Urban Forests and Local Mitigation Measures: Case Study, Baltimore, MD

SMART GROWTH NETWORK

7th Annual New Partners for Smart Growth:
Building Safe, Healthy, and Livable Communities

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Trees & Ecosystem Services

- Baltimore, MD is trying to improve environmental quality through Urban Tree Canopy (UTC) management and enhancement. Being pursued on three fronts:
  - Inclusion of urban tree canopy (UTC) as a stormwater management and water quality agent under the Chesapeake Bay Program (not discussed today)
  - Inclusion of UTC as a voluntary, emerging measure in SIP for ozone non-attainment under 8-hour standard
  - Inclusion of UTC as an offset under RGGI

It’s not all about carpet bombing the landscape with trees…

- UTC enhancement can be most efficiently realized by maximizing protection and maintenance in combination with new plantings.
  - Luley and Bond model for UTC: CT = CB + CN + CG – CM where:
    - CT = total UTC in the modeling domain over time (realization of UTC goal);
    - CB = the existing UTC;
    - CN = UTC increase from new trees (planting);
    - CG = the growth of existing UTC (protection and maintenance); and,
    - CM = UTC mortality or loss due to natural and man-induced causes.

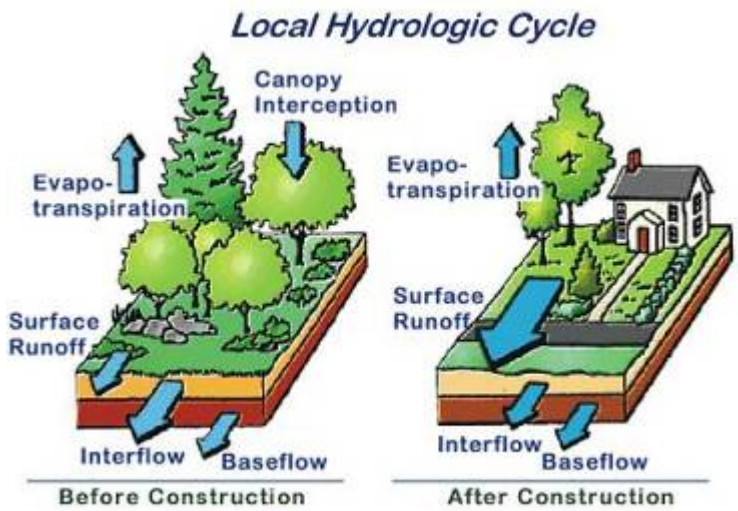
Origins of our approach…Chesapeake Bay

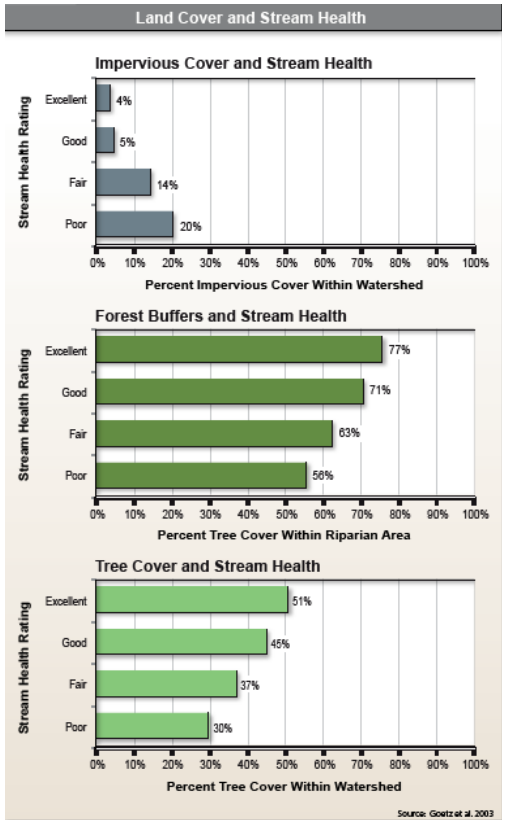
Comparing Watershed Area to Water Body Volume Around the World

Waterbody / Watershed	RATIO Land ($km.^2$)		Water ($km.^3$)
Chesapeake Bay	2,743	to	1
Gulf of Finland	382	to	1
Great Lakes	120	to	1
Baltic Sea	79	to	1
Hudson Bay	25	to	1
Mediterranean Sea	3	to	1

Source: Costanza 2003

Water processing in urban areas





Chesapeake Bay Exec Council

- Directive 03-01, 2003:
  - EXPANDED RIPARIAN FOREST BUFFER GOALS
    - WE FURTHER RECOGNIZE THAT URBAN TREE CANOPY COVER offers stormwater control and water quality benefits for municipalities in the Chesapeake Bay watershed and can extend many riparian forest buffer functions to urban settings.
    - By 2010, work with at least 5 local jurisdictions and communities in each state to…adopt a local goal to increase urban tree canopy cover
    - Encourage increases in the amount of tree canopy in all urban and suburban areas by promoting the adoption of tree canopy goals as a tool for communities in watershed planning.
  - 2007 Commitment: 120 communities with UTC goals by 2020

TreeBaltimore initiative

- *TreeBaltimore is a part of the Mayor's Greener Baltimore initiative that seeks to double Baltimore's tree canopy from 20 percent to 40 percent within 30 years. With this initiative, Baltimore joins the ranks of cities across the country that are aggressively working toward building a sustainable urban forest.*
- *http://www.ci.baltimore.md.us/government/recnparks/treeBaltimore.php*

Trees in SIP

- MDE has included trees in the SIP for ozone non-attainment under the 8-hour standard (June 2007).
- While not a point-source control, use of trees in SIPs has been approved under recent EPA guidance (US EPA, 2004 http://www.epa.gov/ttn/oarpg/t1/memoranda/evm_ievm_g.pdf). This measure aims at achieving area-wide improvement.
- Key point: no SIP credit taken for trees.

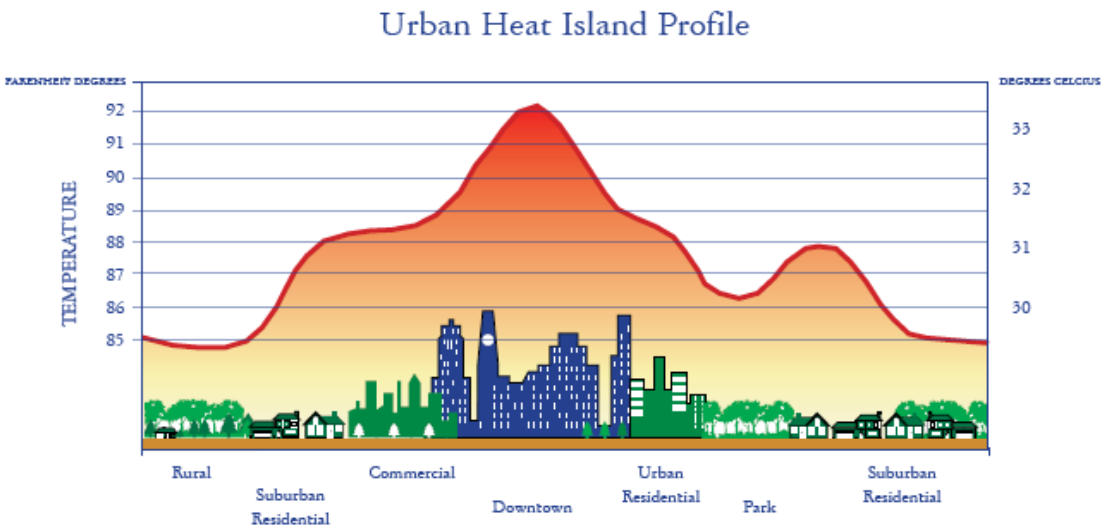
Trees in SIP

- http://www.mde.state.md.us/assets/document/AirQuality/BALT_OZONE_SIP/BALT_OZONE_SIP.pdf
- UTC SIP element can be found under:
  - 6.3 VOLUNTARY AND INNOVATIVE MEASURES (pg 72)
  - Regional Forest Canopy Program: Conservation, Restoration, and Expansion.
- Scientific justification for the UTC SIP element can be found in:
  - Weight of Evidence Documentation appendix G; Appendix G-13: The Relationship between Urban Tree Cover and Ground Level Ozone.

SIP objectives for UTC

- Trees reduce ground-level ozone concentrations by:
  - Reducing air temperatures and reducing energy used for cooling, and
  - Directly removing ozone and NOx from the air.

Heat Island mitigation



PLANET ARK world Environment News

Story Date: 30/3/2007

California Being Warmed by Urbanization

REUTERS KNOW. NOW.

LOS ANGELES - Average temperatures across California rose slightly from 1950 to 2000, with the greatest warming coming in the state's big cities and mostly caused by urbanization -- not greenhouse gases -- authors of a study released on Wednesday said.

SIP commitments

- 1) Initiate and/or enhance efforts to support, monitor, evaluate, and report on preservation of existing UTC and UTC expansion efforts.
- 2) Implement urban forestry programs to affect air and surface temperature, wind speed and reduce VOC emissions.
- 3) Providing assistance and outreach to the landowners and businesses to encourage tree conservation, planting and maintenance.
- 4) Initiate development of a comprehensive plan that will establish a detailed regional baseline and outline strategies to preserve, enhance, increase, and protect measure and track overall forest canopy change in the region over the next 20 years.
- 5) Monitor these activities and report annually.

Local government role

- Track efforts aimed at preserving existing UTC.
- Provide the Resource agency with data regarding preservation efforts including new ordinances and development tools.
- Work with federal, state and private landowners to identify development mitigation areas.

RGGI

RGGI Regional Greenhouse Gas Initiative
An Initiative of the Northeast & Mid-Atlantic States of the U.S.

- Regional Greenhouse Gas Initiative. Nine states in the Northeast US planning to launch market by 2009. Would cut power plant emissions of global warming gases by 10% by 2020.
- UTC framework may be able to provide accounting structure for using trees in carbon trading scheme.

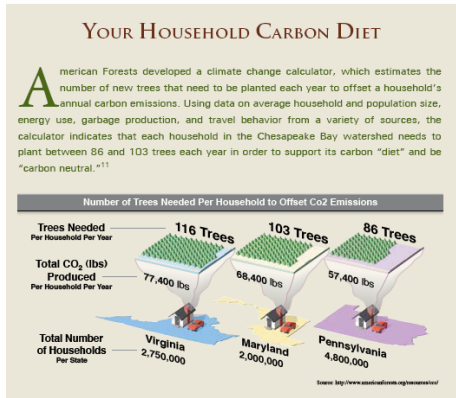


Table 10. Urban area, percent tree cover, and estimated carbon stock and sequestration, by state, Northeast.

State	Urban Area	Portion of state	Urban tree cover	Carbon stock	Carbon density	Annual Sequestration	
	km^2	- - - Percent - - -		TgC	t/ha	t/ha/yr	t/ac/yr
Connecticut	4,085	28.5	21.8	8.24	20.2	0.7	0.28
Delaware	566	8.8	46.3	2.42	42.8	1.4	0.57
Maine	2,887	3.1	47.7	12.74	44.1	1.4	0.57
Maryland	4,525	14.1	40.1	16.78	37.1	1.2	0.49
Massachusetts	6,893	25.2	25.3	16.13	23.4	0.8	0.32
New Hampshire	1,678	6.9	49.1	7.62	45.4	1.5	0.61
New Jersey	6,916	30.6	41.4	26.49	38.3	1.2	0.49
New York	10,127	7.2	26.3	24.64	24.3	0.8	0.32
Pennsylvania	8,363	7.0	34.4	26.61	31.8	1.0	0.40
Rhode Island	926	23.2	8.9	0.76	8.2	0.3	0.12
Vermont	416	1.7	36.0	1.39	33.3	1.1	0.45
Region	47,382	10.0		143.82	30.4		

Source: Nowak and Crane (2002)

Maryland Commission on Climate Change

- Maryland signatory to RGGI
- Climate Change Commission
  - Assess climate change impacts, calculate Maryland's carbon footprint, and investigate climate change dynamics
  - Develop a comprehensive greenhouse gas and carbon footprint reduction strategy
  - Develop a strategy for reducing Maryland's vulnerability to climate change, with an initial focus on sea level rise and coastal hazards

Agriculture, Forestry, and Waste Management Technical Work Group

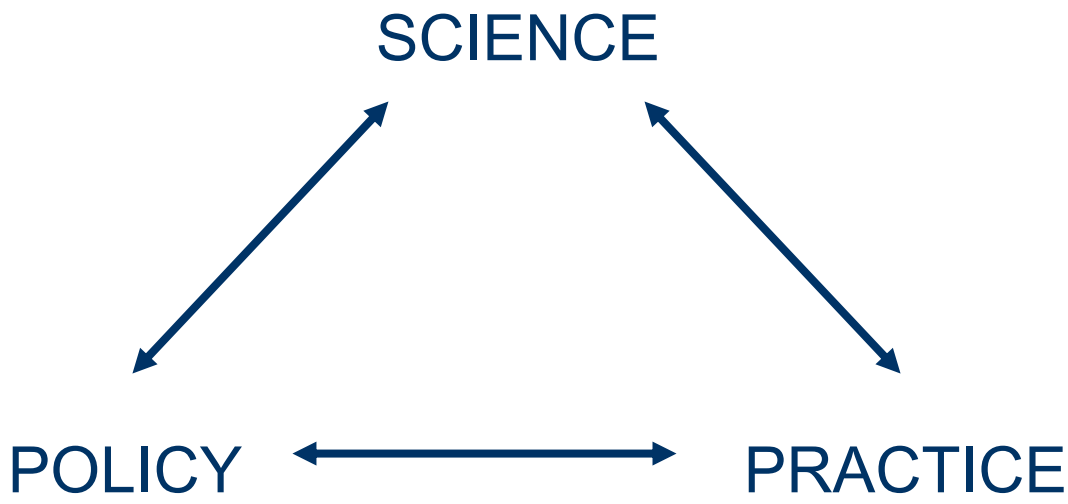
Summary List of Priority Policy Options for Analysis

Draft Option #	Draft Policy Option Name
AFW-1	**Forest Management for Enhanced Carbon Sequestration** (with Mitigation of Forest Loss Due to Insects, Disease, Pests and Invasive Species**)**
AFW-2	**Managing Urban Trees and Forests for Greenhouse Gas Benefits** (with Mitigation of Forest Loss Due to Insects, Disease, Pests and Invasive Species)
AFW-3	**Afforestation, Reforestation and Restoration of Forests and Wetlands**
AFW-4	**Protection & Conservation of Agricultural Land, Coastal Wetlands and Forested Land**
AFW-5	**"Buy Local" Programs for Sustainable Agriculture, Wood and Wood Products**
AFW-6	**Expanded Use of Forest and Farm Feedstocks and By-Products for Energy Production**
AFW-7	**In-State Liquid Biofuels Production**
AFW-8	**Nutrient Trading with Carbon Benefits**
AFW-9	**Waste Management through Source Reduction & Advanced Recycling**

Baltimore City Office of Sustainability

- Mayor Dixon Launches the Sustainability Office as a Part of Her Cleaner, Greener Baltimore Initiative
  - Headed by Sustainability Manager position in the Department of Planning, who will develop a sustainability and environmental management program for the City of Baltimore
  - 21-member commission to be comprised of a diverse group of stakeholders

Feedback loop



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