Erosion modelling Saxony

IPROconsult

Development and provision of scenario maps on water erosion with EROSION-3D for arable land in Saxony, as a basis for the planning and implementation of erosion control measures (R&D project)

Client
Saxon State Office for Environment, Agriculture and Geology (LfULG)

Cooperation partner
GeoGnostics

Services provided
Erosion modelling

Implementation period
2018 - 2020

Published results
Project report: "Szenarien-karten Wassererosion in Sachsen"
LfULG publication series: https://publikationen.sachsen.de
Maps: iDA data portal of the LfULG: www.umwelt.sachsen.de/umwelt/infosysteme/ida

Project background

The risk of rainfall-induced soil erosion on arable land in Saxony is heightened by the widespread presence of siltrich soils combined with sloping terrain.

As part of the R&D project, state-wide scenario maps on soil erosion using EROSION-3D were created on behalf of the Saxon State Office for Environment, Agriculture and Geology (LfULG). These scenario maps provide Saxon farmers with state-wide detailed information on cultivated arable land and effective erosion control measures. They will be used for advisory purposes and as a basis for the conception of agri-environmental measures.

The state-wide map series shows erosion/deposition for the following scenarios on the use and condition of arable land: Seedbed condition with conventional and conservation tillage, grassland use and seedbed condition with conservation tillage, in combination with supplementary erosion control measures (such as green strips, planting on deep lines).

Work steps

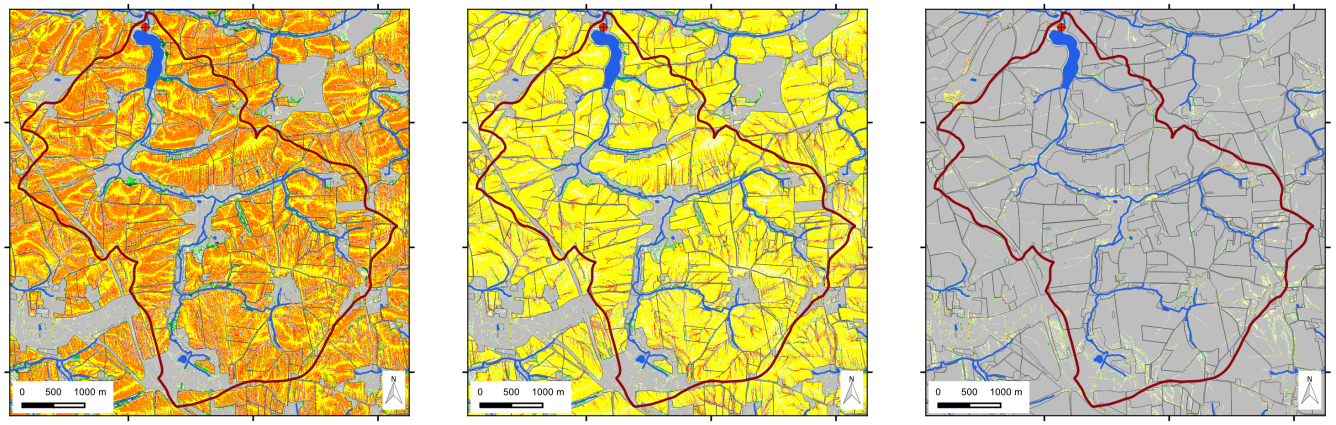
- Development and preparation of the necessary state-wide data basis of high-resolution input data for erosion modelling: land use data (ATKIS-DLM), soil data (BK50), precipitation data (KOSTRA- DWD-2010R) and relief data (ATKIS-DGM2/10).

Dealing with culverts and bridges in the digital terrain model of the state of Saxony was successfully resolved.

- Carrying out the simulations with EROSION-3D to create the state-wide scenario maps (spatial resolution: 10 m) for a 10-year and a 50-year heavy rainfall event. The modelling software was optimised to process very large data sets in a short time

Methodology

The development of the methodology for state-wide data processing as well as simulations in 2 m resolution for exemplary detailed analyses with further scenarios (e.g. strip-till, impact division, damming of a runoff channel) was carried out in the approx. 20 km² catchment area of the Baderitz reservoir in the Central Saxon Loess Hills.



Erosion/Deposition [kg/m²]

- < -25
- -2.5 - -25
- -0.25 - -2.5
- -0.001 - -0.25
- 0.001 - -0.001
- 0.001 - 0.25
- 0.25 - 2.5
- 2.5 - 25
- > 25

Figure 1:
Detailed view of EROSION 3D maps for various agricultural management scenarios (seedbed condition following conventional (left) and conservation tillage (centre) as well as grassland (right) during a 10-year heavy rainfall event

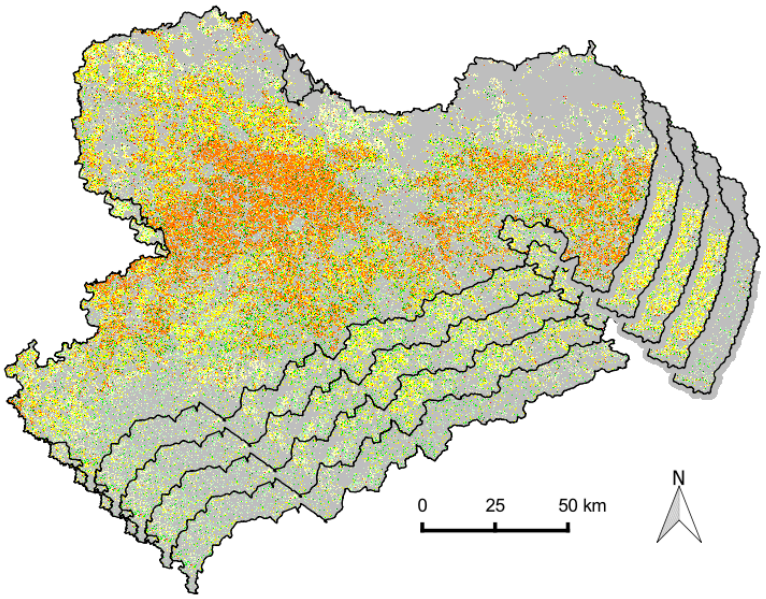


Figure 2:
State-wide scenario maps on soil erosion for Saxony

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