Summary: Guidelines for Implementing the Chesapeake Bay Program's Urban and Community Tree Canopy Goals

The Chesapeake Executive Council set two goals in Directive 03-01 recognizing the importance of tree canopy in communities. This Directive states that the Chesapeake Bay Program will work with at least five communities in each signatory state (Maryland, Pennsylvania, Virginia, and the District of Columbia) to assess their canopy cover, adopt an increased canopy goal, and work toward enhancing tree canopy. These communities may serve as models for others in their states and in the watershed. In order to count toward meeting these goals and to qualify for certain funding, canopy projects will meet the standards outlined in this document.

"Community" Definition:
- An urban place as defined by the US Census; or
- An incorporated municipality; or
- A community of place (not a municipality, but a geographic community that is a legal entity; must be able to execute contracts).

Canopy Assessment:
States and the District of Columbia working with communities and other partners to assess tree canopy will:
- Use remote sensing data with one meter resolution (or greater);
- Use data that was initially acquired/captured within the last five years (next step below);
- Clearly define geographic boundaries of the assessment;
- Include the percent land cover types, percent of land with tree canopy, percent imperviousness, and priorities for canopy enhancement; and
- Update the assessment every 5-10 years.

Goal Setting:
Communities setting tree canopy goals will:
- Adopt a local goal to *increase* tree canopy;
- Outline a 10-year timeframe for attainment of the goal; and
- Goal setting and endorsement of implementation must be done by locally elected officials, local governing body for non-incorporated jurisdictions, non-profit organizations, or other entities.

Additional Recommendation (optional):
- Sub-goals may also be established for specific units within the community's geographic area such as parking lots, riparian forest buffers, public streets, public lands or industrial/commercial/institutional areas.

Implementation:
Communities' one-time implementation plan submitted to their States and the District of Columbia will include:
- The percent increase in canopy cover and specified time intervals for attainment;
- The relationship of the canopy goal to other local goals, ordinances or regulations;
- Identification of priority sites for implementation (e.g., tree planting) and rationale for selection; and,
- Any resolutions, motions or minutes from governing bodies or boards endorsing the participation in the program, the goals set by the community and plans for implementation.

Additional Recommendation (optional):
- Listing of outreach, educational, and funding opportunities.

Reporting, Evaluation, and Monitoring:
The States and the District of Columbia will report the following accomplishments to the Implementation Committee annually:

- Identification of communities that have approved through their elected officials or governing body, their willingness to implement an assessment, set local canopy goals, and develop a plan that identifies measures to attain those goals;
- Tree canopy assessments completed and associated findings;
- Tree canopy goals established and approved;
- Implementation plans developed and approved; and
- An annual evaluation of each selected community's progress towards completion of an assessment, goal setting, plan development, and implementation. The States (or District of Columbia) should incorporate an evaluation method that includes measurable indicators with which to gauge progress such as number of trees planted, canopy lost, or forest acres protected from development (e.g., conservation easements).

Guidelines for Implementing the Chesapeake Bay Program's Urban and Community Tree Canopy Goals

In 2003, the Chesapeake Executive Council signed Directive #03-01 expanding Bay Program goals for riparian forest buffers. The Directive clearly recognizes the importance of maintaining and increasing tree canopy as a way to extend the watershed functions of the forest in developed areas. Furthermore, the directive establishes two specific urban and community tree canopy goals:

> ➢ *By 2010, work with at least 5 local jurisdictions and communities in each state to complete an assessment of urban forests, adopt a local goal to increase urban tree canopy and encourage measures to attain the established goals in order to enhance and extend forest buffer functions in urban areas.*

> ➢ *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.*

Although urban and community forest enhancement and tree planting have long been a focus of federal-state urban forestry programs, this represents a new approach to urban greenspace through the adoption of deliberate goals for specific communities.

What is urban and community tree canopy?

An **urban forest** can be defined as trees growing individually, in small groups or under forest conditions on public and private lands in our cities, towns and their suburbs. **Tree canopy** is the layer of tree leaves, branches, and stems that cover the ground when viewed from above. In its ability to intercept rainfall and filter sediment (among various other functions), tree canopy helps reduce stormwater runoff and improve air and water quality. Tree canopy can augment the roles of riparian forest buffers in providing ecological services.

Urban forests and riparian buffers

Within developed settings, riparian buffers are often narrower and more confined than in rural areas. In

addition, the natural hydrologic functions of infiltration and base flow are severely altered by impervious surfaces, making urban riparian buffers less likely to carry out the full range of riparian buffer functions compared to more rural conditions. In developed areas where water flow is altered by roads, sidewalks, parking lots, roof tops, and storm drains, tree canopy can extend the functions of narrow buffers in the developed environment by capturing rainfall, reducing stormwater through evapotranspiration, and intercepting pollutants before they enter the Bay.

Urban and community tree canopy goals
Canopy goals are most meaningful when tied to specific desired outcomes such as the protection of urban streams, reduced stormwater flows, improved water quality, reduced ozone concentrations or other air quality parameters.

As an example, recently published research conducted in Montgomery County, Maryland, determined that a stream health rating of "good" (as measured by both biological and physical parameters) was strongly correlated to less than 10 percent impervious surface and more than 60 percent riparian forest cover (Goetz 2003).

While detailed and broadly applicable means of predicting desired outcomes are still under development, a number of existing approaches may offer a frame of reference from which to begin setting canopy goals for a given community.

American Forests has developed general guidelines for tree canopy cover goals as defined by the following broad land-use categories:

Land Use Type	Recommended Canopy Cover Goal
Suburban Residential	50%
Urban Areas	25%
Central Business Districts	15%
Average for all zones	40%

The Center for Watershed Protection's (CWP) *Urban Watershed Forestry Manual* (in press) recommends canopy cover values that also factor in percent impervious cover by watershed type to yield the following goals:

Watershed Type	Impervious Cover	Recommended Canopy Cover Goal
Suburban/Forested	<25%	≥65%
Suburban/Rural	<25%	≥40%
Urban	26-60%	≥40%
Ultra-Urban	>60%	≥25%

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With these canopy cover goals in mind, CWP's "Leafout Analysis" also takes into account such variables as the area of land available for development (as dictated by zoning) and area of forest potentially conserved during development. Until such time that this or similar analytical tools are available for refining community goals, the goals and approaches offered by American Forests or CWP may serve as a starting point for community goal deliberation.

PLANT TREES

As urbanization continues to expand over the landscape, understanding the relationship between urban growth, urban influence, and natural resource systems will become increasingly important in our efforts to restore the health of the Bay. Communities can play a significant role in directing the course of urban influences now and into the future. Community-based planning efforts and goal setting are critical steps toward the protection, enhancement and restoration of the urban and community tree canopy.

Components of the tree canopy goal are discussed individually below. These standards apply to the five model communities per state as per the Executive Council's Directive and for those communities seeking funding through the USDA Forest Service's Urban and Community Forestry Program.

Community Definition
Considering the goals above, the states of Maryland, Pennsylvania, and Virginia, and the District of Columbia will select at least 5 communities or jurisdictions and work with them to develop local canopy goals and plans that outline measures to attain these goals. These communities may serve as models for other communities in their state wishing to enhance their canopy cover.

A target of this tree canopy effort is US Census defined urban places (see below). However, there are others bound by interest or place that may also want to develop a tree canopy goal. For this reason, a "community" is defined as:

- An urban place as identified by the U.S. Census (USDA Forest Service, "National Community Database"); or
- Cities, counties, towns or boroughs that are incorporated and thus support an elected governing body; or

- Entities that do not meet the above definitions but maintain a recognized board or leadership (elected or designated) (e.g., unincorporated towns, school districts, military facilities, homeowners' associations, conservation groups, land trusts, etc.) and have direct responsibility or influence associated with a clearly defined geographic area.

Responsibility for targeting and selecting communities rests with the State Forestry Agencies and the District of Columbia Urban Forestry Administration (or other agency as designated by the State or District) and may occur in consultation with State Urban and Community Forestry Councils or other related agencies or groups. State Forestry Agencies and the District of Columbia Urban Forestry Administration should identify criteria for community selection; however, it is expected that each will have different criteria for guiding community selection depending on their respective needs. For Maryland, selection might target incorporated cities where programs are already up and running. Pennsylvania may chose to select smaller towns or boroughs and the District of Columbia may select Wards, where community infrastructure can facilitate program development.

Canopy Cover Assessment

In order to establish canopy cover goals, communities need a baseline from which to operate. An assessment of urban and community tree canopy provides that baseline. It is recognized that there are various assessment approaches that differ in their level of detail. Since the assessment approach will be driven by the funds and technical capacity of the community as well as the availability of modeling applications for these data, an aerial assessment offers the most efficient means for assessment at this time.

An aerial assessment is conducted to determine the percent of tree canopy cover as viewed from above. For most communities, aerial assessments of tree cover can be obtained from existing data or images. Images available to assess canopy cover include U.S. Geological Service digital orthoquads from the 1990s at one meter resolution and high resolution (one to four meters) satellite imagery (e.g., IKONOS).

Since there are different image tools available, minimum standards are needed to compare percent canopy cover within and between states and to evaluate progress toward meeting the goals of the respective communities. For the same reasons standardization is needed for the imagery, it is also needed for the types and quality of data assessed. Therefore, the following standards would apply to the imagery used and information assessed for the five selected communities in each state and the District of Columbia:

- Initial data acquisition (image capture) from national imagery sources (e.g. IKONOS) must have occurred within the last five years
- Assess imagery at a one meter resolution
- Clearly define geographic boundaries for the assessment
- Over the specified geographic area, include in the assessment:
    - percent land cover types
    - percent of land with tree canopy
    - opportunities/priorities for canopy enhancement
    - percent imperviousness
- The State Forestry Agency or District of Columbia Urban Forestry Administration would lead assessment development and work in cooperation with the community
- Repeat assessment at a five to ten year interval.

Aerial assessments at a community scale, while considered efficient at this time, do have their limitations. For example, an aerial view does not take into account vertical structure of the canopy (e.g., understory shrub layer), structure which contributes to interception of rainfall and stormwater run-off. See section on "Future Considerations" for more discussion.

Goal Setting

The directive set forth by the Executive Council articulates the need for communities to adopt a local goal to *increase* tree canopy. The products of the assessment above, specifically, percent land cover types and percent of land with tree canopy, essentially describe the current urban forest condition. Communities, working from this baseline and in consultation with local planning departments, will set tree canopy goals for a 10 year horizon to maintain and enhance their urban forest. Goals will include a desired percent tree canopy (a numerical target such as 40%) but may also include additional complementary goals such as those related to imperviousness or others.

It is recognized that there are various factors beyond existing tree canopy cover that may influence community goal setting. Setting a realistic numerical target for cover depends as much on the current condition of the tree canopy as some estimate of the future canopy condition (e.g., canopy spread as trees mature, mortality events). Planned zoning within the community between now and 2010 will dictate, to some degree, the area available for meeting tree canopy goals. For example, an area of the community

slated for commercial development may not provide as many opportunities for tree planting as "open" urban land (e.g., city parks). Likewise, an area of forest cleared for development will diminish tree canopy. With these examples in mind, communities may find it meaningful to set canopy goals in the context of local zoning categories such as commercial, multi-family residential, or ½ acre residential. Specific goals for water quality, stormwater reduction, public health, air quality, heat island/energy conservation, and community revitalization may also play a role. Below are two examples of goal setting.

Example 1: Syracuse's Urban Forest (Nowak and O'Connor, 2001)

After an assessment of tree cover conditions, ReLeaf Syracuse developed goals that established the following numerical targets:

- Increase street-tree stocking levels to a minimum of 60% in residential areas of each TNT (Tomorrow's Neighborhoods Today) area.
- Facilitate tree planting on private properties to help attain an overall tree cover of 30%.

Example 2: Maryland Forest Conservation Act

The Act established the following numerical targets for restoring forest cover (defined as the percentage of land covered by forest) in those urban areas deforested by development:

- Reforest to 25% of the pre-development forest for medium density residential development,
- 20% for high-density residential
- 15% for commercial, industrial or mixed use

In addition to the overall canopy goals for the community, optional sub-goals may also be established for specific units within the community's geographic area. For example, a canopy sub-goal could be established for parking lots, public streets, commercial, or riparian areas. Watershed forest cover may also be considered as a complimentary goal.

Setting a 10 year canopy cover goal also necessitates establishing targets for percent increase in canopy cover at specified intervals within the 10 year horizon. Identifying this target is discussed further under "Implementation."

Responsibility for setting the goal and endorsing its implementation rests with the locally elected officials or local governing body for non-incorporated jurisdictions, non-profit organizations, or other entities.

Implementation

In this step, tree canopy goals for a community are integrated into a plan outlining specific recommendations for meeting those goals such as acquiring conservation easements to protect existing forest canopy, developing landscaping requirements for new developments, or tree planting along rights-of-way. Tree canopy implementation plans are required to ensure that communities link results of the assessment to the goals, the goals to the implementation techniques, and the implementation techniques to goal achievement. These one-time plans will be developed by the community and submitted to the State Forestry Agencies and the District of Columbia Urban Forestry Administration. Components of the plan will include the following:

- Map showing the geographic extent of the community
- Results of current canopy cover assessment and findings as well as the tools used (e.g., imagery)
- Percent canopy cover goal established and any sub-goals
- Percent increase in canopy cover and specified time intervals
- Relationship of canopy goal to other local planning or program goals, ordinances or regulations
- Identification of priority sites for implementation (e.g., tree planting) and rational for selection
- Resolutions, motions or minutes (as applicable), endorsing the participation in the program, the goals set by the community, and plans for implementation
- (Optional) outreach, educational, and funding opportunities.
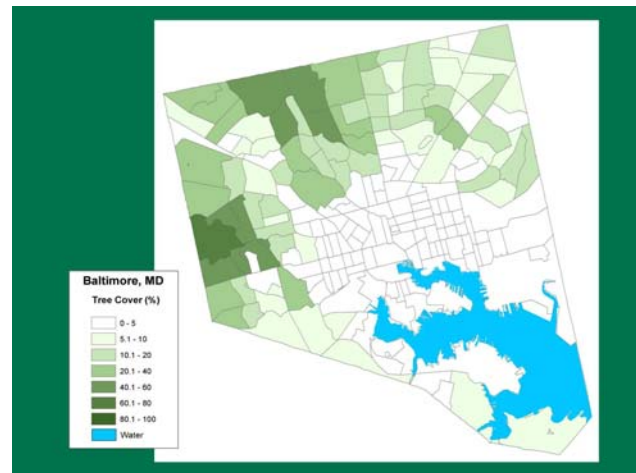
Reporting, Evaluation and Monitoring

The goals of the directive established by the Chesapeake Executive Council highlight the following stages of accomplishment: selection of 5 communities, completion of canopy assessments, adoption of local goals, canopy enhancement planning, and implementation. Since each stage is a step toward meeting the intent of the directive, the States and the District of Columbia will report on an annual basis the following accomplishments to the Implementation Committee of the Chesapeake Bay Program:

- Communities identified by the State Forestry Agencies and the District of Columbia Urban Forestry Administration or those communities volunteering to participate that have formally acknowledged (through their elected officials or

governing body) their willingness to implement an assessment, set local canopy goals, and develop a plan that identifies measures to attain those goals
- Assessments completed and findings
- Tree canopy goals established and approved
- Implementation plans developed and approved.

In addition to reporting the stages of accomplishment, the States and the District of Columbia are also responsible for evaluating a participating community's progress towards completion of an assessment, goal setting, plan development, and implementation. In regards to implementation, the States and the District of Columbia should incorporate an evaluation method that includes measurable indicators with which to gauge progress such as number of trees planted, acres enhanced, canopy lost, or forest acres protected.

Future Considerations

It is recognized that the aerial assessment methodologies and existing guidelines for determining goals have their limitations. Data availability changes as well as new sources are made available and new tools are developed for their analysis. While imagery for aerial assessments is readily available and can be applied across the landscape, such assessments may underestimate tree cover, particularly in urban areas where buildings cast shadows over the trees. Aerial assessments also do not provide the full picture of the canopy, a picture that includes multiple dimensions of a tree including species, height, crown structure, and soil and plant understory. This three-dimensional view of an urban tree or forest is ultimately necessary for fully evaluating the contribution of the tree canopy to extending forest buffer function. For example, the potential of a tree to intercept rainfall (and reduce stormwater runoff), depends upon whether a tree is deciduous or evergreen, or whether it is young with a small crown or bearing the complex crown of a mature tree, and whether it is part of a complex of vegetation and soil which would encourage infiltration of rain or runoff water.

The value of collecting this additional information depends on local objectives and in part upon the availability of models (e.g., Leafout Analysis, Urban Forest Effects) that can use these data to refine goals and evaluate the effects of the tree canopy on water quality and Bay health.

2008 Reevaluation. In 2008, assessment methodologies and tools identified in the above framework will be reevaluated and recommendations will be developed as to how best meet the intent of the directive to extend forest buffer functions in developed areas.

Sources

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