

Estimating nutrient criteria of the lakes and reservoirs by reference condition approach and stressor-response models

Wenchun Sun^{a,b}, Shouliang Huo^{b,*}, Chunzi Ma^b, Beidou Xi^b, Zhuoshi He^b, Jingtian Zhang^b, Jing Su^b, Da An^b

^aSchool of Government, Beijing Normal University, Beijing 100012, China, email: sunwc@craes.org.cn

^bState Key Laboratory of Environmental Criteria and Risk Assessment, Chinese Research Academy of Environmental Sciences, Beijing 100012, China, Tel. +86-10-84937970, Fax +86-10-84913805, email: huoshouliang@126.com (S. Huo), xiaomachunzi@163.com (C. Ma), xibeidou@263.net (B. Xi), zhuoshihe@163.com (Z. He), wuxiang1998@163.com (J. Zhang), sujing169@163.com (J. Su), anda@craes.org.cn (D. An)

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ABSTRACT

Accurate and robust approaches for quantifying regional numeric nutrient criteria are critical to the management and restoration of aquatic ecosystems. In this paper, systematic statistical approaches combining reference condition approach and stressor-response models were developed to determine nutrient criteria in Anhui lakes and reservoirs, China. Reference lake method and lake population distribution method served as the reference condition approach were used to identify nutrient criteria by respectively selecting the upper 25th percentile and the lower 25th percentile as the reference condition. The stressor-response models determined by linear regression model (LRM), Bayesian non-hierarchical linear model (BNLM), classification and regression tree (CART), and change point analysis (CPA) were developed to compare and verify the consistency of these methods. Results indicated that there were no significant differences in nutrient criteria determined by the two types of methods. The ranges of numeric nutrient criteria in Anhui lakes and reservoirs were determined as follows: 0.020–0.046 mg/L for TP and 0.42–0.81 mg/L for TN. The advantages, disadvantages, and applicability of each method were discussed and estimated, which would be beneficial in the scientific selection of nutrient criterion approach and improving the feasibility of setting nutrient criteria.

Keywords: Lake and reservoir; Nutrient criterion; Reference condition approach; Stressor-response model

*Corresponding author.