

Spatio-temporal analysis of disaster risk in Sumida ward, Tokyo



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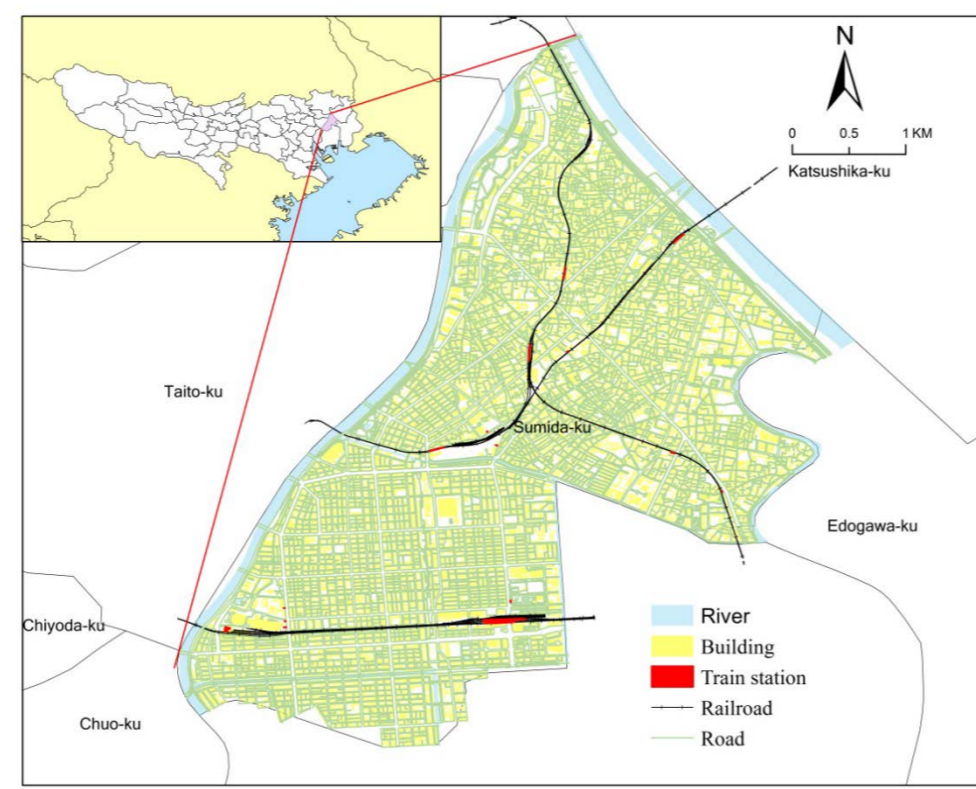
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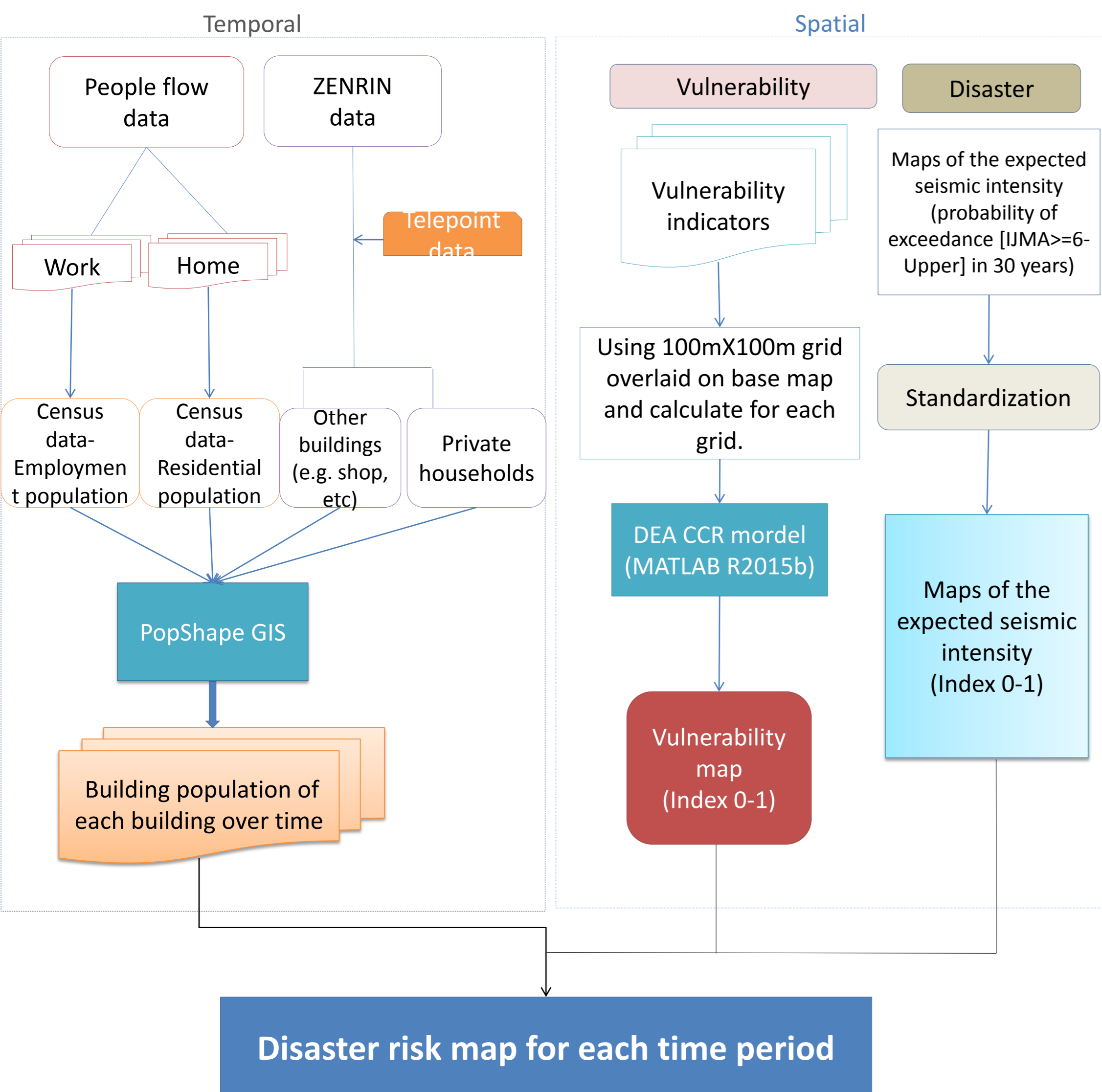
Introduction

The understanding of disaster risk in a spatiotemporal perspective helps to mitigate the potential damages of disasters effectively. In this study, the Data Envelopment Analysis (DEA) technique and people flow data are integrated to develop a disaster risk assessment to understand the disaster risks in both spatial and temporal manner.

Figure 1. Sumida ward, Tokyo.
(Sours: Geospatial Information Authority of Japan, Zenrin Co., Ltd. and ESRI Japan.)



Data and Methodology



Data:

- People flow data(2008): University of Tokyo Center for Spatial Information Science
- Vulnerability indicators: Female population, Children<6, Elderly people>65, School, Hospital, Train Station, Roads, Commercial facilities, Wooden building, Building above 6 floor.

Conclusion

- ◆ The vulnerability map shows that the vulnerable area are mostly concentrated in the northern part of Sumida ward.
- ◆ The northern and southern parts of the Sumida ward are highly prone to disaster damages when an earthquake occurs with a scale of IJMA>=6-upper.
- ◆ The southern part of the Sumida ward is subjected to higher risk of disaster damages during the daytime 9am to 7pm.

- Maps of the expected seismic intensity (probability of exceedance [IJMA>=6-Upper] in 30 years): National Research Institute for Earth Science and Disaster Prevention

Results

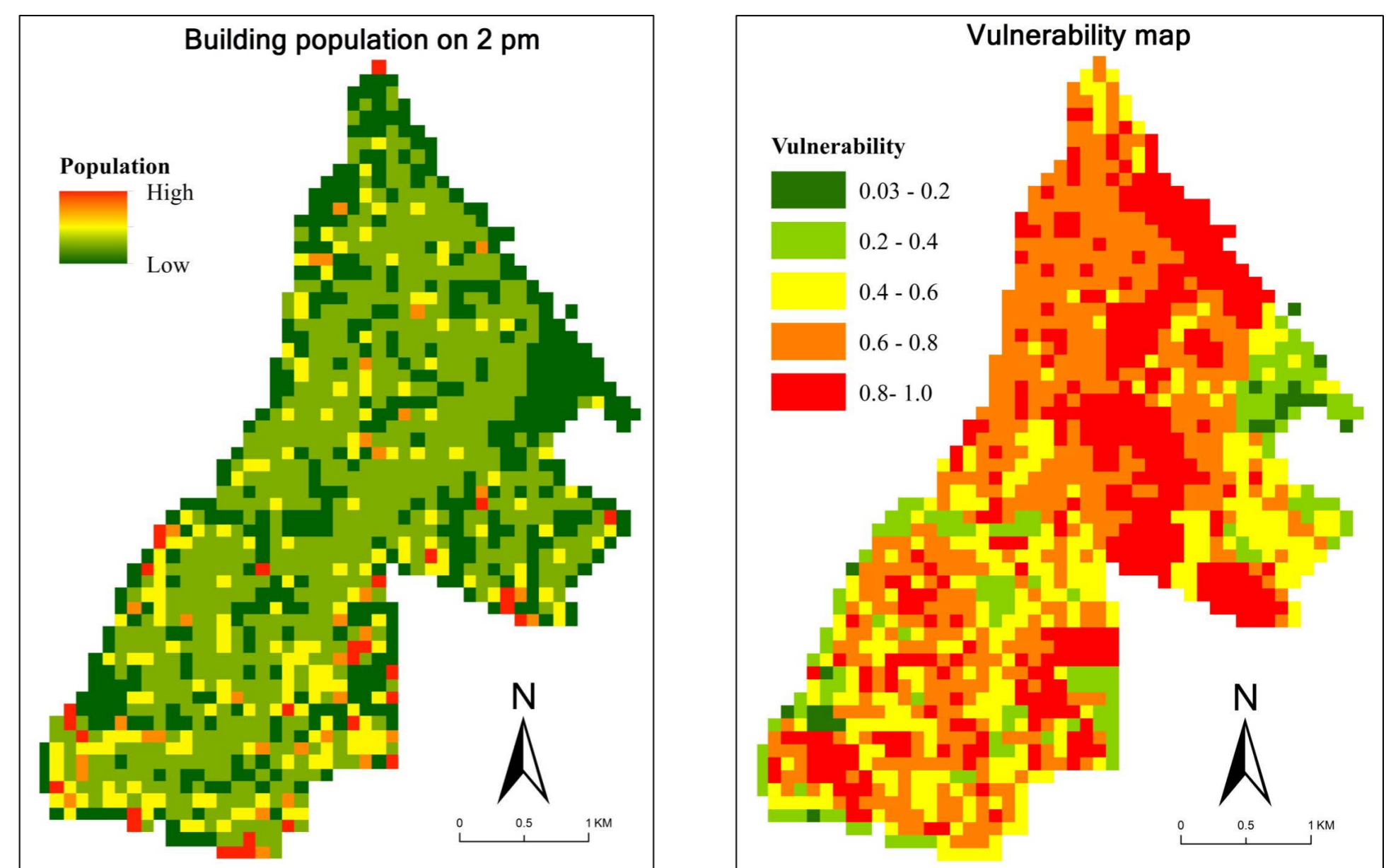


Figure 2.(left) Building population on 2pm, based on People flow data, 2008 and Census data, 2010.
Figure3.(right) Vulnerability map of Sumida ward, Tokyo.

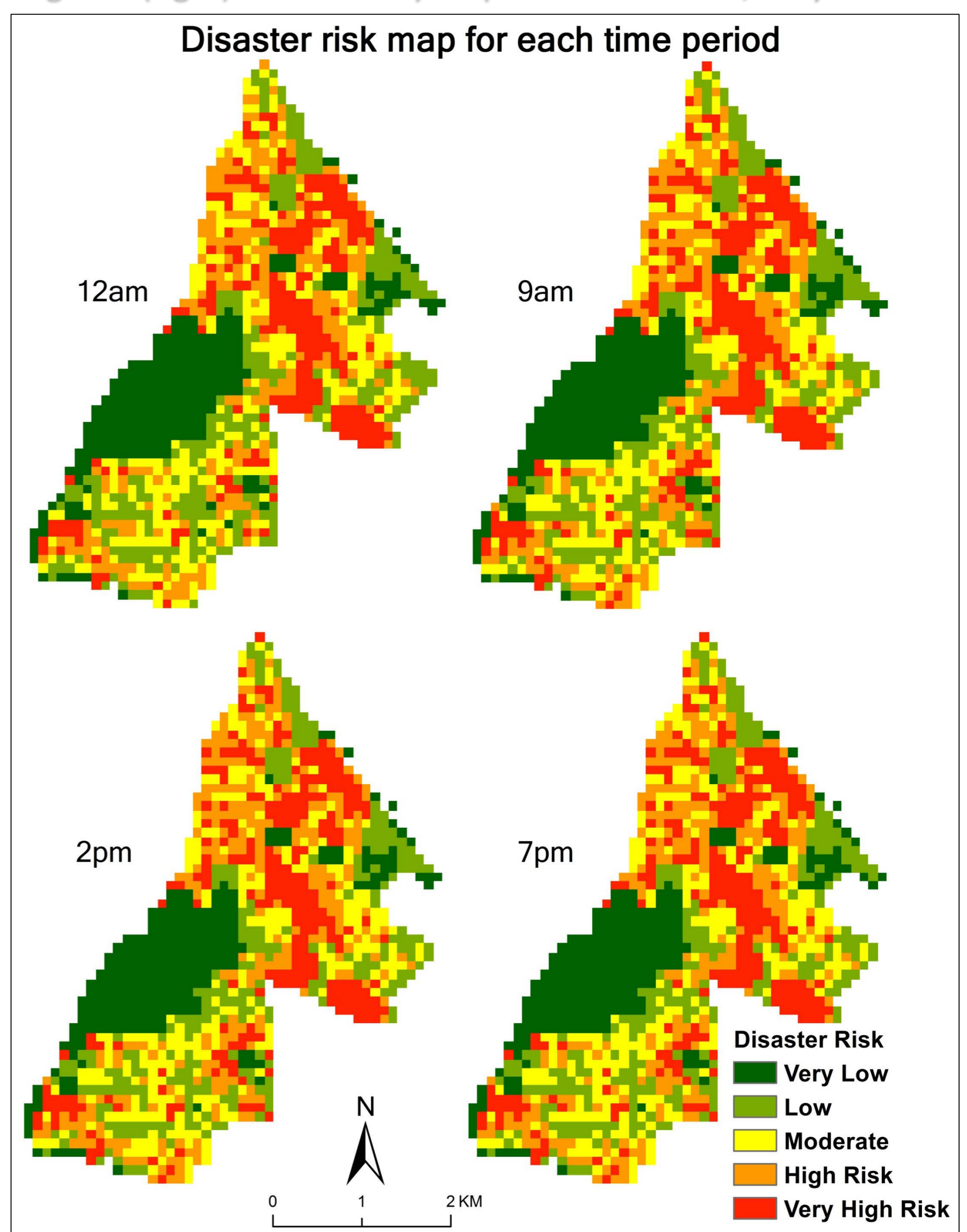


Figure 4. Map of disaster risk on 12am, 9am, 2pm and 7pm.