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Groundwater protection vs. extractable soil resource usage - approaching the problem with GPR-survey

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Finland is fully self-sufficient in clean groundwater and even has a capacity of exportation: there are more than 6000 groundwater areas, a total yield of those is 5.4 million m3/day and only 10% of this is in use. Even so, nowadays the protection of groundwater has come more and more important. One of the reasons is effects of extractable soil resource usage, because the most valuable and remarkable resources of groundwater as well as sand and gravel aggregates appear in the same areas. Also in densely populated areas there is lack of aggregate products. Using the best available techniques and methods which take into account sustainable development, the outcomes of this protection vs. usage -dilemma will be beneficent.

Ground penetrating radar (GPR) -survey is an efficient tool for examination of areas of groundwater and soil resources. Briefly, GPR is a geophysical method that uses radar pulses to image the subsurface. It uses electromagnetic radiation in the microwave band (UHF/VHF frequencies) of the radio spectrum and detects the reflected signals from subsurface structures. Usually groundwater and soil aggregates appear in areas where the structure of soil layers improves the efficiency of GPR , so an exact image of subsurface layers can be outlined. Also the conditions of groundwater can be interpreted from GPR-data.

Results from GPR-survey can be effective in making guidelines for extractable soil resource usage to avoid risks and to address secured sites for both groundwater and soil usage. Geological Survey of Finland has executed many co-operated projects related to these kind of problems, for example in Kainuu area, eastern Finland, 20 areas were studied with over 30 kilometers of GPR-profile. Detailed information from these researches support local authorities and actors in land use planning in future and furthermore assure safe balance in groundwater and soil resource usage.