

## GREEN COMPLEMENTS GRAY

### Saving Forests, Protecting Water Quality

By G. Tracy Mehan III

*"If a man is not to live by bread alone, what is better worth doing well than the planting of trees?"*

— FREDERICK LAW OLMTED, founder of American landscape architecture

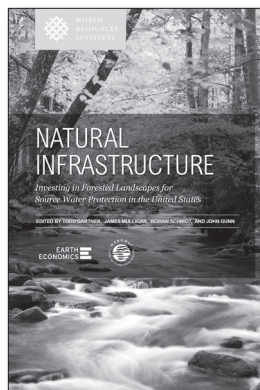
Lawyer and environmental historian Eric Rutkow opens his engrossing 2012 book *American Canopy: Trees, Forests, and the Making of a Nation* noting that "there is nothing else in nature quite as helpful to man as a tree." It is a universal building material and an essential source of fuel for millennia, up to and including present uses of woody biomass. Even in this digital age, you are holding in your hands the pulp of trees, "an unsung pillar of advanced society." How is that paper-free environment working out for you?

Unfortunately, observes Rutkow, "Forests are cordoned off in carefully delimited regions, far away from the cities and suburbs. The juice from the fruit of trees has been pasteurized and homogenized." This is a particularly astute observation, especially as it relates to the role of forests in protecting and restoring water quality and supply. Unfortunately, Rutkow's fine book, the first large-scale narrative history of forests in America, contains only six individual pages, short references, to water supply, nothing to water quality.

In the current intellectual climate, there is increasing appreciation of the idea of natural services and the usefulness and cost-effectiveness of payments for such services as a complement, not a substitute, to traditional structural or engineered approaches,

and the concept of "beneficiary pays" as it relates to financing the protection and enhancement of these services. Moreover, recent practice and research is beginning to elucidate the causal relationship between forests, water quality, and cost savings.

According to "Hydrologic Effects of a Changing Forest Landscape," a 2008 report of the National Research Council, "The forests cycle water from precipitation through soil and ultimately deliver it as streamflow that is used to supply nearly two-thirds of the clean water supply in the United States." Changes in forested headwaters, including tributary streams feed-



**Natural Infrastructure:** Investing in Forested Landscapes for Source Water Protection in the United States. World Resources Institute; 132 pages.

**Natural and Engineered Solutions for Drinking Water**

**Supplies:** Lessons from the Northeastern United States and Directions for Global Watershed Management. CRC Press; 303 pages.

ing into rivers, "influence the quantity and quality of downstream water sources; in this way, forests and water are closely intertwined."

Given ageing infrastructure, a growing population, affluence, and resulting loss of forests, water quality managers have been paying closer attention to the benefits of forests as a least-cost option compared with costly engineered solutions. This is not an either-or proposition. Society will always need well-financed, effective, and well-engineered gray infrastructure.

But, as economists are always telling us, the action is at the margin, and great benefits — economic and environmental — are to be found in the complementarity of green and gray solutions.

The mother of all such efforts is the New York City source water protection initiative to protect its Upstate watersheds. Instead of spending \$8–10 billion on a new filtration plant, it is spending less than \$2 billion on land protection and a variety of forest and agricultural best practices. The "avoided costs" are huge. This eminently sensible program was enabled by a "filtration avoidance waiver" authorized under the Safe Drinking Water Act. These and many other cases, as well as the lessons derived from them, are discussed in several new publications.

Todd Gartner and his colleagues at the World Resources Institute (James Mulligan, Rowan Schmidt, and John Gunn) assemble, review, and synthesize the work product of 56 experts with experience in source water protection across the American landscape, in *Natural Infrastructure: Investing in Forested Landscapes for Source Water Protection in the United States* (2013), "the most comprehensive publication of its kind to date." The report may be downloaded, gratis, from WRI's website. Full disclosure: this reviewer co-authored the foreword to the report with WRI's president,

Andrew Steer, and serves as national source water protection coordinator for the U.S. Endowment for Forestry and Communities which, among other things, tries to foster partnerships between water utilities and forest interests to the benefit of both. The endowment funded some of the research documented in WRI's report.

*Natural Infrastructure* does an excellent job of outlining the business case, scientific underpinnings, and means of identifying and seizing opportunities to work with utilities, stakehold-

ers, political leaders, and conservation organizations to design, finance, and implement forest management measures, at scale, to defer or avoid expensive investments in gray infrastructure and reduce ongoing treatment costs. Whether utilizing fee simple purchases, acquisition of conservation easements, or subsidizing sustainable forest practices by private landowners, water quality goals are achieved, in tandem, with habitat protection, natural hydrologic flow regime, and sequestration of carbon. The value-added proposition extends far beyond cost-effectiveness to encompass a suite of environmental and conservation benefits.

Source water protection under the Safe Drinking Water Act is the analogue to watershed protection under the Clean Water Act but is more tightly focused on potable water. It is part of a “multi-barrier” approach to protecting water supplies up to and including water treatment. It is preventative in nature which is less expensive than treatment after the fact. Jim Taft, executive director of the Association of State Drinking Water Administrators and contributor to the report, describes a recent study by EPA of six communities which concluded that “on average, every \$1 spent on source-water protection saved an average of \$27 in water treatment costs.” Several other studies have also confirmed “that improved source water quality relates to lower treatment and chemical costs.”

In the Upper Neuse River Basin, in North Carolina’s Piedmont region, the city of Raleigh established a “nutrient impact fee,” a one-time charge collected on new water and sewer hook-ups. This was followed by a permanent watershed protection fee on public water bills of one penny per 100 gallons which generates \$1.8 million per year. These measures have generated \$7.5 million since 2005 to address water quality issues within its watershed. Nearby Durham increased

its water rates in 2011 to protect areas upstream of its two water supply reservoirs. Growth and development, with resulting loss of forests and other natural amenities, are key drivers in this watershed.

In the western United States, communities are experiencing increased dredging and treatment costs resulting from drought, climate variability, beetle infestation, and sedimentation after colossal forest fires and big precipitation events. Denver Water spent more than \$26 million in the aftermath of the Buffalo Creek and Hayman fires. The utility is now matching the U.S.

Forest Service’s \$16.5 million investment, totaling \$33 million, toward forest treatment and watershed protection. Comparable investments are now underway in similarly plagued communities such as Salt Lake City, San Francisco, and Flagstaff.

Another volume, this one emanating from Yale University, is *Natural and Engineered Solutions for Drinking Water Supplies: Lessons from the Northeastern United States and Directions for Global Watershed Management*, edited by Emily Alcott, Mark S. Ashton, and Bradford S. Gentry, which takes a very deep dive into the cases of six cities, two of which are also discussed in the WRI report. It evaluates how New York; Boston and Worcester, Massachusetts; New Haven and Bridgeport, Connecticut; and Portland, Maine, have sought to protect and manage upland forests for the benefit of clean and safe drinking water under varying regulatory, social, and economic circumstances.

The findings of this latter report are consistent with WRI’s in confirming that it makes environmental and economic sense to protect and manage these forests to produce downstream services — clean water. In doing so, a community can minimize land devel-

opment and unnecessary engineering or filtration costs.

Both of these volumes go to great lengths to establish the basis for prioritizing and implementing specific policies and practices, on the ground, to achieve optimal outcomes in terms of the balance of green and gray, natural and engineered infrastructure for clean and safe drinking water delivered cost-effectively while attending to environmental benefits. This is essential for further progress.

Utility managers usually acknowledge, intellectually, the benefits of forested landscapes. But, when deciding, again, at the margin, whether to put that next discretionary dollar into the facility or onto the landscape, well, it is hard to resist defaulting to the engineered solution. Their justifiable concern with environmental compliance and frugal ratepayers causes them to choose the gray option more often than not. To the benefit of ratepayers and the environment, these attitudes are changing as evidenced by these two important contributions to the literature on source water protection.

Change is hard, and a combination of scientific, economic, social, and political factors all come to bear on the final outcome. As the editors of the WRI report correctly observe, “Perhaps the two most important lessons from experience to date are the power of individuals and the importance of partnerships. Ultimately, the most effective messengers to decisionmakers and stakeholders affecting natural infrastructure decisions at the local level are influential individuals within their own institutions.” As Tip O’Neill famously opined, “All politics is local.”



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