i-Tree Landscape:

Data, trees, and people

Jason Henning PhD
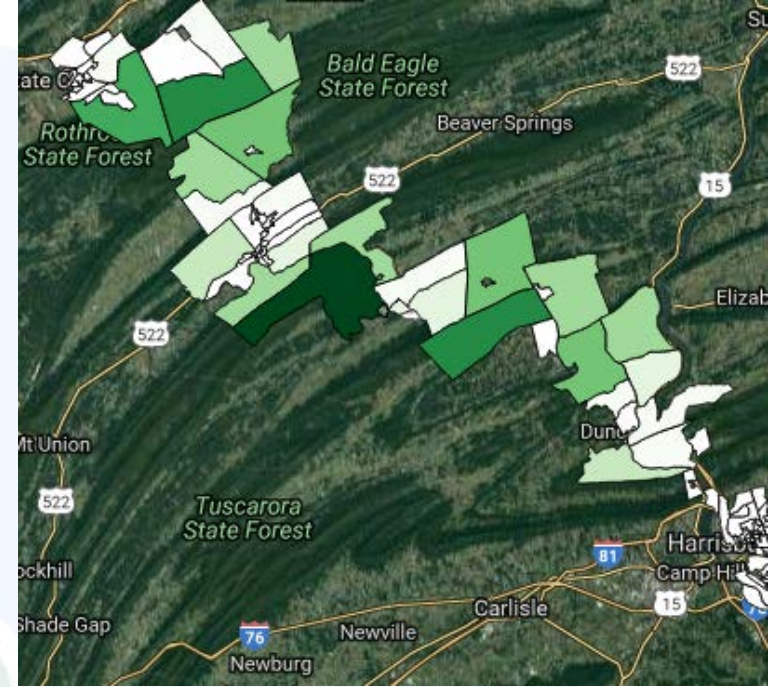The Davey Institute and
USDA Forest Service
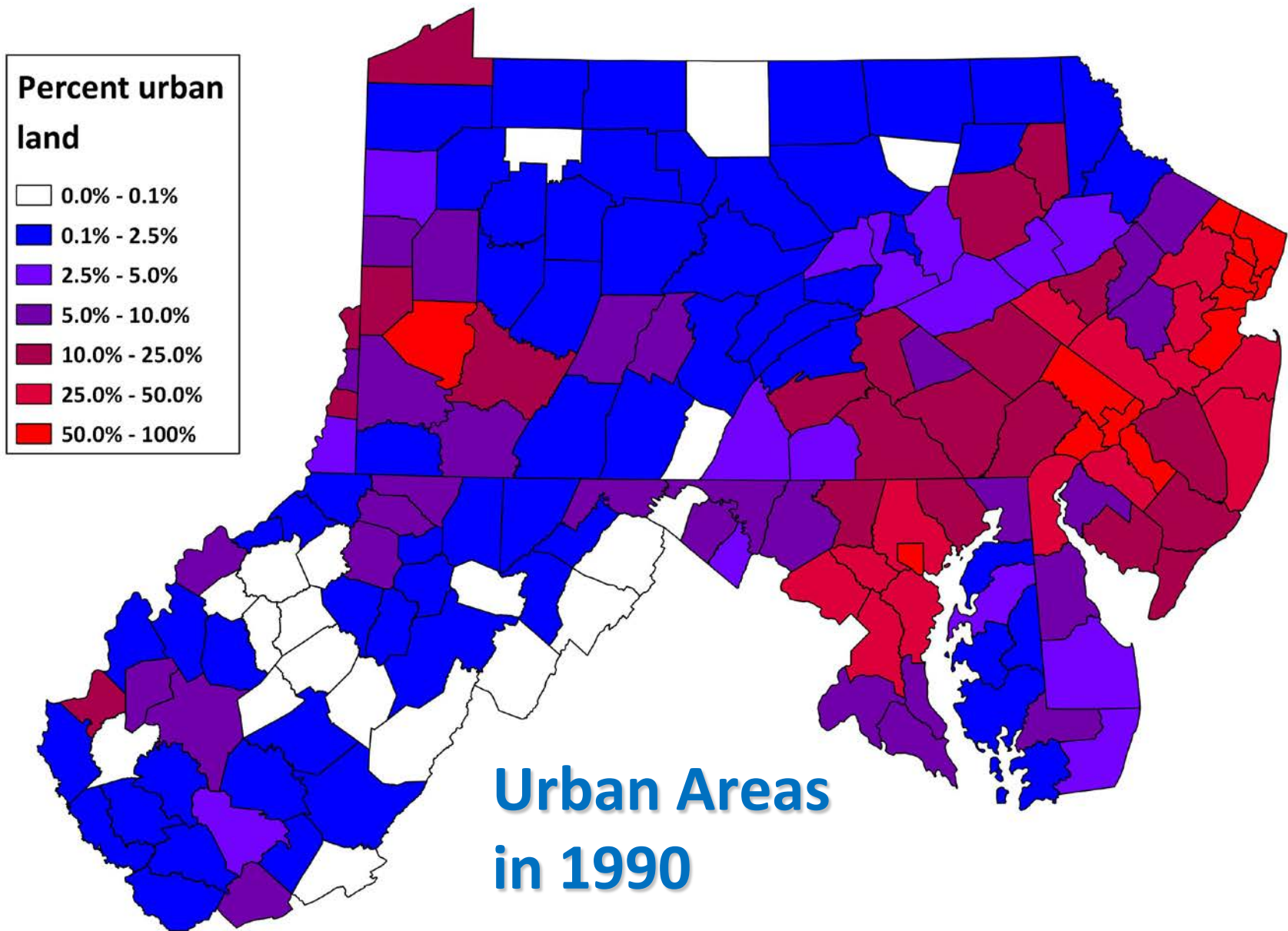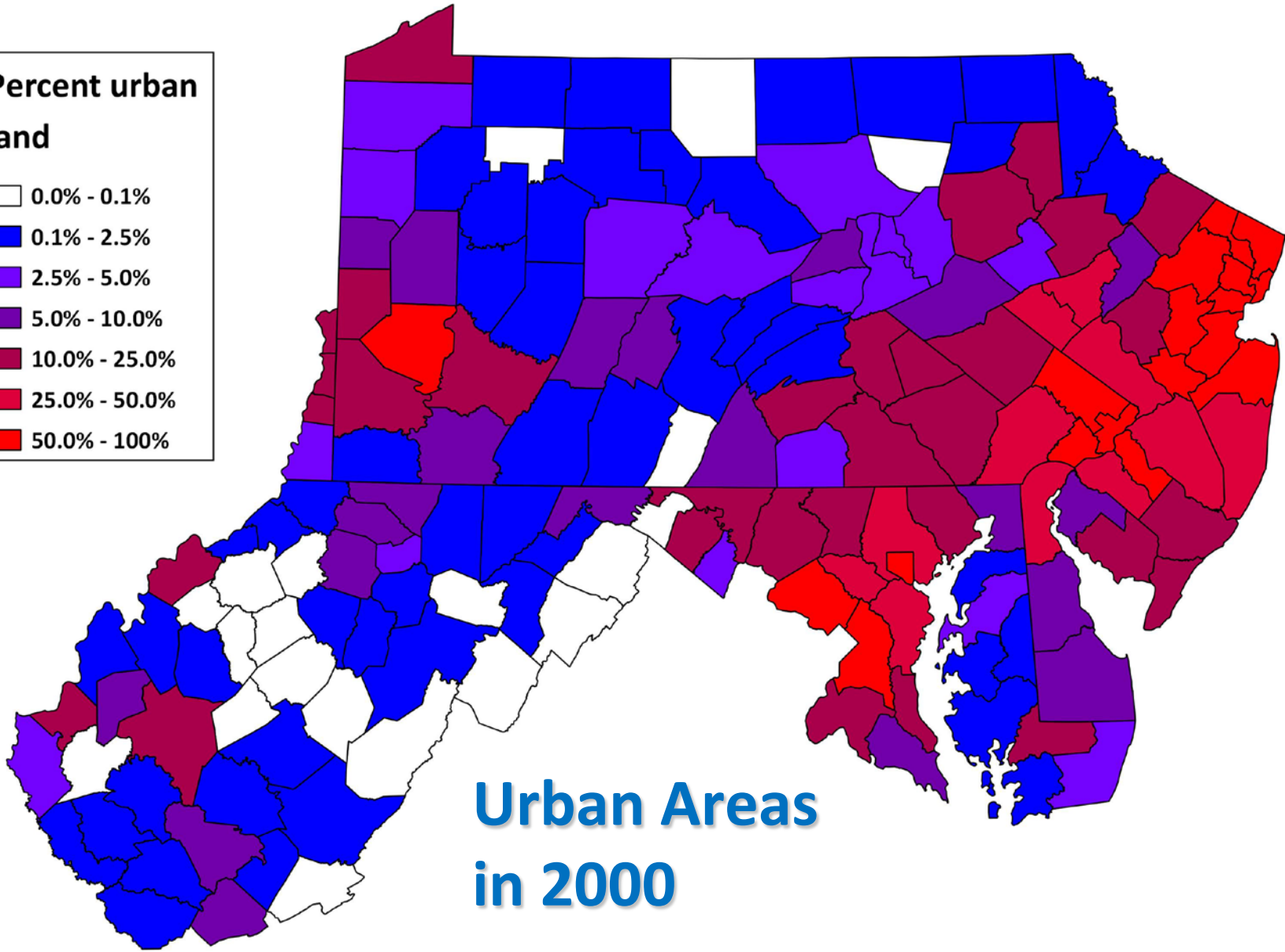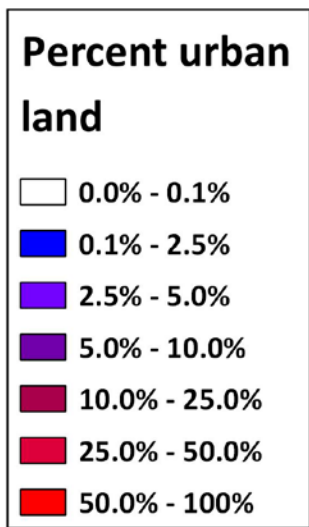Philadelphia, PA
jason.henning@davey.com

Plan for today

- Why worry about people?

- What is i-Tree?

- Introduction to i-Tree Landscape

- An all lands tool

  - Regional and watershed
    Cover and risks

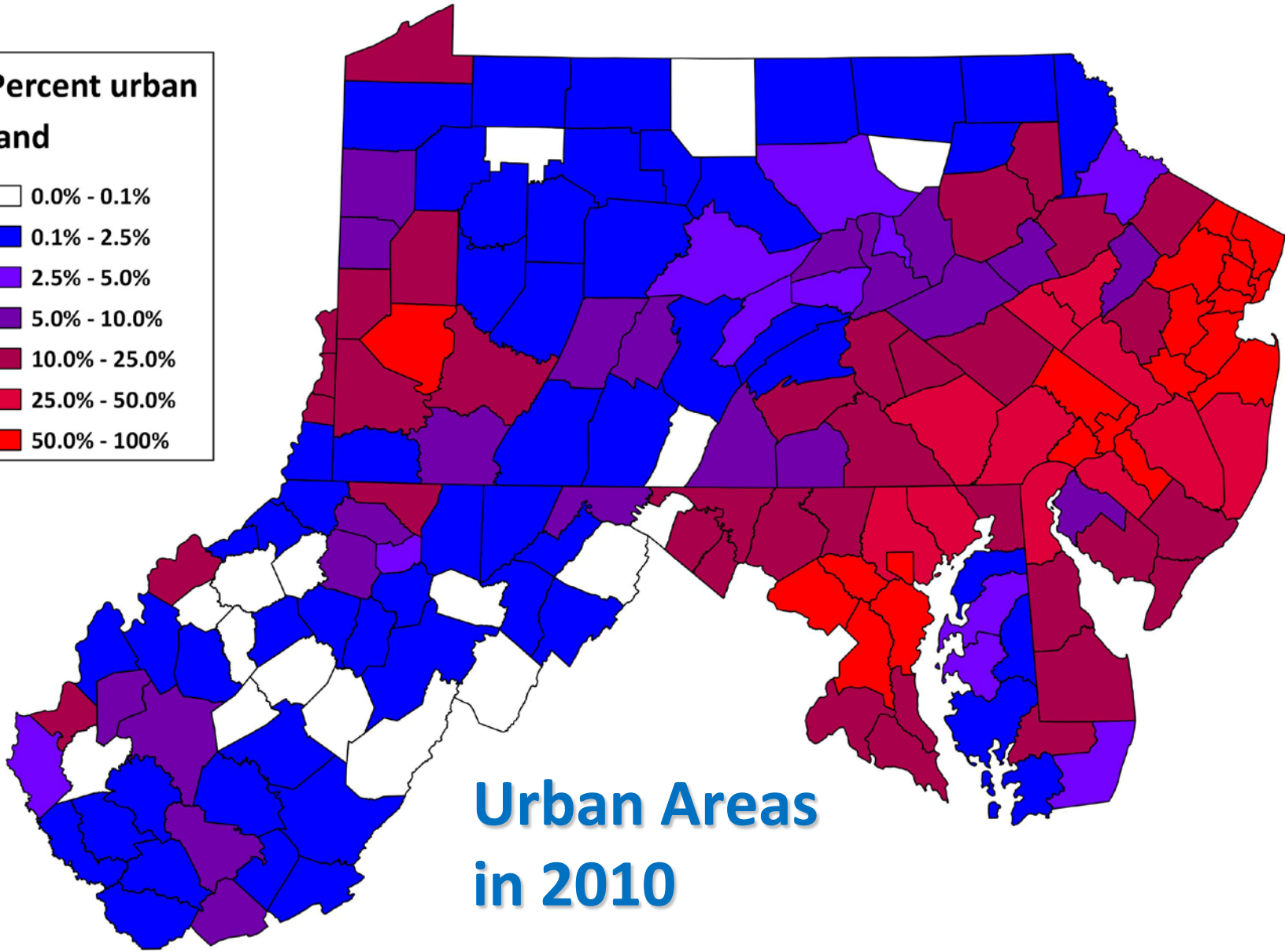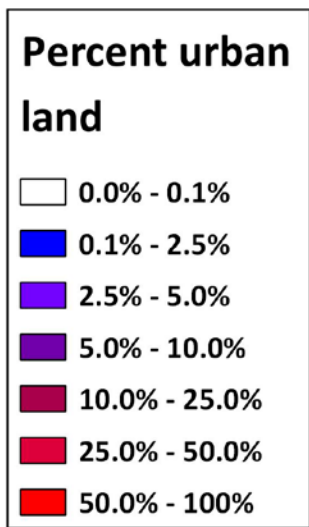 - County and city scale
    Benefits and comparisons

  - Neighborhood scale
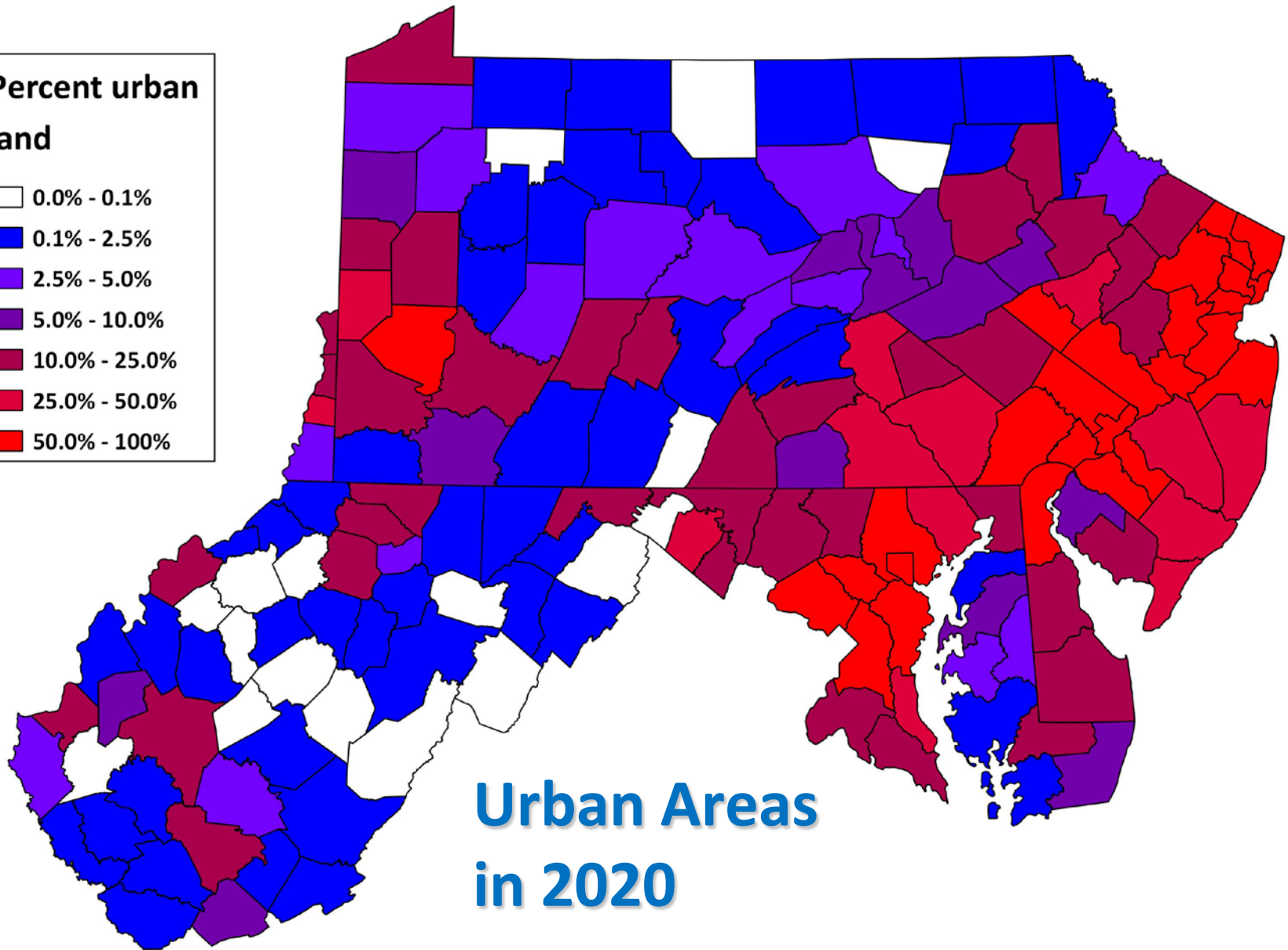   Identifying opportunities
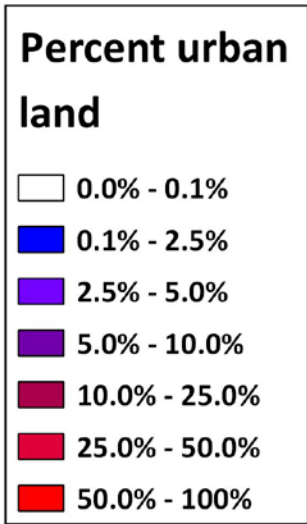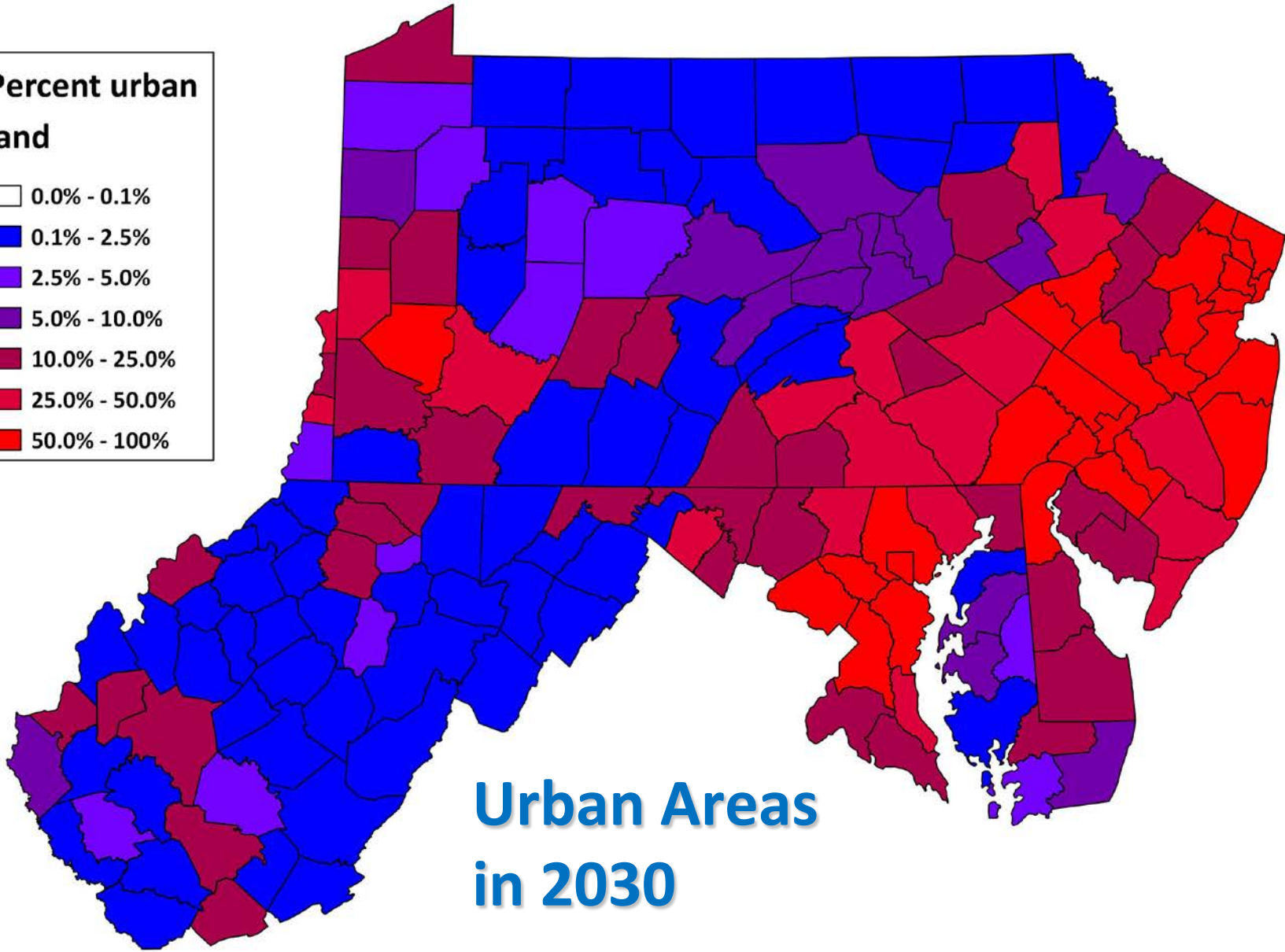
Why are people important to forests?

Percent urban land

- ☐ 0.0% - 0.1%
- 🟦 0.1% - 2.5%
- 🟪 2.5% - 5.0%
- 🟪 5.0% - 10.0%
- 🟥 10.0% - 25.0%
- 🟥 25.0% - 50.0%
- 🟥 50.0% - 100%

Urban Areas in 1990

Urban Areas in 2000

Percent urban land

- 0.0% - 0.1%
- 0.1% - 2.5%
- 2.5% - 5.0%
- 5.0% - 10.0%
- 10.0% - 25.0%
- 25.0% - 50.0%
- 50.0% - 100%

Percent urban land

- ☐ 0.0% - 0.1%
- ■ 0.1% - 2.5%
- ■ 2.5% - 5.0%
- ■ 5.0% - 10.0%
- ■ 10.0% - 25.0%
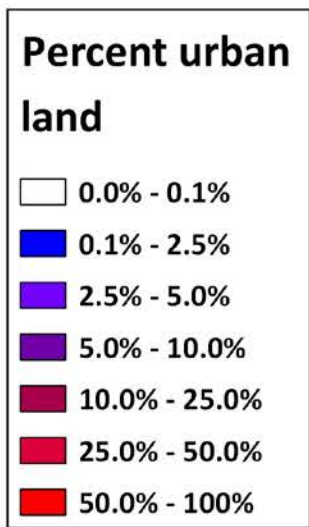- ■ 25.0% - 50.0%
- ■ 50.0% - 100%

Urban Areas in 2010

Urban Areas
in 2020

Percent urban land

- 0.0% - 0.1%
- 0.1% - 2.5%
- 2.5% - 5.0%
- 5.0% - 10.0%
- 10.0% - 25.0%
- 25.0% - 50.0%
- 50.0% - 100%

Percent urban land

- 0.0% - 0.1%
- 0.1% - 2.5%
- 2.5% - 5.0%
- 5.0% - 10.0%
- 10.0% - 25.0%
- 25.0% - 50.0%
- 50.0% - 100%

Urban Areas in 2030

Percent urban land

- ☐ 0.0% - 0.1%
- ■ 0.1% - 2.5%
- ■ 2.5% - 5.0%
- ■ 5.0% - 10.0%
- ■ 10.0% - 25.0%
- ■ 25.0% - 50.0%
- ■ 50.0% - 100%

Urban Areas in 2040

Percent urban land

- 0.0% - 0.1%
- 0.1% - 2.5%
- 2.5% - 5.0%
- 5.0% - 10.0%
- 10.0% - 25.0%
- 25.0% - 50.0%
- 50.0% - 100%

Urban Areas in 2050

Percent urban land
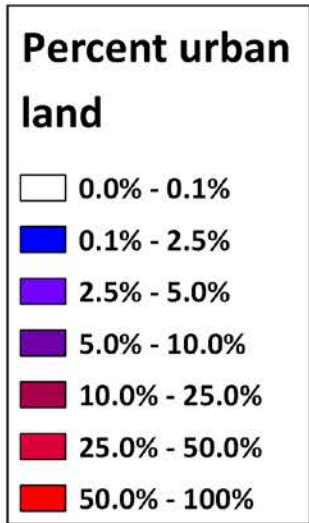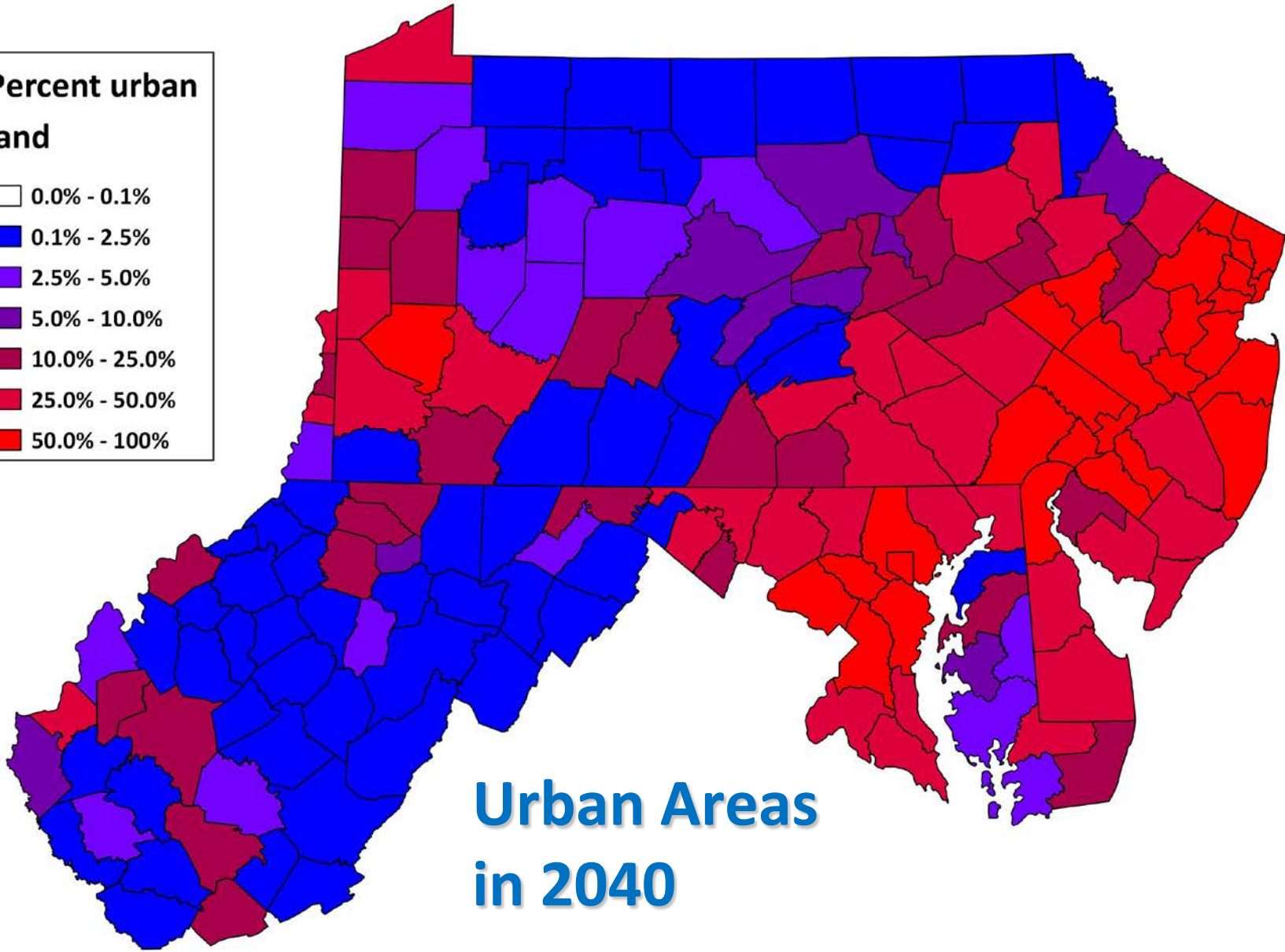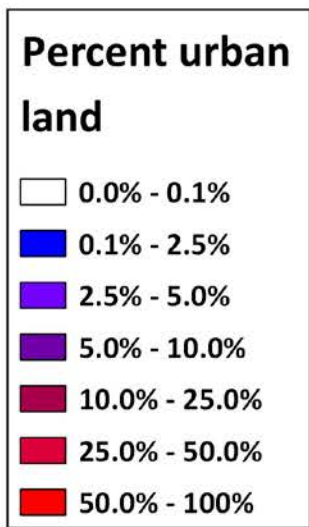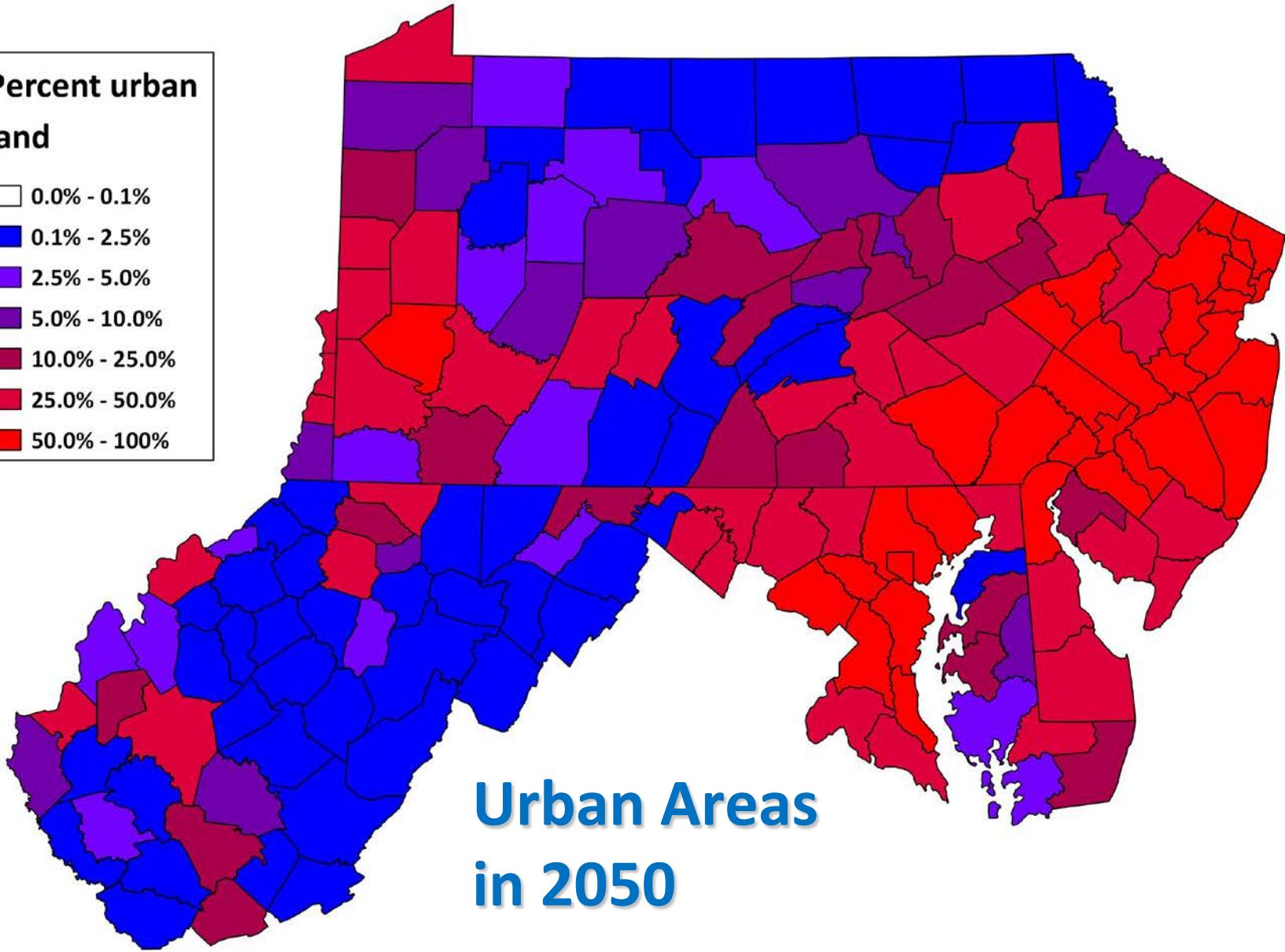
- ☐ 0.0% - 0.1%
- ■ 0.1% - 2.5%
- ■ 2.5% - 5.0%
- ■ 5.0% - 10.0%
- ■ 10.0% - 25.0%
- ■ 25.0% - 50.0%
- ■ 50.0% - 100%
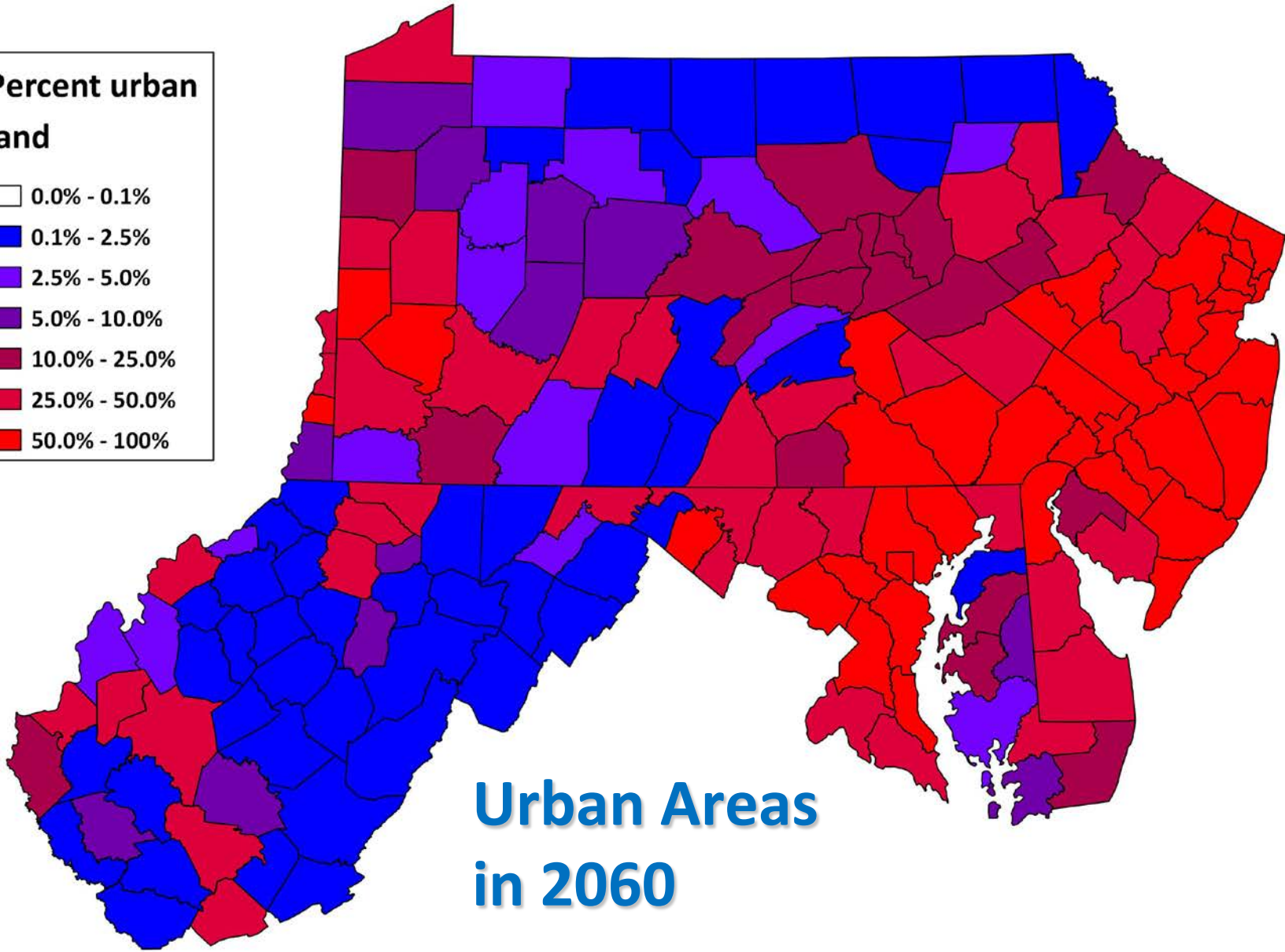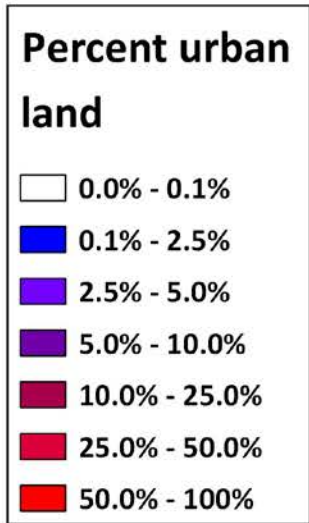
Urban Areas in 2060

Urban area change 1990-2010

Percent urban land change

- No urban land
- -0.4% - 0.0%
- 0.0% - 1.0%
- 1.0% - 5.0%
- 5.0% - 15.0%

Nationally 44% increase
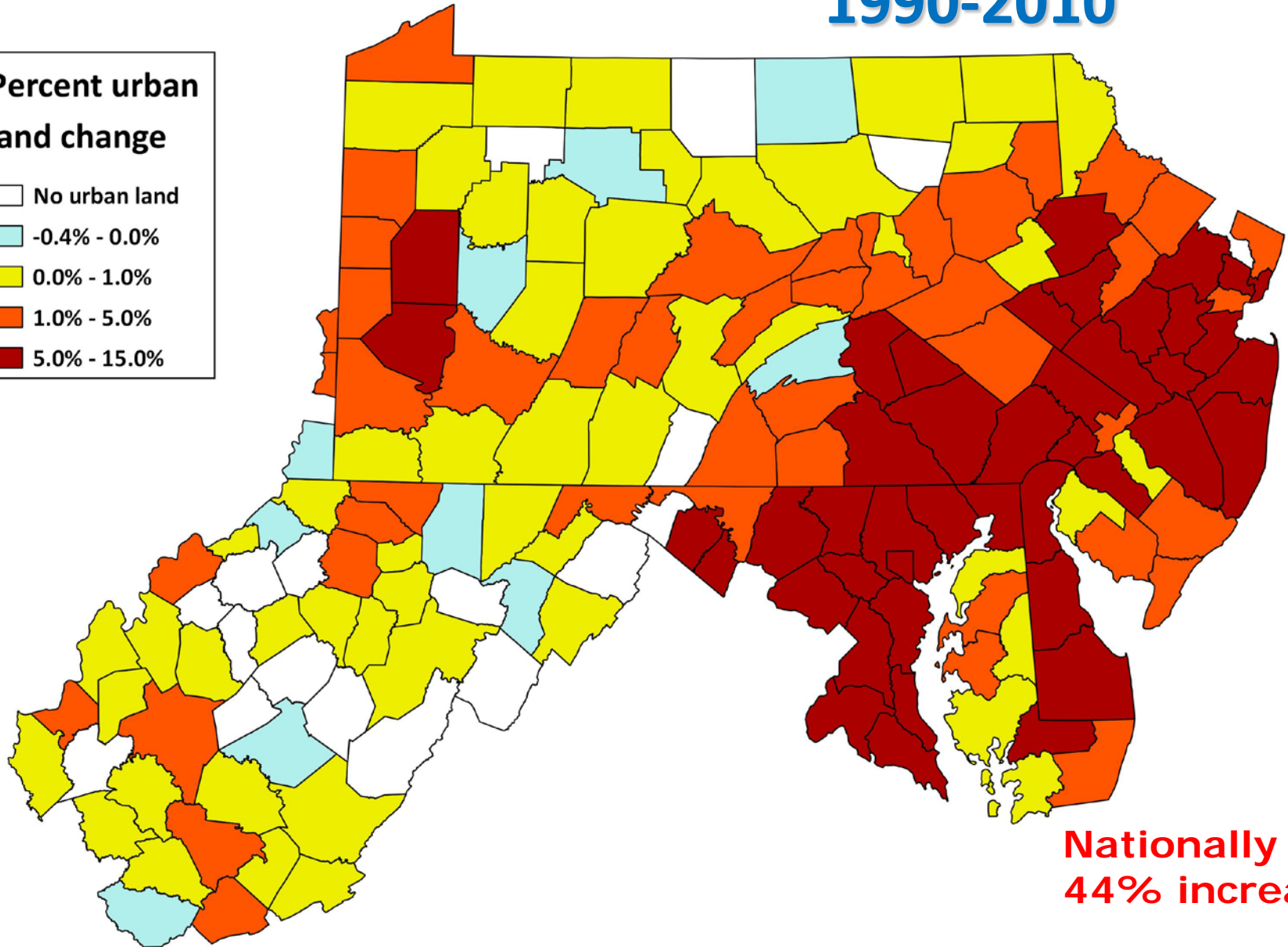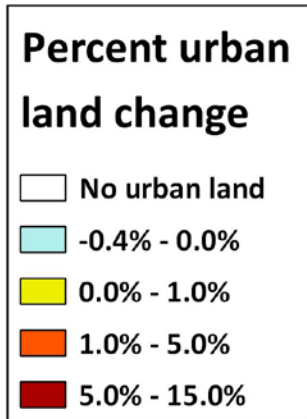
Urban area change 2010-2060

Percent urban land change

- 0.4% - 1.0%
- 1.0% - 2.5%
- 2.5% - 10.0%
- 10.0% - 25.0%
- 25.0% - 37.0%

Nationally 114% increase
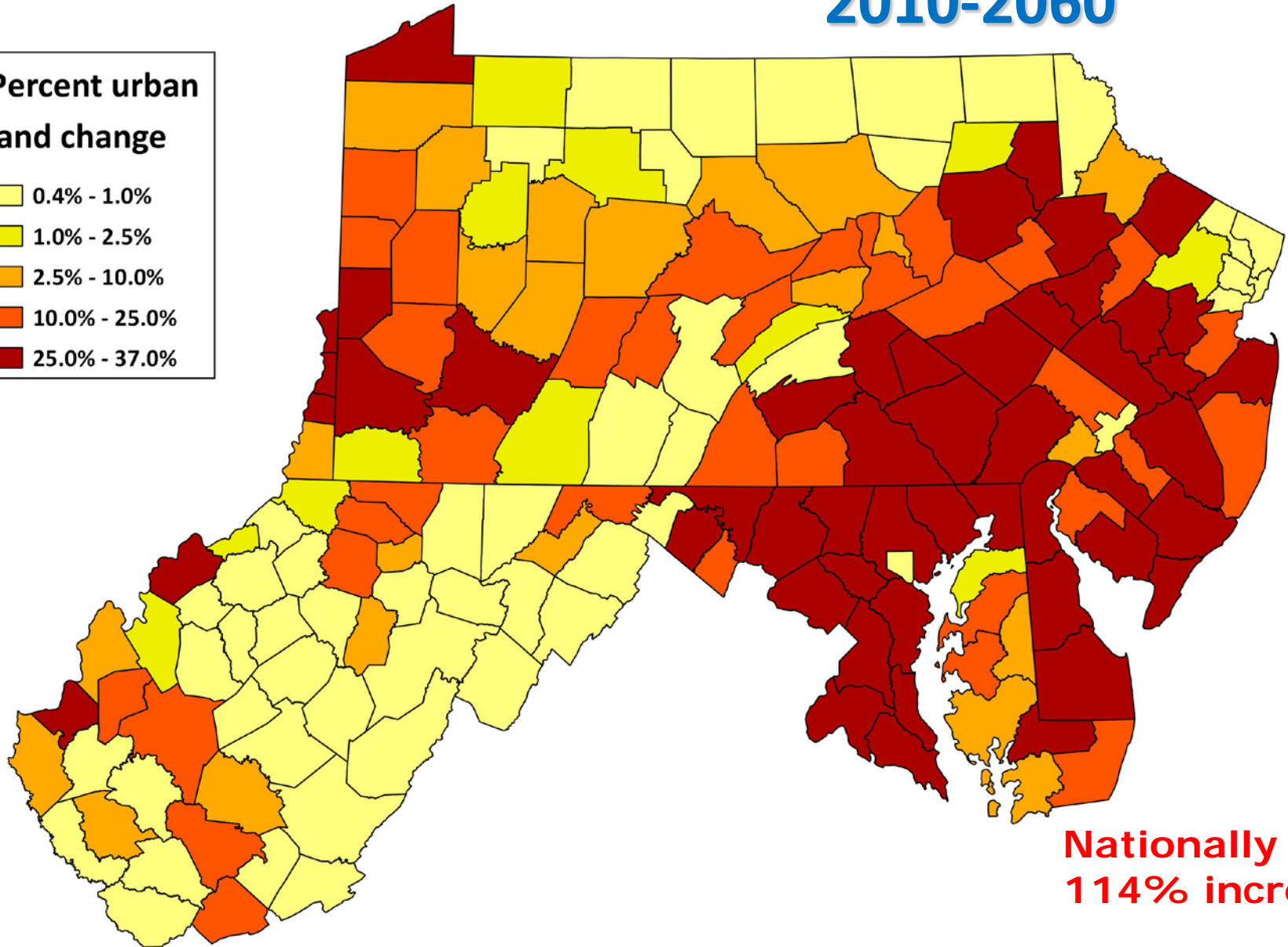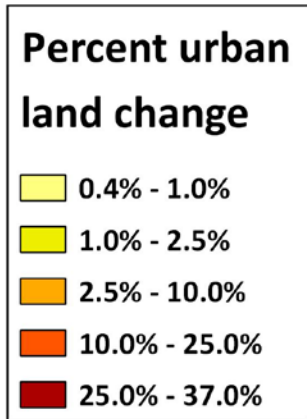
Trees and people: Emerging research

Nature-based strategies for improving urban health and safety

Kondo, Michelle C.; South, Eugenia C.; Branas, Charles C.

Year Published
2015

Source
Journal of Urban Health. 92(5): 800-814.

Tree and forest effects on air quality and human health in the United States

David J. Nowak [a,*], Satoshi Hirabayashi [b], Allison Bodine [b], Eric Greenfield [a]

Neighborhood Blight, Stress, and Health: A Walking Trial of Urban Greening and Ambulatory Heart Rate

Eugenia C. South, MD, Michelle C. Kondo, PhD, Rose A. Cheney, PhD, and Charles C. Branas, PhD

American Journal of Public Health. 105(5): 909-913.

Improving local air quality in cities: To tree or not to tree?

Peter E.J. Vos*, Bino Maiheu, Jean Vankerkom, Stijn Janssen

Short report

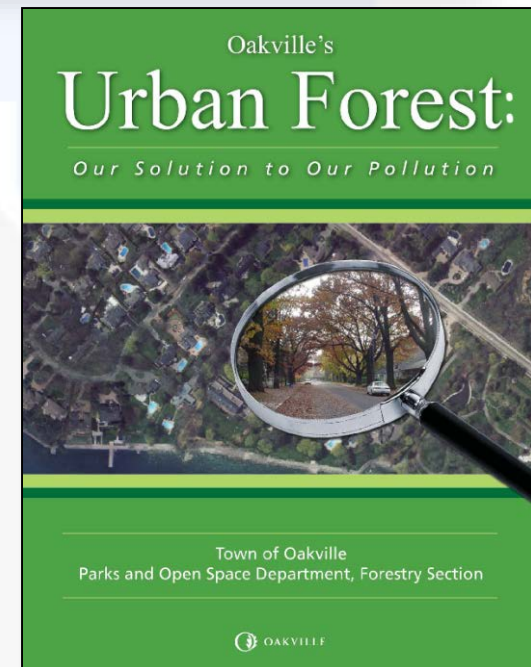## Children living in areas with more street trees have lower prevalence of asthma

G S Lovasi,[1] J W Quinn,[1] K M Neckerman,[1] M S Perzanowski,[2] A Rundle[3]

i-Tree: Demonstrating That Trees Pay Us Back!

Why do trees matter?

i-Tree assesses tree benefits

- Avoided run-off
- Carbon storage
- Carbon sequestration
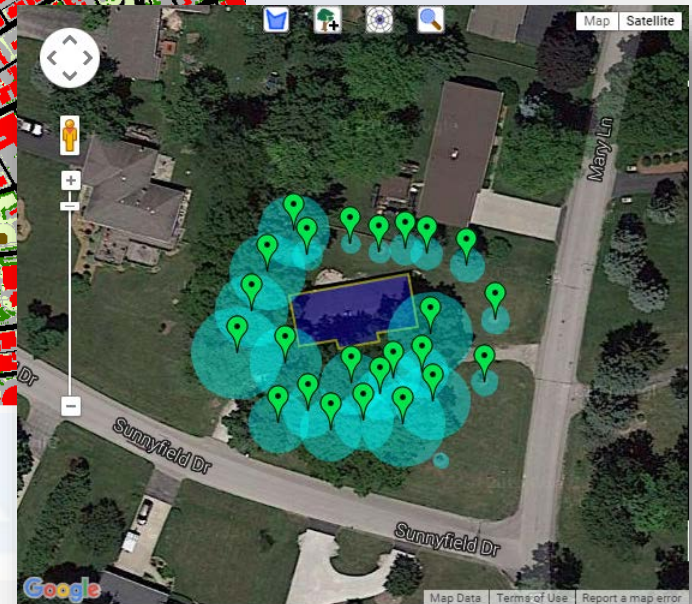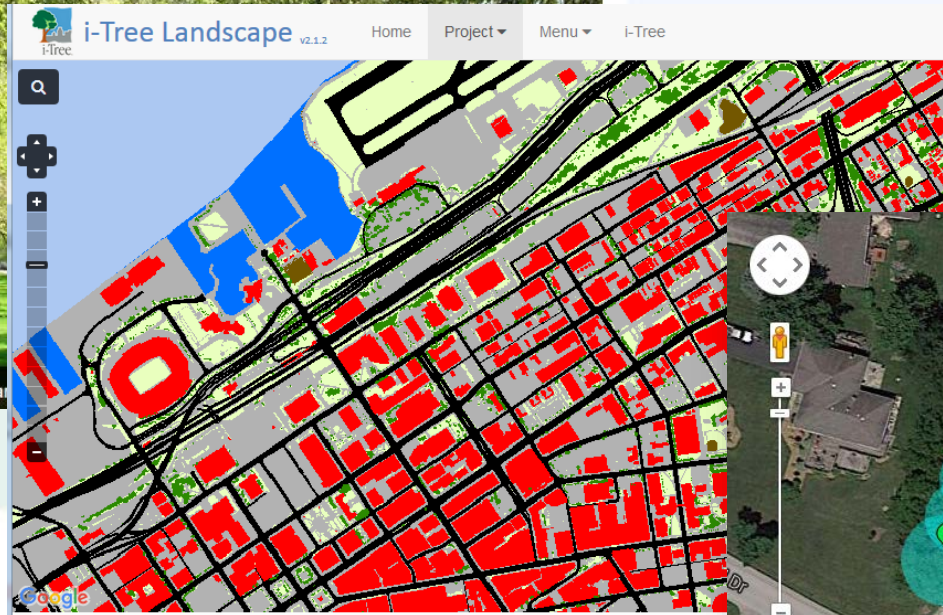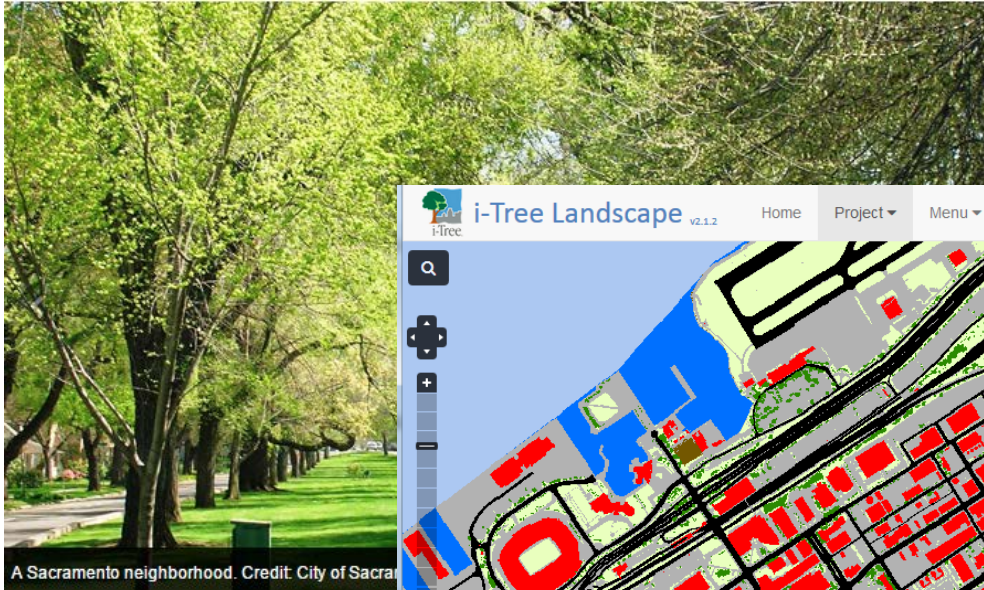- Air pollution removal
- Health benefits
- Energy use
- $ value

Use this information.
Find out what is important to your community.
Be strategic!

Structure ➡ Function ➡ Benefits ➡ Value

A Sacramento neighborhood. Credit: City of Sacra...

….state, county, region, watershed, neighborhood, home, etc.

The 2017 i-Tree Suite of Tools

Web-based, run in your browser

Installed on a Windows desktop or laptop

Design

Canopy

Landscape

Eco

Streets

Hydro

i-Tree Landscape vision

A spatially distributed model that estimates and values ecosystem services of trees on all lands

landscape.itreetools.org
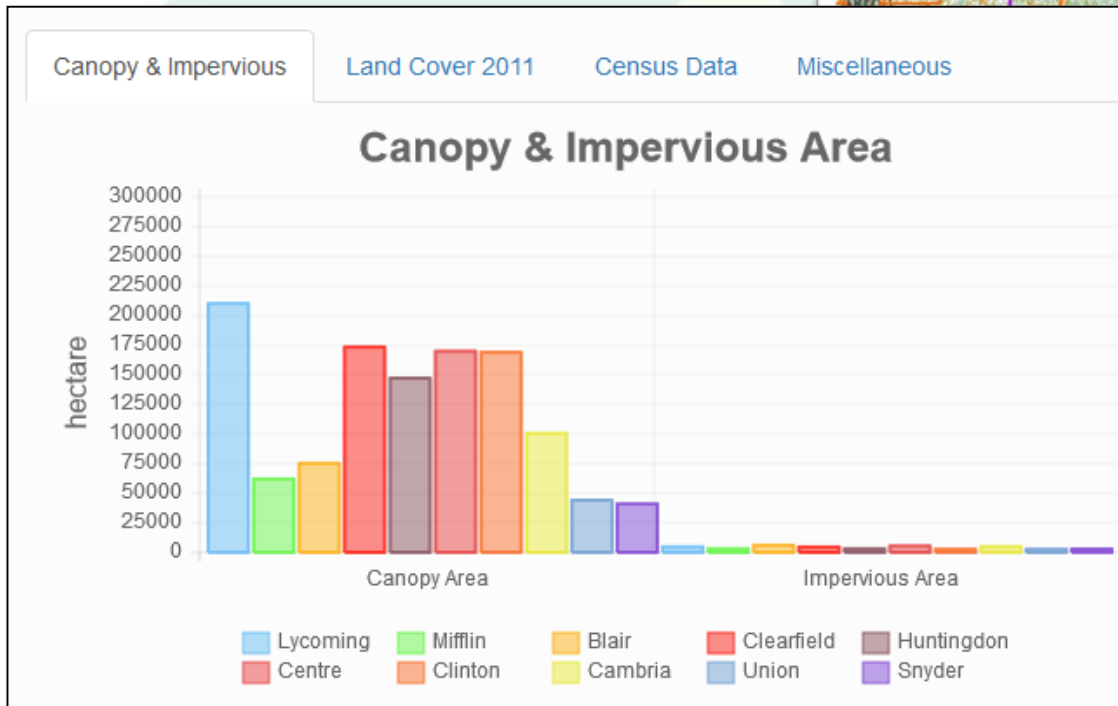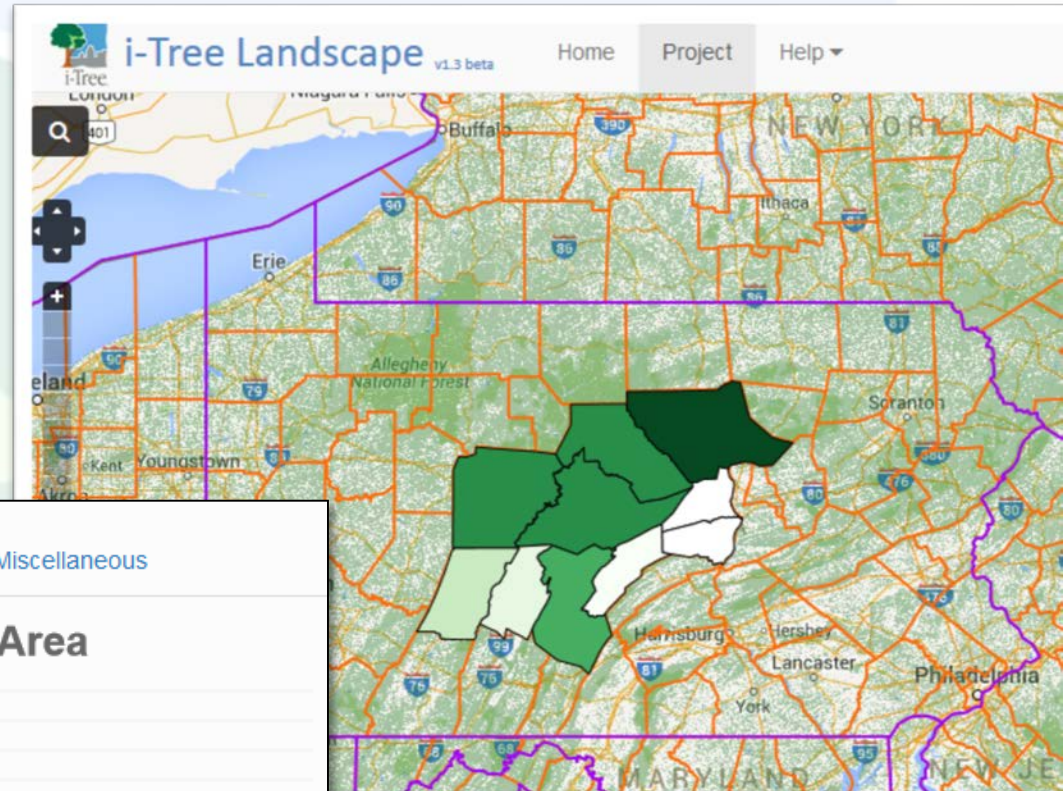
Why i-Tree Landscape Matters?

- Online and accessible

- Engage audiences visually

- Explore relationships among trees, people, and land
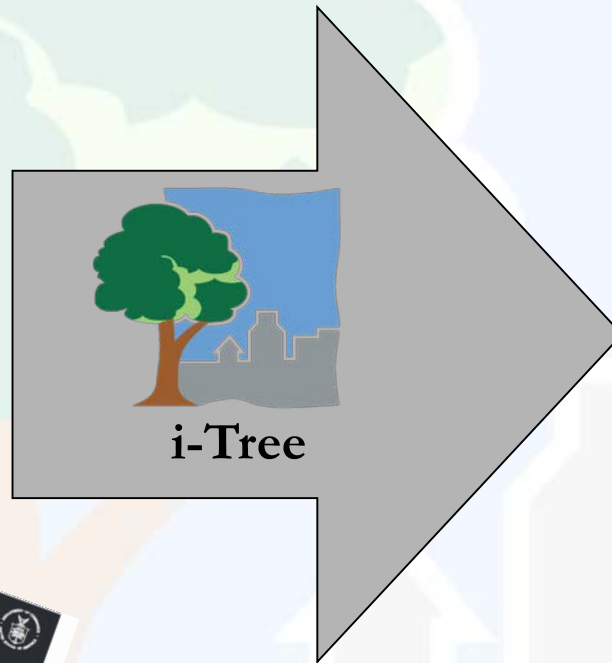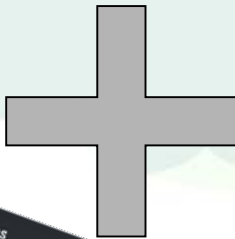
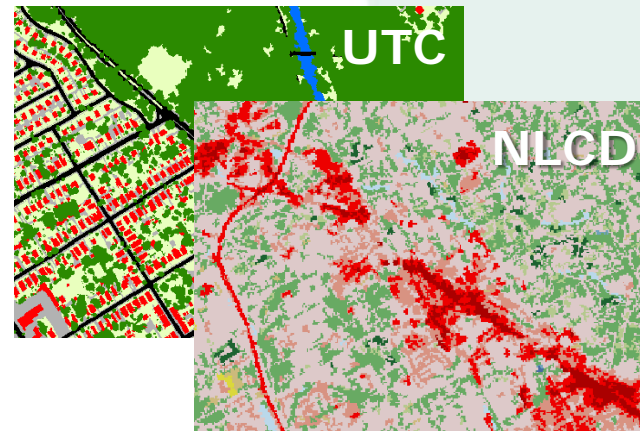- An "All Lands" approach to estimating tree benefits
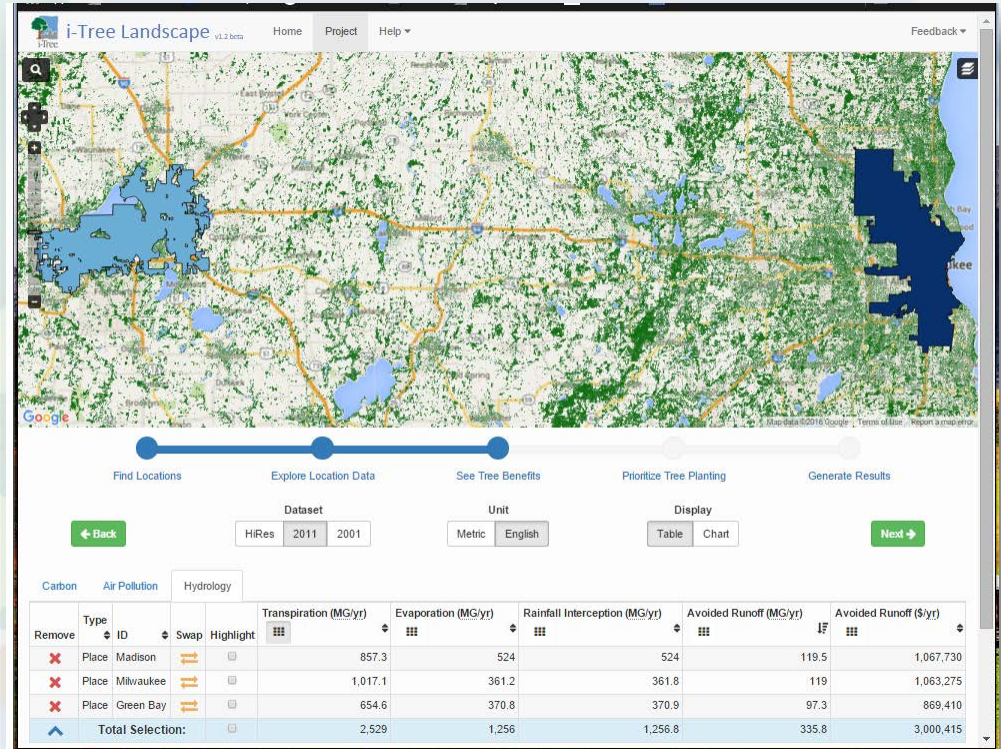
Why i-Tree Landscape Matters?

- We have spatial canopy data covering the entire US (National Land Cover Dataset, NLCD)

- We have high resolution data covering many urban areas (Urban Tree Canopy, UTC)

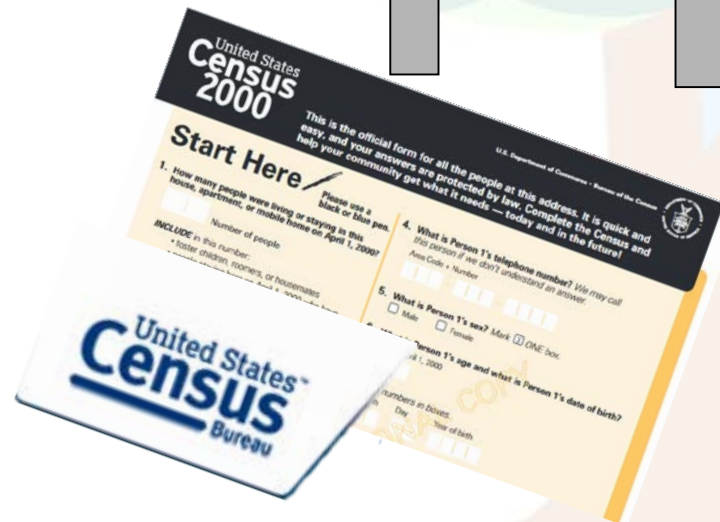- We know how much canopy we have and where it is

Have you used this data?
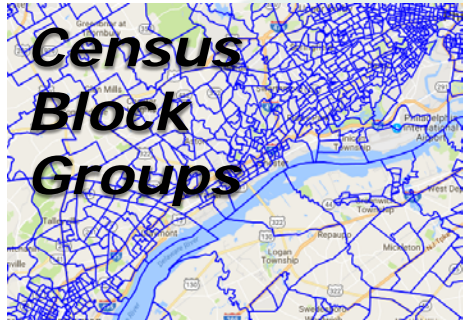
i-Tree Landscape basics

UTC

NLCD
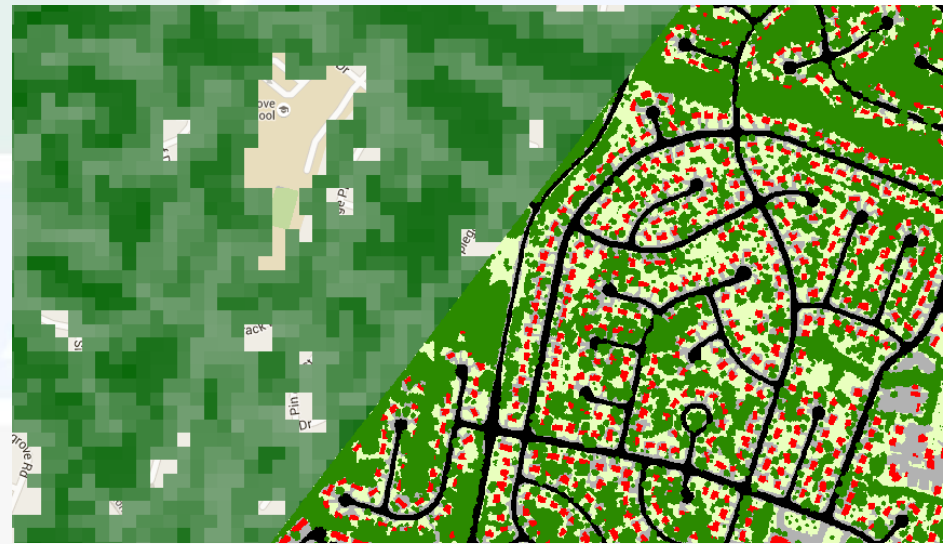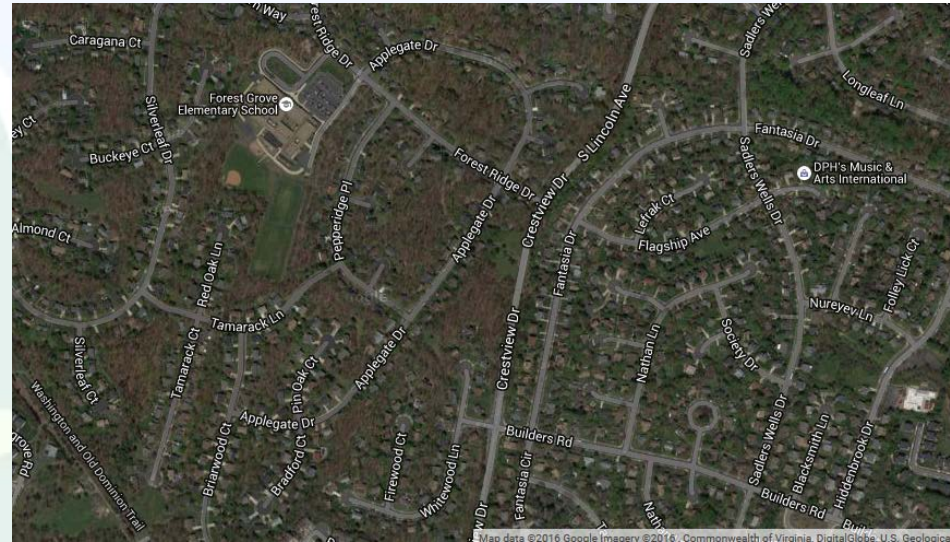
i-Tree

Benefits and $

- Carbon
- Air pollution
- Rainfall and stormwater

i-Tree Landscape basics

Map and summarize by:

Census Block Groups

Congressional Districts

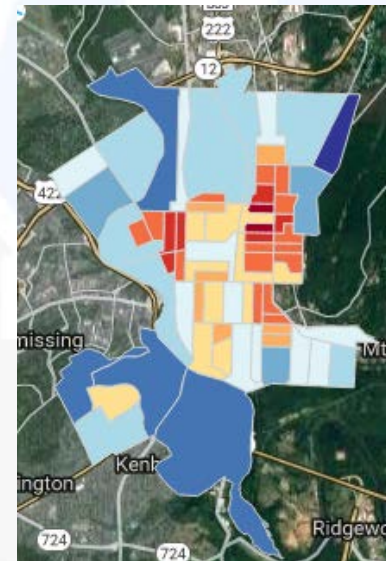
Census Places

Forest Service

Counties
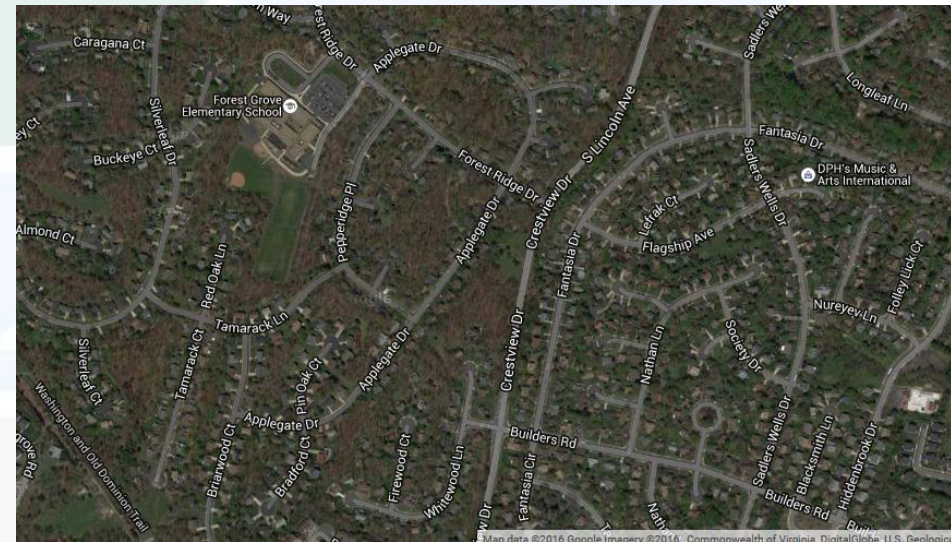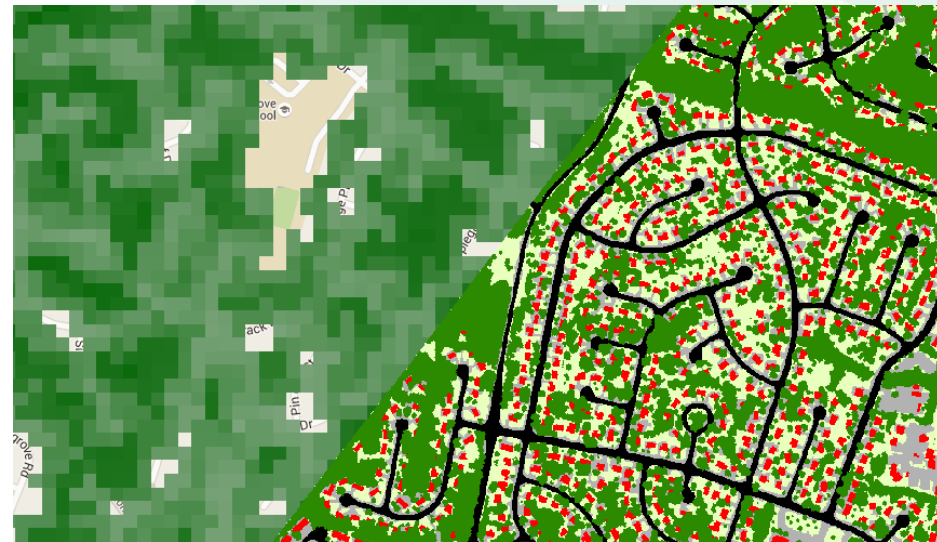

Watershed HUC12
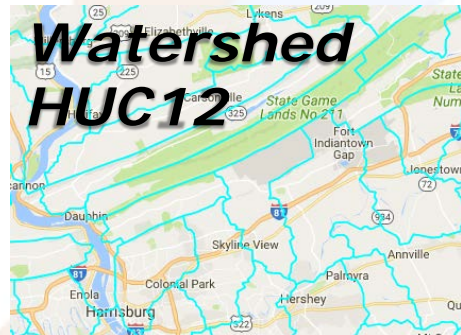
Manage risk and opportunity
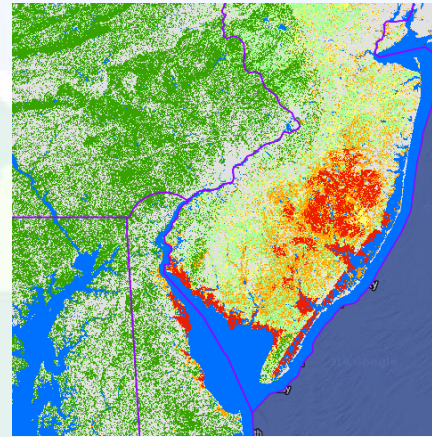
Fire
Pollutants
Development
Pests

Prioritize and inform management

Limitations

- Limited to preprocessed geographies
- NLCD (National Land Cover Data Set) data is low resolution and not always accurate, we have adjustments
- UTC (Urban Tree Canopy) not available everywhere
- Limited to existing imagery and dates

UTC in i-Tree Landscape

48 high resolution UTC data sets uploaded...

- Improved accuracy
- More visually appealing
- Often more timely
- Aligned with local efforts

...more in the queue

State	Municipality/County
CT	Bridgeport
CT	Hartford
CT	New Haven
CT	Trumbull
CT	Stamford
DC	Washington
GA	Chatham County
IA	Iowa (state-wide)
MA	Cambridge
MA	Chelsea
MA	Lawrence
MD	Anne Arundel County
MD	Baltimore County
MD	Harford County
MD	Howard County
MD	Montgomery County
MD	Prince George's County
MD	Wicomico County
MD	Frederick
NC	Mecklenburg County
NJ	Newark
NY	Bronx County
NY	Kings County
NY	New York County

State	Municipality/County
NY	Queens County
NY	Richmond County
NY	Syracuse
OH	Cuyahoga County
PA	Allegheny County
PA	Lancaster County
PA	Philadelphia County
PA	Pottstown
PA	State College
RI	Pawtucket
RI	Central Falls
VA	Alexandria City (County)
VA	Arlington County
VA	Fairfax City (County)
VA	Fairfax County
VA	Falls Church City (County)
VA	Virginia Beach County
VA	Leesburg
VT	Burlington
VT	Montpelier
VT	South Burlington
WI	Madison
WV	Berkeley County
WV	Jefferson County

Regional Scale: Canopy Cover and Benefits
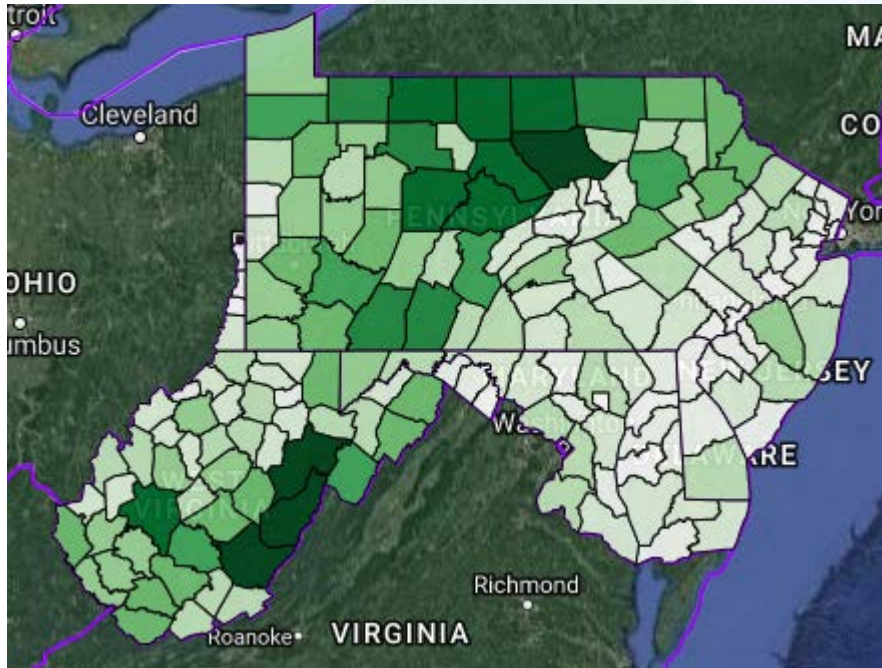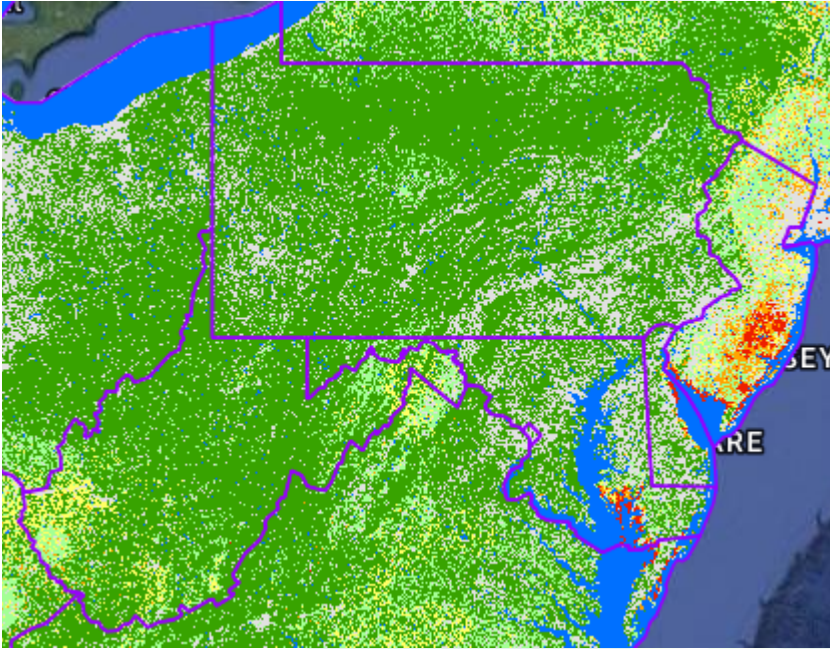

<u>Canopy cover</u>
- 31 million acres
- 55% canopy cover

<u>Annual carbon sequestration</u>
- 20.8 m tons/yr
- $2.9 billion
- 10k tons/yr in Philly
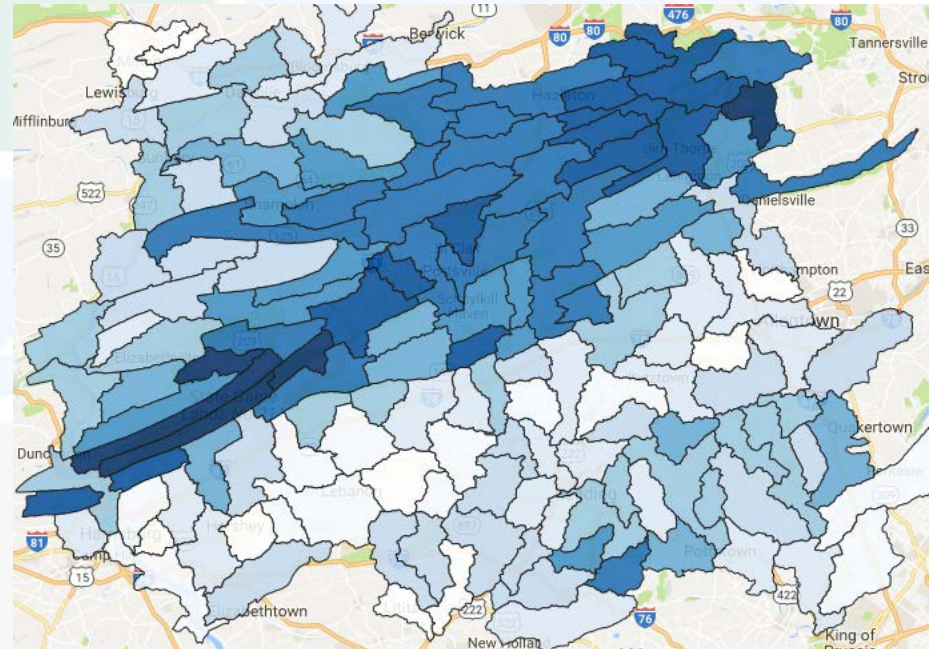- 418k tons/yr in Warren Co.
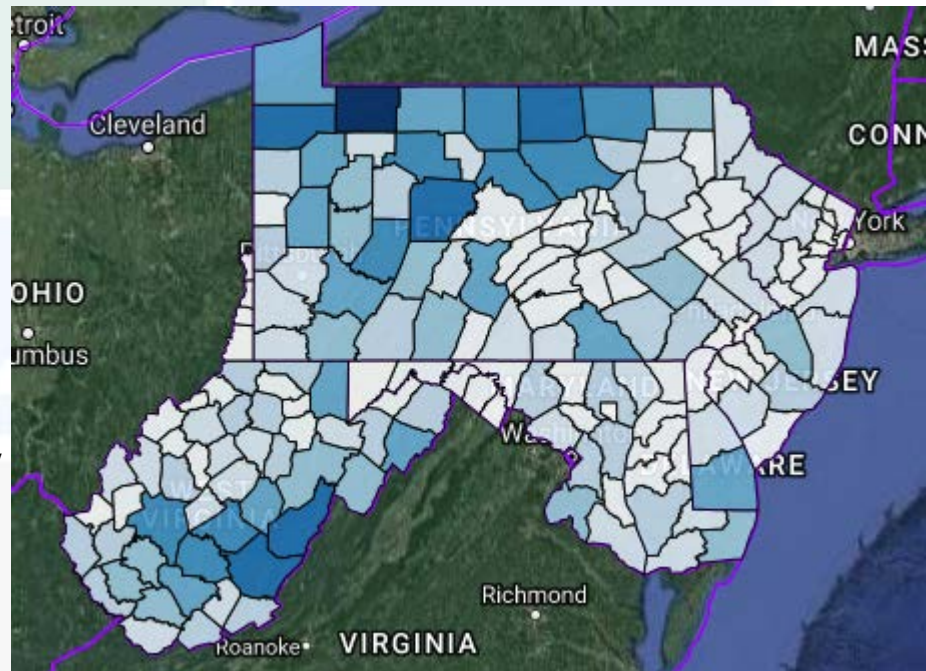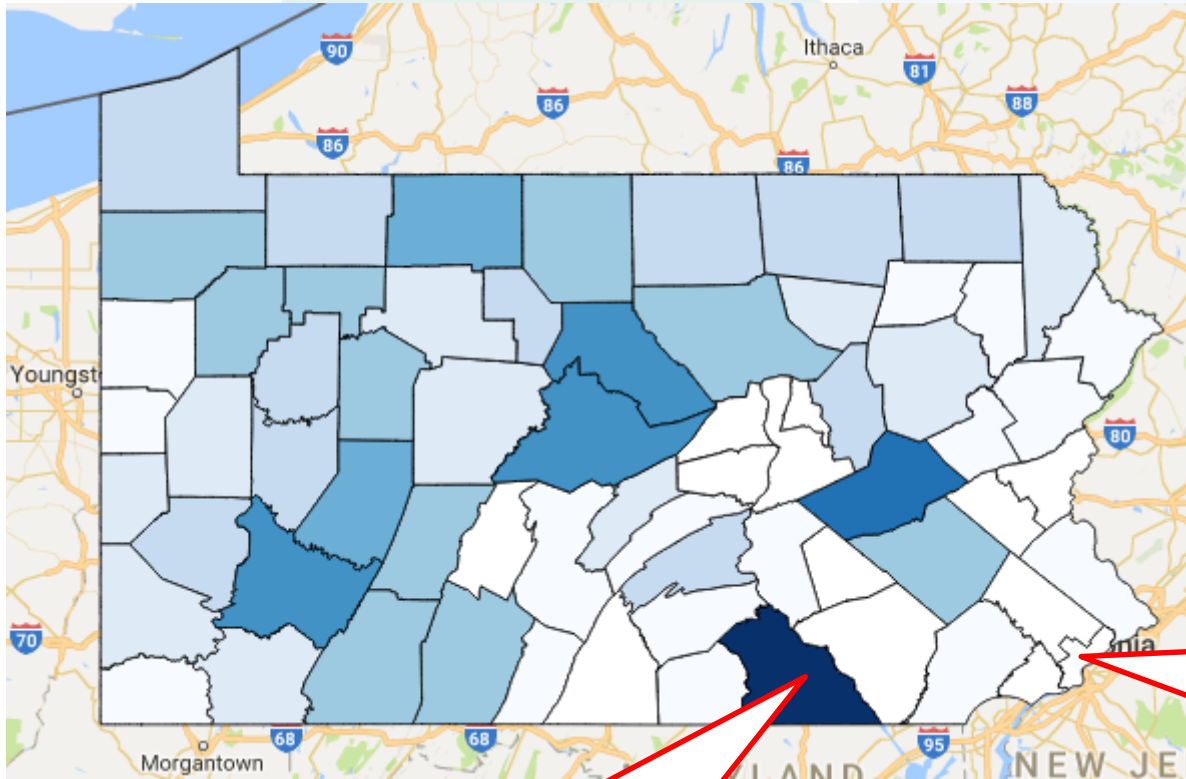
Regional Scale: Risk to forest and people

Relative probability of extreme fire behavior
From US Forest Service Wildfire Hazard Potential map

Forest importance to surface drinking water
From US Forest Service Forests to Faucets Map

County Scale: benefits comparisons

27 thousand pounds of particulates removed per year

$9.9 million in benefits

2.2 million pounds of particulates removed per year

$10.8 million in benefits

City Scale: Comparisons
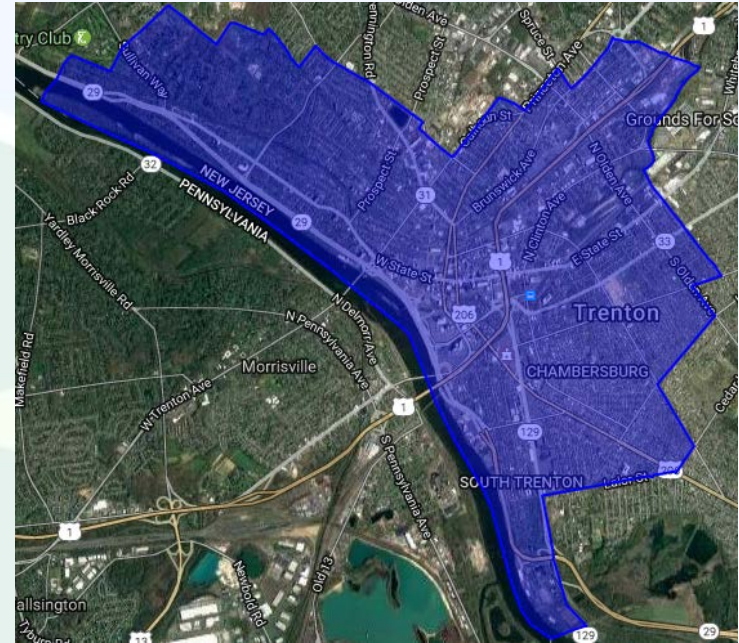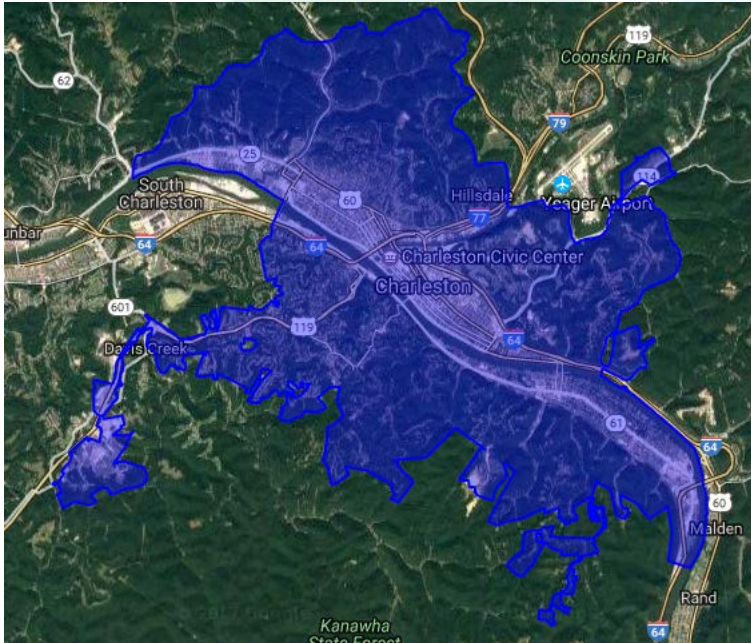
Canopy & Impervious Area
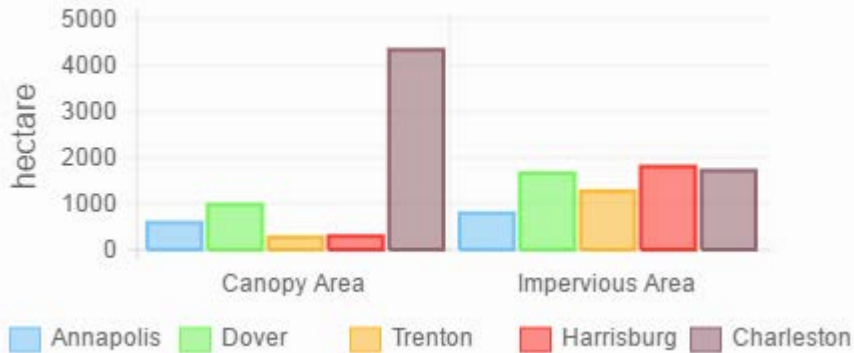
Monetary Benefits per Year
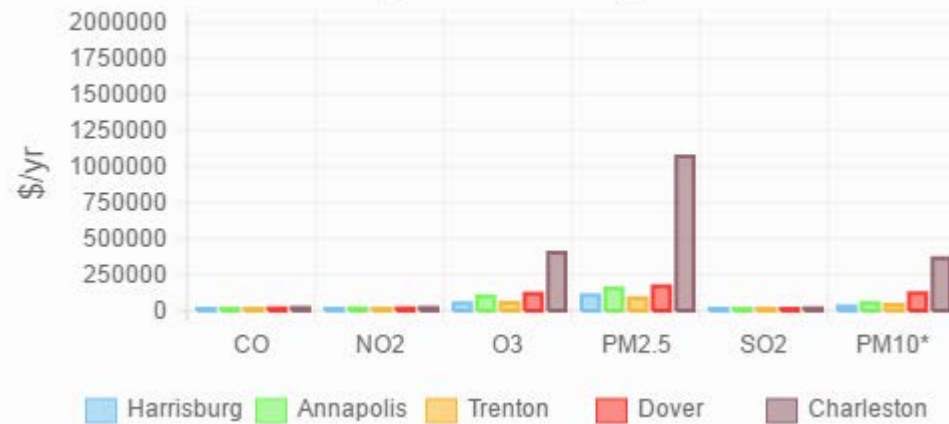
Neighborhood scale: planting priority map

Mapping <u>opportunity</u>

Optimized for planting trees where there is available space and the highest population density
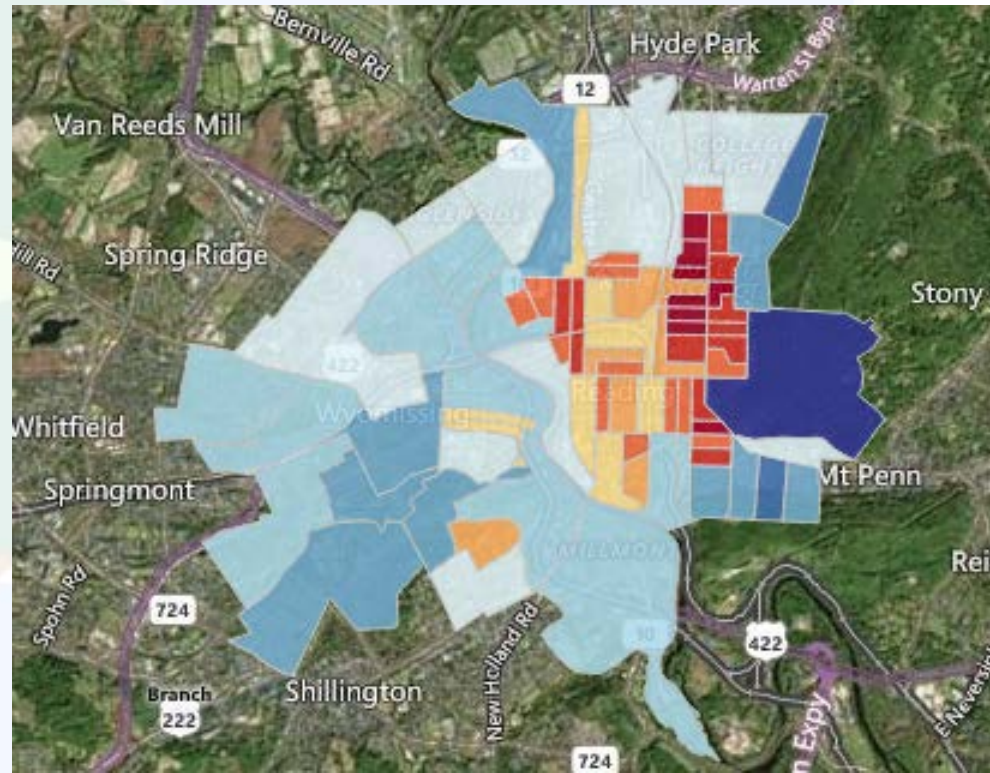
Neighborhood scale: planting priority map

Mapping <u>need</u>

Optimized for planting trees where there is low tree cover and high poverty

Share your results

How can i-Tree Landscape help you?

🌳 Demonstrate tree value to diverse audiences

🌳 Assess trees beyond streets and parks

🌳 <u>Protect</u> & plant trees where they do the most good

🌳 Justify tree maintenance, management, and assessment

🌳 Explore how tree canopy impacts people
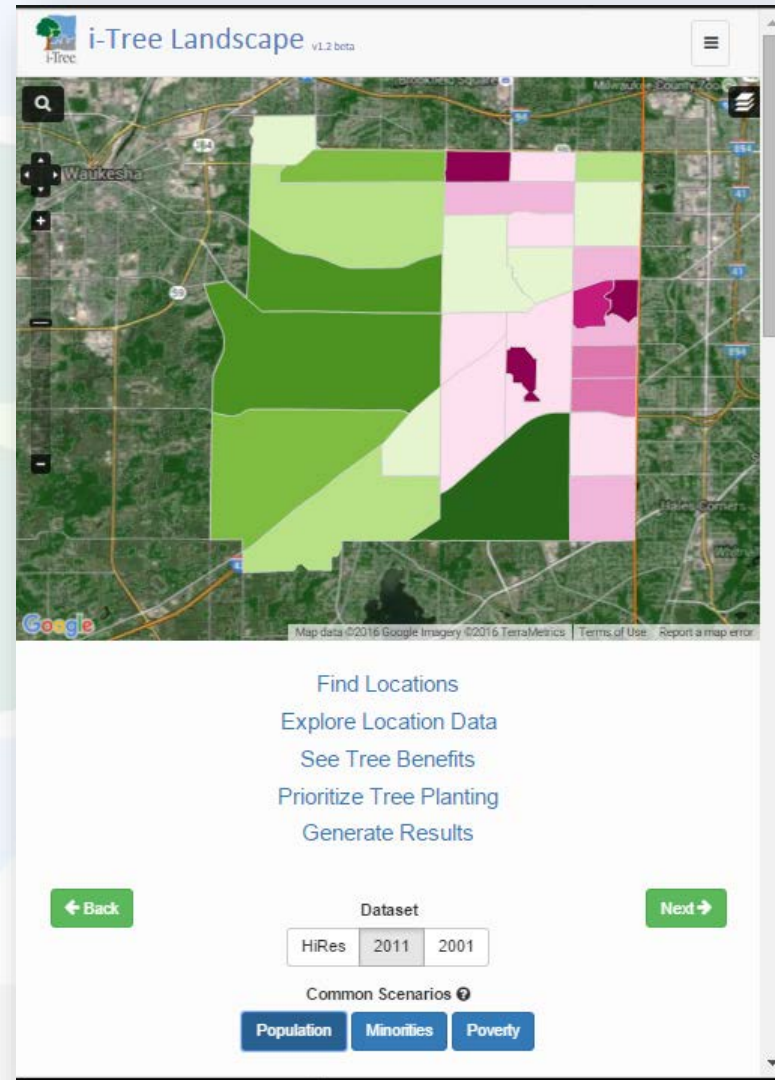
Additional i-Tree resources

www.itreetools.org

Videos

Documentation

Online tools

Support

Examples

Downloads

Forum/FAQs

info@itreetools.org | jason.henning@davey.com | krista.heinlen@davey.com