



PEGASE A model dedicated to Surface Water Quality Assessment that help stakeholders for implementing the WFD

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Keywords: Water quality assessment, integrated water management, Water Framework Directive, environmental modeling

The R&D team of the Aquapôle has been involved in environment modeling for more than 20 years, mainly in the domain of surface water, targeted to water quality. One of its integrated models PEGASE (Planification Et Gestion de l'Assainissement des Eaux) is devoted to the simulation of the surface water quality, very detailed at a local scale up to the whole basin.

The model is deterministic and physically based and:

- extends the "rivers" models to explicitly take into account their watershed;
- has a coherent and complete way to structure pollutants loads and discharges;
- has a complete aquatic ecosystem and water quality description;
- is dedicated to simulate complex future scenarios.

The PEGASE model needs input data like digital terrain models, water flow and other hydrodynamic measurements, ecological model data (to characterize bacteria, phytoplankton, zooplankton, etc...), waste water discharges (industries, cities, treatment plant). The output of the model consists in georeferenced and temporal data tables, graphs and maps, showing the state of various parameters of quality (DO, BOD, COD, N, P, Chla,... + indexes) either at a specified time, along any rivers, or the annual evolution in a given point along a river. It also provides printed maps or animations of the water quality evolution on the basin. The model is able to simulate non stationary scenarios from a local scale (a few km²) up to a global scale, like a whole basin district. The model is running on Windows or Unix computers, tightly bounded to a user friendly interface and to GIS.

The model is used commonly by competent authorities in several countries like France and Benelux. Several calculations have also been performed for transnational basins for the international commissions in charge of the Scheldt, the Mosel and the Meuse districts.

New developments concerning among others micropollutants are continuously in progress, e.g. with help from INERIS and water agencies.

PEGASE is thus a full-scale operational tool for WFD implementation. Our partners (water agencies, administrations ...) handle a workable software directly practicable in the implementation of the WFD and other water related directives. They are also directly involved in the PEGASE development processes.

PEGASE proves to be an efficient tool for helping in surface water management up to the international district level. Already used by several basin management competent authorities, the model also structures the river ecosystem knowledge and represents:

- a new way to handle the assessment of the water quality, by non-stationary, accurate and physically based calculation on the whole basin, and by comparison on discrete measurements points for validation. These results lead to a much more precise knowledge of the rivers network quality with a detailed discretisation of the network

for annual simulation periods or more;

- a new way to assess the impact of decided measures to enhance the quality of targeted water bodies, by performing simulations of scenarios on the basin, before any physical implementation, and thus assess the cost/efficiency ratio of each measure;
- a new operational way to assess the impact of climatic changes on the future river quality, allowing to forecast long term strategies;
- a new way to structure relevant knowledge (construction of operational databases), to ensure the consistency of the data at international levels and to support the coordination on water quality management between the countries;
- a new way to extrapolate discrete measurements from monitoring networks (in time and space) to each water body by a sophisticated physically based calculation.