

Tool for assessing groundwater pesticide sensitivity

Using machine learning on Danish environmental data to predict the risk of pesticide presence in groundwater

Denmark is seeing a vast focus on the presence of pesticides in groundwater. Previously, a few well-known substances caused problems for water utilities, but new pesticides and breakdown products which were not considered to pose a problem until recently have emerged and caused the closure of numerous drinking-water wells. Most recently, the substances BAM, DPC and DMS have received extensive media attention.

Consequently, there is a need for a tool that can help water utilities plan their catchment, and help Danish regions and municipalities carry out risk assessment and prioritise their efforts to protect groundwater resources. Thereby, the tool will also benefit the Danish Environmental Protection Agency as well as the Ministry of Energy, Utilities and Climate since they manage and regulate the abovementioned bodies, and industries with their own catchment activity that requires drinking-water quality.

In Denmark, we have access to large volumes of data on soil and groundwater. They include analysis data on a range of pesticides, general groundwater chemistry and hydrological parameters as well as information on areas classified as contaminated sites. This data can be linked to other important factors such as, e.g., precipitation, mapping of agricultural soil and urban areas, which are freely available on public platforms. To date, few projects apply environmental and hydrological data for machine learning, so this project will have high news value.

This project aims to develop an algorithm via machine learning that can predict the risk of the presence of pesticides or breakdown products in a specific location. The algorithm is trained using two thirds of the relevant data, which is gathered in one big table with data from across Denmark. The last third is used to validate the success rate of the algorithm. Data collection and structuring are carried out using COWI Connect, which gathers all accessible data sources in a coherent database. The data processing takes place in close collaboration between COWI specialists in groundwater, groundwater chemistry, contaminated sites and data analysis.

The project is carried out by COWI in cooperation with three utility companies – Greater Copenhagen Utility (HOFOR), VCS Denmark (Vandcenter Syd) and Aalborg Vand – which will contribute by making available wells for additional quality analyses, with the purpose of first comparing and verifying data using the algorithm and then incorporating data in the algorithm. The project is scheduled for completion at the beginning of 2020.