

# Trends in America



Issue Brief

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## WATER SCARCITY: PREVENTING WATER SHORTAGES

Seventy percent of the Earth's surface is covered by water, yet only 3 percent of the life-supporting compound is drinkable. Of that 3 percent, two-thirds is locked up in glaciers and icepacks, and a mere one-third—1 percent of drinkable water—is located in rivers, lakes and aquifers. The United States' Great Lakes hold 20 percent of the world's fresh water—but even a comparatively water-rich nation like the U.S. is prone to water shortages. Water consumption in this country has doubled over the past 60 years. That trend is largely explained by population increases and citizen migration—the total U.S. population in 1950 was slightly higher than 152 million; today it is around 304 million.

Population growth isn't the only thing that has contributed to water scarcity; the decades following World War II saw rapid increases in overall water use for agricultural irrigation, thermoelectric power and other industrial use—accounting for the majority of water used. Those uses increased after 1950, peaked and leveled off by the early 1980s. The plateau of use was due to more efficient irrigation practices, new and improved industrial technology, and enhanced public awareness on environmental issues. While water used for economic ends has stabilized, however, the amount of water used by the public continues to rise as the population increases, resulting in an overall decrease in available water supply.

Groundwater, which supplies 40 percent of total public drinking water and 97 percent of rural drinking water, has been depleted in much of the U.S.—dramatically in some areas. For example, according to the U.S. Government Accountability Office (GAO), the Ogallala-High Plains aquifer—which provides 30 percent of the nation's water for irrigation—has been reduced to half its original volume in its central and southern reaches. The aquifer lies beneath the nine central states of Colorado, Kansas, Nebraska, New

Mexico, Oklahoma, South Dakota, Texas and Wyoming. Part of the problem is that aquifers refill very slowly, and the Ogallala is being consumed approximately 14 times faster than its refill rate. In addition to dwindling groundwater, depletion of surface water is also a major problem, and can be seen in the receding shorelines of Georgia's Lake Lanier, and Lakes Powell and Mead on the Colorado River; to name a few.

Water scarcity creates a number of problems for states and their residents. Agriculturalists consistently clash with environmentalists over the appropriate amount of water to withdraw from the nation's lakes and rivers. Unfortunately, the two federal agencies most concerned with water supply—the Army Corps of Engineers and the Bureau of Reclamation—have inadequate budgets to efficiently address the problem. The U.S. Government Accountability Office predicted in 2003 that at least 36 states would face water shortages over the next decade. According to that report, water shortages are expected in the next five years. Water-sharing agreements between states will likely play an increasing role in the governance of the nation's fresh water supplies. Stephen E. Draper, chair of the Tasking Committee for Shared Use of Transboundary Water Resources for the American Society of Civil Engineers, cites the institutional framework of water-sharing agreements as being crucial to their effectiveness. According to Draper, effective agreements must be adaptable to changing climatic, hydrologic, economic, social and political conditions. Agreements must also be rigorously enforced and obtain adequate funding. "Without an effective framework," Draper said, "the parties will spend much of their time in dispute resolution rather than effective water management." Water-sharing agreements may soon be a reality for many states—indeed they are already in existence in some parts of the country.



### The States Respond

#### The Colorado River Basin

In the 1920s seven arid Western states (Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming) signed the Colorado River Compact. The agreement was designed to provide balance between the amount of water extracted from the Colorado River by the upriver states (Colorado, New Mexico, Utah and Wyoming) and the downriver states (Arizona, California and Nevada). The compact has become problematic in recent decades; dendrochronologists who study tree rings have determined that the water withdrawal limits of the compact were established in a period of above average rainfall and were too high for sustainable extraction. Evidence of this is visible in the low levels of Lakes Powell and Mead, currently near half capacity, according to the U.S. Department of the Interior. This prompted the seven states to rethink the situation, and

after more than two years of negotiation they came to an agreement. The Interim Guidelines for the Operation of Lake Powell and Lake Mead, crafted in late 2007, gives the U.S. Department of the Interior the authority to declare a water shortage when the river and reservoirs are unable to provide the water that signatory states are entitled to in the agreement. In this case, water deliveries would be decreased based on the levels of the two reservoirs. The pact does not supersede any part of the original compact, but does outline acceptable practices with the responsibility of managing the agreement given to the Interior Secretary.

One key element of the updated agreement is that it allows the downriver states to store surplus water in Lake Mead. Cities such as Las Vegas, which pulls 90 percent of its water from the Colorado River, would be significantly impacted; whereas previously, excess water during periods of abundant rainfall just washed away, they could now be stored for use in drier times. The pact also sets withdrawal limits for periods of below-average rainfall so that no state takes more than its share when water is

scarce, thereby leveling the playing field so that all seven states equally share the risk of drought.

Although the agreement—which will be in effect until 2026—was lauded by Interior Secretary Dirk Kempthorne as the most important agreement since the states began to negotiate the issue in the 1920s, it has not gone without criticism. Environmentalists argue that the decision does not adequately encourage water conservation in exceptionally dry regions. The accord, they argue, implies that growth takes precedence over sustainable resource management. Growth and development tie up water resources indefinitely, and environmentalists argue that the agreement should have focused more on deterring further development in drought prone areas. Other critics cite concerns about the potential effects of climate change on the ability of the reservoirs to regenerate themselves. They also warn that the pact may not be pragmatic for 20 years, and that a renegotiation may be necessary.

## Water Scarcity in the South

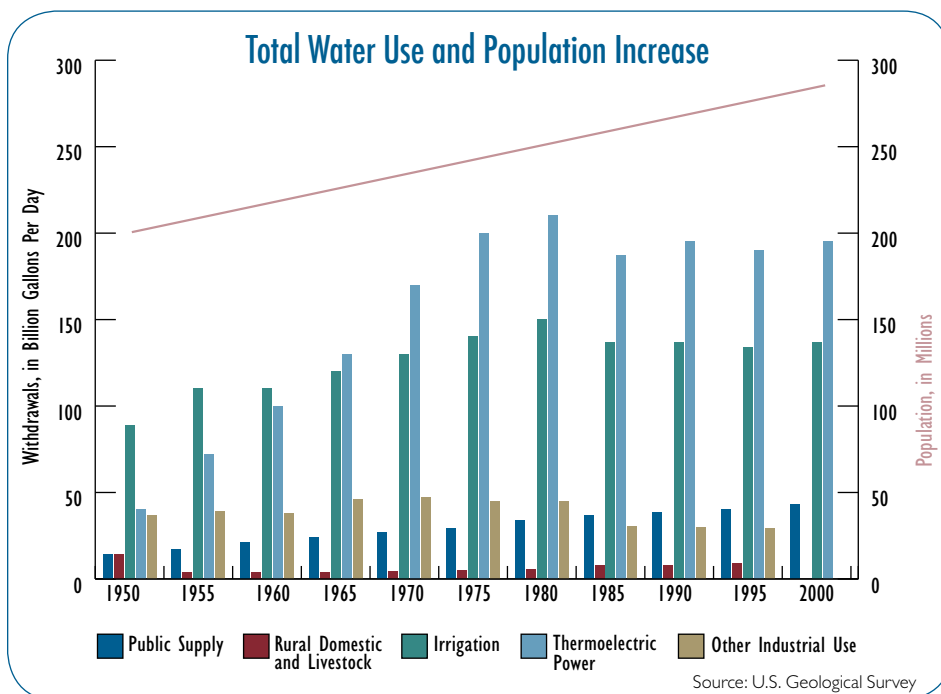
Atlanta's principal water source, Lake Lanier, has become a valuable and sought-

after commodity as the city's population continues to grow. Drought across the Southeast in 2007 created a water shortage in the region that has officials in Alabama, Florida and Georgia searching for answers. The water of the Apalachicola River, which flows south from Lake Lanier, is used in Alabama to produce nuclear power, and is valued by oystermen in the Florida panhandle because it feeds the oyster beds that supply 10 percent of the nation's oysters. According to the Army Corps of Engineers, the water level of Lake Lanier was 14 feet below its January average as of Jan. 21, 2008. The states' governors are currently attempting to reach an agreement on sharing the water of Lake Lanier and the Apalachicola.

The Bush administration tried in November 2007 to broker a deal that would have reduced flows out of Lanier, but the deal was met with heavy criticism from both environmentalists and Florida's oyster industry. Negotiations were ultimately put on hold as the three governors were unable to reach a working agreement. But with concerns about future scarcity fresh in their minds, the governors set a March 15, 2008, deadline for agreement on the issue. Optimism remains high as the states negotiate what could be an agreement that satisfies Atlanta's thirsty population, Alabama's power needs, Florida's oystermen and concerned environmentalists.

## The Great Lakes

Compared to the rest of the country, especially the South and Southwest, the Great Lakes states of Illinois, Indiana, Michigan, Minnesota, Ohio, Pennsylvania, New York and Wisconsin are rich with water. The lakes hold 90 percent of the nation's fresh water, so bordering states have not experienced the same drought and scarcity pains common in other regions. Rather, they are now facing a different dilemma. The surplus water in the Great Lakes has motivated drier states in the South and West to propose piping water from the lakes, a notion that has met firm resistance in the Great Lakes region. To protect their valued resource, the states from the Great Lakes







amounts of energy, and is subject to geographical limitations.

Cities and regions also are leading the fight for innovative water conservation strategies at the local level. San Diego's Ultra Low-Flush Toilet/Urinal Voucher Incentive Program seeks to reduce water consumption by awarding cash vouchers for each low-flow toilet and urinal installed in residential structures and businesses. In Redwood City, Calif., 90 percent of all plants planted on public land are required to be well suited to a dry climate and thus require minimal irrigation to survive.

Another strategy involves requiring new buildings to install equipment that enables collected rainwater to be used for flushing toilets, a process already being used in many buildings in the U.S. State and local governments can also look into recovery systems that reuse what is called grey water—wastewater from sinks, showers and laundry—for non-potable uses such as

flushing toilets and/or irrigation purposes. States can look at Australia as an example; the parched nation in 2007 began offering cash rebates to households for installing grey water pipes.

Additional conservation measures are enforced in certain localities during times of drought. These include bans on watering lawns and spraying down sidewalks and patios; and prohibitions on individuals for washing cars and adding water to private pools and ponds. Many cities now fine individuals and businesses for not adhering to city-wide restrictions on watering lawns.

## Looking Ahead

Many experts on climate change warn that global warming will have direct impacts on the nation's water supplies as well as the ability of those water supplies to regenerate. Other potential effects of climate change are increased drought, smaller snowpacks, receding glaciers, quicker evaporation of surface water, and reduced groundwater levels. Additionally, increased flooding and impacts on water-related recreation that could result from climate change may adversely affect states' economies.

One thing is certain: Population increases will place further strain on the nation's water supplies. States with the highest populations have the highest withdrawal rates and consequently are the states most prone to water shortages. The U.S. Census Bureau estimates that the population in the U.S. will reach 395 million by 2050—an estimated increase of 30 percent. Texas, California

and Florida—states already facing water shortages—will see an estimated 45 percent of that population increase.

Despite these small steps toward water conservation and better water management, Ward Staubitz, a hydrologist with the U.S. Geological Survey, cites various challenges states will face in the future based on a report recently released by the Federal Subcommittee on Water Availability and Water Quality, which falls under the authority of the National Science and Technology Council. Challenges include:

- developing more effective water management strategies that protect aquatic ecosystems;
- developing tools and technologies to make more efficient use of existing water supplies and infrastructure (including energy production, buildings, agriculture and industry);
- developing new treatment and storage technologies;
- developing better information gathering on how water is used; and
- developing better approaches to accurately inventory available ground and surface water.

That report lends credence to the premise that ultimately, a synergy of strategies will be necessary to combat water scarcity in the U.S.

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## Trends in America

The most dominant characteristic of the 21st century is not just change, but the rate of change. Understanding change is the first step toward identifying and implementing effective responses. Trends in America Issue Briefs are designed to help state leaders promote positive change through forward-looking policies and strategic investments.