Spatial prediction on a river network (Former title: Spatial prediction of stream-system quality from a stream-monitoring network)

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Abstract

In this article, we develop methods for spatially predicting daily change of dissolved oxygen (Dochange) at both sampled locations (134 freshwater sites in 2002 and 2003) and other locations of interest throughout a river network in South East Queensland, Australia. In order to deal with the relative sparseness of the monitoring locations in comparison to the number of locations where one might want to make predictions, we use the notions of stratification from survey sampling and (ordinary and constrained) kriging from geostatistics. Because of their directed-tree structure, rivers and streams offer special challenges. A complete approach to spatial prediction on a river network is given, with special attention paid to environmental exceedances. The methodology is used to produce a map of Dochange predictions for 2003. Dochange is one of the variables sampled as part of the Ecosystem Health Monitoring Program conducted within the Moreton Bay Waterways and Catchments Partnership.