

On the Colorado River, Climate Change is Water Change

A team of scientists declares in a new report explaining the effects of climate change on the Colorado River that there won't be any "breakthroughs" to save us from water scarcity.

Matt Weiser • Nov. 7, 2016



Tires that were once under water are now high and dry above the water line at the now defunct Echo Bay Marina in the Lake Mead National Recreation Area, May 19, 2016, near Las Vegas. Lake Mead's surface is at its lowest level since the reservoir was created. *John Locher, AP*

The Colorado River basin is undergoing one of the [worst droughts](#) ever recorded, producing those apocalyptic images of Lake Mead and Lake

Powell with their gigantic “bathtub ring” shorelines caused by shrinking water supply.

All the states that depend on the river – Colorado, Arizona, Nevada, California, New Mexico, Utah, Wyoming – have had to scramble to conserve and add new water supplies as a result. And there’s no clear end in sight.

How low can the Colorado go? When will we get back to “normal” winters? Can we blame it all on climate change?

To address some of these questions, the [Colorado River Research Group](#) recently released a concise four-page paper explaining how [climate change](#) is affecting the river. It is a remarkably accessible summation of lots of complicated science. The conclusion is that we simply need to adapt to a future in which water scarcity is the norm.



Douglas Kenney is chairman of the Colorado River Research Group, which helps explain the river’s challenges through a series of policy reports. (Douglas Kenney)

To help illuminate this conclusion, Water Deeply recently spoke with Douglas Kenney, director of the Western Water Program at the University of Colorado. Kenney is also chairman of the Colorado River Research Group, an independent team of scholars from six public universities that explain the

river's challenges in an ongoing series of plain-language [policy reports](#).

Water Deeply: What was your motivation in preparing this latest paper on climate change?

Douglas Kenney: If there is any subject this group should comment on, climate change seems like the obvious topic. Climate change is one of the most misunderstood topics out there. And a lot of the national political discourse keeps trying to convince people that we don't know anything about what's going on with the climate and it's too uncertain.

The reality is, we actually know a lot, and you can already see the effect in the basin. If you're a water manager, you have to deal with climate change.

Water Deeply: One of the really important statements you make in this paper is that "climate change is water change." Tell me more about that.

Kenney: We're certainly not the first people to make that observation or even use that phrasing. Every element of the hydrologic cycle, to some degree, is temperature dependent: when it snows versus when it rains; when it melts, how much evaporates; how much water the plants use; the length of the growing seasons. It's all temperature-dependent.

Water Deeply: You also write that the effect of temperature "overwhelms precipitation changes." What do you mean by that?

Kenney: It gets to this point that virtually every element of the hydrologic cycle is very much influenced by temperature. You can get conditions that are maybe a little wetter or drier. But you start running those scenarios through the climate models and what you realize very quickly when you look at the output is that those modest changes in precipitation really pale in significance compared to the impact of temperature. It's in part because

temperature so much drives the natural uses of water, the natural movement of water.

There's a great observation that two of our members – Brad Udall and Jonathan Overpeck – have made in recent research: Just a very slight reduction in precipitation, largely because it's so warm, can lead to a significant 15 percent or more reduction in actual streamflow.



In this Wednesday, Oct. 14, 2015 photo, a riverboat glides across Lake Mead on the Colorado River at Hoover Dam near Boulder City, Nev. The bathtub ring shows how far water level has dropped in recent years. (Jae C. Hong, AP)

Water Deeply: How much remains unknown in all this?

Kenney: It's really difficult to determine if the future is going to be wetter or drier. If you asked me that question five or six years ago, I would have said

it's probably going to be a little bit drier. Now I'm maybe leaning toward a little wetter. But in both cases, it's really difficult to say with any precision. It turns out temperature is a lot more important. Temperature has a lot more to do with how much of that precipitation makes it to the stream, be it rain or snow.

Those of us in the academic world are going to keep working on this and debating this for a while. But I think what we've come to appreciate is we don't need the answer right now to make decisions about what the future is going to look like and what we need to do.

Water Deeply: You state in this paper that "assuming drought will end is naive." Why was it important to make that point?

Kenney: The fact is, we're just not going back to life as usual. The Earth is warmer and it's going to get a lot more warm as we go forward. So this idea that we're going to get back to normal conditions – the conditions we had last century – is just not going to happen. And it's not going to happen because of all the heat trapped in the atmosphere and the ocean. Those greenhouse gases that have been emitted over the last several decades, they're going to circulate in the atmosphere for a while even if there are dramatic global changes in greenhouse gas emissions.

It's no longer about how do we manage to get by one more year. Then you start thinking about how do we transform our water management in a way that is sustainable from year to year – that we get to a situation where we're not using more than Mother Nature provides. Once you reframe your activities through that lens, then you can make a lot of progress.

Water Deeply: Where are political leaders on this, in your experience?

Kenney: Political leaders, they run the full gamut of thinking when it comes to issues of climate change. During this presidential campaign, we've heard

from one side that climate is a very serious issue. On the other hand, we've heard that climate change is a hoax perpetrated by the Chinese.

Those in the water management community, about four or five years ago I think they just decided we're not going to deal with all the political rhetoric. The fact of the matter is, it's just something that's causing us real management problems on the ground and we're just going to deal with it. None of them is talking about climate change as a political or ideological issue anymore.

Five or 10 years ago, when water agencies were planning for the future, most of them weren't planning in climate change. Nowadays, it's really rare when I see a water agency that is not doing that.

Water Deeply: You also write that we should not count on any scientific "breakthroughs" to solve the climate change problem. Why not?

Kenney: There are breakthroughs of multiple types here. One is the scientific breakthrough when it comes to climate change and what's going to happen. A lot of people like to say, "Well, the science is unsettled and it's kinda all over the map. Once the scientists figure out exactly what's going on, then we'll listen to them." That's one of the breakthroughs that's just not going to happen. There are certain things science is very good at, like understanding and precision. But other things, like whether it's going to be wetter or drier in future, that's very hard to tell.

There's also not likely to be any great technological fix that changes how much water is available. The most effective tools in water conservation over the last 25 years have been new efficient toilets and higher water pricing. No one's winning Nobel prizes for those inventions. This isn't high-tech stuff. Likewise, in the agricultural sector moving from flood irrigation to sprinklers and drip irrigation, it's not rocket science.

If you're looking for breakthroughs, they're going to be in the form of new incentives that reward people for using less water and give people a reason to try to be innovative.

Water Deeply: Given that context, what's the state of the Colorado River water supply today, in your view?

Kenney: The reality is, there's a lot of water in the Colorado system today. The other reality is, most of the water that we're using we could use more efficiently. There's a lot of room for improvement.

We need to accept the fact that Lake Powell and Lake Mead will probably never be full again. We need to deal with the reality that not everyone will get as much water as they want or as much as they were promised. We just have to use water more efficiently, a little belt tightening and that sort of thing, and then most of this becomes very manageable.

What scares me, if you really want to dig deep here: The worst-case scenario here is the prospect of megadrought, which is a drought that would last decades. The science increasingly says our risk of megadrought is much higher than we've appreciated. Something like that could overwhelm the conservation and the belt-tightening. If something really serious like a megadrought happens, then things could get very ugly very fast. If we can avoid that, at least for a while, then things are pretty manageable.