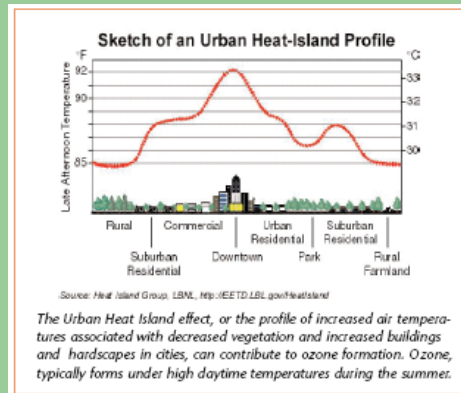
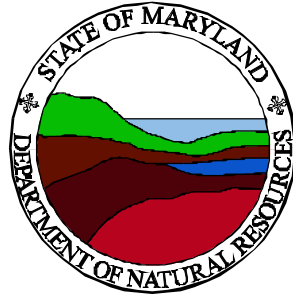


# Implications for State Urban & Community Forestry Programs: Tools for action



Integrating Urban Tree  
Cover into Air Quality  
Planning

Philadelphia, PA



April 22, 2004

**Robert L. Ehrlich, Jr.**

*Governor*

**Michael S. Steele**

*Lt. Governor*

**C. Ronald Franks**

*Secretary*

**W. P. Jensen**

*Deputy Secretary*

**Maryland Department of Natural Resources-Forest Service**

**Urban and Community Forestry Program**

580 Taylor Avenue, E-1

Annapolis, MD 21401

Internet: <http://www.dnr.maryland.gov>

Phone: 410-260-8531

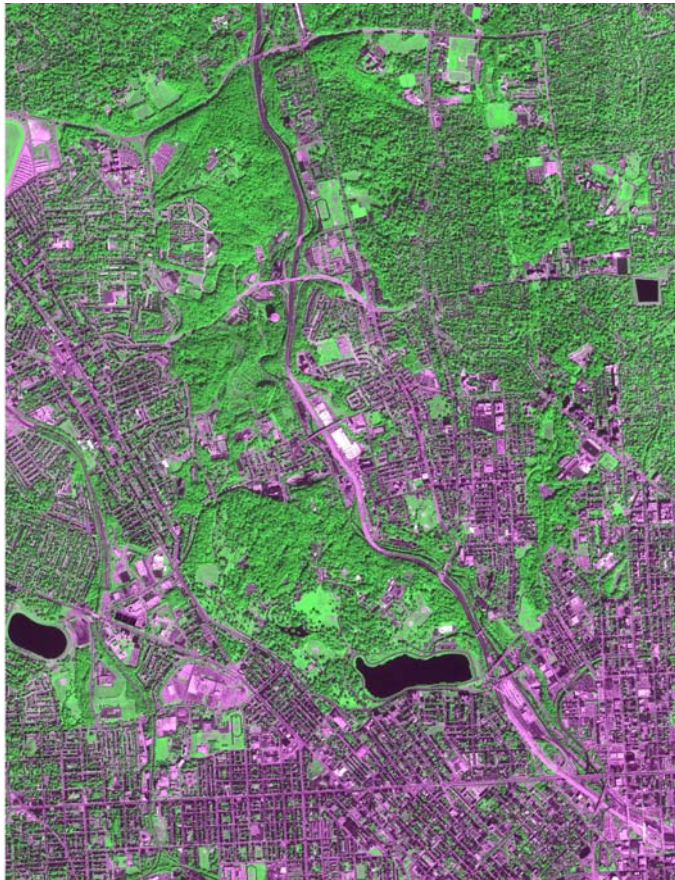
# Presentation Overview

- Conduct Programmatic and Regulatory Assessment
  - Assess suitability of technical results from a regulatory and urban forestry standpoint
  - Develop plans and programs to sustain and increase urban canopy cover
  - Develop legal framework within State Implementation Plan (SIP) for integration of urban forest management into ozone reduction

# Assess suitability from urban forestry standpoint

- Quantification of tree cover / tree resource
  - Where is canopy adequate
  - Where is canopy deficient
    - Where is there opportunity?
      - Existing and projected land use

# SUFA Baltimore



# Assessment example: Hagerstown

- Large-Scale Watershed Grant
  - Potomac Watershed Partnership
- Partners:
  - City of Hagerstown
  - MD DNR
  - USDA Forest Service

# Assessment example: Hagerstown

- Priority: tree canopy enhancement through street tree planting.
- Targets established by the assessment of existing overall and right-of-way canopy cover by zoning category.
- Recommendations by DNR, decision by Hagerstown
- Specific street tree locations identified by Hagerstown; focus on R1, R2, and R3 zoning categories.



# Assessment example: Hagerstown

- 22.6% average canopy cover for MD communities
- 10.5% canopy cover
  - USDA-FS PNW GTR-490
    - 30 m resolution
- 25% canopy cover
  - ‘click and classify’
    - Nowak ArcView extension

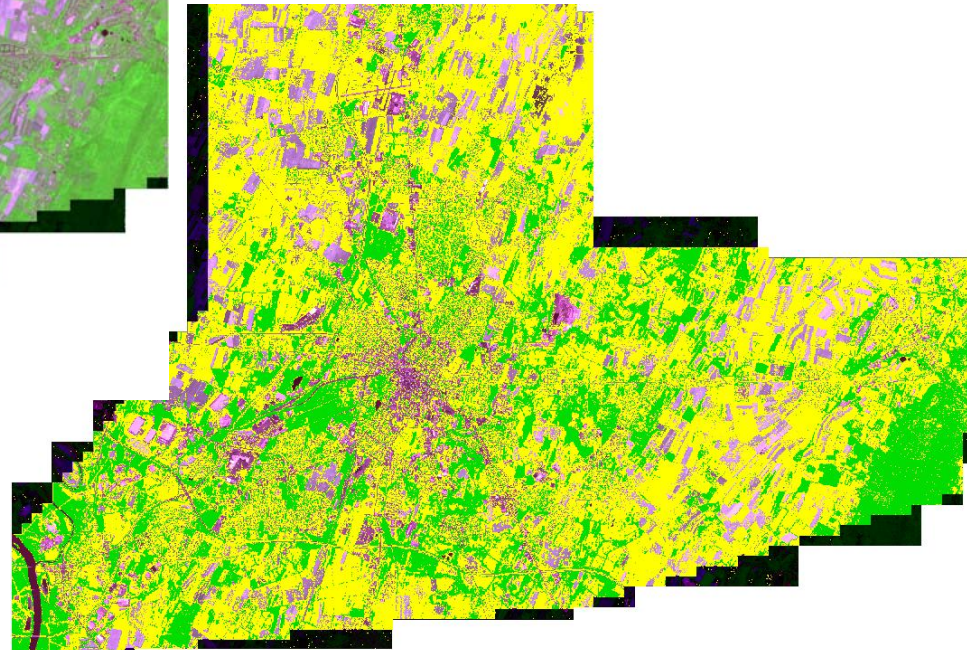
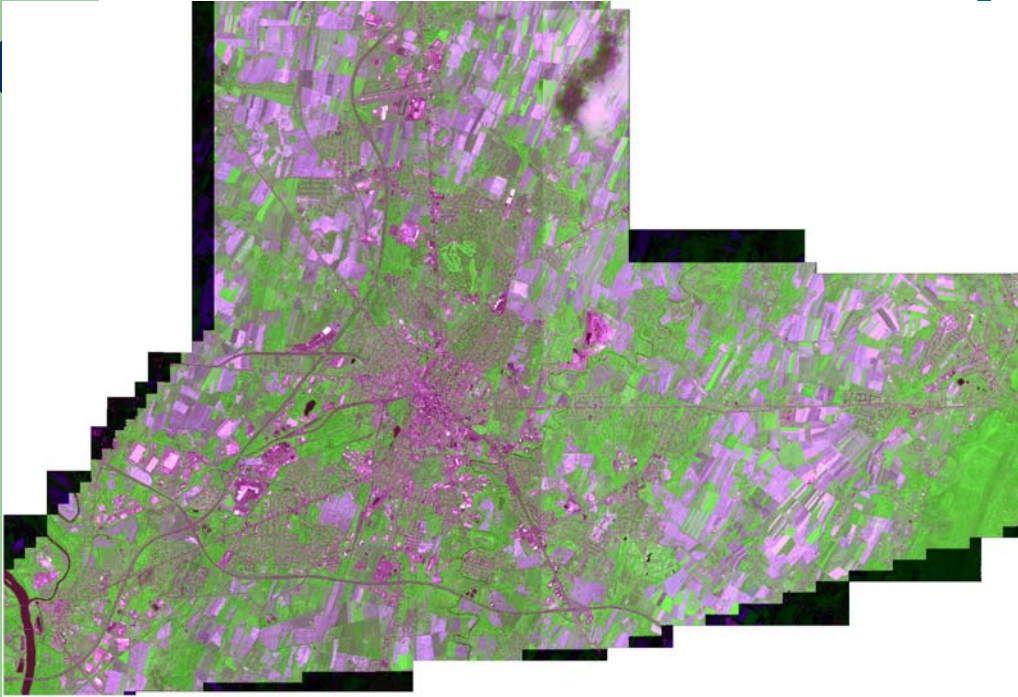




# Assessment example: Hagerstown

- IKONOS imagery
  - 6/02
    - Solar angle not optimal
  - 1m panchromatic
  - 4m multispectral
  - GeoTIFF
  - 11 bits per pixel
  - 25.7 sq km

# Assessment example: Hagerstown



# Hagerstown SUFA statistics

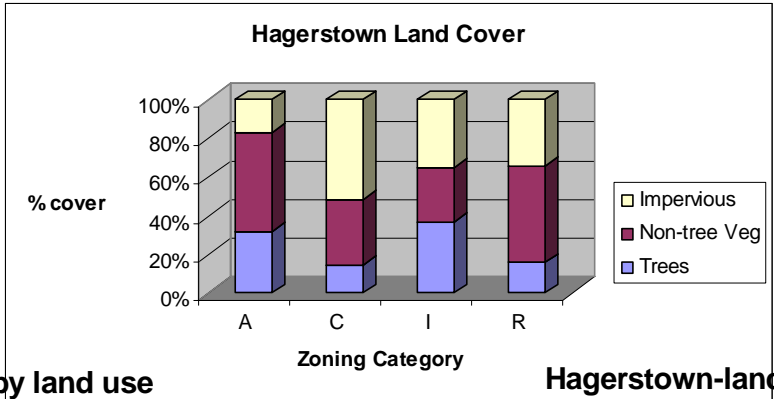
Land area as a % of total area:	100%
Water area as a % of total area:	0%
tree canopy as a % of total area:	33%
tree canopy as a % of land cover:	33%
tree canopy as a % of vegetation:	41%
other veg as a % of total area:	46%
other veg as a % of land cover:	47%
other veg as a % of vegetation:	59%
total veg as a % of total area:	79%
total veg as a % of land cover:	79%
impervious as a % of total area:	21%
impervious as a % of land cover:	21%

## Metro area analysis

Land area as a % of total area:	100%
Water area as a % of total area:	0%
tree canopy as a % of total area:	21%
tree canopy as a % of land cover:	21%
tree canopy as a % of vegetation:	33%
other veg as a % of total area:	42%
other veg as a % of land cover:	42%
other veg as a % of vegetation:	67%
total veg as a % of total area:	62%
total veg as a % of land cover:	62%
impervious as a % of total area:	38%
impervious as a % of land cover:	38%

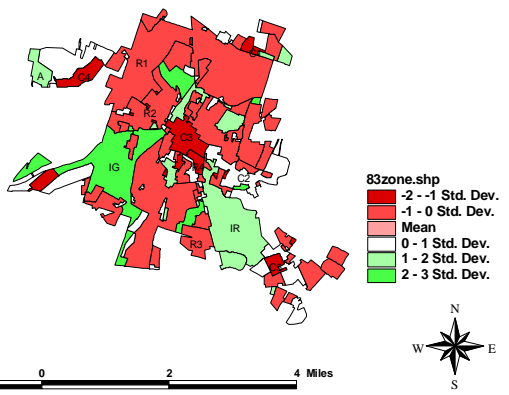
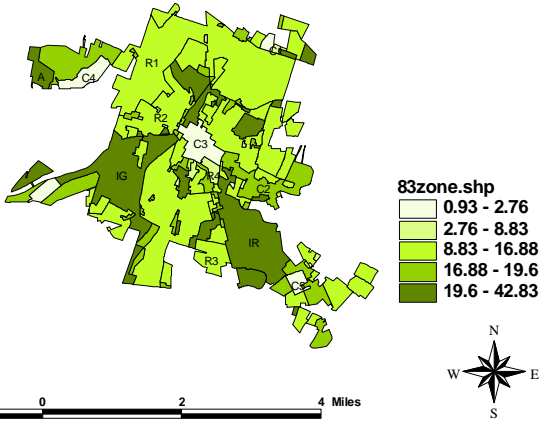
## Municipal analysis

# Hagerstown SUFA preliminary products



Hagerstown % canopy cover by land use

Hagerstown-land use +/- mean % canopy



# Conceptual Analysis of Increasing Tree Canopy Cover

- $C_{30} = C_G + C_N [ - C_M ]$ 
  - where  $C_{30}$  = new canopy required after 30 years  $C_G$  growth of existing canopy
  - $C_N$  canopy increase from new trees
  - $C_M$  canopy mortality that would lead to a decrease in  $C_G$ .
    - Nowak and Luley (2002)

# Conceptual Analysis of Increasing Tree Canopy Cover

- $C_N = C_{RD} + C_{RH} + C_{NS}$ 
  - $C_{RD}$  indicates new canopy from the replacement of dead trees
  - $C_{RH}$  new canopy from the replacement of removed or lost healthy trees
  - $C_{NS}$  new canopy derived from new sites (i.e., the measurement of current canopy does not include a contribution from trees on them)
- All programs and methods to increase canopy in 30 years ( $C_{30}$ ) must aim to increase the terms  $C_G$  and  $C_N$ .
  - Nowak and Luley (2002)



# Canopy Growth ( $C_G$ )

- Maintenance
- Protection
- Education-Maintenance
- PR-Maintenance

# Canopy Growth ( $C_G$ )

- Maintenance
  - Voluntary
    - Funded via grants to persons or jurisdictions of tree maintenance
  - Ordinance
    - Mitigation funds (pollution, construction, etc.) allowed to be directed to maintenance
  - Verification
    - Audit; units maintained; \$ spent on maintenance

# Canopy Growth ( $C_G$ )

- Protection
  - Ordinances (state, local)
    - Examples
      - Forest Conservation (development)
      - Reforestation Law (highway construction)
      - Critical Area law (all trees w/in 1000' of Ches. Bay waters)
      - Roadside Tree Law (all roadside trees)
    - Verification
      - Audit; units accomplished; \$ spent on protection

# Canopy Growth ( $C_G$ )

- Education-Maintenance
  - Voluntary
    - Tree City USA, Tree Line USA, PLANT Community
  - Ordinance
    - Mitigation funds (pollution, construction, etc.) allowed to be directed to education
  - Verification
    - Events; attendees; seat hours; materials

# Canopy Growth ( $C_G$ )

- PR-Maintenance
  - Ordinance
    - Mitigation funds (pollution, construction, etc.) allowed to be directed to outreach/PR
  - Verification
    - Press releases, articles, displays, etc.

# Canopy Mortality ( $C_M$ )

- [Preservation]
  - Ordinance
    - Requires preservation of trees
  - Verification
    - Trees or acres removed or cleared



# Canopy Increase ( $C_N$ )

- Replacement Healthy
- Replacement Dead
- Succession
- Education-Planting
- PR-Planting

# Canopy Increase ( $C_N$ )

- Replacement Healthy (Enhancement)
  - Ordinance or voluntary
    - Afforestation
    - Reforestation
  - Verification
    - Enactment, administration, and enforcement of ordinance or monitoring of voluntary
      - # Trees/acres planted

# Canopy Increase ( $C_N$ )

- Replacement Dead
  - Ordinance or voluntary
    - Maintain base line level in spite of attrition
      - Replacement planting
  - Verification
    - Enactment, administration, and enforcement of ordinance or monitoring of voluntary
      - # Trees/acres planted

# Canopy Increase ( $C_N$ )

- Succession
  - Ordinance or voluntary
    - ‘Grow not mow’
    - Designating areas for regeneration
      - Ordinance or policy
  - Verification
    - Enactment, administration, and enforcement of ordinance or monitoring of voluntary
      - # Acres protected/allowed to regenerate

# Canopy Increase ( $C_N$ )

- Education - Planting
  - Voluntary
    - Tree City USA, Tree Line USA, PLANT Community
  - Ordinance
    - Mitigation funds (pollution, construction, etc.) allowed to be directed to education
  - Verification
    - Events; attendees; seat hours; materials

# Canopy Increase ( $C_N$ )

- PR – Planting
  - Ordinance
    - Mitigation funds (pollution, construction, etc.) allowed to be directed to outreach/PR
  - Verification
    - Press releases, articles, displays, etc.