

# Land subsidence hazard and risk analysis for the whole Netherlands

## A statistical analysis for subsidence hazard and risk in both urban and rural areas

Department: Physical Geography

Research group: NWA-LOSS

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### Project description

Land subsidence in delta regions can lead to various problems, including damage to infrastructure, increased flood risk, and salinization of freshwater resources, particularly when considering the impacts of accelerated climate change and sea level rise (SLR). In the NWA-LOSS research project, different pathways for addressing land subsidence in the Netherlands have been developed by first identifying the targeted future states that align with addressing land subsidence problem in the Netherlands. Then, we developed a series of water and land management strategies and scenarios to reach these identified future states. However, this process required the creation of a novel subsidence risk map in order to link each specific area in the Netherlands with a specific management strategy according to the risk level of this area [1][2][Fig. 1].

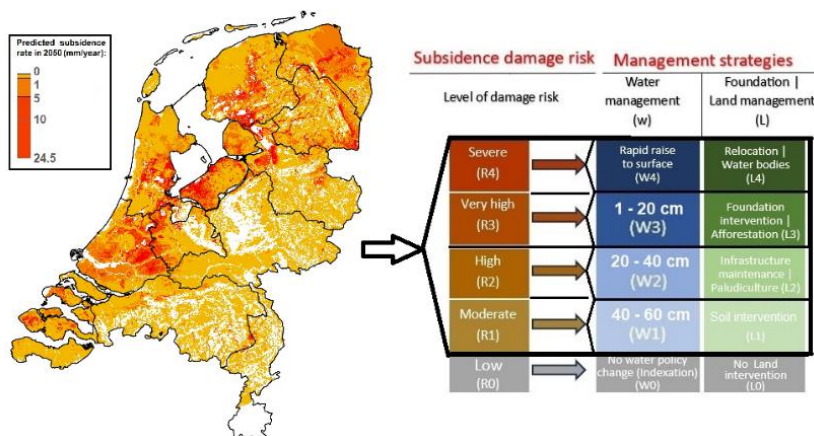


Figure 1. A predictive subsidence map across the Netherlands in 2050 based on the “extensive subsidence” scenario (The left part of the figure) [1], and a series of water and land management strategies aligned with different subsidence-related risk levels (the right part of the figure) [2].

We are seeking for a talented and motivated Master’s student to join our research team to work on using proper statistical risk assessment tools to create a detailed understanding of the subsidence hazard and risk landscape across both urban and rural areas.

### Role and Responsibilities

The selected Master’s student will focus on the development of hazard and risk maps for land subsidence across rural and urban areas in the Netherlands. Key responsibilities will include:

- Collecting and analysing data from remote sensing, GIS, and other geospatial sources to map subsidence patterns over time.
- Developing hazard maps to identify areas most affected by subsidence, integrating environmental, geological, and hydrological factors.
- Creating risk maps that combine subsidence hazard data with social, economic, and infrastructural vulnerabilities, highlighting areas with the highest potential for damage.

The results of this project might significantly contribute to the process of assessing the risk level associated with land subsidence for the whole Netherlands. Therefore, the project will have a significant societal impact as well.

#### Job requirements

Candidates preferably (not strictly required) have a background in Advanced GIS (GEO3-3024), Applied remote sensing & GIS (GEO2-1235), or a statistics and/or data-analysis course or experience with statistics and data-analysis in projects or other courses.

#### References

- [1] Bootsma, H., Kooi, H., and Erkens, G. (2020): Atlantis, a tool for producing national predictive land subsidence maps of the Netherlands, Proc. IAHS, 382, 415–420.
- [2] Hammad, M., Erkens, G., and Stouthamer, E.(2024): Addressing Land Subsidence in the Netherlands: A backcasting Approach. The 4<sup>th</sup> annual symposium of LOSS, October 01<sup>st</sup>, 2024. [https://posters.geo.uu.nl/2024/Addressing\\_Land\\_Subsidence\\_in\\_the\\_Netherlands\\_A\\_Backcasting\\_Approach-Hammad\\_Erkens\\_Stouthamer-September2024.pdf](https://posters.geo.uu.nl/2024/Addressing_Land_Subsidence_in_the_Netherlands_A_Backcasting_Approach-Hammad_Erkens_Stouthamer-September2024.pdf)