

다양한 평가 지표와 최적화 기법을 통한 오염부하 산정 회귀 모형 평가

Evaluation of Regression Models with various Criteria and Optimization Methods for Pollutant Load Estimations

김종건*, 임경재**, 박윤식***

Jonggun Kim, Kyoung Jae Lim, Youn Shik Park

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Abstract

In this study, the regression models (Load ESTimator and eight-parameter model) were evaluated to estimate instantaneous pollutant loads under various criteria and optimization methods. As shown in the results, LOADEST commonly used in interpolating pollutant loads could not necessarily provide the best results with the automatic selected regression model. It is inferred that the various regression models in LOADEST need to be considered to find the best solution based on the characteristics of watersheds applied. The recently developed eight-parameter model integrated with Genetic Algorithm (GA) and Gradient Descent Method (GDM) were also compared with LOADEST indicating that the eight-parameter model performed better than LOADEST, but it showed different behaviors in calibration and validation. The eight-parameter model with GDM could reproduce the nitrogen loads properly outside of calibration period (validation). Furthermore, the accuracy and precision of model estimations were evaluated using various criteria (e.g., R^2 and gradient and constant of linear regression line). The results showed higher precisions with the R^2 values closed to 1.0 in LOADEST and better accuracy with the constants (in linear regression line) closed to 0.0 in the eight-parameter model with GDM. In hence, based on these finding we recommend that users need to evaluate the regression models under various criteria and calibration methods to provide the more accurate and precise results for pollutant load estimations.

Key words: LOADEST, Eight-parameter model, Genetic Algorithm (GAs), Gradient Descent Method (GDM), Nitrogen loads, Accuracy, Precision
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* 정회원 · 강원대학교 농업생명과학연구원 · E-mail : kimjg23@gmail.com

** 정회원 · 강원대학교 지역건설공학과 교수 · E-mail : kyoungjaelim@gmail.com

*** 정회원 · 공주대학교 지역건설공학과 교수 · E-mail : parkyounshik@gmail.com