

A Sustainable Chesapeake

BETTER MODELS FOR CONSERVATION

Edited by David G. Burke and Joel E. Dunn

THE CONSERVATION FUND



The case study you have downloaded is highlighted below. Other case studies from this Chapter of *A Sustainable Chesapeake: Better Models for Conservation* can be individually downloaded. The editors encourage readers to explore the entire Chapter to understand the context and sustainability principles involved with this and other featured case studies. The full publication contains 6 Chapters in total: Climate Change Solutions, Stream Restoration, Green Infrastructure, Incentive Driven Conservation, Watershed Protection and Stewardship.

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A Rapid Green Infrastructure Assessment for the Cacapon and Lost Rivers Watershed

Planning and Implementation Results by a West Virginia Land Trust

The Cacapon and Lost Rivers Land Trust used a rapid land prioritization process and a practical approach of engaging private landowners to protect over 9,000 acres of vital green infrastructure lands in their region.

CASE STUDY SUMMARY

The Cacapon and Lost Rivers, major tributaries of the Potomac River, flow northeastward for 112 miles as they drain 896 square miles of northeastern West Virginia. The watershed includes portions of Morgan, Hampshire, and Hardy counties. The upper third of the waterway is called the Lost River because at low flows it sinks into subterranean channels, and resurfaces downstream where it is called the Cacapon River. Lying in the path of suburban sprawl, the large forest and farmland parcels of this rural, montane watershed are being sold and subdivided. Because development is proceeding without watershed-scale planning and ecosystem functions are being degraded, the Cacapon and Lost Rivers Land Trust, Inc. (Land Trust) developed a green infrastructure assessment that identifies the highest conservation priorities in the watershed and has subsequently been working to protect these areas.

Founded in 1995, the Land Trust has protected 35 parcels totaling 10,121 acres, making it the largest land trust

in West Virginia. Their mission is to assist landowners and their communities in maintaining healthy rivers, protecting forests and farmland, and in preserving rural heritage for the enjoyment and wellbeing of present and future generations. The organization's daily work has been guided by a belief in permanent land protection, formation of enduring friendships with landowners, promotion of a land stewardship ethic, and organizational and personal integrity.¹

In 2002, in response to the growing

threat of development and habitat loss, the Land Trust convened the Healing Waters Retreat to produce a rapid green infrastructure assessment





An aerial view, above Lost River State Park in West Virginia, looking eastward toward the Town of Basore and a section of George Washington National Forest.

to prioritize lands for protection.² Retreat participants were asked to rank conservation criteria. These prioritized criteria were then coupled with GIS spatial data of watershed resources. The resulting green infrastructure assessment provides a guiding framework for the Land Trust and has significantly influenced their work in the watershed. Importantly, the development of the assessment also helped to form some lasting partnerships with citizens in the community and provided a scientific basis for their work, both of which improved the credibility of the organization within the community and throughout the state of West Virginia.

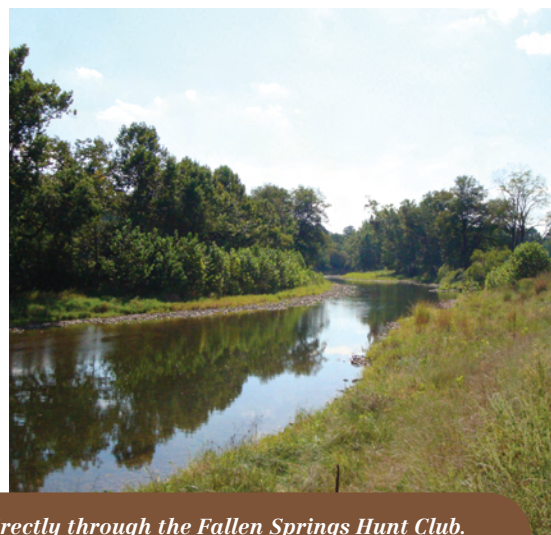
RESOURCE MANAGEMENT CHALLENGE

Until the 1970s the watershed's location, sandwiched between eastern cities and coal fields to the west,

provided serendipitous protection for its maturing deciduous forest, fish and wildlife resources, and rural life style. In the last 40 years, though, the basin has seen swift subdivision of large land parcels for the construction of second homes, high voltage powerlines and a 4-lane highway called Corridor H. These land-use changes have been fueled by the watershed's proximity to eastern cities, minimal land-use planning, and the draw of low real property taxes. Further complicating matters, there is little zoning in the three counties of the watershed and a large percentage of the population does not vote in the region because their primary residences are elsewhere.

Hampshire County presents a good example of the watershed's resource management challenges. Between November 1998 and August 2009,

the average development rate was 2,463 acres per year. Over this 11-year period, 27,100 acres of the county's 410,701 acres (6.6%) were subdivided from larger land parcels, which supported mainly forest and farm uses, to smaller lots with the potential of full build-out residential density.³ Environmental consequences have included habitat loss, forest fragmentation, and excess siltation of the Cacapon and Lost Rivers and some of their tributaries. Social consequences have included losses of rural cultural heritage, defined as those parts of the environment that characterize one's place. Examples of these changes include more light pollution, loss of farm lands, and fewer boating, hunting, and fishing opportunities. In 2000, a timber company sold a 3,200-acre holding, which was subdivided into 20+ acre lots and sold out within a year. This galvanized



LEFT: A new powerline (left of the existing powerline) being installed directly through the Fallen Springs Hunt Club.
RIGHT: The Cacapon River, a tributary of the Potomac River.

the landowner community to support land conservation and highlighted the need for an assessment that identifies conservation priorities.

CONSERVATION VISION

The Land Trust's overall goals are to assist landowners and communities in maintaining healthy rivers, protect forests and farmland, and preserve rural heritage for the enjoyment and well being of present and future generations. Given the advances in Geographic Information Systems (GIS) and conservation planning optimization techniques, the Land Trust identified the need and desire to produce a land prioritization assessment for the watershed (a.k.a. a green infrastructure assessment).

In June of 2002, the Land Trust convened the Healing Waters Retreat, where participants worked with scientists to prioritize land within the watershed for protection, explored funding opportunities, and formed new partnerships. The 31 attendees included technical experts from federal and state government agencies; and national, regional and state conservation groups. Participants also included 12 watershed landowners including three farmers. The retreat featured facilitation and GIS mapping

CRITERIA FOR PRIORITY LANDS

Forest land:

- Large interior forest tracts*
- Adjacent forest blocks*
- Forest biodiversity and condition*
- Forested riparian areas*
- Threat of forest conversion*
- Private lands
- Forest economic viability & sustainability

Farmland:

- Threatened by development*
- Within viewshed
- Nearness to river
- In floodplain
- On prime soils
- With unique features – springs, mature forests
- Size
- Next to other farms
- Working family farm
- Economically sustainable
- Use of BMP's
- Use of sustainable agriculture practices

Water quality:

- Forested riparian buffers*
- Large undeveloped tracts
- Lands in proximity to protected lands/areas
- High quality wetlands, streams
- Groundwater recharge areas
- Grassy riparian buffers
- Headwater streams

Rural Heritage:

- Wild lands*
- Valuable farmlands
- Sustainable timberlands
- Significant plant & animal habitats
- Scenic viewsheds
- Historic, pre-historic sites
- Stewardship example
- Culturally significant land
- High quality streams
- Scenic
- Recreational land

**identified as most important*

by the Canaan Valley Institute, GIS support from the Division of Forestry of West Virginia University, and conservation information from the Rivers and Trails Conservation Assistance Program of the National Park Service.

Using the GIS tools and expertise available to them, retreat participants assessed the watershed's resources, such as soil types, contiguous forests, surface waters, and other natural and cultural assets. These spatial data were integrated with consensus conservation criteria derived by the participants, creating a new optimization technique. The resulting Healing Waters Land Prioritization Plan details consensus recommendations on green infrastructure priorities.⁴ The plan has been providing the Land Trust's board and staff with clear direction and is raising the group's credibility with landowners, project partners, and funders.

IMPLEMENTATION RESOURCES

The Land Trust received a \$45,000 grant from the National Fish and Wildlife Foundation to conduct the retreat and produce the Healing Waters Land Prioritization Plan. This funding paid for the venue, meals, travel, office operations, and three

years of the Executive Director's salary. The Canaan Valley Institute and West Virginia University were core partners in producing the assessment, and provided staff time and materials valued at \$100,000.

Since the retreat, the Land Trust has raised \$2.2 million and \$365,000 in bridge loans from multiple funding sources to buy conservation easements in the green infrastructure network. They also raised additional funds for other conservation projects in the watershed, including: \$650,000 for stream restoration and \$100,000 per year for general operations. These figures are significant considering that the state of West Virginia provides few incentive-based conservation tools for private land protection, such as a land conservation fund, state tax credit or deduction, or transfer of development rights program.

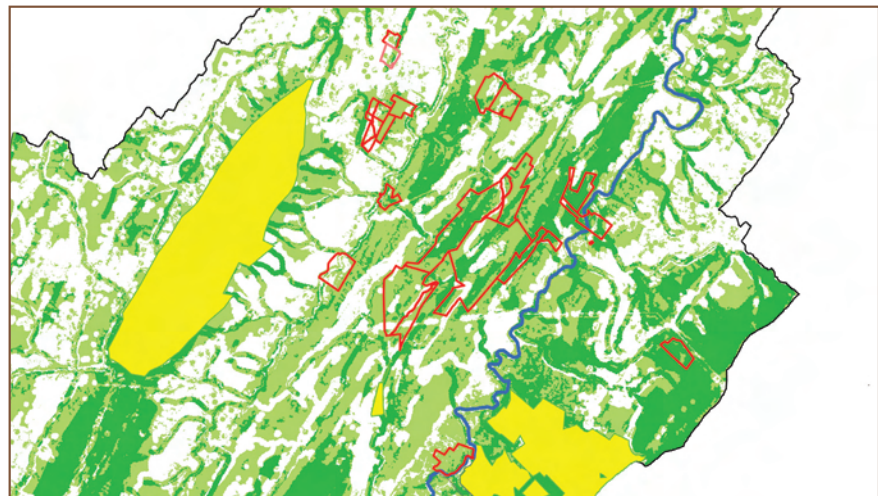
CONSERVATION STRATEGY

From its inception in 1995 until 2002, the Land Trust approached conservation in an unstructured, opportunistic manner, acquiring the lands that were donated or seemed important. With growing analytical capability through the use of GIS they were determined

to get better information, so they could be more proactive and make informed decisions.⁵

The Healing Waters Retreat was conducted to define criteria for priority lands, rank the criteria, acquire the needed data, and display the results in GIS. Primary criteria and sub-criteria were identified by the group using an open discussion brainstorming technique. These categories included: water quality, forest land, farmland, and rural heritage (see text box). Integrating the criteria in order of importance required the use of multi-criteria decision making processes.⁶

Retreat participants identified 37 sub-criteria and then filled out an abbreviated pairwise comparison test, which identified individual preference for each criterion (equal, somewhat prefer, critically better, and absolutely better). The highest rated criteria were dominated by those favoring forests, including: riparian forest buffers for forests, adjacent/connected forest, forest biodiversity, large tracts of undeveloped land and threatened forest lands. The highest rated agricultural criterion was farms threatened with development. The



LEFT: Map showing the high priority green infrastructure (darkest green) in the Cacapon and Lost Rivers watershed. **RIGHT:** Map of the Hampshire County Hub, showing the relationship among public lands (yellow) and the private parcels (red) protected by the Land Trust.



FUNDING SOURCES FOR CONSERVATION EASEMENTS

Federal Programs:

- US Department of Agriculture's Farm and Ranch Land Protection Program, US Fish and Wildlife Service's State Wildlife Grants Program

State Programs:

- West Virginia Department of Transportation's Transportation Enhancement Program and highway mitigation funds
- West Virginia Division of Natural Resources' State Wildlife Grants Program

County Program:

- Hampshire County Farmland Protection Board

Private Foundations:

- National Fish and Wildlife Foundation, Norcross Wildlife Foundation, anonymous foundation

Private Entities:

- Columbia Gas mitigation funds, individual donors

FUNDING SOURCES FOR OTHER CONSERVATION WORK

Federal Programs:

- US Department of Agriculture, US Forest Service, Environmental Protection Agency

State Programs:

- West Virginia Department of Environmental Protection's Stream Partners Program

Private Foundations:

- National Fish and Wildlife Foundation, Carlson Family, MARPAT, Vos Family

Private Entities:

- Canaan Valley Institute
- 500 individual benefactors

highest rated water quality criterion was forested riparian areas for water quality. The highest rated rural heritage criterion was wild lands.⁷

The pairwise comparison results were averaged to create aggregate results, which were then used to rank and weight the criteria.

Using the available data, a GIS additive model was developed to identify high priority land for

conservation. The additive model was simply a linear weighted model, which multiplies all of the criteria with available GIS data by the weight that retreat participants gave it and adds up the values to highlight priorities. The additive model appeared to work better at identifying the highest valued lands than a maximization model, which used only the highest rated criteria and weight combina-

tion regardless of overlapping data.^{8,9}

After the Healing Waters Retreat, the Land Trust used the rapid green infrastructure assessment to identify the larger critical parcels on the landscape that served to connect protected lands. The next step involved a review of the parcel data within this area and identification of landowners that could be approached regarding conservation options. A crucial part of the Land Trust's conservation strategy is becoming friends with landowners—by working “in the dirt” with them—as a way to understand their needs. This personal touch has built trust with landowners, which in turn has attracted partners and funders to participate in conservation projects. In addition, the organization's staff facilitates small neighborhood coffee table gatherings where neighbors talk to neighbors about conservation options.

The Land Trust also formed project-specific partnerships for baseline, legal, and funding needs enabling them to negotiate permanent conservation easements. They also became very adept at splicing together project-specific funding from disparate funding sources.

Finally, they annually monitor each eased parcel for compliance with easement criteria, ensuring conservation on the ground.

RESULTS

The Land Trust's process of creating a rapid green infrastructure assessment is unique in the Chesapeake Bay Watershed. In a three-day-long workshop, they produced a scientifically rigorous green infrastructure



The Cheves Farm, foreground shows a 2.3 acre wetland mitigation site, background shows the 286 acre conservation easement.

assessment to guide their work. They subsequently protected a substantial amount of land within the identified green infrastructure network.

In general terms, the Land Trust has raised local acceptance of land protection as a valid landowner goal. They have grown a forested green infrastructure hub and its connecting corridors in two counties and started them in a third. They have permanently protected land and its associated fish and wildlife habitats and helped maintain ecological functions, like the water quality in the Cacapon and Lost Rivers. Finally, the Land Trust has helped to maintain the watershed's rural cultural heritage.

At the time of this writing, the retreat was convened at the organization's half-life. After the retreat, the Land Trust experienced a dramatic increase in the amount of parcels and land protected. A direct contrast of pre- and post-retreat results shows,

respectively, seven vs. 26 parcels and 1,375 vs. 8,309 acres protected.

The projects highlighted below represent a sample of numerous successful conservation easements by the Land Trust in the high priority green infrastructure areas of the watershed.

The Cheves Farm
Year Completed: 2006
Acres: 286 acres

The protection of the Cheves Farm began with a discussion regarding a wetland mitigation project. To mitigate habitat degradation caused by one of its construction projects, Columbia Gas and Hardy Storage worked with the Land Trust to create a 2.3 acre wetland mitigation site on Bob Cheves' 286-acre farm. In return for wetland mitigation, Columbia Gas and Hardy Storage agreed to provide partial funding for the bargain sale purchase of a conservation easement

on the property. Remaining funds were provided by USDA Farmland Protection Program and by tax transfer income provided by the Hampshire County Farmland Protection Board.

Primary easement restrictions for the Cheves Farm prevents any development unless it is agricultural related and requires a 100-foot riparian corridor along streams on the property. Currently, the farm has nutrient and forest management plans and it is being managed in an effort to permanently protect its soils for agricultural use.

The Fallen Springs Hunt Club
Year completed: 2004
Acres: 1,000

The Fallen Springs Hunt Club, owned by Carlton Mills, is an important part of the watershed's protected green infrastructure network. Years earlier, his mother's farm was sold



LEFT: Nancy Ailes, Executive Director of the Cacapon and Lost Rivers Land Trust, and Carlton Mills at the Fallen Springs Hunt Club, a 1,000-acre conservation easement donated by Mills.

RIGHT: The Rudolph Old-Growth Forest, a 500-acre conservation easement purchased by CLR Land Trust.



and subdivided for development in order to pay taxes upon her death, so he was determined to ensure that the Club land was perpetually protected. At the advice of his attorney, Mills reached out to the Land Trust about a conservation easement agreement for his land.

The Land Trust informed him that a conservation easement would perpetually protect the Club's land, and significantly reduce the inheritance taxes for his daughter. In July, 2004, Mills donated his conservation easement with the Land Trust providing permanent protection from development and subdivision while allowing timber harvest, hunting, and the expansion of his part-time residence and hunting lodge.

Today, the Club is a piece of a much larger network of protected land known as the Cacapon Legacy Project Area. Being an avid outdoorsman, Mr. Mills knew that protecting contiguous parcels was important for maintaining healthy wildlife populations, so he started knocking on neighbors' doors. Just five months later, the Land Trust

protected a 1,657-acre parcel adjacent to the Club. Soon after that, they protected an additional 1,682 acres in two adjacent parcels. The Land Trust hopes to eventually connect the project area to the 8,200-acre Short Mountain Wildlife Management Area managed by the WV Division of Natural Resources lying to the North, and to the even larger George Washington National Forest to the south.

The Trust has exported its "Carlton lesson" to other parts of the watershed. For example, in Morgan County several landowners and hunt clubs have protected over 1,000 acres adjacent to Cacapon State Park.

The Rudolph Old-Growth Forest

Year Completed: 2007

Acres: 500

For four generations, the Rudolph family forest of Yellow Spring, West Virginia, has served as the focus of the family's annual deer hunt in November. When the Healing Waters Land Prioritization Plan identified this parcel as a high priority within the Hampshire County green infrastruc-

ture network, the Land Trust started working with the family to protect the property.

After reaching consensus with the family on a bargain sale for the conservation easement, the Land Trust received a \$250,000 one-year, no-interest loan from the Norcross Wildlife Foundation to secure the easement while funds were being raised. They subsequently received grants to pay for the easement from the U.S. Fish and Wildlife State Wildlife Grant Program (the first in West Virginia history), the National Fish and Wildlife Foundation, and a sympathetic private donor.

Primary easement restrictions for the Rudolph family forest include: a Habitat Management Plan through the West Virginia Department of Natural Resources; stream bank fencing; restrictions on timber harvesting; and development restricted to one subdivision and two minimal building zones. The family is currently managing the land for invasive species reduction and stream bank protection from livestock.





A typical view of the picturesque Cacapon and Lost Rivers watershed.

KEYS TO SUCCESS

- ▶ **Identify conservation criteria** and its relative importance with a group of informed citizens and professionals.
- ▶ **Use resulting information and GIS** to identify high priority focal areas for conservation.
- ▶ **Establish on-the-ground, get-dirt-on-your-hands friendships with landowners**, with the intent of understanding their problems and joys and to develop mutual respect. Then work to address their issues.
- ▶ **Organize a coffee table party** where neighbors talk to neighbors, develop credibility with landowners and the community, and use neighbor to neighbor networks to maximize success.
- ▶ **Develop partnerships** with government, non-profits, funders and private citizens to advance the vision of the green infrastructure assessment.

- ▶ **Promote landowner leadership**, such as that shown by Carlton Mills and his effort to protect lands adjacent to the Fallen Springs Hunt Club.

PHOTOS AND FIGURES

All photos by Joel Dunn
Page 81: Figure, Burke Environmental Associates/The Conservation Fund
Page 82: Image, Google Earth
Page 84: Figures, Dr. Michael Strager

REFERENCES

- ^{1,4}Cacapon and Lost Rivers Land Trust. 2008. Protecting special places in the Cacapon River valley: Organizational strategic plan. In *Cacapon Legacy*, 2008 Annual Report. Cacapon and Lost Rivers Land Trust, High View, WV.
- ²Cacapon and Lost Rivers Land Trust. 2003. *Healing Waters: A stakeholder retreat to prioritize lands for conservation*. Cacapon and Lost Rivers Land Trust, High View, WV. 30 pp.

³Baker, C. 2009. Personal communication on August 6, 2009, with Mr. Charles Baker, Code and Compliance Officer for Hampshire County Planning Office, WV.

^{5,6,7,8}Strager, M. 2002. *Integrating Criteria Preferences and Spatial Data to Prioritize Lands For Preservation in the Cacapon River Watershed, West Virginia*. Canaan Valley Institute, Davis, WV. 40 pp.

⁹Strager, M. P., and R. S. Rosenberger. 2006. Incorporating stakeholder preferences for land conservation: weights and measures in spatial MCA. *Ecological Economics*. 57: 627-639.



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