



**Chesapeake Bay Program**  
*A Watershed Partnership*

# **Land Use Metrics & Methods Outcome Management Strategy**

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## **2014 Bay Agreement's Land Conservation Goal:**

Conserve landscapes treasured by citizens in order to maintain water quality and habitat; sustain working forests, farms and maritime communities; and conserve lands of cultural, indigenous and community value.

## **Land Use Methods & Metrics Development Outcome:**

Continually improve the knowledge of land conversion and the associated impacts throughout the watershed.

By 2016, develop a Chesapeake Bay watershed-wide methodology and local level metrics for characterizing the rate of farmland, forest and wetland conversion, measuring the extent and rate of change in impervious surface coverage and... quantifying the potential impacts of land conversion to water quality, healthy watersheds and communities.

Launch a public awareness campaign to share this information with citizens, local governments, elected officials and stakeholders.

## **Intent:**

To prevent and mitigate adverse effects from land conversion, decision-makers need to be informed about land use changes occurring in their jurisdictions and provided with policy options, incentives, and tools to reduce the rate and magnitude of conversion.

## **Utility:**

- Inform agencies and citizens about the rate and magnitude of land conversion at local levels.
- Target conservation efforts and investments;
- Target support to local governments for reducing the rate of conversion.

## Elements:

1. Assess rate of conversion of forests, wetlands, and farmland.
2. Monitor changes in impervious surfaces.
3. Quantify impacts of land conversion on:
  - a. Water quality
  - b. Healthy watersheds
  - c. Communities
4. Communicate results to the public, elected officials, and CBP partners.

## **What is the specific intent of this outcome?**

- What messages do we want to communicate?
- With whom do we want to communicate?
- What are the technical specifications required to achieve the outcome?

## **Technical Issues:**

1. What exactly are we monitoring? Loss? Loss & Gain?
2. Spatial scale? (e.g., small watersheds, counties, municipalities)
3. Frequency? (e.g., annual, 2-3 years, 5-7 years)
4. Accuracy?
5. Baseline? (fixed or variable?)

# Three Approaches for Monitoring Land Cover Change

## Option 1

### Coarse 30m Wall-to-Wall Mapping

#### Pros:

Comprehensive  
Flexible- multiple uses  
Adaptable- changing objectives

#### Cons:

Accuracy  
Interpretation  
Level of expertise

## Option 2

### High-res 1m Wall-to-Wall Mapping

#### Pros:

Accuracy  
Comprehensive  
Flexible- multiple uses  
Adaptable- changing objectives

#### Cons:

Cost  
Interpretation  
Level of expertise

## Option 3

### High-res 1m Stratified Random Sampling

#### Pros:

Accuracy  
Interpretation  
Level of expertise  
Citizen participation and education

#### Cons:

Focused  
Limited utility  
Fixed  
QA/QC

# Chesapeake Bay Land Cover Data Series



1984



1992



2001



2006



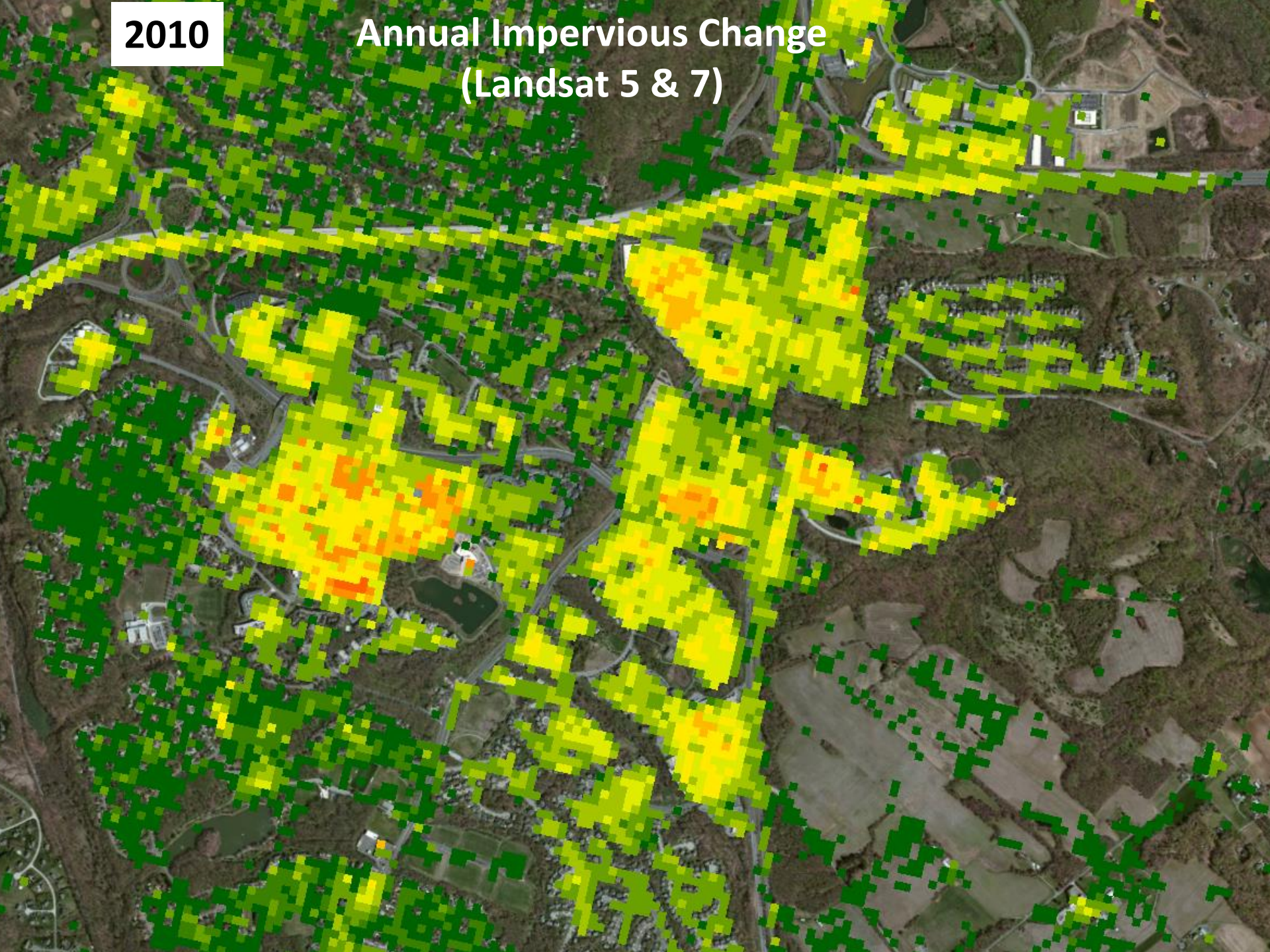
2011

Irani, F. M., & Claggett, P. (2010). Chesapeake Bay Watershed Land Cover Data Series. *US Geological Survey Data Series*, 505.



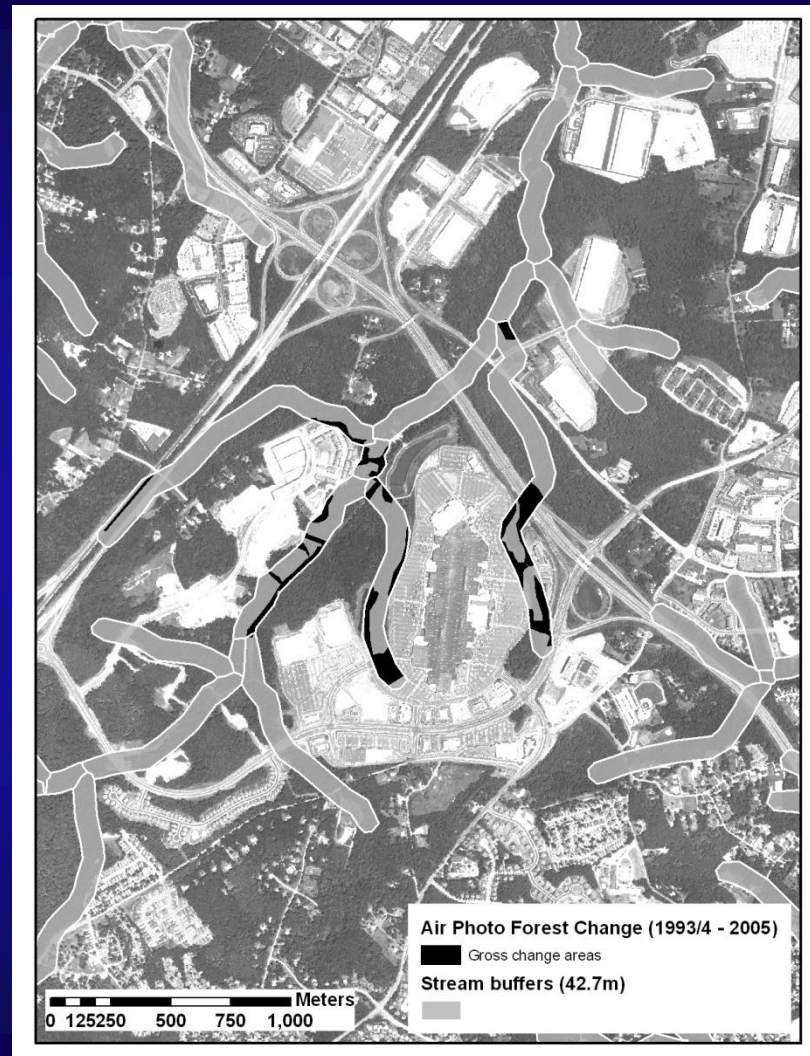
2010

# Annual Impervious Change (Landsat 5 & 7)

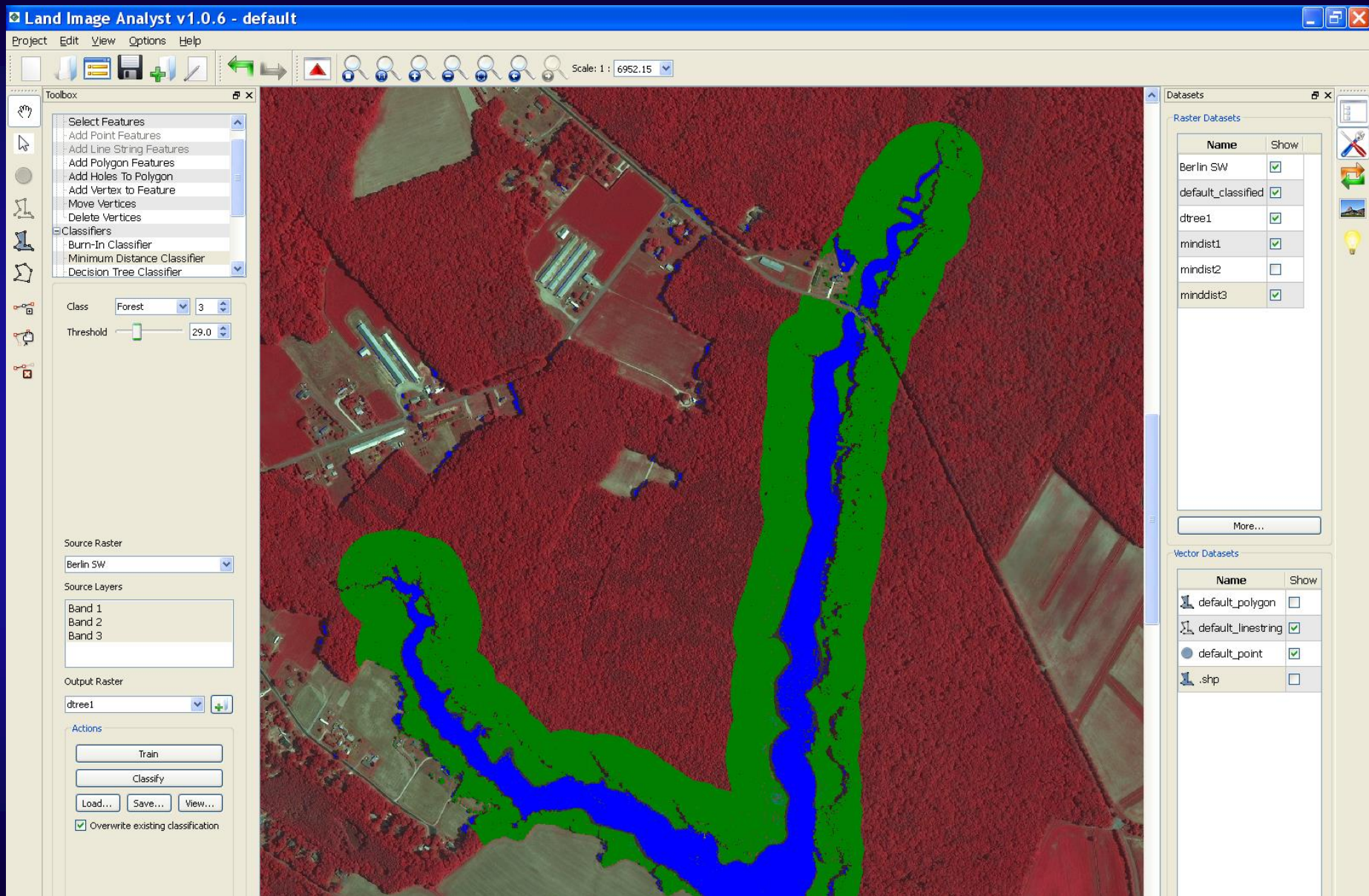




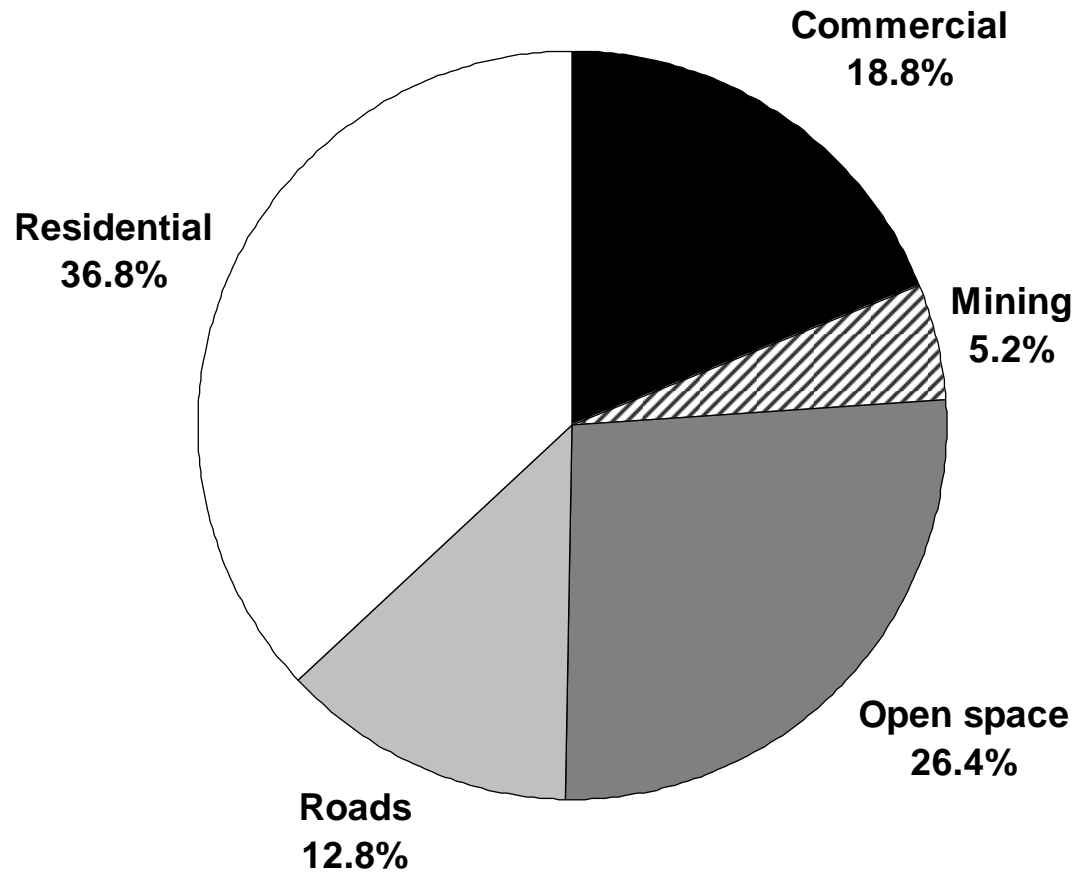
**1.83% (SE 0.22%) Gross Forest Change  
1994 – 2005 Air Photo Interpretation**



# Land Image Analyst v1.0.6

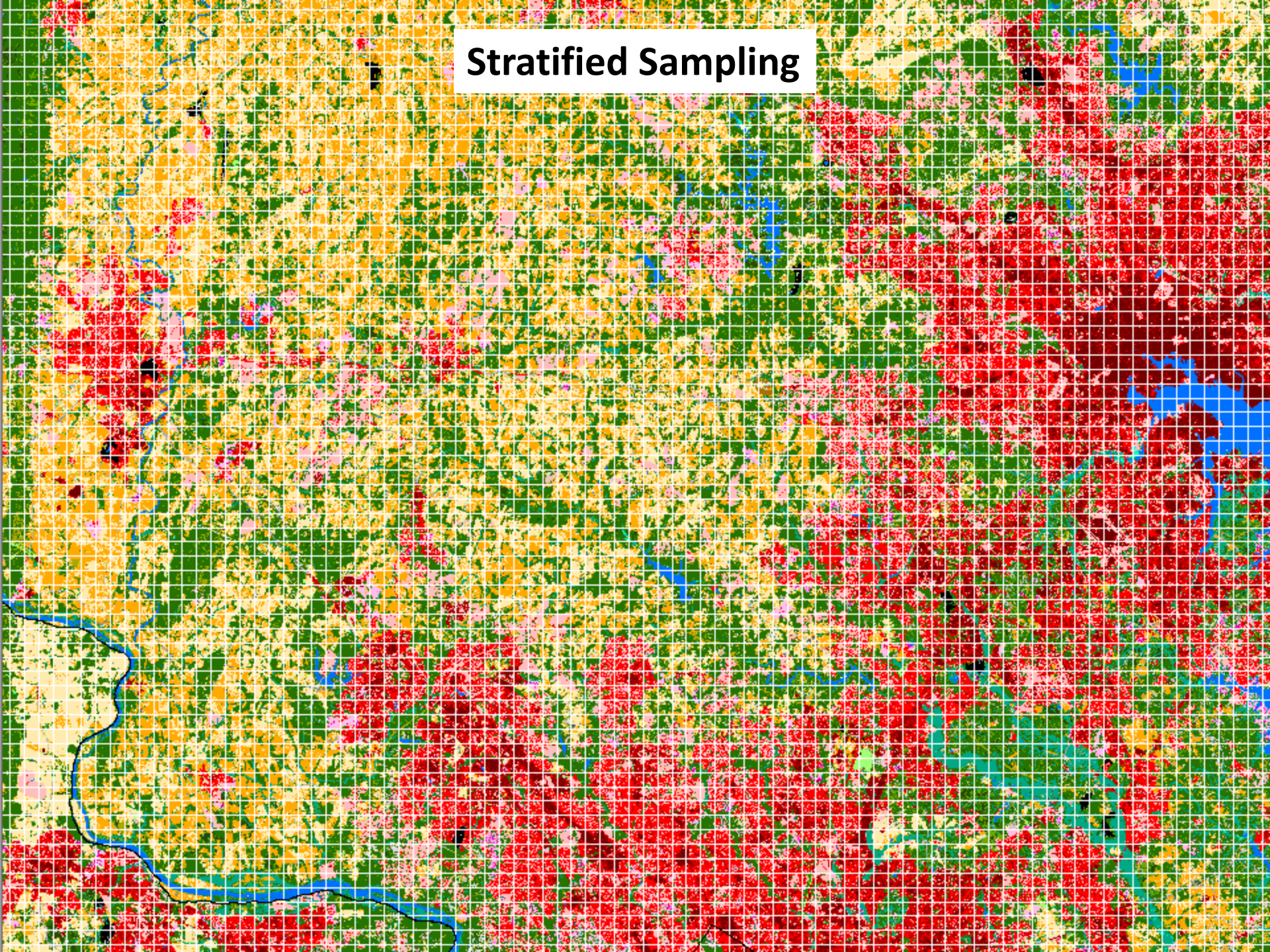


# Reasons for Riparian Forest Loss



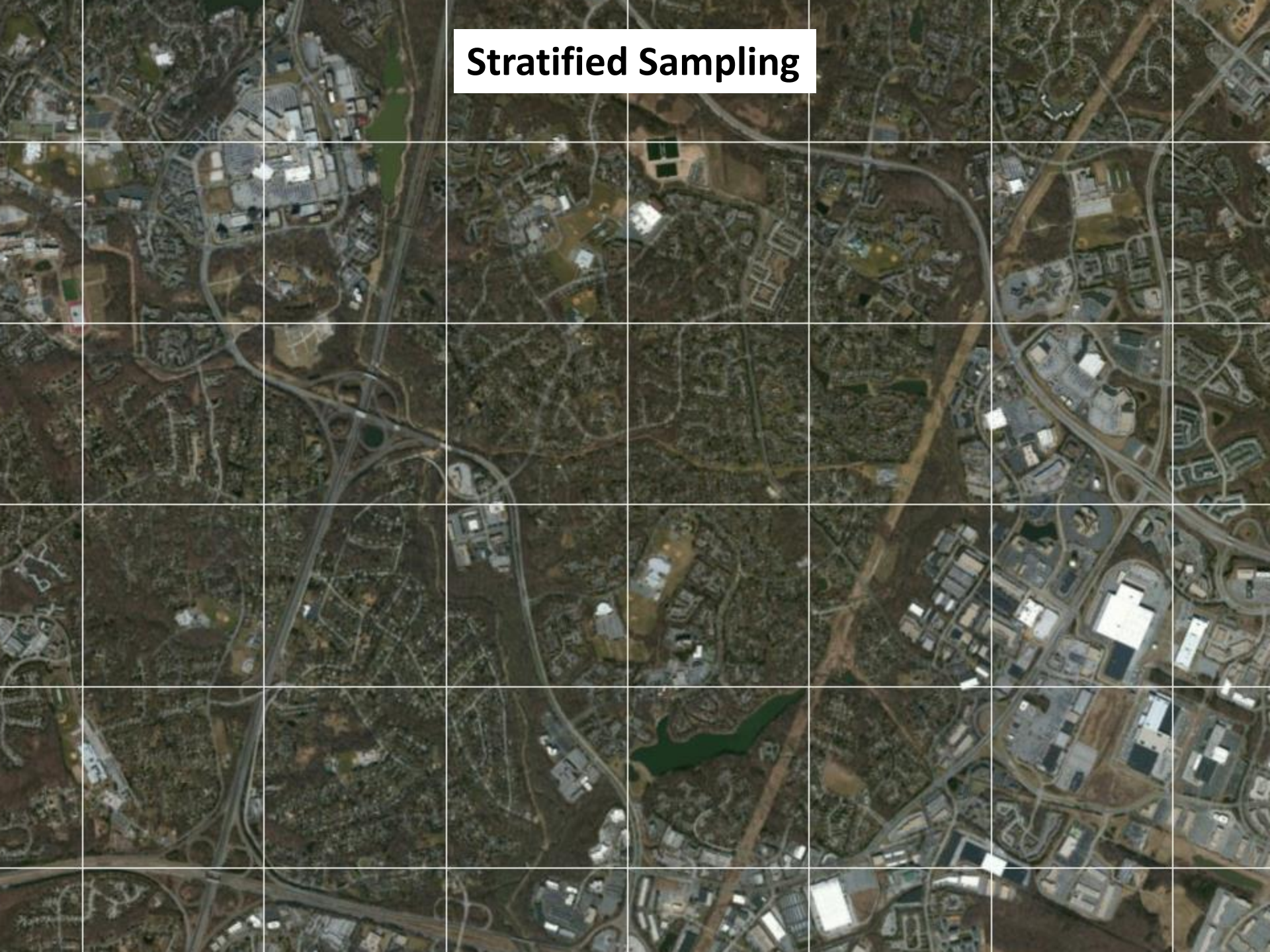


# Stratified Sampling





# Stratified Sampling



## **Roles:**

1. Assess rate of conversion of forests, wetlands, and farmland.
2. Monitor changes in impervious surfaces.
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  - c. Communities
4. Communicate results to the public, elected officials, and CBP partners.