ABSTRACT

Water quality control is affected by several factors such as climate change or the creation of an ecological park for human convenience. The Four-River restoration project of Korea is a government enterprise to solve a variety of problems, such as preventing floods, securing water resources, water quality management, and encouraging re-creation of land. It is evidence that technical developments and the concern of the government have sharply increased for water quality management. In particular, the phenomenon of eutrophication can cause various difficulties in drinking water treatment and water use. Accurate and reliable algal bloom forecasting models will prove very useful in ensuring sustainable water supply and proper water management in the near future. In this paper, a new method based on wavelet transforms and artificial neural networks was adopted for chlorophyll-a concentration forecasting 1, 3 and 7 days ahead. First, 12 models for forecasting chlorophyll-a concentration by combining water quality and hydrological factors from different models as input data were established by using an original ANN with a back-propagation algorithm. The best model, as evaluated by its performance functions, was selected and applied to the new method as a coupled wavelet analysis-artificial neural network (WA-ANN) to forecast chlorophyll-a concentration for 1, 3 and 7 days. Finally, the results of WA-ANN in the study were compared to those of a regular ANN with a back-propagation algorithm. The results showed that WA-ANN models constitute a promising new method for short-term chlorophyll-a concentration forecasting in large lakes.

Keywords: Wavelet transform; Artificial neural network; Forecasting; Chlorophyll-a; WA-ANN