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Your Turn

Your Turn: Climate change, upland development and Napa's drinking water reservoirs

Patrick Higgins Jul 16, 2019 Updated 23 hrs ago

Climate change is causing toxic cyanobacteria proliferation world-wide including in Australia, China, New Zealand, North America and even in the Bay Area.

Commonly known as blue-green algae, cyanobacteria are actually ancient organisms that are photosynthetic bacteria. These organisms thrive in warm water and, while not all cyanobacteria are toxic, species capable of producing toxins are causing serious problems for human and animal health around the globe.

In addition to the warming of the atmosphere and water, nutrient inputs from human activity are a common co-factor stimulating toxic blooms. There is a lesson here for Napa River watershed residents.

Nutrient enrichment associated with intensive agriculture caused Lake Chaohu in China to pass a tipping point and become dominated by a species of cyanobacteria that produces toxins that attack the liver. Long-term exposure is also associated with multiple sclerosis and other neurological disorders. This infestation deprived 20 million people of drinking water and caused the loss of thousands of fishing jobs as fish populations in the lake crashed.

Australia has a long history of toxic cyanobacteria problems in some of its large, shallow lakes that are naturally nutrient rich. But now, cyanobacteria are dominating river systems, including the Murray River that turned toxic in a reach 775 miles long, the result of a warming climate and nutrient enrichment associated with agriculture. Reservoirs at the headwaters and along the Murray River stall the water in the hot sun, promoting toxic cyanobacteria blooms.

Since 2000, New Zealand rivers have been plagued with a neuro-toxic cyanobacteria that covers streambeds and kills livestock. Intensive use of chemical nitrogen fertilizers are coincident with the occurrence of blooms; excess nitrogen has leached into groundwater and is being transferred to streams.

In the United States, in 2018, widespread blooms along the Gulf Coast and the Atlantic coast of Florida caused hundreds of millions of dollars in lost revenue associated with tourism. Diminished freshwater flows from the Everglades and nutrient influxes into the Atlantic Ocean from sugar cane farms are causing toxic cyanobacteria blooms.

Currently, flooding of Midwestern farmland is delivering nutrients to the Mississippi River, stimulating hazardous algae blooms in the Gulf of Mexico that have killed the oyster beds. Mississippi beaches are closed and the impact on the tourist economy is similar to that of the catastrophic 2010 Horizon oil spill.

In California, the Klamath River is plagued with toxic cyanobacteria, fueled by nutrients from farming on the wildlife refuges. The water impounded by the Klamath Hydroelectric Project reservoirs incubates a liver dissolving cyanobacteria that poisons the Klamath River all the way to the Pacific Ocean.

The San Joaquin Delta is turning cyanotoxic, likely as a result of residual herbicides used in the San Joaquin River basin that are killing the Tule marshes that lined the shores. Marshes create mildly acidic conditions that cause cyanobacteria cells to break open and blooms are poisoning drinking water, making water unsuitable for agriculture, and decimating amazing fisheries.

The East Bay Municipal Utility District reservoirs are developing neuro-toxic cyanobacteria blooms along their margins. These reservoirs are shallower and more open to the sun than Napa River reservoirs, but that doesn’t mean the Napa reservoirs are not in danger of flipping from clean, cold water ecosystems to warm, cyanobacteria-dominated ones.

Vineyard development promotes increased runoff in winter and diminished base flow in late summer and fall. Flows in most Napa River headwater streams have already been depleted, so additional water withdrawals and altered hydrology will cause seasonal loss of surface flow. Drinking water reservoirs are at risk of warming and may pass a tipping point to where they support toxic cyanobacteria. As coldwater base flows from tributaries diminish, so will the coldwater lens deep in the reservoir that helps moderate surface temperatures and prevent noxious algae blooms. Nutrient runoff and soil erosion from vineyards on steep uplands could also fuel the blooms.

If Napa Valley drinking water reservoirs turn toxic, the problem will likely be irreversible. Will the Napa Valley still have the same mystique if the Napa River and its tributaries run dry, and your reservoirs are choked with cyanobacteria? Where would a new drinking water supply come from to replace the existing resource? How much would that cost?

Protection of upland areas, similar to what was recently proposed by the initiative Measure C, is needed to prevent the Napa County Supervisors from allowing continued irresponsible upland development. Increased tax revenue is a strong incentive to develop, but the rationale that harm from development can be fully mitigated by implementing “best management practices” is a myth. There are prudent limits to development, because nothing can provide the ecosystem service of clean water better than wild upland areas of a watershed.

Patrick Higgins has been a consulting fisheries and watershed scientist for over 30 years and helped assemble a northwestern California river and watershed information system (www.krisweb.com). Pat's recent work in the Eel River includes basin-wide cyanotoxin assessment (www.eelriverrecovery.org/algae). He wrote this on behalf of the Growers/Vintners for Responsible Ag.

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