

Protecting the Source

Conserving Forests to Protect Water

by Caryn Ernst, Richard Gullick, and Kirk Nixon

More than a century ago, many of America's fastest growing cities, such as Boston and New York, bought land in their source areas to provide lasting protection of water resources critical for sustaining their populations in the future. To this day, these cities, some of the largest in the country, have relatively clean source waters that require minimal treatment.



Advancements in science and technology have enabled water utilities to effectively treat most known contaminants from drinking water sources and to provide American citizens with some of the safest drinking water in the world. However, these advancements have contributed to a movement away from protecting and managing our source areas and to the unfortunate notion that the quality of our raw water supplies is less important.

Treatment alone, although critical to preventing disease, should not be the sole protection of our drinking water. Multiple barriers to disease agents need to be maintained if we are to provide the greatest protection to public health. A multiple-barrier approach to drinking water protection involves several consecutive and interrelated steps, including selection of high-quality source water(s), source water management and protection, appropriate treatment, distribution system management, and water quality monitoring.

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Upper Colorado River watershed

Water suppliers and municipalities can build effective partnerships to conserve forested land and protect their source water. A recent study shows the relationship between forests and clean water, and the resulting effects on treatment costs.

Why Protect the Source?

A major reason suppliers are revisiting the idea of source protection is the growing realization that allowing raw water quality to degrade, in addition to threatening public health, increases treatment and capital costs. Protecting forests — which reduces erosion and sediment, improves water purity, and in some cases captures and stores water — is a cost-effective way to provide clean drinking water,

according to *Running Pure*, a report by the World Wildlife Fund and the World Bank.

“For many cities, time is running out,” said David Cassells, a World Bank forest specialist. “Protecting forests around water catchment areas is no longer a luxury but a necessity.”

Although little research has been done on this issue, a study of 27 water suppliers conducted in 2002 by the Trust for Public Land, a

national nonprofit land conservation organization, and AWWA’s Source Water Protection Committee found that water treatment costs for utilities using primarily surface water supplies varied depending on the amount of forest cover in the watershed. Approximately 40 water suppliers were asked to complete a written survey describing their watershed, treatment system, and treatment costs; 33 responses were received, of which 27 were included in the analysis. (Six responses were not used in the final analysis, either because the data were incomplete or the source area or size of the supply were too large to be comparable to the other respondents.) Not all the water utilities were selected randomly, as some were solicited to provide a diverse range of watershed types, and all respondents primarily use surface water.

The survey results indicated that operating treatment costs decreased as forest cover in a source area increased.

- ▶ For every 10 percent increase in forest cover in the source area (up to about 60 percent forest cover), treatment and chemical costs *decreased* approximately 20 percent.
- ▶ Approximately 50–55 percent of the variation in operating treatment costs can be explained by the percent of forest cover in the source area.

Not enough data were obtained on suppliers that had more than 65 percent forest cover in their watersheds to draw conclusions; however, it is suspected that treatment costs level off when forest cover is between 70 and 100 percent. The 50 percent variation in treatment costs that cannot be explained by the percent forest cover in the watershed is likely explained by varying treatment practices, the size of the facility (larger facilities pay lower costs per gal), the location and intensity of development and row crops in the watershed, and agricultural, urban, and forestry best management practices.

Findings show that the more forest cover there is in a watershed the lower the treatment costs for suppliers drawing from surface water sources. Table 1 shows the change in treatment costs predicted by this analysis, the average daily cost of treatment if a supplier treated 22 mgd, and the average production for surveyed suppliers.

Forest Conservation as a Barrier

Changes in land use can affect source water quality and, thus, treatment costs. Efforts to protect standing forests and natural lands from development or intensive agriculture will help

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communities avoid future increases in treatment expenditures. Improving land use practices and protecting lands that serve as natural filters for contaminants, such as forests, riparian areas, and wetlands, is critical to reducing pollutants that reach our raw water sources.

A growing understanding of the role that forests and natural lands play in filtering pollutants and maintaining water quantity has led many municipalities and water suppliers, particularly those in growing communities, to consider land protection as part of a multiple-barrier approach to providing safe drinking water. These communities have found that land conservation

- ▶ offers permanent protection of critical watershed or recharge land;
- ▶ is perceived as equitable by landowners, as it compensates them for the value of their property;
- ▶ is broadly supported by voters;
- ▶ provides multiple benefits to communities, such as flood control, recreation, and the protection of historic and environmental resources; and
- ▶ offers land use control options for communities that do not have regulatory authority in their source area.

Local governments and water suppliers around the country are teaming up with land trusts, community groups, and other stakeholders to protect forests, wetlands, and other natural lands as part of a comprehensive approach to protecting their drinking water sources. This is happening in Austin and San Antonio, Texas, where communities are partnering to protect the Edwards Aquifer.

Protecting the Edwards Aquifer

Austin, Texas

The Edwards Aquifer, on the western side of Austin, is the sole drinking water source for more than

% of Watershed Forested	Treatment and Chemical Costs <i>per mil gal</i>	% Change in Costs	Average Treatment Costs <i>per day at 22 mil gal</i>
10%	\$115	19%	\$2,530
20%	\$93	20%	\$2,046
30%	\$73	21%	\$1,606
40%	\$58	21%	\$1,276
50%	\$46	21%	\$1,012
60%	\$37	19%	\$814

Table 1. Water treatment and chemical costs based on percent of forested watershed

1.5 million people, including residents of San Antonio and Austin. A portion of the Barton Springs segment of the aquifer is surface water, but is connected to the Edwards Aquifer as it flows below and around Austin. Barton Springs, identified as the most endangered aquifer in Texas, is highly vulnerable to pollution because of its smaller size, high soil permeability, and high recharge capability, and because of the region's land-development boom.

In 1995 and 1996, a citizens' planning committee studied current and future growth patterns in the region and determined that the city's surface water needed protection beyond current regulatory restrictions. Building on that recommendation, the Austin city council designated the most sensitive third of the Austin region — land that drains into Barton Springs and the Highland Lakes — as

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a Drinking Water Protection Zone. They designated the remaining two-thirds as a Desired Development Zone, which included the urban core, commercial corridors, and the central business district. The new designations made it more difficult to develop in the protection zone and created incentives for building in the development zone.

Even as Austin voters tried to strengthen development regulations, they moved to protect the watershed through land acquisition. A 1991 poll jointly sponsored by the TPL and Citizens for Open Space revealed that Austin residents favored open space acquisition, particularly to protect water quality, and would approve increased property taxes to pay for the land. With technical assistance from the TPL, the city passed a \$20 million bond act for purchase of a new Barton Creek Wilderness Park, which would protect the most critical areas around the springs.

In 1997, the city's Watershed Protection Department published the "Barton Creek Report," which recommended further conservation to protect drinking water quality through the purchase of land and development rights. In 1998, voters approved several land-protection funding measures, including a \$65 million revenue bond to purchase land and easements within the Drinking Water Protection Zone and a \$75.9 million bond to create parks and greenways. Together, they raised a total of \$140 million to help meet the community's recreation and drinking water protection goals.

San Antonio, Texas

As the residents of Austin took action to protect the portion of the Edwards Aquifer within their jurisdiction, the residents of San Antonio continued their efforts to protect a sensitive portion of the same aquifer in northern San Antonio. In a May 2000 bond measure, San Antonio voters approved a one-eighth cent sales tax for land acquisition to protect the Edwards Aquifer and to create greenways along sensitive creeks within the city. This measure is expected to raise \$65 million over the next three to five years. Of the four bond measures on the ballot in 2000, including measures to increase tourism and attract new businesses, the drinking water protection measure was the only one approved by voters.

Years of public education efforts by the San Antonio Water System had laid the groundwork for the measure by educating residents on community water supply issues. The SAWS efforts to acquire land, which began in 1993 with the acquisition of Government Canyon, highlighted the importance of land protection to the public. The acquisition of Government Canyon was spearheaded by the TPL, which structured a cooperative effort with SAWS, Texas Parks & Wildlife Department, and the Edwards Underground Water District (now the Edwards Aquifer Authority). Funding came partially from SAWS, which continues to budget annual funding for the acquisition of both fee-simple purchases and conservation easements over the Edwards Aquifer Recharge Zone.

The final impetus and popular support necessary to pass the bond measure came from grassroots efforts to mobilize voters and educate the public about the threat presented to their water supply by rapid development within the aquifer's recharge zone.

With approximately half of the aquifer's 80,000 acres of recharge zone already developed or planned for development, the TPL, The Nature Conservancy, and the Bexar Land Trust work closely with the City of San Antonio, SAWS, and the Texas Parks and Wildlife Department to quickly protect the remaining sensitive lands before further development can take place.

Since 1993, the TPL has protected more than 10,000 acres of recharge land over the Edwards Aquifer in the San Antonio area. Most of the land has been conveyed to the Texas Parks and Wildlife Department, and water quality conservation easements on the properties are conveyed to the City of San Antonio. Water quality conservation easements permanently prevent development that could be detrimental to water resources. Some of this land has been purchased by leveraging local bond and sales tax dollars to attract federal Land and Water Conservation Funds.

Working with Land Trusts

According to Jeff Francell, director of land acquisition for the Texas Parks and Wildlife Department, many of the acquisitions over the aquifer "wouldn't have happened without the San Antonio Water System, the city of San Antonio, and the TPL." Texas Parks and Wildlife would not have been able to acquire the

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land without leveraging Land and Water Conservation Fund dollars with SAWS funding and the City of San Antonio's bond funds, and "it took TPL to put all the pieces of these fairly complicated transactions together."

Municipalities and suppliers often lack the tools and resources necessary to implement land conservation strategies on their own. Local and national land trusts, such as the TPL, work in partnership with local governments and water suppliers to help them permanently protect the highest-priority lands in their source areas. Land trusts can work with local governments and water suppliers to identify high-priority lands, negotiate with landowners, build appropriate partnerships, manage the legal process, and assemble complex funding packages that incorporate local, state, and federal dollars. Many land trusts also work in partnership with suppliers and natural resource agencies to manage land appropriately for source protection.

Local land trusts found throughout the country have experience in acquisition, finance, and management partnerships with water suppliers. The Land Trust Alliance is an umbrella group that serves the 1,200 land trusts around the country. To find land trusts in your area, go to <www.lta.org>.

The TPL, which is staffed with real estate, legal, planning, and finance professionals, has a national program focused specifically on drinking water protection. In the last eight years, TPL has worked around the nation with private and public water suppliers in Connecticut (Bridgeport Hydraulic Water Co.), New York (states of New York and New Jersey on Sterling Forest), North Carolina (Charlotte–Mecklenburg County), Texas (SAWS), and Florida (City of Naples–South Florida Water Management District), to name a few.

With help from the Henry P. Kraft Memorial Fund and AWWA's Source Water Protection Committee, TPL

and AWWA have released a new report *Protecting the Source: Land Conservation and the Future of America's Drinking Water*. This report explores the scientific, economic, and public health rationales for using land conservation for drinking water protection and presents best practices for successful implementation locally. Hard copies can be ordered online for

\$20 from the AWWA Bookstore, along with a companion handbook that will provide suppliers and municipalities with detailed guidance on how to implement land-conservation strategies to protect source water.

For more information about the report and handbook, or about TPL, contact Caryn Ernst at (202) 543-7552 or Caryn.Ernst@tpl.org.

