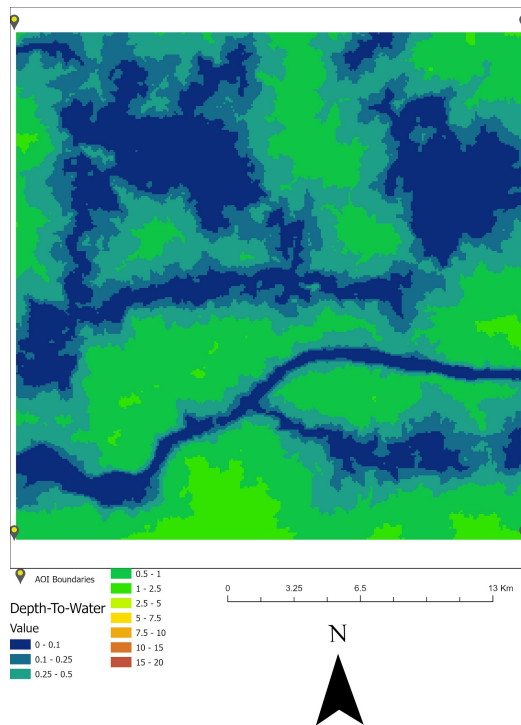


Application of DTW index in MIP model for fire ponds and access routes layout optimisation

Bacherikov, I., Simonenkova, A., Simonenkov M., Danilov, D.

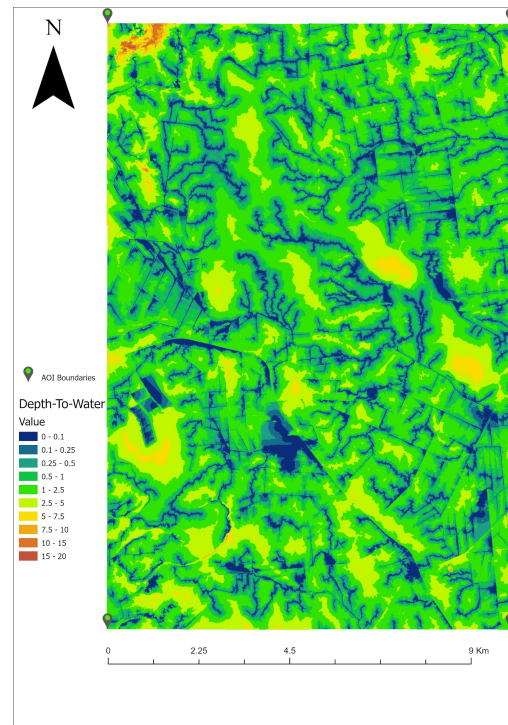
Dataset comparison: DTW

Dataset: Podporozhye



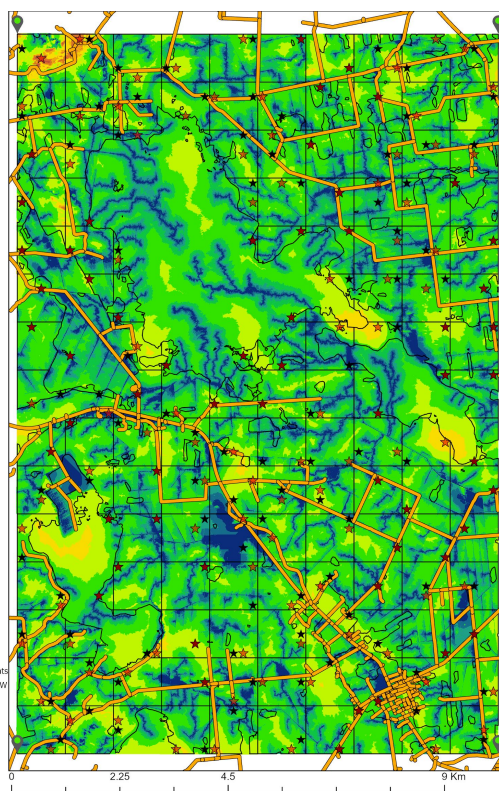
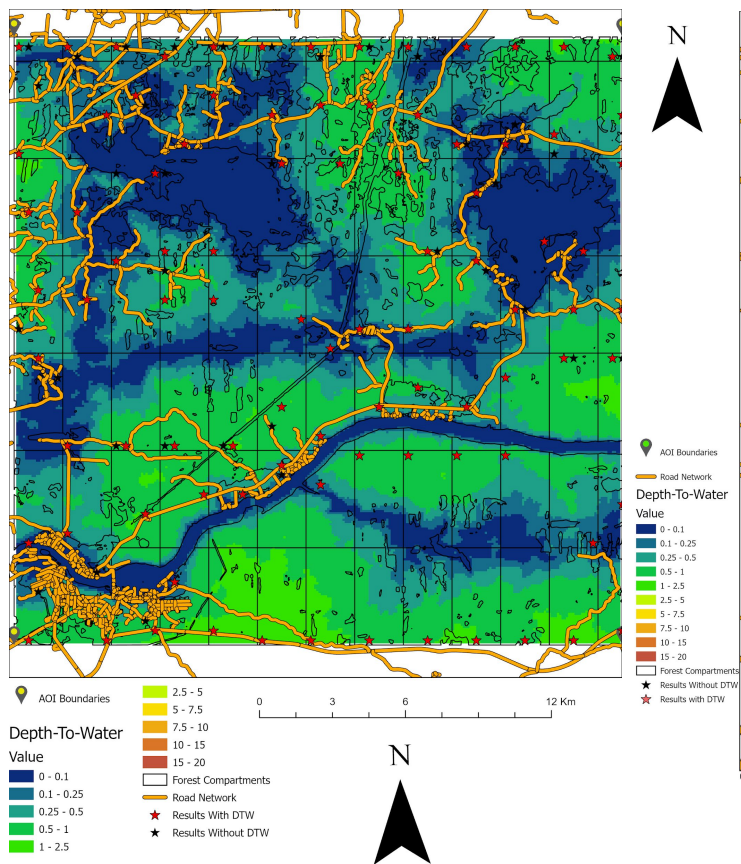
Area: 25x25 km
DTM SRTM: 90m

Dataset: Estonia



Area: 10x15 km
DTM Estonian Land Board: 1m

Dataset comparison: potential fire ponds and existing roads



Podporozhye:
91 fireponds, 56 overlap
Artificial forest compartments: 2*4 km
Max distance between fireponds = 1 km
DTW coefficient = -5000 euro

Lohusuu:
144 fireponds, 57 overlap
Artificial forest compartments: 1*1 km
Max distance between fireponds = 0.4 km
DTW coefficient = -1000 euro

Main findings

- in the first approximation, the problem of optimal placement of fire ponds is solved;
- the planned ponds in the obtained solution tend to the existing roads, regardless of the DTW consideration;
- the formulated mathematical model finds the optimal solution in 30 seconds for 625 km²;
- DTM resolution has a significant influence on the quality of the obtained solution;
- the study showed that for the fire ponds allocation optimisation planning, it is necessary to use high-quality digital elevation models (no more than 10 m resolution);
- Podporozhye is significantly more wetted than Lohusuu.

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For this publication, the Estonian Topographic Database, Land Board, 2020 and Elevation data, Land Board, 2019, was used. <https://geoportaal.maaamet.ee/>

Thank you!

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