

**Title of Article:** Composite Goodness of Fit in Reaeration Coefficient Modeling

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**Abstract:** Determination of reaeration coefficient is an important factor in surface water quality modeling as it determines the efficiency of the Streeter-Phelps model used for predicting dissolved oxygen deficit of any stream. This study compared the efficiency of Atuwara model with ten other reaeration coefficients models by making use of three data sets obtained from river Atuwara during the prevalent wet and dry seasons using composite goodness of fit test which was developed by quantitatively combining statistical and graphical goodness of fit. The eleven tested models were ranked in order of performance. Results show that the four top ranking models were developed through a process that utilized data from multiple streams while models that were developed from data obtained from the test subject alone performed less competitively. The outcome of the study also suggests that the usual practice of selecting the best model based on statistical analysis alone does not necessarily yield the best result and therefore recommended the incorporation of quantitatively analyzed graphs. The paper concludes that selection of the best performing model among existing reaeration coefficient models using the composite goodness of fit may present a cheaper and better alternative to conventional model development approach.

**Keywords:** re-aeration coefficient, algorithm, error statistics, fit, Atuwara, modeling, surface water