

## Modeling Water Quality in the Lake Shkodra Using CE-QUAL-W2 Model

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**Abstract:** The main goal of this study, as part of an effort to understand the water quality dynamics in Lake Shkodra, was to provide a calibrated water quality model capable of predicting future water quality conditions resulting from potential changes in lake operations and/or environmental conditions. The 2-D laterally averaged CE-QUAL-W2 model was used to simulate water quality in Lake Shkodra, for the years 2005 through 2009. Once the necessary data have been assembled into proper input format, and then simulations began. The model parameters initially were calibrated using the data from 2005 - 2006 and tested with data from 2007 - 2008. Calibration was done iteratively until an acceptable fit of the predicted and observed data was achieved. The calibration process produced an integrated modeling system of CE-QUAL-W2 with sufficient accuracy to allow evaluation of lake water quality response. Input data required for model setup were divided into four broad categories: physical and spatial characteristics of the water body defining the computational grid; time-varying boundary conditions describing the meteorological and hydrologic influences on the water body; initial conditions, and kinetic and hydrodynamic data characterizing the physical, chemical, and biological processes. The sample data for each water quality parameter was statistically analyzed. Model results revealed that model calculated concentrations of key water quality indexes matched well with the measured values. The modeling results presented here provide a starting point for simulating the water quality in the lake. The results and conclusions from this study are not intended for use on Lake Shkodra alone. The concepts of model development can potentially be applied and also broaden its usefulness to other surface water systems.

**Keywords:** *Lake Shkodra, CE-QUAL-W2 model, hydrodynamics, water quality, calibrated constituents*

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