

## Linking landscapes to ecosystem services: Landscape structure as an indicator and predictor of water clarity in New England lakes

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Lakes provide ecosystem services such as recreation, clean water, aesthetics, wildlife habitat, and nutrient attenuation. While numerous methods exist to monitor these services (e.g. visitor counts, opinion surveys, water quality monitoring, etc.) they are labor intensive to collect and difficult to implement in broad-scale monitoring programs. An alternative is to use linkages between landscapes and ecosystem services to monitor services over large areas. In our research, we are exploring the feasibility of this approach with relationships between water clarity and landscape structure. Water clarity, measured simply by Secchi depth, is an excellent predictor of recreational and aesthetic quality of lakes as well as habitat suitability for charismatic species (e.g. Common Loon, *Gavia immer*) whose presence can be shown to increase lakeshore property values. Furthermore, water clarity is related, in part, to nutrient loads derived from the surrounding landscape. To begin our work on landscape structure and water clarity, we have compiled data on lakes in New England collected as part of the US EPA's National Lakes Survey and the New England Lakes and Ponds Survey. For each lake catchment, we measure landscape structure of sinks and sources of nutrients and calculate proportion, inverse distance weighted proportion (a measure of proximity), and weighted flow accumulation (a measure of connectivity). We compare these to measured Secchi depth to determine if source composition, proximity and/or connectivity is related to water clarity. Results of this research will inform future efforts to identify source patches that due to their configuration on the landscape contribute nutrients in amounts disproportionate to their size. This information will likely improve conservation, restoration and other landscape level management decisions.

**Purpose statement:** The purpose of this research is to explore how structure of landscapes relates to clarity of water in New England lakes. This research will provide useful information on how location within a watershed impacts aquatic ecosystem services.

**Keywords:** ecosystem services; water clarity; connectivity; National Lake Assessment