Lakes, landscapes, and R: A framework for open research on freshwater cyanobacteria

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## Abstract

In the last several years scientific reproducibility has been a hot topic with several fields openly struggling with reproducing and replicating research results. One of the key tools to address reproducibility is the use of open source software. Increasingly in ecology, the R langauge for statistical computing is the open source software of choice for analysis and programming tasks. Our research group has also made the choice to invest in the use of R for our work. In this poster we share examples of how we use R to help build an open foundation for our work on understanding how water quality, landscapes, and limnological processes interact to control cyanobacteria blooms. In particular we discuss three R packages - lakemorpho, elevatr, and goatscape - that we have developed to facilitate our research. The lakemorpho package provides the ability to more easily reproduce calculation of lake morphometry metrics. One of the data requirements for lakemorpho is access to elevation data. In response to this need, we developed elevatr to provide access to digital elevation models and point elevation estimates for anywhere in the world. Lastly, we are developing goatscape to provide the ability to reproducibly summarize key landscape metrics within an input landscape polygon. We will illustrate the use of these packages with examples form our own research on landscape and water quality drivers of cyanobacteria. While these tools have direct applications to landscape and limnological research, they are more broadly concevied such that they can benefit the larger landscape ecology community and help facilitate openness and reproducibility of a variety of landscape ecological research efforts.