



# i-Tree Landscape: Data, trees, and people

**Jason Henning PhD**  
The Davey Institute and  
USDA Forest Service  
Philadelphia, PA  
[jason.henning@davey.com](mailto:jason.henning@davey.com)



**DAVEY**

Arbor Day Foundation



**ISA**

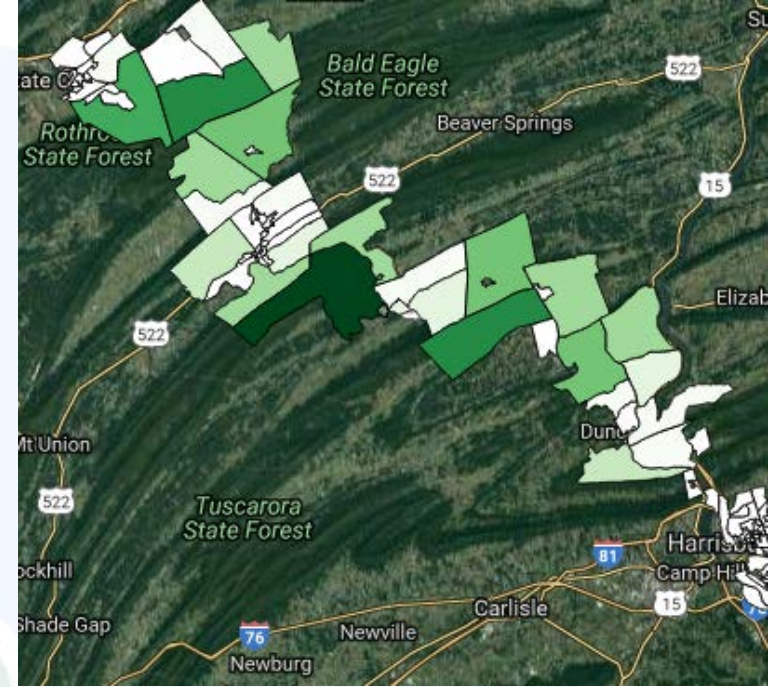


**ESF**

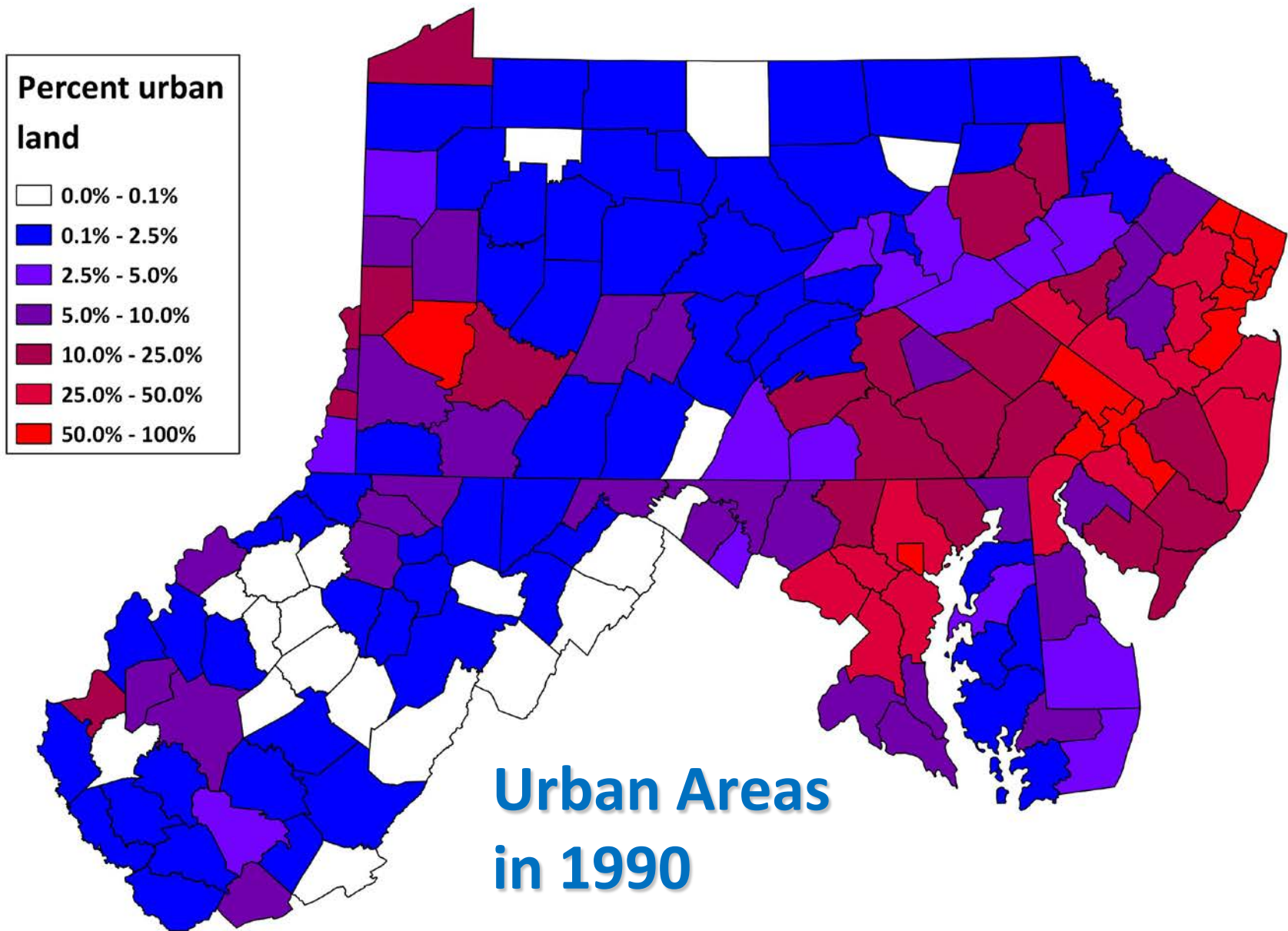


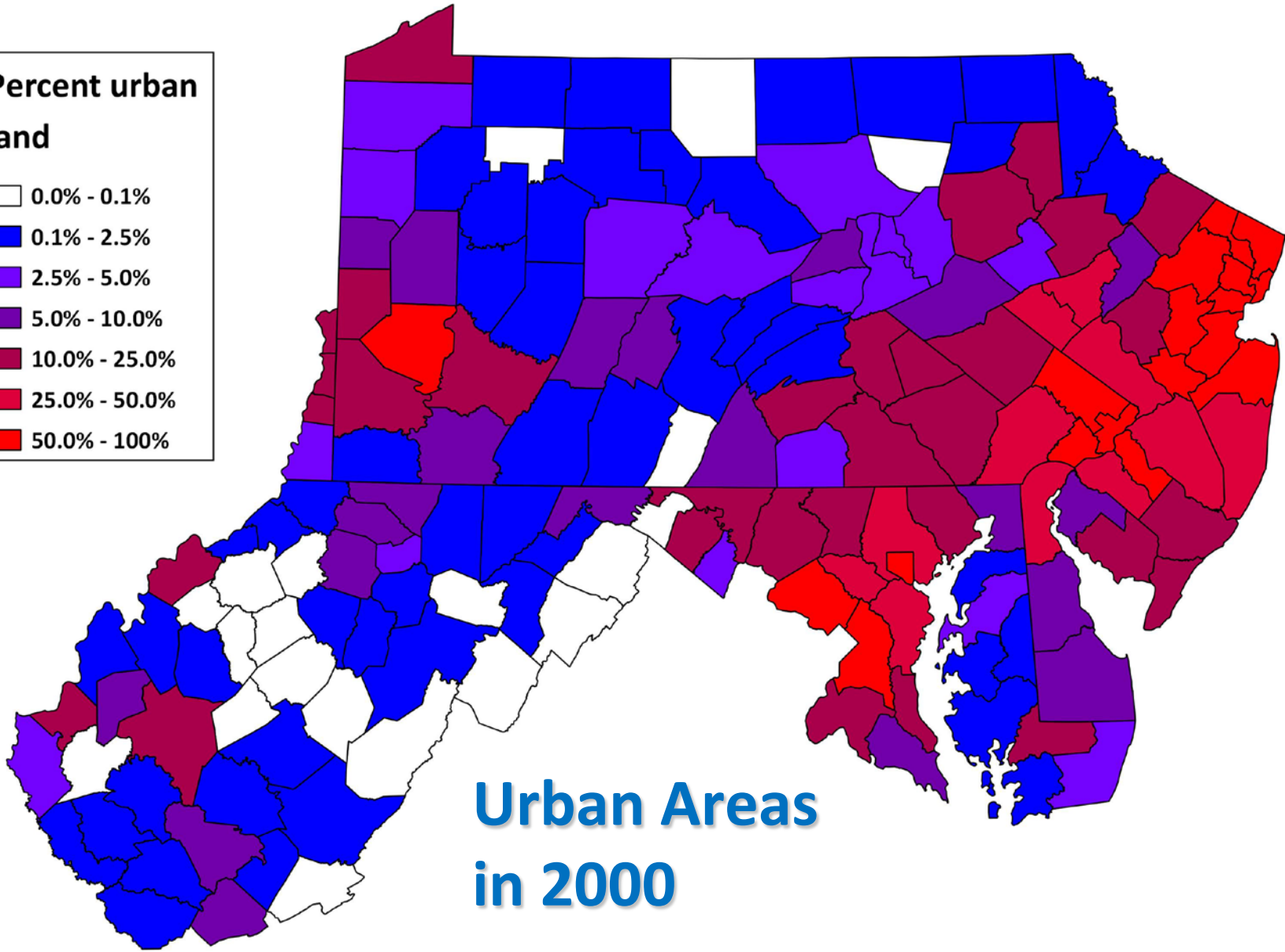
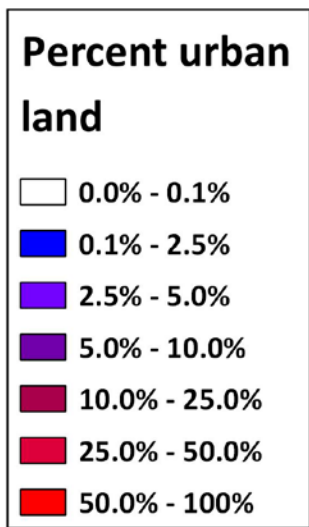
# Plan for today

- 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

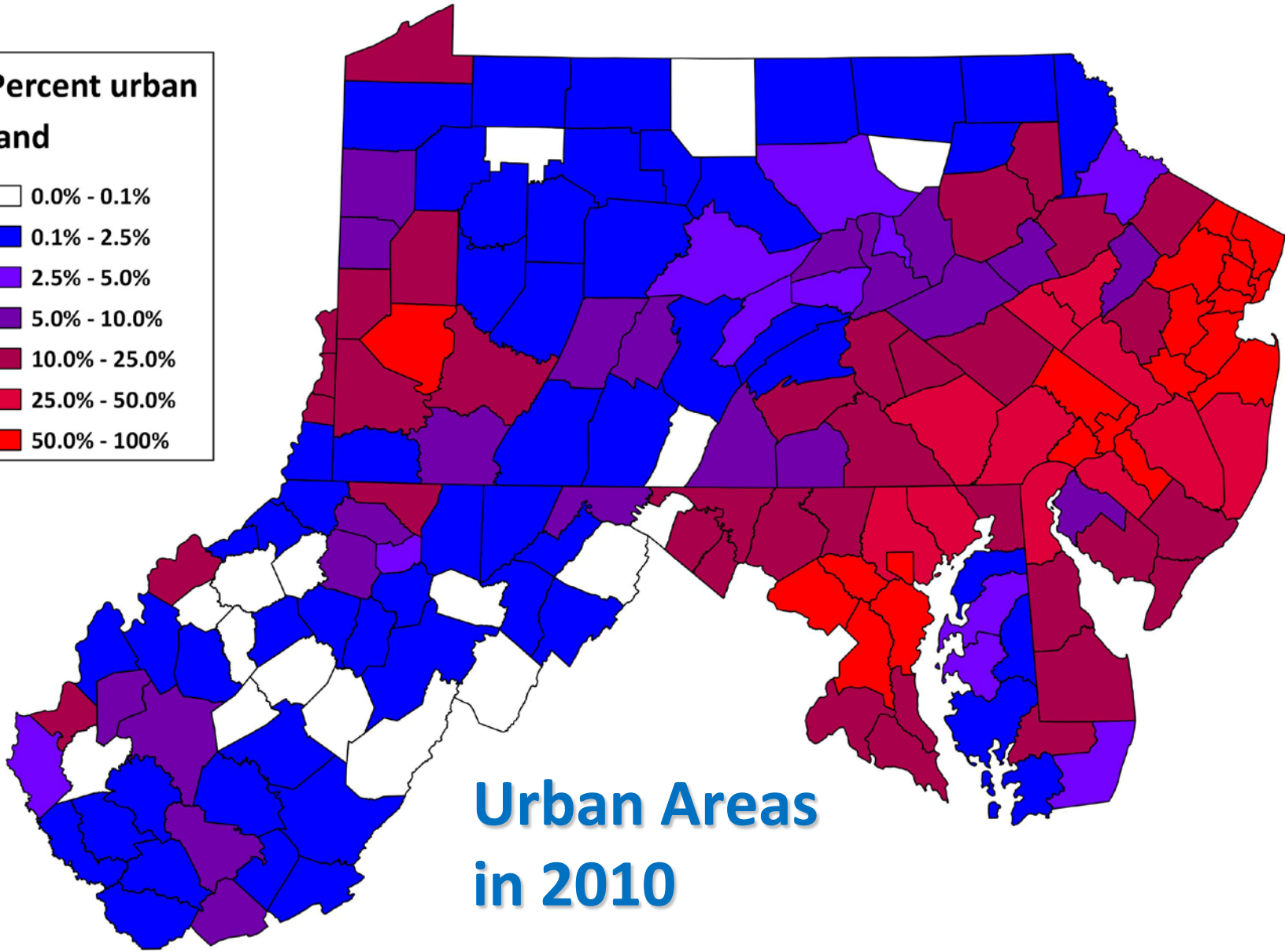
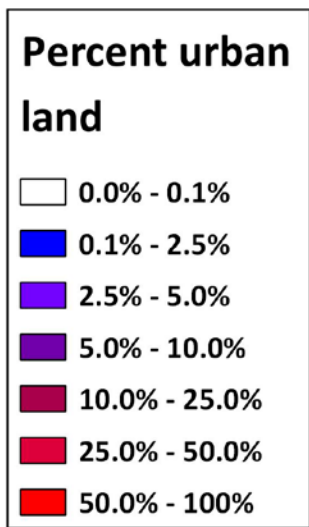


# Why are people important to forests?

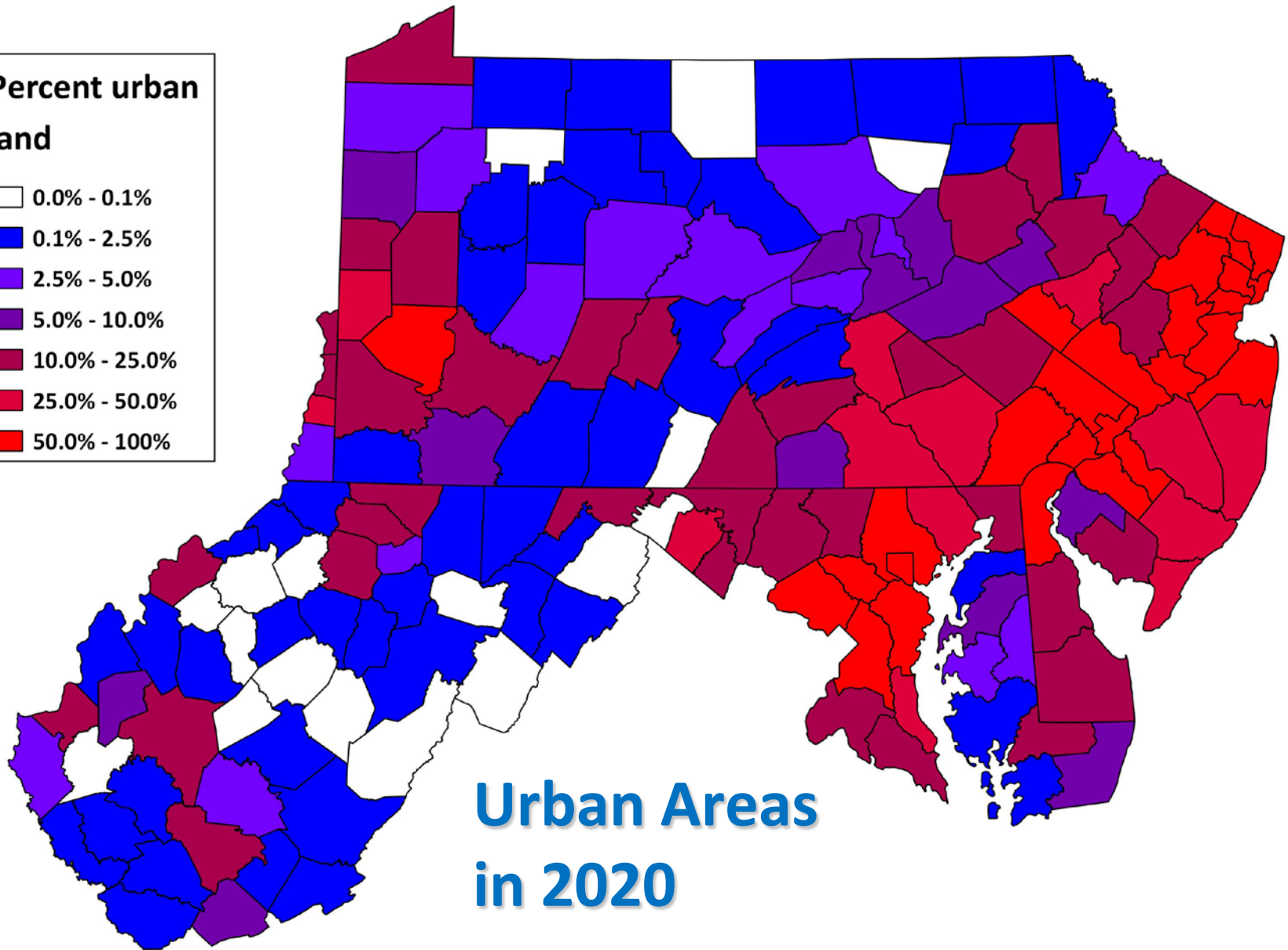
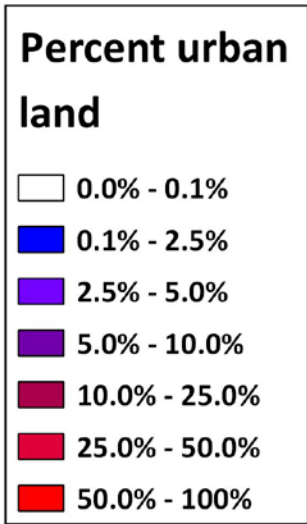




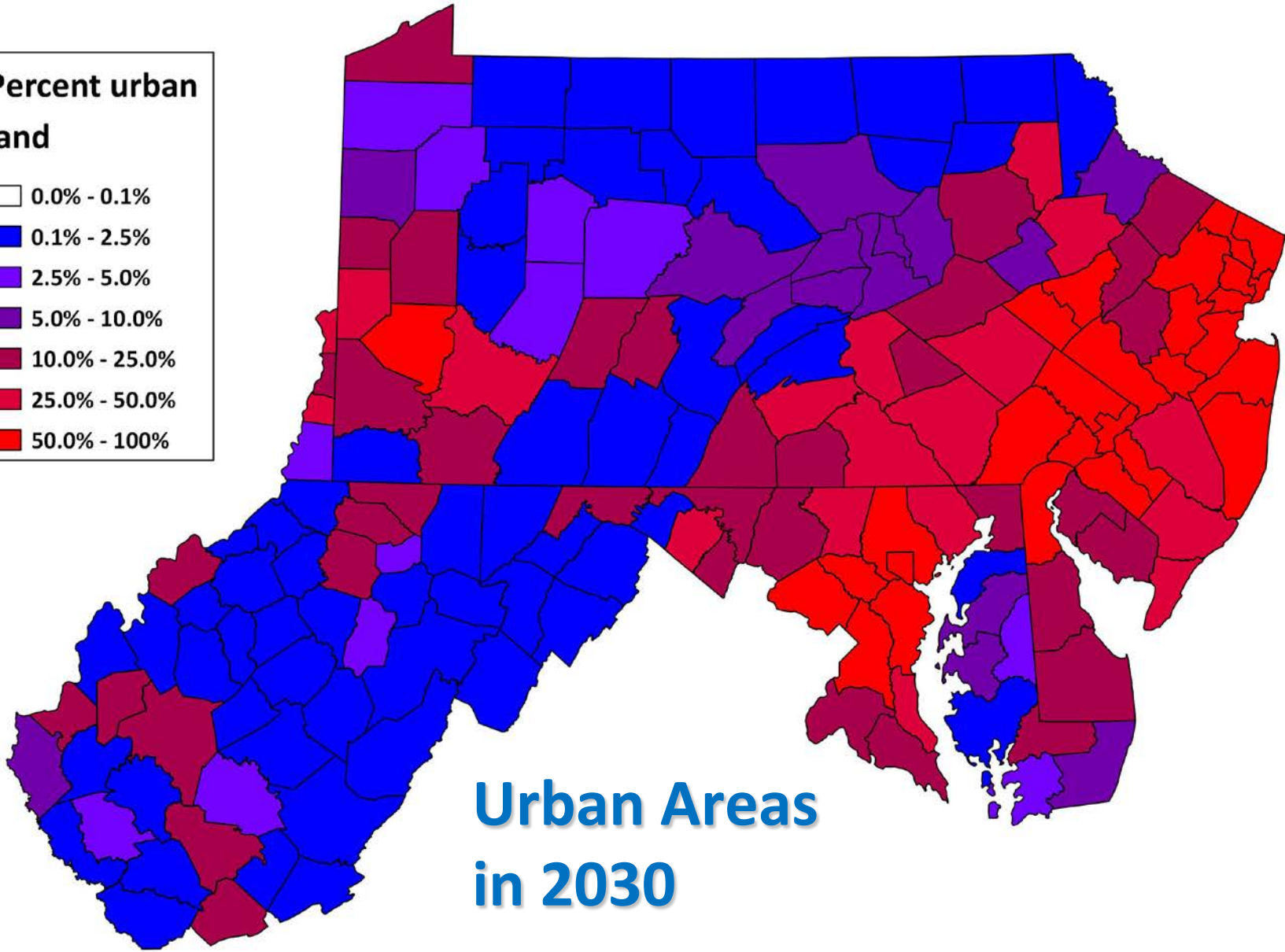
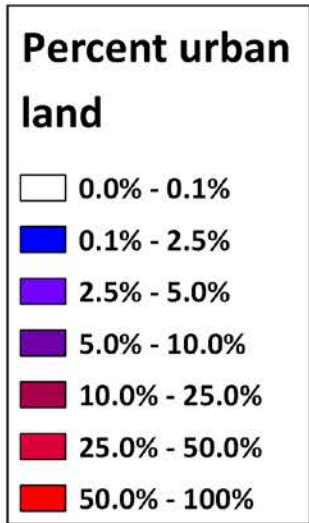
**Urban Areas  
in 2000**



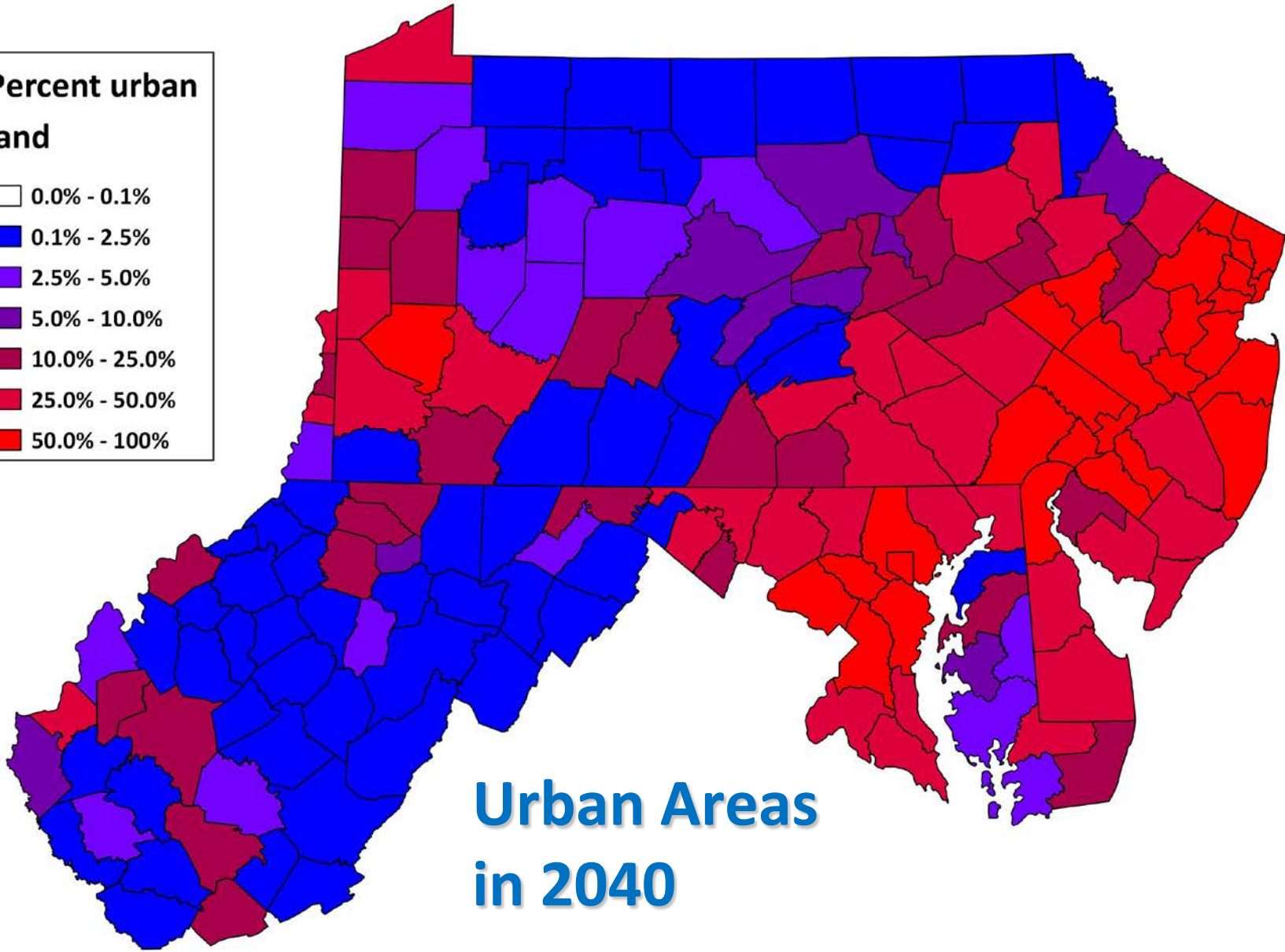
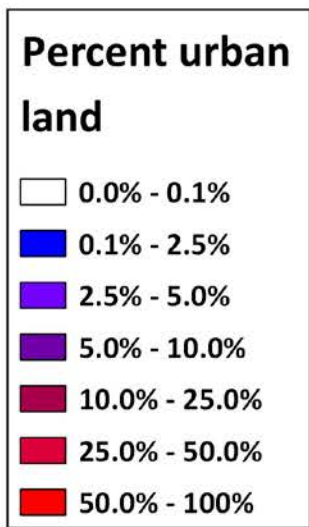
**Urban Areas  
in 2010**



**Urban Areas  
in 2020**

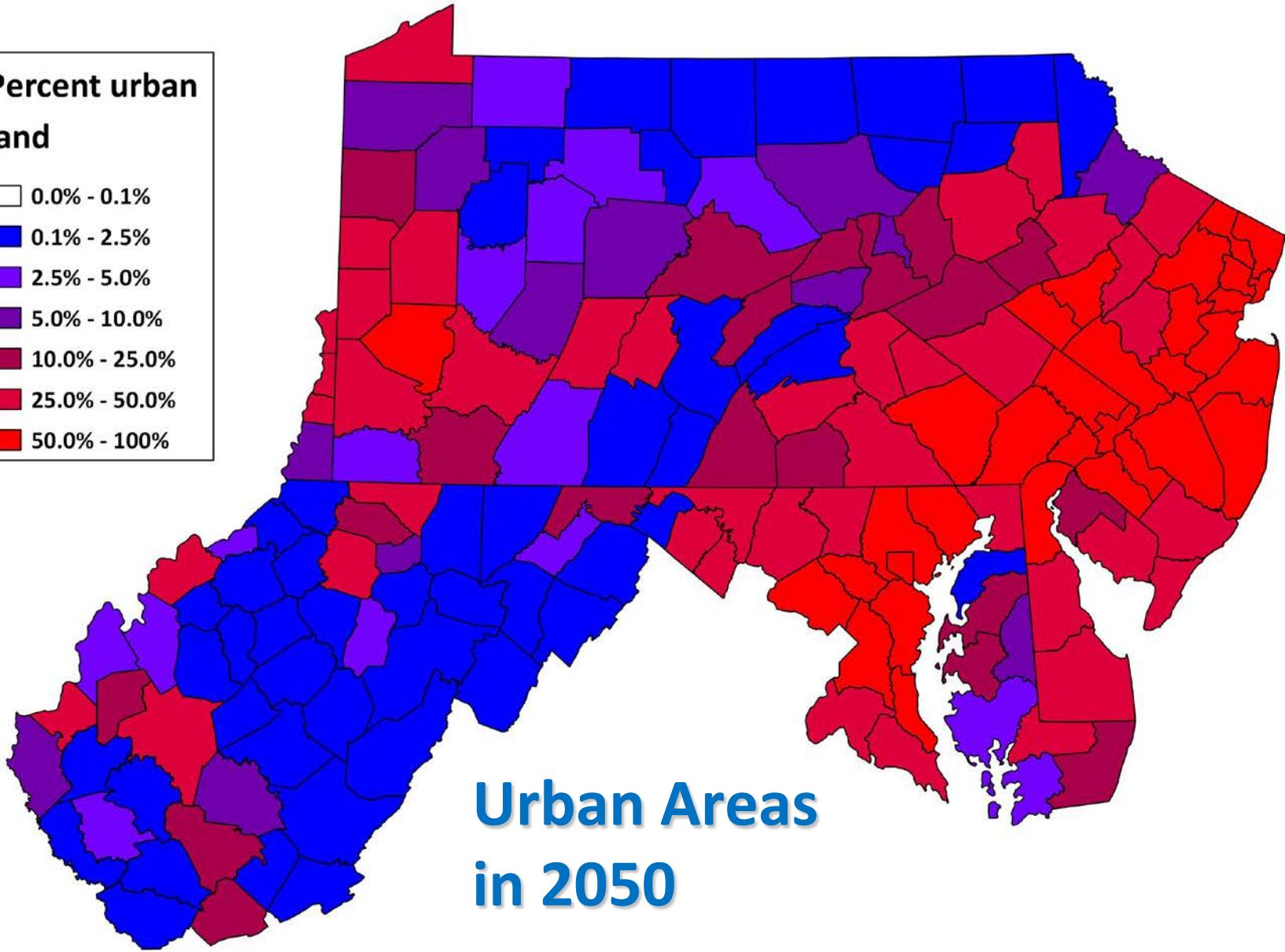
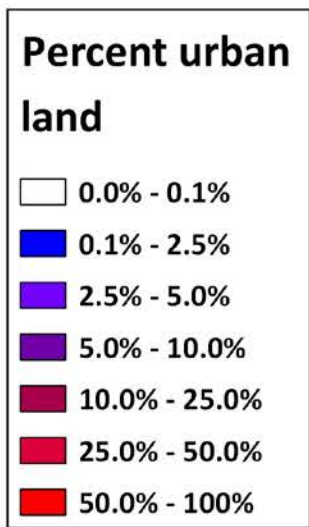


**Urban Areas  
in 2030**

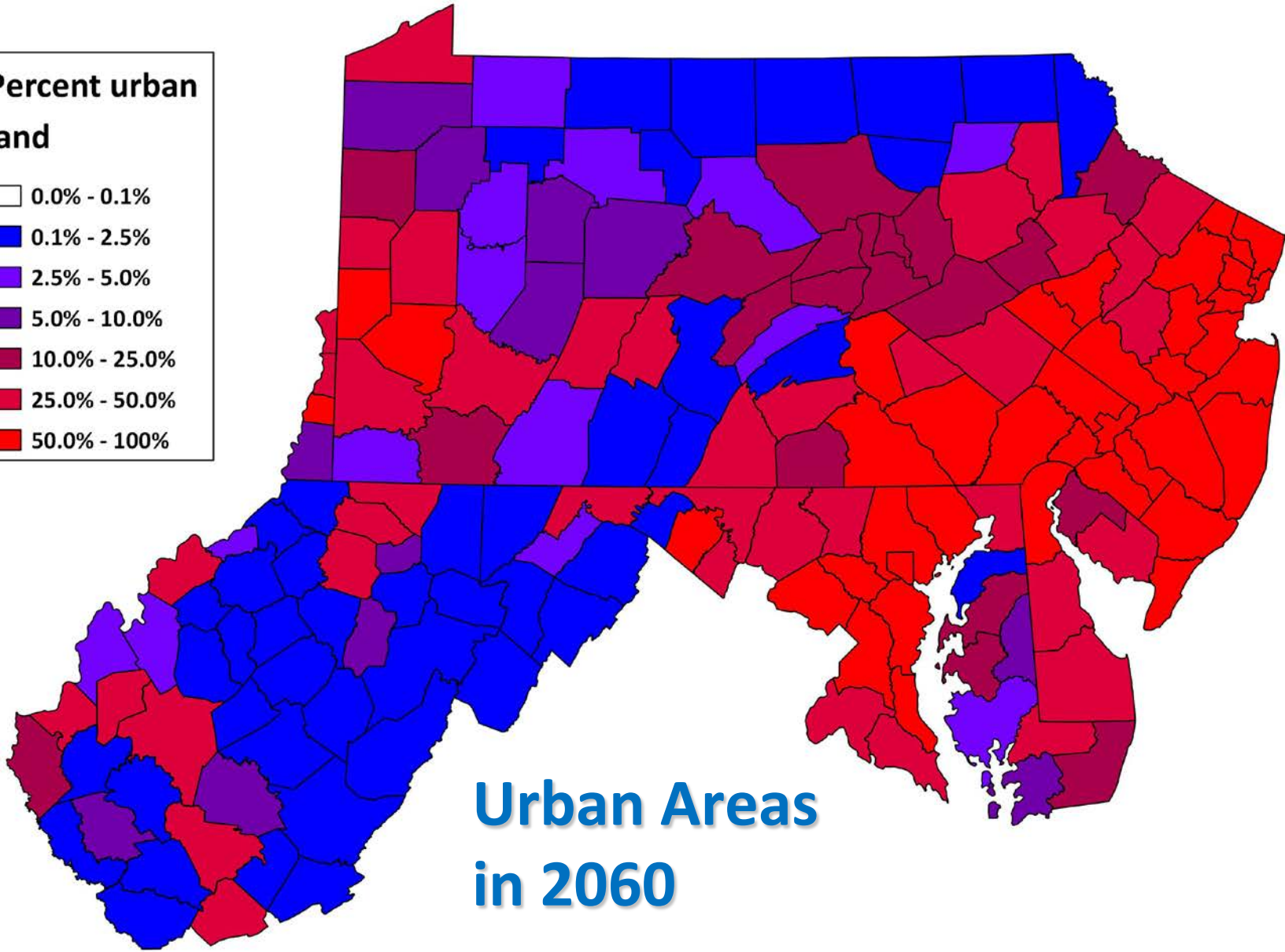
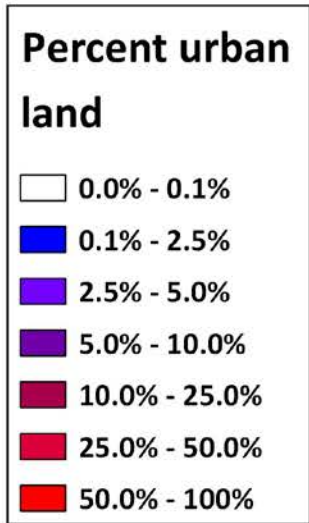


**Urban Areas  
in 2040**



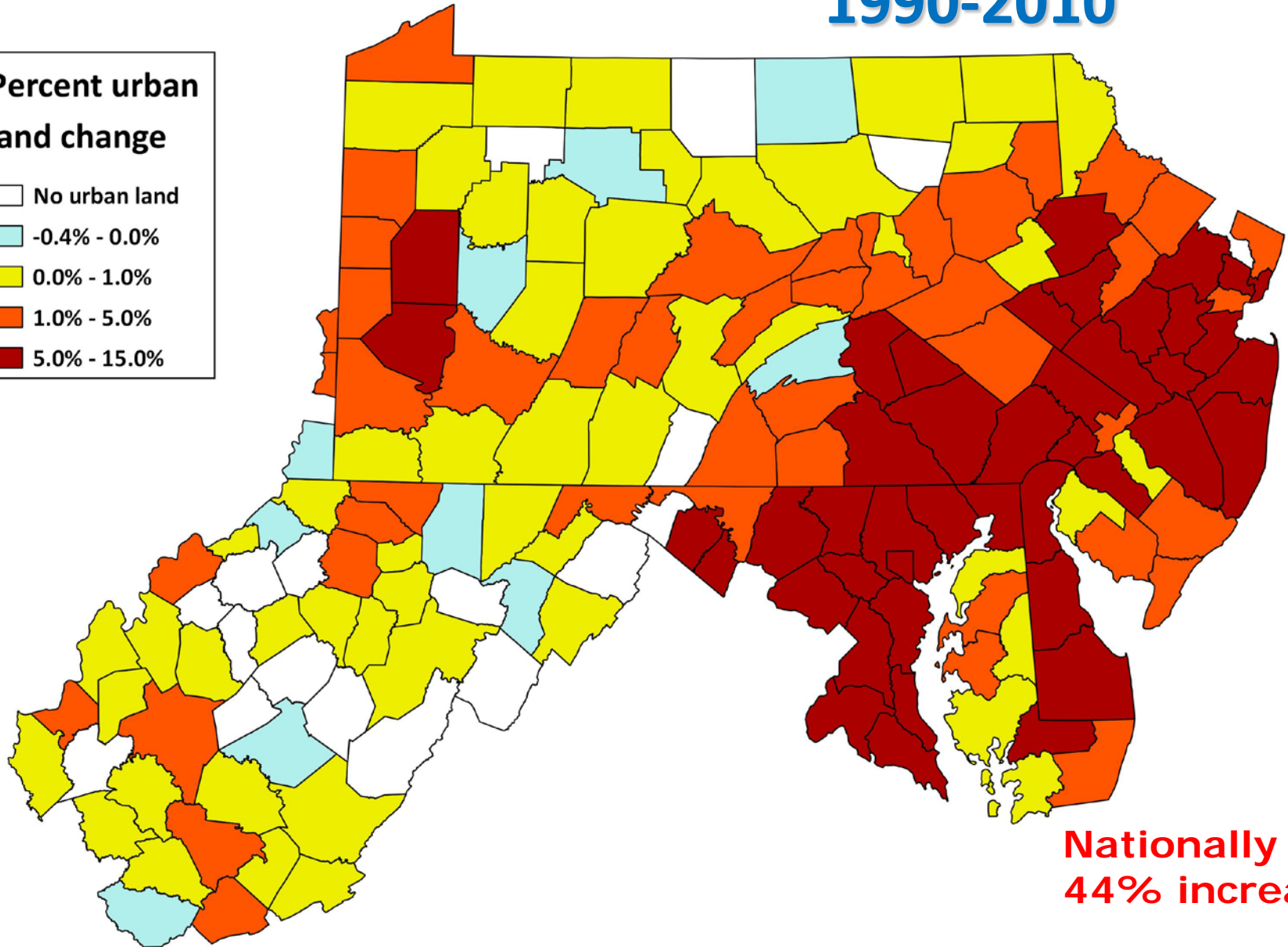
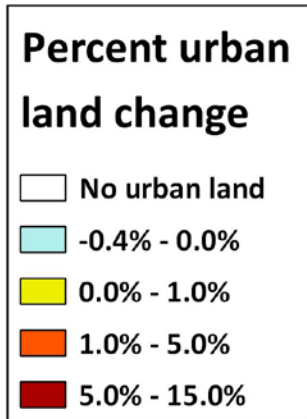


**Urban Areas  
in 2050**

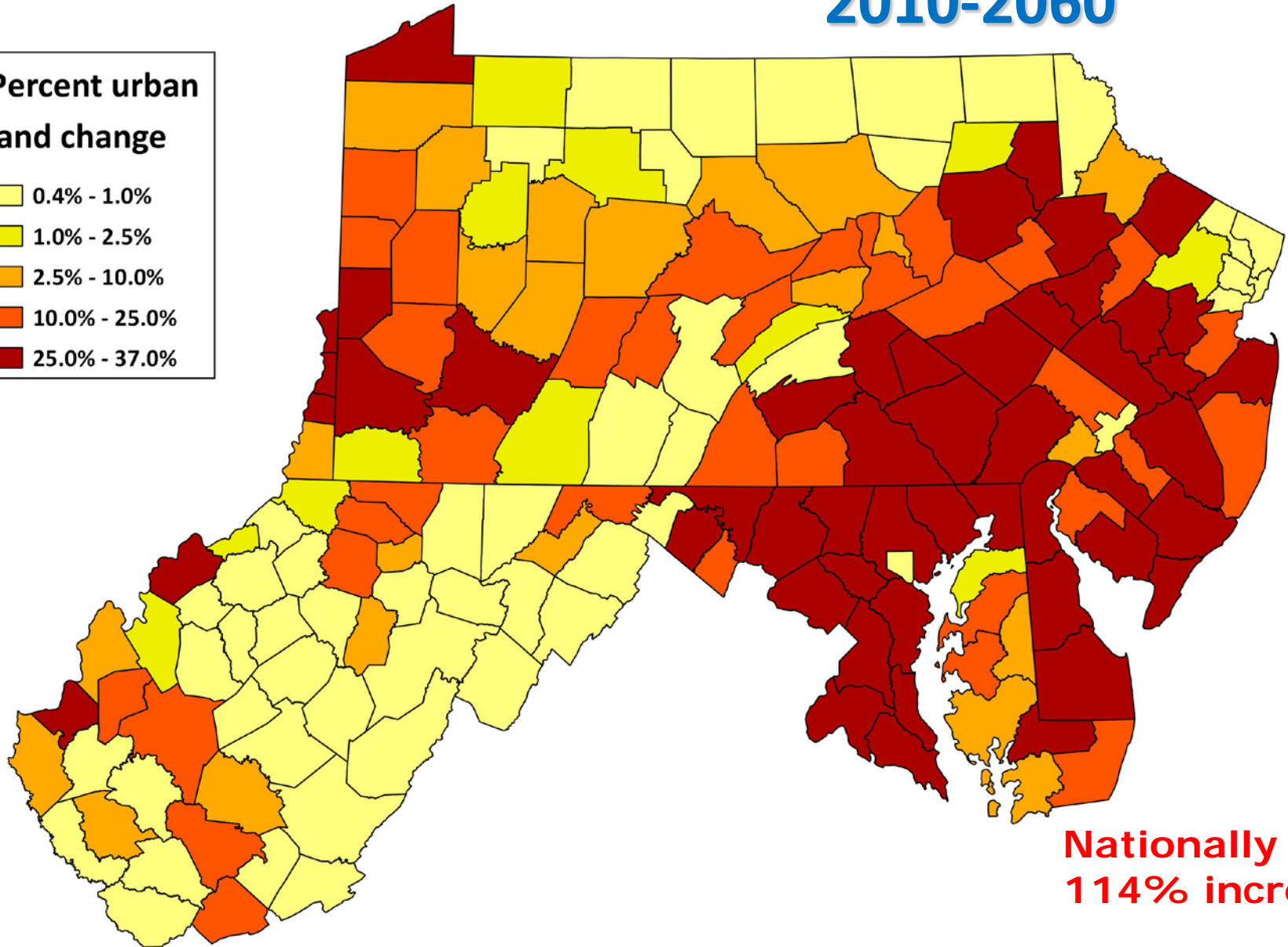
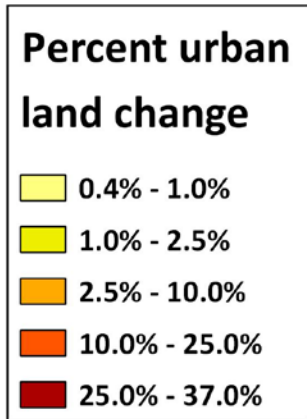


**Urban Areas  
in 2060**

# Urban area change 1990-2010



# Urban area change 2010-2060



# 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.

## 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.



ELSEVIER

Contents lists available at ScienceDirect

Environmental Pollution

journal homepage: [www.elsevier.com/locate/envpol](http://www.elsevier.com/locate/envpol)

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

David J. Nowak <sup>a,\*</sup>, Satoshi Hirabayashi <sup>b</sup>, Allison Bodine <sup>b</sup>, Eric Greenfield <sup>a</sup>



ELSEVIER

Contents lists available at SciVerse ScienceDirect

Environmental Pollution

journal homepage: [www.elsevier.com/locate/envpol](http://www.elsevier.com/locate/envpol)

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

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

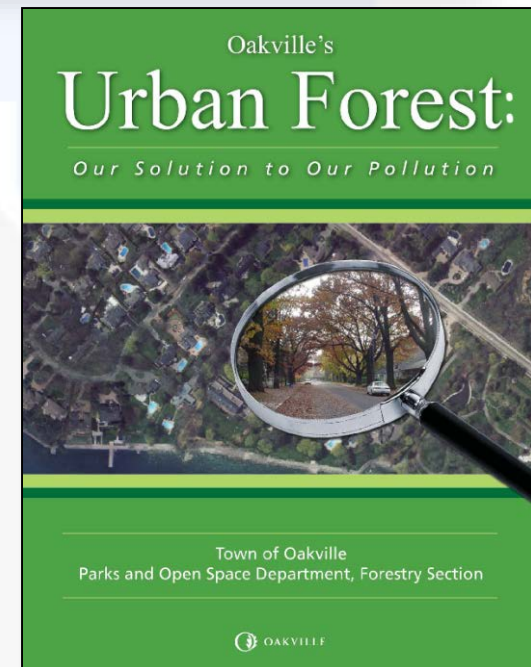
Downloaded from [jech.bmj.com](http://jech.bmj.com) on 11 November 2008

Short report

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

G S Lovasi,<sup>1</sup> J W Quinn,<sup>1</sup> K M Neckerman,<sup>1</sup> M S Perzanowski,<sup>2</sup> A Rundle<sup>3</sup>

# 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

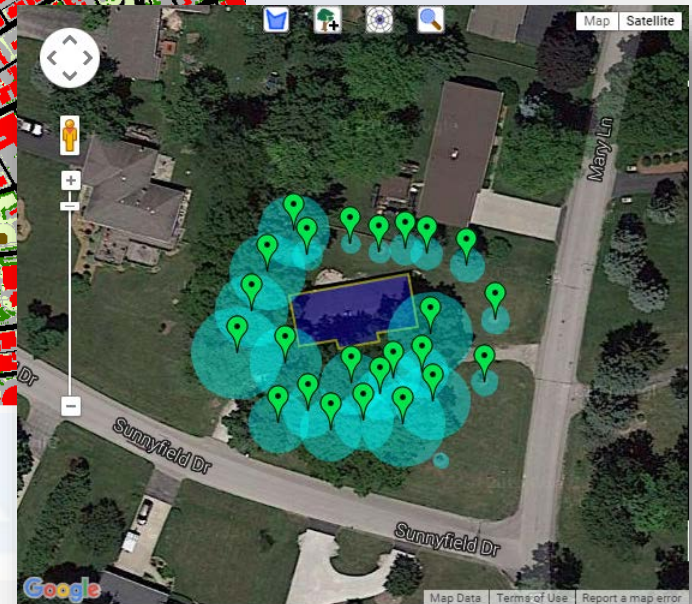
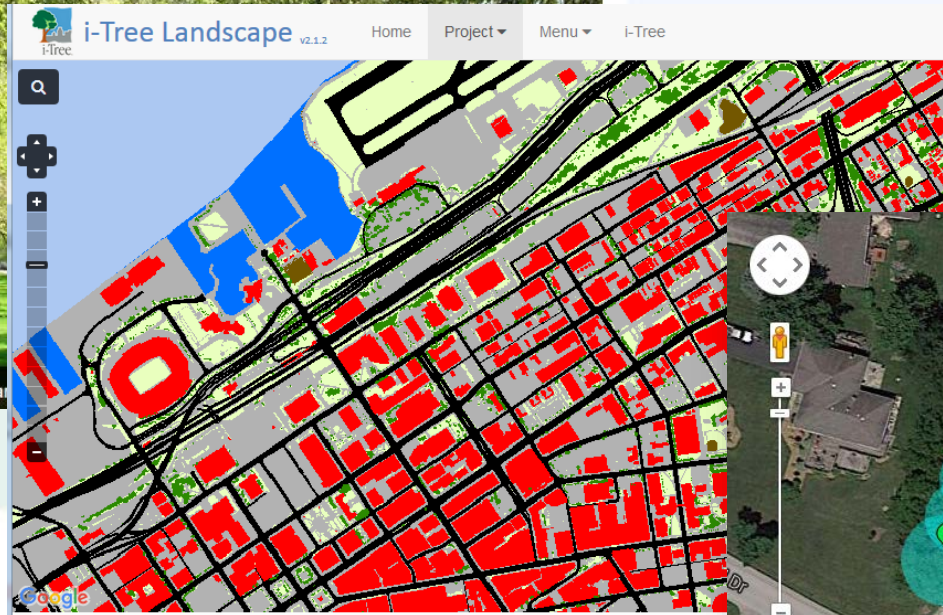
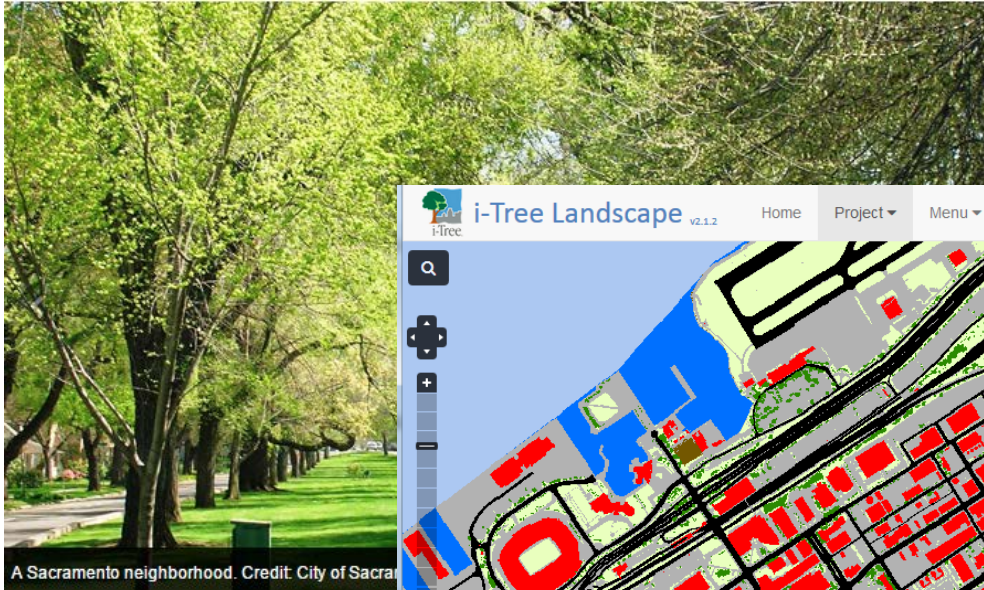


Use this information.

Find out what is important to your community.

**Be strategic!**

# Structure → Function → Benefits → Value



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



# The 2017 i-Tree Suite of Tools

Web-based,  
run in your  
browser



i-Tree™

Design



i-Tree™

Canopy



i-Tree™

Landscape



i-Tree™

Eco



i-Tree™

Streets



i-Tree™

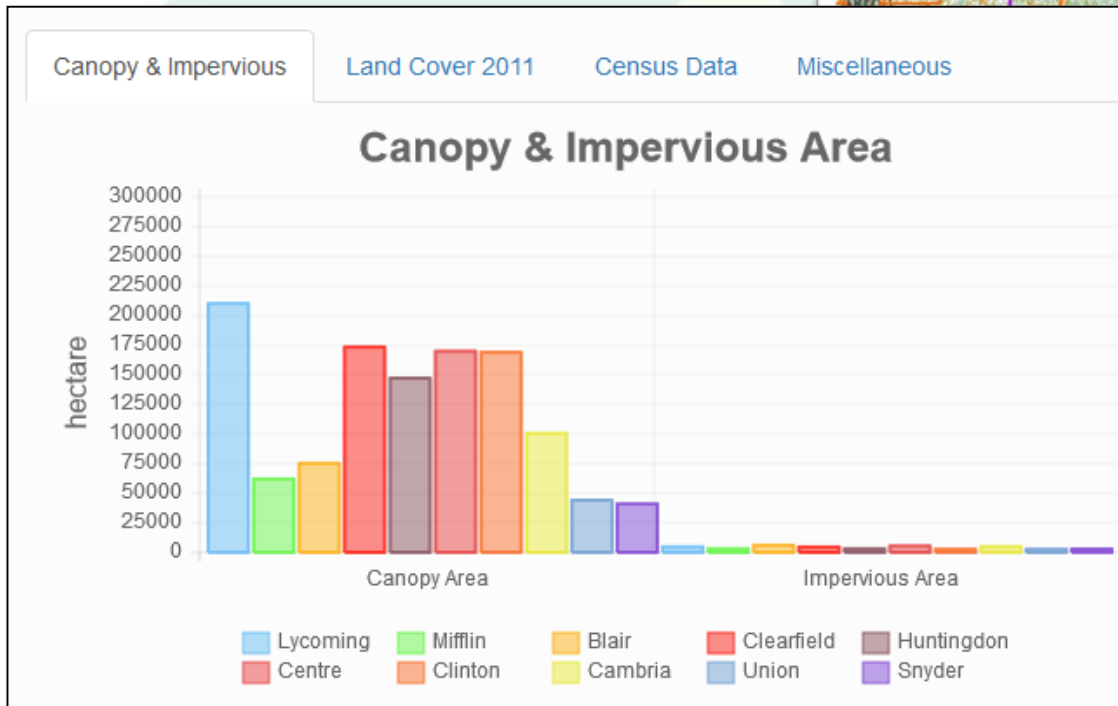
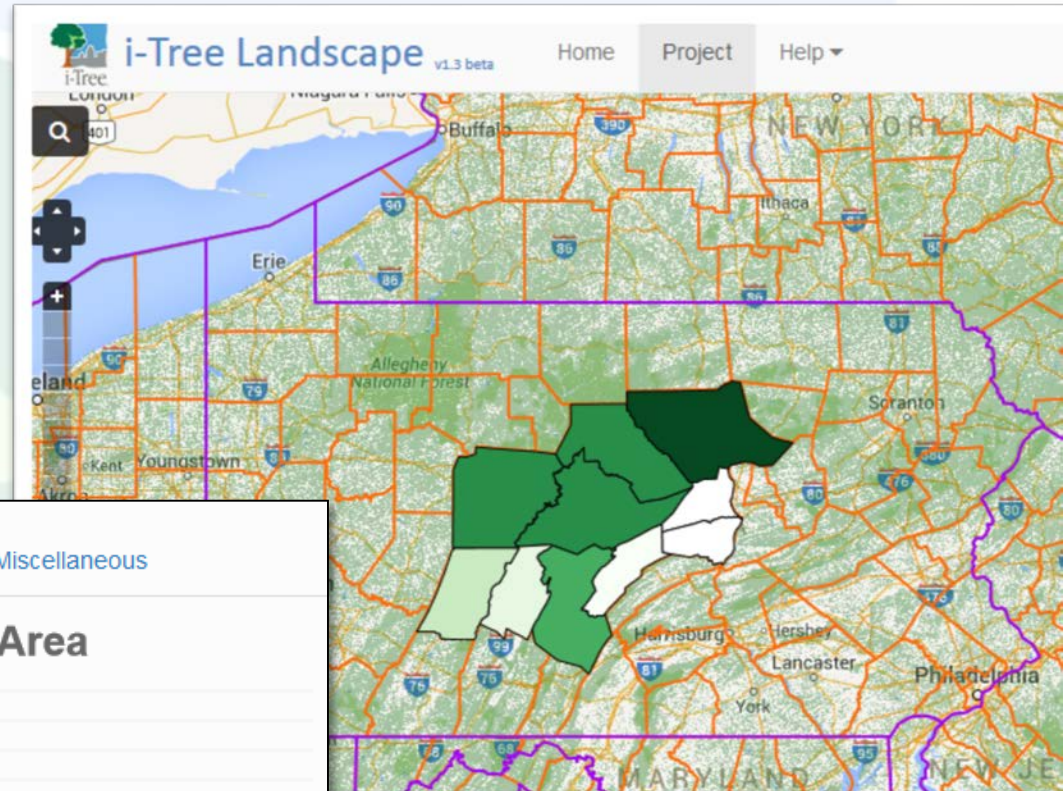
Hydro

Installed on  
a Windows  
desktop or  
laptop

# i-Tree Landscape vision

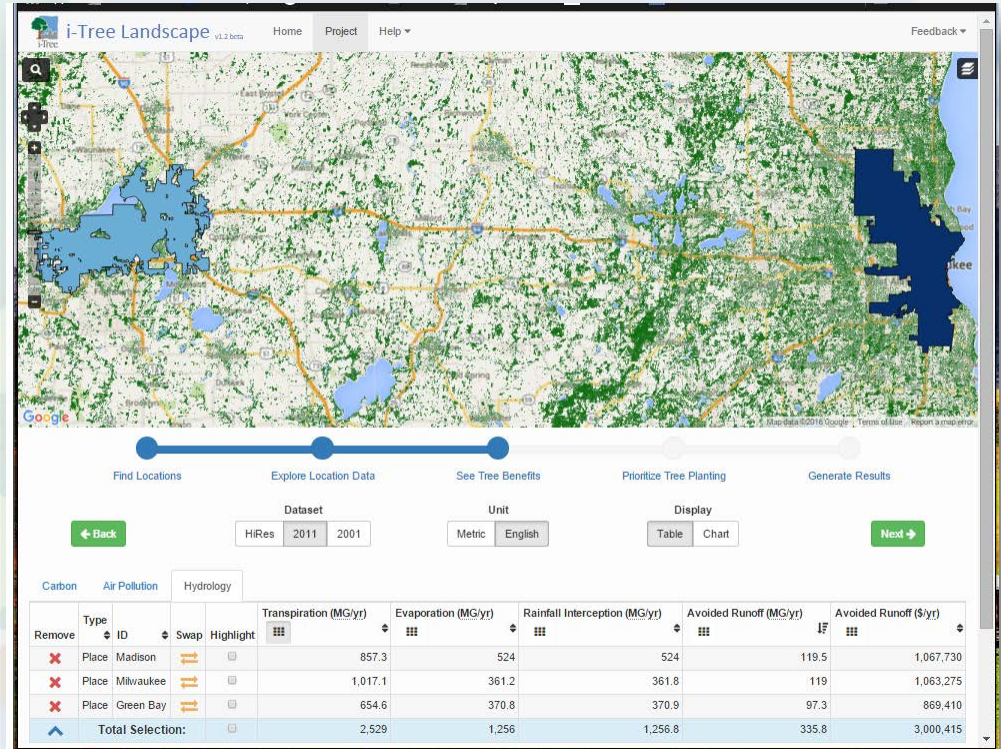
A spatially distributed model that estimates and values ecosystem services of trees on all lands

[landscape.itreetools.org](http://landscape.itreetools.org)



# Why i-Tree Landscape Matters?

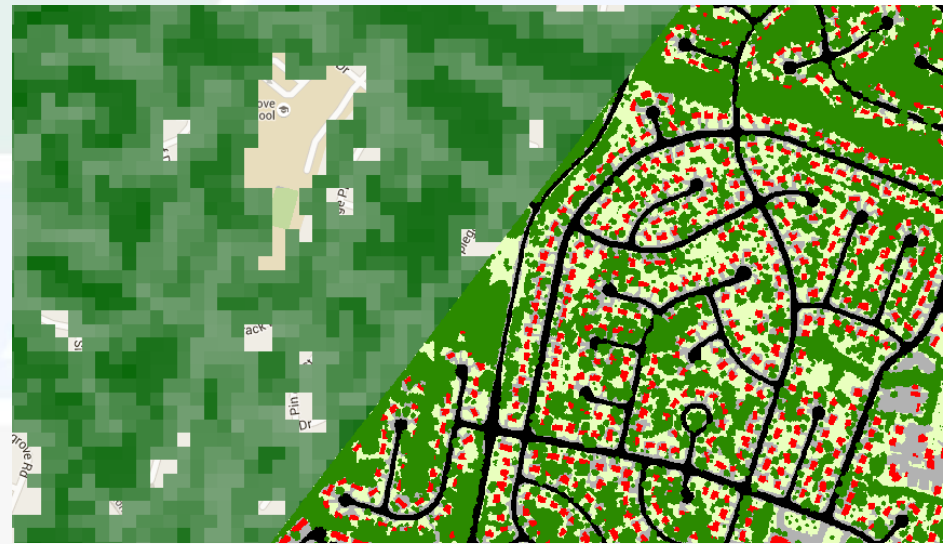
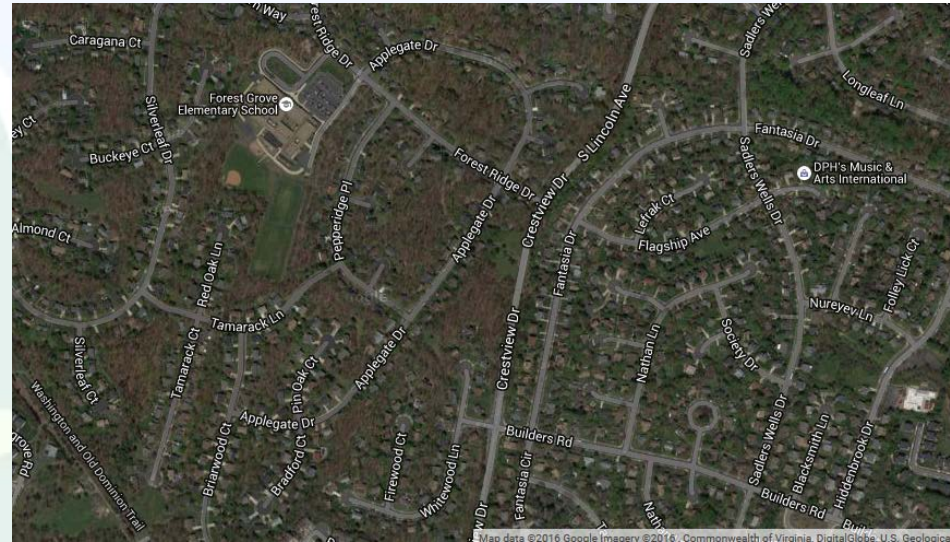
- Online and accessible
- Engage audiences visually
- Explore relationships among trees, people, and land
- An “All Lands” approach to estimating tree benefits



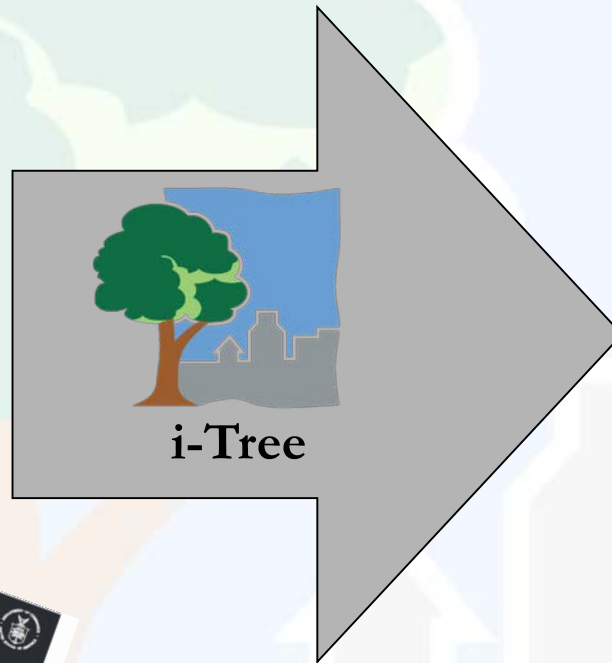
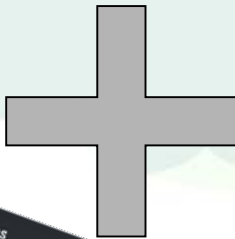
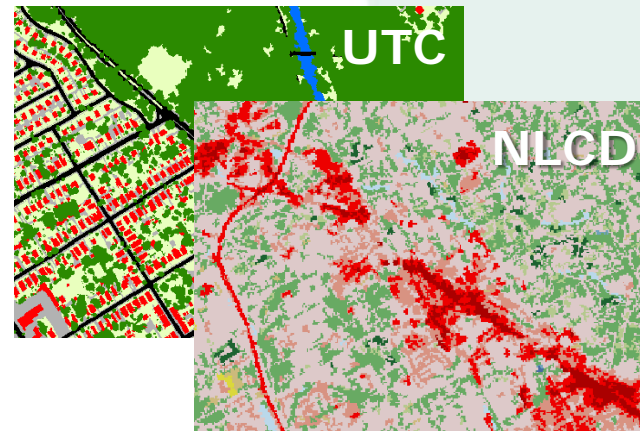
# Why i-Tree Landscape Matters?

- 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?**

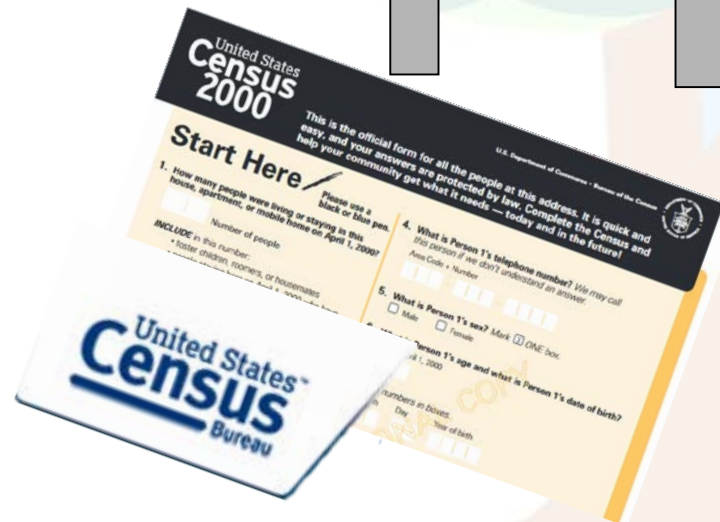


# i-Tree Landscape basics



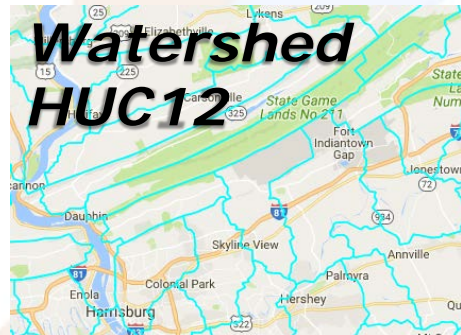
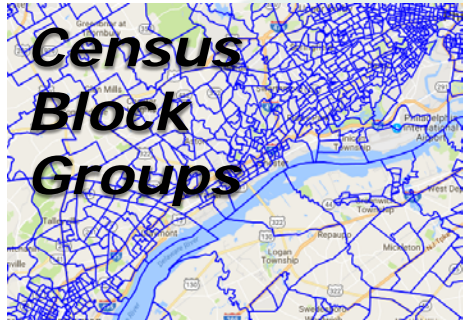
## Benefits and \$

- Carbon
- Air pollution
- Rainfall and stormwater

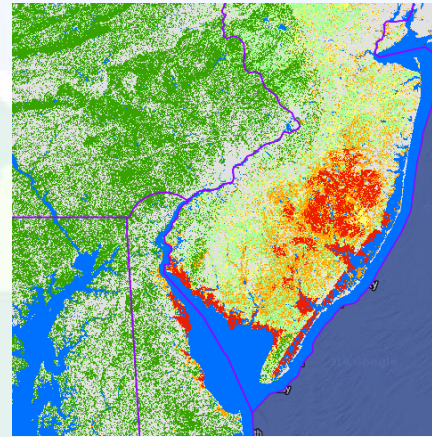


# i-Tree Landscape basics

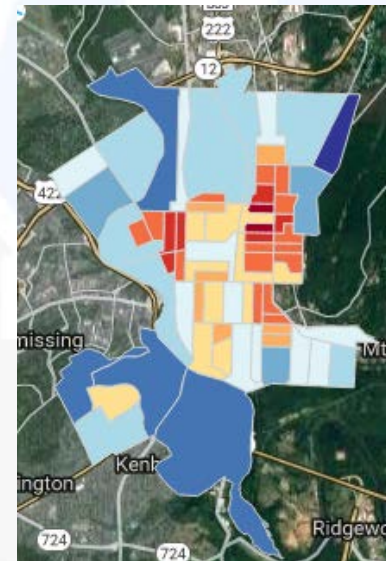
Map and summarize by:



Manage risk and opportunity



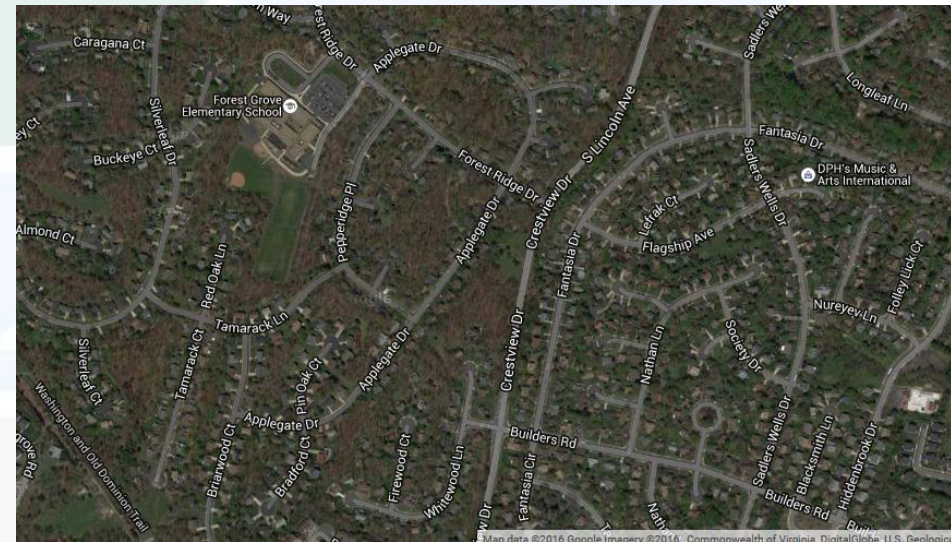
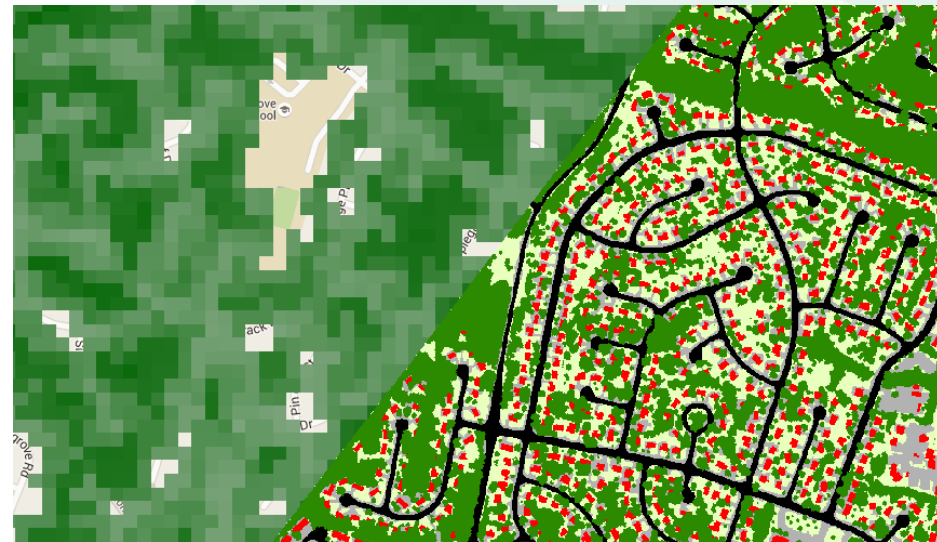
Fire  
Pollutants  
Development  
Pests



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

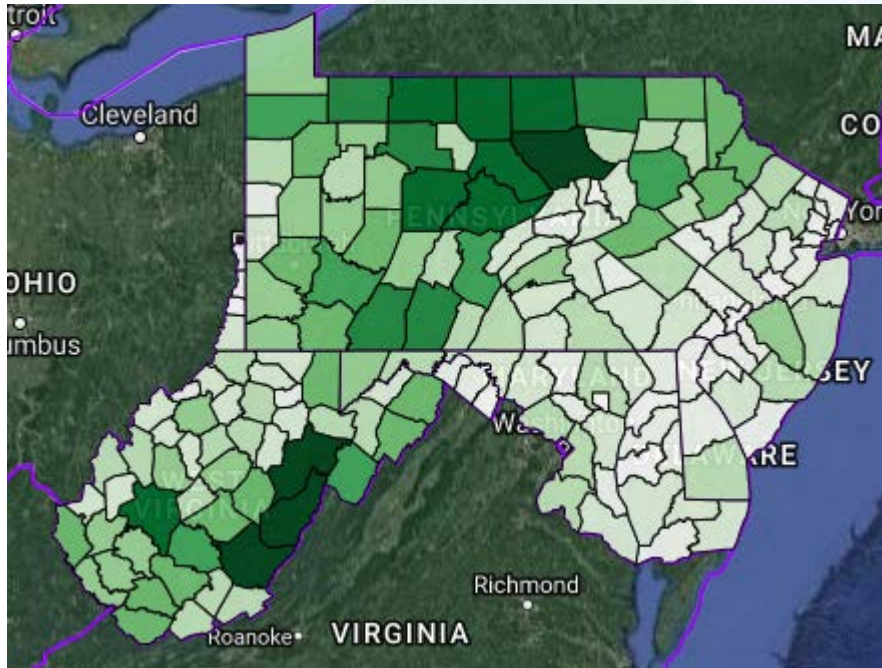
...more in the queue

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

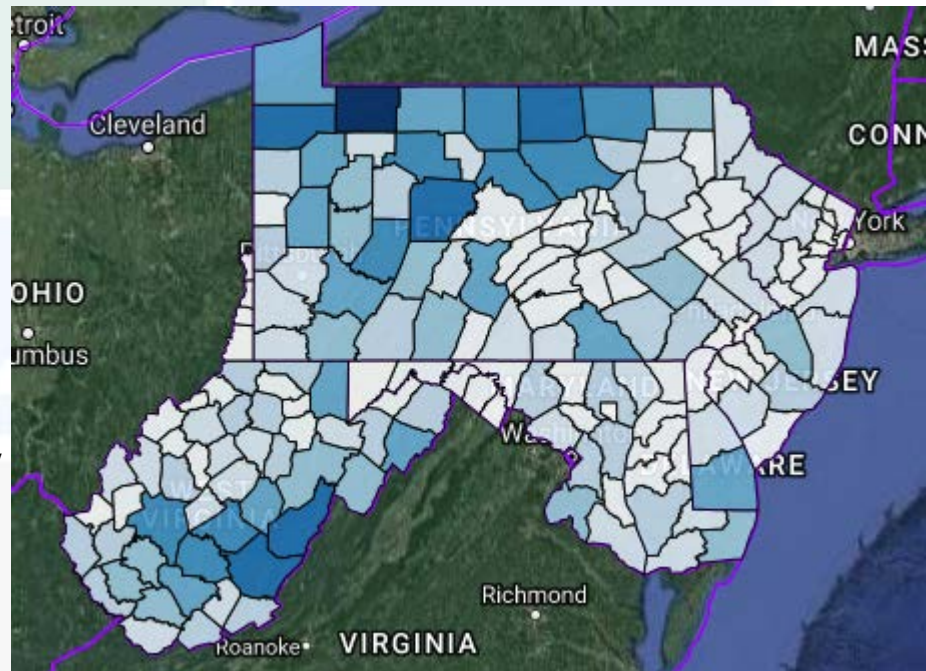


## Canopy cover

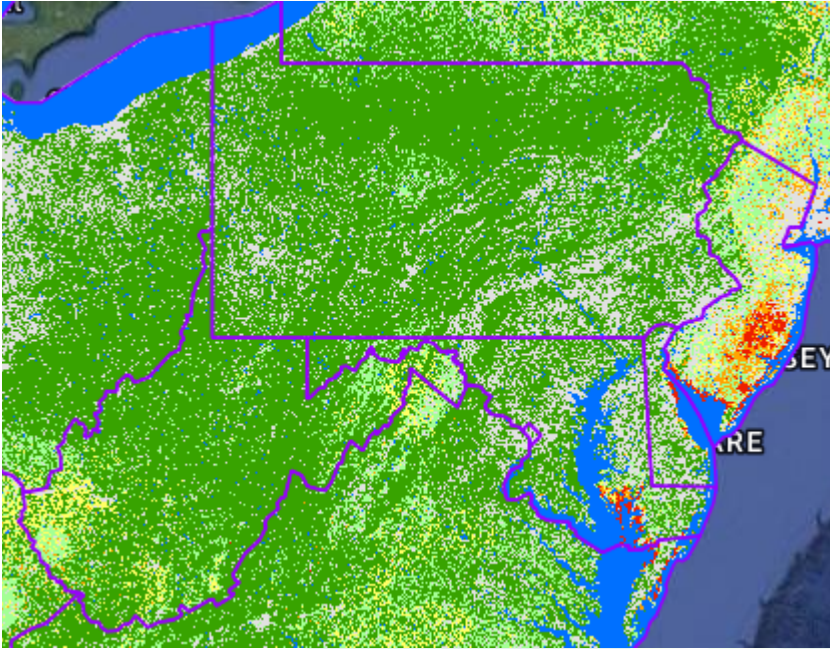
- 31 million acres
- 55% canopy cover

## Annual carbon sequestration

- 20.8 m tons/yr
- \$2.9 billion
- 10k tons/yr in Philly
- 418k tons/yr in Warren Co.

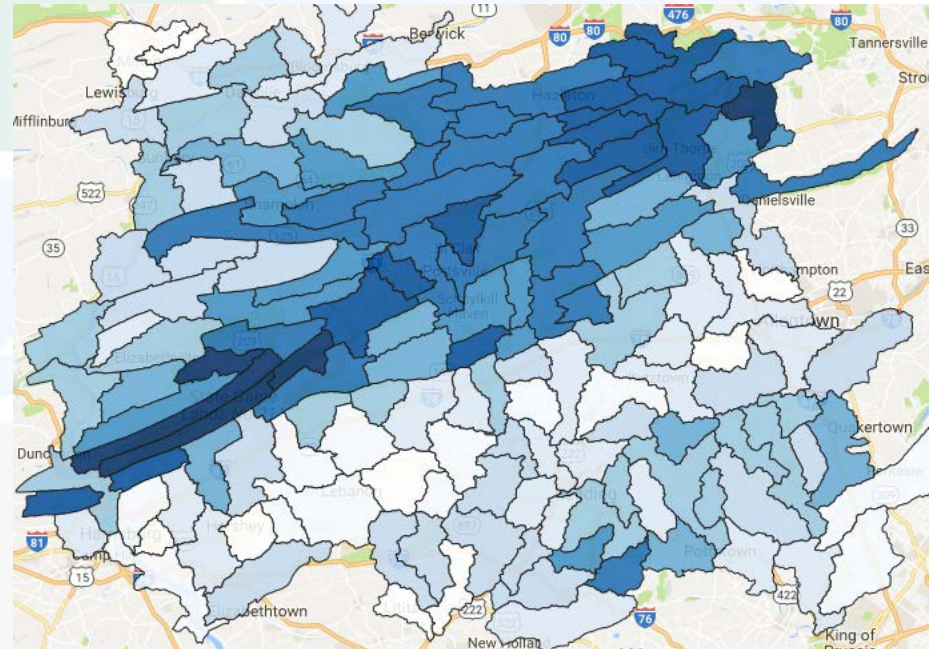


# Regional Scale: Risk to forest and people

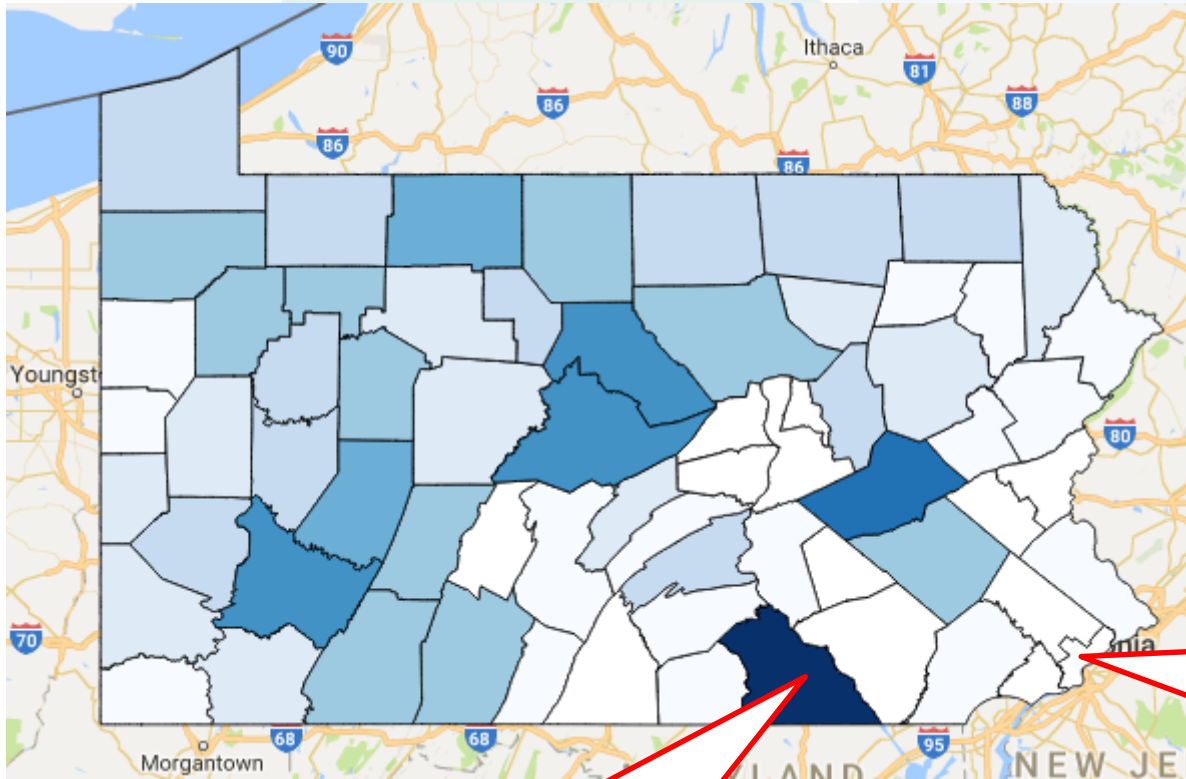


**Relative probability of extreme fire behavior**  
From US Forest Service  
Wildfire Hazard Potential map

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



# County Scale: benefits comparisons

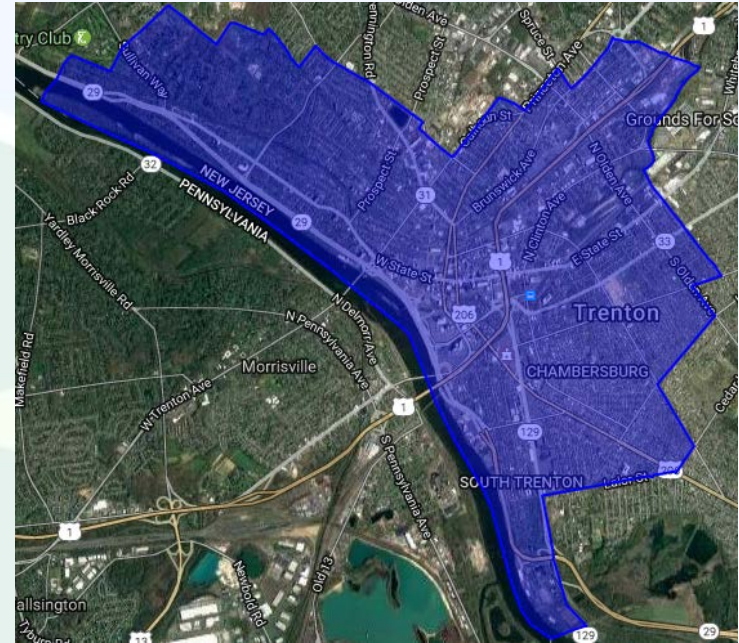
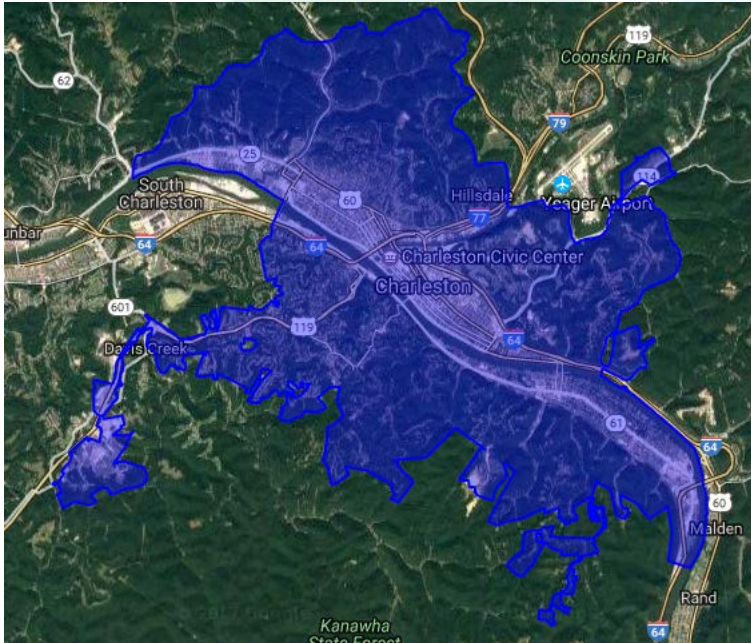


2.2 million pounds of  
particulates removed  
per year  
  
\$10.8 million in benefits

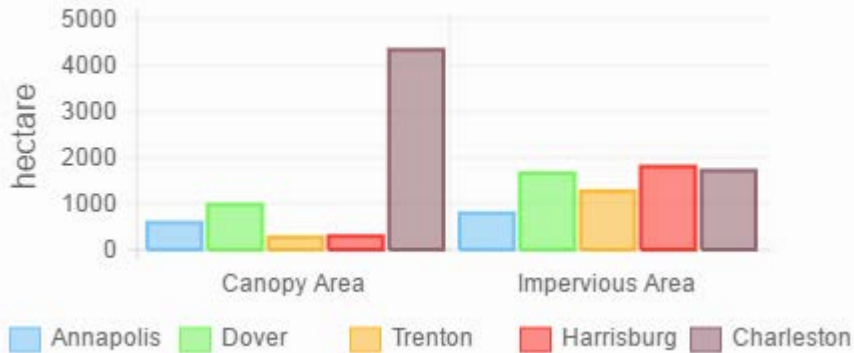
27 thousand pounds of  
particulates removed  
per year

\$9.9 million in benefits

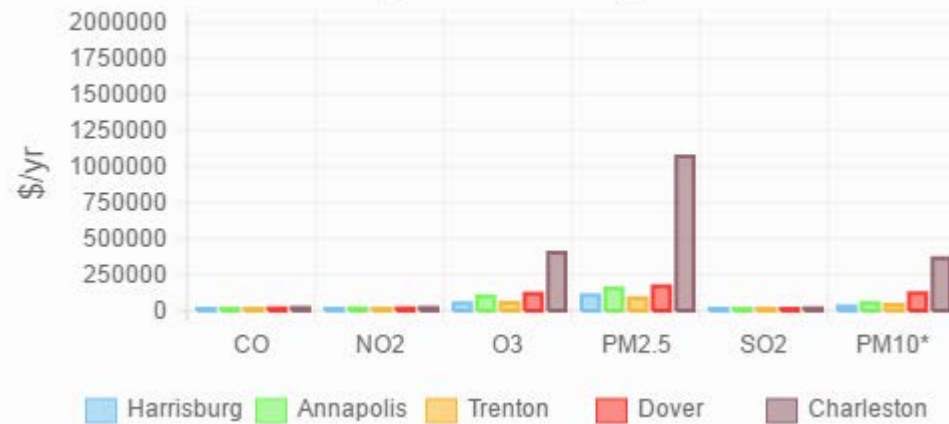
# City Scale: Comparisons



## Canopy & Impervious Area



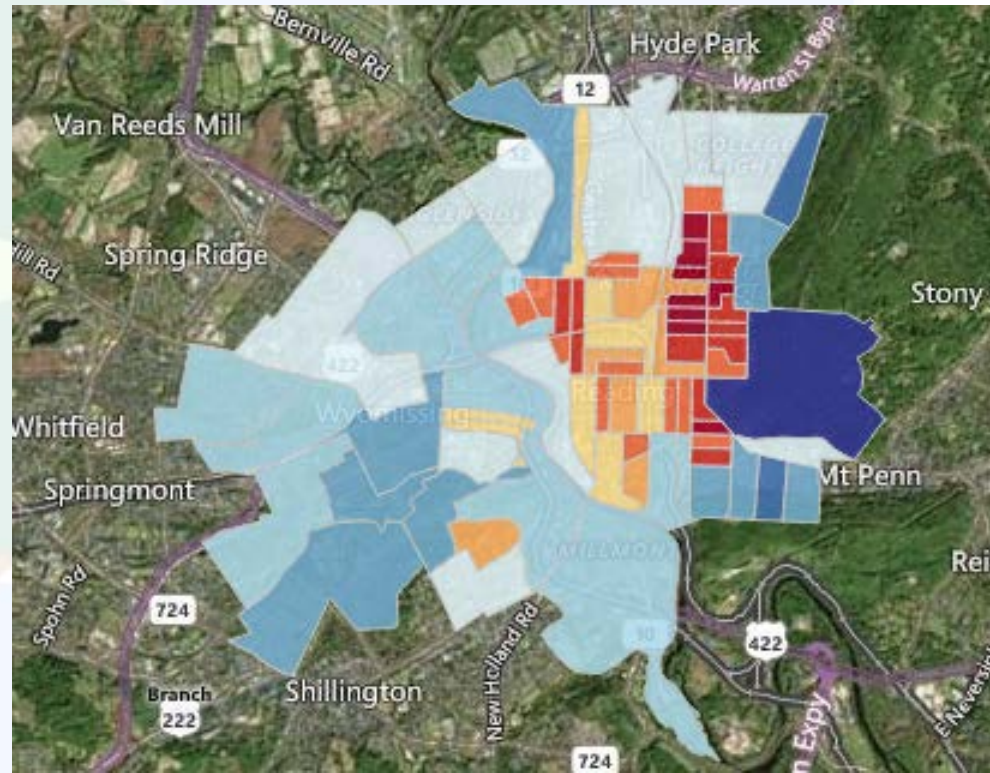
## Monetary Benefits per Year



# Neighborhood scale: planting priority map

Mapping opportunity

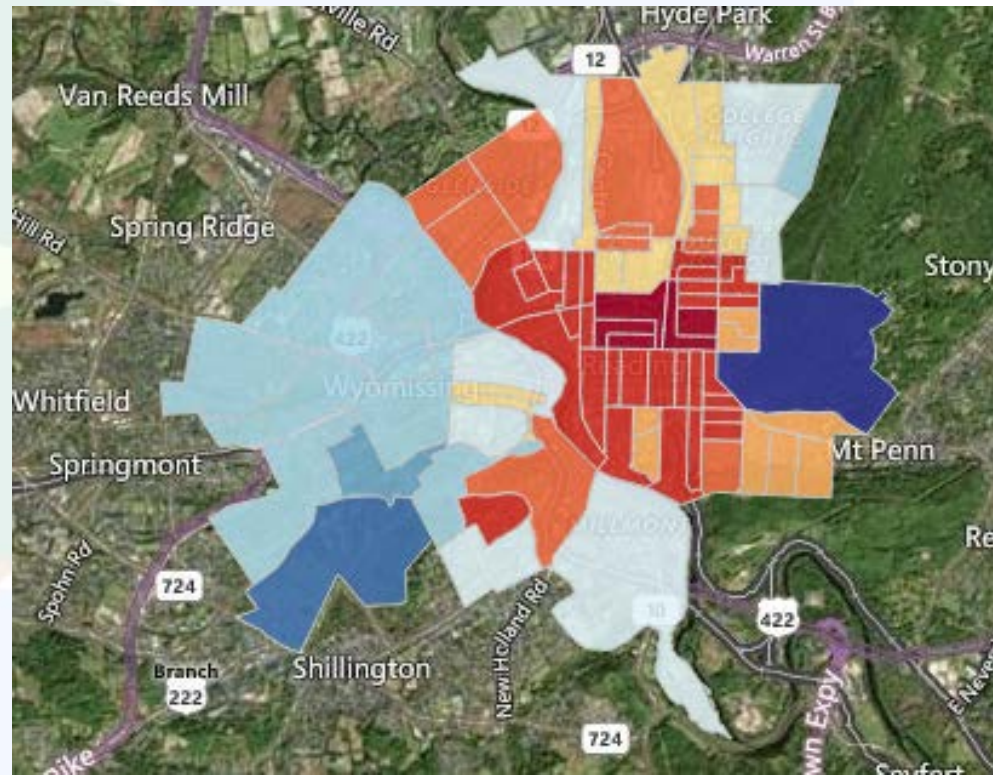
Optimized for planting trees where there is **available space** and the **highest population density**



# Neighborhood scale: planting priority map

Mapping need

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



# Share your results

Find Locations   Explore Location Data   See Tree Benefits   Prioritize Tree Planting   Generate Results

[← Back](#)   [Executive Summary](#)   [Everything](#)   [Pre-Formatted Reports -](#)   [Export Data](#)   [Done](#)

To create a report, start by entering a title to describe it. Then visit each section to add individual report elements, such as tables, charts, or maps. Repeatedly use the Add button as many times as desired, to enter multiple report elements within a section. Once everything is configured, click Done to see the report.  
For more information, see the [Help](#) page.

Report Title

Sub-title

### Location Information

Report element:    Display as:    Show only total?

Dataset:      Unit:     [+ Add](#)

Description (Optional text may be entered here for each report element, or edited later via the button in the table below.)

### Configuration of Report Elements

Remove	Title	Display as	Unit	Dataset	Description	Total Only	Ordering
<input checked="" type="checkbox"/>	Canopy	<a href="#">Map</a>	English	2011	<a href="#">Edit</a>	N/A	1 <a href="#">+</a>

### Tree Benefits

Report element:    Display as:    Show only total?

Dataset:      Unit:     [+ Add](#)

Description (Optional text may be entered here for each report element, or edited later via the button in the table below.)

## Below is the finished report.

Would you like to print this report?

Choose from one of the available layouts below. Then use your internet browser's print function to print the report with the chosen width.

Note: The content that you see in the dashed border is what will be printed from this page. The dashed border itself will not be rendered.

### Available Layouts

- Portrait, width: 6.5 inches (1 inch margins)
- Portrait, width: 7.5 inches (1/2 inch margins)
- Landscape, width: 9 inches (1 inch margins)
- Landscape, width: 10 inches (1/2 inch margins)

[← Back](#)

i-Tree Landscape

Tree cover and opportunity in  
Reading

estimates of the benefits trees provide



## Publish as a public report.

Would you like to make this report available to others?

Publish your report on the i-Tree server where it can be viewed again by you or the people you want to share it with. You will receive the web address where the report can be viewed - share this link with others or post it to social media!

*DISCLAIMER: Reports published to the i-Tree server will be available there for an indeterminate period of time. While reports may remain published forever, unpredictable events such as power failures or changes in storage space requirements may result in reports being removed from the server. The i-Tree Team takes no responsibility for, and will not be liable for, the loss of published reports.*

To publish your report, click on the **Agree and Publish** button.

[Agree and Publish](#)

## Permanent Address

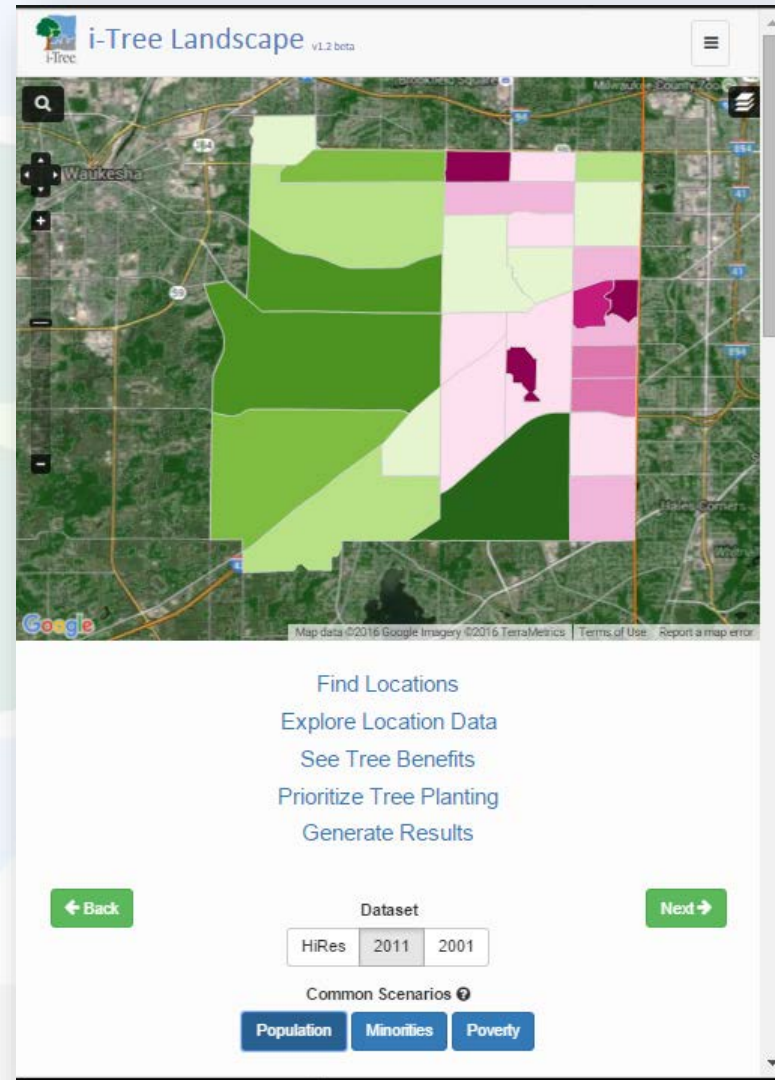
[Copy](#)

[https://landscape.itreetools.org/report/34c64c57-39db-465c-{}</a>](https://landscape.itreetools.org/report/34c64c57-39db-465c-{})



# How can i-Tree Landscape help you?

- 🌳 Demonstrate tree value to diverse audiences
- 🌳 Assess trees beyond streets and parks
- 🌳 Protect & 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](http://www.itreetools.org)

Videos

Documentation

Online tools

Support

Examples

Downloads

Forum/FAQs



The screenshot shows the i-Tree website homepage. At the top left is the i-Tree logo, which includes a tree icon and the text "i-Tree". To the right of the logo is the tagline "Tools for Assessing and Managing Community Forests". Further right is a "Get the Tools." button with a CD-ROM icon. On the far right is a Google Custom Search box with a "Search" button, and a login section with "Username" and "Password" input fields, a "Login" button, and a "Register" button. Below the search and login area is a large banner image of a residential street with many trees. Underneath the banner is a navigation menu with buttons for "Home", "About", "Applications", "Utilities", "Resources", "Support", and "News". The main content area is divided into three columns. The left column features a book cover titled "A Guide to Assessing Urban Forests" from the US Forest Service Northern Research Station. The middle column has a heading "What is i-Tree?" followed by a paragraph describing the software suite and its purpose. The right column has a heading "What's New?" and two news items: "European i-Tree Conference, March 12th, Alnarp, Sweden" and "Breathe Easy: Urban Forests for Human Health Archived ACT webinar featuring Dave Nowak".

[info@itreetools.org](mailto:info@itreetools.org) | [jason.henning@davey.com](mailto:jason.henning@davey.com) | [krista.heinlen@davey.com](mailto:krista.heinlen@davey.com)