

Sustainable Finance Strategies for Watershed Protection

Greenville, South Carolina



Photo of Lake Keowee in Fall: www.lakekeoweerealestate.com

May 2013

Table of Contents

Executive Summary	3
Call to Action	4
Table A - Forest Cover Chart	
Watershed Locator Map	
Long-Term Watershed Protection Programs	
Reduce Treatment and Storage Costs	5
Chart 1 - Keowee Sedimentation	
Funding Watershed Protection	7
Chart 2 - Fee Contributions for Funding Watershed Protection	
Forestland Protection Mechanisms	8
Chart 3 - Program Cost Breakdown	
Bibliography	9

Research and report provided by Patrick Starr, Shi Sustainability Fellow from Furman University, under guidance of the Endowment’s Healthy Forests through Healthy Watersheds Initiative. The Shi Sustainability Fellowship is made possible through the generosity of Piedmont Natural Gas.

Carlton Owen, President and CEO

U.S. Endowment for Forestry and Communities

908 E. North Street
Greenville, SC 29601
Phone: 864.233.7646

www.usendowment.org

Executive Summary

Water quality and watershed protection are inextricably linked. When water quality decreases, the citizenry is saddled with additional costs to treat water and rehabilitate watersheds. This can include costly dredging programs. The most cost effective tools for long-term protection of municipal water supplies include:

- Intact forestlands
- Well-planned infrastructure and development
- Well-managed agriculture

A **Watershed Management Program** enables communities to take an organized and collaborative approach to protecting the watersheds that feed critical drinking water sources. Facilitation of the education and outreach as well as identification of land parcel and conservation tool(s) appropriate for a given locale are program tasks. Tools include, conservation easements, stream side agreements and the Natural Resources Conservation Service (NRCS) Environmental Quality Incentive Program (EQIP). EQIP ensures “environmentally sensitive” management.

Common finance strategies for **Watershed Management Programs** include fees on water utility users, landowners and developers. Special energy fee assessments are a new approach. If a combination of fee assessments were instituted, Greenville Water System (GWS) could raise over \$10 million annually to support energy production, water quantity and quality for future generations.



www.greenvilleinfo.com for photos

Call to Action for the Greenville Water System

The GWS includes the Poinsett Reservoir, Table Rock Reservoir, and Lake Keowee. The reservoirs are fully protected and owned by the City of Greenville and GWS. Both are almost entirely forested (98 percent) and closed to all forms of development, agriculture and recreation.

Lake Keowee, built for hydroelectric power generation and nuclear turbine cooling, is owned and operated by Duke Energy. Lake Keowee’s watershed is 71 percent forested and open to multiple-uses, including development, agriculture and recreation. Thirteen percent of the total acreage is protected by long-term agreements. Approximately 24,450 acres is farmland.

Four percent of farms within the watershed participate in EQIP and thus are guaranteed to utilize state designed best management practices (BMPs).

The lake holds eight times more water than both the reservoirs combined.

The majority of Greenville’s future growth – projected to double over the next decade or more – will receive their potable water from Lake Keowee, according to the Greenville County Planning Commission. The South Carolina Department of Health and Environmental Control (SCDHEC) claims the Lake Keowee watershed has a “moderate to high potential for growth.”

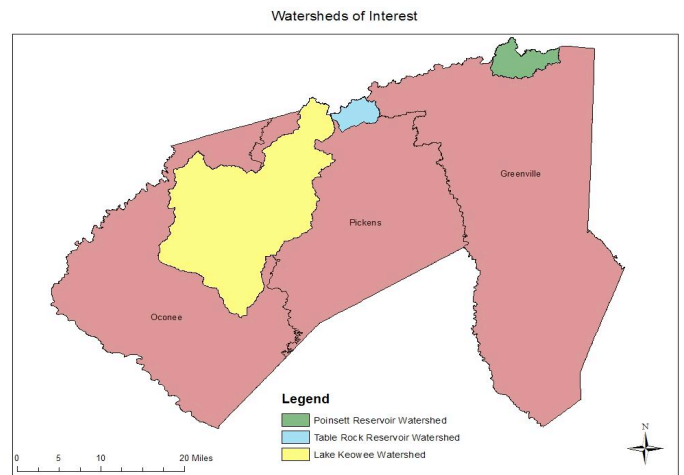
Analysis by the American Water Works Association indicates that when watersheds fall below 70 percent forest cover, they lose the ability to act as natural, cost-effective filters for water quality as well as buffers to sedimentation and erosion.

Since 1976, Lake Keowee has lost nearly 9 percent of its capacity due to sedimentation. If capacity loss increases, Duke Energy cannot operate their energy systems. Duke Energy consultants, HDR Engineering, calculate dredging Lake Keowee could cost over a billion dollars.

Greenville’s leaders took steps to ensure a water-secure future through purchase and construction of the Poinsett and Table Rock Reservoirs nearly 100 years ago. Today is the time for community partners to create a **Watershed Management Program** and funding mechanisms to ensure Lake Keowee’s waters provide safe, clean water for generations to come. Communities around the nation are experimenting with new tools and approaches described on page 7.

% of Watershed Forested	Average Treatment Cost per day at 22 mil gal	% Change in Cost
10%	\$2,530	19%
20%	\$2,046	20%
30%	\$1,606	21%
40%	\$1,276	21%
50%	\$1,012	21%
60%	\$814	19%

Table A. Forest Cover Reduces Water Treatment Costs (AWWA, Ernst, Gullick, & Nixon 2004).
 Water treatments costs increase by approximately 20 percent for every 10 percent decrease in watershed forestland.



Green = Poinsette
 Blue = Table Rock Yellow = Lake Keowee

Long-Term Watershed Protection Programs Reduce Treatment and Storage Costs

A 2007 drought left Atlanta, Georgia dangerously close to running out of water. Many Southeastern cities have since rethought long-term water management and protection strategies. Greenville is the ninth fastest growing city in the country. The community and Duke Energy must maintain clean drinking water, lake capacity and sound economic growth.

A Watershed Management Program will align the interests of Duke Energy and GWS to protect critical land surrounding water sources while preserving their working status in private hands. Lake Keowee can continue to serve broader ecosystem and quality of life needs.

Watershed Threats

Forests store water for slow release, filter water and prevent sedimentation. The [American Water Works Association](#) reports that watersheds with less than 70 percent forest cover eventually see treatment costs increase in correlation with decreasing water quality (see Table A, page 4). A loss of forestland around Lake Keowee will likely increase water treatment costs for GWS.

Development, agriculture and recreation – including the road building, construction sites, livestock and pets that accompany all three – around Lake Keowee can cause runoff pollution, sedimentation, and fecal coliform bacteria increases. Maintaining forested lands

in balance with these land uses can offset the negative impacts.

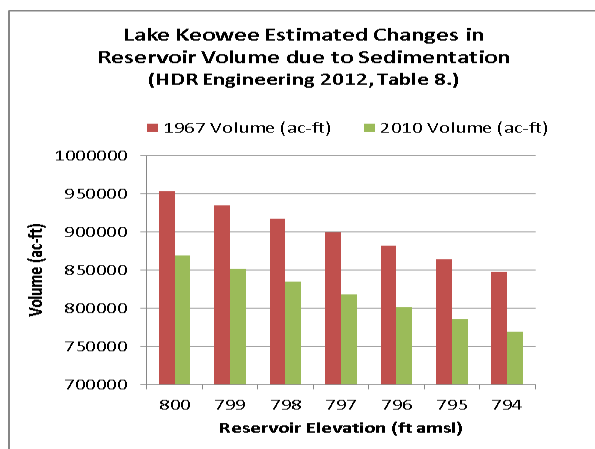
Watershed Water Quality Assessments conducted by SCDHEC between 2003 and 2010 revealed a nearly 300 percent increase in developed land, rising from 3,806 acres to 11,153 acres. The same reports indicate a significant growth in farmland use as well.

Sedimentation and erosion increase turbidity and total suspended solids and decrease capacity.

Duke Energy cannot operate their systems if water levels fall below six feet of full elevation, according to HDR Engineering .

In 1967, Lake Keowee held more than 950,000 acre-feet of water. By 2010, according to HDR, it had lost 8.8 percent of its capacity, dropping to less than 870,000 acre-feet (see Chart 1 below).

HDR Engineering reports hydraulic dredging cost ranges at \$6.00 -\$12.00 per cubic yard. Just to return to original fill, Duke Energy would need to dredge 129,066,640 cubic yards. This endeavor would result in costs between \$774 million to \$1.5 billion.



Fecal coliform often originates as leakage from failed septic systems and pet waste. According to the 2010 US Census, approximately 71 percent of homes in the Lake Keowee watershed utilize septic waste systems. That equates to about 63,000 septic systems in the affected two county area. The Environmental Protection Agency reported in 2006 that a range of one to five percent of septic systems fail annually. In a similar report, Purdue University Extension estimated that a failing system could leak more than 76,650 gallons of wastewater in a year.

Meanwhile, SCDHEC estimates that in South Carolina, there is approximately one dog for every four people and each dog produces about a quarter pound of waste daily. Those figures place 10,000 dogs and perhaps as much as 1 million pounds of dog waste in the Keowee watershed annually. And, lots of cats live there too.

Potential Key Partners for a Lake Keowee Watershed Protection Program:

- GWS
- The Nature Conservancy
- U.S. Forest Service
- U.S. Army Corps of Engineers
- South Carolina Forestry Commission
- Duke Energy
- local municipalities and counties
- Naturaland Trust
- Upstate Forever
- NRCS

Funding Watershed Protection

The bottom line for Greenville and similar communities is that watershed protection is costly yet vital. Costs can be minimized and funding made stable through fee-based initiatives, coupled with partnerships and education.

The cost to permanently protect 70 percent of Lake Keowee's forestland and employ BMPs on all farmland in the area could approach approximately \$100 million.

Below is a scenario to generate \$111 million over ten years through a combination of fees.

Water Utility User Fees

\$0.63 charged monthly to 168,000 GWS users = \$1.2 million/year x 10 years = \$12.7 million

Ten water utilities across the nation have a monthly user fee. The minimum fee is \$0.14, the maximum is \$1.50 and the average is \$0.63.

In 2005, prompted by local land trusts and future water quality, Raleigh, North Carolina began charging an impact fee for new utility connections. These funds helped acquire property in the watershed feeding their drinking water reservoirs. As the program grew, and with support from the U.S. Endowment for Forestry and Communities and NRCS, it evolved into a line item on ratepayer's bills, a "Watershed Protection Fee" of \$0.0748 per CCF (10 cents per 1000 gallons), or about 45 cents extra per monthly bill.

Durham, North Carolina has since followed suit. The two municipalities generate approximately \$2.5 million annually earmarked for conservation activities in their watersheds.

Storm water Fees

\$81.00 per 22,000 residential parcels in Pickens and Oconee counties surrounding Lake Keowee = \$1.782million/year x 10 years = \$17.8 million

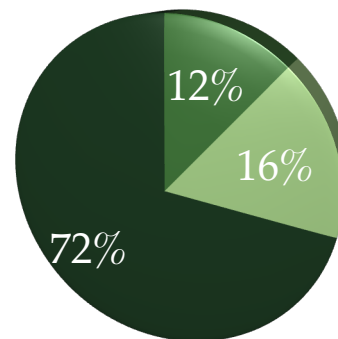
In Greenville, annual storm water fees are used to improve the city's watershed basins and to create a watershed master plan.

*A storm water program requires the county to gain a National Pollution Discharge Elimination (NPDES) permit from the Environmental Protection Agency.

Energy Fees

If Duke Energy were to donate 1/10th of one cent for each of its 715,000 South Carolina customers - a total of just over \$11.00/customer/year - it would generate \$8.05 million/year x 10 years = \$80.5 million

The U.S. Energy Information Administration estimates that the average per person energy usage is 940 kWh per month.



Pie Chart 1 - Percentage of Watershed Program Fee Contributions over Ten Year Period

Duke Energy = 72% at \$80.5 million

Storm Water Fee = 16% at 17.8 million

Water User Fee = 12% at 12.7 million

Forestland Protection Mechanisms

NRCS EQIP Contracts

\$8,900 per EQIP Contract x 311 farms = \$2.8 million

There are 311 farms or 23,500 acres not under the EQIP grant program. The average cost per grant is \$8,900. The average farm size for the two counties is approximately 75 acres.

NRCS Stewardship Management Plans and Conservation Easements

Stewardship Management Plan at 37,073 acres x \$18.00 = \$667.3 thousand.

Conservation Easements at 37,073 ac x \$2,700 = \$100 million

Just over 113,400 acres falls outside of some form of government or private protection. The 70 percent protection mark totals 74,146. In our scenario, we assume conservation easements on 50 percent and stewardship management plans on 50 percent.

The NRCS pays landowners an average of \$18.00 per acre annually through the Conservation Stewardship Program.

Forestland in Lake Keowee's watershed ranges from \$3,000 to \$22,500 per acre. The average cost is \$9,000 per acre.

Conservation easements average 30 percent of the land's value, i.e. \$2,700 per acre.

Watershed Management Program

A collaborative management program that conducts landowner education, identifies appropriate parcels and tools is estimated at \$1,000,000 over a ten-year period.

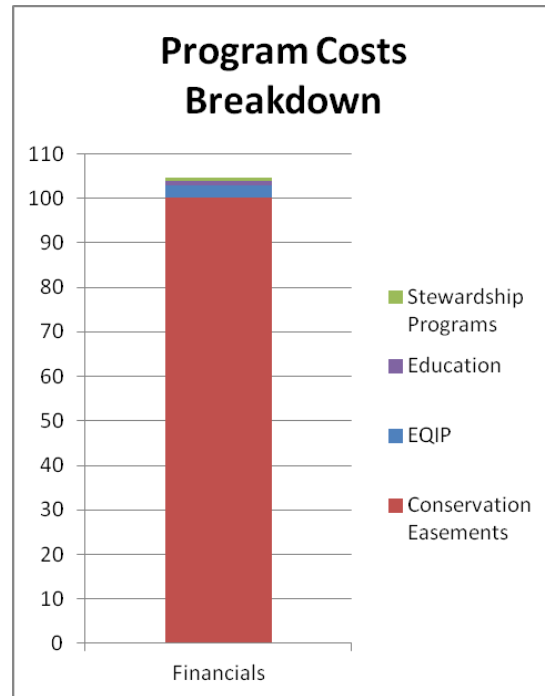


Chart 3

Bibliography

- Christie, L. (2012, April 5). 10 Fastest Growing US Cities. CNN Money. Retrieved From http://money.cnn.com/galleries/2012/real_estate/1204/gallery.US-Cities/9.html
- Duke Energy. (2013). Fast Facts. Retrieved From <http://www.duke-energy.com/pdfs/de-factsheet.pdf>
- Duke Energy. (2013). Lake Keowee. Retrieved From <http://www.duke-energy.com/lakes/facts-and-maps/lake-keowee.asp>
- Environmental Protection Agency. (2006). Preventing Septic System Failure. Fact Sheet. Retrieved From <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=25>
- Electric Power Research Institute. (2013). Water Quality and Watershed Protection: Program 53. Program Overview. Retrieved From <http://portfolio.epri.com/ProgramTab.aspx?sid=ENV&rid=222&pid=6954>
- Ernst, C. (2004). Protecting the Source: Land Conservation and the Future of America's Drinking Water. Hopper, K. & Summers, D. (Eds.). San Francisco, CA: The Trust for Public Land.
- Ernst C., Gullick R., & Nixon K. (2004, May) Protecting the Source: Conserving Forests to Protect Water. *Opflow*, 30(5), 1, 4-7.
- Greenville County Planning Commission. Greenville County Comprehensive Plan: Population Element. Retrieved From http://www.greenvillecounty.org/gcpc/long_range_planning/demographics/populapopu_element.pdf
- HDR Engineering, Inc. Of the Carolinas. (2012). Savannah River Basin Cheops Model Operations/Verifications Report. Retrieved from http://www.duke-energy.com/pdfs/KT_Progress_Report_2012_06.pdf
- Jones, D., Lee, B., & Peterson, H. (2005). Septic System Failure. Purdue University, Purdue Extension HENV-1-W. Retrieved From <http://www.extension.purdue.edu/extmedia/HENV/HENV-1-W.pdf>
- National Sustainable Agricultural Coalition. (2009). Conservation Stewardship Program. Retrieved From <http://sustainableagriculture.net/publications/grassrootsguide/conservation-environment/conservation-stewardship-program/>
- Natural Resource Conservation Service. (Visited 2013, March 30). Conservation Stewardship Program. Retrieved From <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/csp/>
- South Carolina Department of Health and Environmental Control. (2003). Watershed Water Quality Assessment: Savannah River Basin. Technical Report No. 002-03. Bureau of Water, Columbia, SC.
- South Carolina Department of Health and Environmental Control. (2010) Watershed Water Quality Assessment: Savannah River Basin. Technical Report No. 02F-10. Bureau of Water, Columbia, SC.
- South Carolina Department of Health and Environmental Control. (2009). Turning the Tide: A Citizen's Guide to Protecting Our Water Resources from Runoff Pollution. CR-002358. Bureau of Water, Outreach Program, Columbia, SC.
- U.S. Bureau of the Census. (2010). State & County QuickFacts. Retrieved From <http://quickfacts.census.gov/qfd/states/45/45073.html>
- U.S. Energy Information Administration. (2013). How Much Electricity Does an American Home Use? Retrieved from <http://www.eia.gov/tools/faqs/faq.cfm?id=97&t=3>

Carla Harper, West 65 Inc., editor.
Carla@west65inc.com