BIORETENTION GARDEN DESIGN

Context

Is a Bioretention Garden System Right for Your Site?

- Drainage
  - Connected or disconnected
  - Slope
- Space
  - Is there enough available space?
- Sustainability
  - Will it be maintained
  - Is it affordable
- Is there a better or more appropriate system?

Other BMP system options to consider

- Level spreaders
- Wet ponds
- Bioswales
- Porous/pervious paving
- Rain barrels, above-ground cisterns
- Below-ground cisterns, dry wells and modular storage

Critical Consideration: Potential Design Objectives

- Enhance water quality through filtration and plant uptake
- Reduce peak runoff quantities
- Storage to meet regulatory requirements (address WQv and/or additional volumes associated with significant storm events)

Understanding the Landscape

To be successful, the bioretention garden designer must have a full understanding of the particular landscape in which they are working.

Nebraska's Environment

- Prairie Heritage
- Spring and early summer storms
- Warm/hot summers – often dry
- Deep loess soils
- Native vegetation – deep roots
- Impact of urbanization

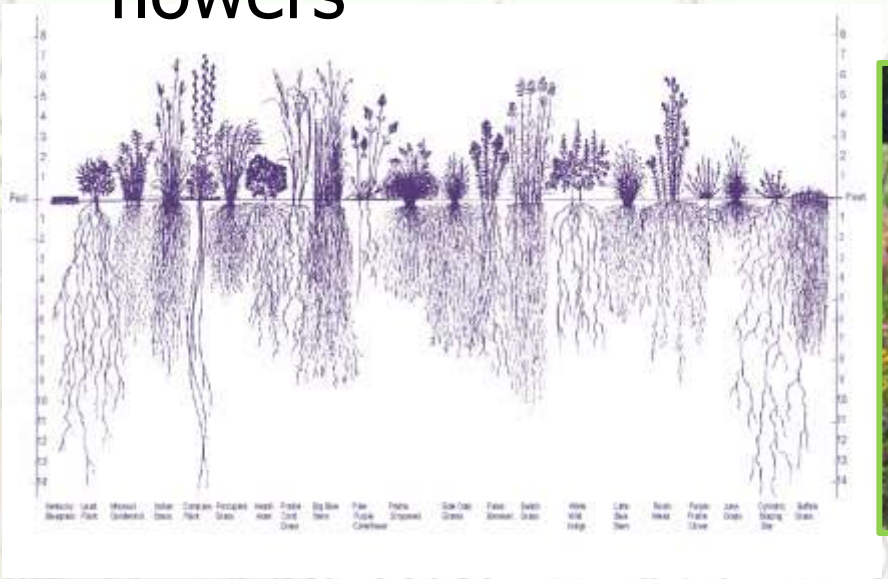
Nebraska's Environment

- Rolling landscapes
- Established urban/expanding urban areas
- Incised streams, degraded water quality

Effective stormwater management requires integrated management of water, vegetation, and soil

The Wisdom of Native Plants

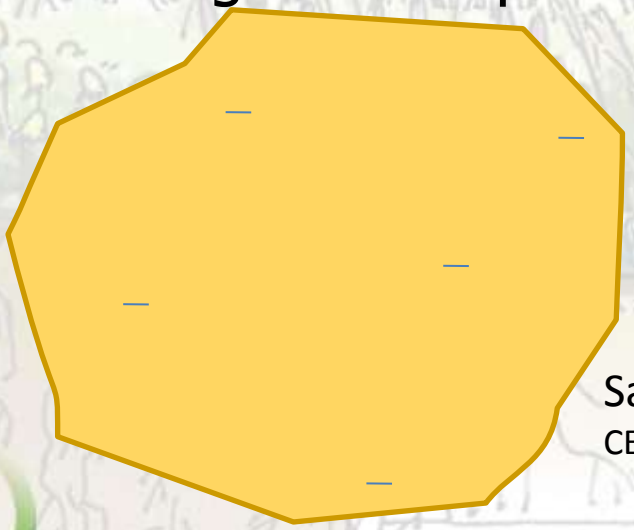
- Adapted to this region
- Water and nutrient stingy
- Deep roots
- Beautiful leaves and flowers



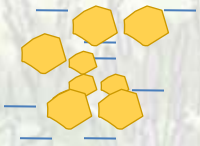
Soil: How it "Works"

Soil Chemistry

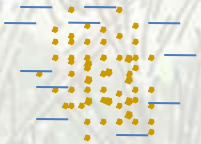
- Soil particles have negative charges on surface – attract cations (metals and salts)
- Adsorption – cation exchange (CEC)
- Finer soils have more surface area and higher CEC
- Organic soils have highest CEC, also attract organic compounds



Sand
CEC 2-6 meq/100g

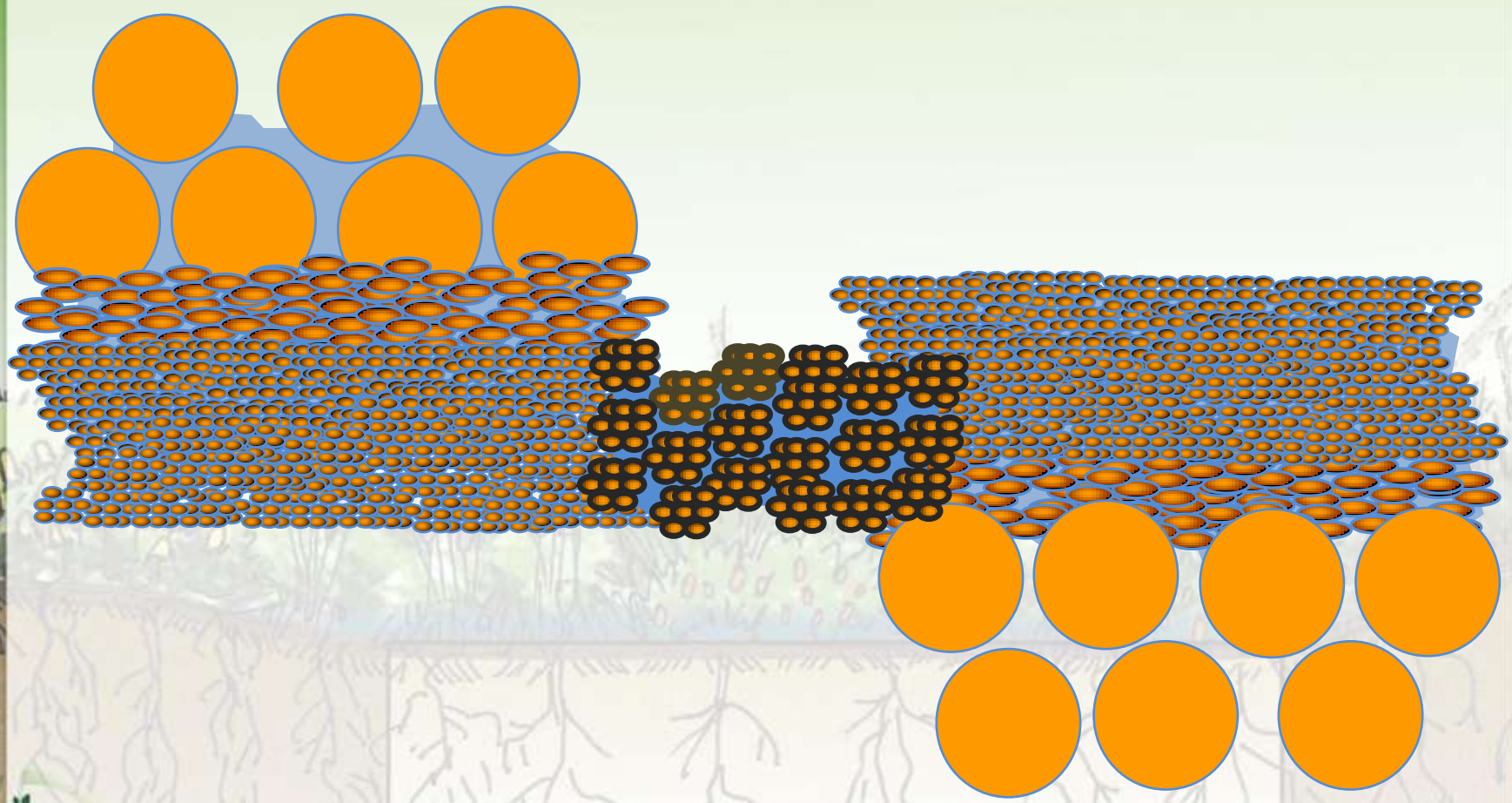


Silt
CEC 10-25 meq/100g



Clay
CEC 20-75 meq/100g

Drainage of Water into Soil



Soil: How it "Works"

1. *Organic Matter – Carbon*
2. *Soil Microflora – Bacteria and Fungi*
3. *Hydrology*
   storage / evaporation / recharge / detention
4. *Storing Cycling Nutrients (bacteria / fungi)*
   phosphorous / nitrogen / carbon
5. *Soil Structure*
6. *Water Quality*

"Most diverse ecosystem in the world"