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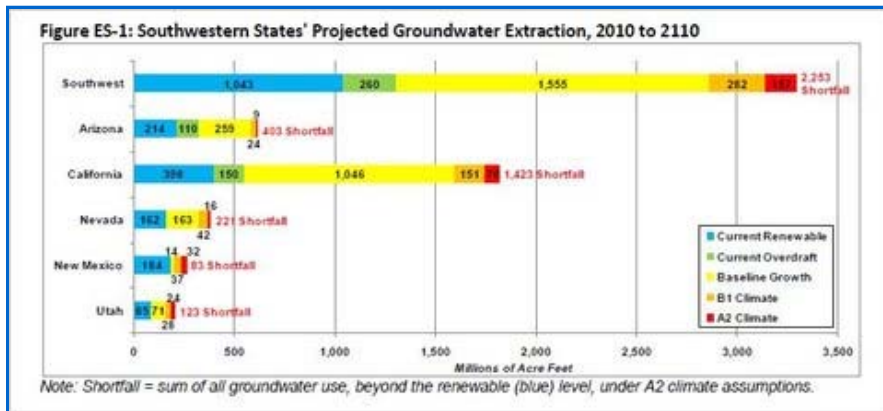
A Blog About Energy and the Environment



February 11, 2011, 2:59 pm

# Southwestern Water: Going, Going, Gone?

By [FELICITY BARRINGER](#)



[Stockholm Environment Institute](#)



The glum projections of the growing gap between demand for water in the Southwest and the dwindling supplies have never been optimistic, but two new studies— one a research report based on satellite data, and the other an analysis of rainfall, water use and the costs associated with obtaining new water — make earlier forecasts seem positively rosy.

The United States branch of the Stockholm Environment Institute, based in Somerville, Mass., just released an extended analysis of water demand and future supplies that estimates that the cumulative shortfall over the next century in the Southwest, without the adoption of adaptation strategies, will be 1.815 billion acre feet. (At the top of the graph above, that's the green and yellow bars combined.) And that's without factoring in a climate-change-driven reduction in supply.

Add that extra climate-change impact, based on mild and moderate projections, and the next century's total shortfall would increase by another 282 million acre feet (orange bar) to 439 million acre-feet (orange and red bars combined).

An acre-foot is generally counted as the amount of water needed to supply two to four average households for a year. The total annual volume from the Colorado River is estimated at 15 million acre feet.

The replacement cost of the water, according to the authors of [the analysis](#), Frank Ackerman and Elizabeth A. Stanton, would be \$2.3 trillion to \$4 trillion over the next century; by 2050 the annual costs would be \$7 billion to \$15 billion in 2009 dollars, the equivalent of 0.3 to 0.6 percent of the Southwest's 2009 gross domestic product.

“Climate change is already causing measurable and unfortunate impacts on water supplies, they write. “The mountain regions of the West are experiencing reduced snowpack, warmer winters and stream flows coming earlier in the calendar year.”

Action will be essential, the authors add. “The bottom-line question about water is not whether adaptation is difficult or expensive, compared to doing nothing,” the authors wrote. “Rather, it should be compared to buying several trillion dollars worth of water over the next century; adaptation is a bargain that the region cannot afford to ignore.”

A good portion of their report focuses on the drawdown of groundwater reservoirs in California's San Joaquin Valley, one of the nation's [richest agricultural areas](#), which depends on water from the Colorado River in the southern part of the state and water pumped southward from the Sacramento and other rivers in the north.

Among Southwestern states, California ranks just after Arizona in the percentage of water use supplied by groundwater: in 2005, it was 33 percent for California and 49 percent for Arizona. In both states, irrigated agriculture accounts for the lion's share of all water use.

The drawdown of underground aquifers has been hard to measure in California because of the state's decades-old policy of not requiring permits for wells or asking for an accounting of the water withdrawn. But satellite data is filling in some of the gaps.

A study just accepted by the journal *Geophysical Research Letters*, written by Jay S. Famiglietti of the Center for Hydrologic Modeling at the University of California, Irvine, along with eight other authors, uses 78 months of satellite data from NASA's Gravity Recovery and Climate Experiment satellites, known as the Grace mission.

As Dr. Famiglietti explained in an e-mail:

The Grace mission accurately monitors the very small changes in Earth's gravity field that result from changes in water stored on land, in the oceans and the ice sheets. So, for example, on land, we can use the gravity data to tell us how much water has entered or left a region like the Sacramento and San Joaquin River basins during a month. We can then use other observations of the snowpack in the Sierras and of the volume of water in local reservoirs to estimate how much of what Grace sees comes from groundwater depletion in the Central Valley.

Using 78 months' worth of Grace data, his team found that the total loss of groundwater from the Sacramento and San Joaquin River basins in California's Central Valley from 2003 to 2010 was just under 16.5 million acre-feet — approximately the volume of the Lower Colorado River reservoir, Lake Mead, when it is full. About 80 percent of that loss, the study estimated, came from the San Joaquin basin. A multiyear drought began in the region in 2006.

“Given the naturally low rates of groundwater recharge in the San Joaquin Valley, combined with projections of decreasing snowpack and population growth, continued depletion of groundwater at the rates estimated in this study may become the norm in decades to come, and may well be unsustainable on those time scales,” Dr. Famiglietti and his co-authors write.

Both studies agree on that unappetizing prediction.



Getty Images Dust billowed as a farmer plowed a dry field in near Buttonwillow, Calif., in April 2009, when the drought was in its third year.

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[1.](#)

Clif

Evanston, IL

February 11th, 2011

1:37 pm

I lived in Phoenix in 1955 when there were many dirt roads and a population a tenth of what it is now.

When I was last in Arizona, about six years ago, I climbed with my son to the top of a small peak (200 feet above the terrain) in northern Phoenix. We did this because I had climbed the same peak decades before and I wanted to see the change.

I was astounded. Where before there had been empty desert, housing no stretched as far as the eye could see. But even more remarkable to me was that a large percentage of the homes had swimming pools. These little blue shapes were everywhere, each of them holding thousands of gallons of water and none within the distance I could make out, in use.

So we have vast numbers of people, more all the time with many indulging in a luxury use of water in an area that, outside populated places, can only sustain cactus. It's not sustainable and this news story on confirms the obvious. What's clear is that people are not thinking about what they do - air conditioning a desert.

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[2.](#)

Denis DuBay

North Carolina

February 11th, 2011

3:01 pm

Get ready, here come the comments denying that climate change is real, or at least not something we have caused or can do anything about. When you begin to add up all the costs of dealing with the effects of climate change, it just might be cheaper to switch to non-carbon-based fuels. But of course the tea-party, oil and coal industry folks know much better about that sort of thing than any bunch of liberal scientists.

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[3.](#)

James

Northern Nevada

February 12th, 2011

5:49 am

One point: the San Joaquin & Sacramento Valleys don't (AFAIK, and geography's really against it) draw water from the Colorado River. Colorado River water goes to southern California & the agricultural area near the Mexican border. These are separated by high mountains and a couple hundred miles of Mojave Desert from the Central Valley, which gets essentially all of its water from the Sierra Nevada & southern Cascades.

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[OldStone50](#)

Germany

February 12th, 2011

5:50 am

Ah! The nobility of the farmer, acting as caretaker of the land!

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[5.](#)

Ace Tracy

New York

February 12th, 2011

5:50 am

Cliff's comments reflect my own astonishment when I first visited Tucson a couple of years ago. I expected homes and yards to reflect its desert location, but the opposite has been developed. HUGE golf courses as green

as you see in the east. Lawns around homes as if they lived in with abundant water. And when you talk to local people, they all agree that it doesn't make sense but no one wants to take any action.

As we are now finding out, throughout history the greatest civilizations usually didn't collapse because of a foreign invader but because of the environmental changes (sometimes man made, sometimes completely natural). I don't go for crying Armagedon but what are we thinking when we allow precious water supplies to go for cotton farming, golf courses, mining, gas extraction, and housing in the desert, to name just a few.

There are solutions but most rely on huge investments and Americans changing their living patters: waterless toilets, desalination plants, environmental rules on industrial water uses, etc. However, Americans are not hearing this and industrial lobbying groups won't let them.

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[6.](#)

ambrit

hattiesburg mississippi

February 12th, 2011

12:52 pm

Friends;

As the articles prove, Stupidity is an option. Unfortunately, it's not a survival strategy.

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[7.](#)

kevin nelson

San Clemente, CA

February 12th, 2011

12:52 pm

Here in So Cal I frequently bring up the subject of massive overdevelopment, how we have crushed nature into oblivion in the mega-city areas and how we might preserve the slivers of resources that are left. Each and every time, the cause comes to the fact that govt choices are made too heavily with money in mind. Whos got it, and who will make the most. When preservation for the future is brought up its, whos going to pay for it? There is no way to solve this until we all demand new laws removing excessive profit from important natural resources such as healthy open land, farmland etc. Local govt is almost powerless in the face of private property rights and greed so the change has to be at state level with something similar to the Coastal Act. Then we can rezone areas and put sustainability into planning before money consumes everything. Egypt just made greater change than this, so we should be able to dethrone money as the dictator of our future and bring nature and future generations to the planning process.

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[8.](#)

mark

phoenix

February 12th, 2011

12:52 pm

To commenter #2....Totally irrelevant! The cause is the huge growth in population as #1 accurately describes and the water demands which such a large population requires for all its needs.

[Recommend](#) Recommended by 1 Readers

[9.](#)

kevin nelson

San Clemente, CA

February 13th, 2011

6:29 am

To commenter 8; the situation with water is exactly the same as with global warming, species extinction, deforestation, resource depletion and water. Every one of these issues is caused by a humanity which seeks more, more, more instead of living simply with enough. Overpopulation may reveal the problem sooner, but it would only be a matter of time before overconsumption and greed caught up to a finite planet.

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[10.](#)

Ed

Wimberley, TX

February 13th, 2011

6:29 am

Golf courses are sometimes a way to handle wastewater affluent. A scenario might be the local water supply company (could be private, could be public) provides water and wastewater services. Say this locale was in an environmentally sensitive setting and the water supply company was restricted from discharging into streams/rivers. Add to this a developer who offers a golf course or playing field as a way to handle discharge (all legal). Put this in the boom - boom years of inflated property values, ponzi-based financial schemes, unencumbered population growth and (gasp!) finite resources and, viola, limits are reached.

Meanwhile, back at the ranch, the bubble burst, the golf course community (and membership) dwindles and the water supply company, which may or may not have supplied all the golf course's needs, is unable to meet the minimum need and the golf course either folds, is made public or seeks groundwater.

The current systems of regulations and development do not encourage, much less promote, adaptation.

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