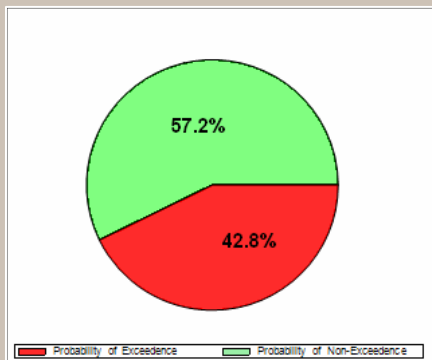


“Where will our knowledge take you?”

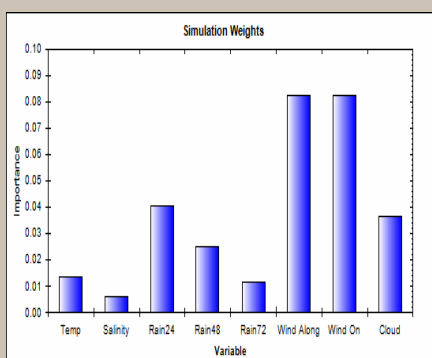
Bathing Water Management and Prediction Service



The bathing water prediction tool is a data-driven model, based on relationships between historical water quality data and meteorological data.



The bathing water prediction tool calculates the probability of Risk of Exceedance of a threshold value for E-coli contamination



The tool can also determine the main factors that influence the risk of a high contamination event

The data modelling service and web-based prediction tool that helps beach operators prepare for high-risk contamination events/manage bathing waters.

Knowledge of the cause and timing of a high risk contamination event is fundamental to the planning of a successful response. Designated bathing waters will, in future, be expected to provide information relating to the classification of bathing water quality to the public under the revised **EU Bathing Water Directive**. This should include information on the origin of any pollution, and notification banning or advising against bathing. Under the revised directive, predicting poor water quality resulting from periodic microbial contamination of bathing waters allows operators to ‘discount’ a scheduled water sample from its annual compliance assessment by temporarily prohibiting or advising against bathing on the days when high risk contamination is expected. Statutory bodies must improve their ability to forecast periodic incidents in order to meet these requirements, and take advantage of the ‘discount’.

Present forecasting techniques are heavily reliant on well-informed guesswork. BMT Cordah has the ability to provide a tailor-made data modelling service based on historical data of faecal coliforms (E-coli) collected at individual beaches, along with contextual measurements such as weather observations and changes in water treatment. This data is statistically analysed to determine the relationships between these parameters, enabling beach operators to predict when a high-risk contamination event is likely, and to plan their response accordingly. The forecast tool takes into account a variety of factors that may influence the occurrence of high risk contamination events, including:

- ~Wind Speed/Direction
- ~Sunshine Hours
- ~Salinity
- ~Sea Temperature
- ~Cloud Cover
- ~Tidal Range
- ~Number of bathers
- ~Historical Data
- ~Rainfall

Features:

- ✓ **Web based access with no need to install**
- ✓ **Historical data obtained and analysed as part of data-driven modelling**
- ✓ **Statistical regression analysis of historical data produces algorithms for individual beaches**
- ✓ **Influencing factors weighted depending on correlation found in master observation database**
- ✓ **Forecast is specific to individual bathing zones/beaches**
- ✓ **Validated under the Environment Agency project Improving Coastal and Recreational Waters (ICReW) and the European S@NY project**
- ✓ **Forecasting ability allows public information to be disseminated, reducing the risk to the public**
- ✓ **Enables the discounting method of the revised Bathing Water Directive (2006/7/EC), allowing bathing zones to retain their status despite the occurrence of random contamination events**
- ✓ **Assists operators in the maintenance of an observations database and assists in the development of bathing water profiles**
- ✓ **Automatically calculates bathing water classification and alerts user to changes**
- ✓ **Updating facility for the algorithm upon which predictions are based**
- ✓ **Neural network modelling techniques available for increased accuracy**

The forecast tool provides an estimation of the level of faecal coliforms (E-coli), alerting operators to the probability of occurrence of high risk events, delivered via a web-based prediction tool.

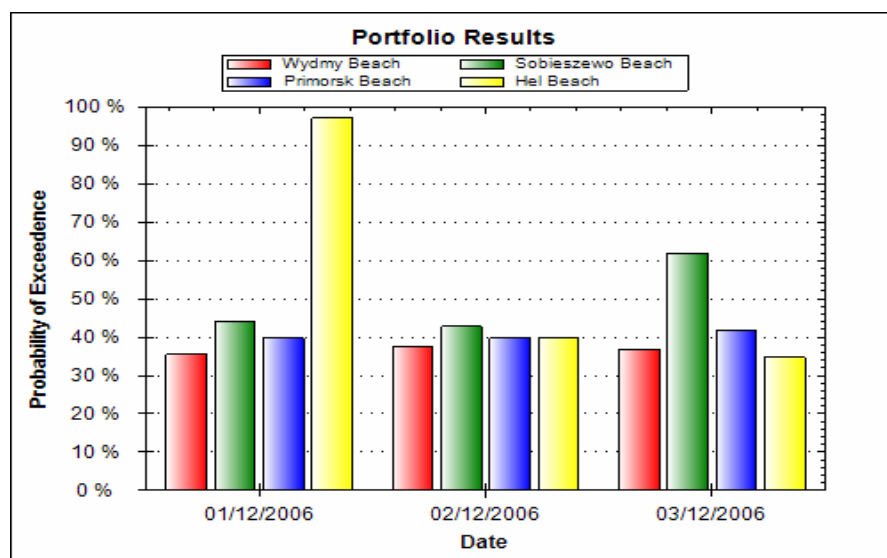
Bathing Water Management System

The Bathing Water Management System assists beach operators in managing bathing waters in direct response to the European Directive. Clients may take advantage of a number of supporting features, including the observations and predictions database, automatic bathing water classification, bathing water profiler and alert system. The system aims to guide local authorities and beach operators Europe-wide in achieving bathing water compliance.

Bathing Water Prediction Tool

The Bathing Water Prediction Tool is primarily a data modelling service, resulting in the production of an online water quality prediction tool specific to the operator's desired bathing zone(s). Daily predictions are supplied directly to the client's website. The prediction tool forms a large component of the overall management system. The regression analysis may be automatically updated in future using the observations database.

Neural network modelling is also available in place of regression analysis, and may be more suited to some locations. The merits of either method can be discussed with the client in order to determine the most useful model to employ depending on their individual circumstances.



Bathing Water Validation

The techniques employed in the bathing water modelling service have been successfully demonstrated during the INTERREG funded project 'ICReW' (Improving Coastal and Recreational Waters) in association with the Environment Agency of England and Wales, which focused on 36 beaches located in the South-West of England. These techniques are also implemented in the European Project 'Sensors ANYwhere' (S@NY), as part of the marine risks pilot.