



Climate preparedness & the role of biosolids

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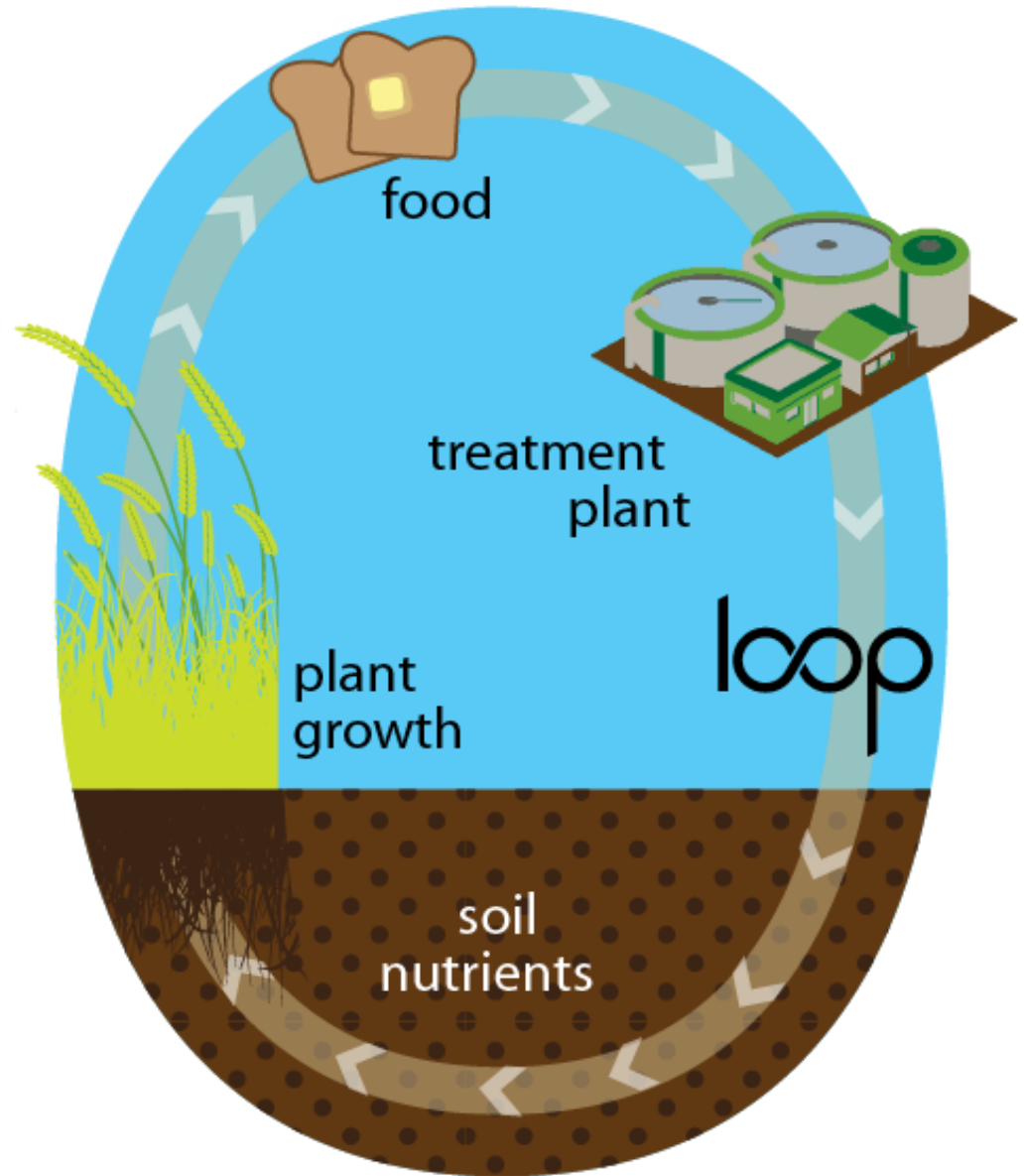
Agricultural challenges in the time of climate change

- Drought
- Erosion
- Fertilizer shortages
- Crop Failure



Mansfield, WA, 2015

What are biosolids?





Biosolids agronomic application on a dryland wheat field.



A typical agricultural application rate

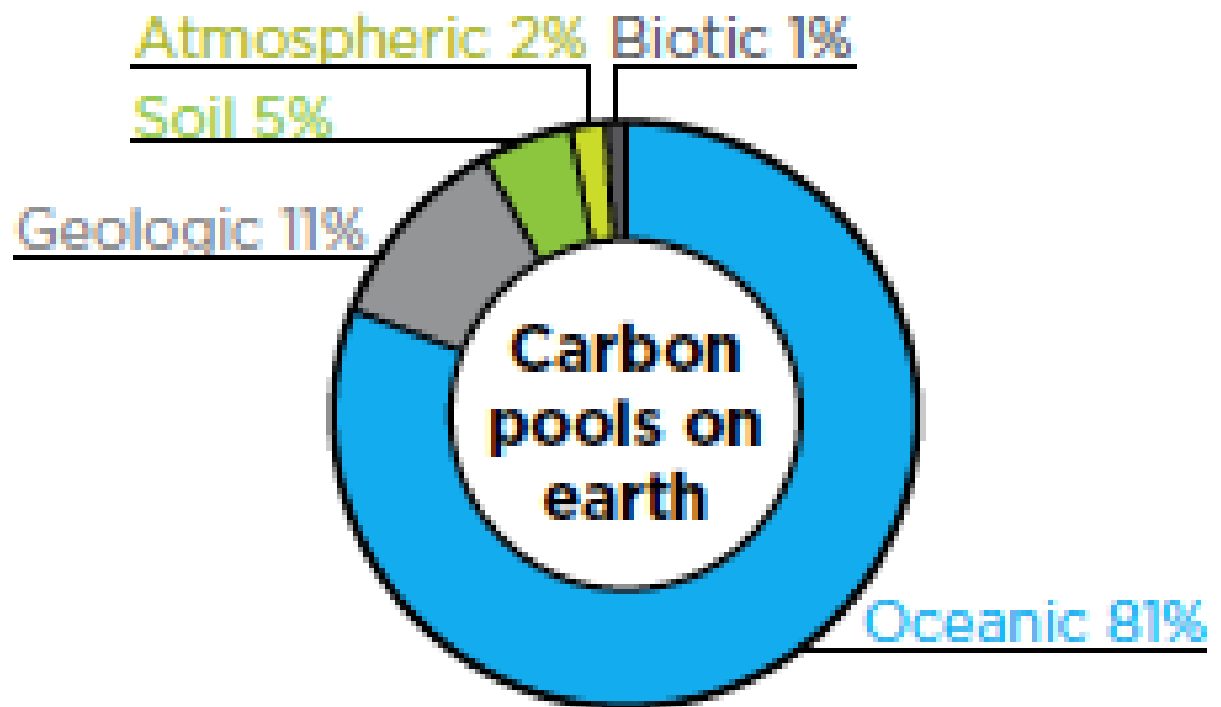
Beneficial Soil Amendment

- Increases soil organic matter
- Adds nutrients
- Improves soil structure
- Increases water retention
- Stimulates plant growth
- Reduces erosion
- Affordable fertilizer
 - Helps keep farmers in business
 - Aids local food security, economic health



Carbon Around the Planet

Soil is an important global storage location for carbon.



Dryland wheat long-term research



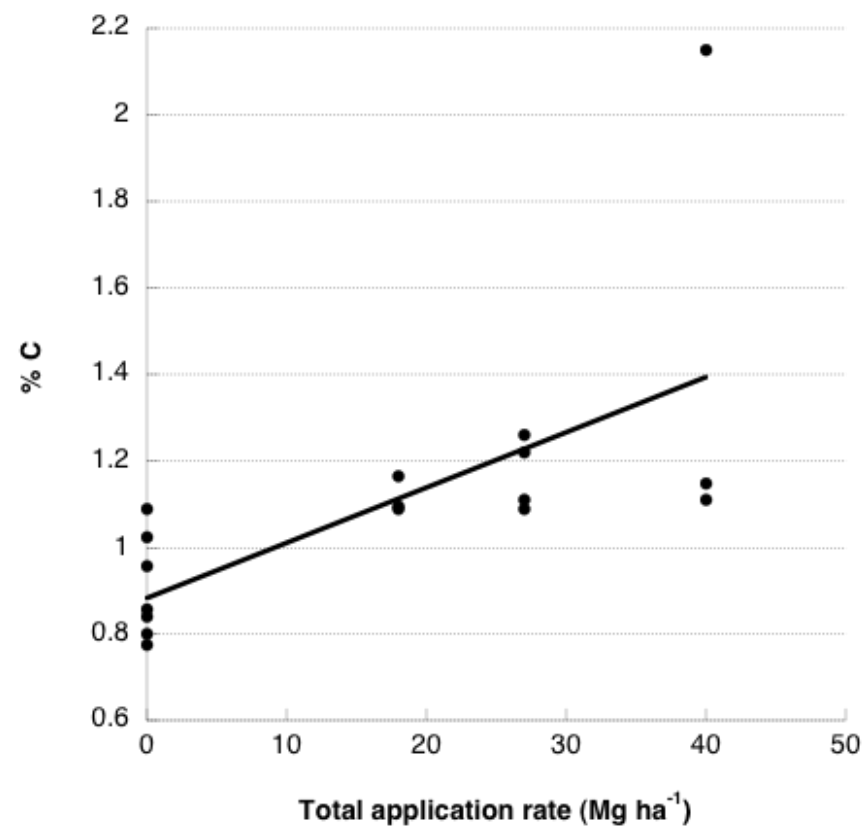
- Douglas County, WA
1994-present
- Alternating winter wheat
and fallow
(crop planted every 2 years)
- Biosolids applied every 4th
year
(2 harvests/application)

Dryland wheat long-term research



- Biosolids rates:
2, 3, 4.5 dry tons/a
each application
(every other crop)
- Inorganic N 50 lb/a
each crop
- Zero-N control

Total biosolids applied 1994 – 2010: 10-22 tons/acre



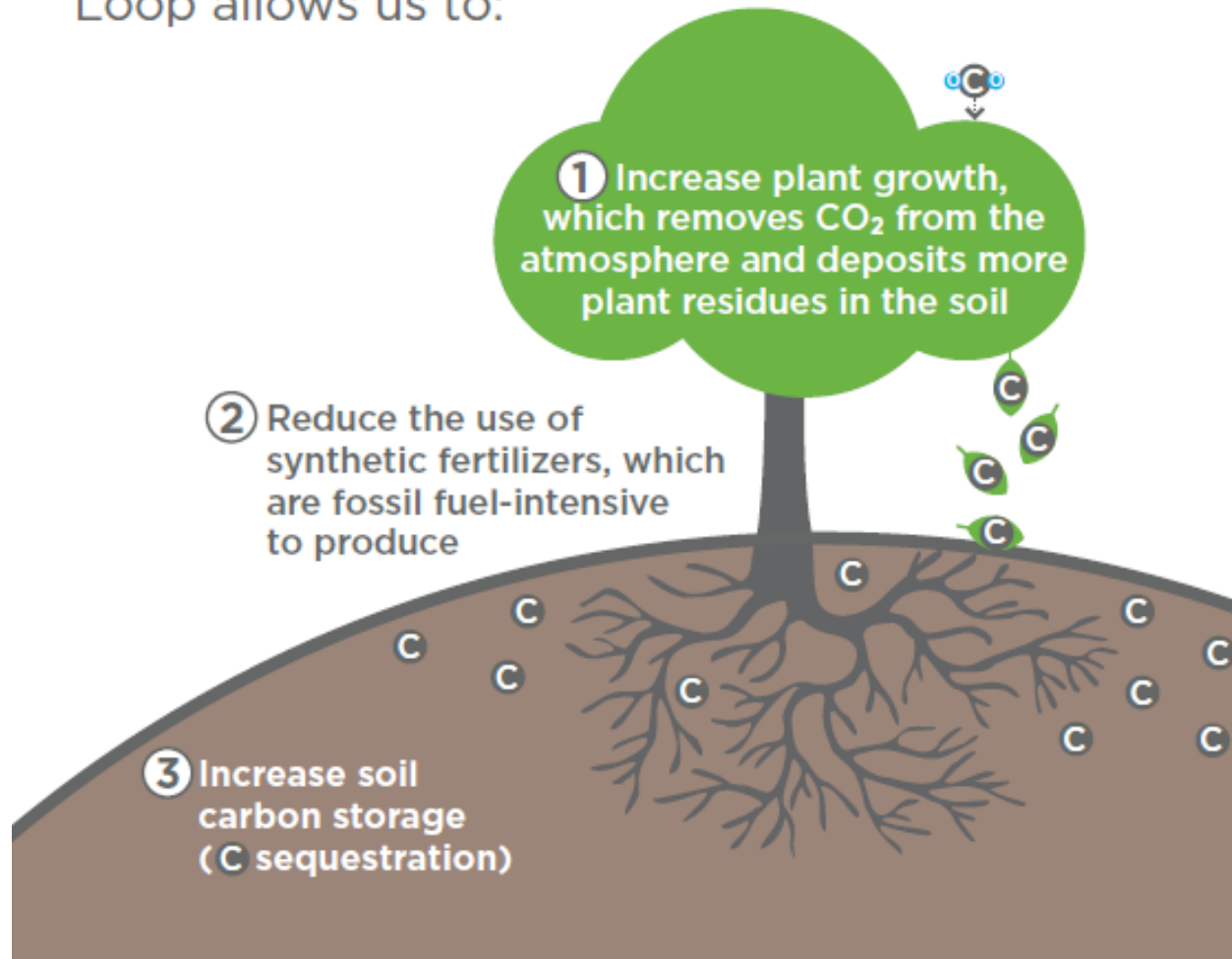
C response to biosolids application rate in the 0-15cm depth of the soil profile at field GP-17. $r^2=0.48$, $p<0.001$.

All biosolids application rates increased organic matter in the upper 15cm of soil

Carbon Accounting for WTD Loop Biosolids - 2015						
	Carbon Credits (per dry metric ton)		Carbon Emissions (per dry metric ton)	Net Carbon		
Project	Accumulation of Carbon in Soil	Replacement of Synthetic Fertilizer	Diesel For Application of Biosolids*	Sum of Credits and Emissions	Biosolids Recycled/ project	Net Carbon/ Project
	(Mt CO2e)		(Mt CO2e)	(Mt CO2e)	(Dry Mt)	(Mt CO2e)
Douglas Co. Agriculture	1.25	0.29	0.00	1.54	18,174	27988
Yakima Co. Agriculture	1.25	0.29	-0.02	1.53	3,687	5623
GroCo Compost	0.35	0.29	-0.06	0.58	350	204
Western WA Forestry	1.00	0.00	0.00	1.00	3,441	3441
Lind (WSU)	1.25	0.29	-0.02	1.53	5	7
			Net carbon (Mt CO2e) offset from Loop land application:			37,263

*Emissions associated with the transportation and application of Loop are calculated as zero for projects where WTD owns the equipment and pays for the fuel (transportation from the plants and application in Douglas County agriculture and western WA forestry) . These emissions are included in WTD's division-wide fuel emissions.

Fertilizing with carbon-rich
Loop allows us to:



We offset over 38,000 tons of CO₂ equivalents in 2013

That's like
taking

8,000

cars
off the road!



Building soil carbon

Climate Impacts:

Increased drought



Increased storm intensity



Soil organic matter can have a profound impact to mitigate these consequences of climate change.

Organic matter supplied by compost or biosolids can help soils hold significantly more water

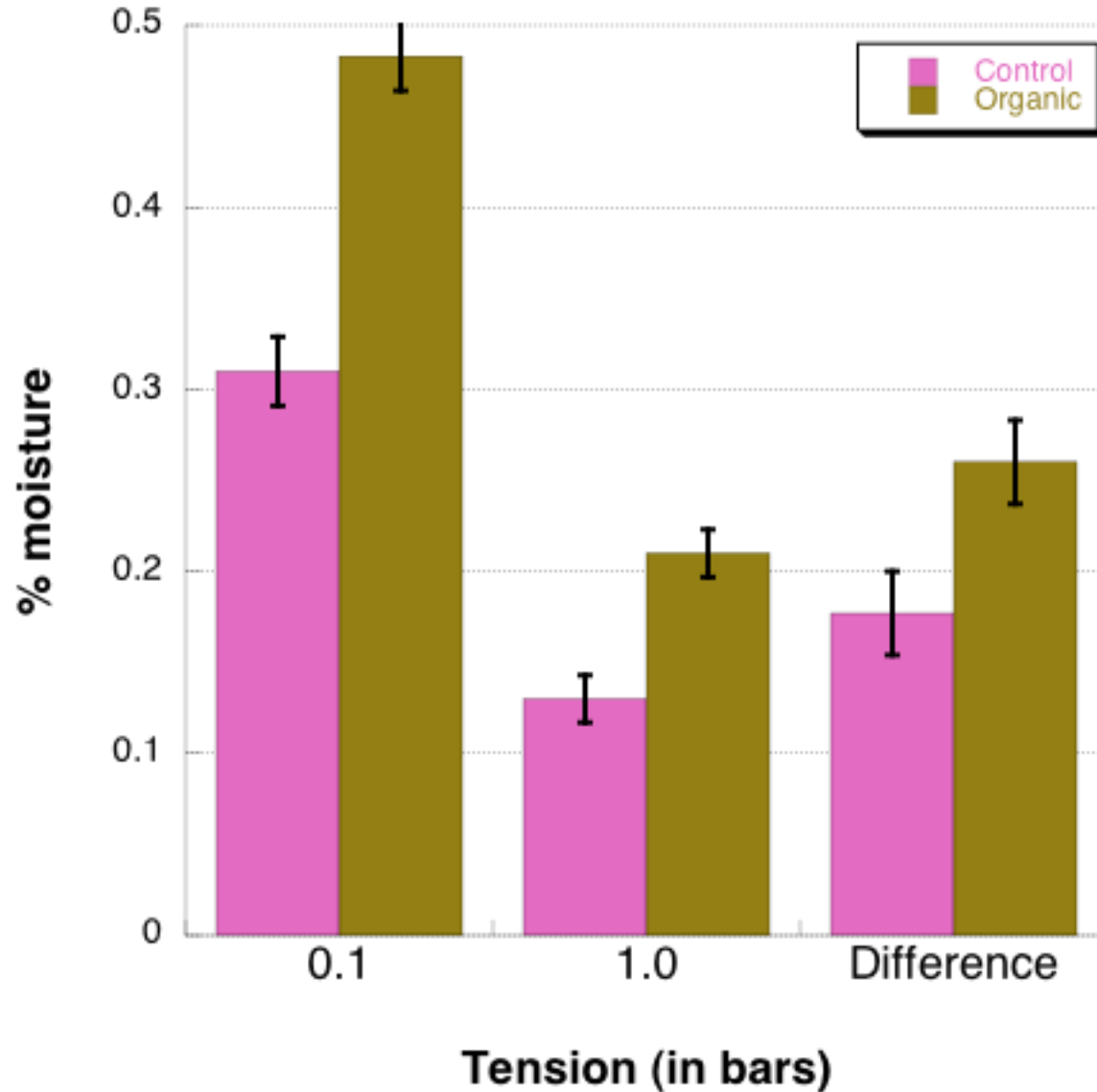
- Stormwater runoff reduced
 - UGA study: compost applied to soil surface can absorb 80% of a 4" rainfall event, with runoff reductions between 60 and 97% (over multiple high intensity storms)
 - SDSU: compost applications reduced stormwater by up to 94%, with similar reductions in soil erosion
- Irrigation needs reduced
 - MSU study: for every 1% increase in SOM, soil is able to hold up to 16,500 gallons of plant available water per acre.
 - UGA study: compost-amended soils can reduce irrigation needs by 30%



Photos courtesy of Filtered the national

Compost blankets can reduce stormwater and sequester carbon.

Soil water holding capacity: eastern WA cherry orchards



Erosion...





Biosolids help our region:

- mitigate net CO₂ emissions and
- be more resilient with the changing climate
 - Drought
 - Flooding
 - Erosion
 - Renewable fertilizer

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