

FOREST CONSERVATION GOALS FOR MARYLAND

SUMMARY

11/14/07

Long-term Forest Conservation Goal in Maryland

Maryland's current forest cover is estimated at 41%. The long-term goal is to retain existing levels of forest cover in the state and expand it in areas of higher benefit for water quality, habitat, and rural economies.

1. Extent Matters: Retain existing levels of forest cover in Maryland, estimated at 2.6 million acres.
2. Location Matters: Protect 20% of Maryland (1.25 million acres) in forest cover, targeting areas with high value for water quality, conserving and expanding forests located in areas such as stream and shoreline buffers, wetlands, and steep slopes.
3. Streams Matter: Protect 70% of stream and shoreline buffers from development long-term (35-ft minimum, preferably 100 feet).
4. Context Matters: Develop guidelines to retain at least 65-70% of watershed area in rural land uses, with forest targets based on landscape characteristics like steep slopes, buffers, wetlands, existing and planned developed areas, and prime agricultural soils.
5. Communities Matter: Set urban canopy cover goals in Maryland's municipalities and urbanized areas, focusing on areas developed before stormwater management requirements.

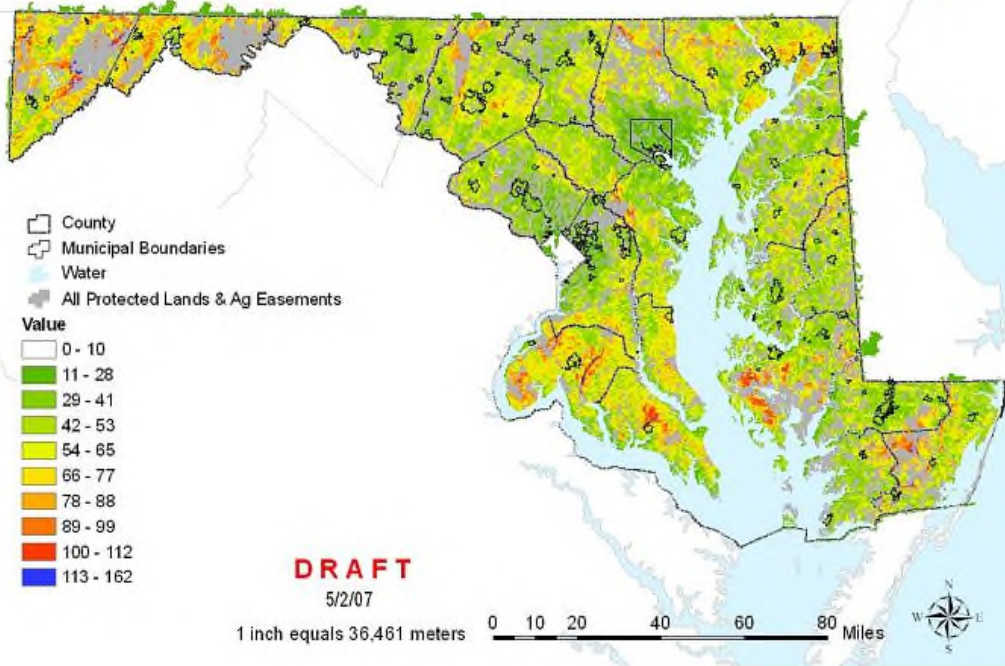
2020 Forest Conservation Goal in Maryland

Maryland is committing to time-specific numeric goals and milestones that work aggressively towards the long-term desired conditions and functions.

1. Retain existing levels of forest cover in Maryland, estimated at 2.6 million acres past 2020.
2. Protect an additional 250,000 acres of forest by 2020 through legal mechanisms, with more than half in areas of high value to water quality.
3. Restore an additional 25,000 acres of forest buffers, or other areas of high value to water quality outside of prime agricultural land, by 2020.
4. Produce rural and forest land retention guidelines based on watershed indicators by 2008 that can support requirements for forest and water protection in local comprehensive plans.
5. By 2020, have urban canopy goals for 50% of the area developed primarily before stormwater management regulations (pre-1984).

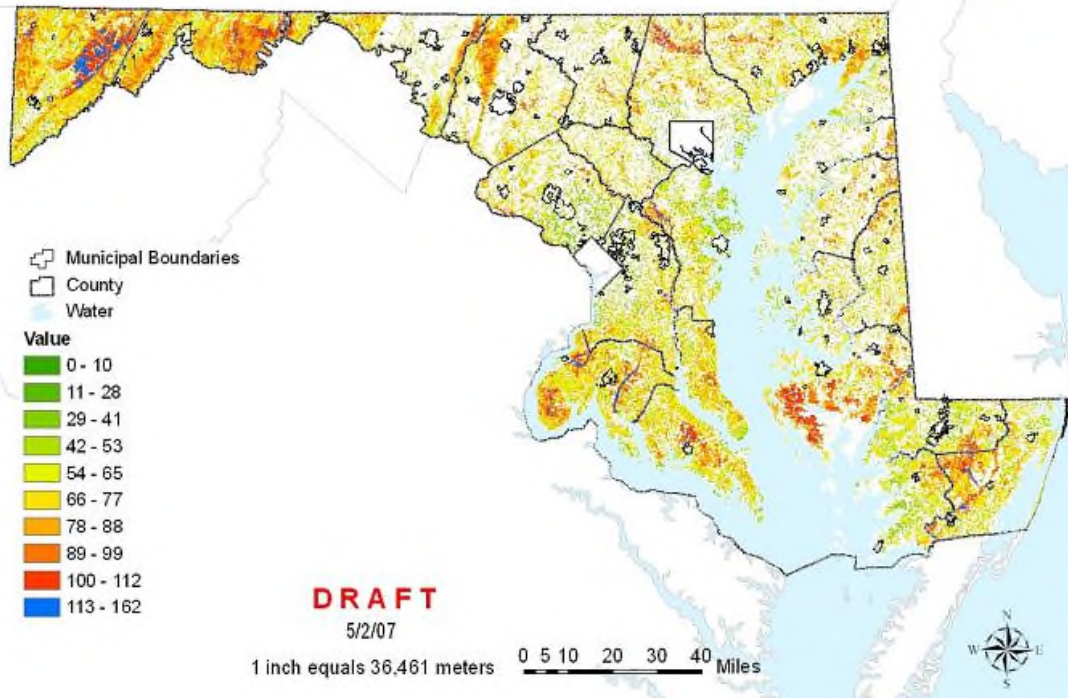
**Areas Targeted for Forest Conservation
Based on Potential Value to Water Quality**

Currently protected areas are darkened and include agricultural areas protected under MALPF easements



**Forested Areas Targeted for Conservation
Based on Potential Value to Water Quality**

Currently protected areas are darkened and include agricultural areas protected under MALPF easements



Comparative ranking based on forest characteristics, nutrient loading, water supply areas, and aquatic indicators; Upper figure has all lands, lower figure has only existing forest

The Chesapeake Bay basin is a naturally forested watershed, and forests have a critical role in its protection and restoration. Forests have low nutrient outputs and high value for natural habitat, providing simultaneous benefits for water, air, and habitat. Forest conservation is an essential long-term strategy for meeting nutrient reduction and water quality goals for many reasons:

- Forests yield high-quality, clean water, with streams from forested watersheds averaging less than 1 mg/l of nitrate (Binkley et al., 2004).
- A 10% loss of forest land disproportionately increases the loading of nutrients discharged into the Bay by 40% (Pan et al., 2005).
- Forests retain more than 85% of the atmospheric N deposited (Pan et al., 2004).
- Forests are capable of storing and filtering 6 times more rainfall than grass alone and 20 times more than a parking lot (Capiella et al., 2005).
- Riparian forest buffers reduce N from upland uses by 70-90% (Mayer et al., 2005).
- 60% of Maryland's population relies on surface reservoirs for drinking water, and cleaner water generally means lower treatment costs.
- Forests are a water quality BMP that gains in effectiveness for decades.

The forest conservation goal for Maryland has taken into account recent research on watershed function and Chesapeake Bay nutrient reduction goals. The goal elements address the variety of roles for forests in protecting water quality.

1. Retain 41% forest cover. Where forest land use and stream quality have been correlated, good stream quality has generally been associated with 45 to 60% forest or more (Goetz et al., 2003; Booth et al., 2002). Maryland is currently at 41% forest, 2.6 million acres. Trends in forest cover have been declining for several decades, and averaged over 6,000 acres/year between 1986 and 1999. Continued declines are likely to make meeting and maintaining basic water quality more difficult and expensive. Maintaining at least the existing level of 2.6 million acres was considered a minimum for avoiding the likely water quality impacts for lower levels of forest cover.

2. Protect 20% from development, targeted at high water quality value areas. Of Maryland's 6.25 million acres, about 10% are within 100 feet of a stream or shoreline, over 6% are in wetlands outside of stream buffer areas, and just under 4% have steep slopes. The 20% goal reflects the proportion of Maryland that is in landscape areas with location-dependent functions. These are appropriate areas to place long-term easements or other restrictions needed to meet water quality goals over the foreseeable future. Out of the 1,250,000-acre goal, about 700,000 acres are estimated to be already protected, leaving 550,000 additional acres. 250,000 acres by 2020 represents a *more than 50% increase* in current rates of land conservation.

3. Provide forests on 70% of stream and shoreline buffers or other high-value lands. Substantial research has shown the pollutant reduction function of forest buffers (Mayer et al., 2005; Goetz et al., 2003). The 70% goal supports the long-term goal for the 2003 Riparian Forest Buffer Directive. 25,000 acres of restoration by 2020 would be an additional 2063 miles of 100-foot forest buffers, about equal to Maryland's commitment for 1996-2010.

4. Protect 65-70% of watershed in rural land uses, varying based on landscape characteristics.

Research on stream health has fairly consistently found that 10% to 15% of land area in impervious surfaces results in measurable loss of stream function or quality (Booth et al., 2004). Medium-density residential land uses (e.g., ½-acre lots) tend to have impervious surface cover greater than this. Maryland currently has about 79% rural land, with over 2.1 million acres of agricultural land, 2.6 million acres forest, and 0.2 million acres wetlands. In order to protect stream health watershed-wide, the forest conservation goal needs to coordinate with other rural land uses to limit overall impervious surfaces.

5. Set urban canopy goals, targeting areas developed prior to stormwater management regulations. Tree canopy can reduce stormwater runoff, particularly during smaller rains that are most frequent and can have high pollutant concentrations. Areas developed prior to stormwater management regulations usually have few BMPs in place to treat water quality or quantity of runoff, and little room to retrofit with structural measures. Techniques for increasing urban tree canopy range from street trees to greenways to pocket parks to brownfields restoration, and can be practiced in different ways across even an already developed landscape. Maryland will assess forest canopy for expansion goals in 74 or more jurisdictions by 2020.

Priority Actions for forest conservation in Maryland

- 1) Participate in and support emerging ecosystem markets and land registries to generate additional incentive for continued forest conservation and restoration;
- 2) Develop a Sustainable Forestry Policy in Maryland by 2008 to stimulate improved forest conservation through:
 - a) tax incentives, such as income tax credit for developing a forest stewardship plan and expanded property tax rebate for having a forest stewardship plan;
 - b) effective and equitable regulations, particularly related to forest harvesting;
 - c) forest enterprise zones to support healthy forest product markets and technical innovation for new markets;
 - d) forest health reserve fund to improve response to forest health threats; and
 - e) family forest revolving loan fund for intact intergenerational transfer of forests;
- 3) Link forests, stormwater, and water supply through Comprehensive Plan Elements like Sensitive Areas, Water Resources, and Land Protection Plans, and new requirements for prioritized environmental site design for stormwater;
- 4) Revise the Forest Conservation Act to reduce forest loss through development, potentially to no net loss of forest;
- 5) Support full funding annually and bond measures for Maryland's dedicated land conservation funding through Program Open Space, including Rural Legacy and Maryland Agricultural Land Preservation Foundation;
- 6) Adopt a transferable and/or refundable tax credit program for donated conservation easements by 2009;
- 7) Support effective local Transferable and Purchase of Development Rights programs;
- 8) Adopt a watershed improvement benefit district to aid forest conservation and restoration by 2009;
- 9) Invest in coordinated tracking for forest and other vegetative cover by 2008;
- 10) Invest in ongoing education, outreach, and technical assistance to local jurisdictions and landowners to improve forest conservation and management.

Forest Conservation Goals for Maryland State Implementation Plan 11/14/07

Introduction

The Chesapeake Executive Council adopted Directive 06-01, the Forest Conservation Directive on September 22, 2006, committing to setting a forest conservation goal for the Chesapeake Bay basin within a year. Proposals were requested from signatory states by April 2007 to contribute to the Bay-wide goal.

Maryland's Forest Conservation Goal is the result of an extensive information-gathering and deliberative process. Maryland established a stakeholder group of over 90 people representing state, federal, and local government, conservation nonprofit groups, landowners, forest industry, universities. Five statewide meetings were held in Annapolis, presenting information on potential conservation tools in Maryland, targeting approaches, and environmental services markets, and gathering input on priorities and strategies for forest conservation in Maryland. An additional four regional meetings were held around the state, targeted particularly to local governments, watershed organizations, and conservation groups.

Framework of the Forest Conservation Goal

Forest management and conservation are long-term endeavors over decades and centuries, and, as such, demand a long-term view. The framework of the goal is built around establishing the *long-term goal* or vision, and committing to specific and numeric *commitments by 2020* to support rapid progress towards the long-term goal.

The framework of the goal is summarized by the captions from the long-term goal:

Extent- An overall level of forest conservation

Location- Prioritize areas of the landscape with highest value to water quality

Streams- Assure protection of riparian areas for water quality and aquatic habitat

Context – Practice forest conservation in a watershed and rural working land perspective to avoid loss of other important watershed functions to increased imperviousness.

Communities- Use urban tree canopy goals to support reduced stormwater in developed areas, even where levels of impervious surface are high.

This framework starts with an overall goal for maintaining forest cover, and brings in the details that support forest functions for water quality, related to landscape position, watershed characteristics, other rural lands, and the need to match approaches to existing land uses and conditions. A more detailed goal for protecting forest areas from development is made, with the intent of conserving land where location matters most.

In Maryland, the land planning process is the overall framework for implementation. Current land planning requirements are built around an overarching Comprehensive Plan with Zoning and Subdivision ordinances to implement the intent of the Comprehensive

Plan. Comprehensive Plans in Maryland currently require several elements that are distinctly relevant to forest conservation: Sensitive Areas Element, Water Resources Element, and Land Preservation, Park and Recreation Plans. The Sensitive Areas Element has recently been expanded to include forests in general, beyond riparian areas, wetlands, steep slopes, and rare species habitat. The Water Resources Element is new, and guidance is just being developed to help jurisdictions consider water supply, treatment, and water quality issues. An additional basic element for rural land protection is the Agricultural Certification Program, which will be requiring targeting for agricultural and woodlands to protect with easements. A Forest Retention Plan could be added, in conjunction with Green and Blue Infrastructure targeting, to develop areas of forest to conserve to meet multiple local objectives. Program Open Space funding can be used as an incentive, where state-side funds are used in local forest retention priority areas, and a consequence (withholding or reduction in local funds if basic implementation requirements and forest conservation reporting are not completed).

Another basic framework is the state water quality programs implementing the federal Clean Water Act. Stormwater management was first implemented in the early 1980s and is required on new development disturbing more than 5000 sq. ft. Sediment and erosion control regulations, first adopted in 1970, are required for limiting sediment during the development process. Pollutant discharges are limited through National Pollutant Discharge Elimination System (NPDES) permits. More recently, Municipal Separate Storm Sewer System (MS4) permits have been required in 11 of Maryland’s jurisdictions, addressing nonpoint source pollutants from stormwater runoff, with Phase II programs in additional jurisdictions. Where water bodies do not meet the water quality criteria for their designated use, Total Maximum Daily Load caps are being developed in a prioritized sequence. The TMDL limits can affect permitted discharges under NPDES or MS4 permits.

Table 1: 2020 Goal and Milestones

Goal	2008	By 2010	By 2013	By 2016	By 2020
1. Retain or expand existing levels of forest cover	2.6 mill. acres	2.6 mill. acres	2.6 mill. acres	2.61 mill. ac.	2.62 mill. ac.
2. Protect an additional 250,000 acres of forest in Maryland (half or more in high-water-quality-value forest)	15,000 acres	50,000 acres	110,000 acres	170,000 acres	250,000 acres
3. Restore an additional 25,000 acres of forest in buffers and other high-water-quality-value land outside prime ag lands	500 acres	2,250 acres	6,800 acres	13,600 acres	25,000 acres
4. Produce rural and forest land retention guidelines based on watershed indicators	Publish				
5. Set urban canopy goals for 50% of the area developed before stormwater management	64,000 acres	120,000 acres	210,000 acres	300,000 acres	420,000 acres

Actions to Maintain Levels of Maryland's Forests

Reversing the decades-long trend of forest loss in Maryland is not a simple matter. Establishing a sustainable forestry policy is a core action that will set a benchmark for assembling and implementing the variety of more specific actions needed to make changes. *Environmental services markets* are seen as fundamental to expand incentives for keeping land in forest. Many of the markets are still in early stages, so specific actions into the future cannot be clearly identified. However, Maryland is committed to participating in and supporting the technical development of these markets. In April 2007, Maryland joined the Regional Greenhouse Gas Initiative as a full member of the northeastern region's cap and trade system for carbon sequestration slated to begin trading in 2009. Another new market is the emerging biomass energy market. Maryland should support the national 25x25 Initiative, previously endorsed through a Governor's Executive Order. The national goal for the 25x25 program is to produce 25% of the nation's energy needs from renewable resources by the year 2025. Specifically, Maryland should encourage development of wood-based thermal energy applications, expanded use of combined heat and power applications utilizing wood for fuel, and determine the feasibility of developing cellulosic ethanol production within Maryland's borders.

A sustainable forestry policy should be set to assure that measures designed to protect and increase forest cover support the range of forest functions and values needed for sustainable forestry, from ecological to social and economic. The stakeholder committee identified several areas in which sustainability of forests, particularly in private ownership, is not well-supported by tax policies, regulatory requirements, and broad-based markets, including traditional fiber markets as well as emerging biomass and environmental services markets. Forest Enterprise Zones should be established in regions that are especially important to the vitality of the various forest industries present in Maryland, which generally revolve around the primary processing facilities (e.g., sawmills, papermills, wood merchandising yards, etc.). It is these primary manufacturing businesses that provide the economic power to implement beneficial forest management prescriptions improving and maintaining the health and diversity of the forests and all of the ecological and social benefits derived from them. Establishing Forest Enterprise Zones will focus resources on stimulating investment in state-of-the-art harvesting and milling technologies, implementing improved forest management practices, and providing enhanced support for establishing new markets, technologies or industries that increase or improve utilization of forest products.

Other identified needs included better response to insect and disease problems and strategies to improve ability of inheritors of forest land to retain intact forest ownerships while meeting estate tax obligations. The forest health reserve fund would set aside funds that could be quickly accessed in the case where quick intervention is needed, such as in the current emerald ash borer infestation in Maryland. This would avoid delays related to approval of additional funding and loss of the most effective options for control. One option for addressing cash flow imbalances between time of inheritance and silviculturally appropriate times to harvest is a family forest revolving loan fund. Funds borrowed at subsidized interest rates could provide a financial bridge until the time of

harvests or other income generated through practices recommended in a forest management plan.

Maryland has some well-established and effective *land conservation programs* at the state and local level, including Program Open Space with Rural Legacy and Maryland Agricultural Land Preservation Foundation. Full funding from the dedicated real estate transfer tax or increases via bond sales will be needed to reach the ambitious forest conservation goals established here, even with new mechanisms for land protection at work. Reductions in funding have been all too common, and expected budgets will continue to generate incentive to divert the major land conservation funding to other sources. Vigilance will be required to maintain state funding, and additional effort is needed to identify progress made through the local POS and agricultural land preservation funds.

Two measures that had demonstrated potential for significant new acres of forest conservation were a *transferable or refundable tax credit program for donated conservation easements* and *Transferable and Purchase of Development Rights Programs* with sufficient downzoning to generate demand. Other measures like nutrient trading and carbon sequestration seem best suited, at least initially, to restoration efforts, rather than conservation of existing forest.

Long-term low-density zoning tools are effective in conserving forests, especially combined with clustering requirements for new subdivisions. Even without conservation easements, many counties that use large-lot low-density zoning as part of growth management strategies will help conserve forested due to the reduced potential for conversion to development. This represents a contribution to the State's goal without additional taxpayer support, a tangible benefit of Smart Growth practices.

Additional funding for water quality improvement is being sought, which could fund additional forest restoration and conservation among other things. Approaches are being crafted to have the costs be borne by the full range of contributors to the nutrient and stormwater problems (existing as well as new development) and apportion funds efficiently to those who would implement measures to reduce impacts. One approach being developed is a *watershed improvement benefit district*. This or a related measure to link water quality impacts to funding for solutions will be aggressively pursued for 2008.

Basic needs for *education, outreach, and technical assistance* were identified. Substantial relevant information on forest conservation and management exists but the tools are not in the hands of those who could best use it.

One of the basic challenges for committing to forest conservation is being able to *track changes in forest* at the scale required. Some portions of the commitment can be tracked through paper or electronic records. The overall commitment encompassing all types of actions from easements to tax incentives, local zoning, education, and ecosystem markets requires accurate assessment over the whole watershed. Maryland is pursuing alternatives such as adding a near-infrared band to the National Agricultural Imagery Program, which could yield higher resolution data than the National Land Cover Database with sufficient distinction between vegetation types. Improved assessments,

coordinated among jurisdictions for compatibility and efficiency, is a fundamental need for the forest conservation commitment.

Priority Actions for forest conservation in Maryland

- 1) Participate in and support emerging ecosystem markets and land registries to generate additional incentive for continued forest conservation and restoration;
- 2) Develop a Sustainable Forestry Policy in Maryland by 2008 to stimulate improved forest conservation through:
 - a) tax incentives, such as
 - i) income tax credit for developing a forest stewardship plan;
 - ii) expanded property tax rebate for having a forest stewardship plan;
 - b) effective and equitable regulations, particularly related to forest harvesting;
 - c) forest enterprise zones to support healthy forest product markets and technical innovation for new markets;
 - d) forest health reserve fund to improve response to forest health threats; and
 - e) family forest revolving loan fund to support intact intergenerational transfer of forest land;
- 3) Link forests, stormwater, and water supply through Comprehensive Plan Elements like Sensitive Areas, Water Resources, and Land Protection Plans, and new requirements for prioritized environmental site design for stormwater;
- 4) Revise the Forest Conservation Act to reduce forest loss through development, potentially to no net loss of forest;
- 5) Support full funding annually and bond measures for Maryland's dedicated land conservation funding through Program Open Space, including Rural Legacy and Maryland Agricultural Land Preservation Foundation;
- 6) Adopt a transferable and/or refundable tax credit program for donated conservation easements by 2009;
- 7) Support effective Transferable and Purchase of Development Rights programs in local jurisdictions;
- 8) Adopt a watershed improvement benefit district to aid forest conservation and restoration by 2009;
- 9) Invest in coordinated tracking for forest and other vegetative cover for 2008 and beyond;
- 10) Invest in ongoing education, outreach, and technical assistance to local jurisdictions and landowners to improve forest conservation and management.

Regulatory Linkage to Stormwater and Land Use

Recent requirements for local land use planning and development offer avenues for more clearly linking stormwater and forest practices. House Bill 1141 passed in 2006 required revisions to Comprehensive Plans, including adding agricultural and forest lands intended for resource protection or conservation, and a Water Resources Element that identifies water supply, stormwater management, treatment, and disposal needs of existing and future development. House Bill 2 from 2006 added an optional Priority Preservation Element in a Comprehensive Plan targeting agricultural land and woodlands; this element is required for those counties that have a certified agricultural land preservation program and as such, receive a greater proportion of funding from MALPF. Maryland passed a bill

in the 2007 legislative session requiring the use of environmentally sensitive design to the extent possible to address stormwater issues (Senate Bill 784/House Bill 786) http://mlis.state.md.us/2007RS/chapters_noln/Ch_122_hb0786T.pdf . The implementation of the bill represents an opportunity to increase the use of the natural area and buffer credits (summarized below).

Maryland’s stormwater regulations as revised in 2000 contain provisions to give credit for “natural area conservation” and “sheet flow to buffers” (Chapter 5.3). They have five criteria used to estimate volume of stormwater that development projects need to treat:

- Water quality volume (detain the first inch of runoff)
- Recharge volume (infiltrate a portion of the water quality volume based on soil group)
- Channel protection storage volume (extended detention for the 24-hr storm with 1-yr return interval, with discharges to tidal waters exempt)
- Overbank flood protection volume (control peak discharge from 10-yr storm, on the Eastern Shore, only the 2-yr storm)
- Extreme flood volume (usually met by avoiding development in the 100-yr floodplain)

Natural area conservation is given credit in the water quality volume by subtracting the conservation area from the total site area used in the volume calculation, and using the impervious surface percentage considering the entire site. For channel protection storage volume, the natural area conserved is allowed to use the curve number for woods in good condition. Sheet flow to buffers receives similar credits, with an additional reduction in the recharge volume.

Partnerships and Action

Partners participating in the forest conservation goal-setting process are listed in Appendix B, with 58 agencies, organizations, or interests represented in the stakeholder group. The stakeholder group and regional meetings involved significant outreach to organizations and interests that went beyond traditional partners in forest stewardship.

Each of the priority actions involves a different set of partners, and part of the basic planning for each priority action will involve seeking out the partners needed to implement the action and other interested stakeholders. The ecosystem services markets involve new institutions, which will become new partners. For many of the other actions above, few could be described as entirely “new”; however, implementing them will involve a significantly greater level of interaction, particularly with state and local planning agencies for the stormwater linkage.

Appendices

Appendix A. Targeting Methodology

Appendix B. Partners in Stakeholder Group

Appendix C: Frequently asked questions

Appendix D: Maryland mechanisms for forest conservation

References

Appendix A. Targeting Methodology

1. Forest Conservation is targeted 3 groups of indicators itemized in Table 2:
 - a. Forest characteristics
 - b. Nutrient loading
 - c. Aquatic habitat quality
2. Forest Restoration is targeted on buffers (includes agricultural lands) and high-value water quality land outside of prime agricultural areas, based on the matrix in Table 2.
3. Vulnerability is determined separately, based on the most recent MD Dept. of Planning data.

Table 2: Maryland's Forest Protection Targeting

<i>Desired Attribute</i>	<i>Parent Layer</i>	<i>Location</i>	<i>Scoring</i>					
			10	7	5	3	1	0
Important Forest Resource Layers								
Existing Forest	forest_by_cnty	S:\Data\NAD83\Forests\Forest_cover (LWAD)	Present					Absent
Percent of watershed forested (12 digit)	calculated from forest_by_cnty plus SWSHEDS	S:\Data\NAD83\boundaries (LWAD)	>80	60 - 79	40 - 59	20 - 39	<20	N/A
Buffers of streams, coasts, lakes	SW_100ft_buffers	S:\Data\NAD83\water\streams_rivers\SW_100ft_buffers (LWAD)	Present					Absent
Floodplains	fema100yr	S:\Data\NAD83\FEMA (LWAD)	Present					Absent
Forested Wetlands	forest_wet (Created from forest_wetlands)	S:\Data\NAD83\Forests\Forests (LWAD)	Present					Absent
Steep slopes over 25%	slopes_25 (created from DEM30)	MD Forest Service Data Layers (from Pat Patterson)	Present					Absent
Headwater wetlands and headwater streams in forest interior	created from mbss100ckh-rivertypes.shp	From Natural Heritage and Interior forest layer	Present					Absent
Forests over 20 acres rated by number of stream meters	forest_ge50ac	S:\Data\NAD83\Forests\Forest_cover (LWAD)	>80%	60%-80%	40%-60%	20%-40%	<20%	N/A
Green Infrastructure Hub or Corridor	gi_v5_1_83	S:\Data\NAD83\Green_Infrastructure\grid (LWAD)	Current		Gaps			Outside
Water quality for nutrients and sediment								
Priority Drinking Water Protection Areas-groundwater, surface waters, community systems	Various Shapefiles	From MDE	Present					Absent

Nitrogen efficiency ranking (based on hydrogeomorphic regions)	sw_n_removal (created from sp_hydrogeo)	From USGS http://water.usgs.gov/lookup/getgislislist	85% removal	60%-70% removal	45% - 55% removal	40% removal	25% removal	N/A
Phosphorus efficiency ranking (based on hydrogeomorphic regions)	sw_p_removal (created from sp_hydrogeo)	From USGS http://water.usgs.gov/lookup/getgislislist	75% removal	70% removal	65% removal	60% removal	50% removal	N/A
Percent Impervious Surface in the Watershed (12 Digit)**	Created from impsurf83 (grid) and SWSHEDS	Impervious surface data from Towson university	5% - 14.9%	0% - 4.9%	15% - 19.9%	20% - 24.9%	>25%	N/A
Atmospheric Nitrogen Deposition		National Atmospheric Deposition Program	High Loading	Med High	Med	Med Low	Low Loading	N/A
SPARROW- incremental yield model -Total Nitrogen	tnnye_v3 (grid)	http://md.water.usgs.gov/gis/chesbay/SPARROW.htm	High Loading	Med High	Med	Med Low	Low Loading	N/A
Water quality for living resources								
Rare species habitat- SSPRAs - forest-dependent?(to be ESAs, DFS, & colonial water bird areas)	SSPRA.shp	S:\Data\NAD83\SSPRA (LWAD)	Present					Absent
High-Quality FIDS habitat	fids_hi_qual.shp	S:\Data\NAD83\Forests\FIDS_habitat\fids_hi_qual (LWAD)	Present					Absent
TNC Forest Matrices (globally rare species)	Export_MatrixBlocks.shp	From TNC	Present					Absent
High-quality streams- MBSS Stronghold Watersheds	allresrc (grid)	From MDP/MBSS	Present					Absent
Cold-water, Blackwater, Limestone Streams	mbss100ckh-rivertypes.shp	From Natural Heritage	Present					Absent
Layers to display with targeting:								
Vulnerability to development	sw_devpress	S:\Data\NAD83\devpress (LWAD) From MDP analysis						

**March 2001, Landsat 7, 30-meter pixel resolution data for Maryland *west of the bay*. October 1999 was used for Maryland *east of the bay* due to cloud cover in the 2001 imagery

The RMSE calculated (for the entire Chesapeake Bay (CB) Watershed) is ~0.5 Pixels horizontal accuracy. Appx. 1000 ground control/ground truth points were obtained through the Maryland Virtual High school (for the Maryland portion of this effort). Teachers were trained on the use of GPS etc. as part of a multi-state effort.

Appendix B. Partners in Stakeholder Group

Agricultural Conservation and Development Service, LLC	MD DNR Ecosystem Assessment
Alliance for the Chesapeake Bay	MD DNR Fisheries
Assoc. of Soil Conservation Districts	MD DNR Forest Service
Association of Forest Industries	MD DNR Heritage Service
Baltimore County DEPRM	MD DNR MBSS
Calvert County Planning and Zoning	MD DNR Resource Planning
Center for Chesapeake Communities	MD DNR Tributary Strategies
Chesapeake Bay Commission	MD DNR Watershed Services
Chesapeake Bay Foundation	MD DNR Wildlife and Heritage Service
Chesapeake Bay Trust	MD Environmental Trust
City of Annapolis	MD NRCS
Environmental consultant	MDA, Resource Conservation
Dept. of Business and Economic Development	MDE, Wetlands and Waterways
Dev. Review Planning, Frederick Co.	Mead-Westvaco
Eastern Shore Land Conservancy	National Audubon Society
Ecosystem Recovery Institute, Inc.	Newpage Corp.
Farm Service Agency	NRCS, Maryland State Office
Forestry and Conservation Inc.	Pinchot Institute
Landowner	Program Open Space
Maryland Agricultural Land Preservation Foundation	Rural Legacy
Maryland Tree Farm System	Rural Maryland Council
Mar-Len Environmental	Society of American Foresters, MD/DE Division
Maryland Assn. of Counties	State Assn. District Forestry Boards
Maryland Forests Association	The Conservation Fund
MD Assoc. of Soil Conservation Districts	The Nature Conservancy
MD Center for Agro-Ecology	Trust for Public Land
MD Cooperative Extension	University of MD
MD Dept. of Agriculture	US Fish&Wildlife Service
MD Dept. of Planning	USFS State and Private Forestry

Appendix C: Frequently asked questions

Why do we need to protect the existing levels of forest land in Maryland?

Where forest land use and stream quality have been correlated, good stream quality has generally been associated with 45 to 60% forest or more (Goetz et al., 2003; Booth et al., 2002). Maryland is currently at 41% forest, 2.6 million acres. Although trends in forest cover have been declining for several decades, and averaged over 6,000 acres/year between 1986 and 1999, continued declines are likely to make requirements to maintain basic water quality more difficult and expensive. Maintaining at least the existing level of 2.6 million acres was considered a minimum for avoiding the likely water quality impacts for lower levels of forest cover.

Why protect 20% of the landscape from development?

Some portions of the landscape are functionally linked to stream systems because they are very close to the stream and in landscape positions that water passes through just before entering the surface waters. These include riparian buffers, many wetlands, and seeps at toeslopes. Other areas have inherently higher risk of erosion, like steep slopes. Of Maryland's 6.25 million acres, about 10% are within 100 feet of a stream or shoreline, over 6% are in wetlands outside of buffer areas, and just under 4% have steep slopes. The 20% goal reflects the proportion of Maryland that is in landscape areas with location-dependent functions. These are appropriate areas to place long-term easements or other restrictions needed to meet water quality goals over the foreseeable future.

Why only protect 250,000 acres by 2020?

The shorter term goal reflects an accelerated pace that relies on new mechanisms like a transferable tax credit for donated easements, and full funding for Maryland's major land conservation programs, which have often been cut substantially in recent years. Out of the 1,250,000-acre goal, about 700,000 acres are estimated to be protected through a variety of mechanisms. Even with substantial new progress, protecting the estimated 550,000 additional acres by 2020 is an unlikely goal, given the necessary process and time for passing laws, establishing new program administration, advertising a new program, and conducting land conservation transactions like easements, which can be multi-year projects. The long-term goal was stated as the desired end point that can be used if an unforeseen funding source or protection mechanism emerges. The 250,000-acre goal is an ambitious but potentially reachable goal, based on meeting or exceeding past performance from all known existing mechanisms and potential of identified actions following a fairly optimistic (but still multi-year) time frame for adoption of new practices.

What are legal mechanisms?

Legal mechanisms for land conservation are specified to assure that the goal will be able to be tracked, and the areas protected from development for the foreseeable future. They would include conservation easements that limit future development, purchase of land for public open space, regulations that limit construction in certain locations (e.g., local zoning, grading, subdivision ordinances), and lands owned by public agencies or conservation non-profits.

Why develop guidelines for 65-70% rural lands?

Research on watershed health and stream quality has frequently found that impervious surface is one of the most significant indicators. King et al. (2005) found that stream quality as measured by macroinvertebrates was almost certainly impaired where there was more than 32% developed land uses, looking at 295 Maryland Coastal Plain streams. Goetz et al. (2003) found that good stream quality was found where there were less than 10% impervious surfaces and more than 60% riparian forest cover. Research on stream health has fairly consistently found that 10% to 15% of land area in impervious surfaces results in measurable loss of stream function or quality. Medium-density residential land uses (e.g., ½-acre lots) tend to have impervious surface cover greater than this. Some water quality functions, like the ability to support brook trout, are sensitive to as little as 2% impervious cover (Boward et al., 1999). Forest land is fundamentally important for maintaining a suite of functions important for water quality and stream habitat, with the lowest nutrient exports and highest infiltration rates of any major land use. However, in order to protect stream health watershed-wide, the goal needs to coordinate with other rural land uses to limit overall impervious surfaces in a watershed. It also needs to function with social and political landscapes as well, and retaining working forests are most effectively done as part of a working landscape that includes various agricultural lands and town centers. An approach of developing guidelines will allow other factors important for sustainable development patterns to be a part of the strategy, with forest targets balanced with other environmental interests and economic realities. Factors that would be considered include impervious surfaces (e.g. <15%), sensitive areas, forest block sizes, agriculture soil productivity, and cost of community services. Maryland currently has about 79% rural land, with over 2.1 million acres of agricultural land, 2.6 million acres of forest, and 0.2 million acres of wetlands.

Why set a canopy goal in areas developed prior to stormwater management regulations?

Tree canopy can reduce stormwater runoff, particularly during the smaller rains that are most frequent and can carry high concentrations of pollutants. Based on current models, trees that overlap impervious areas tend to have greater ability to mitigate stormwater. Urban tree canopy also has the side benefit of decreasing air temperatures to improve air quality. Areas developed prior to stormwater management regulations do not have Best Management Practices in place to treat water quality or quantity of runoff. Often, there is little room left to retrofit BMPs, even if funding and permission were available. Increasing urban tree canopy includes a variety of techniques from street trees to greenways to pocket parks to brownfields restoration, and can be practiced in different ways across even an already developed landscape. Most jurisdictions adopted stormwater management around 1980 in Maryland, so the goal is based on developed area prior to 1980.

Appendix D: Maryland mechanisms for forest conservation

State Land Preservation Programs and Opportunities						
Program	Types of Land	Geographic Extent	Prioritization Method	Lead Agency & Participating	Protection Type	Funding Source
Program Open Space POS	Recreational, Cultural, Forestry, Natural Resource	Statewide with 50% Local Allocation	Gov's Priorities, LPRP, DNR Regional Teams, GI, ESA and WQ Assessments *	DNR MDP, DGS	Easement & Fee Simple	Real Estate Transfer Tax, Bonds, Federal Grants (LWCF & TEA21)
Heritage Conservation Fund	Natural Resources	Threatened Endangered Species Habitat	Natural Heritage Methodology	DNR DGS	Easement & Fee Simple	Real Estate Transfer Tax
Rural Legacy	Natural Resources, Ag., Cultural, Forestry	Rural Legacy Areas	GI, ESA and WQ Assessments *	DNR MDP, MDA	Easement & Fee Simple	Bonds, Real Estate Transfer Tax
Md. Agricultural Land Preservation Foundation - MALPF	Agricultural	Statewide - Primarily areas zoned for agriculture	County Ranking Systems & Discount from Easement Value	MALPF MDA, DGS	Easement	Agricultural Transfer Tax, Real Estate Transfer Tax, Federal Grants (FRPP)
Maryland Environmental Trust MET	Natural Resources, Agricultural, Cultural, Forestry, Historical.	Statewide	Targeted gift solicitations & local land trusts	MET DNR	Easement gift	Land & Easement Donations
Maryland Historical Trust - MHT	Historical, Cultural	Statewide	National & State Registers of Historic Places	MHT DHCD	Easement	Donations, conditions on Capital Grants
Transportation Environmental Stewardship	Natural Resources, Cultural, Historic, Recreational	Transportation Project Area	Interagency Workgroup	SHA, State and Federal Agencies	Unknown – New Opportunity	Federal and State Highway Funding

* GI = Green Infrastructure, ESA = Ecologically Significant Areas, WQ = Water Quality

Federal Land Preservation Programs administered by State Agencies						
Program	Primary Types of Land	Geographic Extent	Strategy or Prioritization Method	Lead Agency & Participating	Protection Type (easement, fee simple)	Funding Source
Land and Water Conservation Fund LWCF	Recreational, Cultural, Civil War, Forestry, Natural Resource	Statewide with 50% Local Allocation	Land Preservation and Recreation Plans - LPRP	DNR MDP, DGS, NPS	Easement & Fee Simple	Federal Land and Water Conservation Fund State Appropriations USDOJ
Transportation Enhancement	Scenic areas, Greenways, Trails, Civil War sites	Statewide	MDOT T.E. Technical and Executive Committees	MDOT/SHA FHWA	Easement & Fee Simple	Federal TEA21 etc. Appropriations FHWA matched w/50% POS Real Est. Transfer Tax
Farm and Ranch Protection Program FRPP	Agricultural	Statewide	NRCS LESA Assessment	NRCS/USDA MDA	Easement	Federal USDA FRPP Appropriations
Wetland Reserve Program WRP	Non tidal wetlands	Statewide	NRCS criteria	NRCS/USDA	Permanent Easement 30-year Easement Restoration Cost-Share Agreement	USDA - NRCS Appropriations in Farm Bill
Conservation Reserve Enhanced Program - CREP	Bay and Stream buffers	Statewide, stream corridors	MOA with USDA CCC	DNR, MDA NRCS/USDA	Rental Agreement & Easement	USDA appropriations matched w/ POS Real Estate Transfer Tax
Forest Legacy	Forest Lands	Forest Legacy Areas	USFS criteria for FLA designation	DNR US Forest Service	Easement	Federal USDA appropriations matched w/ POS Real Estate Transfer Tax
North American Wetlands Conservation Act NAWCA	Wetlands and other natural habitat for migrating waterfowl	Wetlands in North American Flyway	North American Wetlands Cons. Council criteria	DNR NAWCC/USFWS	Easement & Fee Simple	Federal Appropriations USDOJ-USFWS

Wildlife Restoration Act (Pittman-Robertson)	Wildlife habitat	Statewide	USFWS Grant Review criteria	DNR US Fish & Wildlife Service	Easement & Fee Simple	Federal excise tax on sporting arms, ammunition, archery equipment, handguns.
Sports Fish Restoration Act (Dingle-Johnson)	Habitat for fish & wildlife, public access & facilities	Statewide	USFWS Grant Review criteria	DNR US Fish & Wildlife Service	Easement & Fee Simple	Excise tax - fishing tackle & equipment; fed. fuels tax for boat access & related
Coastal and Estuarine Land Conservation Fund (CELC)	Significant and/or threatened ecological, recreational, historical or aesthetic values	Coastal Zone	NOAA Grant Review Criteria and State CELC criteria (GI, ESA and WQ Assessments*)	DNR NOAA	Fee Simple	NOAA appropriations w/1:1 State or local match using cash; in-kind services or suitable lands
* GI = Green Infrastructure, ESA = Ecologically Significant Areas, WQ = Water Quality						

Other programs affecting forest conservation in Maryland

Regulatory (state and local laws and ordinances)

- Forest Conservation Act retention and long-term protection requirements,
- Purchase of Development Rights/Transfer of Development Rights programs,
- Critical Area Law, especially forest replacement and buffer requirements
- Ag Certification Program changes as required by House Bill 2
- Comprehensive Plan changes for House Bill 1141, including expanded Sensitive Areas Element and Water Resources Element
- Requirements for considering environmental site design in stormwater, House Bill 786
- Water quality regulations (NPDES and MS4/stormwater permits, TMDL caps, water quality trading)

Financial Incentives

- Forest Conservation and Management Agreements with property tax abatement,
- Reforestation tax incentives/TAXMOD for state income tax
- Carbon credits through Chicago Climate Exchange or, after 2009, RGGI

References:

- Binkley, D., G.G. Ice, J. Kaye, and C.A. Williams. 2004. Nitrogen and phosphorus concentrations in forest streams of the United States. *Journal of the American Water Resources Association* 40(5): 1277-1291.
- Booth, D.B., D. Hartley, and R. Jackson. 2002. Forest cover, impervious surface area, and the mitigation of stormwater impacts. *Journal of the American Water Resources Association* 38(3):835-845.
- Boward, D.M., P.F. Kazyak, S.A. Stranko, M.K. Hurd, and T.P. Prochaska. 1999. From the Mountains to the Sea: The State of Maryland's Freshwater Streams. EPA 903-R-99-023. MD Dept. of Natural Resources, Monitoring and Nontidal Assessment Division. Annapolis, MD 54p.
- Cappiella, K., T. Schueler, and T. Wright. 2005. Urban Watershed Forestry Manual, Part 1: Methods for Increasing Forest Cover in a Watershed. USDA Forest Service NA State and Private Forestry Publication NA-TP-04-05. Newtown Square, PA. 94p.+app.
- Goetz, S.J., R.K. Wright, A.J. Smith, E. Zinecker, and E. Schaub. 2003. IKONOS imagery for resource management: Tree cover, impervious surfaces, and riparian buffer analyses in the mid-Atlantic region. *Remote Sensing of the Environment* 88:195-208.
- King, R.S., M.E. Baker, D.F. Whigham, D.E. Weller, T.E. Jordan, P.F. Kazyak, M.K. Hurd. 2005. Spatial considerations for linking watershed land cover to ecological indicators in streams. *Ecological Applications* 15:137-153.
- Mayer, P.M., S.K. Reynolds, Jr., M.D. McCutchen, and T.J. Canfield. 2005. Riparian buffer width, vegetative cover, and nitrogen removal effectiveness: A review of current science and regulations. US EPA NRMRL EPA/600/R-05/118. Cincinnati, OH. 27pp.
- Pan, Y. J. Hom, R. Birdsey, and K. McCullough. 2004. Impacts of rising nitrogen deposition on N exports from forests to surface waters in the Chesapeake Bay watershed. *Environmental Management* 33(4):120-131.
- Pan, Y. et al. 2005. Forest productivity and effects of nitrogen deposition on water quality. USDA Forest Service, Northeastern Area Research Station. Newtown Square, PA.

Compiled for the Forest Conservation Goal-Setting Committee by
Anne Hairston-Strang
MD DNR Forest Service
580 Taylor Ave., E-1, Annapolis, MD 21401
410-260-8509 astrang@dnr.state.md.us