

Feeling Salty in the Colorado River

By Amelia Munson

Salt is the key ingredient to make flavors sing in many recipes. It can be the difference between a bland chicken and a succulent dinner. Sprinkled on caramel, it has become a trendy addition to desserts. And yet to the nearly 33 million people who depend on the Colorado River for water, salt means something different.

Gabriel LaHue, a graduate student in the Soils and Biochemistry Graduate Group at the University of California, Davis explained that salt is a major water quality problem in the Colorado River.

For researchers like LaHue, “salt” means something different than just the little shakers full of white crystals found in kitchens across America. That salt-sodium chloride-is just one of many different chemical compounds that are formed when an acid and base react. Depending on which acid and base react, different salts will form. Other common salts include substances such as gypsum, calcium chloride and potassium chloride. All of these can dissolve in water and increase the salinity of a river like the Colorado.

As the Colorado river flows south toward Mexico the salinity increases from about 50 mg L⁻¹ to 900 mg L⁻¹. Overall the river transports enough dissolved salts each year to fill 1800 Olympic-size swimming pools, claims LaHue. And this amount is increasing-it is currently nearly double historic levels. The problems with increased salinity are likely to become even more pronounced in drought years.

Increased salinity in the river causes problems for the irrigation of crops, the animals that live in the river and people who depend on it for drinking water. Damage to crops has necessitated the construction of drainage wells to remove excess irrigation water and limit the amount of salt that accumulates near the roots of crops. Managing salinity levels in the Colorado River is made even more important by treaties with Mexico that limit the amount of salt that can be in the water when it reaches the boarder.

All of these factors have important financial consequences as well-the US alone currently faces \$300 million worth of salinity damages!

With such a steep economic consequence it is important ask “where does all of this salt come from?” Some of the salt is natural, LaHue explains. To understand why this is, it is helpful to know how the Colorado River Basin formed. Many of the rock formations that the river runs over and through were actually formed in a shallow *marine* environment. This means that many of the rocks present are rich in salts. As groundwater runs past these salt rich rocks it absorbs some of the salts and forms

“saline springs,” essentially sources of concentrated salty water that mix with the greater Colorado River.

However not all of the salinity in the Colorado is from natural sources. Agricultural practices in the areas surrounding the basin also add salt to the river. As LaHue explained, crops concentrate salt because the salt is left behind after the plant takes up the water. Additionally irrigation practice increase the amount of water the flows through soils with concentrated salts in them, further increasing the amount of salt that makes it’s way to the Colorado River. While the majority of salt in the river comes from natural sources it is perhaps the agricultural practices that are most concerning in light of the increasing salinity seen in the river.

While desalination plants like the Yuma Desalination Plant have been constructed to treat agricultural runoff, these plants are costly to build and operate. The Yuma plant is currently only being used as a reserve source for the event that salinity levels fail to meet standards set by international agreements.

The Colorado River Basin Salinity Control Forum was created in 1973 to coordinate efforts of the states and Federal government to control the salinity levels in the Colorado River. Strategies for decreasing the flow of salt into the Colorado River include improved irrigation practices, erosion control and reduction of point sources. While these efforts have helped to limit the increases in salinity of the river, the problem remains one that must be aggressively monitored in order to serve the water needs of the agriculture, industry and municipalities.

The Colorado River is important for many reasons, but its connection to agriculture cannot be understated. Water from the river is used for irrigation of crops that much of the country depends on. However, increasing salinity in the river can cause damage to crop plants. Ironically it is the very agricultural practices that it has hurt that have, in part, caused the increases in salinity in the first place.

In conclusion, while salt has the power to make the flavors in broccoli and other vegetable stand out, it also has the power to kill the crops before they even make it to the kitchen table. Monitoring and managing salinity in the Colorado River thus is important for a healthy and productive agriculture system.

Additional sources used

Colorado River Basin Salinity Control Forum-
<http://coloradoriversalinity.org/index.php>

Salinity in the Colorado River Basin-

https://watershed.ucdavis.edu/education/classes/files/content/page/6%20Morford-Colorado_Basin_Salinity.pdf

