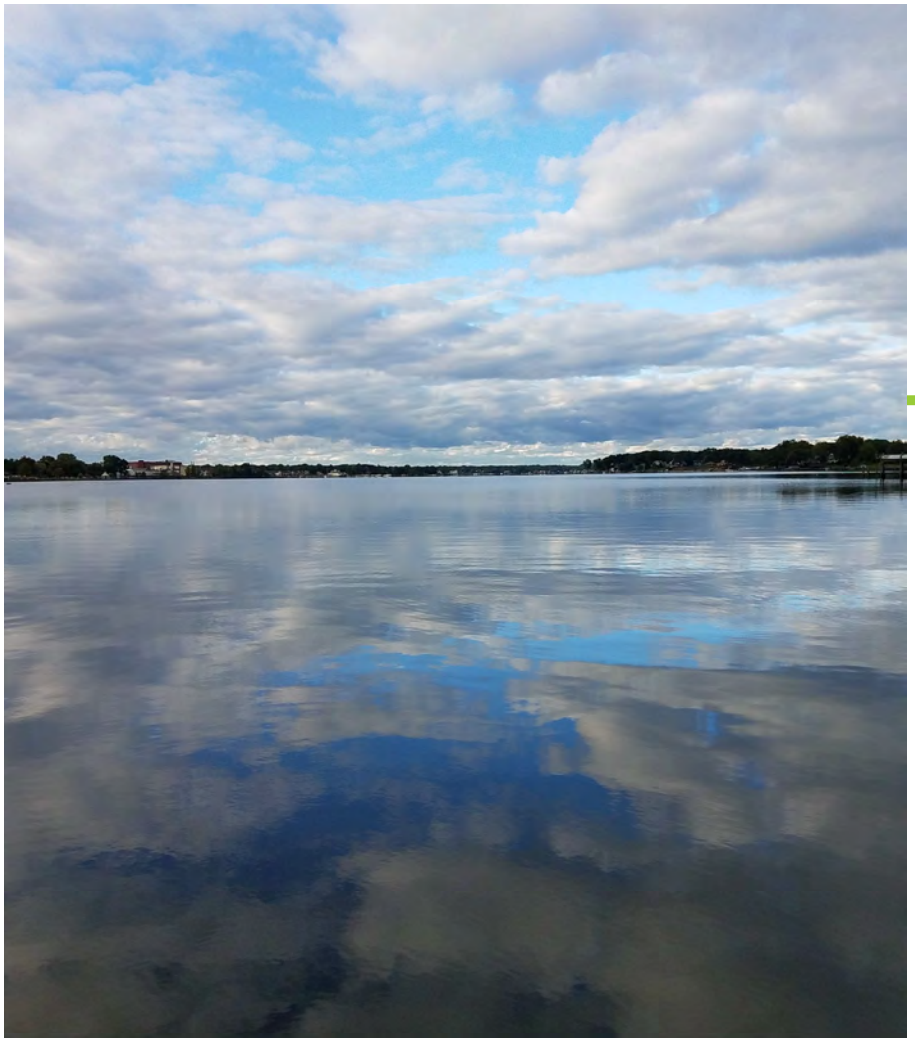
GREEN INFRASTRUCTURE 101

KELLY GOWARD, MACATAWA AREA COORDINATING COUNCIL

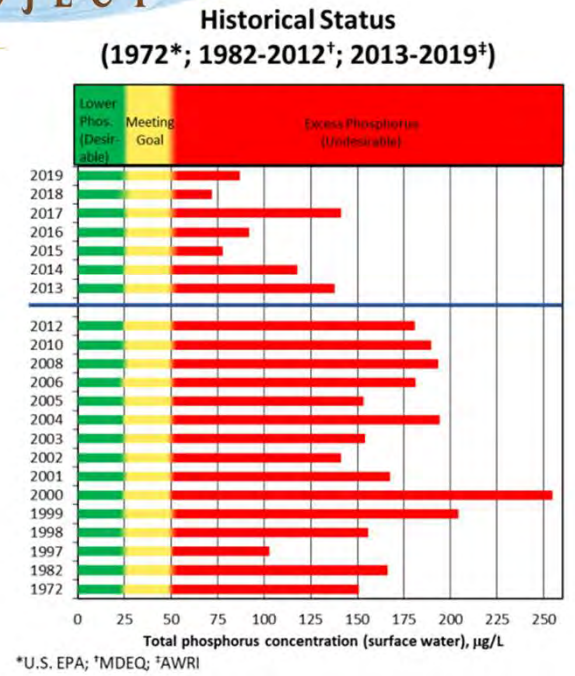


AGENDA

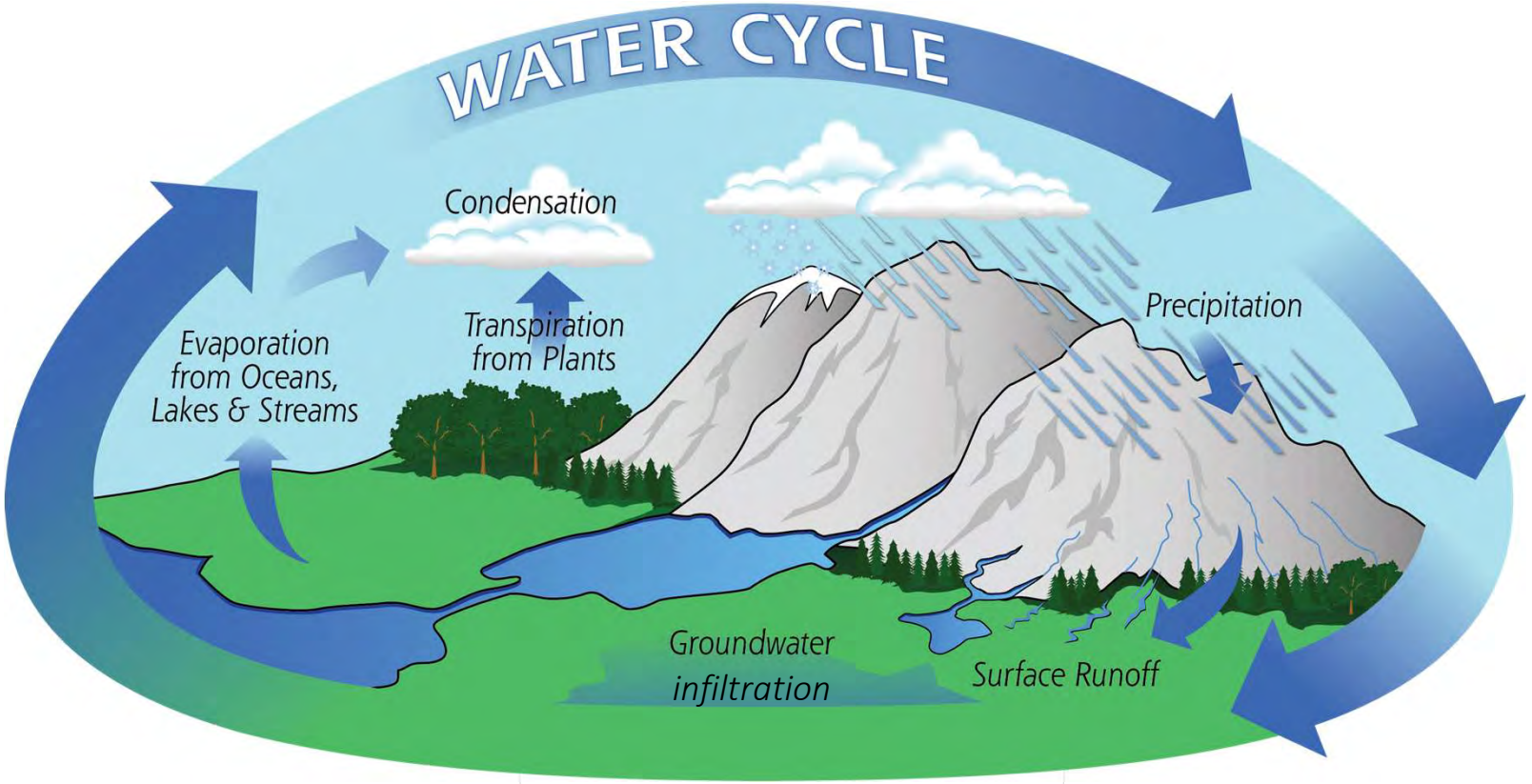
- Macatawa Watershed Project
- Water cycle review
- Terminology
- Types of green infrastructure

MACATAWA WATERSHED PROJECT

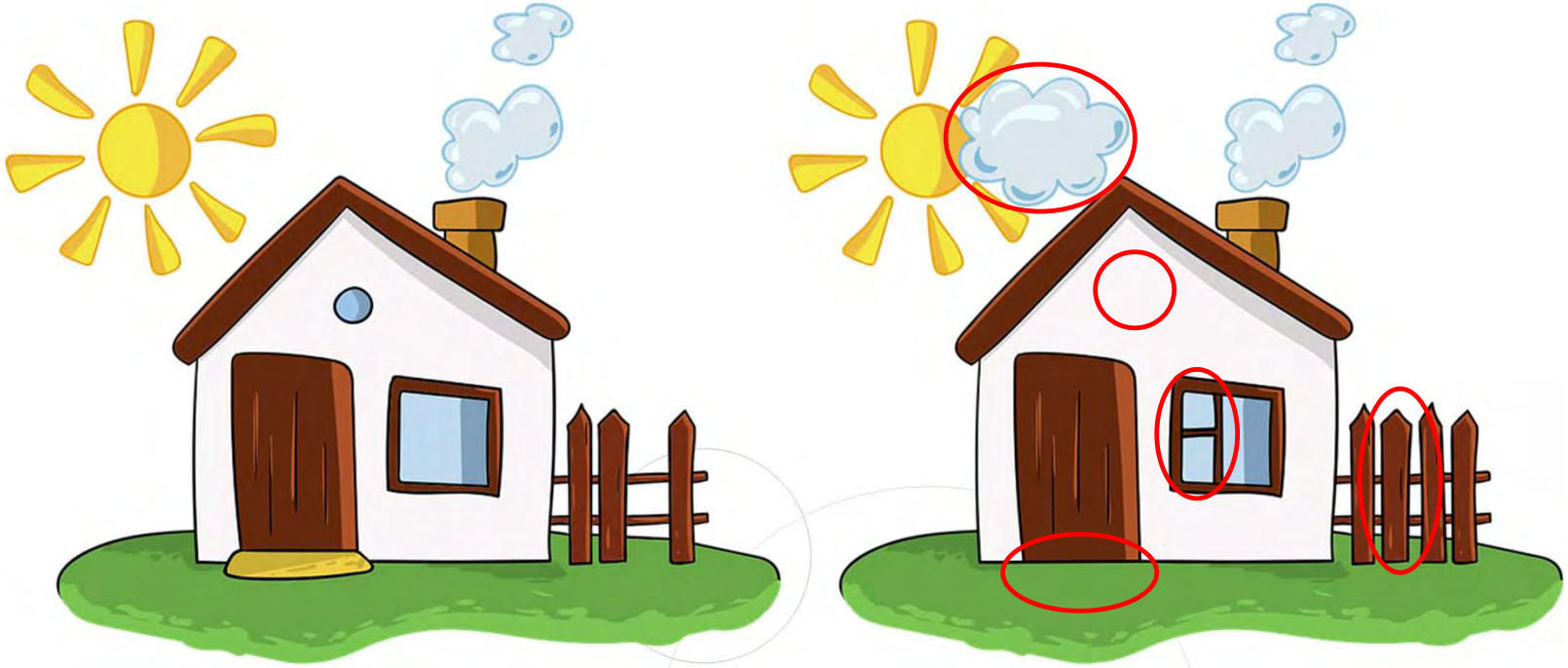
- Housed at the Macatawa Area Coordinating Council
- Started in 1996 in response to impaired water quality
  - Too much phosphorus and sediment
  - Impairments to aquatic habitat
- Public awareness, education, best management practices
- Project Clarity launched in 2013 to accelerate restoration
  - 92 acres of wetland restoration
  - 290 total acres protected
  - 3 miles of streambank restoration
  - 128 agricultural projects (65 farms, 10,000 acres)



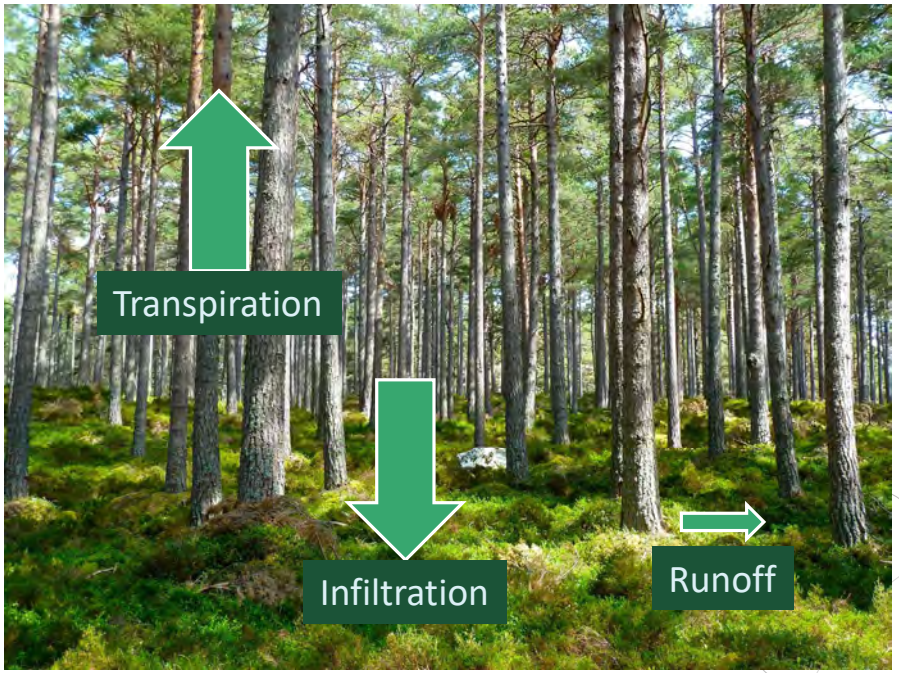
WATER CYCLE REVIEW

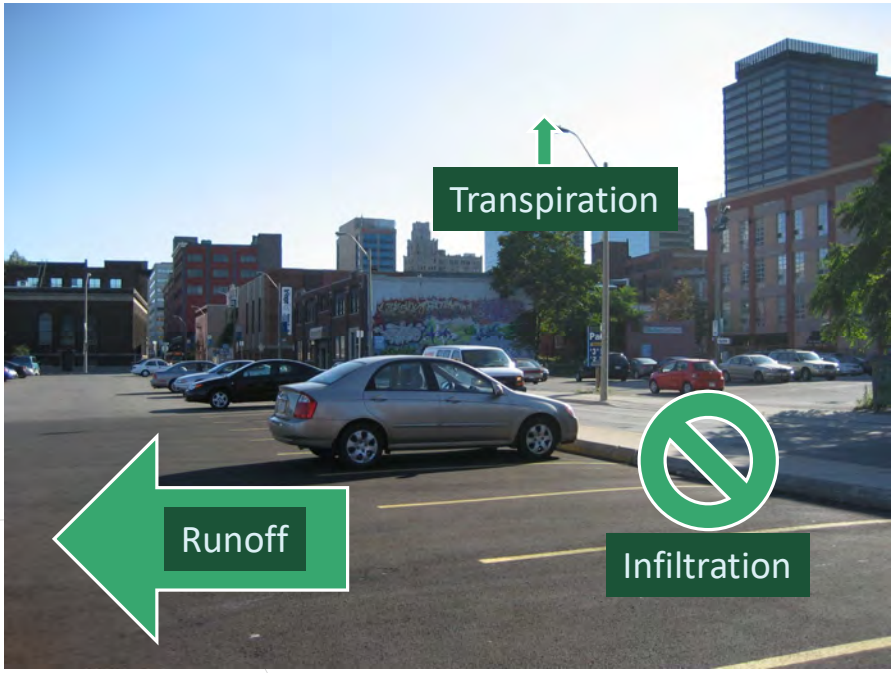


SPOT THE DIFFERENCES

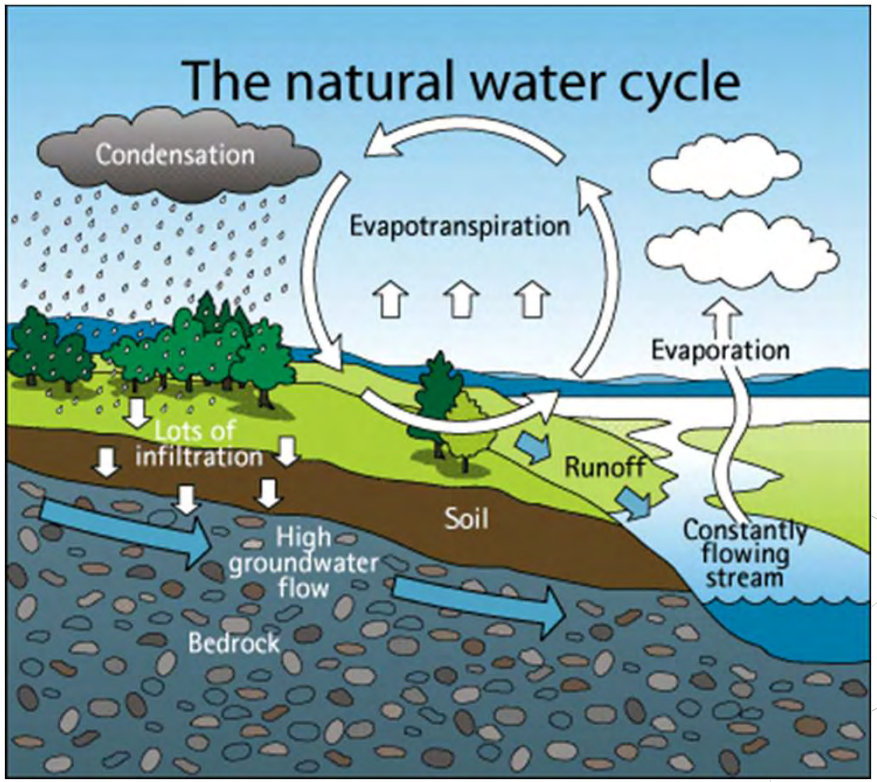


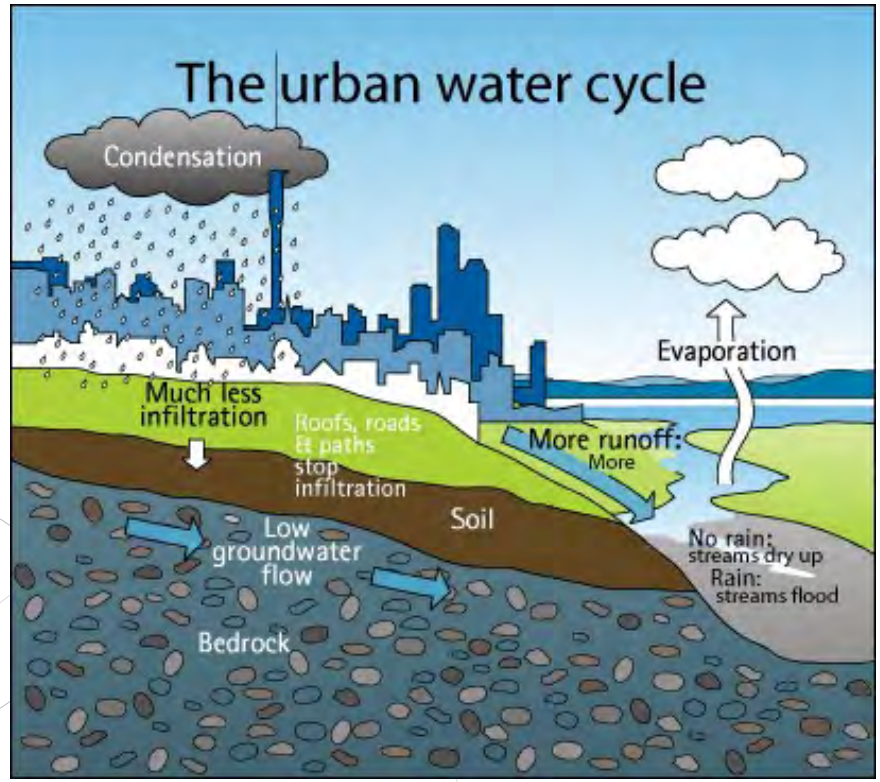
SPOT THE DIFFERENCES: WATER CYCLE EDITION





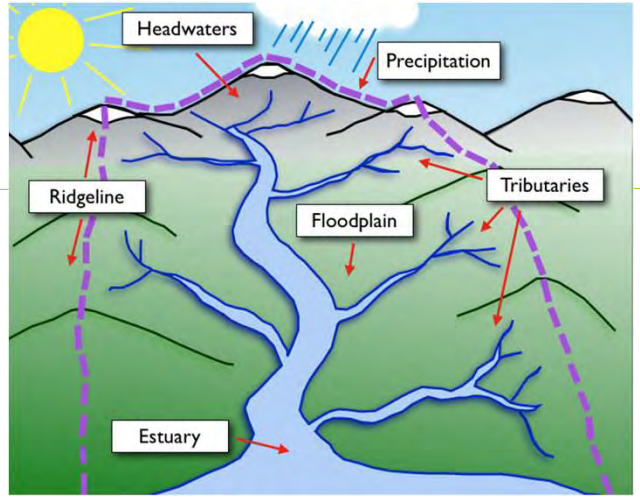
ALTERED WATER CYCLE

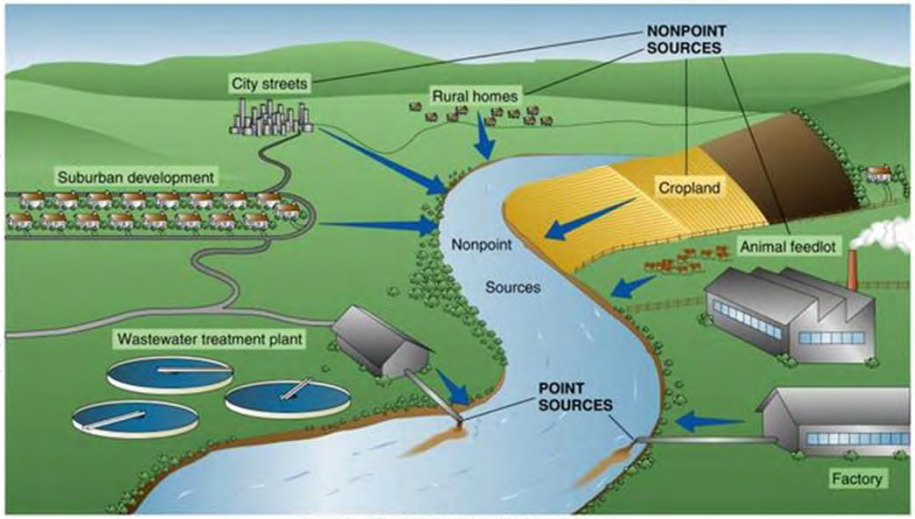




TERMINOLOGY

- Watershed
- Stormwater
  - Runoff that is generated from rain and snowmelt
  - Flows over land and impervious surfaces (paved roads, parking lots, buildings, etc.)
  - Does not soak into the ground
- Pollution
  - Point source
  - Non-point source





TERMINOLOGY, CON'T

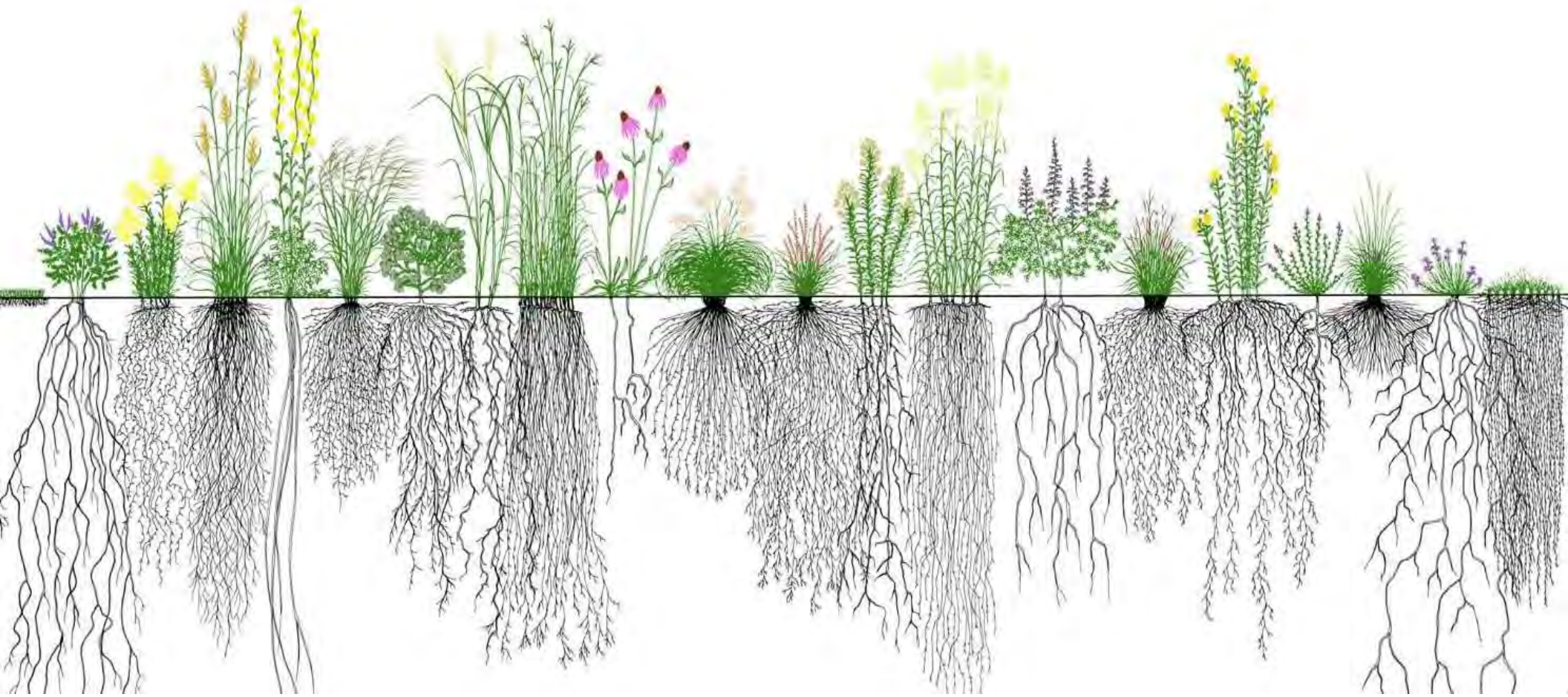
- Low impact development
  - Design approach that mimics natural processes: infiltration & evaporation
- Green infrastructure
  - Management of stormwater using natural processes
  - The natural environment (green space)
- Green stormwater infrastructure

TYPES OF GREEN STORMWATER INFRASTRUCTURE

- Non-structural
  - Native plant establishment/lawn conversion
  - Tree planting
- Structural
  - Bioretention/rain gardens
  - Planter boxes
  - Green roofs
  - Pervious pavement
  - Cisterns/rain barrels

NATIVE REVEGETATION/LAWN REDUCTION

- Reduce runoff, increase infiltration, increase transpiration
- Increase water conservation
- Decrease non-point source pollution
- Increase urban wildlife
- Entry-level/DIY

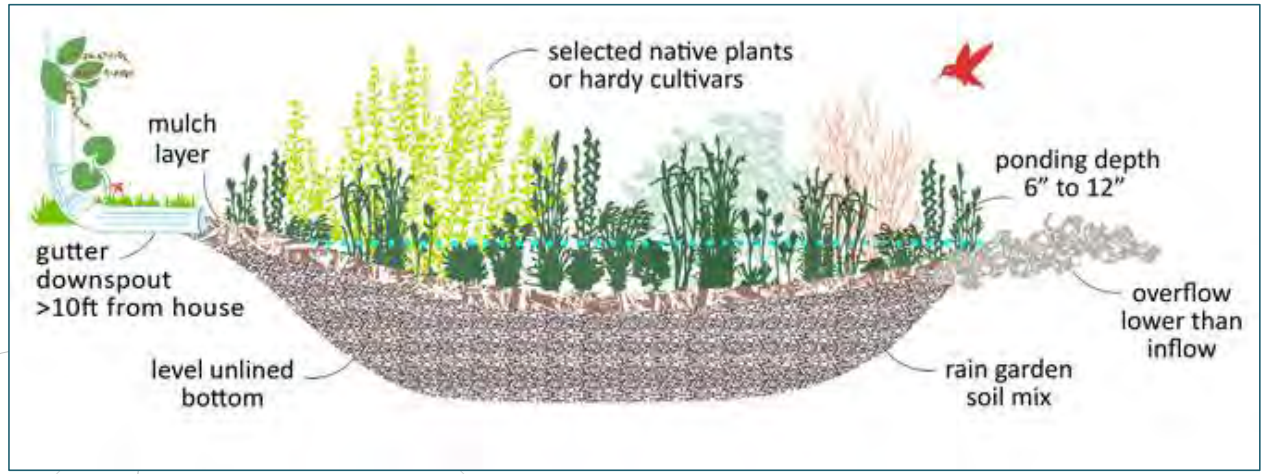


TREE PLANTING

- Reduce runoff, increase infiltration, **increase transpiration** (large oak - 40K gallons per year)
- Increase water conservation
- Decrease air pollution
- Increase energy efficiency
- Increase urban wildlife
- Entry-level/DIY

BIORETENTION/RAIN GARDENS

- **Increase infiltration**, increase transpiration
- Can be simple or engineered
  - Inlet
  - Ponding area/infiltration
  - Outlet/overflow
- Simple still requires calculations
- Entry-level/DIY to Advanced



PLANTER BOXES

- Increase infiltration, increase transpiration
- Can be simple or engineered
  - Inlet
  - Soil/filter media/storage
  - Outlet
- Simple still requires planning/design
- Moderate to Advanced

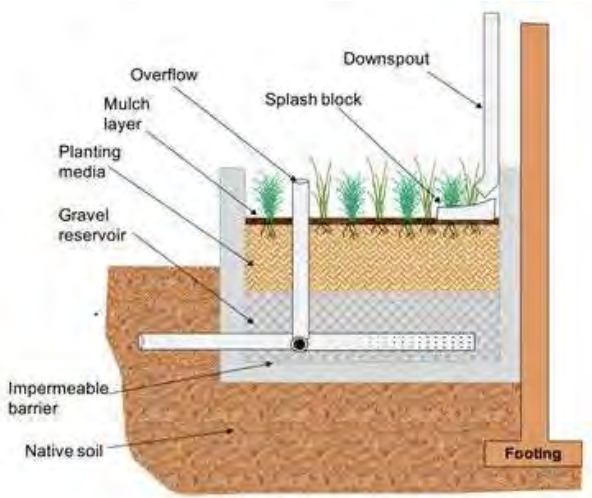
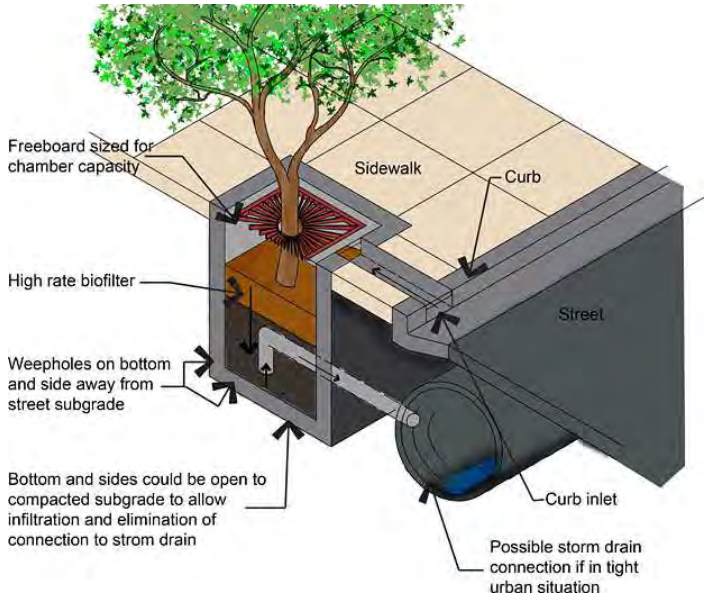
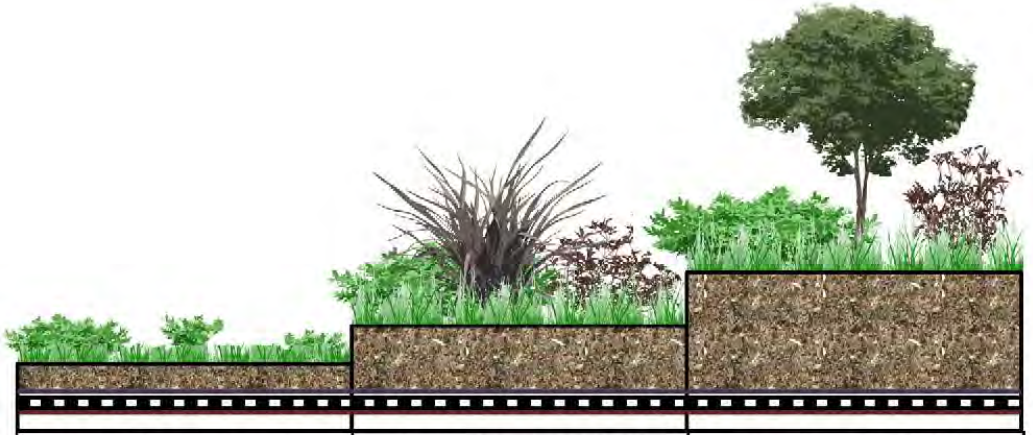


Illustration of a Planter Box



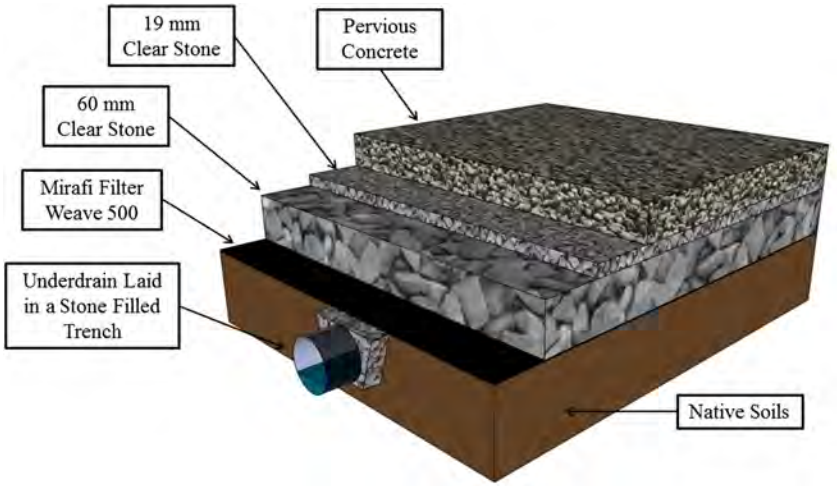
GREEN ROOF

- Reduce runoff, increase transpiration
- Reduced energy costs
- Increased structural longevity
- Must be engineered
- Extensive vs. Intensive
- Advanced



EXTENSIVE GREEN ROOF	SEMI-INTENSIVE GREEN ROOF	INTENSIVE GREEN ROOF
Height: 6- 20 cm **Weight**: 60 - 150 kg/m² **Vegetation**: mosses, sedums, herbs and grasses **Cost**: low **Maintenance**: low	**Height** : 12 - 25 cm **Weight** : 120 - 200 kg/m² **Vegetation** : grasses, herbs and shrubs **Cost**: middle **Maintenance** : periodically	**Height** : 15 cm > 1m **Weight** : 180 - 500 kg/m² **Vegetation** : lawn, perennials, shrubs and small trees **Cost**: high **Maintenance** : regularly

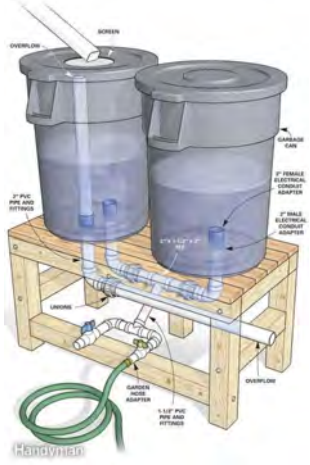
PERVIOUS PAVEMENT



- Reduce runoff, increase infiltration
- Concrete, asphalt, pavers
- Maintenance concerns (salt, plowing, dirt and debris)
- Must be engineered
- Advanced

CISTERNS/RAIN BARRELS

- Reduce runoff
- Increase water conservation
- Above or below ground
- Simple or engineered
  - Collect/inlet
  - Inlet protection (mosquitoes)
  - Overflow
  - Outlet (spigot or hose)
  - Gravity fed (elevate)
- Entry-level/DIY to Advanced



RESOURCES

- EPA Green Infrastructure - https://www.epa.gov/green-infrastructure

- Rain Garden Resources - https://drive.google.com/drive/folders/1sy1OZ3Gji4hLezD6IN5ReBXj9SG6eX3W?usp=sharing
  - Iowa Rain Garden Manual – calculate size of rain garden

- LGROW Grand River Rainscaping Program - https://www.lgrow.org/rainscaping
  - Sign up for a free site assessment to receive recommendations
  - Educational workshops
  - Volunteer training

Grand River Rainscaping
An LGROW Program

QUESTIONS?

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