



# Urban and Rural Land Management Options for Enhancing Runoff/Recharge

Fern Bromley, University of Arizona

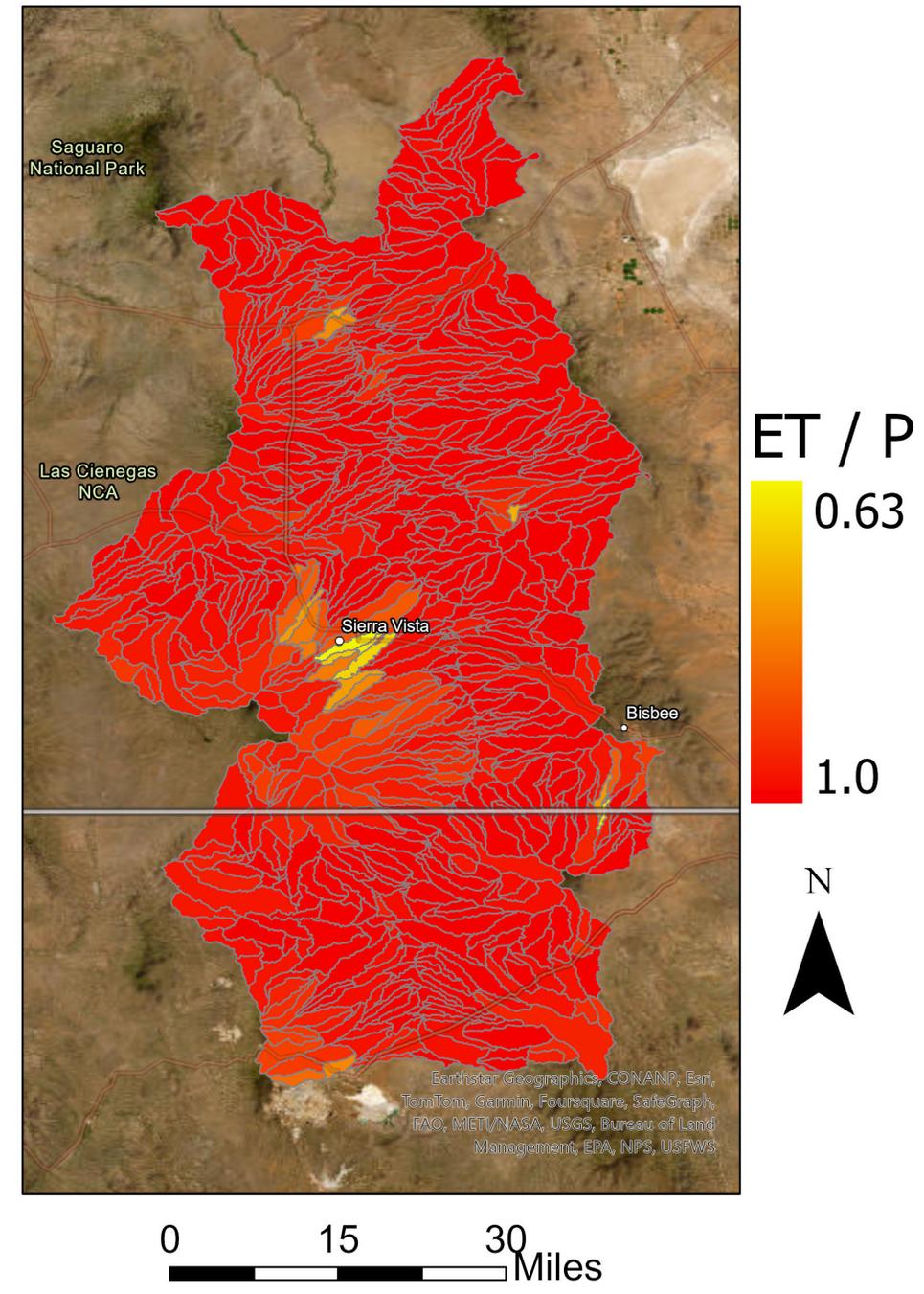
Xin Su, Arizona State University

## Rural Land Management: Key Questions

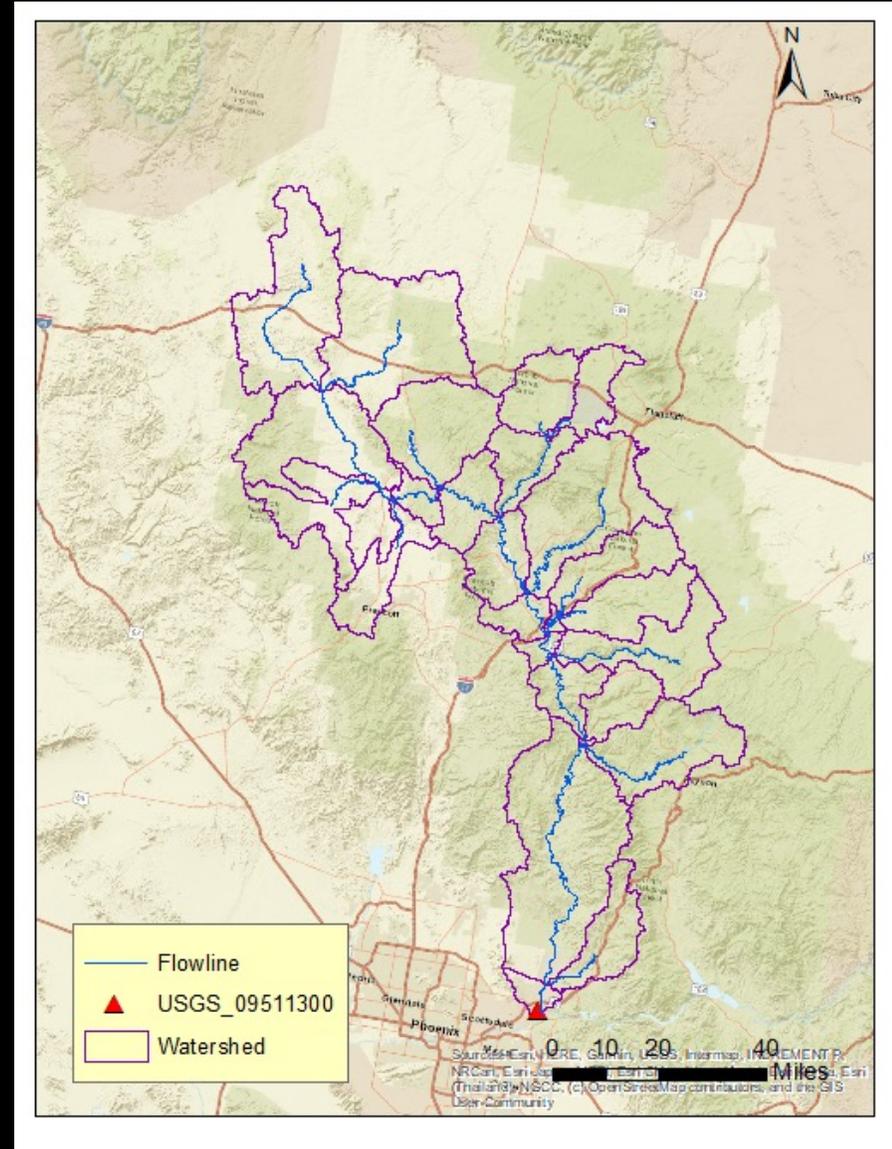
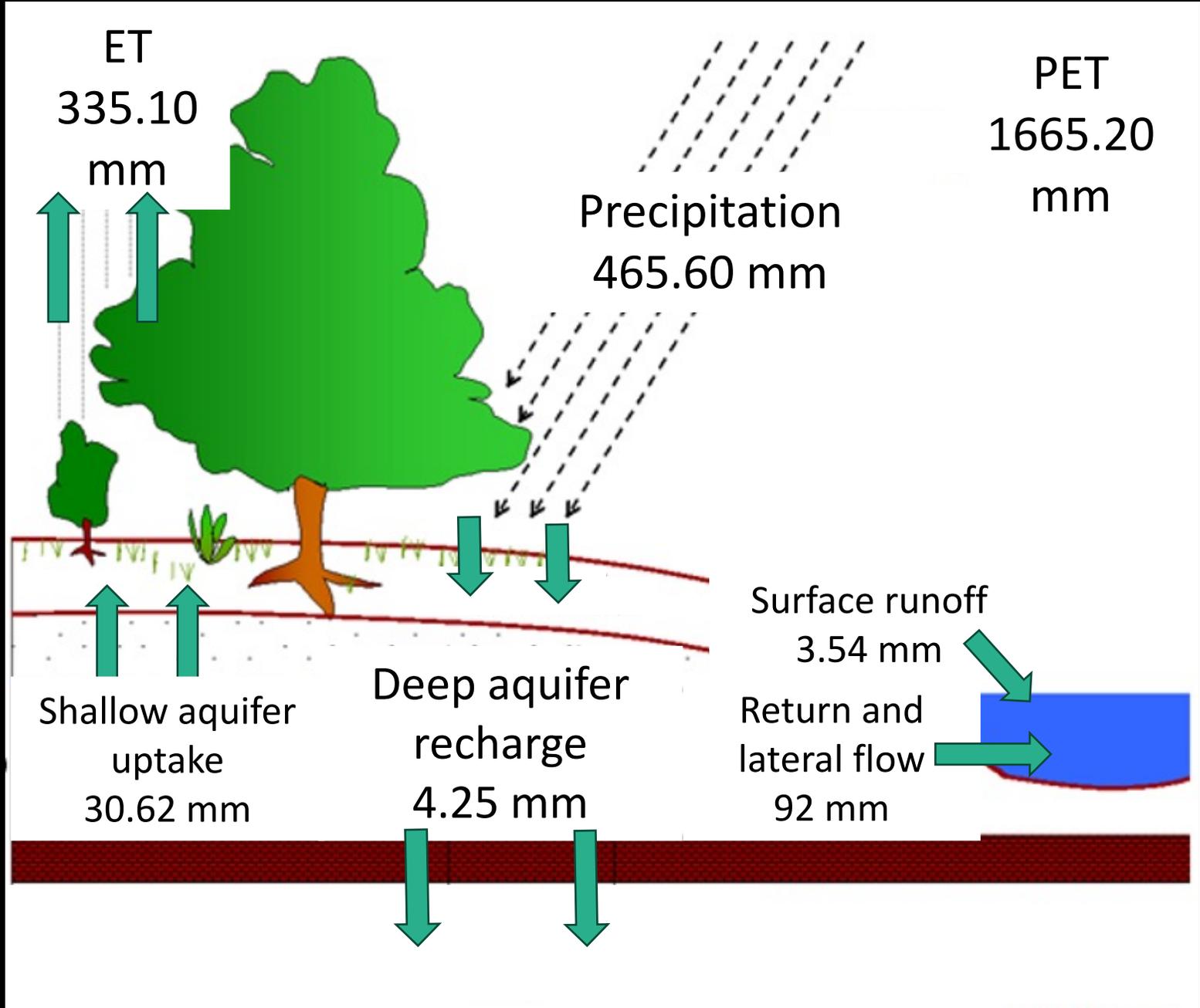
1. How and where can the state of Arizona **change management** of forests and rangelands to **enhance runoff and recharge** in the context of **climate change**?
2. How do different methods of **management and disturbances** affect **evapotranspiration and sublimation** in the state?
3. Where are the potential source areas (**opportunities**) for **reducing atmospheric water losses** and diverting them to **recharge areas**?

# Evaluating Ecosystem Water

- Estimate when or where recharge is occurring and/or can be enhanced through management

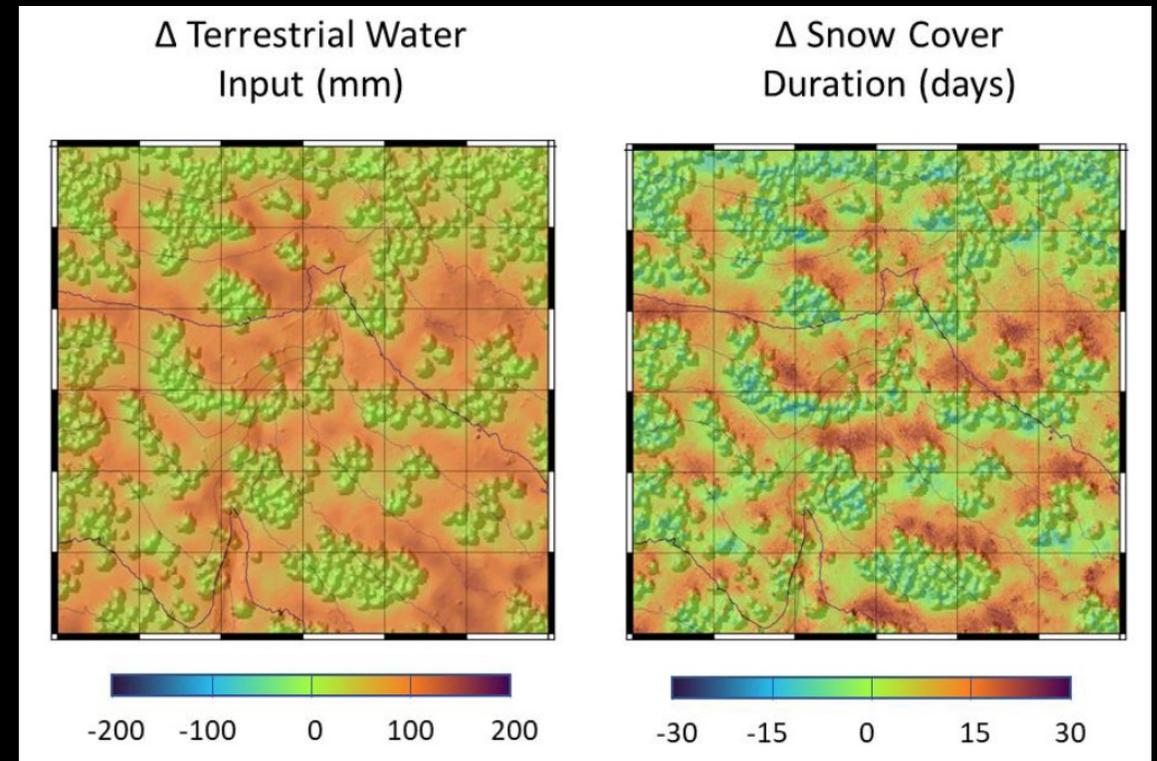


# Verde Basin: modeled annual averages, 1985-2021

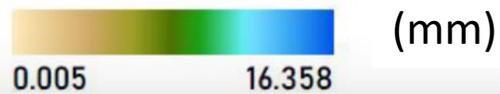
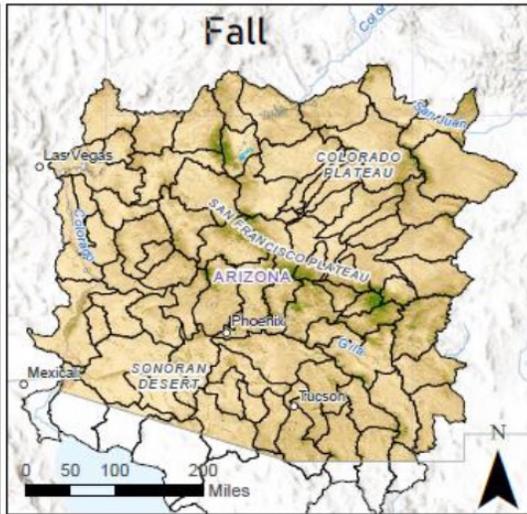
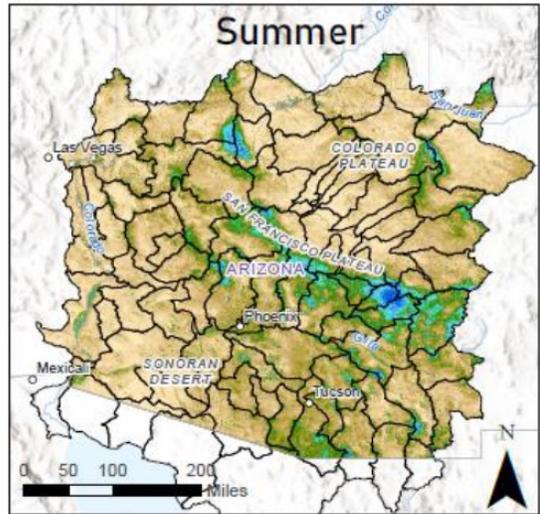
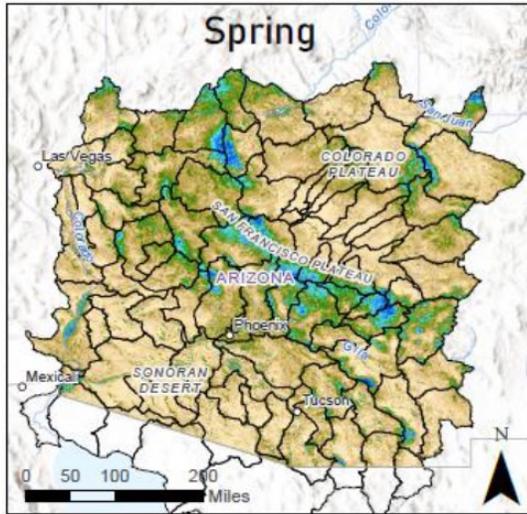
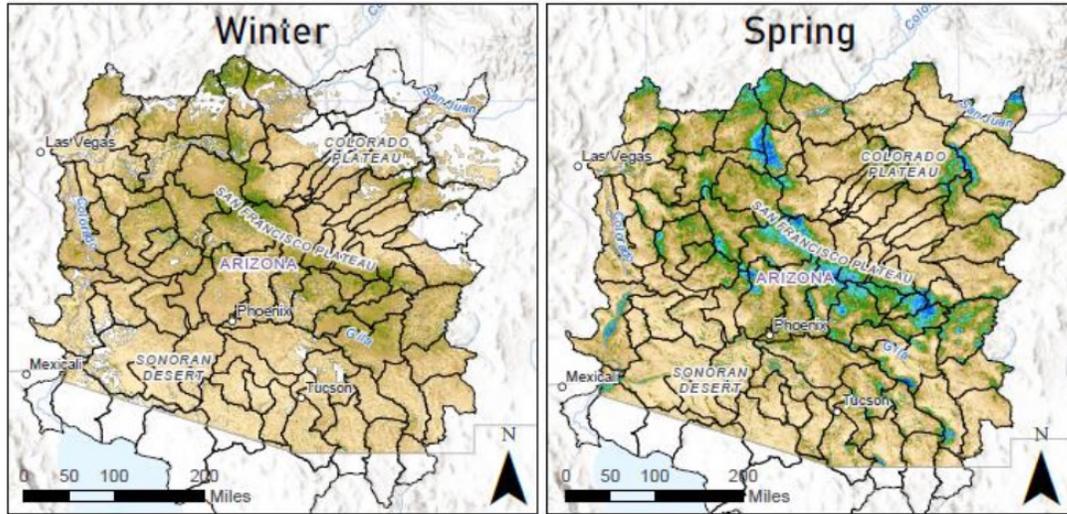


# Evaluating Ecosystem Water

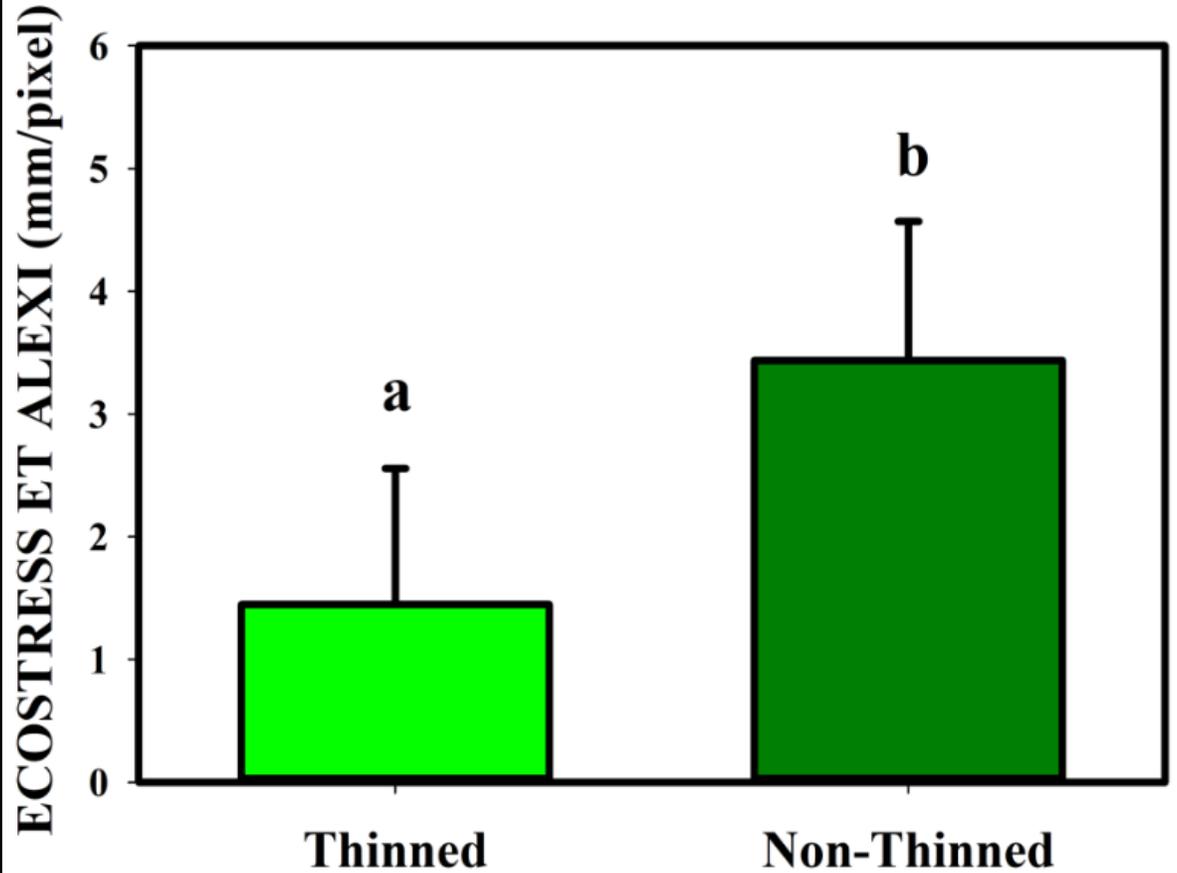
- Effects of land management and cover change
- Forest thinning leads to more snow on the ground for longer



# ECOSTRESS Daily Evapotranspiration of Arizona HUC8 Watersheds 2019



## Spring 2021 ET, 3 years post-thinning



# Management Opportunities



Leaky Weir



Sandbag Dam



Wood Log Jam



Gabion



Left images: Laura Norman, Western Geographic Science Center  
Right image: Fern Bromley

# The Strategy – Green Stormwater Infrastructure

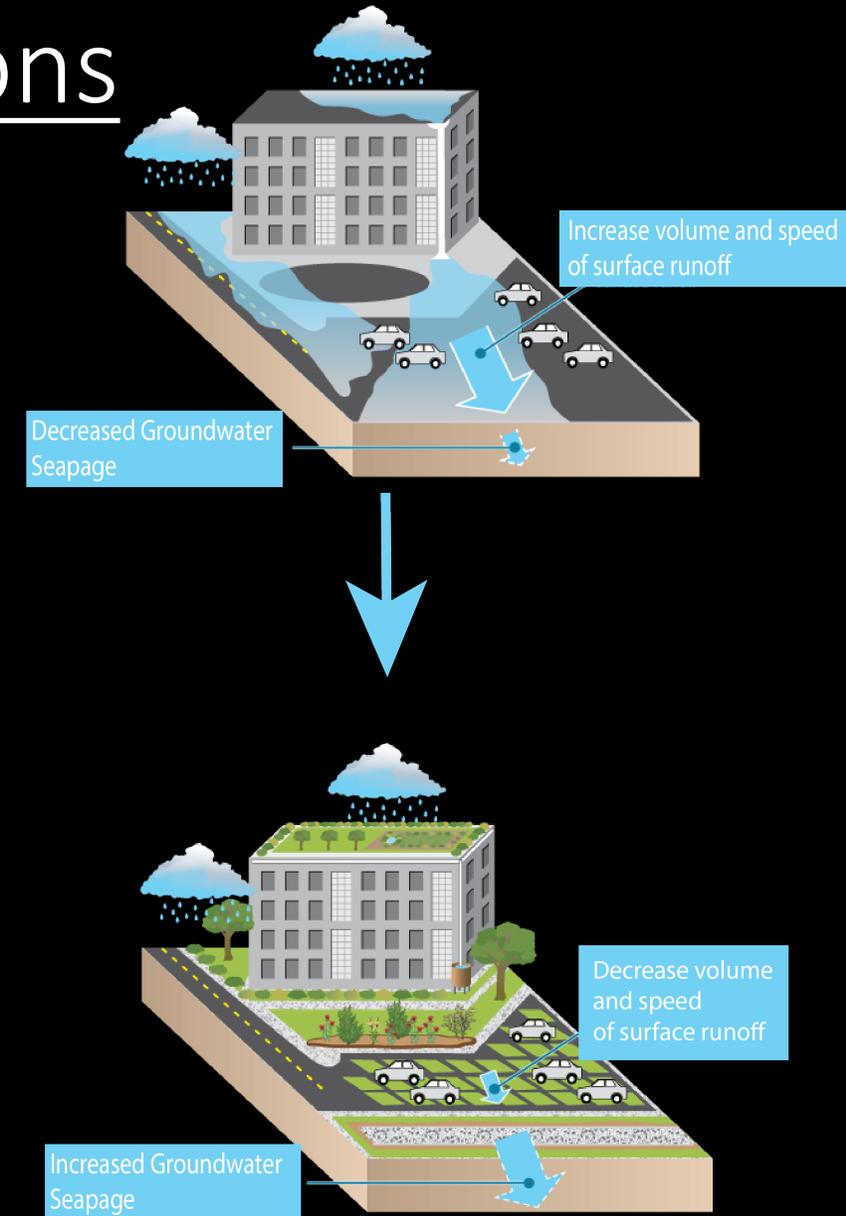
## Benefits of GSI:

- Water quality and quantity
- Air Quality
- Climate Resiliency
- Habitat and wildlife



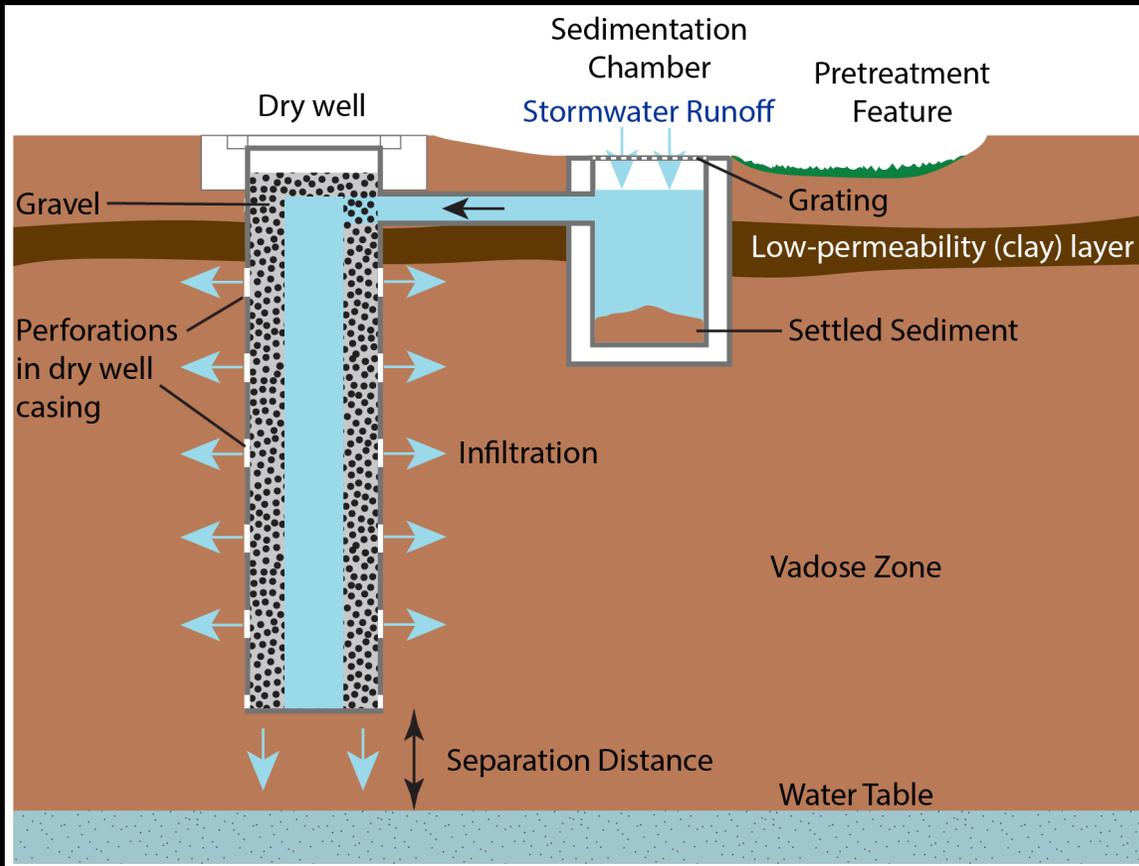
# Urban Management: Key Questions

- What are the Green Stormwater Infrastructures (**GSI**) we have ?
- **How much** do GSI enhance the local groundwater recharge potential?
- Which is playing the major role in enhancing groundwater recharge in urban aquifer, **future climate**, or **urban development**?

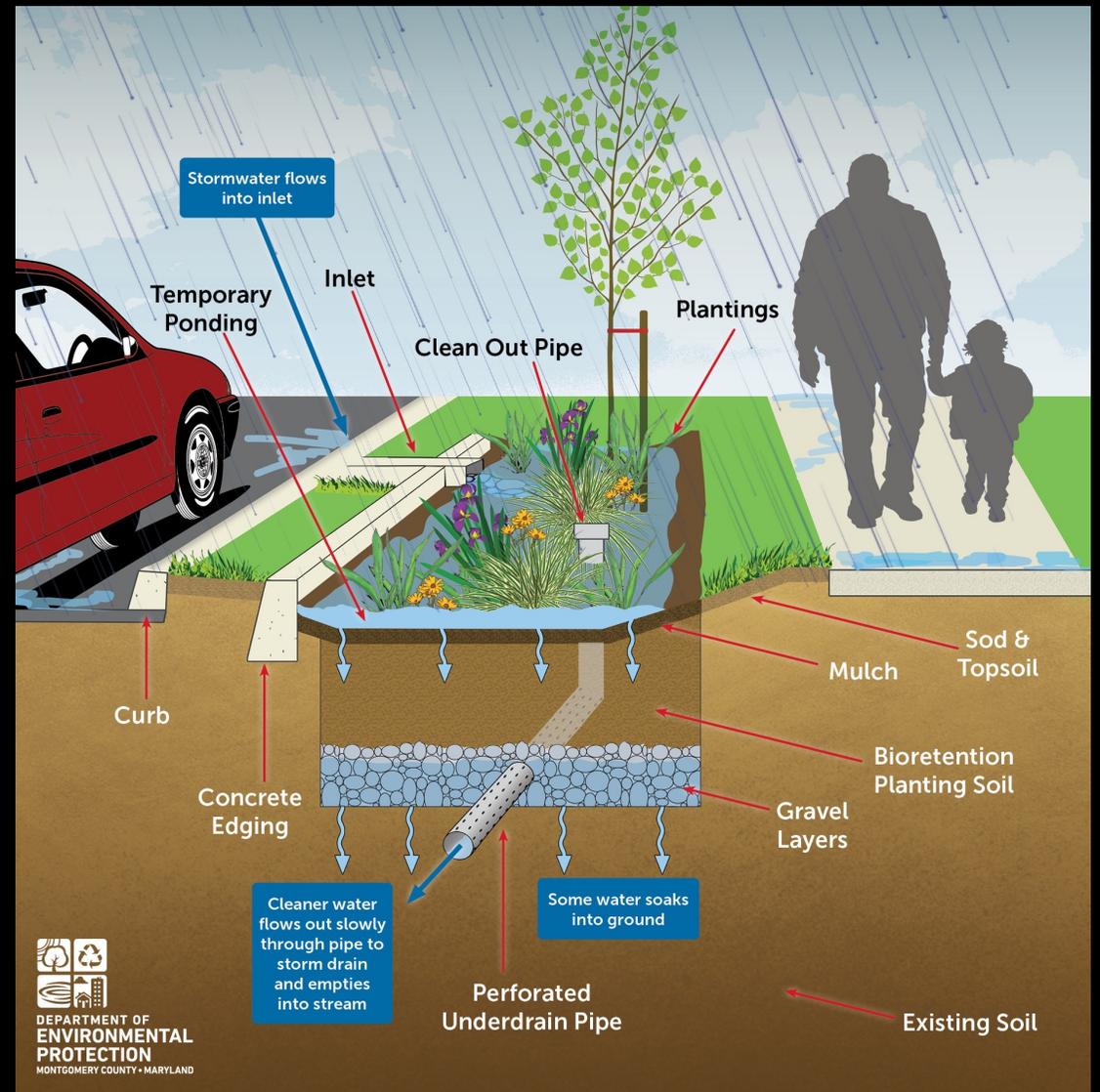


# Retention-Detention Ponds

## Drywells Design

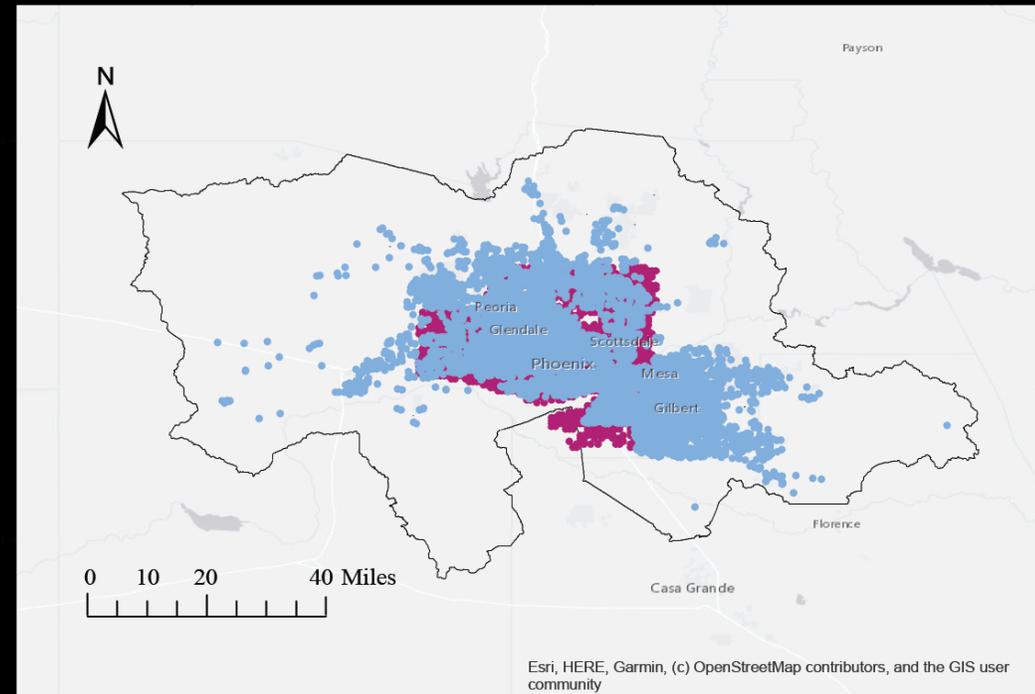
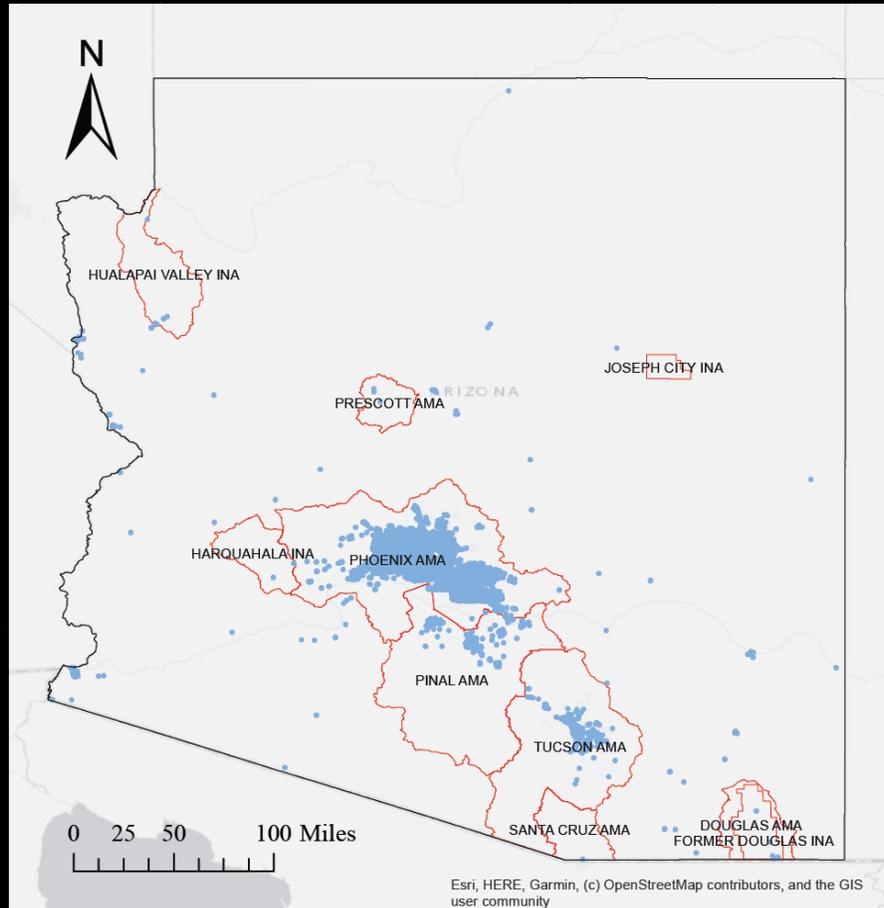


Source: *What Is A Dry Well System And How To Build It?* Michael Bowen February 11, 2024



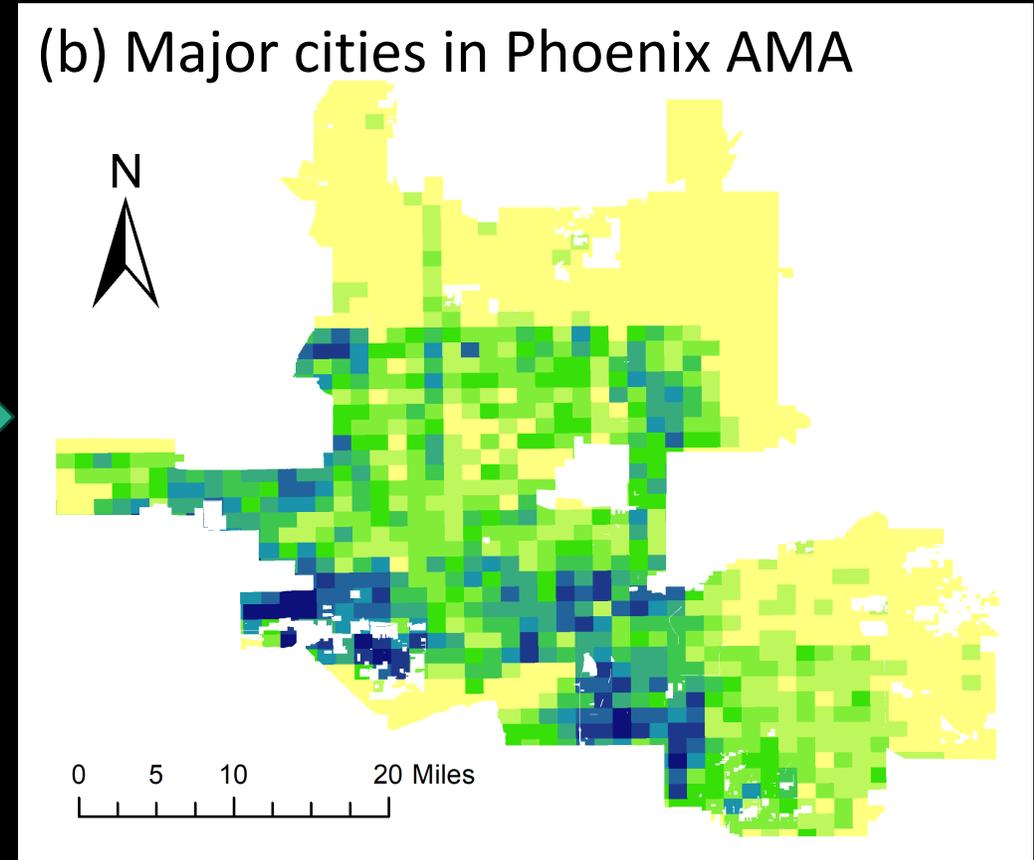
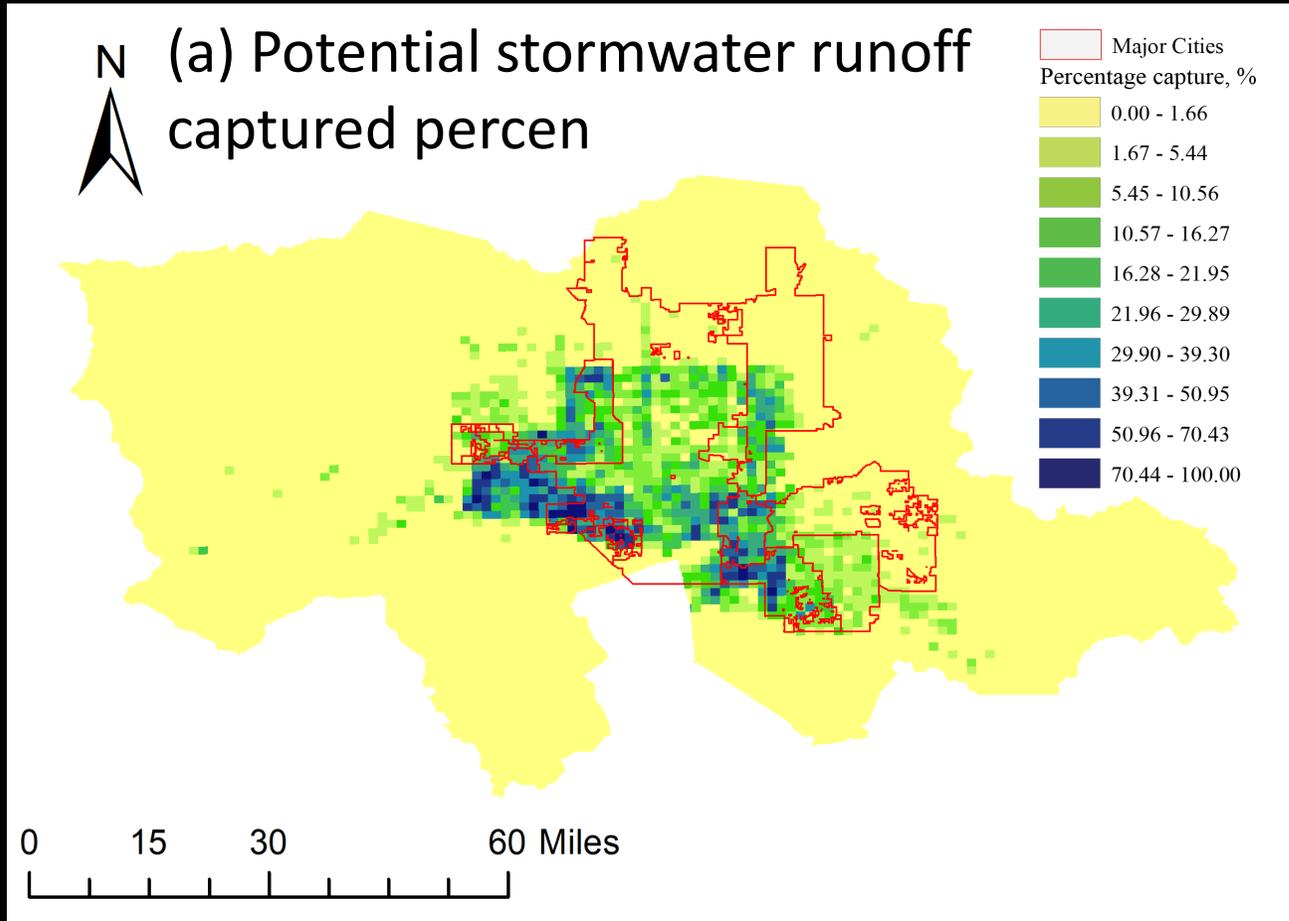
Source: <https://mygreenmontgomery.org/2020/stormwater-best-management-practices/> 44

# Drywells and Detected Ponds in Phoenix AMA



- State boundary
- AMA and INA
- Active drywell location
- Detected pond

# Drywell and Detected Pond Potential



Based on infrastructure capacity and design code, the drainage area for each one is ranging from **0.37- 187.23 acres, 2019 total captured runoff at 264,635.66 AF.**

