

# ASAP Platform: hydrological forecasting with SWAT+ made easy

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# The problem in the case of Vejle in Denmark

## Der ryddes op i Grejsdalen efter voldsomt skybrud



Tirsdag formiddag er der masser af mudder på vejene i Grejsdalen ved Vejle efter mandagens voldsomme regnskyll.

## Vejle Amts Folkeblad

illing Børkop Give Egtved Hedensted Billund Sport Danmark

ERHVERV

## Ramt af oversvømmelse: Legendarisk Vejle-butik opgiver at genåbne



Hossi Ghassem fik idéen til at sælge sandwich til vejlerne, da han og familien prøvede lykken i USA og han besøgte en Subway. Siden har sandwichshoppen været en god forretning for den dansk-



Erhverv

Morten og Jesper har skabt en robust succes: - Vores glas kan ikke gå i stykker, selv om en lastbil skulle køre over dem

- Vejle is an area prone to flooding due to its topography combined with its location at a fjord
- Problem: more extreme weather → potentially more flooding
- Challenge: When to open or close a flood gate when both fjord water level is high and intensive rainfall is on the way?

# The problem in general: surface waters and reservoirs



- Problem: more extreme weather → flooding & drought → flood damages & agricultural yield loss
- Problem: poor water quality → algal blooms → low oxygen → manganese → treatment cost
- Scale of problem: there are > 8000 reservoirs in USA and > 7000 in Europe
- Challenge: how much water should be extracted, when and from which depth, so that we can reduce treatment cost, reduce impacts of flooding, and increase environmental integrity?

# The solution: ASAP Platform



Powered by WaterWebTools

- WRF reviewed & accepted technology provider in the **US**
- Innovation Radar reviewed as tech ready and noteworthy solution in the **EU**

- A single **intuitive platform** for all data management overview
- Hydrological and water quality **forecasting made easy**
- Built for all ASAP forecast products and **any IoT devices** implemented in the field

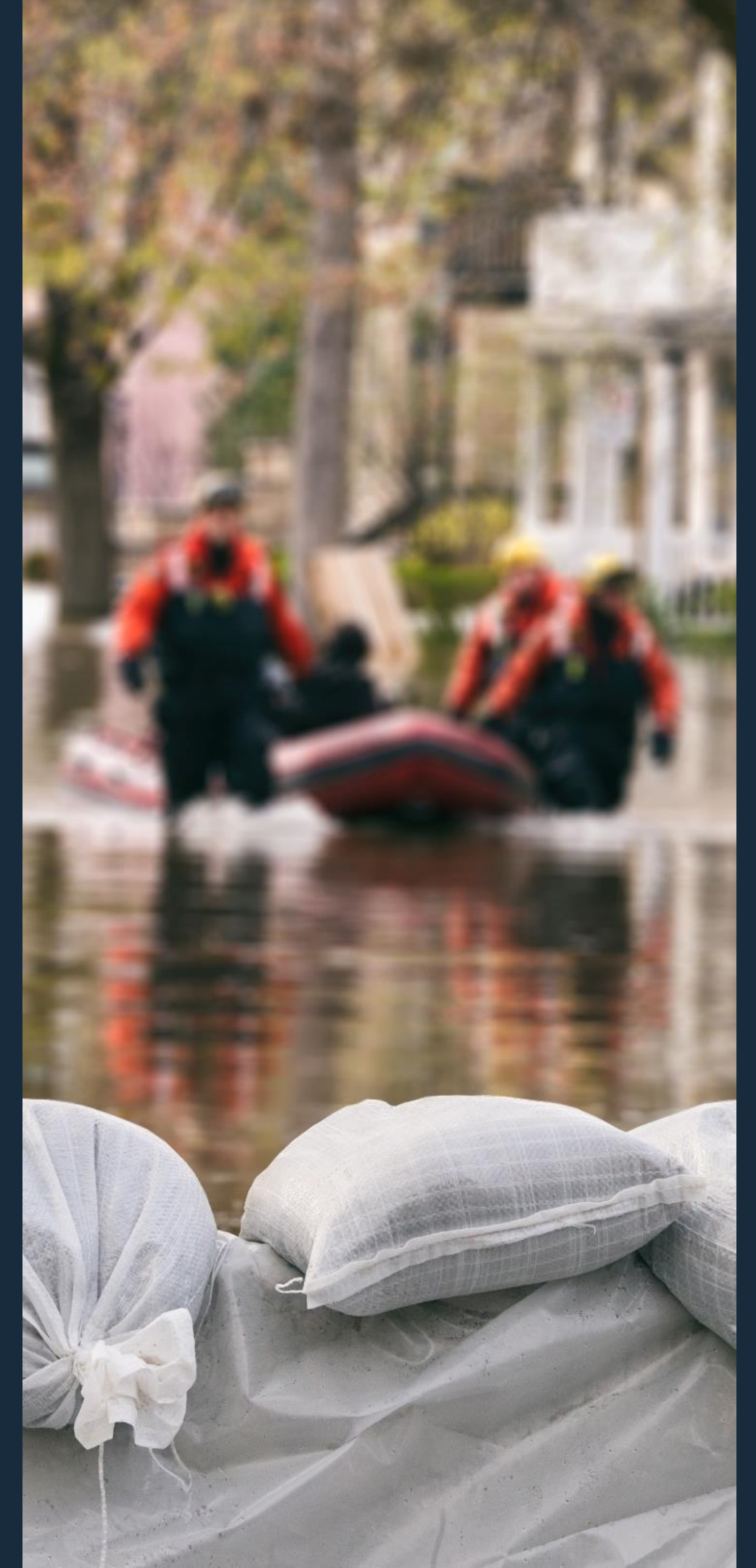


# Why is hydrological forecasting is a good idea

## - the benefits

Examples of benefits of hydrological forecasting:

- As little as one hour forecast lead-time can result in a 10% reduction in flood damages
- Total benefit of operational forecasting can be > \$9M annually in economic gains in relation to water supply, operation costs, fisheries, recreation and hydropower for a single drinking water reservoir



# Technology behind the forecasts

- includes both process-based modeling and machine learning



## SWAT+

- Holistic hydrological model
- Often applied for assessing climate change impacts



## GOTM-WET

- Hydrodynamic-ecosystem model – lakes, reservoirs, estuaries
- Often applied for estimating maximum allowable loads (TMDL)



## SWMM

- Hydrology-hydraulic water quantity and quality simulation model
- Used for single event or continuous simulation of runoff from urban areas



## Malstroem

- Applied for urban flood-screening

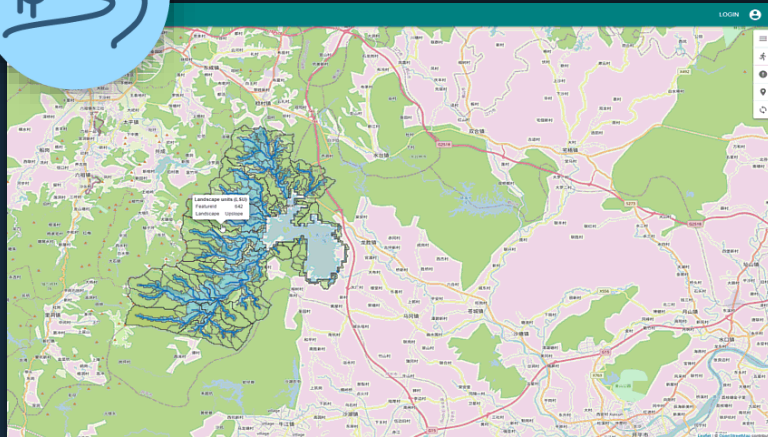


## Machine Learning

- Advanced ML and data analytics based primarily on Python

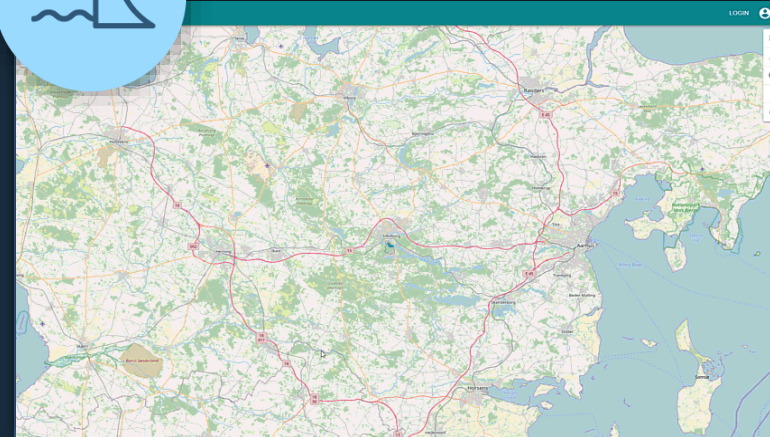


# ASAP Platform solutions



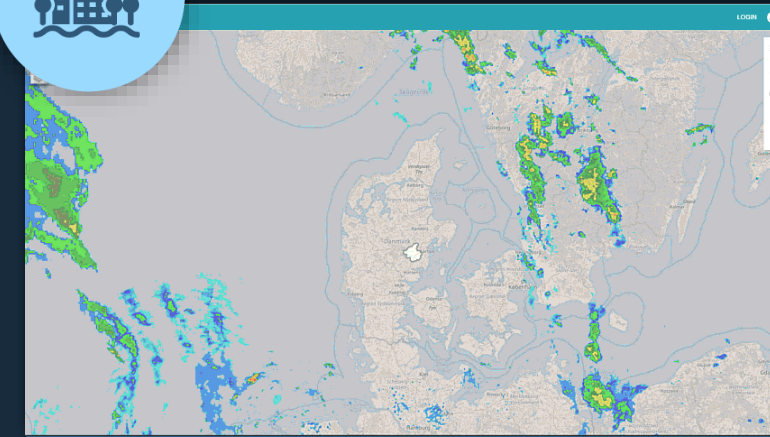
## ASAP Rural

Hydrological forecast for catchments. River discharges. Overbank flooding.



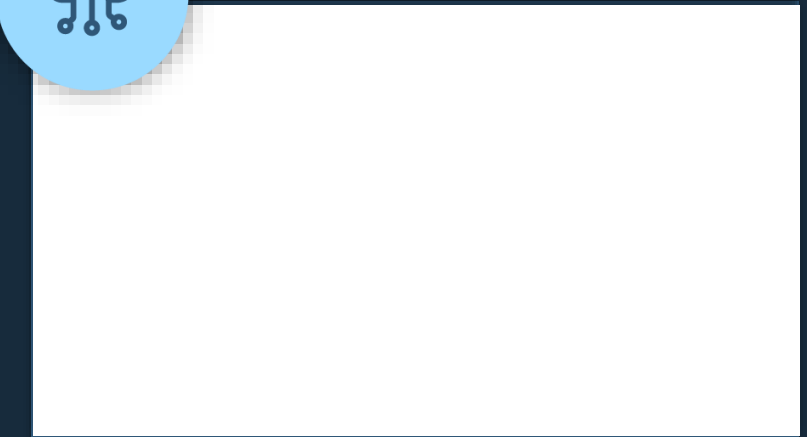
## ASAP Reservoir

Water quantity and quality forecasts for lakes and reservoirs.



## ASAP Urban

Real-time urban flood mapping.

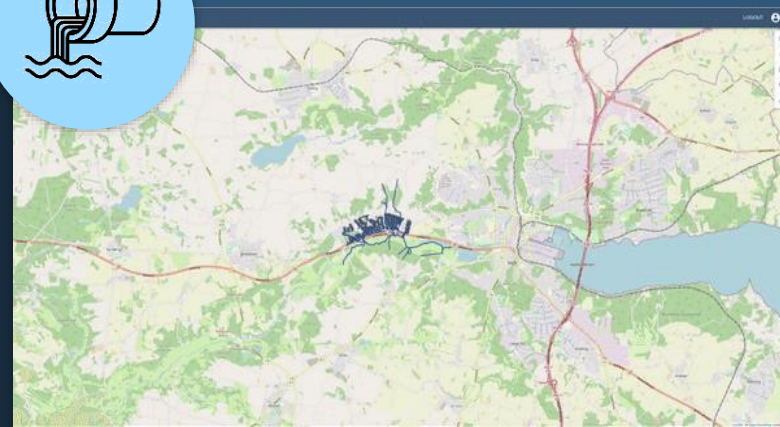


## ASAP Live (IoT)

Integration of any type of IoT sensor device for real-time data overview.



# New solutions in pipeline



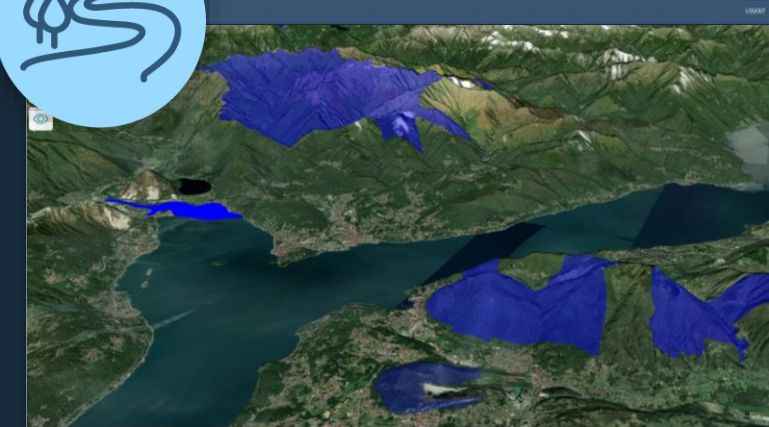
## ASAP SWMM

Operational stormwater runoff from sewer systems.



## ASAP Farm

Forecasting of irrigation need.



## ASAP Map

Environmental mapping and data processing.



# Work with the Data: Desktop Solution



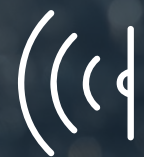
Operational hydrology and water quality forecasts integrated with real-time data.



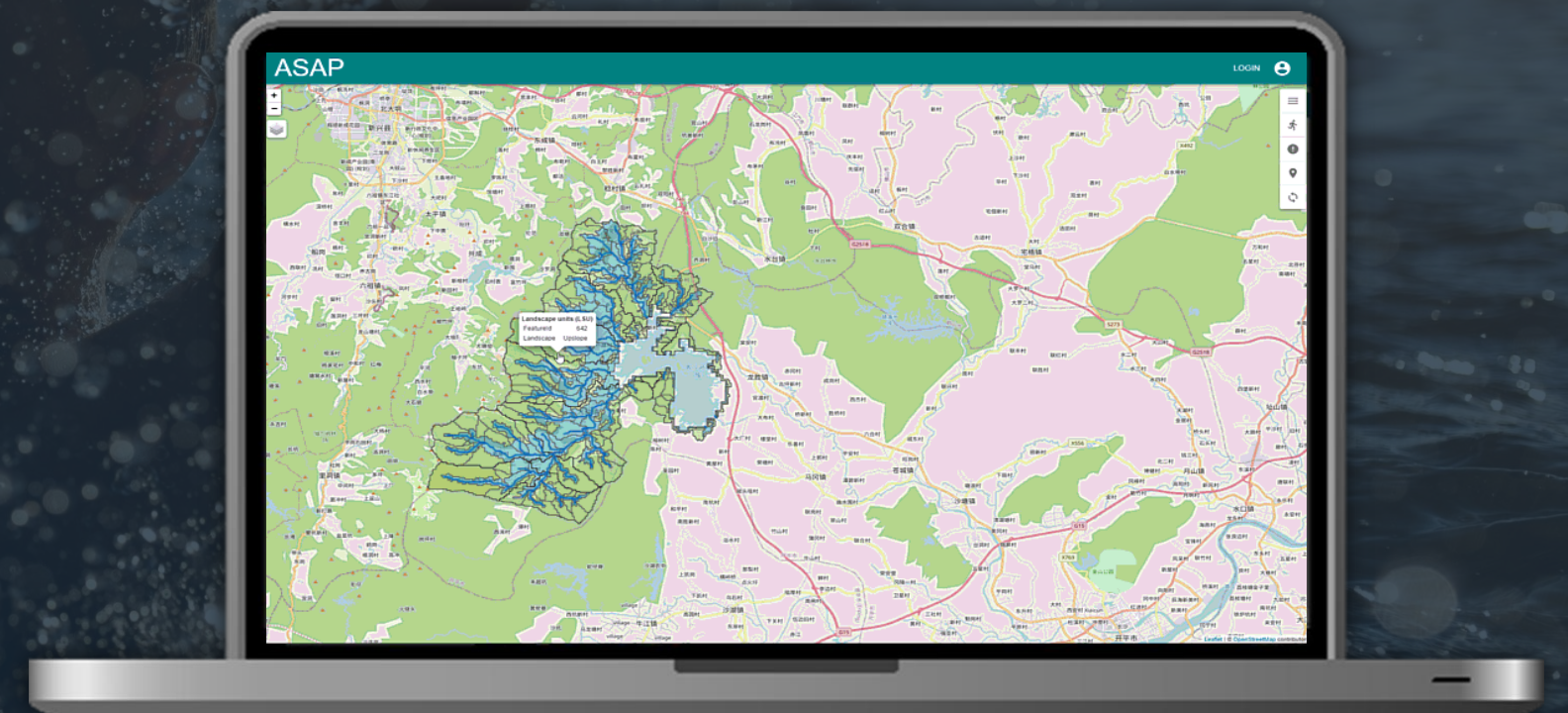
9-16 day forecast of flood and discharges for the entire watershed



9-16 day forecast of reservoir storage and water quality



Real-time sensor data integration



# Work with the Data: Mobile App Solution



Connect people in source water, treatment, supply and the public



9-day forecast data integration



Real-time sensor data integration



3rd-party data integration

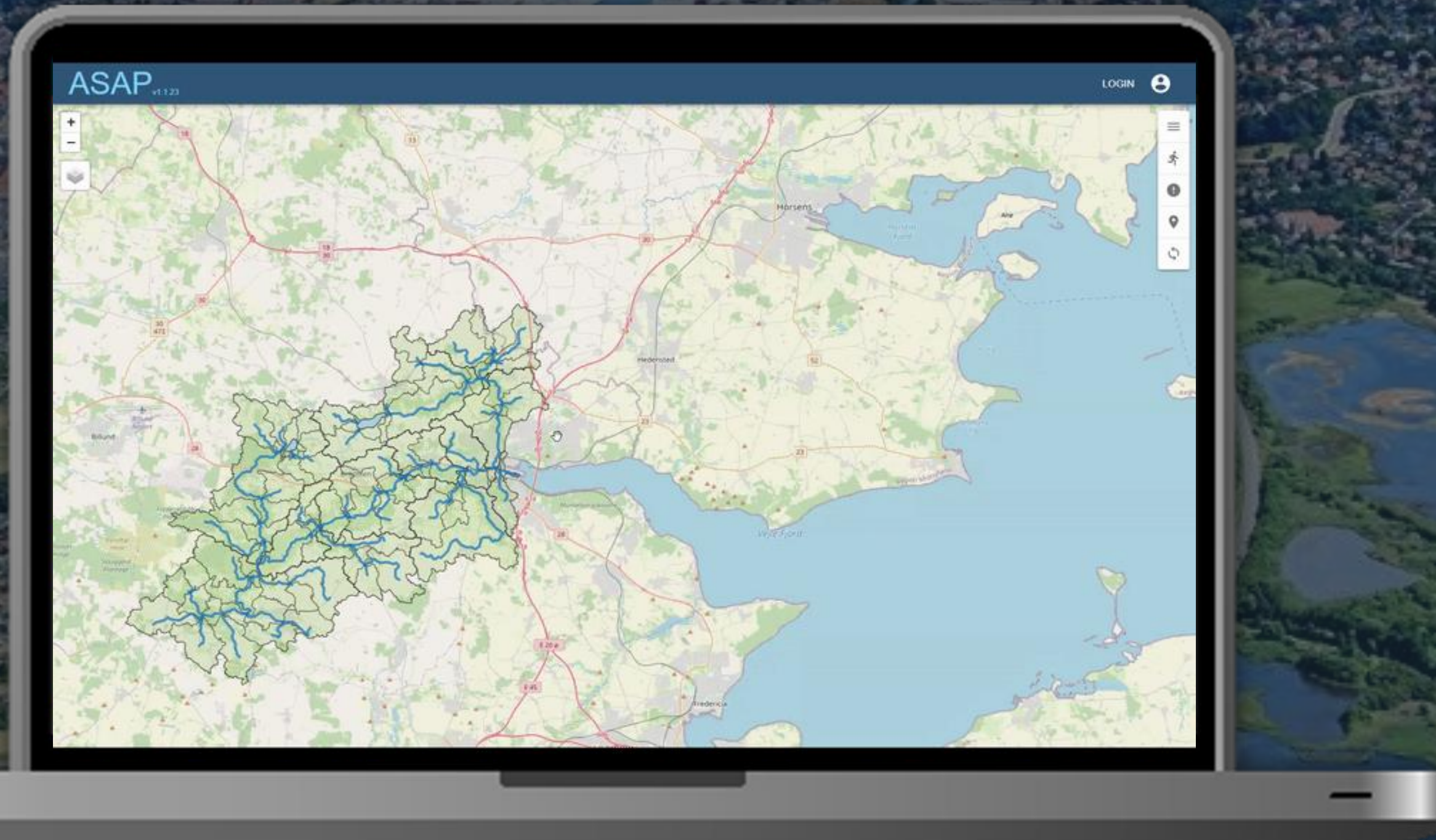


Water quality and flooding information for end-user & stakeholders





Live demo(s)  
try it on [www.waterwebtools.com](http://www.waterwebtools.com)





Conclusion: ASAP Platform makes forecasting easy

Thank you. Questions welcome.



[www.waterwebtools.com](http://www.waterwebtools.com)  
[www.watertech.com](http://www.watertech.com)

