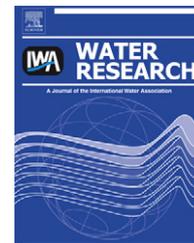


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# Prediction of contamination potential of groundwater arsenic in Cambodia, Laos, and Thailand using artificial neural network

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## ABSTRACT

The arsenic (As) contamination of groundwater has increasingly been recognized as a major global issue of concern. As groundwater resources are one of most important freshwater sources for water supplies in Southeast Asian countries, it is important to investigate the spatial distribution of As contamination and evaluate the health risk of As for these countries. The detection of As contamination in groundwater resources, however, can create a substantial labor and cost burden for Southeast Asian countries. Therefore, modeling approaches for As concentration using conventional on-site measurement data can be an alternative to quantify the As contamination. The objective of this study is to evaluate the predictive performance of four different models; specifically, multiple linear regression (MLR), principal component regression (PCR), artificial neural network (ANN), and the combination of principal components and an artificial neural network (PC-ANN) in the prediction of As concentration, and to provide assessment tools for Southeast Asian countries including Cambodia, Laos, and Thailand. The modeling results show that the prediction accuracy of PC-ANN (Nash–Sutcliffe model efficiency coefficients: 0.98 (training step) and 0.71 (validation step)) is superior among the four different models. This finding can be explained by the fact that the PC-ANN not only solves the problem of collinearity of input variables, but also reflects the presence of high variability in observed As concentrations. We expect that the model developed in this work can be used to predict As concentrations using conventional water quality data obtained from on-site measurements, and can further provide reliable and predictive information for public health management policies.

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