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## **DEVELOPMENT OF A MULTI-INDEX ECOSYSTEM HEALTH ASSESSMENT MODEL USING BACK-PROPAGATION NEURAL NETWORK APPROACH: A CASE STUDY OF THE YANGTZE ESTUARY, CHINA**

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### **Abstract**

The objective of this study is to develop a back-propagation neural network (BPNN) to assess the health status of estuarine ecosystems. The BPNN objectively reflected ecosystem health due to the weight and bias values obtained by the network training, owing to its adaptive learning, self-organization and fault tolerance. Correlation analysis is used to avoid double counting of the input variables. Particularly, 11 ecosystem health indices were used as assessment parameters to establish a set of three-layer BPNNs. The output is one layer of ecosystem health index. After training and testing BPNNs, the network structure of 11-12-1 was selected to be the optimal model for assessing the health status of the Yangtze Estuary. The result indicates that the health status of the Yangtze Estuary has progressively been declined since 1998. Before 2002, the ecosystem health did not change much and fitted in subhealthy level; however, it deteriorated dramatically to unhealthy level after 2002. Due to the implementation of a series of ecological restoration measures, the ecosystem has improved to subhealthy level since 2006.

*Key words:* artificial neural network, ecosystem health assessment, the Yangtze Estuary

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