

# **Paving Our Way to Water Shortages:** *How Sprawl Aggravates the Effects of Drought*



## EXECUTIVE SUMMARY

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Over this long, blistering summer, Americans from coast to coast have been suffering through one of the worst droughts in decades. Many blame erratic weather conditions for water shortages, while others point to population growth. But that's not the whole story. Another major contributor to our water problems is the way we develop land. As we pave over more and more wetlands and forests, this new report shows that we are depleting our water supplies. It's not only the arid West that is facing critical shortages. The rapidly suburbanizing Southeast, blessed with a seemingly inexhaustible water supply, is now in serious trouble, as are many other formerly water-rich regions of the country.

Over the last decade, studies have linked suburban sprawl to increased traffic and air pollution as well as the rapid loss of farmland and open space. Sprawl also threatens water quality. Rain that runs off roads and parking lots carries pollutants that poison rivers, lakes, streams, and the ocean. But sprawl not only pollutes our water, it also reduces our supplies. As the impervious surfaces that characterize sprawling development – roads, parking lots, driveways, and roofs – replace meadows and forests, rain no longer can seep into the ground to replenish our aquifers. Instead, it is swept away by gutters and sewer systems.

The problem has its genesis in the post-World War II push by federal and state governments to promote suburbs at the expense of cities by, among other things, constructing new networks of roads and highways. Suburbs spread decade after decade, and the amount of land eaten up by sprawl jumped 50 percent from the 1980s to the 1990s alone, according to the Department of Agriculture's Natural Resources Inventory. By the 1990s, Americans were developing about 2.1 million acres a year.

The sprawling of America has translated into a significant loss of valuable natural resources. Undeveloped land is valuable not just for recreation and wildlife, but also because of its natural filtering function. Wetlands, for example, act like sponges, absorbing precipitation and runoff and slowly releasing it into the ground. More than one-third of Americans get their drinking water directly from groundwater, and the remaining two-thirds who depend on surface water also are affected, given that about half of a stream's volume comes from groundwater.

This new study by American Rivers, NRDC (Natural Resources Defense Council) and Smart Growth America investigated what happens to water supplies when we replace our natural areas with roads, parking lots and buildings. First, we determined which metropolitan areas have experienced the most development over the last 20 years. We found that 11 of the 20 metro areas with the greatest land conversion rates from 1982 to 1997 are in the Southeast; the other nine are divided evenly among the remaining regions – three each in the Northeast, Midwest and West. And population growth alone does not explain the magnitude of the development. Indeed, in every case but one, developed land growth topped population growth, in many cases by a factor of two to three.

We then developed a "range of imperviousness" for new development in these 20 metro areas. Assuming regional average soil types and accounting for regional rainfall patterns, we calculated the amount of rainwater that runs off the land instead of filtering through and recharging vital groundwater resources. Comparing the level of imperviousness in 1997 to 1982, we found that the potential amount of water not infiltrated annually ranged from 6.2 billion to 14.4 billion gallons in Dallas to 56.9 billion to 132.8 billion gallons in Atlanta. Atlanta's "losses" in 1997 amounted to

enough water to supply the average daily household needs of 1.5 million to 3.6 million people per year. The report found the following groundwater infiltration “losses” in other major sprawl centers:

- Atlanta – 56.9 billion to 132.8 billion gallons;
- Boston – 43.9 billion to 102.5 billion gallons;
- Charlotte – 13.5 billion to 31.5 billion gallons;
- Chicago – 10.2 billion to 23.7 billion gallons;
- Dallas – 6.2 billion to 14.4 billion gallons;
- Detroit – 7.8 billion to 18.2 billion gallons;
- Greensboro, N.C. – 6.7 billion to 15.7 billion gallons;
- Greenville, S.C. – 12.7 billion to 29.5 billion gallons;
- Houston – 12.8 billion to 29.8 billion gallons;
- Minneapolis-St. Paul – 9 billion to 21.1 billion gallons;
- Nashville – 17.3 billion to 40.5 billion gallons;
- Orlando – 9.2 billion to 21.5 billion gallons;
- Philadelphia – 25.3 billion to 59 billion gallons;
- Pittsburgh – 13.5 billion to 31.5 billion gallons;
- Raleigh-Durham-Chapel Hill – 9.4 billion to 21.9 billion gallons;
- Seattle – 10.5 billion to 24.6 billion gallons;
- Tampa – 7.3 billion to 17 billion gallons; and
- Washington, D.C. – 23.8 billion to 55.6 billion gallons

Fortunately there is a way to reverse this growing problem, but it means changing the way we approach development. Using smart growth techniques, we can reduce the impact of development. These approaches protect farms and forests on the metropolitan fringe by encouraging investment in the urban core and older suburbs. By directing growth to communities where people already live and work, we can limit the number of new paved and other impervious surfaces that cover the landscape, make existing communities more attractive, and discourage new infrastructure that alters natural hydrologic functions and increases taxpayer burdens.

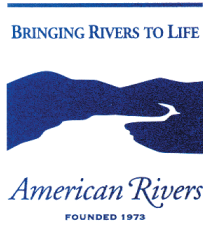
Although communities around the country are turning to a range of strategies to cope with water shortages, including conservation, they are overlooking smart growth solutions. There is no one-size-fits-all definition, but smart growth generally entails integrated planning and incentives and infrastructure investments to revitalize existing communities, prevent leapfrogging sprawl, provide more transportation choices, and protect open space. By adopting a regional smart growth approach, metropolitan areas could reduce the spread of impervious surfaces. An analysis completed in 2000, for example, estimated that over the next 25 years smart growth techniques could save more than 1.6 million acres of land in all 20 metropolitan regions in our study. And if these communities focused their efforts on preserving forests, wetlands and other valuable lands, their vital role in recharging groundwater would not be compromised.

American Rivers, NRDC and Smart Growth America urge policymakers to embrace smart-growth policies to address water shortage issues. Specifically, the groups recommend that state and local authorities:

- allocate more resources to identify and protect open space and critical aquatic areas;

- practice sound growth management by passing stronger, more comprehensive legislation that includes incentives for smart growth and designated growth areas;
- integrate water supply into planning efforts by coordinating road-building and other construction projects with water resource management activities;
- invest in existing communities by rehabilitating infrastructure before building anew – a “fix it first” strategy of development;
- encourage compact development that mixes retail, commercial and residential development;
- manage stormwater using natural systems by replacing concrete sewer and tunnel infrastructure, which conveys stormwater too swiftly into our waterways, with low-impact development techniques that foster local infiltration of stormwater to replenish groundwater;
- devote more money and time to research and analysis of the impact of development on water resources, and make this information accessible.

These are efficient, cost-effective and proven approaches. They would provide multiple benefits for communities that not only want to conserve water, but also to find relief from endless commutes, air and water pollution, and disappearing open spaces. All we need is the political will to adopt them.



*American Rivers, founded in 1973, is dedicated to protecting and restoring healthy natural rivers and the variety of life they sustain, for the benefit of people, fish, and wildlife.*

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*The Natural Resources Defense Council is a national nonprofit environmental organization with more than 500,000 members. Since 1970, we have been working to protect the world's natural resources and improve the quality of the human environment.*

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*Smart Growth America is a nationwide coalition promoting a better way to grow: one that protects farmland and open space, revitalizes neighborhoods, keeps housing affordable, and provides more transportation choices.*

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