

# Forest-to-Faucet Partnership



## Public and Private Forests, Drinking Water Supplies, and Population Growth in the Eastern United States

This project was designed to supplement and build upon the U.S. Forest Service "Forests on the Edge" study by focusing on the linkages between (1) current watershed conditions, (2) public and private forest land ownership patterns, (3) surface water supplies, and (4) human population (in 2000 and estimated for 2030). It also builds on the EPA-funded Source Water Stewardship project (Trust for Public Lands, U.S. Forest Service, and University of Massachusetts Amherst) which included four diverse watersheds in the eastern U.S. (GA, MD/PA, NJ, MA/NH), networking activities by Northeast Association of Watershed Forest Managers, the Northeastern Area (NA) Strategic Plan 2008-2012, the Southern Forest Resource Assessment and Southern Forest Futures Project, and the many state & private forestry programs that conserve forests and water.

*"A national policy which, though considering the direct value of forests as a source of timber, fails to take full account also of their influence upon erosion, the flow of streams, and climate, may easily endanger the well-being of the whole people."*

Raphael Zon



STEP 1: Ability to Produce Clean Water				
Score→ Attribute	Very High (4 points)	High (3 points)	Moderate (2 points)	Low (1 point)
<b>F</b> = Percent forest land	>75	50-75	25-50	0-25
<b>A</b> = Percent agricultural land	<10	10-20	20-30	>30
<b>R</b> = Percent riparian forest cover	>70	50-70	30-50	0-30
<b>D</b> = Road density (quartiles)	0-25 <sup>th</sup> percentile	25-50 <sup>th</sup> percentile	50-75 <sup>th</sup> percentile	75-100 <sup>th</sup> percentile
<b>S</b> = Soil erodibility (k factor)	0-0.2	0.2-0.28	0.28-0.34	>0.34
<b>H</b> = Housing Density (2000; acres per housing unit)	> 20.0	5.0 – 20.0	0.6 – 5.0	< 0.6
<b>Step 1 (APCW) = F + A + R + D + S + H</b>			Composite Score of 6-24	

Categories based on research reviewed by de la Cretaz and Barten (2007), Ice and Stednick (2004), and National Research Council (2008).



Paul E. Gregory and Paul K. Barten  
University of Massachusetts Amherst – USDA Forest Service

[www.forest-to-faucet.org](http://www.forest-to-faucet.org)

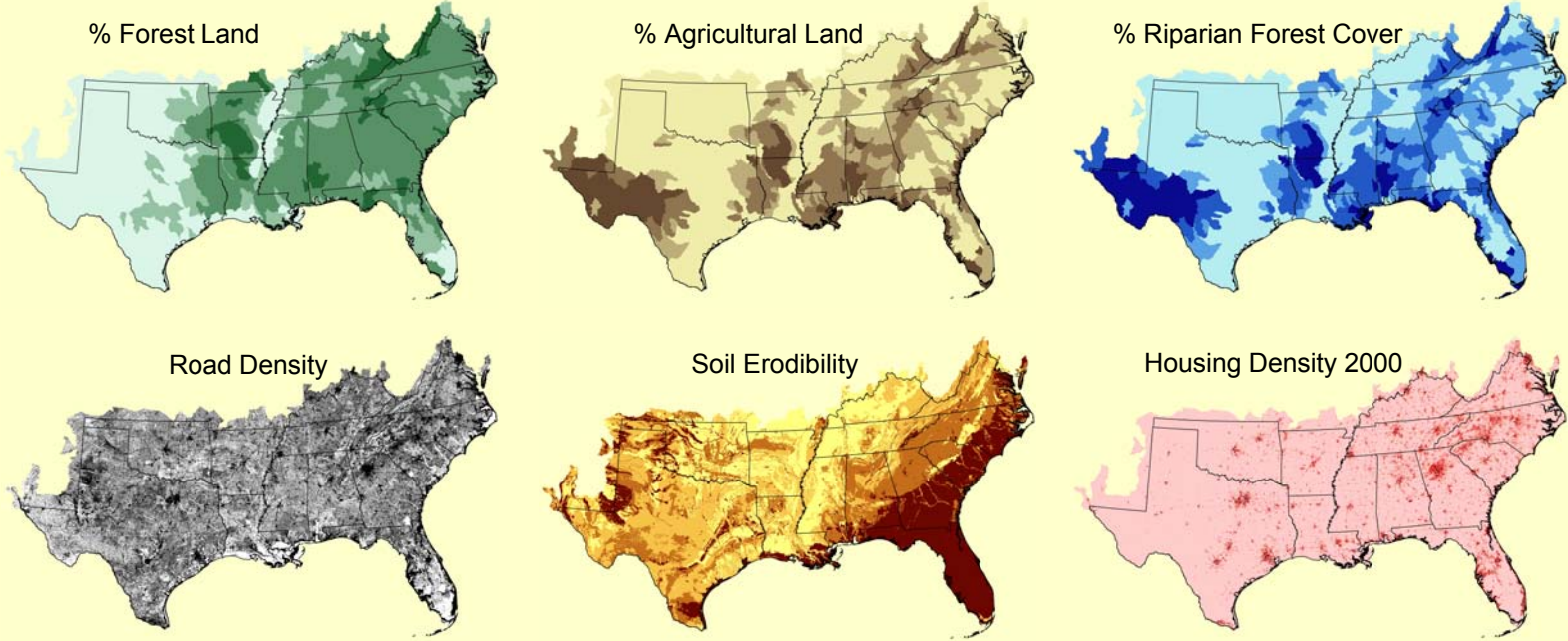
November 2008



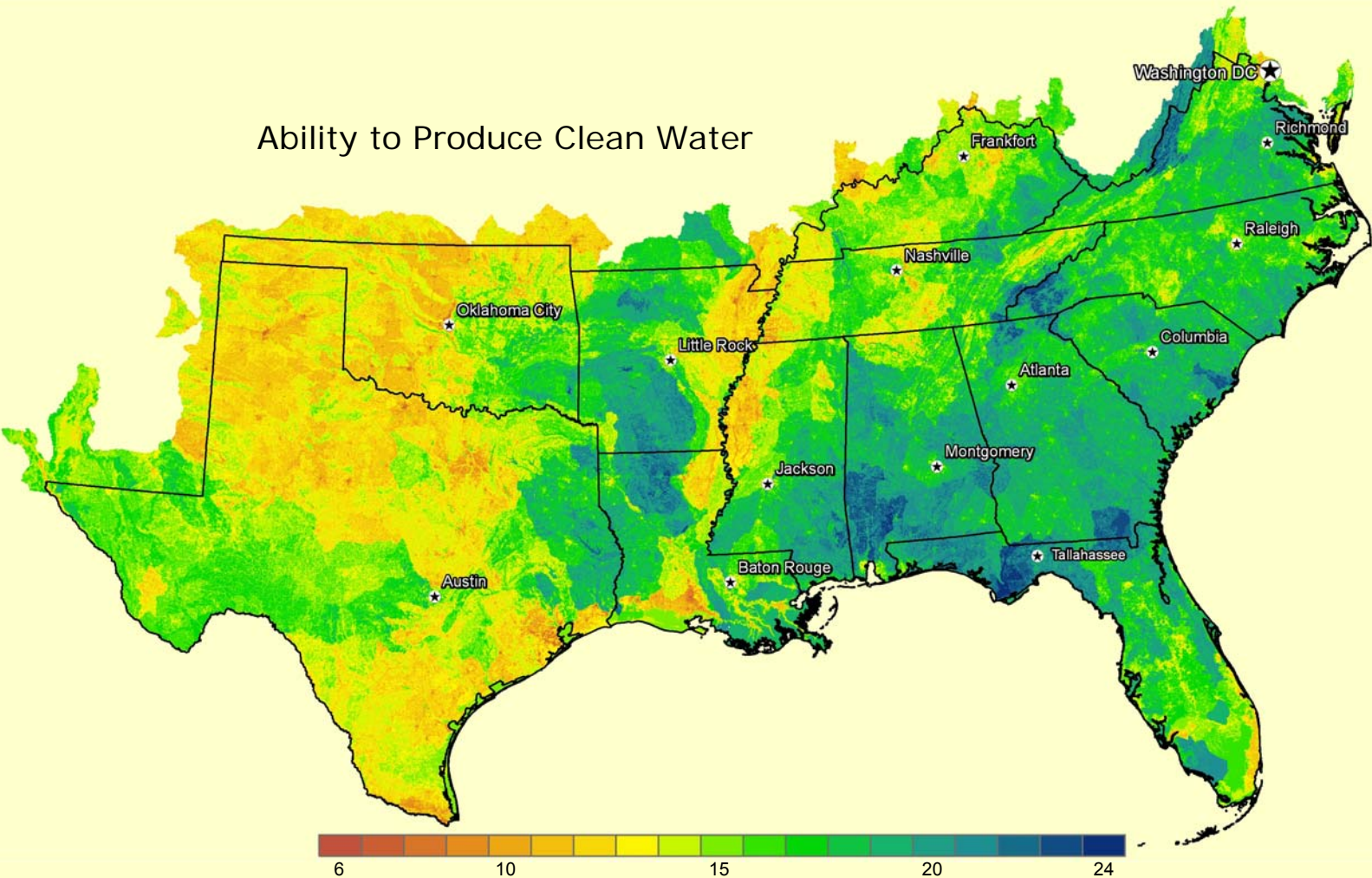
# Public and Private Forests, Drinking Water Supplies, and Population Growth in the Eastern United States

In 1910 the population of the U.S. was 92 million and decisive actions were taken to protect forests, water, and people and the natural resource legacy for future generations. The U.S. population passed the 300 million mark in October 2006 and is projected to reach 309 million in 2010 and 364 million in 2030 (the time horizon for this study).

The **first step** used a set of biophysical attributes (%forest (F), %agricultural land (A), riparian forest cover (R), road density (D), soil erodibility, and housing density (H) to develop an index of each large watershed's ability to produce clean water (APCW). Each of the six attributes was rated from 1 to 4.



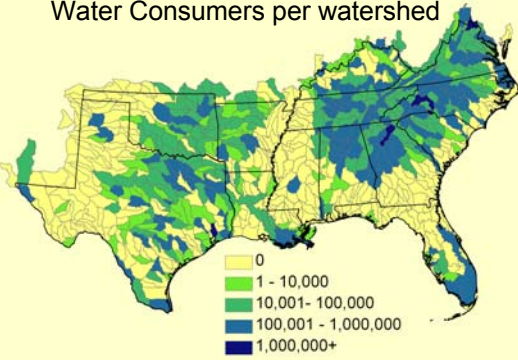
## Ability to Produce Clean Water



The patterns and trends highlighted by this GIS analysis of forests, water, and people in the 21st century clearly demonstrate the need for a renewed commitment to forest conservation—especially on private forest lands that protect public water supplies.

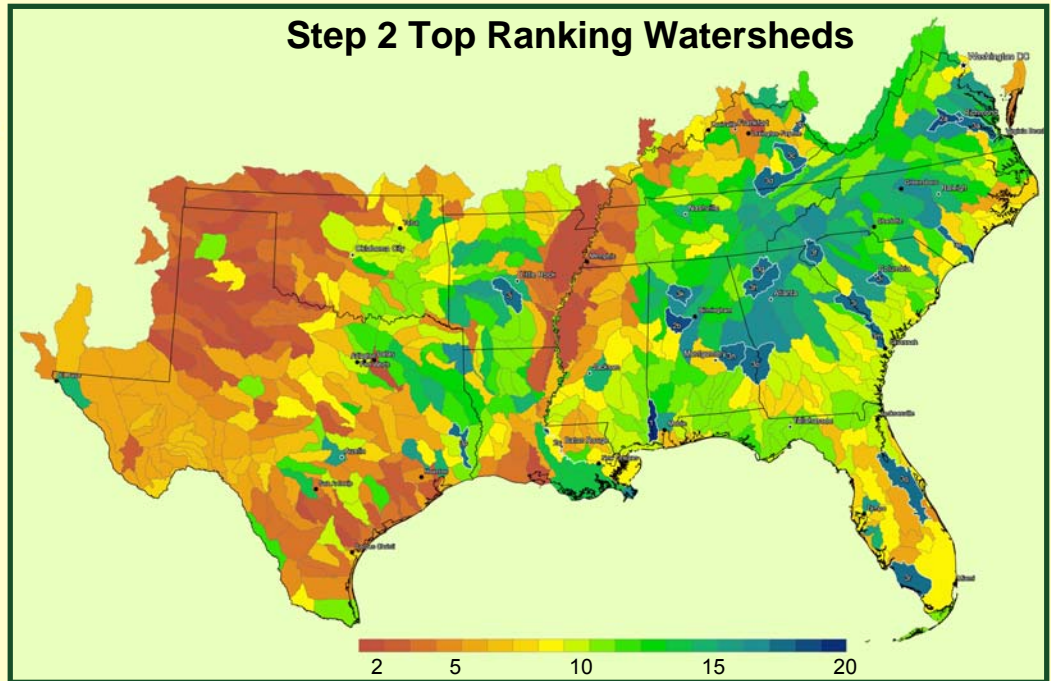
The **second step** added the number of water consumers per unit area for each watershed to the APCW layer. The top scores represent watersheds with a high inherent ability to produce clean water upon which a large number of water consumers depend.

Water Consumers per watershed



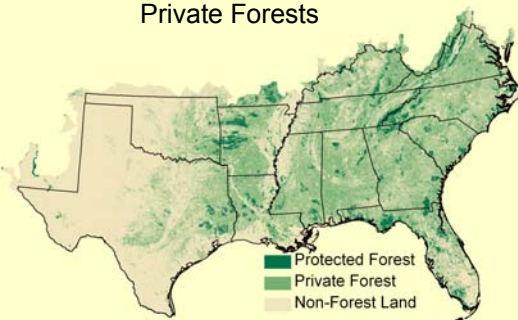
➤ There is over 47 million surface drinking water consumers in the Southern Region.

Step 2 Top Ranking Watersheds



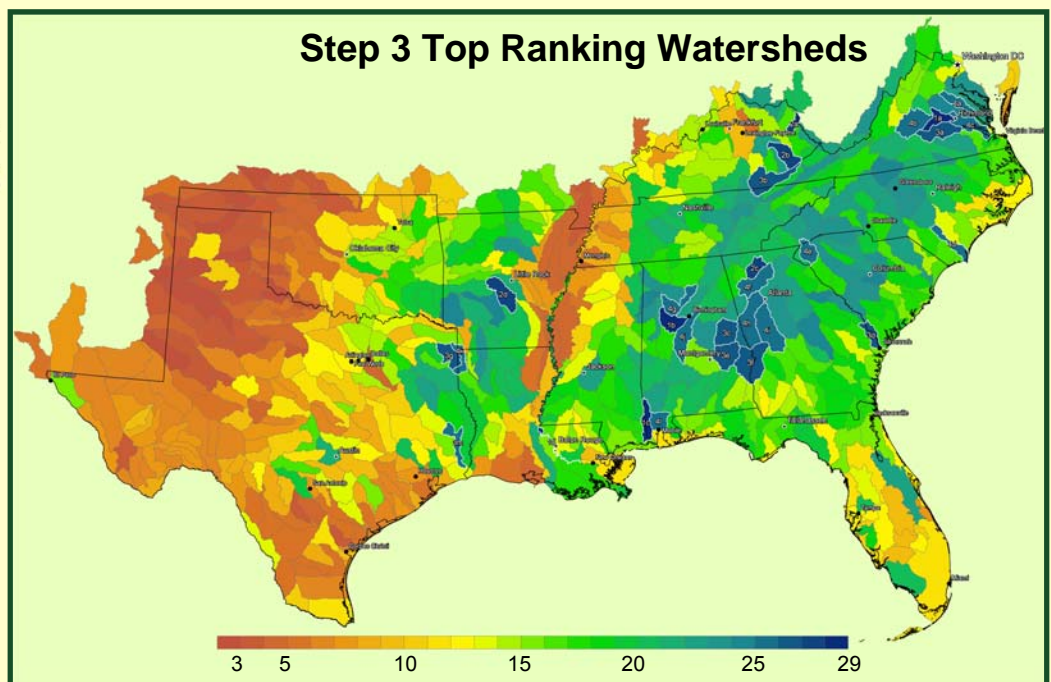
The **third step** accounts for the proportion of private forest land (versus public or other forest land that is permanently protected from conversion to other uses) – combined with the preceding steps – to highlight the public water supply systems that depend upon the private forest land and landowners for source protection. In contrast to public forest land, privately-owned forest land may be developed, diminishing its protective influence.

Private Forests

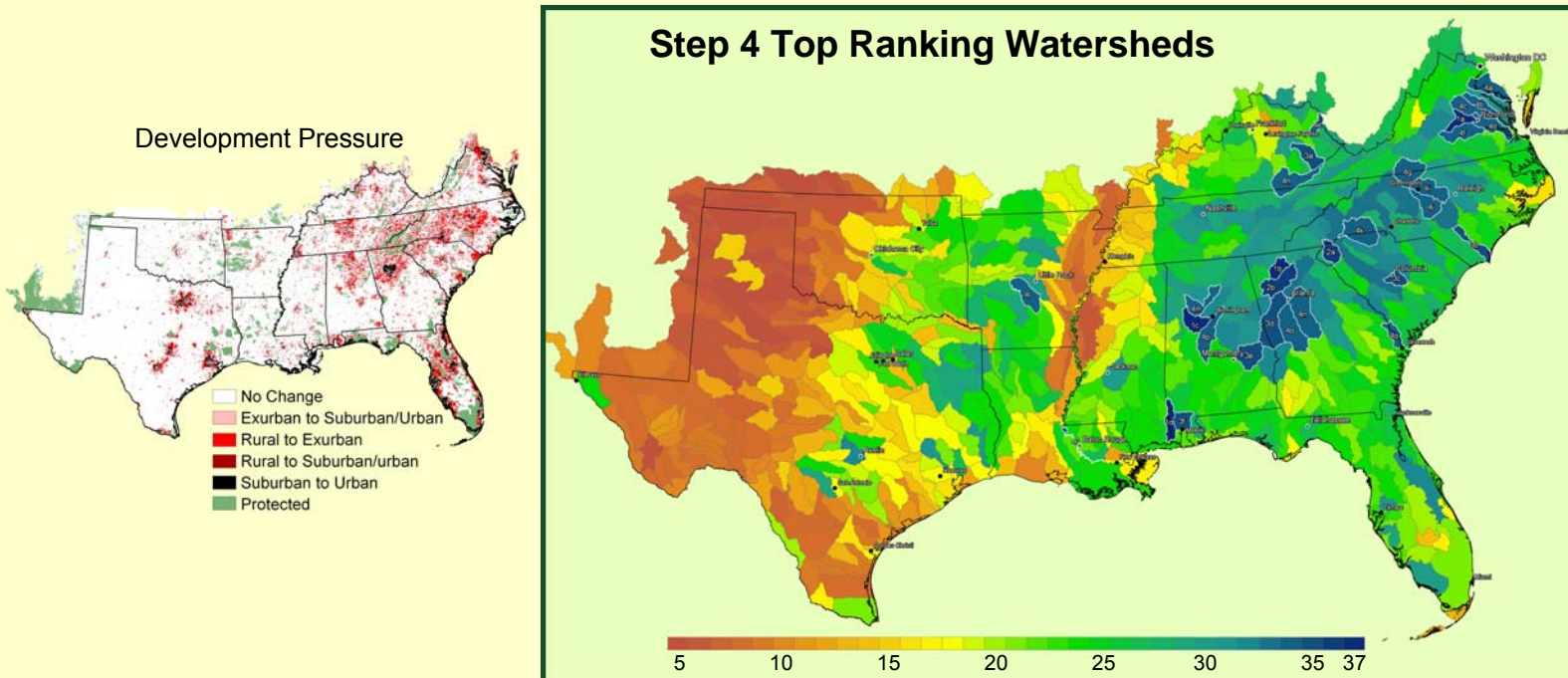


➤ 1911 Weeks Act established National Forests in the East, leading to the protection of 25.3 million acres.

Step 3 Top Ranking Watersheds



Linking to the "Forests on the Edge" project, the **fourth and final step** ("development pressure") forecasts when and where forest conversion to residential and associated commercial and industrial land use (commonly referred to as suburban sprawl) is likely to occur. This development pressure map is added to the output of the three preceding steps to highlight the parts of the Southern Region where watershed forest conservation and management efforts are particularly important.



## Building on the Study Results

The results of the **Public and Private Forests, Drinking Water Supplies, and Population Growth** analysis can be used to guide and support the following conservation approaches:

### 1. Heighten awareness of our dependence on forests for clean water

➤ If a larger proportion of local and regional policy makers and the public had a clear understanding of the unfavorable economic and ecological tradeoffs associated with forest loss then support for conservation would be more equal to the challenge ahead.

### 2. Form partnerships to conserve forests and water resources

➤ The most promising examples of source water protection frequently involve highly motivated citizens, water utilities, local, state, and federal government agencies and commissions, non-governmental organizations, private sector firms, and educational institutions working together on a shared vision.

### 3. Increase conservation of forest lands in priority watersheds

➤ Examples being conservation easements, watershed-based forest planning and zoning, the purchase of development rights, current use tax assessment programs, woodland owner cooperatives, and locally-supported forestry and agriculture.

### 4. Improve the management of forests in water supply watersheds

➤ When water quality is the primary objective of forest management, the importance of having a vigorous and diverse forest that can reliably deliver clean water is clearly recognized and deliberately pursued. Management for long term watershed resilience is a flexible and adaptive management approach with many benefits and values.



#### References:

- Barnes, Martina C., Albert H. Todd, Rebecca Whitney, and Paul K. Barten. 2008. *Forests, Water and People: Drinking water supply and forest lands in the Northeast and Midwest United States*. USDA Forest Service, Northeastern Area State and Private Forestry, NA-FR-01-08. Newtown Square Pennsylvania.
- Gregory, Paul E., and Paul K. Barten (in preparation) *Public and private forests, drinking water supplies, and population growth in the eastern United States*. for *Environmental Management*.

#### Acknowledgements:

This research was supported by a grant from the U.S. Forest Service Southern Research Station, Coweeta Hydrologic Laboratory as part of the East-wide Forests and Water Project. The GIS analysis updates (with 2001 NLCD), replicates, and extends to the Southern Region (Region 8) earlier work by Barnes, Whitney, Todd, and Barten (2008) in the Northeastern Area (Region 9). The authors gratefully acknowledge the continuing support of the Forest-to-Faucet Partnership by the U.S. Forest Service, Northeastern Area State and Private Forestry.