Spatial and temporal analysis of extreme hydrological and meteorological events impact in Lower Silesian Voivodeship (1994-2011)

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Overview

1. Extreme events in Poland
2. Data
3. Analysis
4. Conclusions

Extreme events in Poland

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- extreme natural events (CRED):
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  - meteorological events (storm)
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- extreme natural events (CRED):
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  - meteorological events (storm)
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- the need to adapt to new conditions

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The need for adaptation investments to reduce negative impact of extreme events probabilities (improving existing standards of protection, determine the location and extent of current and future exposure, **careful planning**).

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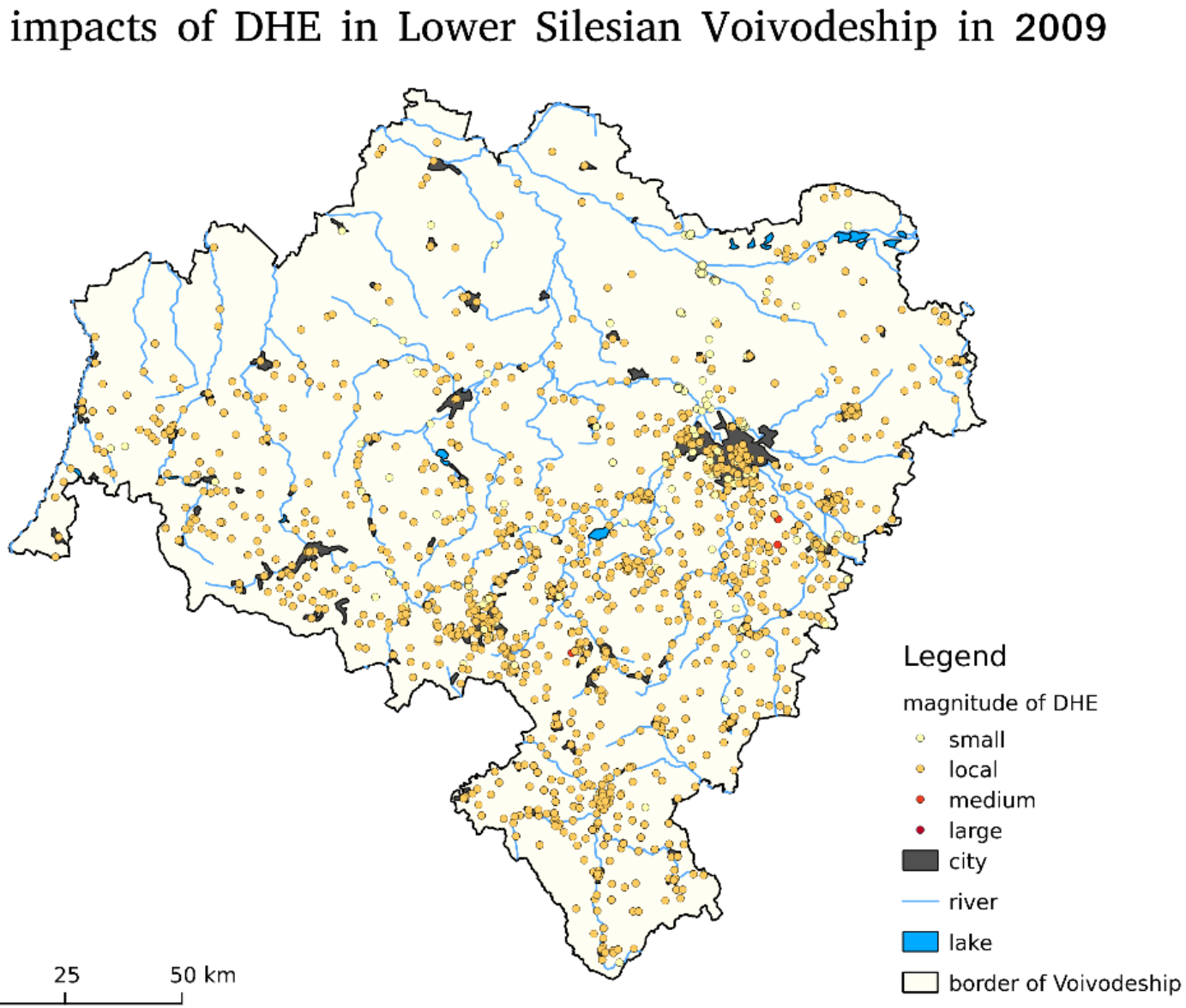
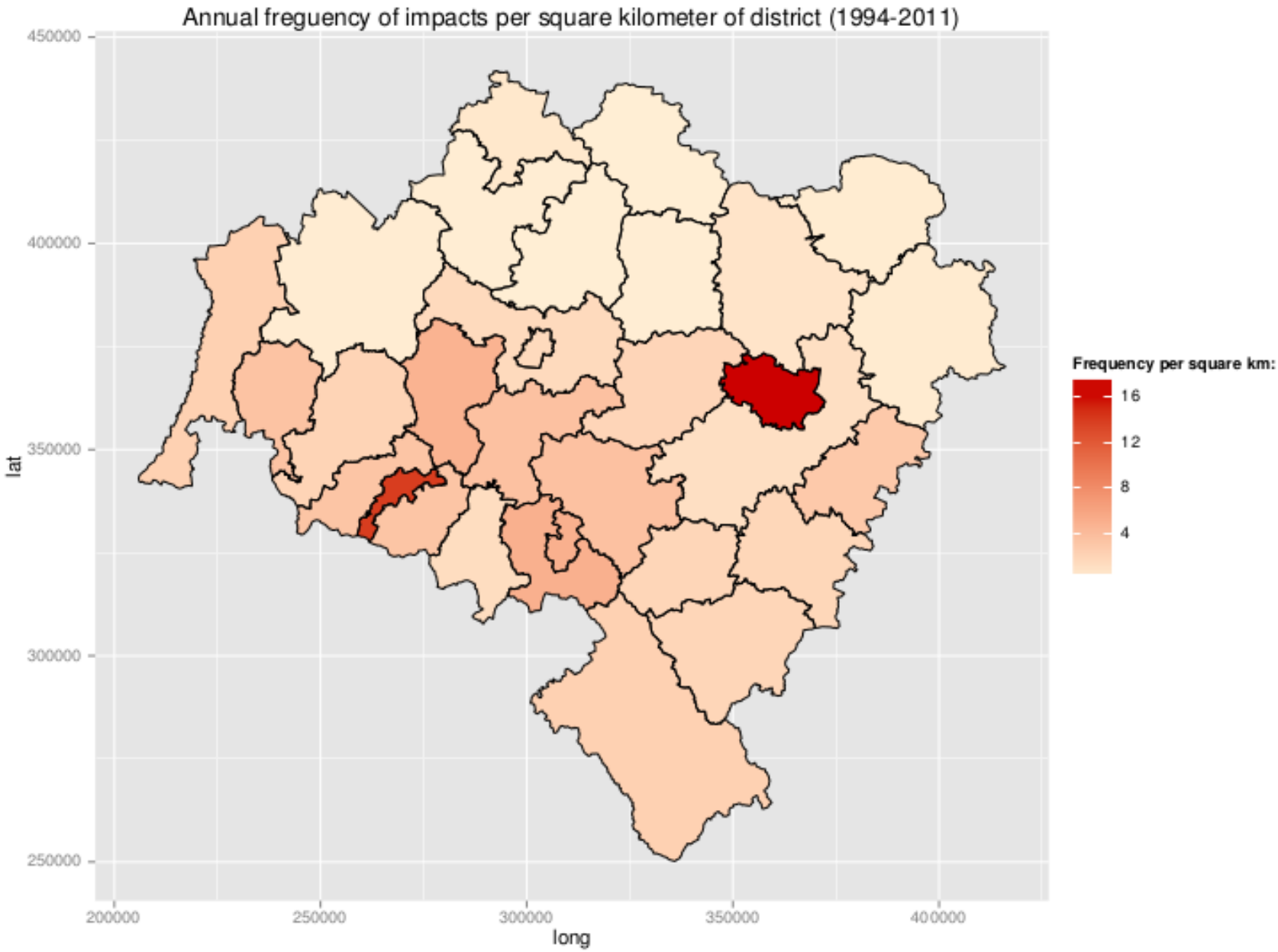
Data

- registered impacts of extreme events
- 1994–2011
- consistend data for whole country
- point format

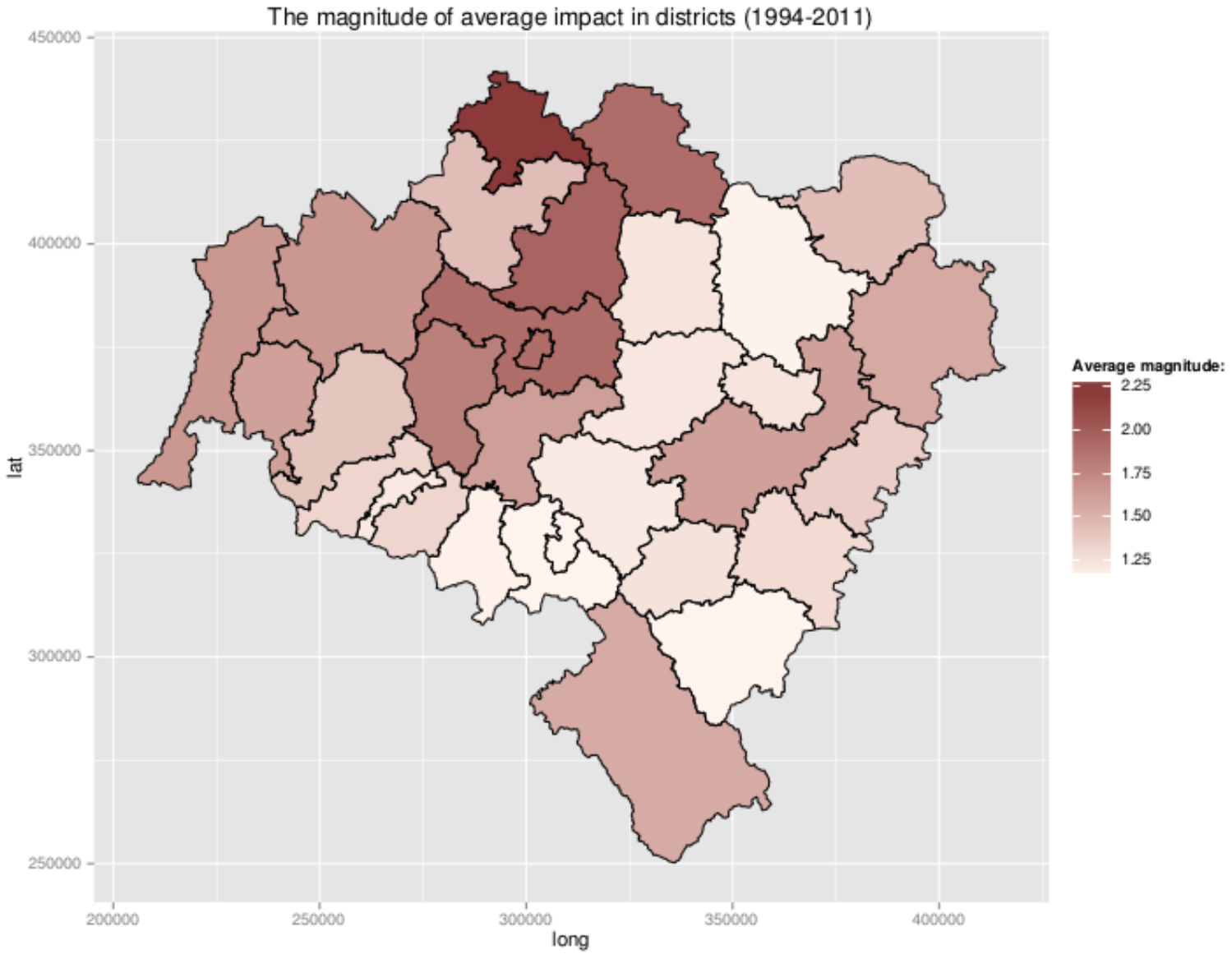
Extreme events in Poland



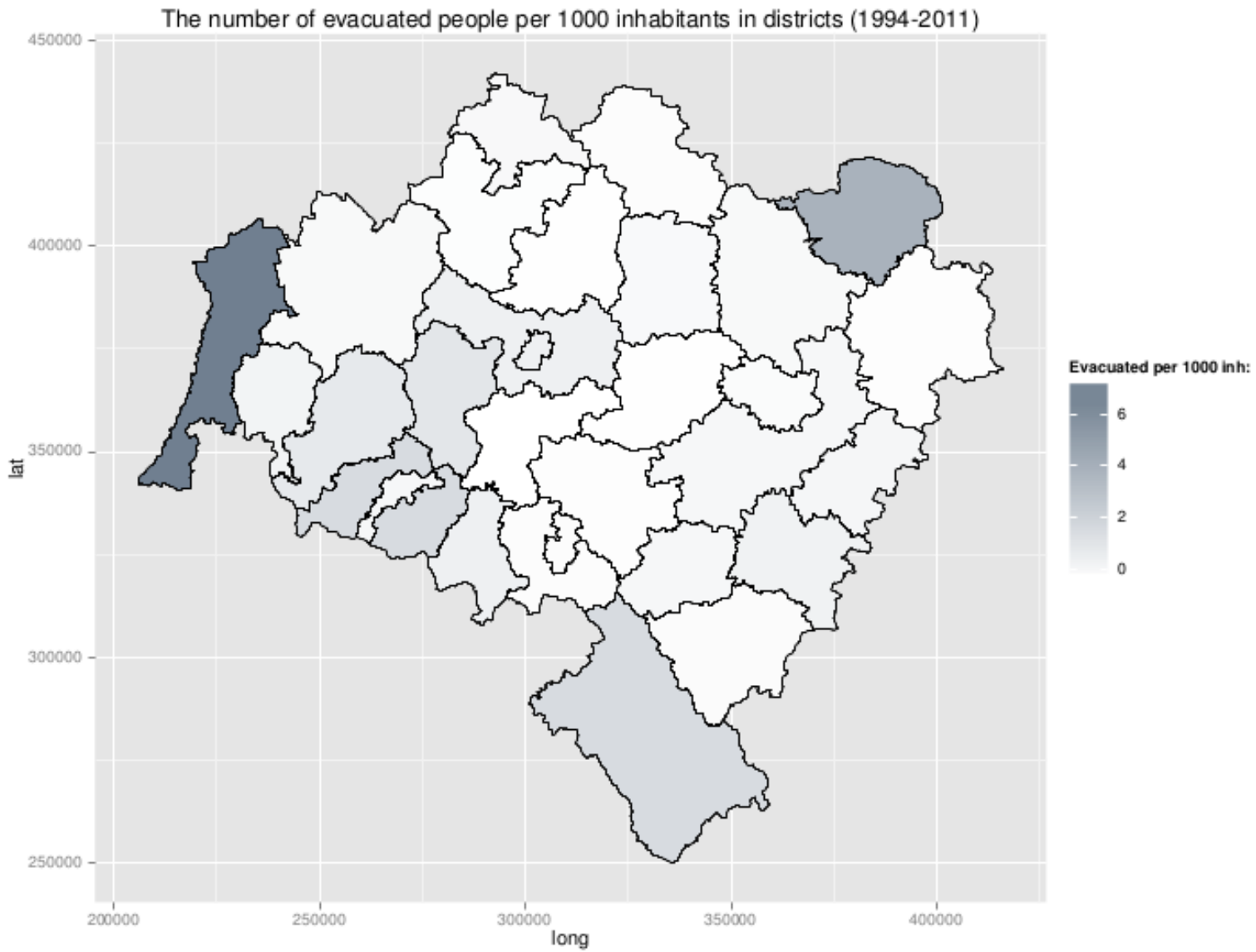
Spatial analysis: frequency of impacts



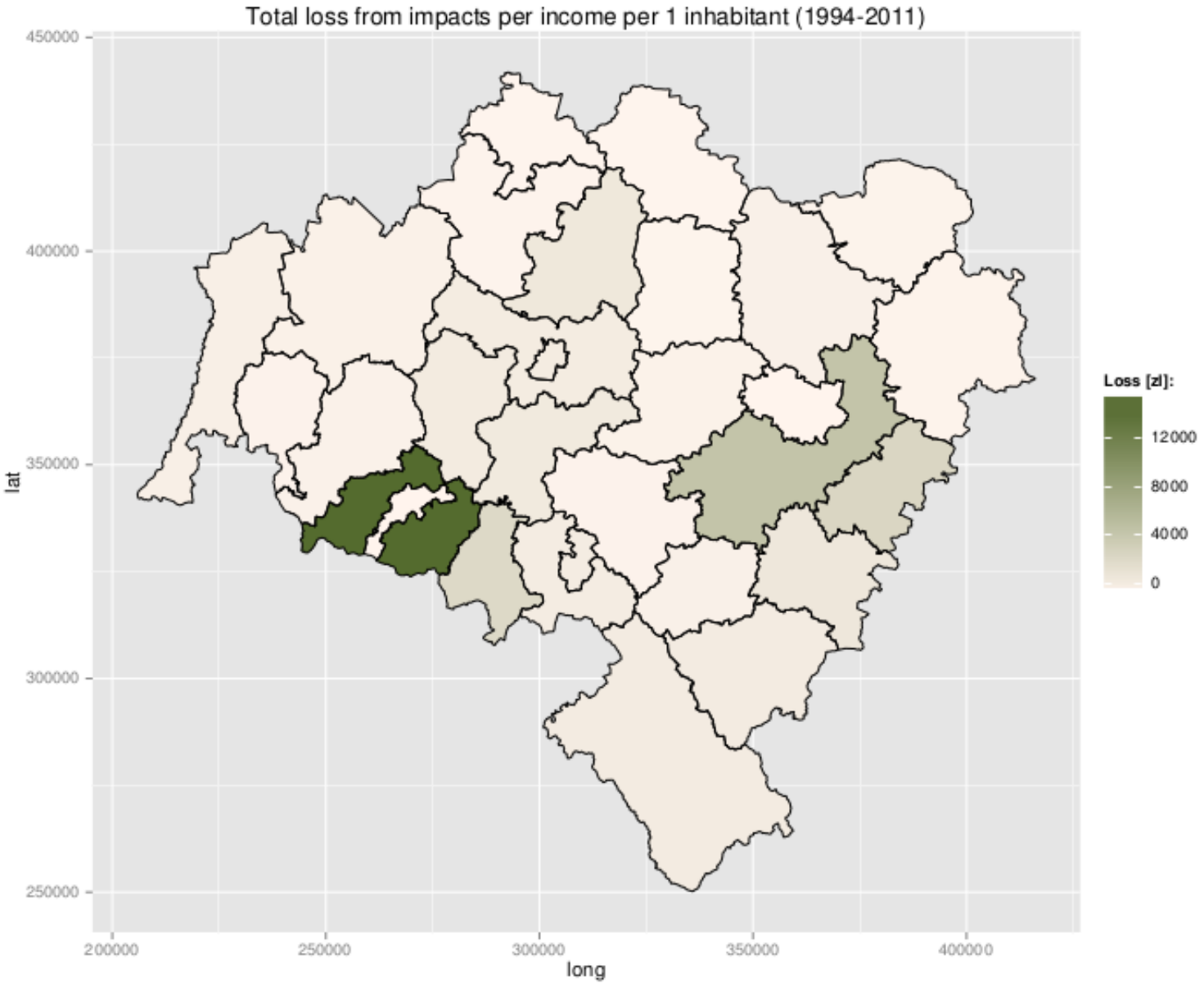
Spatial analysis: magnitude of impacts



Spatial analysis: evacuated people



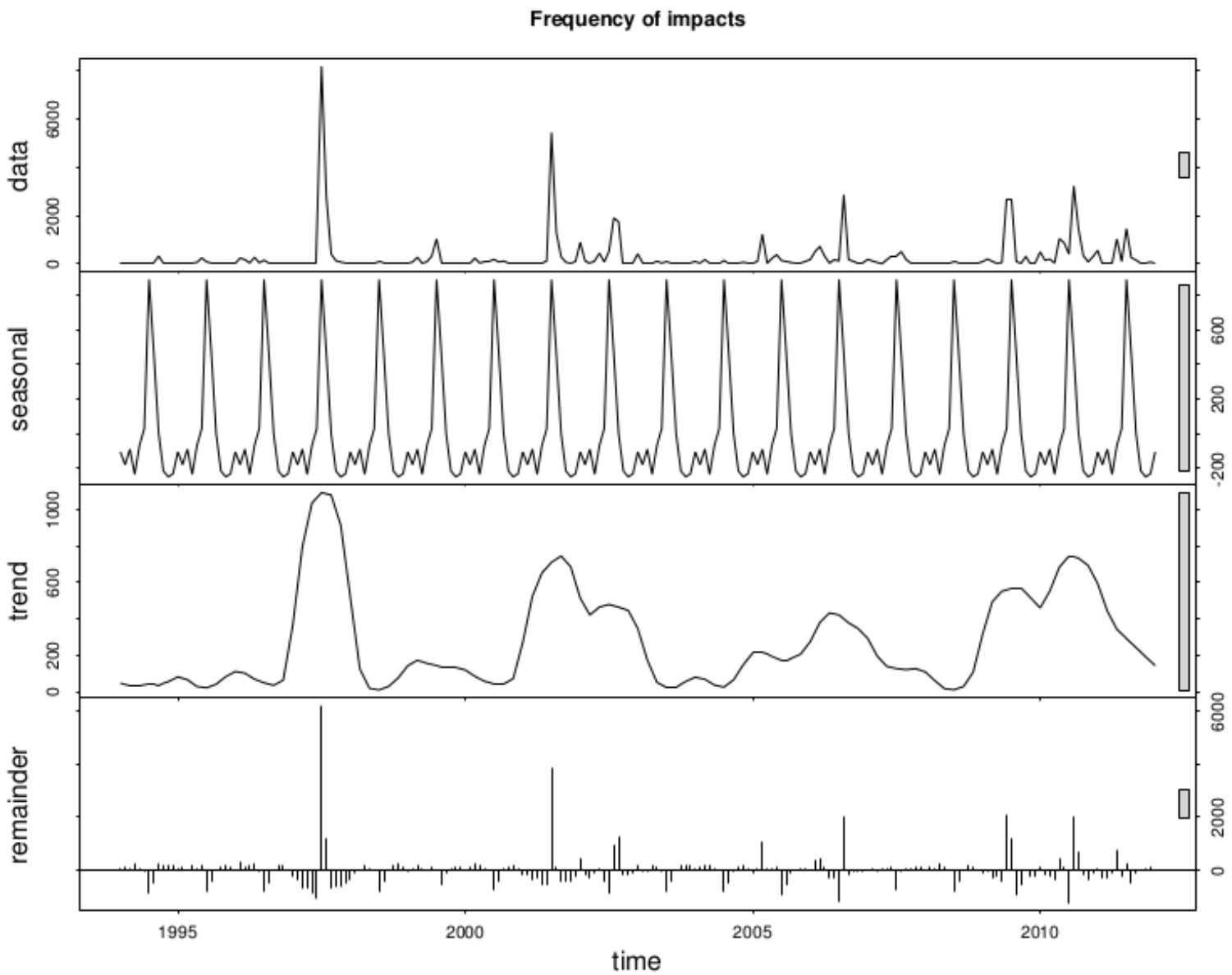
Spatial analysis: economic losses



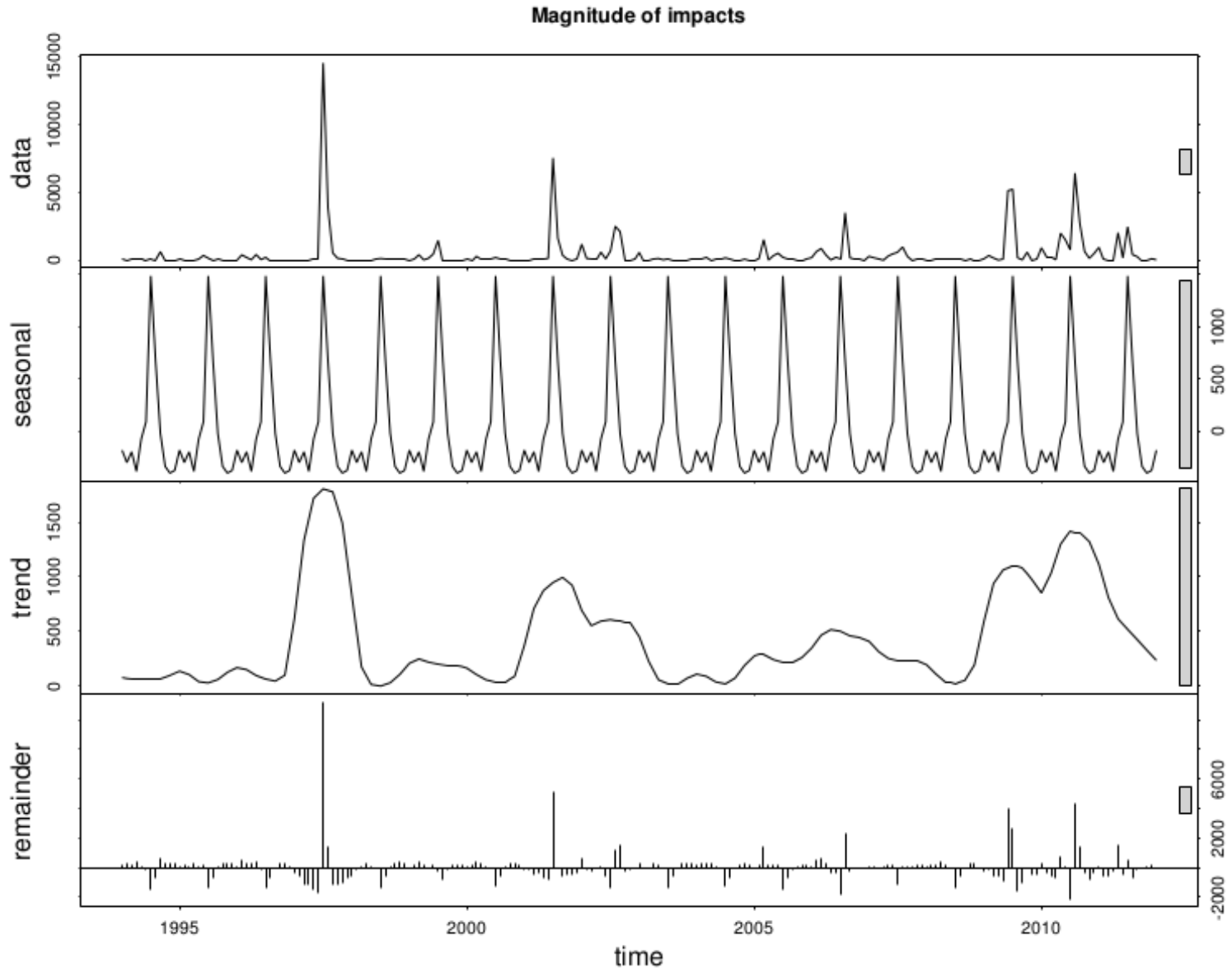
Temporal analysis: a seasonal-trend decomposition (STL)

- decomposing time series into trend, seasonal and remainder components
- presented by Robert Cleveland, William Cleveland, Jean McRae and Irma Terpenning in the Journal of Official Statistics in 1990
- available within R via the **stl** function

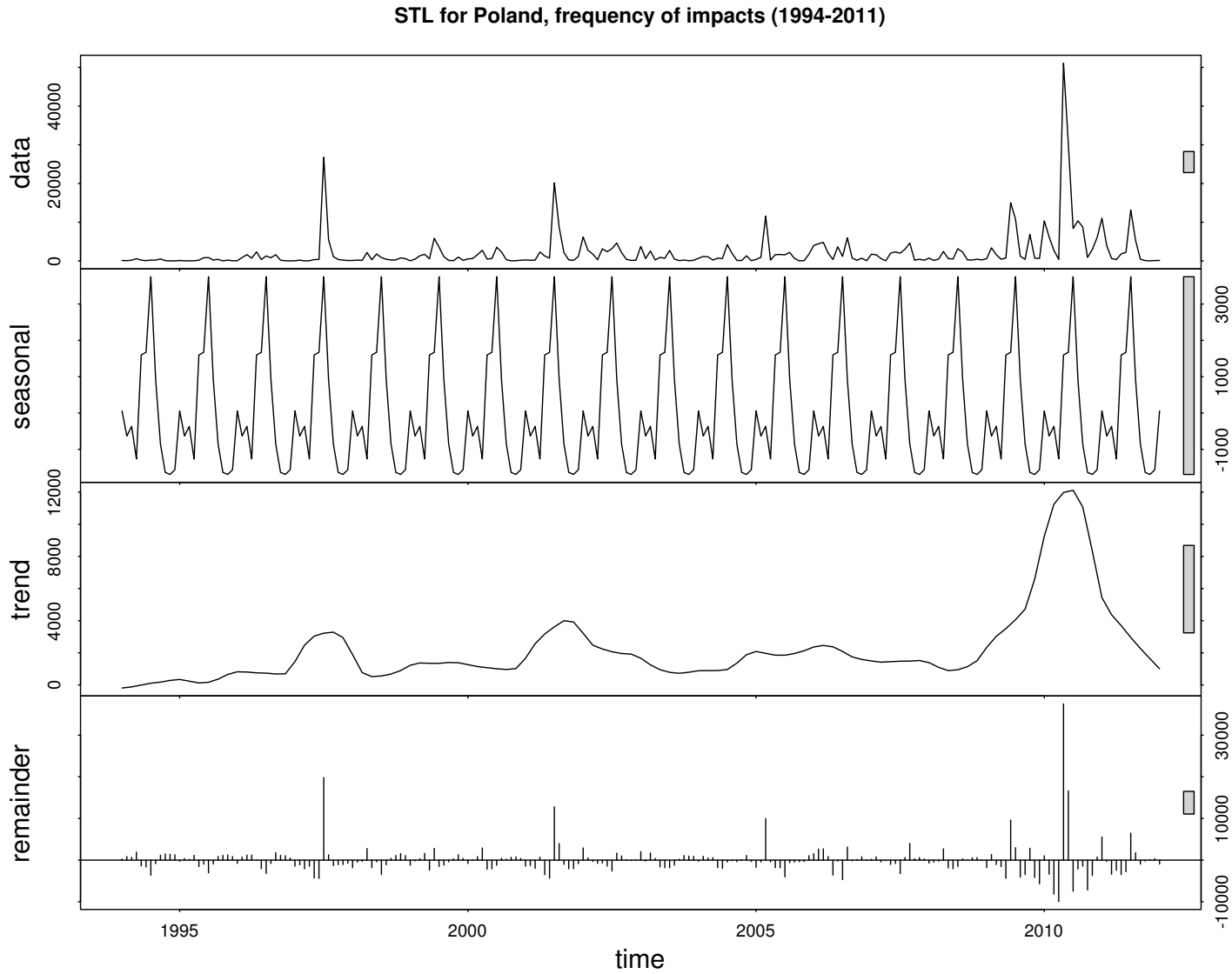
STL


Frequency of impacts
data
seasonal
trend
remainder
0
2000
6000
200
600
1000
-200
1995
2000
2005
2010
time

STL


Magnitude of impacts
data
seasonal
trend
remainder
0
5000
10000
15000
500
1000
1500
2000
6000
-2000
1995
2000
2005
2010
time

STL, Poland


STL for Poland, frequency of impacts (1994-2011)
data
seasonal
trend
remainder
0
20000
40000
0
4000
8000
12000
3000
1000
-1000
30000
10000
-10000
1995
2000
2005
2010
time

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- small impacts on a frequent basis, resulting in large estimate average costs — small exposure but low level of protection
- big cities better protected than smaller ones
- adopting the right long-term approaches in anticipation of urban growth
- improving standards of protection

The End