APPLICATION OF MULTIVARIATE STATISTICS IN DETECTING TEMPORAL AND SPATIAL PATTERNS OF WATER CHEMISTRY IN LAKE GEORGE, NEW YORK

Authors: B. Momen, L. W. Eichler, C. W. Boylen, and J. P. Zehr

Source: ECOLOGICAL MODELLING Volume 91, Issues 1-3, 15 November 1996, Pages 183-192

Abstract: Cluster and component analyses were used to identify temporal and spatial patterns of water chemistry in Lake George, a meso-oligotrophic lake in northeastern New York, during 1981–1993. The lake includes two major basins that have similar area and volume, but different biological community structure, plankton assemblages, watershed area, and watershed development. Analyses were based on total phosphorus, particulate phosphorus, dissolved organic phosphorus, dissolved inorganic phosphorus, nitrate, calcium, chlorophyll *a*, silica, chloride, and pH, individually or in combinations. Total phosphorus, chlorophyll *a*, chloride, and particulate phosphorus were included in the first linear component indicating that these are probably the most important analytes in explaining the total variance of the data. In spring or summer, three or four components explained 86 or 84% of the total variance, respectively. Cluster analysis based on the major components or on the original variables indicated that there are distinct differences in water chemistry between the two major basins of the lake. The only long-term temporal pattern that could be detected by cluster analysis was an increase in chloride concentrations. Cluster analysis is found to be a useful tool to detect both step (abrupt) and monotonic (gradual) changes in time and space.

Full article can be found at: http://dx.doi.org/10.1016/0304-3800(95)00189-1