

# A Sustainable Chesapeake

BETTER MODELS FOR CONSERVATION

*Edited by David G. Burke and Joel E. Dunn*

THE CONSERVATION FUND



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# Restoring Green Infrastructure

## *Rural Reforestation and Forest Stewardship Initiatives in Baltimore County*

These model programs have planted nearly 40 acres of forest on privately owned, suburban land, increasing the stewardship practices of the landowners and reducing the amount of sediment and nutrients that enter local waterways and the Chesapeake Bay.

### CASE STUDY SUMMARY

The Department of Environmental Protection and Resource Management (DEPRM) in Baltimore County, Maryland, developed and implemented two versions of a rural reforestation initiative to meet its resource management challenges and help landowners become better forest and watershed stewards.

The first project, the Rural Residential Stewardship Initiative in 2005 and 2006, involved working with landowners in rural residential sub-

divisions with lots of three or more acres. The landowners converted mowed, “excess” lawn and fields to forest cover, expanding riparian buffers and contiguous forest patches. The second project, the Valleys Reforestation Initiative in 2008 and 2009, involved reforestation of larger rural properties. Reforestation was targeted to riparian buffers and areas adjacent to existing forest patches in the Loch Raven and Prettyboy Reservoir watersheds, which are part of the Gunpowder River basin of the Chesapeake Bay watershed.

DEPRM worked to reduce rural landowners’ perceived barriers to beneficial stewardship practices, including costs, technical knowledge of reforestation, and legal consequences of required easements for reforestation areas. DEPRM’s experience with these projects supports the conclusion that using education, reducing barriers, and providing technical and financial incentives is just as necessary to achieve successful stewardship for rural residential landowners as it is for farmers.

In all, the two projects resulted in a total of 38.7 acres of reforestation on lands owned by 19 different landowners. Three different conservation organizations were also involved in the projects. Both projects were supported by the Chesapeake Bay Small Watershed Grants Program, administered by the National Fish and Wildlife Foundation.

### RESOURCE MANAGEMENT CHALLENGE

The Rural Residential Stewardship Initiative and Valleys Reforestation Initiative addressed two major resource management challenges: (1) the loss of and need to replace critical forest resources for watershed health, and (2) the need to engage



*Baltimore County targeted the watersheds of Loch Raven Reservoir (above) and Prettyboy Reservoir for reforestation efforts.*

rural landowners, who own about 75% of the forests in Baltimore County, as forest resource managers. The premise of both projects was that forests are the most effective land cover for protecting water quality and that under-utilized lands can be converted to forest cover.

By reducing nutrient and sediment loads and improving habitat, these projects also directly addressed goals established by the Chesapeake Bay Program, including the restoration of 10,000 miles of stream buffers by 2010 and covering at least 70% of riparian areas with forest buffers. Recently, the need for accelerated progress toward these and other restoration goals has been widely acknowledged. Environmental indicators tracked by government and leading non-profit organizations demonstrate that the largely voluntary efforts undertaken since 1983 have not achieved established restoration targets.

Baltimore County's reforestation projects focused on the interface of land management for water quality and the special character of rural

land ownership patterns. Baltimore County's rural landscape is a mosaic of active farms, forests, and large-lot, low-density residential uses. DEPRM used Maryland nutrient load data from the Chesapeake Bay Program to illustrate the functional benefits of converting what were essentially agricultural lands to forest cover. Over the long-term, each acre of land returned to forest reduces pollutants that degrade water quality, including approximately 12.7 pounds of nitrogen, 1.06 pounds of phosphorus, and 0.42 tons of sediment each year. Because many local jurisdictions use large-lot, low-density zoning as a tool for protecting rural lands and managing growth, rural reforestation projects have wide applicability for improving water quality.

### CONSERVATION VISION

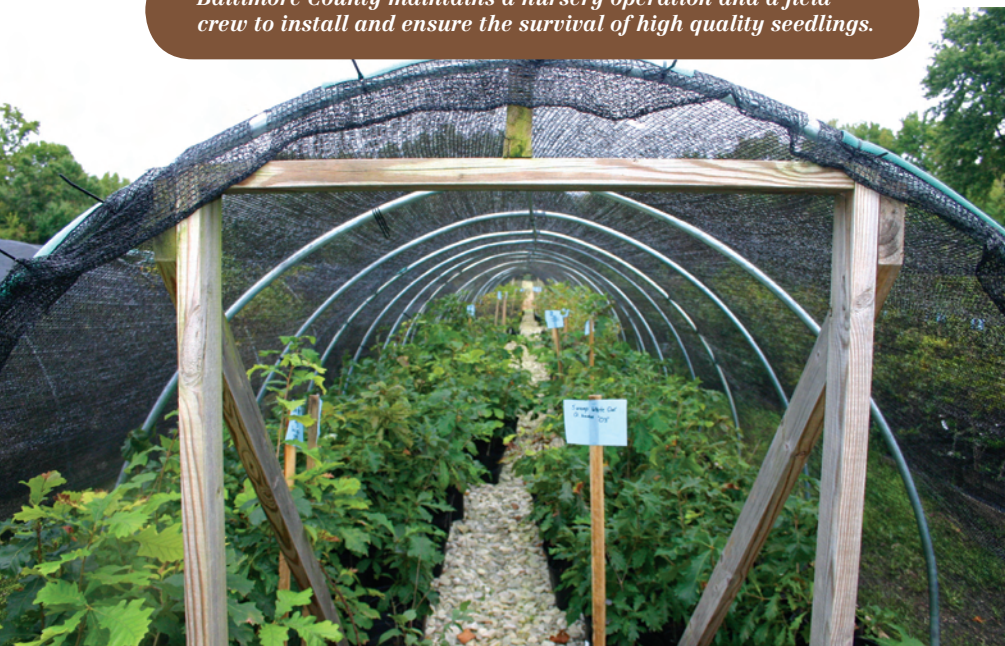
Baltimore County's rural reforestation initiatives arose from a long-standing awareness of the multiple benefits of forests, as well as a specific challenge from a conservation organization.

On one hand, the county was rather progressive in developing an environmental program for stream and forest

protection. Forest buffer regulations for new development evolved from non-tidal wetland protection efforts in the mid-1980's, and the *Regulations for the Protection of Water Quality, Streams, Wetlands, and Floodplains* (forest buffers) were enacted in 1989. The county also adopted the Maryland Forest Conservation Act of 1991, as required, which remains the only state-wide development regulation of its type. The county worked with the Maryland Department of Natural Resources in the mid-1990's to develop a GIS-based method for identifying a green infrastructure network of the most ecologically-valuable forests and wetlands. And in 2001, the county was one of three counties in the United States that were invited to participate in the *Linking Communities to the Montreal Process Criteria and Indicators* (MPCI) project. This project was sponsored by the Communities Committee of the Seventh American Forest Congress following adoption by the United States and 11 other nations of the MPCI, which measure the ecological and economic sustainability of forests. Through this project, the county began to compile data about forest distribution and health, and it worked with a stakeholder steering committee to prepare and implement a Forest Sustainability Strategy for the county in 2005. As issues were identified, DEPRM developed programs to improve forest management, including the two rural reforestation projects.

Baltimore County also contributed to technical review of The Conservation Fund's *The State of Chesapeake Forests*<sup>1</sup>, which summarized the scientific information regarding the functional benefits of riparian buffers and forests for protecting water quality. The report cites that riparian buffers and forest canopy over streams are associated with wider, shallower stream

*Baltimore County maintains a nursery operation and a field crew to install and ensure the survival of high quality seedlings.*





*Rural Baltimore County—a mosaic of farms, forestlands, and low-density subdivisions.*

channels compared to open grass/agricultural lands, thereby increasing the water surface area and permitting a 10 to 40-fold increase in biological processing of nutrients. The report further noted that 100 acres of forest in the Bay watershed are converted to non-forest uses each day, and a third or more of the remaining forests are vulnerable to conversion due to local zoning.

The second impetus for the rural reforestation initiatives came from concern about thresholds for impervious surfaces in sensitive trout streams in the protected rural portions of the county. The northern two-thirds of the county are located outside of the Urban-Rural Demarcation Line, which was established in 1967 and subsequently has become an urban growth boundary. Resource Conservation Zones have been in place in these areas since 1975, protecting more than 92% of the reservoir watersheds that cover 182,650 acres or 47% of the

county. However, DEPRM's analysis revealed that forest cover in rural watersheds with agricultural uses and large-lot, low-density development was typically less than 50%. It was also highly fragmented and parceled. While the prevailing programs for agricultural best management practices included efforts to re-establish riparian buffers on farmland, there was no service agency for the rural residential landowners.

Overall, tens of thousands of acres of rural land in Baltimore County are residential; they are not owned by farmers who work the land for a living. Many of these rural residential lots, by the nature of the zones that created them, abut or include significant parts of large forest patches that primarily exist along the major stream systems.

Based on information from the Maryland Department of Natural Resources on the threatened health

of sensitive trout populations, the Greater Baltimore Group of the Sierra Club asked DEPRM to help identify the degree to which these threatened systems can be better protected during future development, through measures such as impervious surface limits. GIS analysis revealed that many of these areas have essentially been built out, or that future development potential is far less than the cumulative development to date. In addition, some of the Resource Conservation Zones already had impervious surface restrictions, and the densities were as low as one dwelling unit per fifty acres. The challenge, then, was to assure continued protection of water quality in areas with multiple ownerships of moderate-sized forests greater than 100 acres and to expand forest cover.

#### **IMPLEMENTATION RESOURCES**

The Rural Residential Stewardship Initiative (RRSI) was funded



by a \$27,200 grant from the U.S. Environmental Protection Agency's Chesapeake Bay Small Watershed Grants Program, administered by the National Fish and Wildlife Foundation. The Valleys Reforestation Initiative was funded by a \$50,000 grant from the U.S. Department of Agriculture Forest Service through the same program. These grants provided funds for materials, including tree seedlings and associated planting supplies (such as tree shelters with bird nets, stakes, root dip, and rodenticide pellets), and labor. For the RRSI project, a small amount of grant funds also reimbursed the Sierra Club for printing costs and the Gunpowder Valley Conservancy for staff time

devoted to outreach. The match from DEPRM totaled \$10,800 and \$ 15,700, respectively.

Labor for both projects was provided by DEPRM's in-house Community Reforestation Program, which uses fees in lieu of mitigation from developers with reforestation obligations. After implementing the reforestation program for several years through private contractors and an AmeriCorp-affiliated youth service organization, a full-time, year-round crew of four was hired to plant, monitor, and maintain reforestation projects using the fees-in-lieu payments from developers. For these two reforestation projects, the county used its crew for labor and charged

the costs to the reforestation grants instead of the mitigation fund. The project therefore benefited from a highly experienced team that has to date planted more than 170 acres, and from the use of its reforestation equipment, including a truck, tractor and trailer, and hardwood seedling planter, all of which were provided as match for the grants. DEPRM staff also provided an in-kind match for grant management and GIS/GPS functions.

Labor costs (salary and benefits) for the Valleys Reforestation Initiative averaged \$600 per day for a crew of four, including a field supervisor. DEPRM costs included preparation of planting plans, site preparation



*A reforestation project in Bernouddy Farms subdivision—trees were planted to expand a narrow riparian buffer (above). This tract is located in the upper right hand corner of the Bernouddy Farms stewardship plan (see right).*

## ► A Cluster of Properties Within the Bernoundy Farms Stewardship Plan



*The Bernoundy Farms stewardship plan shows actual locations where reforestation took place in one large lot subdivision located on former agricultural lands in northern Baltimore County.*

(mowing) where necessary, and planting. The crew was able to plant an average of one acre per day (including installation of tree shelters) at an average density of about 200 trees per acre. The lower planting density was possible due to the high quality and survival rate of the seedlings, with the benefit of reducing both labor and tree costs compared to planting 300 to 400 seedlings per acre. A “tree unit” (seedling, tree shelter with stake, root

dip treatment, and rodenticide) cost about \$3.50 each. DEPRM equipment for each project was valued at about \$5,000, including \$36 per day for a truck and trailer, \$250 for the tractor, and \$20 for the seedling planter. Tree seedlings included two-year bare root seedlings and 12 to 18 inch seedlings grown out in DEPRM’s tree nursery for one year. The stock originated from bare-root seedlings purchased from the state nursery at about \$0.50 each. DEPRM has found that the extra

year of growth results in a superior seedling that can still be planted using a mechanical planter. Survival rates were in excess of 90%.

An important goal of these projects was to engage landowners as stewards of forests and other rural resources. In order to accomplish this and also to provide additional match for the grants, landowners agreed to provide monitoring and maintenance for the projects after the DEPRM reforestation crew installed the seedlings. DEPRM met with landowners and provided practical guidance about maintenance options.

### CONSERVATION STRATEGY

Both the Rural Residential Stewardship Initiative and Valleys Reforestation Initiative used partner organizations for outreach and communication with landowners during the initial stages of each project. This was done to overcome any of the traditional biases that are commonly associated with government programs. For the Stewardship Initiative, the Gunpowder Valley Conservancy sent an introductory letter to residents in a targeted thirty-lot subdivision that solicited their interest in meeting with them and DEPRM to discuss details about the reforestation. For another five-lot subdivision, a landowner coincidentally contacted DEPRM directly asking about reforestation opportunities. For the Valleys Reforestation Initiative, the Valleys Planning Council sent a letter prepared by DEPRM that announced the opportunity for reforestation to its entire membership, over an area that covers about 21% of the northwestern portion of the county.

DEPRM staff worked closely with all of the participating landowners because increasing awareness and stewardship were important objectives of both projects. Especially for the single-lot



residential homeowners, DEPRM's initial assumption was that these owners were not very connected to the trees and forests on their lots or the adjacent stream systems. This was confirmed by one landowner who simply stated that "we didn't want all of this land, it just came with the house." DEPRM initially asked for a landowner in each subdivision to volunteer to host a meeting at their house for just their neighbors. DEPRM staff then presented an overview of the local watershed, showing maps of all forested areas, streams, hypothetical 100-foot buffers, and all property boundaries. This clarified the watershed context and resource management needs and emphasized the role that each landowner potentially plays in resource management. After the introductory meeting, DEPRM arranged for a separate "walk and talk" session with each landowner to map and design the reforestation on their lot and, where possible, to blend it into the reforestation area on adjacent lots. Lot owners seemed to trust the DEPRM staff and were eager to ask questions about other trees on their lot.

DEPRM's reforestation designs involve building stands of native species, which are matched to the hydrologic gradients of sites (floodplains to dry ridges), with a limited number of flowering and other accent trees added to high-visibility edges. Seventeen species were planted for the RRSI, favoring oak communities whose long-term dominance in the Maryland Piedmont is threatened. Five species accounted for 77.8% of trees planted, including red oak, green ash, chestnut oak, pin oak, and black oak. All bare-root seedlings were treated with a mycorrhizae dip, and all trees planted were protected by four-foot tree shelters with bird netting. The addition of forest to riparian buffers and existing forest patches will benefit numerous species of terrestrial and aquatic wildlife, as well as the quality of life of the landowners in these developments.

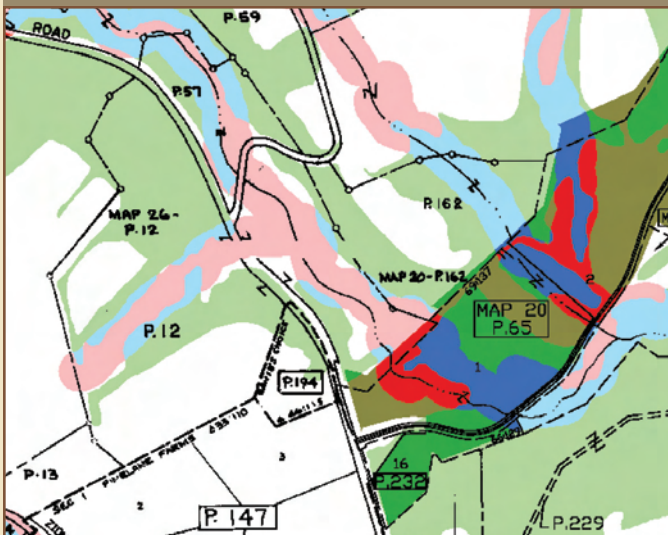
In addition to engaging the individual lot owners, the Greater Baltimore Group of the Sierra Club developed two special newsletters about the benefits and functions of riparian buffers and some background infor-

mation on forest management issues. These were distributed across the region's membership to an estimated 1,850 addresses.

For the Valleys Reforestation Initiative, DEPRM performed a GIS-analysis of reforestation opportunities for the entire project area, which covers 83,159 acres or 21% of the county. Summary information about the status of forest and buffers in the area was incorporated in the introductory letter that was sent by the Valleys Planning Council to its 600 member families. The analysis indicated that active agriculture is the predominant land cover, with forest cover at only 38.5%. Most land (64.4%) in this area is unprotected, with only 7.7% of lands in public ownership and 27.9% of lands preserved through land conservation programs. Fortunately, most of this area has low-density zoning.

More than 13,300 acres of forested land, or 41.6% of total forested land and 16.0% of total land in the project area, have the highest level of protection through either public ownership or inclusion in a land preservation

## ➤ Reforestation Opportunities in the Valley Planning Council Region



Baltimore County conducted a parcel level GIS-analysis of reforestation opportunities in the 130 square-mile Valleys Planning Council region. Among other informational features shown on this graphic are areas along streams (pink and red) where reforestation efforts are possible. This analysis pin-points specific properties where green infrastructure can be restored to improve water quality and wildlife habitat.

		Unforested	Forested
100' Stream Buffers	Unencumbered		
	Publicly Owned		
	Preserved		
Non-Buffer Lands	Unencumbered		
	Publicly Owned		
	Preserved		



program. Hypothetical 100-foot stream buffers comprise more than 14,000 acres or about 17% of the area. More than 6,400 acres or 45.6% of stream buffers are un-forested. More than 2,300 acres or 53.6% of buffers on preserved land in the area are un-forested. Outside of stream buffers, more than 13,200 acres or 69.8% of preserved land is un-forested.

An important part of the conservation strategy for the reforestation projects focused on reducing barriers, such as cost, to landowner participation in watershed restoration projects. Prior to these projects, DEPRM was aware that landowners are often advised by attorneys to not participate in environmental restoration programs that place permanent easements and restrictions on their deeds and incur costs for legal review and recordation. Without an agreement that prevents landowners from cutting, most government programs will not support reforestation efforts on private lands.

DEPRM approached these reforestation projects with the idea that working closely with landowners and increasing awareness and commitment to stewardship would help reduce the likelihood of future loss of forests. Most of the subject subdivision lots have no further development potential, and buffer areas are protected from disturbance in any event. Even if forest harvesting were to occur, decades would elapse before trees were mature and, in the meantime, sustainable forest management practices would assure that the area remained a forest and not be converted. The county's interest in improving water quality for reservoir protection and meeting Total Maximum Daily Loads under the Clean Water Act argued for assuming that the risk of forest loss was reasonably balanced.

## RESULTS

For the Rural Residential Stewardship Initiative, a total of 17 acres of forest was established on 12 residential lots in two subdivisions in 2005 and 2006. Forest cover increased 76.2%, from 17.8% to 49.1% for the eight lots in one of the subdivisions. One landowner, with a 12-acre lot and enough existing and reforested land to meet the five-acre eligibility, entered the state's Woodland Assessment Program in 2009, which provides a property tax reduction for forested lands under management. The tax reduction was sufficient to cover the cost of having a Forest Stewardship Plan prepared by a licensed forester to guide future forest management activities. Each participant received a copy of *Caring for Your Reforestation*,<sup>2</sup> a landowners booklet developed by DEPRM that explains the details of the reforestation project and that provides guidance for monitoring and maintaining the reforested areas. Each participant also received a copy of the subdivision's "reforestation plan." DEPRM shared the project concept as a case study in the USDA National Agroforestry Center's newsletter, *Inside Agroforestry*.<sup>3</sup>

The 2009 Valleys Reforestation Initiative resulted in the planting of 21.7 acres of forest on land held by seven different landowners. More than 4,250 trees were planted. Due to mostly mechanical planting and larger planting sites, the project was more cost efficient than the Stewardship Initiative, which used mechanical and manual planting on smaller lots. The total project cost came to \$35,000, compared to \$50,000 for the Stewardship Initiative. DEPRM used Maryland-specific pollution load reduction data (2002) from the Chesapeake Bay Water Quality Model to estimate that the project will ultimately reduce about 275 pounds of nitrogen, 23 pounds of phosphorus,

and 9 tons of sediment per year. Pollutant loads are 12, 60, and 13 times greater, respectively, for farm versus forest cover.

While the full potential for water quality protection will only be realized once the reforestation areas mature, forests are nevertheless the most cost-effective best management practice and provide increasing and continuing benefits over time.

## KEYS TO SUCCESS

Don Outen, DEPRM's Natural Resource Manager for forest sustainability, offered the following recommendations for promoting rural residential stewardship through reforestation:

- ▶ Partner with local citizen organizations, including watershed associations that are known to citizens in the project area, to assist with identifying candidate properties.
- ▶ Do not underestimate the extent of assistance needed to successfully enlist the participation of rural residential landowners, even for a project designed to reduce barriers.
- ▶ Do not underestimate the potential for rural residential landowners to become better stewards or the potential acreage that can be reforested—even in priority areas such as riparian buffers. Unlike farmers who use most of their land, the majority of rural residential landowners appear to actively use only about 1.0 to 1.5 acres of land.
- ▶ Rural residential landowners often mow un-used, "excess" areas of their lots because they have been told that they must control invasive weeds. Outreach efforts are essential—landowners know of no alternatives to mowing, and there are virtually no assistance programs to achieve alternative outcomes.
- ▶ In some areas, residents may be concerned about the aesthetics



of tree shelters. Black open-mesh shelters may help address this concern. A broad multi-party education effort may also be needed regarding sustainability.

- Contact all property owners if working on a subdivision basis. Do not assume that a local contact or coordinator is actually contacting and coordinating with all landowners, especially non-participants. All landowners who live in the development and who can see a project are potentially affected by it.
- Provide detailed information for landowners about the reforestation process on their land and recommended monitoring and maintenance practices.
- Follow-up with landowners on the progress of the reforestation and

continue a dialogue about resource stewardship. Leave landowners with the feeling that they can make a difference.

### PHOTOS AND FIGURES

Pages 99, 100, 102: Photos, David Burke

Page 101: Photo, Don Outen

Pages 103, 104: Figures, adapted from Baltimore County Department of Environmental Protection and Resource Management

### REFERENCES

<sup>1</sup>Sprague, E., D. Burke, S. Clagget and A. Todd (editors). 2006. *The State of Chesapeake Forests*. The Conservation Fund, Arlington, VA. 114 pp. +appendices. Available online at: <http://www.na.fs.fed.us/watershed/socf.shtm>.

<sup>2</sup>Baltimore County Department of Environmental Protection and Resource Management. 2006. *Caring for Your Reforestation: A Landowner's Guide to Reforestation Project Maintenance*. Department of Environmental Protection and Resource Management, Towson, MD. 13 pp.

<sup>3</sup>Outen, D. 2006. An end to seemingly endless mowing. *Inside Agroforestry*. 15(1):4,11.



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