## Swimming in clear lakes: How model coupling with R helps to improve water quality

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Scientific understanding of complex ecological systems is inherently difficult, and numerous theoretical and management models have emerged. Each model has its own purpose, philosophy, and implementation. Often, tunnel-vision and wheel re-invention are hindering scientific exchange [3] and in response, ecological modelers have started to develop platforms and interfaces to support scientific and technical exchange.

We will present an approach to implement the core models platform independent in C/C++ or Fortran, while using R for model coupling, data management, numerical treatment and visualization. The partial differential equations of the models were solved with package **deSolve** [7] and matter transport with **ReacTran** [6]. This enables the separation of process equations from numerical techniques.

The feasibility of the approach is shown by coupling an ecological lake model (**SALMO**) describing nutrient turnover and growth of planktonic algae [1, 4] with a model for water plants, based on a lake model (**PC Lake**) of another group, [2]. The coupled model (package **rSALMO**) was used in a case study for a stratified German lake [5], where the presence of submerged macrophytes resulted in significant improvement of water quality.

The case study shows, that the *R* language with its pool of application-specific packages is a powerful resource for scientific computing even beyond statistics. It can be used as an efficient general-purpose development platform for coupling of complex models and for sharing code and ideas.

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