

Ecosystem services: roots

Big roots for
big problems

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Ecosystems provide goods and services

Ecosystem goods

- Crop production
- Wood and other fibers
- Livestock
- Fisheries
- Drinking and irrigation water
- Peat
- Charcoal
- etc.



Ecosystem services

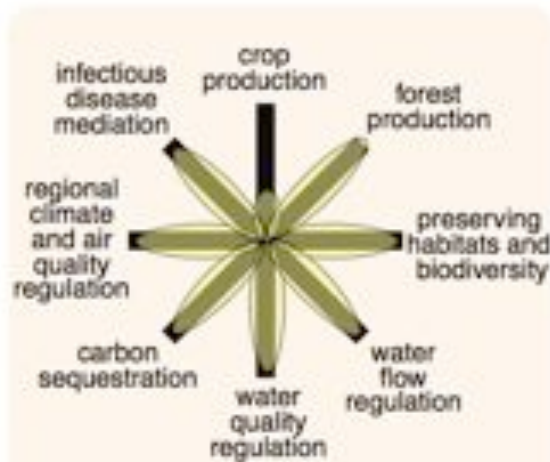
The processes by which the environment produces resources that we often take for granted such as clean water, timber, and habitat for fisheries, and pollination of native and agricultural plants.

Whether we find ourselves in the city or a rural area, the ecosystems in which humans live provide goods and services that are very familiar to us.

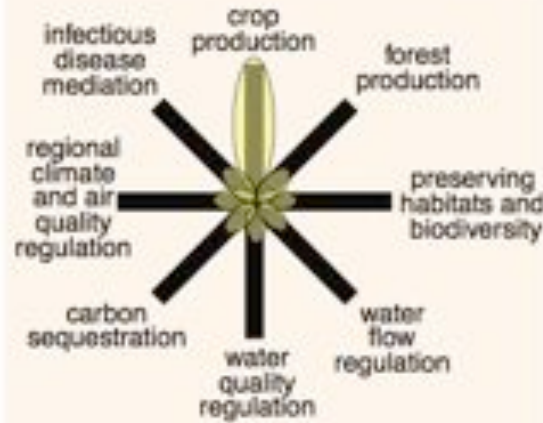
Ecosystems provide goods and services

Ecological economics

an attempt to quantify the less tangible benefits of ecosystems



natural ecosystem



intensive cropland



cropland with restored ecosystem services

Four Categories of Ecosystem Services

1. Supporting

- Laying the foundation for all ecosystem services

2. Cultural

- Non-material benefits humans obtain from nature

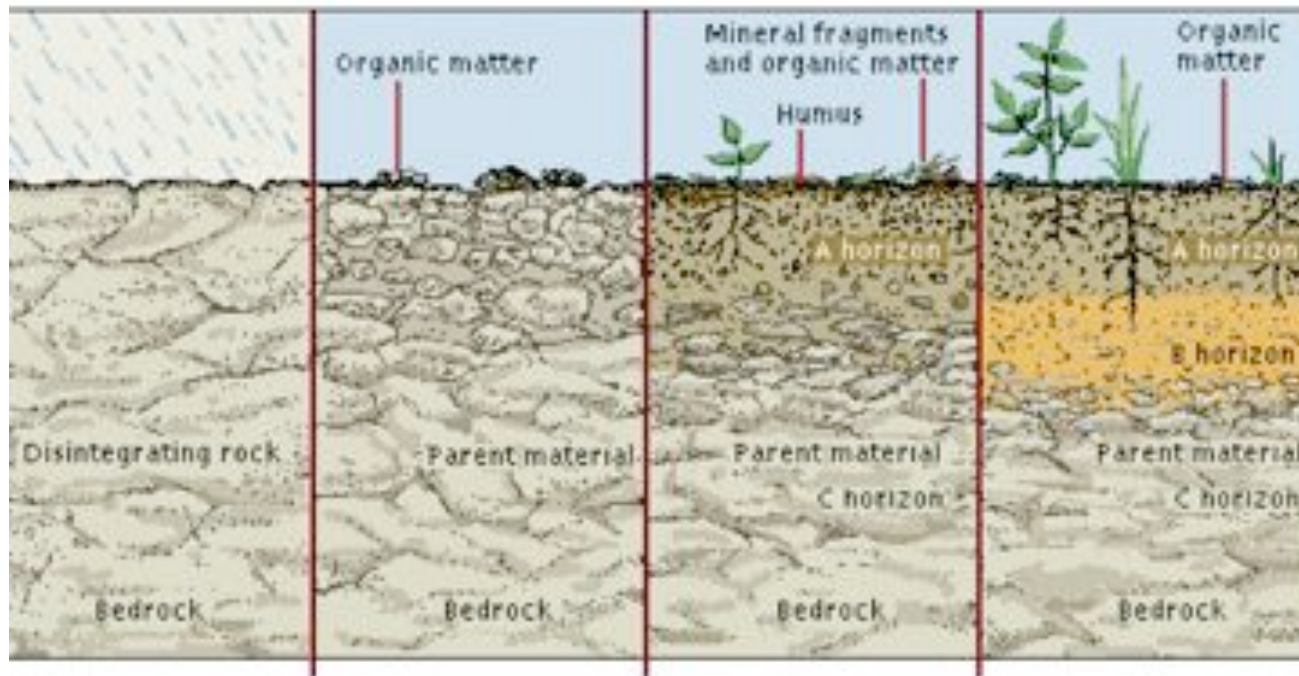
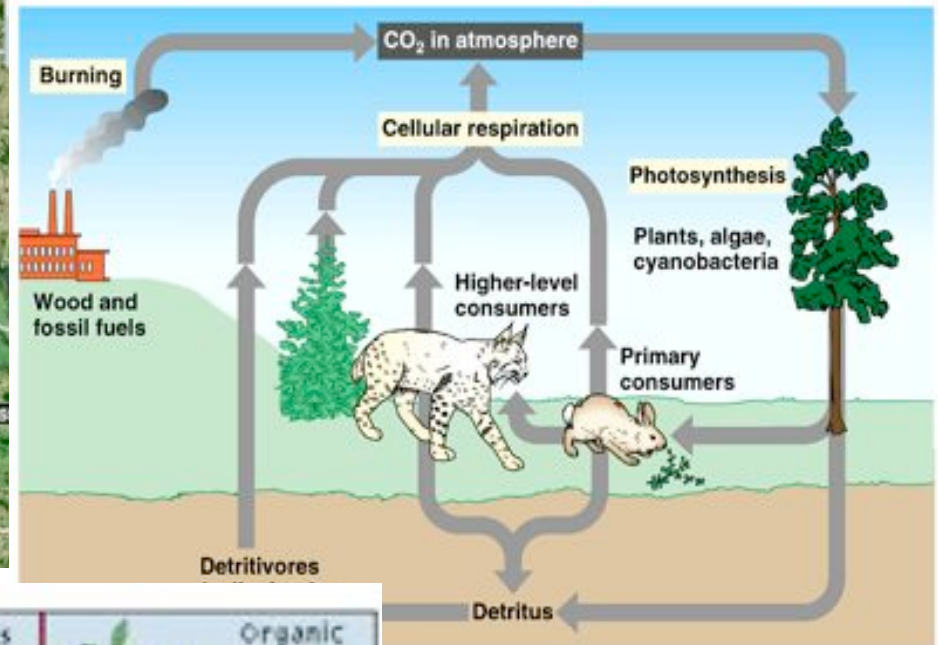
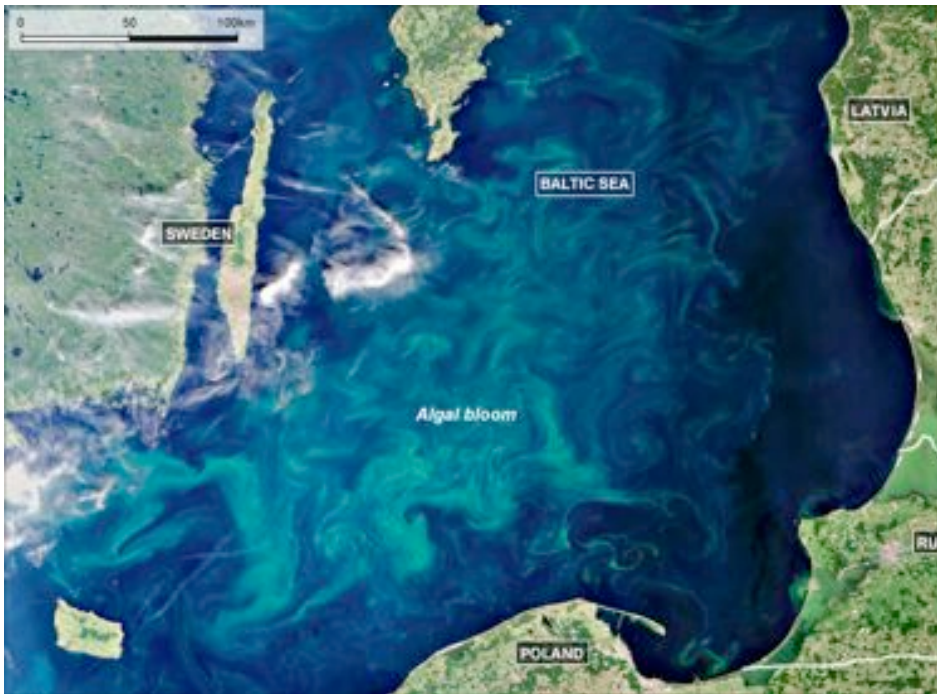
3. Provisioning

- Products obtained from ecosystems

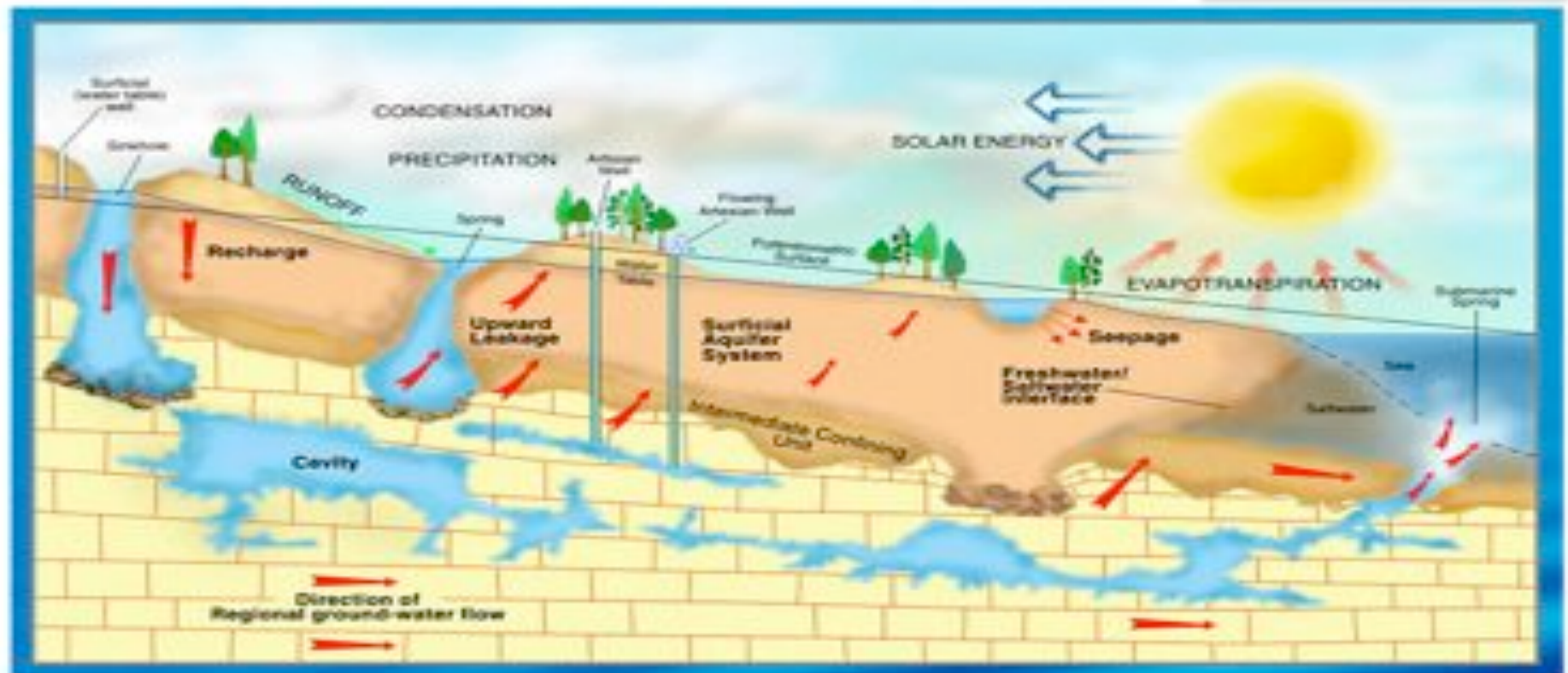
4. Regulating

- Benefits realized through the regulation of ecosystem processes

Supporting Services



Supporting Services



Cultural Services

Non-material benefits humans obtain from nature

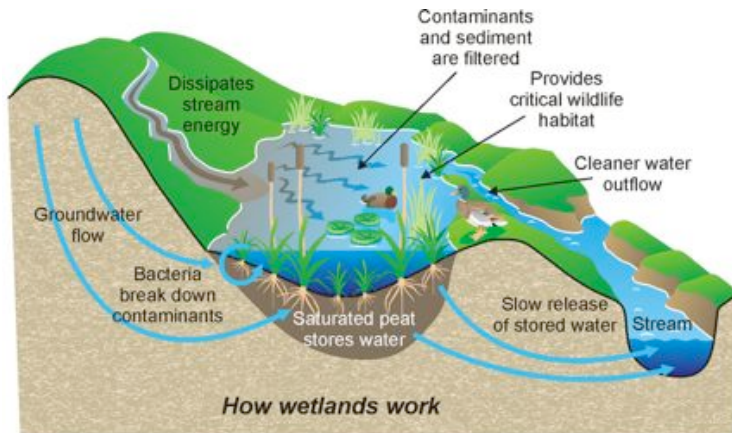


Provisioning Services

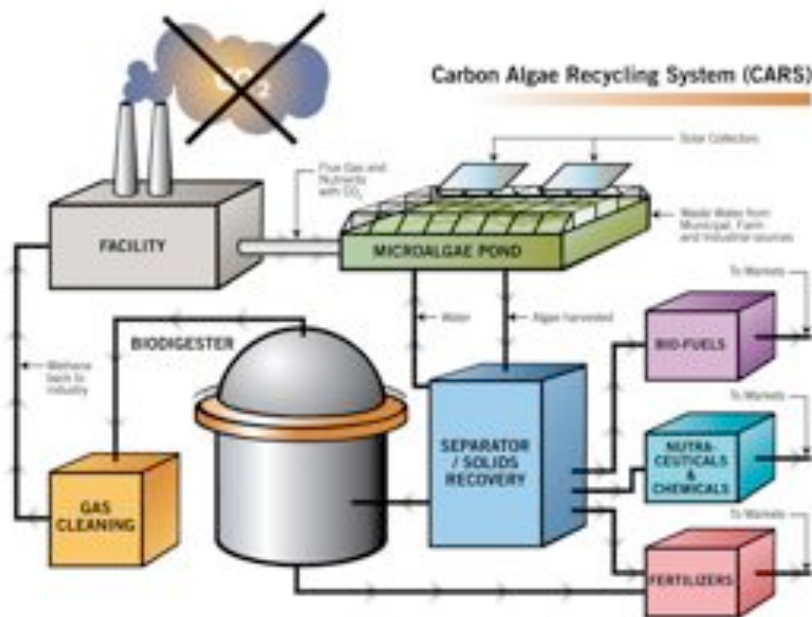


Regulating Services

Benefits realized through the regulation of ecosystem processes

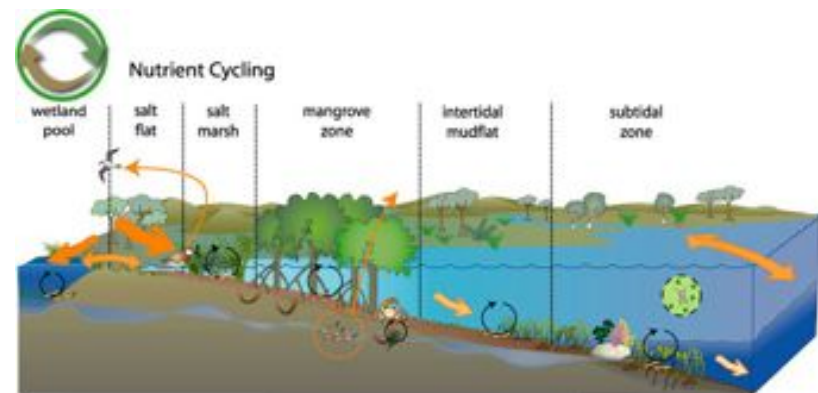


Regulating: Algal Biofuel Generation



Zooming In On Roots!

- Roots in particular are one plant trait that provides several ecosystem services
 - Nutrient cycling
 - Building topsoil
 - Carbon sequestration
 - *Erosion control
 - *Drought resistance



Lab Demonstrations

- Comparison of Root Systems with Drought (Native v. Exotic)
- Erosion Control
- Root Throwdown
- How We Can Give You \$\$\$\$

Roots and Erosion

- Plant roots hold soil together in an intertwining mass that protects against wind and water erosion
- Larger root systems are better at holding soil together



Loss of plant cover leads to soil erosion.

Storm erosion on Lower Cape...



Demo: Soil Erosion Boxes

- Two boxes with soil
 - 1 with vegetation cover
 - 1 with no vegetation
- Pour water through boxes to test for soil erosion
 - Dark, muddy water = lots of erosion
 - Clear water = no erosion
- Which box do you think will have less erosion?



Now its your turn!



- Time to build your own roots!
- Groups of 2-3
- Using pipe cleaners to represent roots, build your own root system
- After you have built your roots we are going to add soil and see how resistant your mini “prairie” is to water erosion

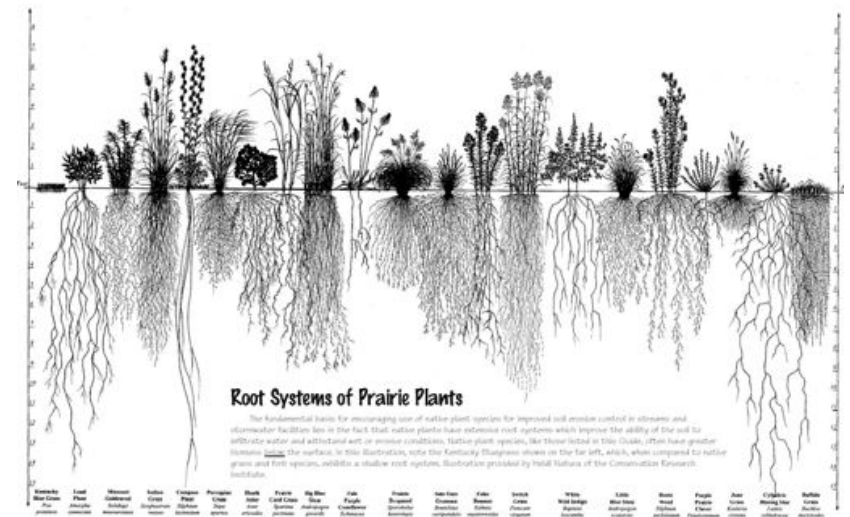


Roots of native vs. non-native plants?

Good roots= deep, aerating,
fibrous, diverse structure

Landscape= dominated by a low diversity of non-natives

Restoration= a diversity of native species adapted to local conditions

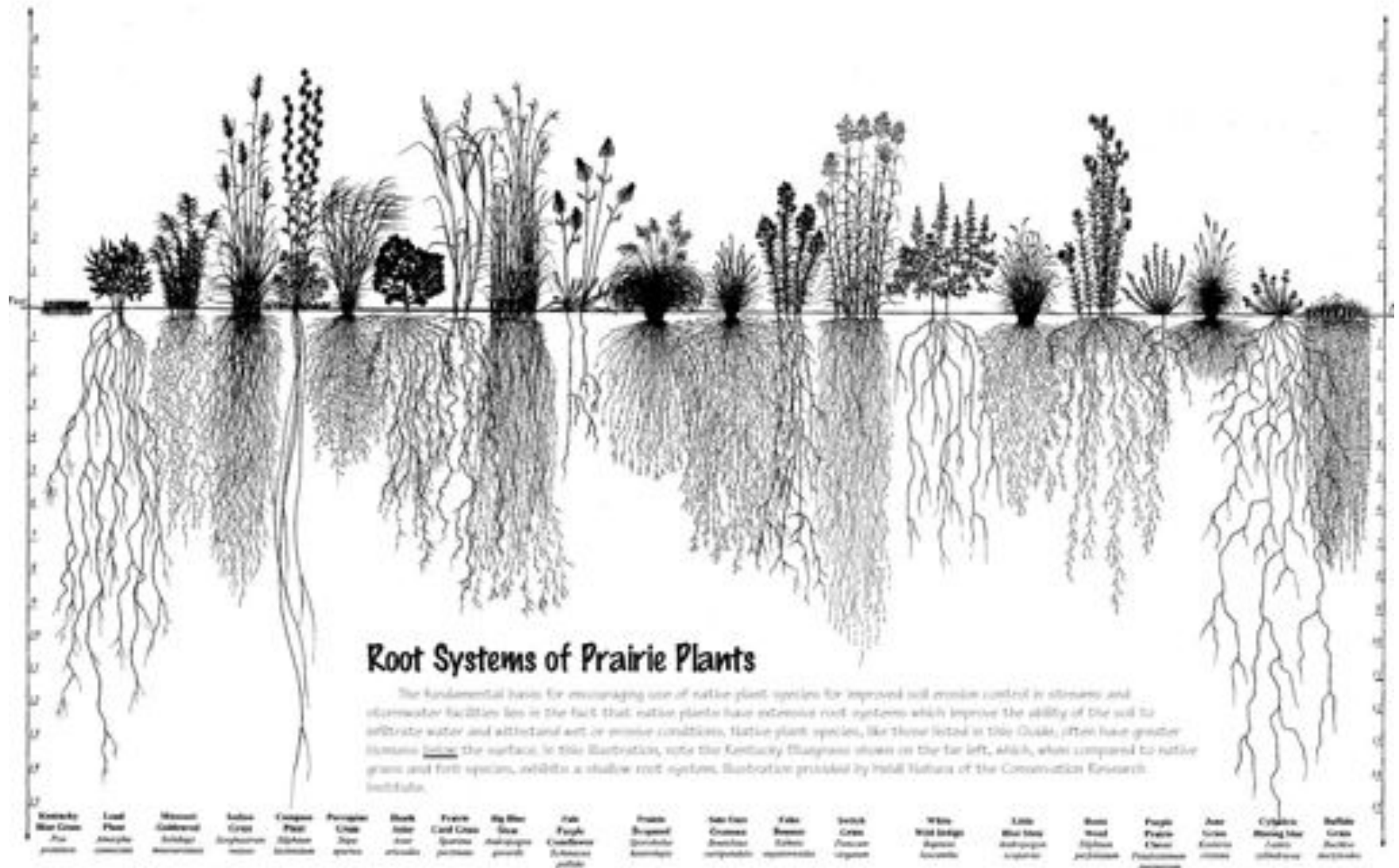


Drought Treatment

- Groups will be assigned a plant species that was subjected to 3 water regimes
 - Everyday (Control), x3 a week (Trt 1), x1 a week (Trt 3)
- Count the number of leaves
- We will then compare the change in leaf number from the control and each drought treatment for both native and exotic species



Roots of native vs. non-native plants?



Summary: what about the Roots?

- Provide several valuable ecosystem services
- We demonstrated “drought resistance” and erosion control
- Better roots=deep, aerating, fibrous, diverse structure =
A BETTER WORLD!



Grant Proposals

Funding from Project GREEN has allowed us to offer a funding opportunity for your districts!

- Teachers may submit a 1-page grant proposal that outlines a project that harnesses the many environmental benefits of native plants
- An itemized budget (capped at \$500) is also required
- Up to three grants will be funded
- A short write-up will also need to be submitted to illustrate how the funds were utilized for Project GREEN

