



Performance assessment of water quality monitoring system and identification of pollution source using pattern recognition techniques: a case study of Chaohu Lake, China

Yunfeng Xu^a, Chunzi Ma^a, Shouliang Huo^b, Beidou Xi^b, Guangren Qian^{a,*}

^a*School of Environmental and Chemical Engineering, Shanghai University, No. 333 Nanchen Road, Shanghai 200072, P.R. China*

Tel. +86 021 66137758; Fax: +86 021 66137758; email: grqian@shu.edu.cn

^b*Chinese Research Academy of Environmental Sciences, No. 8 Dayangfang, Beijing 100012, P.R. China*

Received 21 October 2011; Accepted 6 February 2012

ABSTRACT

The present study intends to evaluate the properties of two pattern recognition methods, principal component analysis (PCA) and cluster analysis (CA), for a better management of the water quality monitoring systems, and then to identify those lake areas with similar pollution behaviors and possible pollution sources. These methods were employed to analyze the four indexes: chlorophyll-a, secchi depth, total nitrogen, and total phosphorus, and were compared with each other. The results indicated that the classification outcomes by the PCA were consistent with those by the CA. Twelve monitoring sites were classified into 5, 7, or 8 groups based on their similarity characteristics of the pollution level. In addition, the pollution sources in the Chaohu Lake were mainly exogenous pollution, derived from the four rivers into the lake. These facts demonstrated that the PCA and CA methods had a great application potential for a better management of the water quality monitoring system, and the present paper provides a case study for many other lakes in China.

Keywords: Chaohu Lake; Principal component analysis; Cluster analysis; Water quality monitoring system

*Corresponding author.