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2/28/2020 Workshop

This paper was the work of many multidisciplinary scientists and engineers across academia and industry. Chris Mebane works for the USGS as a “dirty water biologist”. He studies ecology of pollutant rivers. Dr. Chowdshury is the International Lead Associations Science Manager. Dr. De Schamphelaere is a Professor of Ecotoxicology, who studies risk assessment of chemicals and other anthropogenic stressors in the environment. Dr. Lofts is a soil and water chemist, Paul Paquin and Rob Santore are environmental engineers from New York, and lastly Dr. Chris Wood is a zoologist who studies fish. This is interesting because it is a very broad and interdisciplinary collaboration.

This article is especially cool because it introduces a typically under analyzed component of surface water quality modeling: the impact on biodiversity and ecosystem health. If we want to be able to conduct rich, robust, watershed level management of a water body we need to incorporate these models into our research. I also think we should care because inorganic chemistry is also an underutilized aspect of environmental engineering.

There are several models outlined in this paper. Since this is a review paper, we get to see a wide variety of models and how they are used. This paper introduces a deep history of how each model was developed, and how decades of research has sharpened each model accordingly. Current advances in coupled inorganic water quality modeling has allowed us to understand the physiological underpinnings of ecosystem health and helps us understand what specific water quality parameters have toxic effects on fish.

This paper was extremely robust, linking traditional water quality modeling to hardcore biochemical analysis. This paper even discussed pathways in biochemistry (my favorite), different types of inorganic ligand binding models, and other common water chemistry models. I have few, if any, additional insight to give aside from perhaps creating a table like I did to summarize all of them.

The fundamental idea that is tackled in this paper is that you can introduce multiple elements from several models to develop a model that assesses multiple important parameters for water quality management. Biodiversity and ecosystem health are essential for human lives: it is intrinsically tied to us through the various ecosystem services they provide. Accounting for ecotoxicity and making sure water quality parameters account for the health of wildlife is a very important aspect of water quality modeling.