



Spatial Industrial Accident Exposure and Social Vulnerability Assessment of Industrial Installations in Germany

Steffen Neuner¹, Alexander Fekete², and Udo Nehren³

¹Institute of Rescue Engineering and Civil Protection, TH Köln, Cologne, Germany (steffen.neuner@th-koeln.de)

²Institute of Rescue Engineering and Civil Protection, TH Köln, Cologne, Germany (alexander.fekete@th-koeln.de)

³Institute for Technology and Resources Management in the Tropics and Subtropics (ITT), TH Köln, Cologne, Germany

To assess the potential risk of NaTech disasters in Germany, we present an approach that evaluates both natural hazards triggering industrial accidents and the potentially affected population. First, the exposure of industrial installations, facilities registered under the Seveso Directive, chemical parks, and nuclear power plants to earthquake and wildfire hazards is mapped. Second, because NaTech disasters can amplify risks to nearby populations, the study examines the effects of NaTech disasters on communities surrounding these industrial sites. It is necessary to assess the exposure to hazards and the type of potentially vulnerable social groups that may be threatened by NaTech disasters in order to better guide preparedness against and mitigation of such disasters.

We apply a spatial analysis methodology using Geographic Information Systems (GIS) to assess exposure around hazardous sites and analyse census data to assess social vulnerability. Our findings indicate that while some industrial installations are situated in earthquake-prone areas, even more are exposed to wildfire hazards. Most industrial sites are located in urban areas, where we observe higher population density, more foreign residents, and smaller housing units. The analysis of buffer zones around industrial installations shows that vulnerability decreases with increasing distance from these sites.

These findings can help emergency management planners and stakeholders in developing more effective disaster risk reduction strategies tailored to different social groups, thereby enhancing preparedness for NaTech disasters and industrial accidents.