Water Quality Standards: Designated Uses (Newsletter)*

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The EPA requires states to protect designated beneficial uses of water such as municiple water supplies; protection of fish, shellfish, and wildlife; and recreational, agricultural, industrial, and navigational purposes. States are required to examine the suitability of a water body for designated uses based on physical, chemical, and biological characteristics as well as its geographical setting, scenic qualities, and economic considerations.

EPA's highest designated use is "fishable/swimmable". All designated uses are to be assessed to determine whether they do, or can, attain suitable quality. Unfortunately, the agency does not specify a quantitative process for use attainability analyses (UAAs), nor does it offer guidance for measuring attainment status of designated uses or how designated uses are affected by changes in the physical, chemical, or biological characteristics of the water body. Regulated companies holding NPDES or WPCP discharge permits also need to know this information to make informed decisions about operations.

Sometimes, when regulatory staff are asked how a designated beneficial use is defined, and how water body characteristics affect the use's attainment status. they responded with a chemical concentration value; below that value there's an assumption of no adverse impacts, above that value there's an assumption of adverse impacts. If you suspect this is rather subjective, arbitrary, and capricious you are correct: it is.

There is a robust statistical approach to quantifying the status of designated uses and predicting changes based on the relative influences of each causal factor that affects it. This approach is Partial Least Squares-Path Modeling (PLS-PM). It is too complex to explain in a brief newsletter so a white paper is being written describing how PLS-PM works and how to use it to quantify designated uses and measure changes over time and space. (For those who want more technical details, path modeling is a sub-set of structural equation modeling, SEM.) Applying PLS-PM models using agency staff and other technical inputs quantifies the status of the use and relative influences of factors that contribute to that use. The result is a quantitative answer to the frequently asked question, "So what if this chemical concentration exceeds the threshold value?"

More importantly, for permit holders and regulators who need to answer to their legislatures and public, PLS-PM can incorporate the physical, biological, and geographical components that the EPA wants included in setting water quality standards. Adopting this statistical approach offers potential savings of time and money and might reduce the likelihood of appeals, challenges, and lawsuits.

When an operation is designed to last for a number of years, as many mines and manufacturing facilities are, the investment in defining the causal relationships of designated uses and acquiring necessary data not already available can be amortized over the anticipated life of the operation. The benefits of having defined the quality of designated uses of receiving waters may not be immediately apparent, but your experiences with regulator and public concerns during permit acquisition and compliance will guide you in determining if this approach might have value for you.