

Further development of water management in the Ruhr region

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Date : August 16, 2021

As a result of intensive mining, the terrain and surface in the Ruhr region have in some cases subsided to such an extent that large depressions have been created - the so-called polder areas. In these areas, some waters can no longer flow freely. The "deepened" areas must therefore be artificially drained on a permanent basis to prevent the water from rivers and lakes from backing up. These processes have a significant impact on the overall water balance in the region.

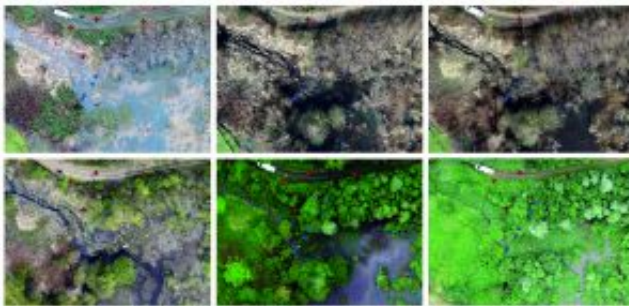
In a new project, the Post-Mining Research Center (FZN) of the Georg Agricola University of Applied Sciences (THGA) is therefore now investigating how water management in the Ruhr region can be made even more sustainable. Above all, farmers and the forests in the area could benefit from this. However, targeted environmental monitoring should also improve the way extreme events such as heavy rainfall or long periods of drought are dealt with. This is where the "MuSE" project (Multisensory Earth Observation for Sustainable Polder Management) comes in.

"MuSE" is funded by the RAG Foundation until 2024. Bärbel Bergerhoff-Wodopia, member of the board of the RAG Foundation, emphasizes: "As the RAG Foundation, we see it as our responsibility to find solutions to the challenges that mining has left us. With this in mind, we work closely with the THGA and the Post-Mining Research Center and support the "MuSE" project with great conviction."

"Where the terrain has subsided as a result of coal mining, i.e. large ground subsidence has occurred, the soil moisture has also changed. This naturally affects the use of land and resources in agriculture, forestry and water management as a whole. Especially because of climate change, there are far-reaching consequences. The Ruhr region needs more water to absorb the consequences of climate change in the long term - even if the impressions of the last few weeks actually convey a different picture."

- Prof. Dr. Tobias Rudolph of FZN

This raises the question for Prof. Rudolph and his team of a modified management of the polder water supply - in other words, "What can we do to make better use of this water? And how can we optimize irrigation scheduling overall?" In the new "MuSE" research project, experts at the research center are investigating how such an efficient and sustainable reorientation of polder management could be designed. For example, higher groundwater levels and an economical and technical use of the elevated groundwater and surface water could lead to minimizing drought damage in agriculture and forestry. At the same time, targeted monitoring can help to better adapt polder areas to heavy rainfall and flooding.



To this end, the experts not only evaluate the available historical data, but also use modern satellite data and conduct their own measurements in selected test areas: "We use various sensors to determine soil moisture. At the same time, we evaluate tide gauge data and explore the vegetation with our drones. In the process, we also look at how the health of the plants is doing. We combine the on-site information with remote sensing data provided by the European satellite program Copernicus and evaluate it for this question for the first time," explains Dr. Xiaoxuan Yin, a specialist in radar interferometry and remote sensing who has joined the center for the project.

Then it gets extra tricky again: "We fuse the many different pieces of information in a so-called 4D model with the factor 'time' as a fourth dimension," the 32-year-old explains. This allows scientists to track the changes in the water balance over the decades and model them digitally. "At best, we can make recommendations for long-term land and resource use and help improve environmental conditions in agriculture, forestry and water management."