DHI CASE STORY

FLOOD FORECASTING SYSTEM UPGRADE FOR SLOVENIA'S LARGEST RIVERS

Optimised decision support through reliable forecasts and well-trained staff

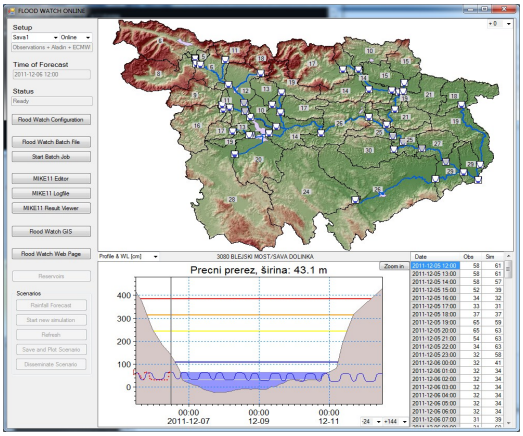
Slovenia is a mountainous country which experiences frequent floods. The high costs resulting from flood damage call for the implementation of an efficient early warning system. In close collaboration with ARSO (Slovenian Environmental Agency, Hydrology and State of the Environment Office), an existing system was upgraded to ensure that fast and reliable forecasts are easily available and to enable timely and targeted precautionary measures against floods. Early action is expected to reduce the present financial costs from flood damage by up to one third.

THE BENEFITS OF UPGRADING YOUR FLOOD FORECASTING SYSTEM

Rivers are not straightforward. Obvious as it is, that does not make flood forecasting any easier. However, with the relevant processes understood, flood forecasting can significantly help reduce the costs of flood damage, which are a considerable financial burden for a country like Slovenia. The cost of damage from the flood in September 2010, for example, has been estimated to be approximately EUR 250 million. Moreover, climate change is expected to significantly increase the frequency of flood events. A modern and reliable flood forecasting system will help the country to reduce financial loss as well as the risk of fatalities.

EXPERIENCED PARTNERS FOR THE SET-UP OF A MODERN SYSTEM

ARSO wanted to upgrade their existing services using DHI's modelling technology and expand them to the rivers Sava and Soča, the two longest rivers in Slovenia, with catchments covering about 64 per cent of the country.



The user-friendly online forecasting system provides decision makers with an overview of the entire system and enables fast simulation of scenarios when required. The system is running automatically, providing new 6-day-forecasts at 74 locations in the river network every hour 365 days a year .

SUMMARY

CLIENT

Slovenian Environmental Agency(ARSO)

CHALLENGE

Setup and implementation of an upgraded, fast and reliable early flood warning system

SOLUTION

An up-to-date real time flood forecasting system with a user-friendly interface, used for the dissemination of early flood warnings

VALUE

- Better preparedness
- Optimised mitigation measures
- Reduced costs from flood damages and losses due to early action
- Improved and consistent overview of the river network

LOCATION / COUNTRY

Slovenia, Europe

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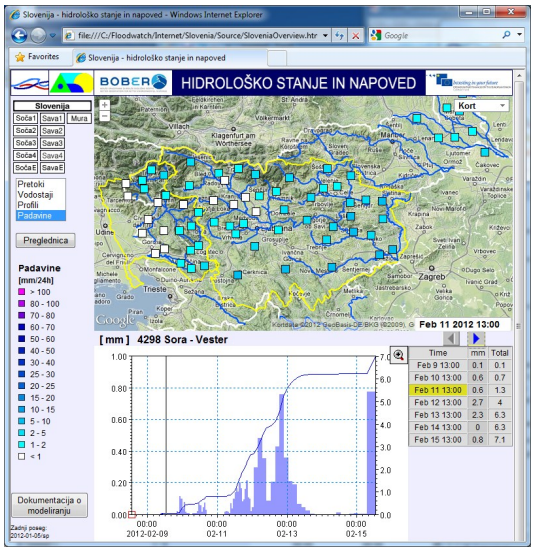
Two MIKE 11 hydrological/hydrodynamic models were developed to form the core of the upgraded forecasting system. DHI ensured that all available sources of real-time information are incorporated in the model—a prerequisite for reliable forecasts. Amongst others, these input data include water level, discharge and rainfall data from Slovenia's telemetric network as well as meteorological models.

DECISION SUPPORT AVAILABLE ANYTIME AND EVERYWHERE, EVEN ON YOUR SMARTPHONE

In addition to being reliable, the forecasting system needs to work fast and efficiently, especially during flood events. It should be easily accessible to users to allow timely and targeted warnings for mitigation measures against flood loss.

Therefore the new system is equipped with a user-friendly and robust platform for the real-time operation and flood forecasting. Furthermore, web pages based on Google maps now facilitate an improved graphical presentation of forecasting results, supporting the client in the final preparation of flood warnings. A web page optimised for mobile devices completes the new system.

Flood warnings are issued to the general public based on the HYDROALARM system, one of the end-products of the new forecasting system. It subdivides the country into 26 regions, which are coloured in warning colours indicating the flood danger level (yellow, orange and red) according to the modelling results.



Presentation of forecast results for decision makers on a Google maps-based web page. The page provides a fast and complete overview of all forecast simulations available before dissemination of flood warnings.

CLIENT DRIVEN DEVELOPMENTS FOR OPTIMISED RESULTS, TRAINING FOR OPTIMISED USE

The Soča is famous for its emerald colour and—just as the Sava—a popular spot for recreational activities. However, both rivers with their tributaries regularly become the source of significant flooding, posing a great financial burden on the country.

Knowledge transfer and capacity building is another crucial component of a sustainable forecasting system. During the whole project, ARSO actively participated in the development and testing as well as in the associated comprehensive training activities provided by DHI to their personnel. ARSO provided invaluable input to improve the functionality and usability of the real-time and emergency operation platform.

EARLY PROOF OF THE SYSTEM'S REAL-TIME OPERATIONAL CAPABILITY

The upgraded forecasting platform has already proven its value. During the flood in September 2010, while in its testing phase, the system was used to support the dissemination of early warning messages. Thereby, civil defence was able to move thousands of relief workers to the right places in time, saving livelihoods as well as substantial amounts of money.

The early results of DHI's system underline the value of the implemented flood forecasting technology. Thus, the client is considering further expansion of the decision support systems. In an envisaged new project phase, key issues include floodplain modelling as well as flood mapping and flash flood forecasting.

Forecasting re-sults presented on mobile devices: discharge, cross-sections and predicted rainfall in graphical and tabular views.

ARSO flood forecasting staff working with the upgraded system. Extensive training formed an im-portant part of the project, en-suring its optimal utilisation.

CLIENT TESTIMONIAL

> *With the new upgraded forecasting system and well trained staff we expect to save up to 20-30 % of the total cost caused by flooding due to early action during flooding."*
> *Janez Polajnar—Chief, Flood Forecasting Department—ARSO*

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