- Mulch – sell "overs" or minimally composted wood chip as high quality mulch; differentiate and explain mulch products
  - Uniform color
  - Disease control
  - High C, low N for weed control
  - Chunky 1" screen, few fines

Selling compost for Erosion Control

- Larger particle size (1” screen)
  - Longer chunks tie it together, resist erosion
  - Higher initial porosity
  - Resists compaction and crusting
- Range of intermediate particle sizes, but few fines
- Low P (for water quality)
- Low metals
- Delivery:
  - blower trucks
  - readily available
  - builders can’t wait!

Best Resources & Specs

- WA Soil BMP Manual
- Soils for Salmon background science
- Stormwater Manual for Western WA
- WA Low Impact Development Technical Manual
- USCC “Seal of Testing Assurance” compost specs & tests
- WsDOT “Soil Bio-engineering” specs
- Compost blanket, berm, and sock specs on EPA’s NPDES menu of best management practices
  - Seattle’s “Natural Drainage Systems” specs, and “Stormwater Design Seminars”

all linked from

www.SoilsforSalmon.org

www.BuildingSoil.org

Building Soil
Foundation for Success