Public lands and climate change: Carbon sequestration for soil health and land reclamation

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And Members of the Carbon Project

The Carbon Project

- Peggy Leonard, Wastewater Division
- Lisa Vogel, Wastewater Division
- Roberta King, Wastewater Division
- Josh Marx, Solid Waste Division
- Laura Belt, Solid Waste Division
- David Kimmett, Parks Division
- Scott Snyder, Parks Division
- Kristi McClelland, Water and Land Division
- Robert Fuerstenberg, Water and Land Division
- Jason Finlinson, Roads Maintenance Division
- Sally Brown, University of Washington
- Kate Kurtz, University of Washington

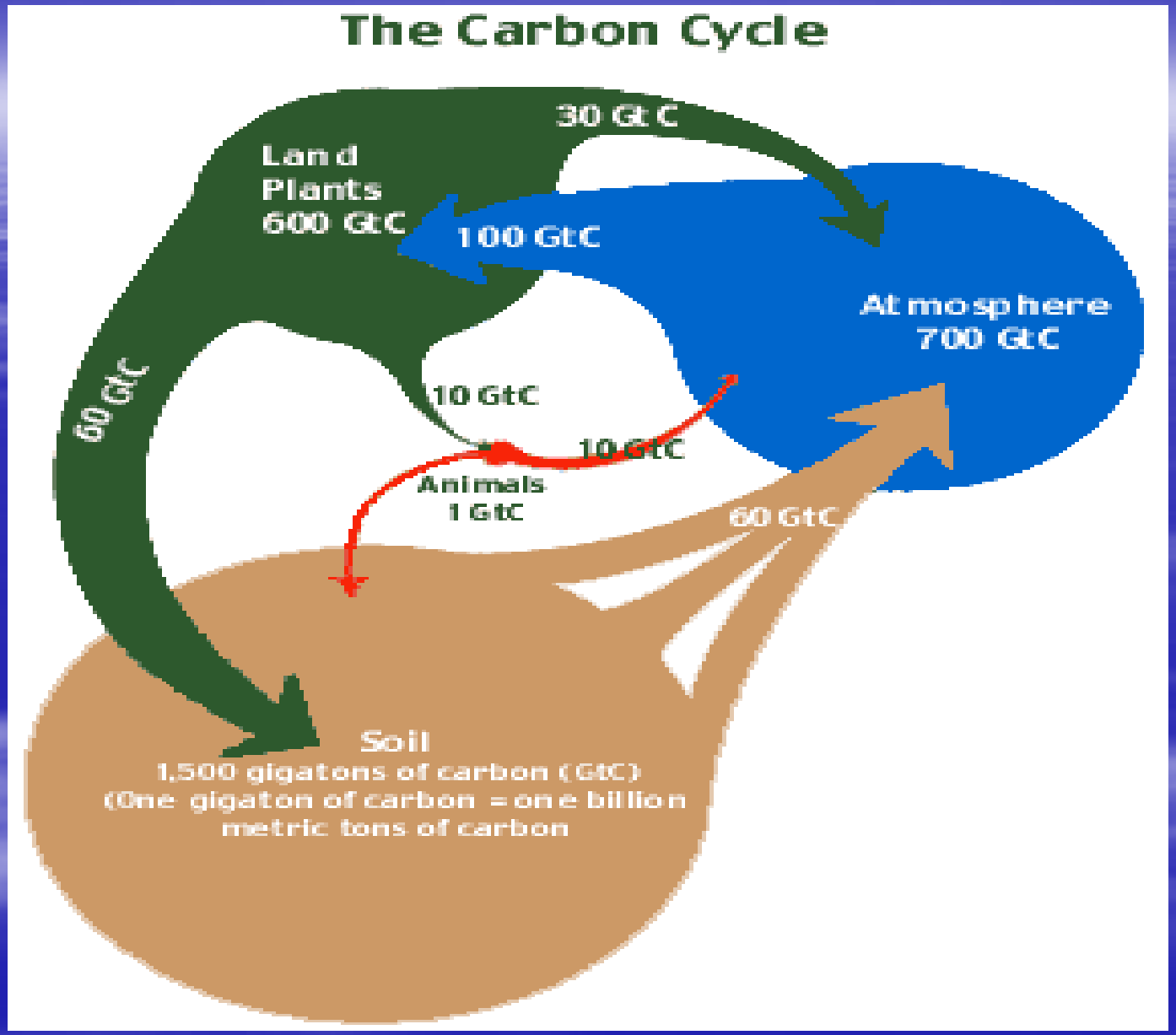
Main Components of the King County Climate Plan

- Emission reductions from transportation, agricultural, and forestry operations;
  - Maintain/increase carbon stored in forestland biomass
  - Reduce losses from agricultural soils
- Adaptation to climate changes
- Response to disruptions
  - Health
  - Water supply
  - Hazards

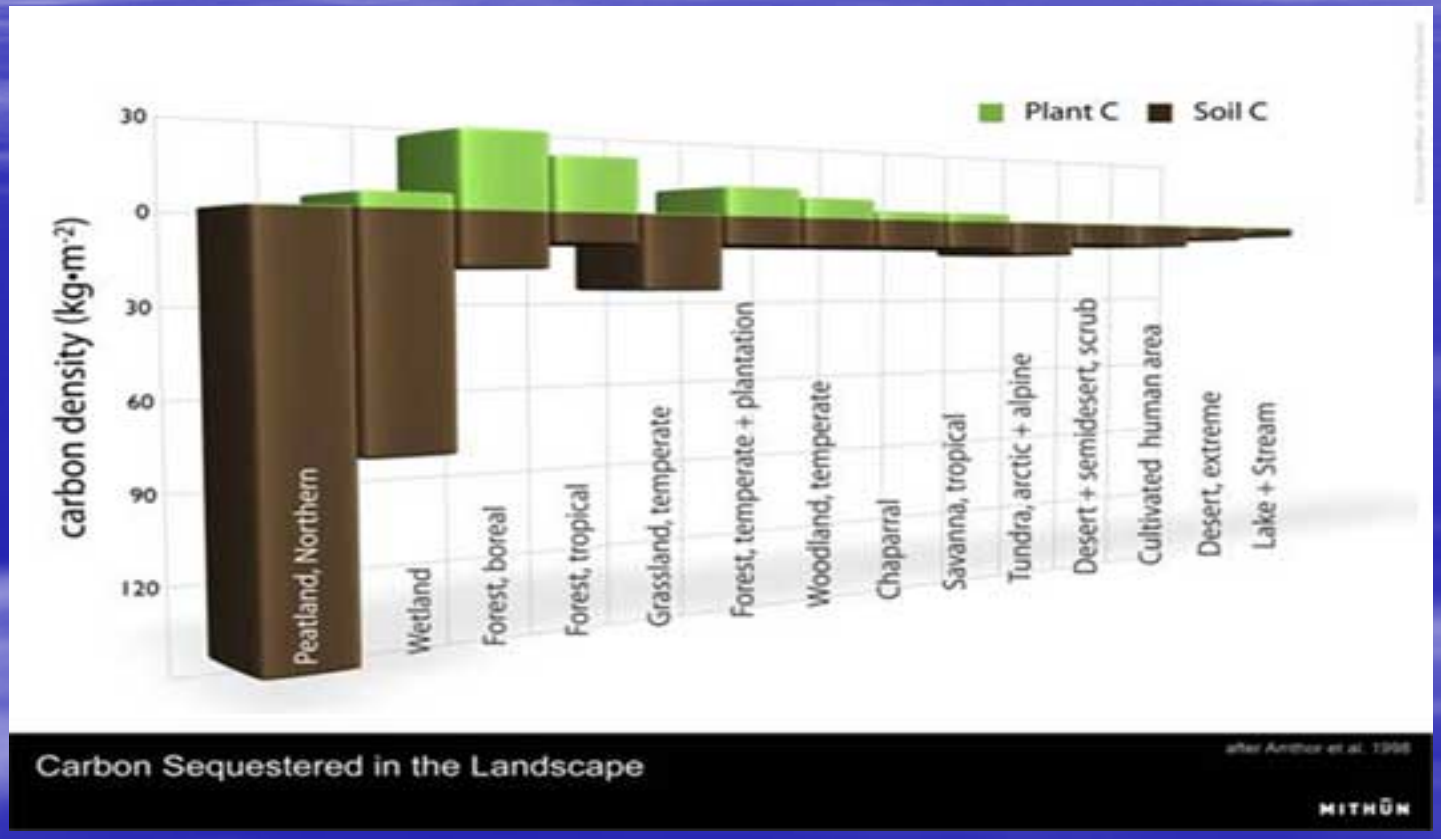
What's missing?

Active management of carbon stores by direct ecological manipulation of landscapes

Active carbon sequestration in the soil affords an immediate and effective mechanism to offset and even reduce CO_2 concentrations in the atmosphere until emission reductions are sufficient to meet global targets.


The Carbon Cycle
30 Gt C
Land
Plants
600 GtC
100 GtC
Atmosphere
700 GtC
60 GtC
10 GtC
10 GtC
Animals
1 GtC
60 GtC
Soil
1,500 gigatons of carbon (GtC)
(One gigaton of carbon = one billion
metric tons of carbon

Sequestration across ecosystem types



Benefits of soil carbon sequestration

- Sink for CO_2: 35 to 65 year storage life
- Increased soil quality and fertility:
  - Higher yields
  - Higher food quality?
- Increased soil moisture capacity
  - Decreased runoff
  - Reduced soil erosion
  - Ecosystem support (including agroecosystems)
    - Resilience
    - Biodiversity
    - Sustainability

An opportunity for King County

- Over 30,000 acres of public land
- 20,000 acres of farm and forest resource lands;
- 5,000 acres of ecological lands;
- 7500+ acres of derelict lands—pits, storage sites;
- Variety of restoration projects;
- Virtually all of the lands have depleted soils and degraded vegetation:
  - Soil carbon declines of 60 to 70%;
  - Soil structure lost;
- Significant resource in organic residuals:
  - Bio-solids, food waste, yard waste, woody debris

The Proposal

Suitable public lands in King County should be used to actively sequester carbon as a method to reduce rising CO_2 concentrations, to initiate soil recovery, ecosystem recovery, and improve resilience to climate change.

Use organic residuals as the main component to initiate soil recovery and carbon storage.

Four elements:

- Identify County lands suitable for sequestration
- Establish test plots at the Vashon Island landfill borrow pit
- Recover the borrow pit site
- Initiate broad-scale carbon sequestration


project site
THORSEN RD SW
SW 84TH ST
125TH AVE SW
WEST SIDE HWY SW
(C) 2008 King County
0
704ft

Borrowpit Project objectives

Using KC organic residuals to create fine to coarse grained compost mixes:

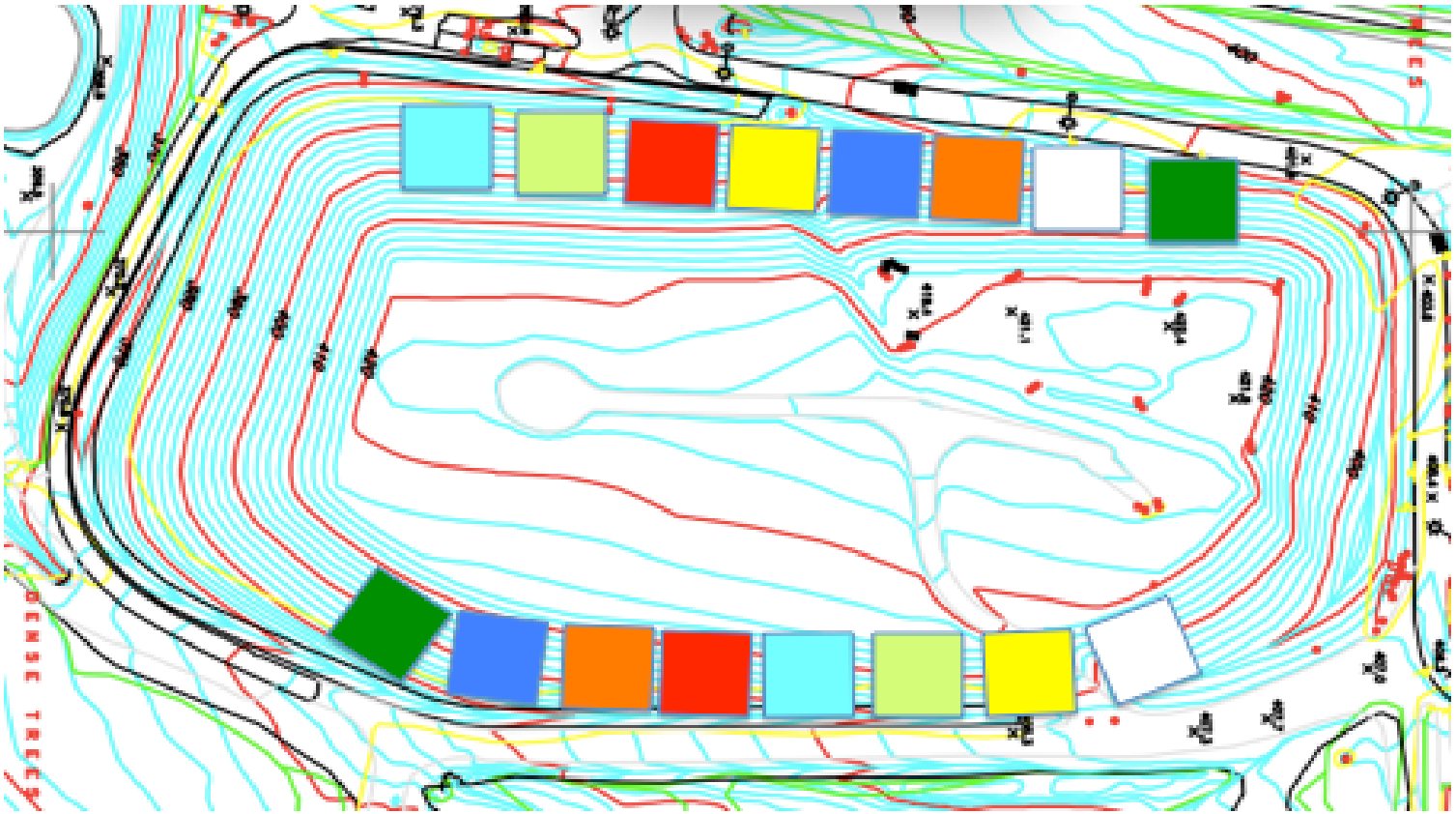
- Compare effectiveness of mixes to capture and store carbon;
- Evaluate N_2O emissions associated with organic amendments;
- Compare plant growth on the test plots;

Sampling and evaluation

- 16 - 75’ X 75’ plots
- 2 replicates of each compost mix;
- ½ plot layered, ½ plot ripped
- Sterile grass mix planted 1st year
- Various tree seedlings after 1st year

- Soil texture, bulk density;
- carbon content, nitrogen, N_2O emissions
- Water infiltration rate;
- Plant density, growth rate, total biomass

Each color square= 1 treatment measures 75' x 75'



Treatment table

Treatments	Compost	Wood	Fill
	quantities per acre (yds)		
GroCo compost	500		
Restoration mix	500		
Restoration mix, double	1000		
Restoration mix + wood chips	500	100	
Restoration mix + fill	500		1000
Cedar Grove compost, double	1000		
Control			
Cedar Grove compost + fill	500		1000

Amendment Composition

- Groco- Class A biosolids compost made with sawdust. Screened fully cured
- Restoration mix- Class A biosolids compost made with storm clearing debris
- Cedar Grove- Class A compost made with yard waste and food scraps
- Clean fill – inorganic soil material, meets all testing requirements
- Woody debris- chipped storm clearing woody debris

Island Center Forest

Broadscale-application

Other Cooperators

- Natural Resources Conservation Service
- US Geologic Survey
- Washington Dept. of Ecology
- KC DDES
- Friends of Island Center Forest
- Vashon Forest Stewards