

# Intelligent Management of our Water Systems

A water system can be described as a large-scale system comprised of multiple subsystems for collecting, cleaning, disinfecting and delivering water to consumers through drinking water distribution networks. Due to their vital role, water systems are considered among the critical infrastructures; if their operation is disrupted, e.g. due to water contamination, vital societal functions and the economy could be affected.

The operation of water distribution systems is monitored and controlled with the use of sensors and actuators by water utilities. However, maintaining water quality in accordance to national regulations, optimizing the system operation through real-time monitoring, as well as detecting and mitigating quality and hydraulic faults, such as contamination and leakages, are major research challenges in the coming years.

## What problems are we working on solving at KIOS?

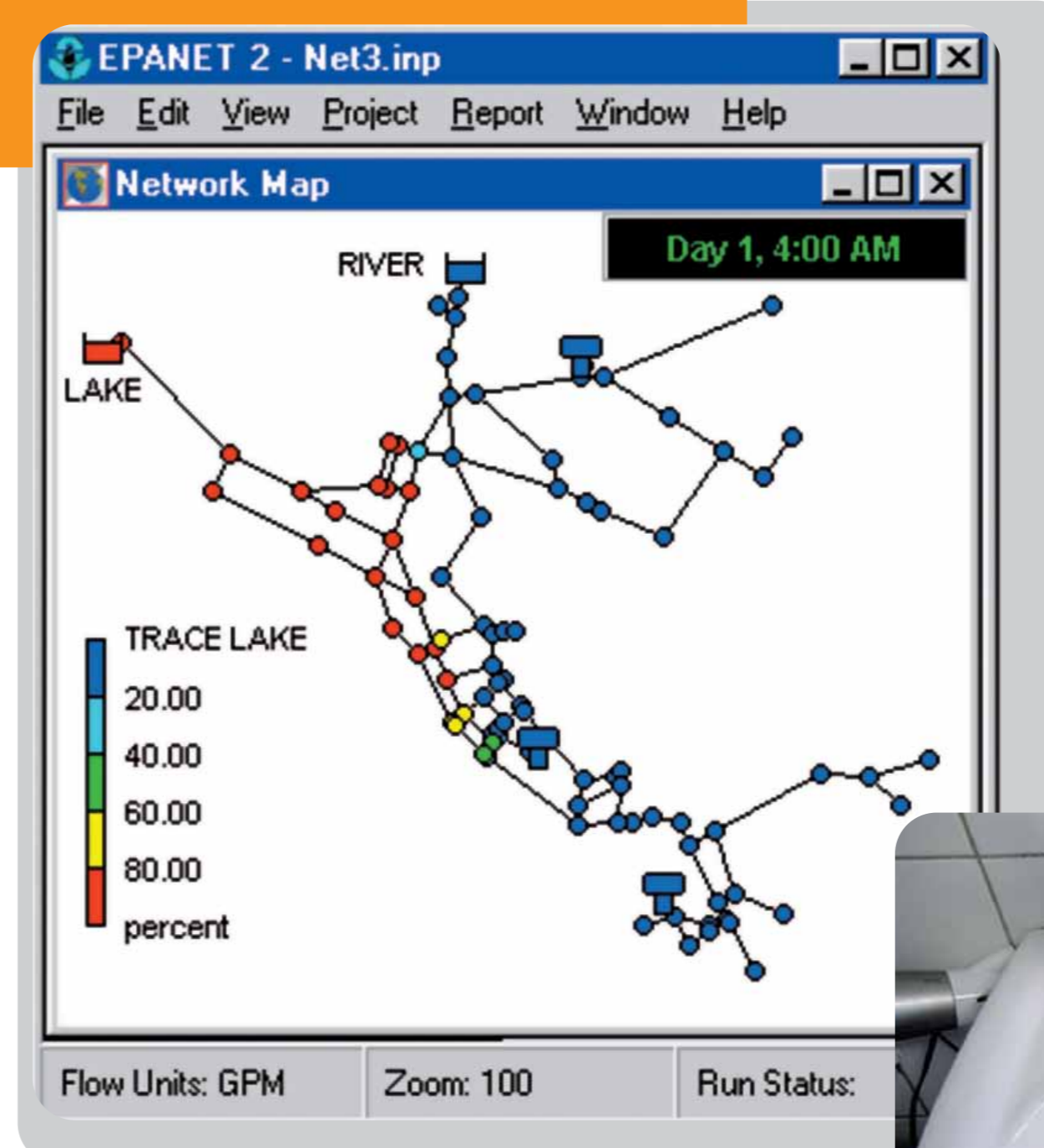
- Modelling, monitoring and optimal operation of water systems,
- Hydraulic and quality control and fault diagnosis,
- Designing intelligent systems for control and event detection in water systems,
- Modelling interdependencies with other critical infrastructures.

## Collaborators:

- The Water Development Department, Ministry of Agriculture, Natural Resources and Environment, Cyprus.
- The Water Board of Lemesos (Limassol), Cyprus.

## Latest Research Results

- Designed algorithms to find the locations where quality sensors should be installed in water distribution networks, as well as where and when to conduct manual quality sampling, to monitor the water chemical characteristics;
- Designed algorithms to regulate the disinfectant concentration in water distribution networks within some desired levels;
- Designed algorithms to isolate the source area and evaluate the impact of a contamination event;
- Designed algorithms to detect and isolate leakages in water distribution networks, using real time measurements from standard monitoring sensors.



## What are the major problems that must be solved?

- Detect a contamination event early enough to minimize the extent of the contamination impact,
- Isolate the source location of a contamination event,
- Evaluate the level of risk as early as possible,
- Mitigate contamination events,
- Improve the efficiency of water resources management.

