Editor's Message: Impact of politics on USA water quality monitoring, protection and management

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The interaction between humans and natural hydrological systems is of great interest to hydrogeologists, with ~40 articles published on this topic in *Hydrogeology Journal* in 2017 alone. Much of this work involves the monitoring of these systems at various temporal and spatial scales. It is obvious to hydrogeologists and hopefully to water resource managers that the monitoring of known pollutants is essential for maintaining the health of those consuming this essential resource. Additionally, for natural ecosystems, monitoring helps expose detrimental human impacts and hopefully offers approaches to their remediation. We expect that the information hydrogeologists provide will be incorporated into public policy resulting in the provision of a reliable and clean water supply to our population and reliant ecosystems. However, examples such as high lead concentrations found at Flint, Michigan (USA), and pollution of groundwater resulting from the process of hydraulic fracturing (fracking) show this is not always the case. These cases were a direct result of lack of attention paid to water monitoring.

Recently, I requested permission from a regulatory agency in the USA to investigate the presence and/or concentrations of pharmaceuticals and personal care products (PPCPs) in a surficial aquifer. Septic tanks, a common source of these PPCPs, are still used as the primary and often the only water treatment facility in certain rural and even some urban areas in this state. These chemicals have been detected in wells used for drinking water (Schaidler et al. 2014) and water discharged from city water treatment plants (Daughton and Ternes 1999). A worrisome finding is that these chemicals are endocrine

disrupters and potentially causes of various types of cancer (Daughton and Ternes 1999). I discussed my proposal with an environmental scientist at the agency who expressed interest in the study but said it required approval from management. My impression from our discussion was that this was a mere formality. I was surprised, maybe naively, and somewhat concerned when my request was denied. The reason given was that the organization did not want to be involved in any studies of pollutants that it was not required to monitor, which included PPCPs.

This exchange got me thinking about the politics of water monitoring. When I asked my contact whether this denial resulted from the agency's prescribed mandate or whether there was something political behind this decision, the response was "probably both". Purposely, I do not mention this specific regulatory entity because I do not want to jeopardize any future interactions I may have with this organization. The response "probably both" brought to mind what I call the "Ostrich Syndrome", namely if one cannot see it, then it's not a problem. Using this analogy, if the agency is not required to measure PPCPs, then if future health issues arise from the population being exposed to these contaminants, then that entity can claim that they were not given the mandate to collect this data. I can imagine that it is the nature of the health effects of PPCPs that may partially be behind the decision not to monitor for these constituents in the surface waters and groundwater. It takes long exposure to these chemicals to produce negative health effects due to their low levels in the water, i.e. the process of bioaccumulation (Wu et al. 2013; De Solla et al. 2016).

This lack of monitoring, that I had hoped to address in my study, I have come to see as a microcosm of what is playing out on the national stage. With the current federal administration, the main governmental agency responsible for protecting the water quality of this nation, the US Environmental Protection Agency (EPA), is under siege. The current chief

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administrator has made it clear that environmental regulations are restricting economic growth. However, if the US environmental/economic history is any guide, these very regulations, despite the costs to industry which are ultimately passed down to consumers, have had a net benefit to the US economy amounting to many millions of US dollars. For example, the EPA cost/benefit analysis found that the 2015 proposed revision to the regulatory term “waters of the US” could have net benefits of between \$US 32 and 191 million (EPA 2015); however, in February 2017, the current administration announced it would rescind this rule.

Arguably, it was the lack of environmental regulations that led to the poor water quality in much of the USA which motivated the creation of the EPA and the Clean Water Act of 1972 (Hecht and Fiksel 2017). During the 1970s, there were extreme examples of groundwater contamination such as the “Valley of the Drums” in Kentucky and the “Love Canal” in New York. This latter example led to the creation of the 1976 Resource Conservation and Recovery Act (Myers 2015). Recent political pressure on the EPA has led to 400 scientists leaving the agency, some of these are individuals who had knowledge of the value of groundwater monitoring as a safeguard for the nation’s water supply. Additionally, EPA grants amounting to \$US 236 million may be in jeopardy, which include funding for water monitoring (EPA 2017).

It is not only the threat to the EPA that is worrying. The US Department of Agriculture (USDA) has also lost many staffers with firsthand experience of the impact that agriculture has on our groundwater. These staffers are being replaced with political appointees with no experience in agriculture and certainly not in its impact on groundwater (National Public Radio 2017). How can we expect such individuals to understand the importance of regulating the agricultural sector so that our waterways and groundwater will be protected from agricultural pollution? Additionally, this agency has provided research funding for reducing the negative impacts of agriculture—for example, the USDA made available \$2 million in 2016 to help farmers install edge-of-field stations that monitor water quality as it leaves their fields. In 2017, the USDA provided over \$US 4.7 million in research grants that included water monitoring (EPA 2017). How will these research funds be allocated in the future with the push for deregulation?

I do not suggest that water monitoring will cease in the future or that governmental agencies will no longer support relevant programs. National legislation stipulates that monitoring must occur. Such regulation includes the Integrating Clean Water Act Sections 305(b) and 303(d) on monitoring and assessment of state waters. These sections require states to provide lists of impaired water bodies and they require that water monitoring must be an integral part for states to receive Section 106 grants for administering water-pollution-control programs. Water monitoring programs at all levels of government are essential for maintaining public health, advancing

scientific knowledge and protecting the natural environment; however, expenditures—appropriations for monitoring and assessment can vary significantly, thereby making consistent rigorous monitoring difficult. For example, the Minnesota Pollution Control Agency’s water quality monitoring and assessment program, funded by the state’s 2006 Clean Water Fund, had appropriations that varied from the fiscal year 2016–2017 at 11% to the fiscal year 2018–2019 projected to be 18%. In the case of Flint, Michigan, the state’s Department of Environmental Quality, the agency responsible for detecting lead in drinking water, had its 2010 annual budget reduced to approximately \$1.5 million, a \$300,000 decrease from the previous fiscal year (EPA 2010). Obviously, changing appropriations for water monitoring programs can make implementation of regulation requiring monitoring a complex issue and even threaten public health.

What steps can hydrogeologists take to improve public awareness of the need to protect our groundwater that is being threatened under the current political regime? No quick and easy answer exists to this question and the concerns of scientists are often ignored. For example, in 2015 the EPA Regulations Manager of the Groundwater and Drinking Water Branch, Miguel Del Toral, informed Thomas Poy, the branch chief, that high lead concentrations had been found in Flint’s drinking water (Pieper et al. 2017). The environmental and health concerns of high levels of this contaminant were raised by Dr. Marc Edwards who alerted the Flint public of this threat. The Poy report was ignored leading to the 2016 crisis and the subsequent State of Emergency declaration by President Obama. Intimidation is another strategy used, as found by Dr. Tyrone Hayes of UC Berkeley. He determined that a common herbicide, atrazine, in high concentrations can produce sexual abnormalities in frogs. Syngenta, the company that produces this herbicide, consequently tried to discredit Dr. Hayes research and even prevent the EPA from banning this chemical (Aviv 2014). The Center for Regulatory Effectiveness, run by a consultant of Syngenta, was the organization that petitioned the EPA to prevent this ban from being instituted. Syngenta also formed a panel of scientists to critique his findings even though his research had been published in the *Proceedings of the National Academy of Sciences*, a top scientific journal. In 2012, Syngenta paid out \$US 105 million to settle class-action lawsuits pertaining to the presence of atrazine in drinking water (Aviv 2014).

Returning to the question of what steps can hydrogeologists take to improve awareness, public education is one answer, whether it be organizing public information campaigns of water management authorities, exhibiting our research in public venues such as science festivals or even speaking at local schools. As academics, we sometimes feel that publishing our research in journals such as the *Hydrogeology Journal* is enough, but to be blunt, the public does not read such publications. Nevertheless, I do recognize that scientists have

increasingly been engaging with the public to highlight the need to protect our water resources. One such example is the education activities of the American Water Works Association's *Drinking Water Week*. Despite my concerns about the future of the US EPA, the agency has been proactive in public education regarding water safety.

Similar aforementioned issues that I have outlined can be found globally, so the USA is not alone in this matter. In 2015, high levels of heavy metals were found in Hong Kong's drinking water servicing numerous public housing estates and schools (Westcott and Chen 2015). The Vaal Dam in South Africa, which supplies drinking water for over 20,000 people, is heavily polluted (Lynch et al. 2016). However, as the USA is the richest economy in the world, one would expect that we should not share the same concerns regarding water quality. I conclude with the hope that it does not require becoming whistleblowers, as did Dr. Marc Edwards (McQuaid 2016), to force public officials to fund the monitoring and protection of the most important resource they offer.

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