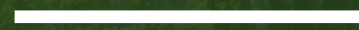


Looking Beyond Facility Location to Evaluate Equity in the Distribution of Green Stormwater Infrastructure



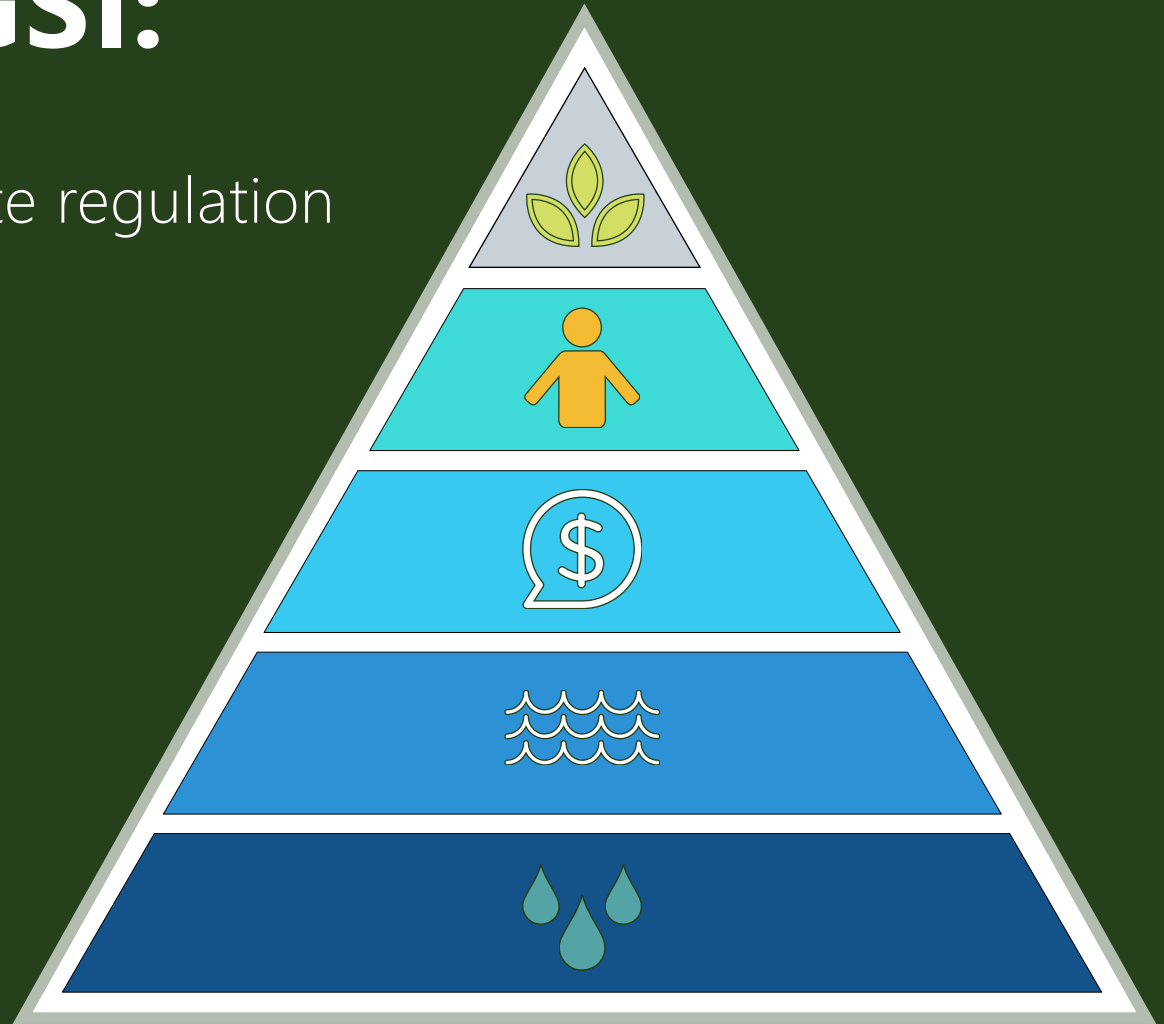
Erin Rivers, PhD | *Utah State University*
Marissa Matsler, PhD | *US EPA*
Dillon Mahmoudi, PhD | *U Maryland Baltimore County*



Green Stormwater Infrastructure (GSI)

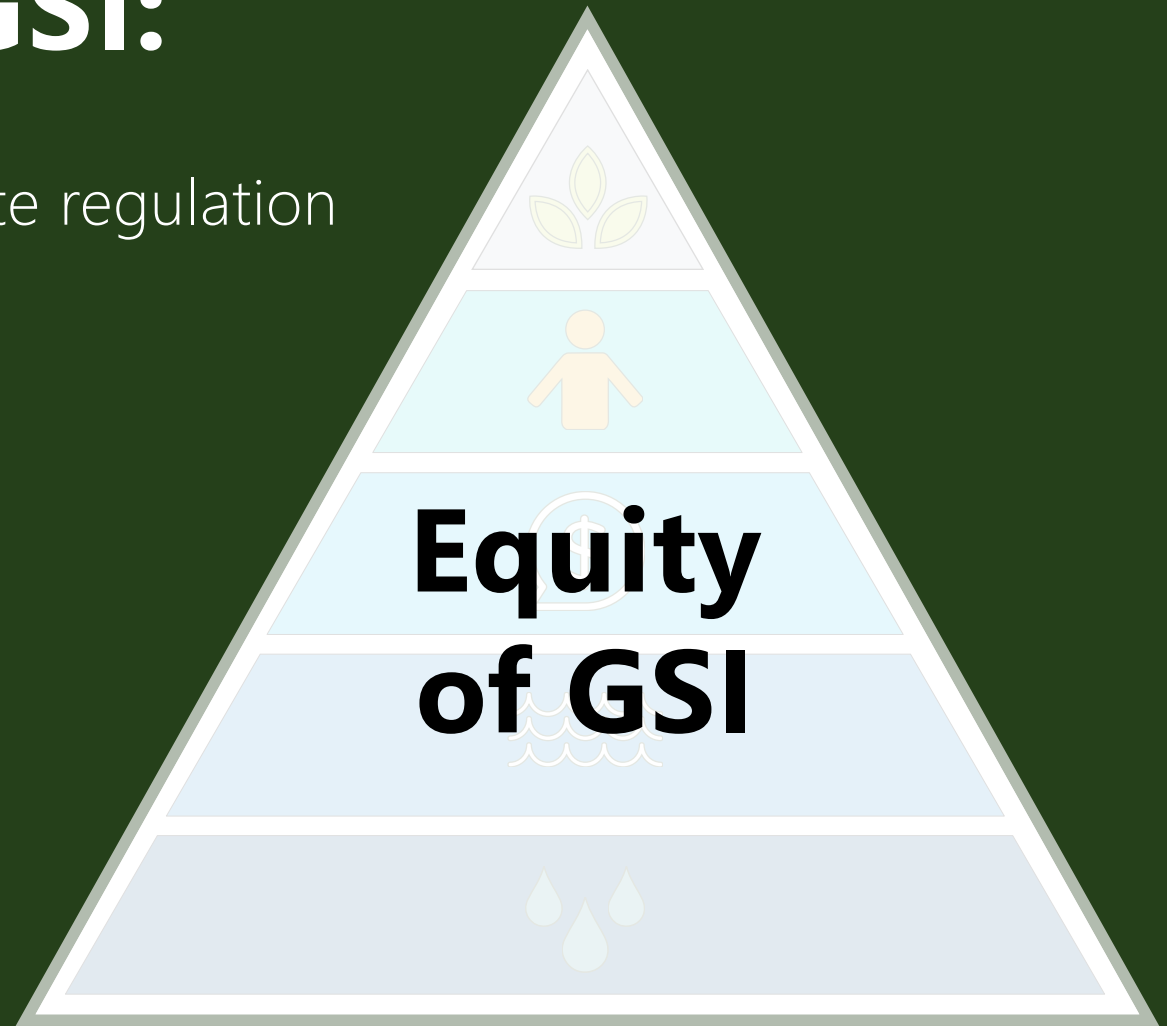
Co-benefits of GSI:

- Biodiversity, C-seq, Climate regulation
- Social
- Economic
- Water Quality
- Hydrology



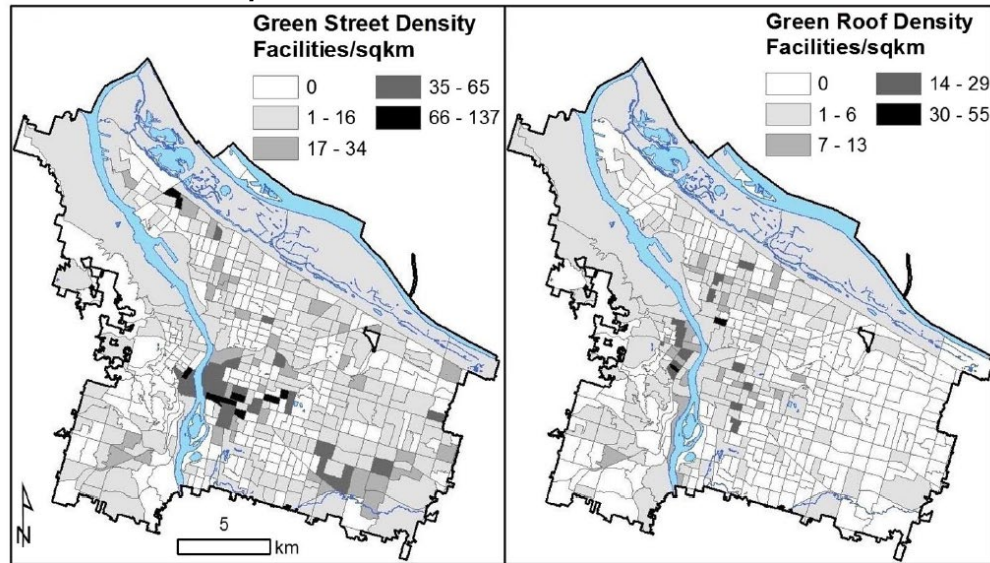
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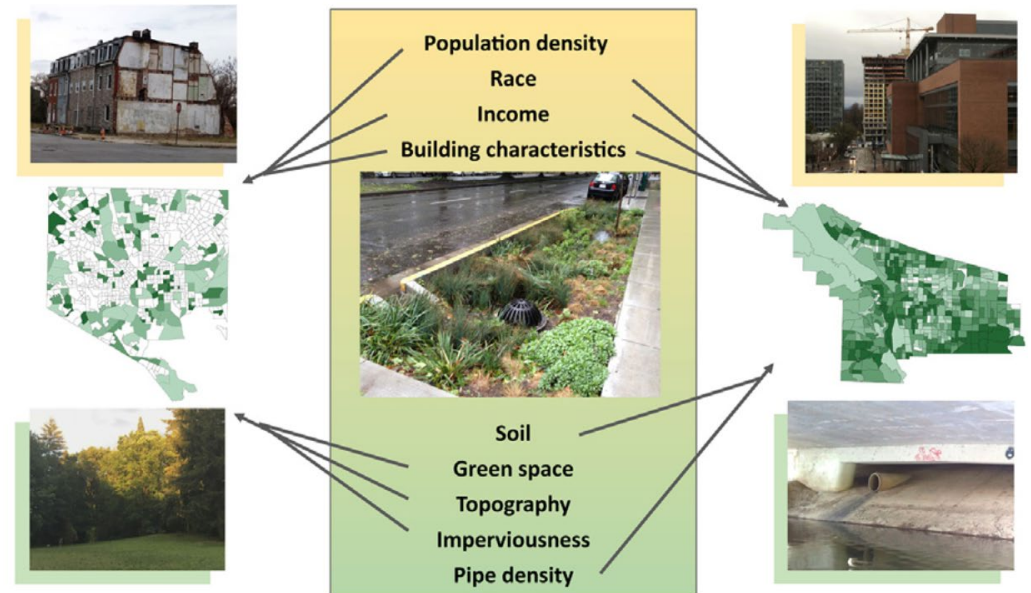


Spatial Distribution ~ Sociodemographic Patterns

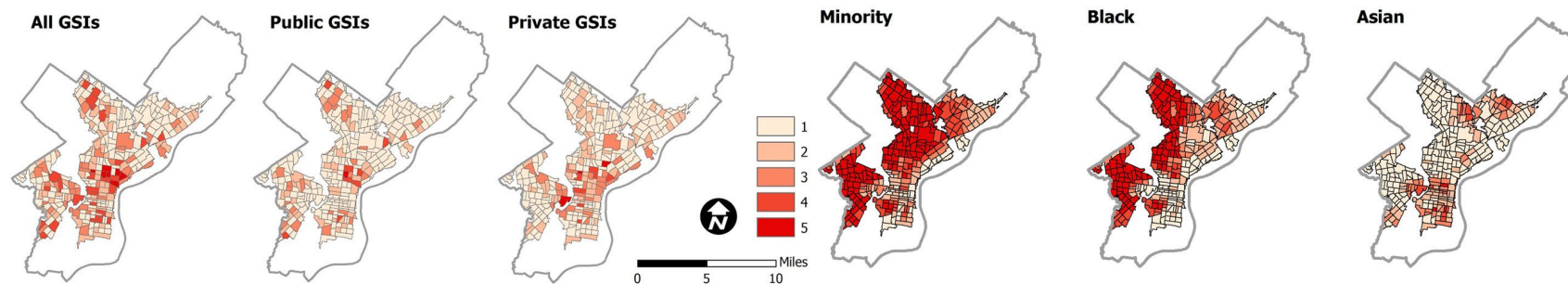
Chan & Hopkins 2017 - Portland



Baker et al. 2019 - PDX & Baltimore




Mandarano & Meenar 2017 - Philadelphia





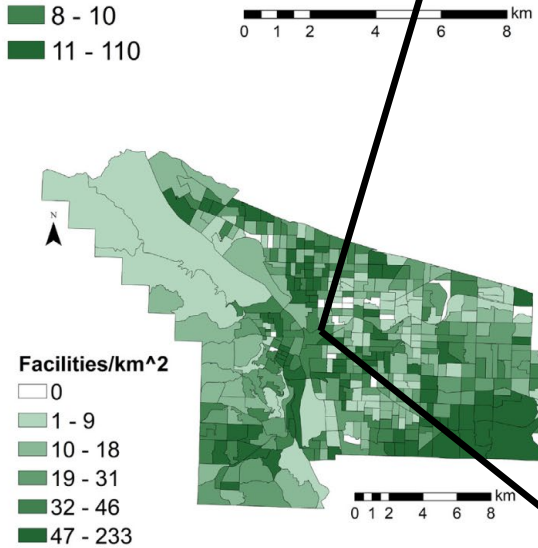
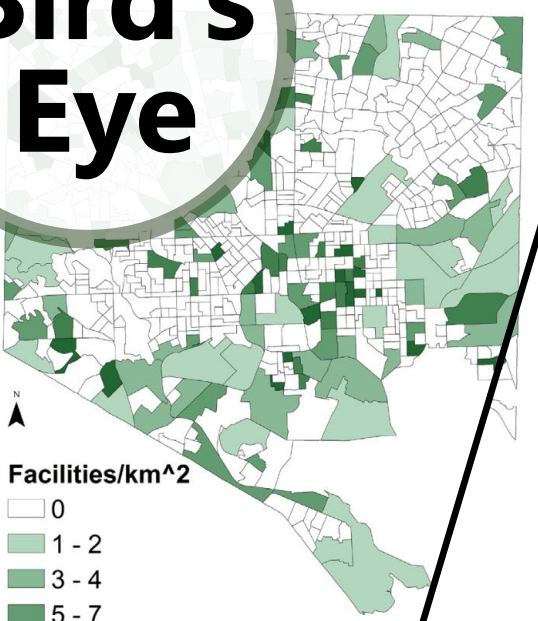
**GSI presence = social,
economic, and
environmental benefits**

Benefits *assumed*



Distribution = Equity?
Presence = Benefit?

Bird's Eye



Worm's Eye

**Summer
2016**



**Pruned
Ornamental plants**



**Overgrown
Weeds**

← 3 mi →

**Winter
2016**



**Thin leaf litter
No trash**



**Heavy leaf and
trash accumulation**

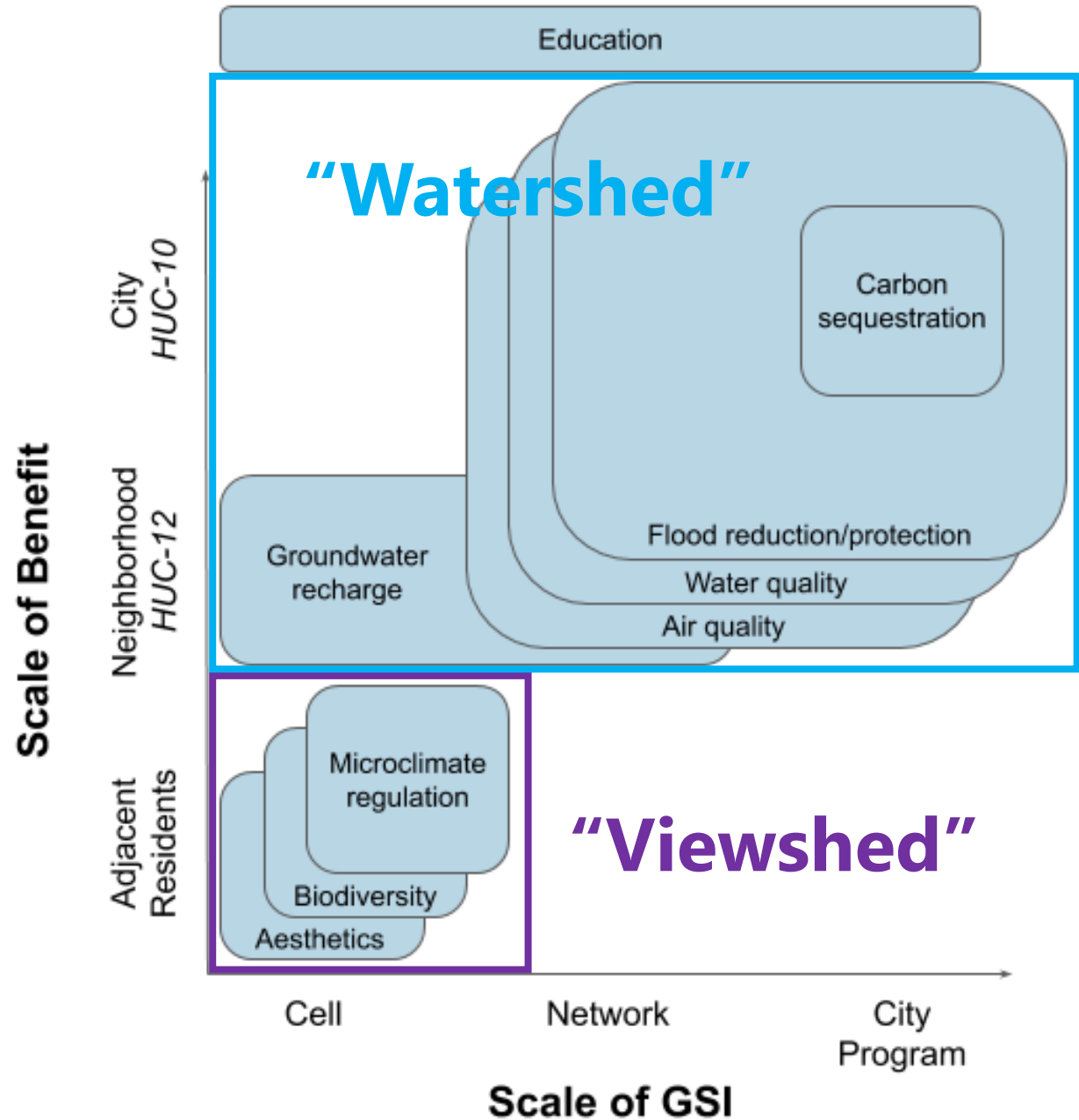
**Winter
2016**



Scales of Benefits



Benefit production and distribution are multi-scalar

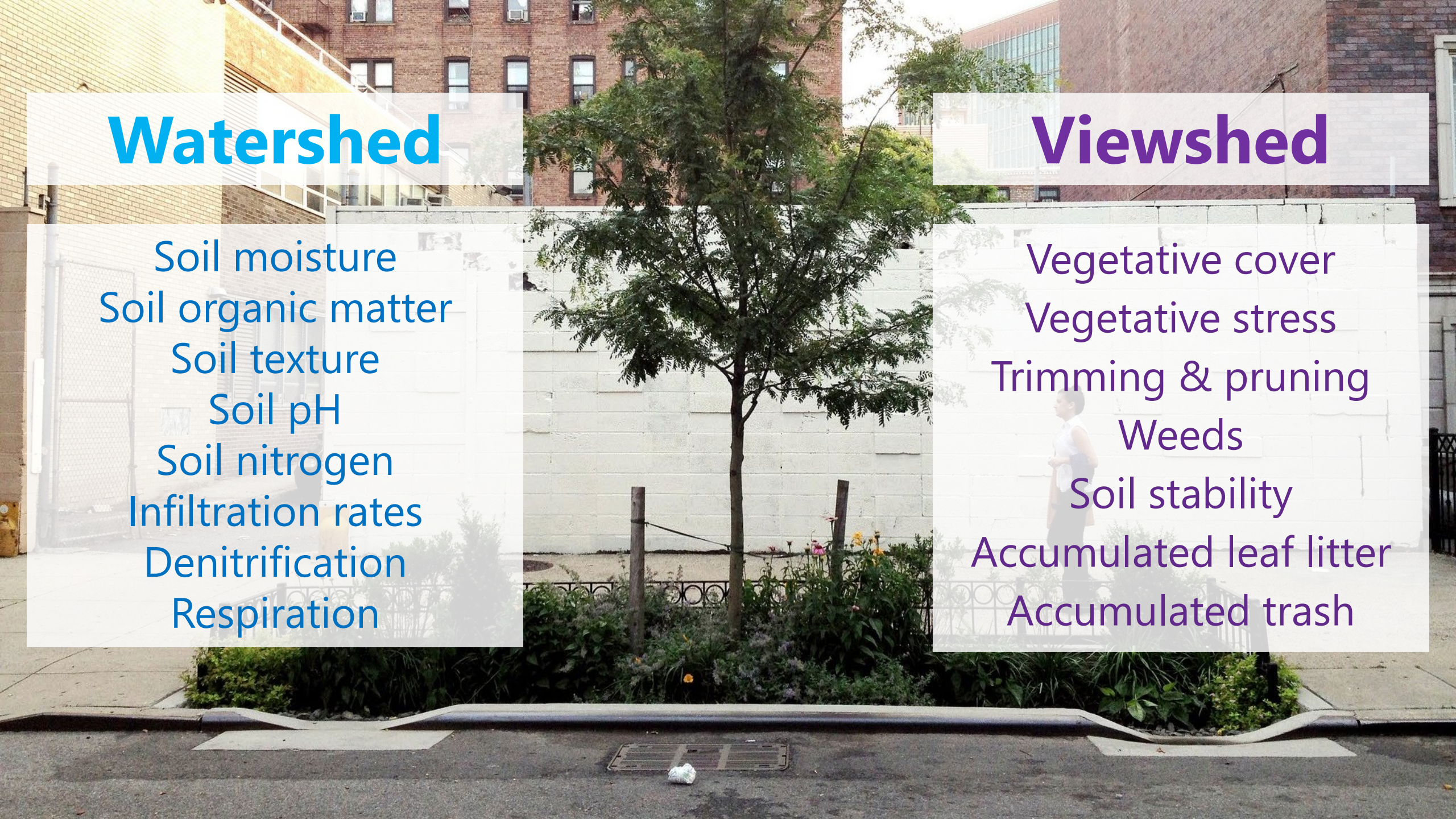


Watershed

Soil moisture
Soil organic matter
Soil texture
Soil pH
Soil nitrogen
Infiltration rates
Denitrification
Respiration

Viewshed

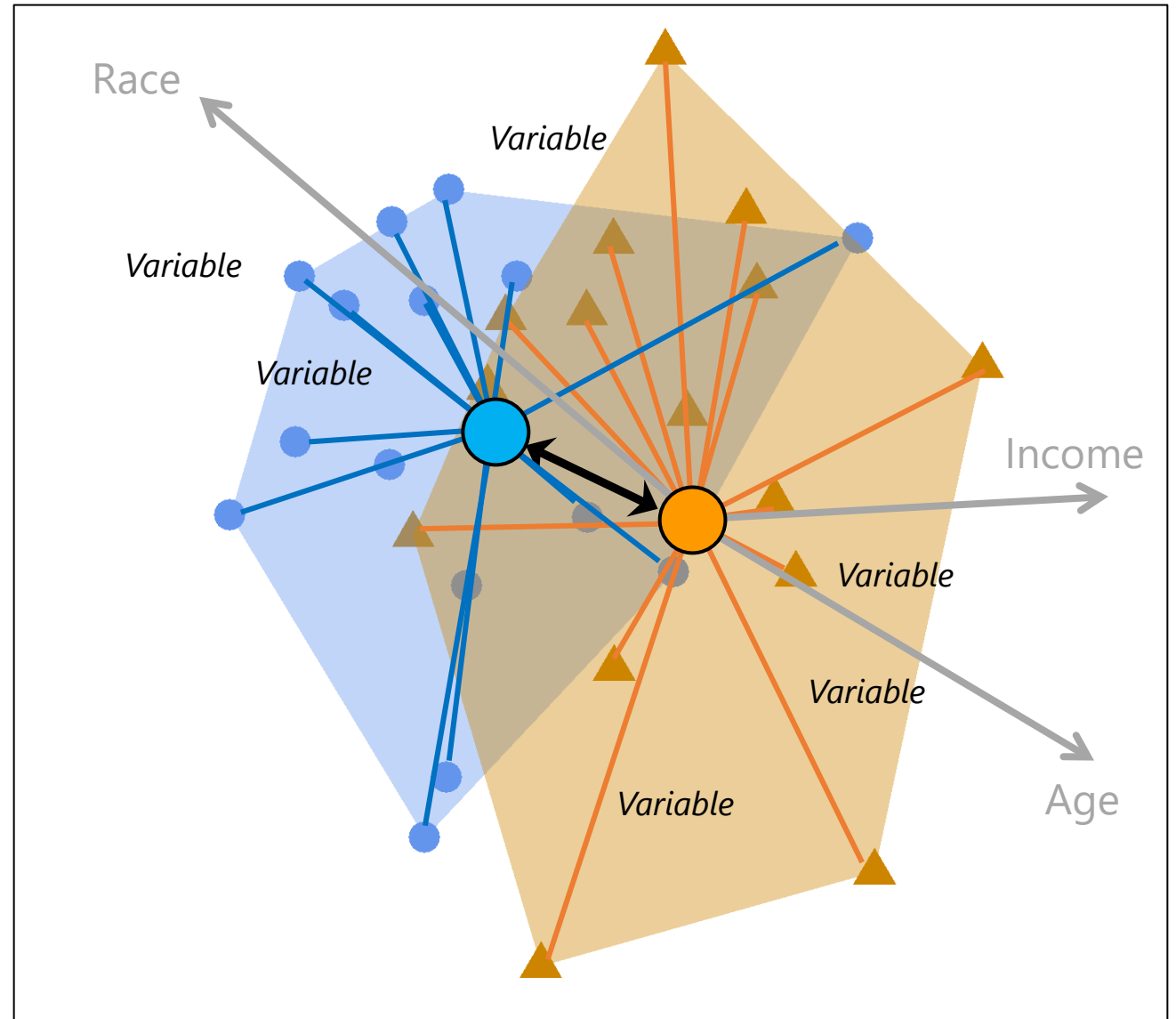
Vegetative cover
Vegetative stress
Trimming & pruning
Weeds
Soil stability
Accumulated leaf litter
Accumulated trash



Analysis

1. Difference between cities
2. Differences within each city
3. The relationship between sociodemographic factors and facility characteristics

NMDS

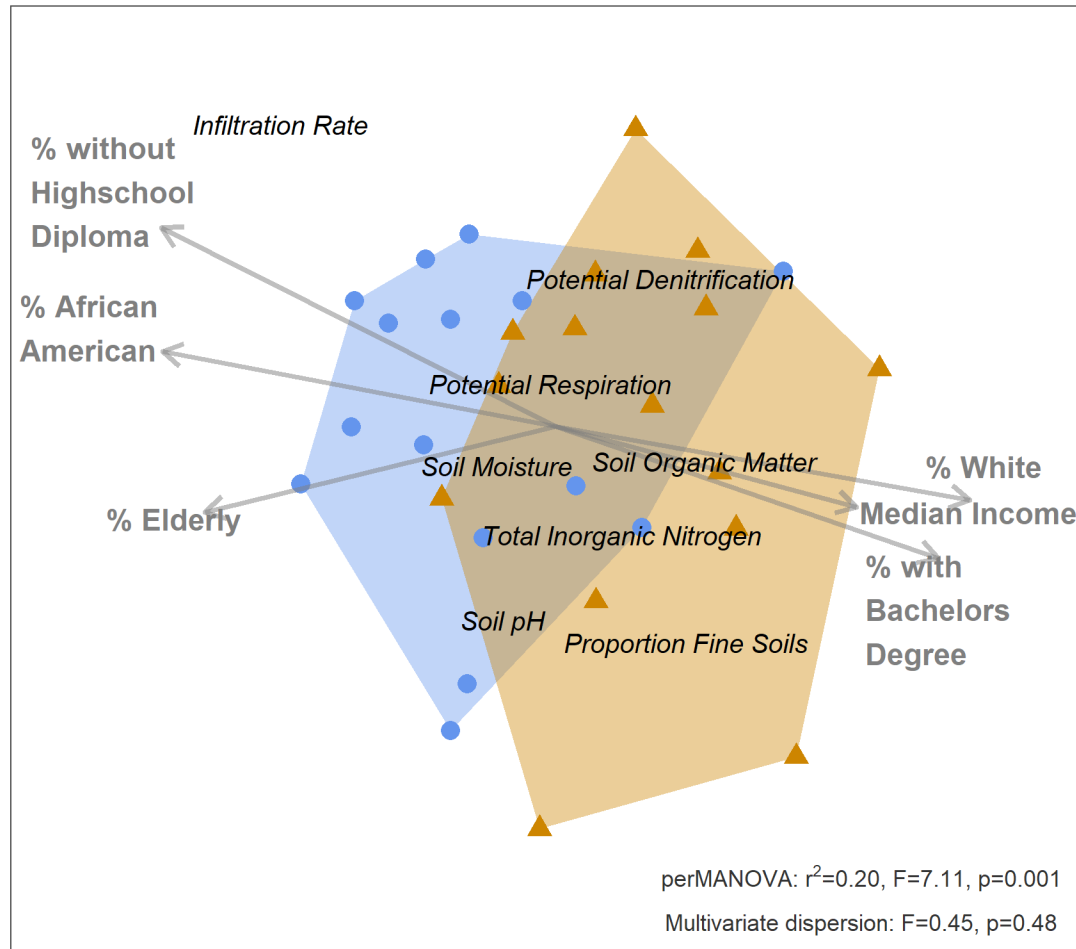


GSI outcomes ~ Sociodemographic Patterns

City ● Baltimore ▲ Portland

A)

Watershed Variables



1. City Comparison

Significant difference between cities

2. Evenness:

Similar between cities

3. Sociodemographic Factors:

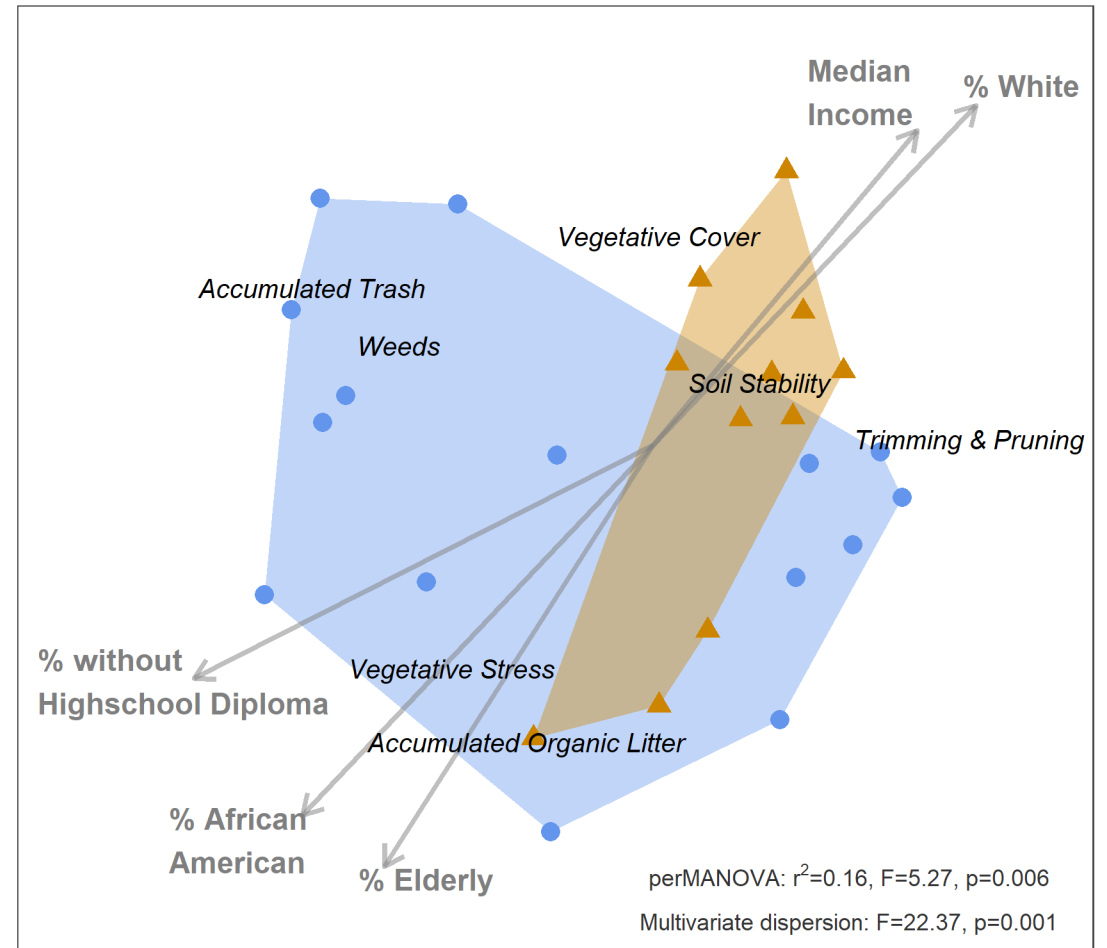
Significant relationships, but watershed benefits are displaced downstream

GSI outcomes ~ Sociodemographic Patterns

City ● Baltimore ▲ Portland

B)

Viewshed Variables



1. City Comparison

Significant difference between cities

2. Evenness:

Higher variability between sites in Baltimore than in Portland

3. Sociodemographic Factors:

Signs of routine maintenance in whiter & wealthier neighborhoods

Signs of low or insufficient maintenance in older, poorer, communities of color

Conclusions

Focus has been on examining spatial distribution of GSI informs planning efforts

Distribution might be equal, but benefits may not be equal

Next step is to examine on-the-ground outcomes of GSI

How are benefits distributed?

How do maintenance plans impact benefit delivery?



erin.rivers@usu.edu



STORM DRAINS ARE ONLY FOR RAIN

