Study shows climate change makes some chemicals more toxic to aquatic life

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Some areas of the southern United States are suffering from the longest dry spell since 1887 and a new Baylor University study shows that could prove problematic for aquatic organisms.

The Baylor study found that drought conditions make some chemicals in the environment more toxic to fish and other aquatic life. Specifically, the study found that drought conditions exacerbate the magnitudes of the natural pH shifts in the water. This is important, the researchers said, because some contaminants in the water, such as ammonia, are more toxic to aquatic life depending on the pH level. Also, more than 75 percent of the essential drugs described by the World Health Organization and approximately one-third of modern pesticides have ionizable groups of compounds. These "weak base" compounds when dispersed in the environment can become more toxic to fish when surface pH levels are high.

The findings appear on-line in the journal *Integrated Environmental Assessment and Management*.

"The importance of this work is it shows that we may be underestimating or overestimating the adverse effects of some chemicals on fish," said study co-author Dr. Bryan Brooks, associate professor of environmental science and biomedical studies and director of environmental health science at Baylor. "How drought conditions, especially those influenced by climatic changes, impact fluctuations of the water's pH level is just now emerging as an area of concern in regards to making certain

chemicals more toxic and more likely to accumulate in fish."

The Baylor researchers took samples at different times over the course of two years at 23 streams across the southern U.S. and measured how ecosystem production and respiration, dissolved oxygen content, the amount of phosphorus and nitrogen, and pH level changed over the course of a day. The researchers found that in the year that was one of the driest on record, the fluctuations of the water's pH level was extreme and coincided with increased toxicity to aquatic life.

"Future water scarcity associated with global climate change and altered precipitation patterns may profoundly impact in-stream flows in semiarid regions, which have direct implications for water resource management," said study co-author Dr. Ted Valenti, a former Baylor doctoral student. "Predicting the cumulative effects of climatic variability on the risk of contaminants may require a significant shift in the environmental assessment and management approaches for freshwater systems."

Provided by Baylor University

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