BSAP Fund

3D soil monitoring solution to reduce land-based nutrient runoffs to the Baltic Sea

Deep Scan Tech

BSAP-2023-150
Report prepared 27.6.2024

Executive summary of the project

This project demonstrated a disruptive technology and service solution to combat nutrient runoff to the Baltic Sea. The solution is based on soil tomography currently being developed by Deep Scan Tech (DST). It is based on measurements of soil properties from the surface that can then be presented as 2D and 3D pictures of the underground. This allows accurate analytical results concerning the relevant properties of the land studied for the management of nutrient discharges to water. The main application area is in agriculture, especially in fields and their buffer areas next to water bodies.

Nutrient runoff from agriculture is the single largest contributor to eutrophication in the Baltic Sea. However, the main mitigation measures, reducing fertilizer use and buffer zones next to water bodies, entail economic impacts to farmers. Effective tools for optimization could help employ both approaches more efficiently. The technological solution demonstrated in this project can provide uniquely accurate information on key soil properties affecting the runoff susceptibility of fields and their buffer areas to support decision making. The chosen method allows quick and reliable investigation of soil properties from the surface. There is no need to dig, take samples or spend time in laboratory. The solution allows the properties of the field and its buffer zone to be determined sufficiently deep, even though it is based on surface measurements. Short- and long-term monitoring are also possible, for example to determine the impact of seasons. This new technological solution significantly improves the accuracy with which key characteristics of nutrient loads in fields can be rapidly determined without the need for in-depth field investigations.

In this project we examined the properties of a field in the experimental farm of Qvidja in Southern Finland and provided a comprehensive view into its composition. This gives unique new insight into understanding how the dynamics of a field operate with regard to nutrient flows and, combined with the extensive results of past studies performed at the experimental farm, will enable developing better guidelines for reducing nutrient runoffs.