



MIKE CUSTOMISED CASE STORY

A DECISION SUPPORT SYSTEM FOR THE CONSORTIUM 'PIANURA DI FERRARA'

A complex reclaimed area now under control

The Consortium PIANURA di FERRARA, located in north-east Italy (north-east of Bologna, next to the Adriatic Sea) is currently operating a complex network of irrigation channels. The drainage system of the reclaimed area is managed by the operation of a complex and structured system of canalisations, pumps and gates. A Decision Support System (DSS) for the entire complex area has been developed and implemented. This provides support to the Consortium technicians in both ordinary and emergency activities.

The basin covers an area of about 2500km², some of which comprises reclaimed land protected by dikes on the sea side. The area includes 430km of drainage channels and another 810km for irrigation purposes, in addition to more than 150 pumping stations. The basin is divided into several sub-catchments, most of which have elevations equal to or below the sea level.

The Decision Support System (DSS), based on the MIKE CUSTOMISED RealTime platform that DHI developed, continuously simulates the dynamic behaviour of the network and all the irrigation structures. The DSS provides all the synthetic information needed to make operative decisions in the management of predicted hydraulic criticality.

Moreover, the platform supports the daily operations of the drainage system and all design activities. That makes all types of information easily accessible and allows the comparison of the effects of different operating solutions. The decision support facilities can be used to develop operational strategies, to optimise water use and reduce energy costs.

The DSS collects, validates and makes available all the meteorological and hydrological types of data as well as data concerning the status and operation of all the hydraulic structures. The system is based on several modules of MIKE 11 for the simulation (also in forecasting mode) of the behavior of the drainage network.

THE MODELLING

Collects and archives all the meteorological and hydrological information in a unique database. This information comes from remote sensing, meteorological forecasting, radar data and includes all the information on the operational status of hydraulic structures

- A graphical interface allows the configuration and management of the DSS platform, including all the GIS functionalities

SUMMARY

CLIENT

Consortium Pianura di Ferrara

CONTEXT

- Control of drainage flows
- Management of the drainage network and structures

APPROACH

- Monitoring of field data, operational structures data and meteo forecasting information
- Integrated hydrologic-hydraulic modelling system simulated in continuous mode
- Evaluation of alternative scenarios for the management of the network
- Publishing and alerting system

ADVANTAGES

- Pumping stations control
- Forecasting of alarm conditions
- Support in risk prevention and management
- Reduction of flooding risk

- Uses the 'continuous' hydrology approach combined with the canal hydrodynamic propagation through the **MIKE 11 RR** module (Rainfall-Runoff) and **MIKE 11 HD** module (Hydrodynamic) developed by DHI
- Is provided with an autocalibration system of the forecasts, based on the real-time iterative comparison between calculated and available measured data (DHI module **MIKE 11 DA** Data Assimilation)
- Uses the module **MIKE 11 SO** (Structure Operation) for the schematisation of the operating structures
- Predicts the behaviour of the hydraulic system and the pumping stations in the following days and supports planning alert actions
- Verifies the effectiveness of possible interventions and manoeuvres on structures
- Constantly monitors the system in terms of resources balance, structural adequacy and management procedures
- Reports warning and alarm conditions along the network
- Sends automatic forecasting bulletins
- Publishes measured and forecasted data on the web

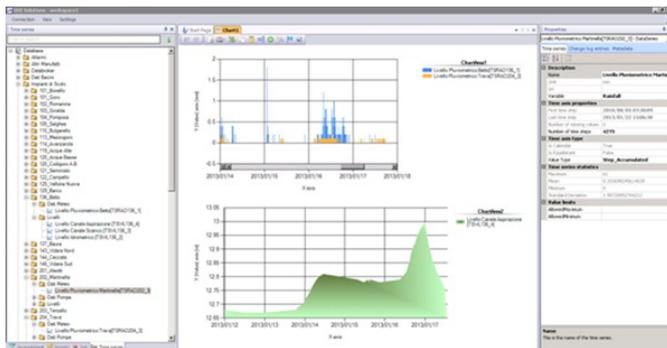


An aerial view of some pumping stations in the huge area of reclaimed land of the Consortium ©Consortium Pianura di Ferrara

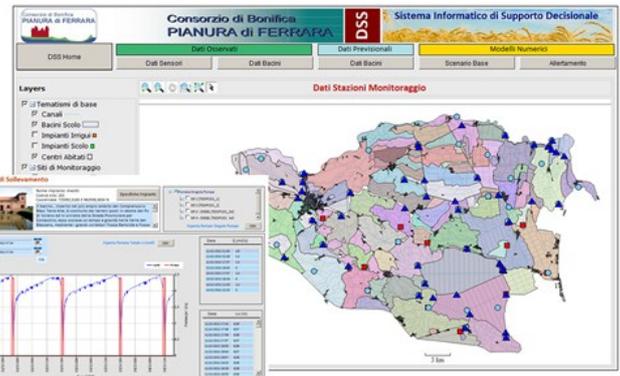
WEB PUBLISHING OF INFORMATION

Data coming in from the telecontrol system, along with the forecasting simulation results of the consortium's network status are available on a dedicated web portal. They can be accessed and consulted in real-time.

The consultation of all the observation data, in conjunction with the forecasting simulations results allows the technicians to prevent and manage possible hydraulic criticalities in advance.



The user interface provides easy access to the required data ©DHI



WebGIS map displaying gauges, pumps, gates on the basin ©DHI



The basin is divided in several sub-catchments. The Consortium has the responsibility to maintain the channels and to manage pumps and weirs to distribute water and prevent flooding on the area ©Consortium Pianura di Ferrara

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