Chesapeake Bay Watershed: Multi-state priority area
Forestry Considerations
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Overview
Assessing the location and condition of forests in the Chesapeake Bay watershed allows for meaningful priorities and defined results. Water quality and watershed functioning remain the largest emphasis areas of the work in the Chesapeake. Forestry plays a critical role. This paper is a subset of the great deal of resource information (e.g., data, assessments, models, maps) that has been amassed at the Chesapeake Bay Program (www.chesapeakebay.net) regarding water quality and land use.

Background
The Chesapeake Bay is the largest and most productive estuary in North America. More than 64,000 square miles of land drain into the Chesapeake Bay, including parts of six states — New York, Pennsylvania, Maryland, Delaware, West Virginia, and Virginia — and the District of Columbia. It is home to over 3,600 species of plants, fish and wildlife. The Bay has struggled for more than 100 years against pressures such as pollutants, overfishing, and development. But it is the way in which humans use the land that is the primary threat to the water quality and healthy functioning of the Chesapeake watershed.

Many Chesapeake landscapes with ecological, historical, and cultural importance are vulnerable to the effects of land development and climate change. Development trends place enormous pressure on valuable ecological and cultural landscapes, tearing at the very fabric that defines the region and supports our way of life. Humans are taking up more space on the landscape, converting open green spaces into paved and developed environments that will not return to their original state. For example, the region’s population grew by 8.2 percent between 1990 and 2000, but the conversion of farms and forest land to development grew at three times that rate—roughly 25 percent.

By the end of this century, the water level in the Bay region may rise between 21 and 48 inches, about double the predicted global average (Wu et al. 2009). In the coming decades, water will cover many valuable low-lying areas—including islands, forests, wetlands, and beaches—that were not submerged before. Erosion will claim others. Land managers must modify land protection strategies, possibly by conserving areas that will support the upward migration of tidal wetlands and habitats. With these major forces at work, many of the Bay region’s most important landscapes may soon be irreversibly altered or lost.

Value of Watershed Forests
Forests are the most abundant, and the most beneficial land cover to the health of the Bay. Currently, 58% of the watershed is forested, down from 95% prior to European settlement. Between 1982 and 1997, the Bay watershed lost over 750,000 acres of forestland to development—a rate of about 100 acres per day. From 1997-2006, forests have continued to be subject to the highest land use conversion.

Forests are most valued because of the suite of ecological services they provide human communities—by protecting the quality and quantity of our drinking water; promoting air
quality; combating global warming; and reducing the pollution, erosion, and flood events related to stormwater runoff. Essentially, forests mitigate the effects of development, and give back in many ways:

- 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).
- The majority of the population relies on surface reservoirs for drinking water, and cleaner water means lower treatment costs.
- Forests are a water quality BMP that gains in effectiveness for decades.

The best indicator of watershed health is impervious cover--- the healthiest watersheds have less than 4%. The next best land use indicator is the amount of forest cover and the amount of riparian forest (Goetz 2003). A healthy watershed has over 70% forest cover. Riparian forest cover is especially important on agricultural-dominated landscapes.

The following geographic features help maintain forest water quality functions over time:

- porous soils
- vegetation height (taller is better)
- shallow soils and flatter slopes (entire floodplain and land that is at or near water table should be forested).
- contiguous forest.

Importance of Location

While all forests are valuable to water quality, some forests are more valuable than others (see map on Water Quality Protection Value). Assessing the location and condition of forests in the watershed allows for meaningful priorities and defined results. These locations often combine habitat value with significant value to people providing essential watershed services such as flood control, stormwater management, base flow, carbon sinks, and water quality treatment. Notable examples are:

- forested areas of contiguous natural habitat with significant interior size, and
- low-lying landscapes such as forested wetlands and riparian habitat
- areas close to drinking water sources and/or containing headwater streams.
- landscapes of ecological and social importance sometimes referred to as “green infrastructure” by virtue of the crucial ecosystem services they provide for human communities and wildlife.

Because forests are the most beneficial land cover for watershed services, if these landscapes are not forested, they should be priority areas for reforestation and conservation wherever possible.

This prioritization was the focus of the Chesapeake Forest Conservation Directive (http://www.chesapeakebay.net/content/publications/cbp_27761.pdf). See associated map
on Forest Conservation in the Chesapeake Bay. Other elements of the Directive are provided as example Opportunities on page 4.

**Urban Forests**

With over 17 million citizens, the Chesapeake watershed is heavily populated, especially along the Baltimore-Washington-Richmond (I-95) corridor. Urban forestry is a vital component to livable, well-planned communities, which are also important to open space conservation. Chesapeake urban areas are expected to grow (see map on Forecasted Forest Loss).

An urban tree canopy reduces stormwater runoff, particularly during the smaller rains that are most frequent and often 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. 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, that are more appealing and cost-effective than other stormwater retrofits. Forestry in urban areas is a priority because of politics: more people will reap the benefits of work done in urban areas.

**Chesapeake Forest Health Issues**

- Parcelization is the breakup of larger land ownerships into smaller parcels. Over the past 10 years, the number of family forest owners in the Bay watershed increased by nearly 25 percent, or 23,000 new family forestland owners per year. Nearly 70 percent of all family forest owners hold less than 10 acres. Forest parcelization often corresponds with a decline in the percentage of forestland under sustainable management plans. This restricts access to residents and increases the risk of fragmentation and conversion to other uses.

- Inaccessibility to mills and other forest industry infrastructure means that stewardship plans do not get implemented (see map on Forest Economics).

- White-tailed deer have become one of the greatest threats to many of the Bay watershed's forests. As forests have become fragmented and surrounded by farms and suburban gardens, deer have more plentiful and nutritious food sources. Fragments also provide refuges for deer where hunting is prohibited. Locally high deer populations:
  - Eat large amounts of tree seedlings and young trees, keeping forests from regenerating.
  - Selectively browse for food, which changes forest composition and depletes species diversity.

- Japanese barberry, Japanese honeysuckle, kudzu, Canada thistle, English ivy and other invasive plants have become permanent residents of Chesapeake forests. Invasive plants:
  - Grow and reproduce rapidly, killing and out-competing other species in the process.
  - Lower the quality of food and shelter for wildlife.
Eliminate host plants of insects.
- Compete with native plants for pollinators.

- Invasive pests and diseases have also altered forest conditions in the Bay watershed. Some, such as gypsy moth, chestnut blight, beech bark disease and Dutch elm disease, have had long-term, devastating impacts. Others, such as emerald ash borer, also have potential to further & severely degrade ecosystems.

**Opportunities and Potential Strategies**

1) Support ecosystem markets and land registries to generate additional incentive for continued forest conservation and restoration;

2) Work closely with NRCS to prioritize forestry projects under the Chesapeake Bay Watershed Initiative in the 2008 Farm Bill.

3) Develop a sustainable forestry incentives & policies 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;

4) 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;

5) Support dedicated land conservation funding through state, and especially through local ballot measures;

6) Adopt a transferable and/or refundable tax credit program for donated conservation easements similar to the one Virginia has;

7) Support effective Transferable and Purchase of Development Rights programs in local jurisdictions;

8) Work with other federal, state, and local organizations to improve technical assistance provided to forest landowners;

9) Invest in ongoing conservation education, outreach, and technical assistance to local jurisdiction planners and landowners to improve forest conservation and management, and to schools. The ultimate outcome is greater integration of the benefits of forest cover, forestry, and natural resource conservation into public education and public policy decisions. The need for public understanding of the importance of forests, and the trade-offs involved when forest cover is degraded or removed is a critical.
References:


[Double click on the maps below to view in higher resolution.]
Forest Conservation in the Chesapeake Bay Basin
State High Priority Forested Conservation Lands not Already in Conservation

Legend
- State Boundary Outline
- Chesapeake Bay
- County Boundary Basin
- All Land Currently in Conservation
- Lower Priority Targeted Forest
- High Priority Targeted Forest
- All Forested Land
- Chesapeake Bay Basin

Data source: Chesapeake Bay Program - Chesapeake Bay basin boundary derived from state small watershed boundaries. Forest Cover from REBAC 2000 Land Cover. PA, MD, and VA Forest Conservation Target Layers from PADNR, MDNR, and VA Dept. of Forestry.

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