MIKE 21 software is used for Grand-Lieu Lake project in France
A study at Science University of Nantes

The Grand-Lieu Lake is located in the heart of a wetland made of several marshy and lacustrine areas. Situated inside a vast depression, it grows up to 6000 hectares during winter and dwindles to 2000-3000 hectares during summer.

This natural area is quite well protected by Nature Reserve, ZNIEFF (French for *Natural Area* of *Ecological Interest* for *Flora* and *Fauna*), Natura 2000, Hunting Preserve, etc. However, since 1970s it suffers an alarming evolution including phenomena such as:

- fast erosion of the macrophytes belt, plus significantly decreasing biodiversity
- earlier blooming of cyanobacteria phytoplankton
- negative sedimentary balance, along with average deepening and fast expansion of the central area of open water (from 10 to 15 hectares per year since 2000)
- eutrophication of the lake and contributing rivers (Boulogne and Ognon catchment areas).

Objectives of this study
The Grand-Lieu project will provide a scientific assessment on the following aspects:
1. water quality and eutrophication risk in Grand-Lieu Lake
2. hydrosedimentary evolution of the lake on a short term and a long term basis.

It also includes a plan to develop a decision support numerical tool. This project is funded as part of a regional project called "Assessment for the benefit of the territory", which aims at providing a scientific assessment and concrete solutions to a local problem.

The numerical tool is based on MIKE 21 software, developed by DHI. The hydrosedimentary model is currently being calibrated using laboratory analysis (quantity of suspended matter) and tools that measure physical and chemical features of the lake such as turbidity, oscillation or water level setup.

Objectives of modelling
After the calibration phase, the numerical model will be used in order to:
- test several scenarios of hydraulic management of Bouaye lock gate (main outlet)
- simulate the effects of today's hydraulic management system on a long term basis
- simulate sediment remobilisation during a storm
- simulate the effects and impacts of hydraulic structures
- simulate the topographic evolution according to different kinds of hydraulic management systems having a direct impact on reed bed and macrophytes restocking conditions.

The results of these simulations will allow stakeholders to anticipate the effects of the manipulation of this environment on the abiotic functioning of the lake and the evolution of current ecosystems.

For more information about the MIKE by DHI software products, please visit www.mikebydhi.com.
For more information on this project, please contact Mathieu Hellegouarch at mjh@dhigroup.com, DHI France, or go to the project webpage (in French): http://www.sciences.univ-nantes.fr/lpgnantes/index.php?option=com_content&view=article&id=189&Itemid=86&lang=fr.