

Groundwater chemistry evaluation and a GIS-based approach for determining groundwater potential in Mörbylånga, Sweden

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The aim of this thesis, which is written in collaboration with SGU, is to evaluate the groundwater quality of Mörbylånga municipality. The evaluation is based on more than 1400 groundwater analyses, sampled from private and municipal wells over the last 8 – 10 year period. The samples, analyzed for physiochemical and microbiological content, are compared to guideline values elaborated by SGU and the National Food Agency (Livsmedelsverket). In addition, 26 maps were created based on georeferenced data from private wells, showing the spatial distribution of the analyzed parameters.

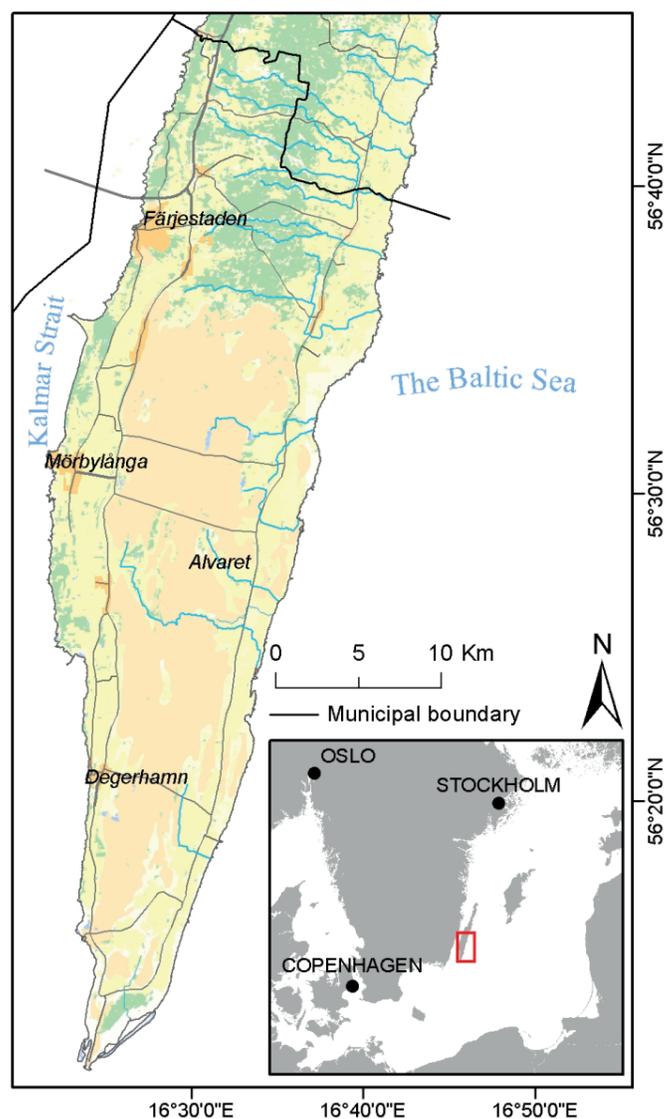


Fig. 1. Mörbylånga municipality, study area.

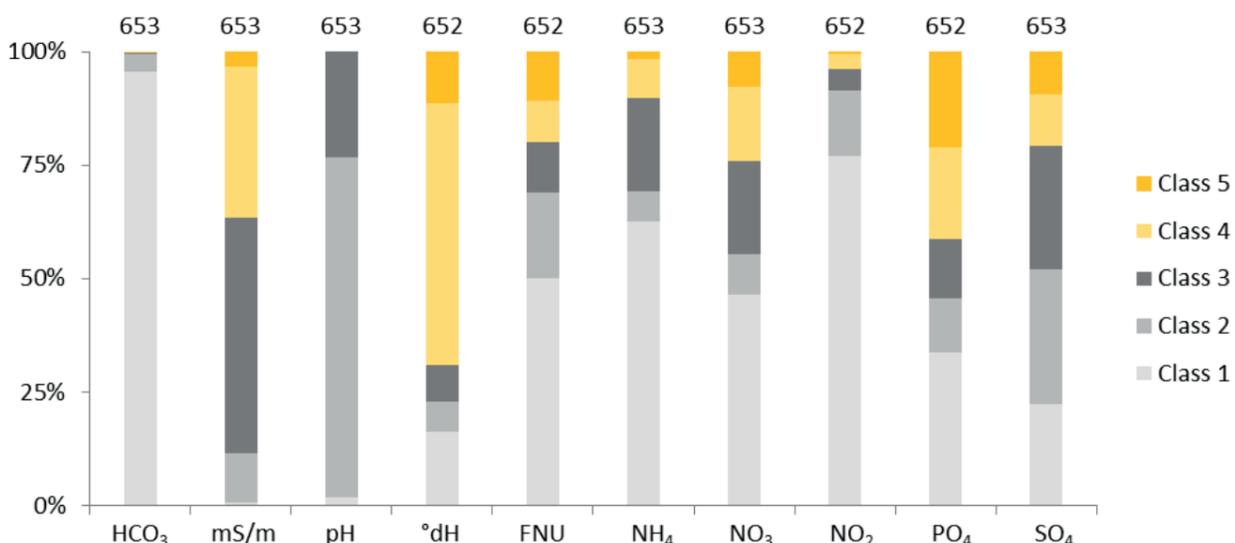


Fig. 2. Stacked chart showing the distribution of physiochemical parameters according to guidelines in SGU 2013:01. Numbers above each stack represents amount of samples for each parameter.

Possible saltwater intrusion events during summers and autumns? Well #1 Södra Möckleby water catchment

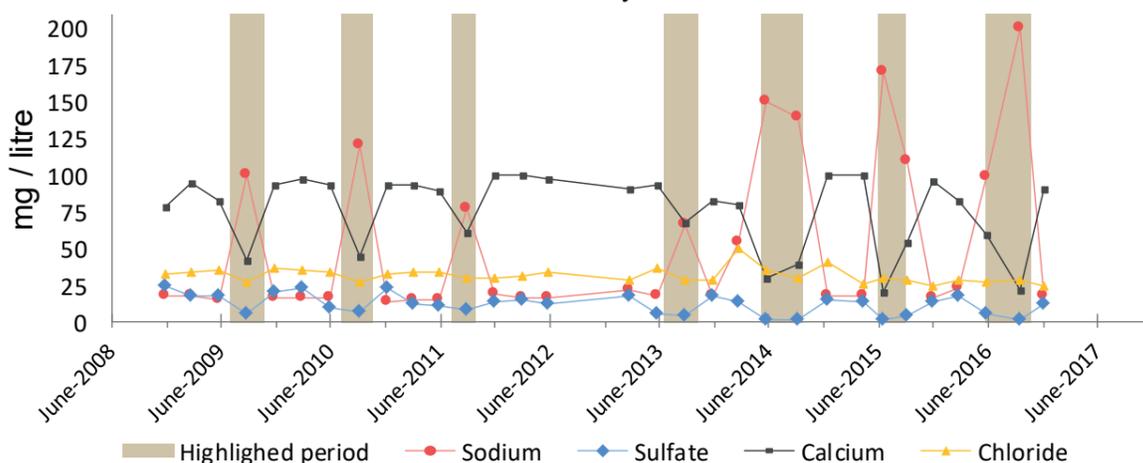


Fig. 3. A comparison of sodium-, sulfate-, calcium and chloride concentrations in municipal water.

RESULTS of the evaluation show, for the studied period, a better groundwater quality in municipal wells, compared to private wells. Significant concentrations of nutrients and microorganisms were detected in private wells, especially in the northern and eastern parts of the municipality. High concentrations of lead were in a few occasions encountered in both municipal and private wells and a cyclical variation in concentrations of sodium, sulfate and calcium in one of the municipal wells could possibly be linked to saltwater intrusion.

GIS overlay analysis

By integrating spatial geodata in a GIS overlay analysis, the groundwater potential of an area can be estimated. The data is weighed and scored according to their relative importance in relation to the groundwater formation process. The result is a suitability map that, together with other material, can be used as a base for future groundwater exploration.

The GIS-analyses undertaken in this study reveal an area of approximately 2,5 km² with higher than average groundwater potential. The area, conveniently located with regards to users and infrastructure, is situated between existing municipal groundwater catchments Tveta and Resmo.

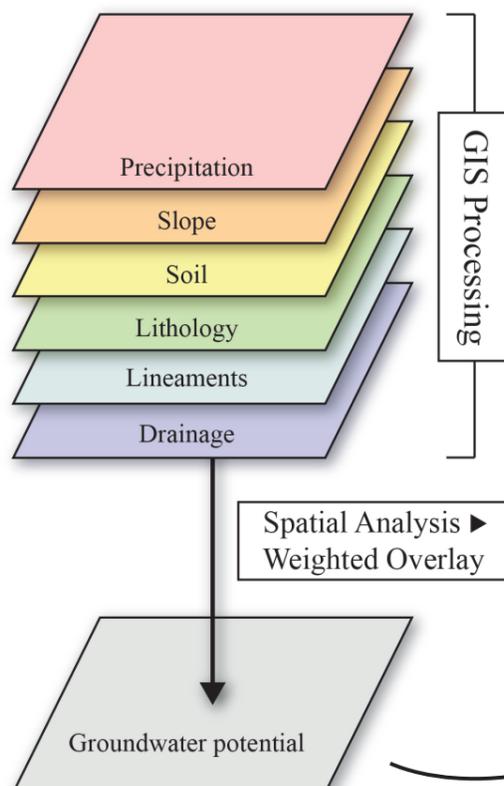


Fig. 4. Conceptual model of the overlay analysis method.

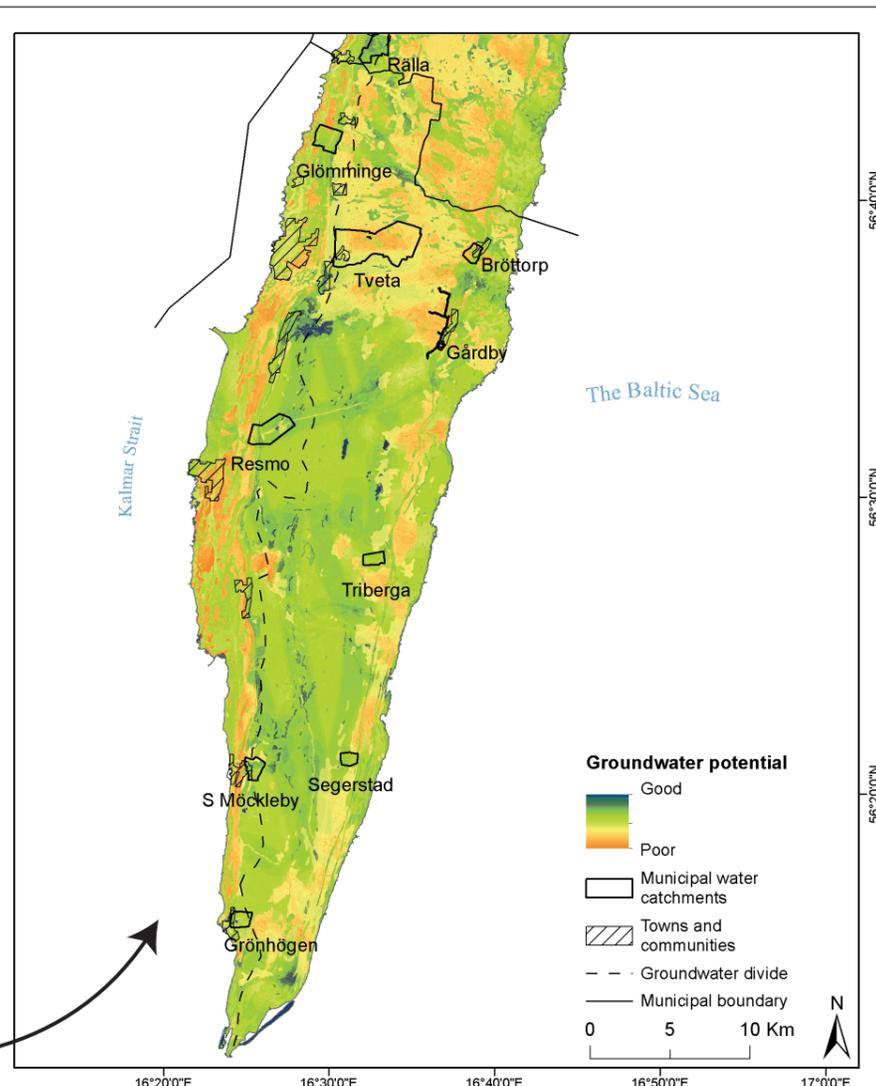


Fig. 5. Results of the GIS overlay analysis performed in this study.