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Assessment of Social Vulnerability at Sub-national Scale

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Content

1. Motivation
2. Vulnerability – Different Schools of Thought
3. Conceptual Framework
4. Assessment Process for the Sub-National Level
5. Data Limitations
6. Scale Issues
7. Conclusions

Understanding of Vulnerability

Fundamental Equation of Risk Analysis

risk =

probability of failure

of coastal defences

[1/a]

X

consequences

due to flooding

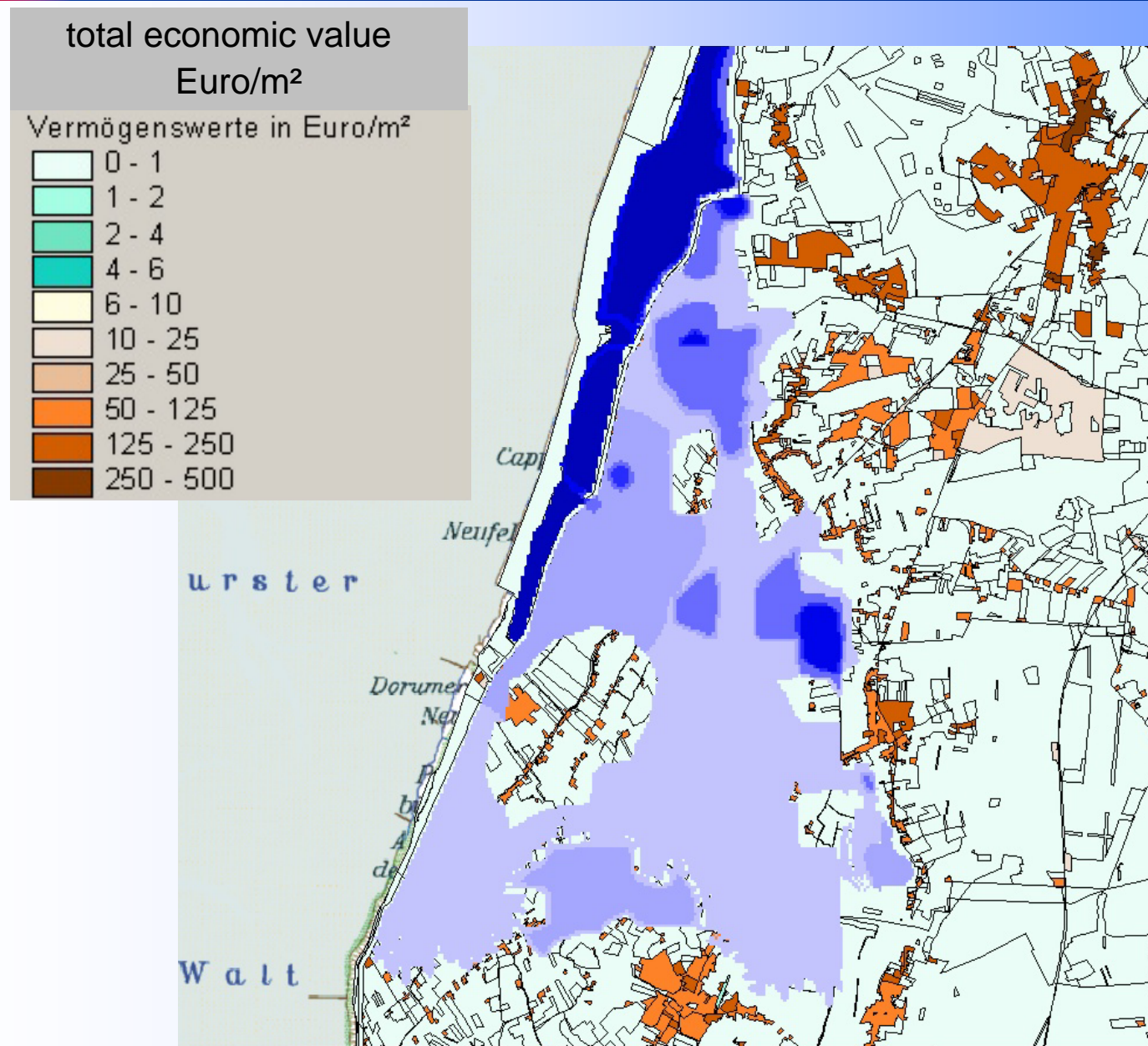
[EUR]



Source: Stephan Mai 2006

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Expected Damage



Source:
Stephan Mai
2006

Social Vulnerability

- Tsunami 2004: Gender imbalance
- Katrina 2005: Institutional failure; but also ethnical
- Banat flood 2005: Cultural acquaintance; - duration

Sri Lanka



New Orleans - Superdome





Vulnerability Definitions

"... a human condition or process resulting from physical, social, economic, and environmental factors which determine the likelihood and scale of damage from the impact of a given hazard"
(UNDP, 2004)

"... the likelihood of injury, death, loss, disruption of livelihood or other harm in an extreme event, and/or unusual difficulties in recovering from such effects"
(Wisner, 2002)

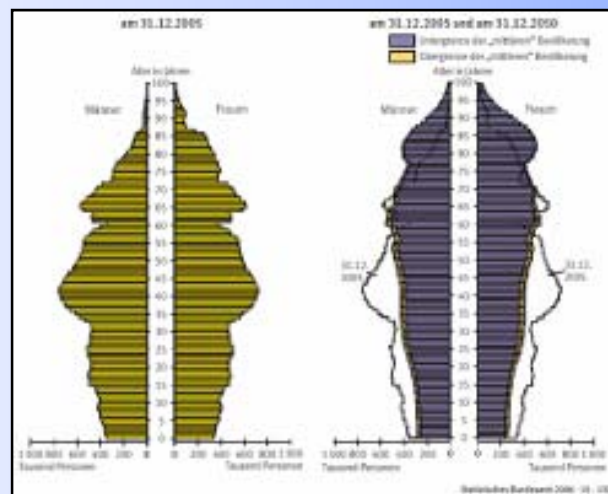


Social Vulnerability in Germany

- Are some social groups more vulnerable ?

Baseline social problems in Germany:

- Unemployment
- Migration; ethnic integration; racism
- Ageing of the population; pension security
- Relative poverty gap



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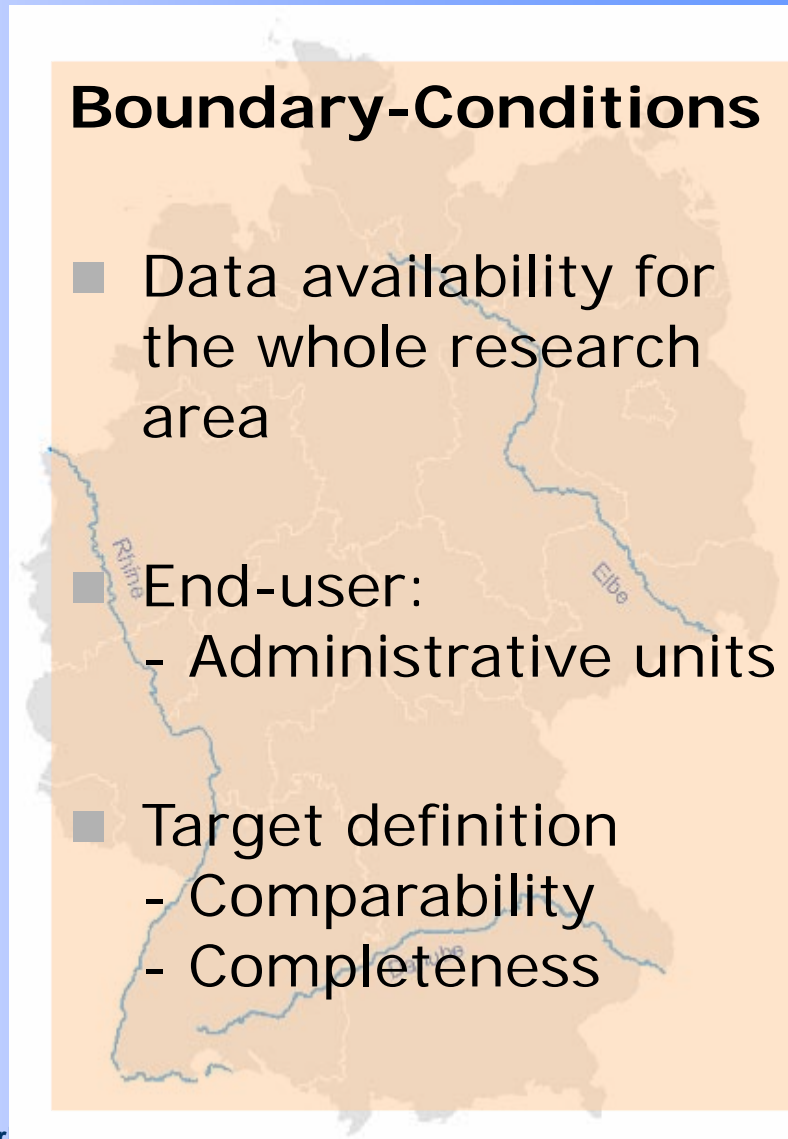


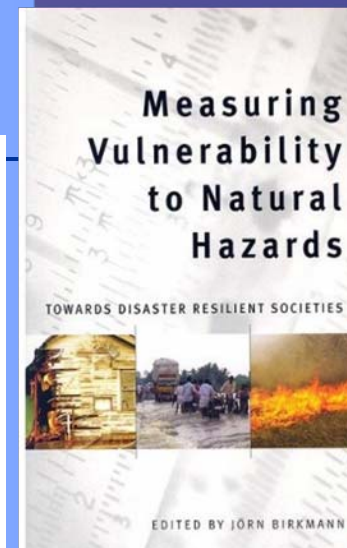
Project DISFLOOD

- Identify social and ecological vulnerability
- Interlink vulnerability to hazard
- Provide overview for 3 river-areas
- GIS Integration

Boundary-Conditions

- Data availability for the whole research area
- End-user:
 - Administrative units
- Target definition
 - Comparability
 - Completeness





Source: Bogardi/Birkmann (2004) and Cardona (1999/2001)



Social Vulnerability Index -Criteria

Exposure Potential

- People
- Settlement area

Sensitivity

- Unemployment, welfare dependence
- Ethnic and economic conditions
- Age, dependency, gender

Capacities

- Income and building type
- Education and medical supply
- Physical vitality



Social Vulnerability Index

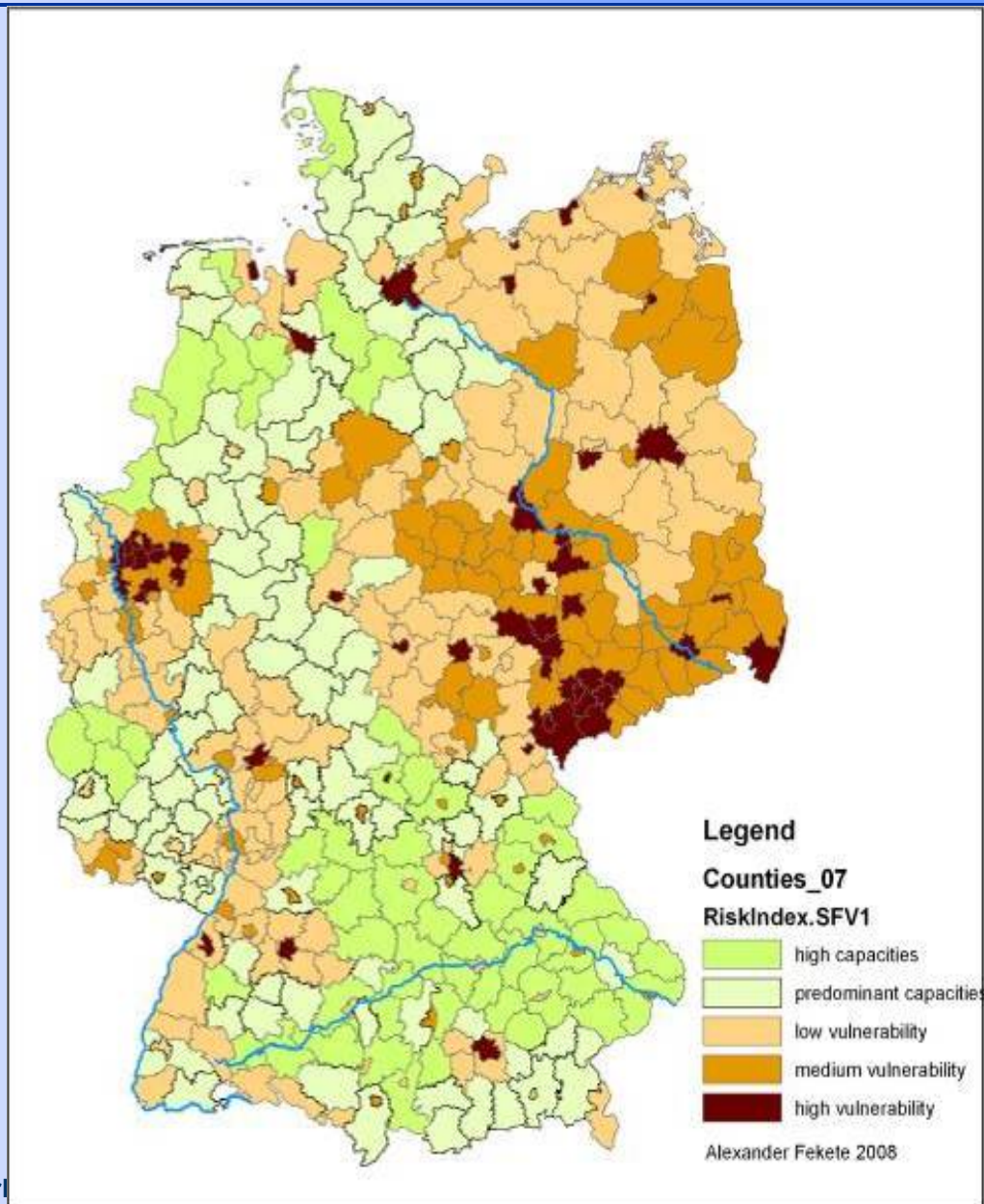
- Input: 34 variables of Federal statistical data 2006
- Method: Factor analysis, with varimax rotation
- Result: 4 Composite factors that indicate vulnerability
 - Income
 - Population density
 - Physical fragility, age
 - Lack of medical care

General Social Vulnerability Index

Which social groups are more vulnerable?

- 34 demographic variables
e.g. age, education, income
- Map shows general vulnerability
- Comparable studies on county level in USA, UK, Spain, Germany

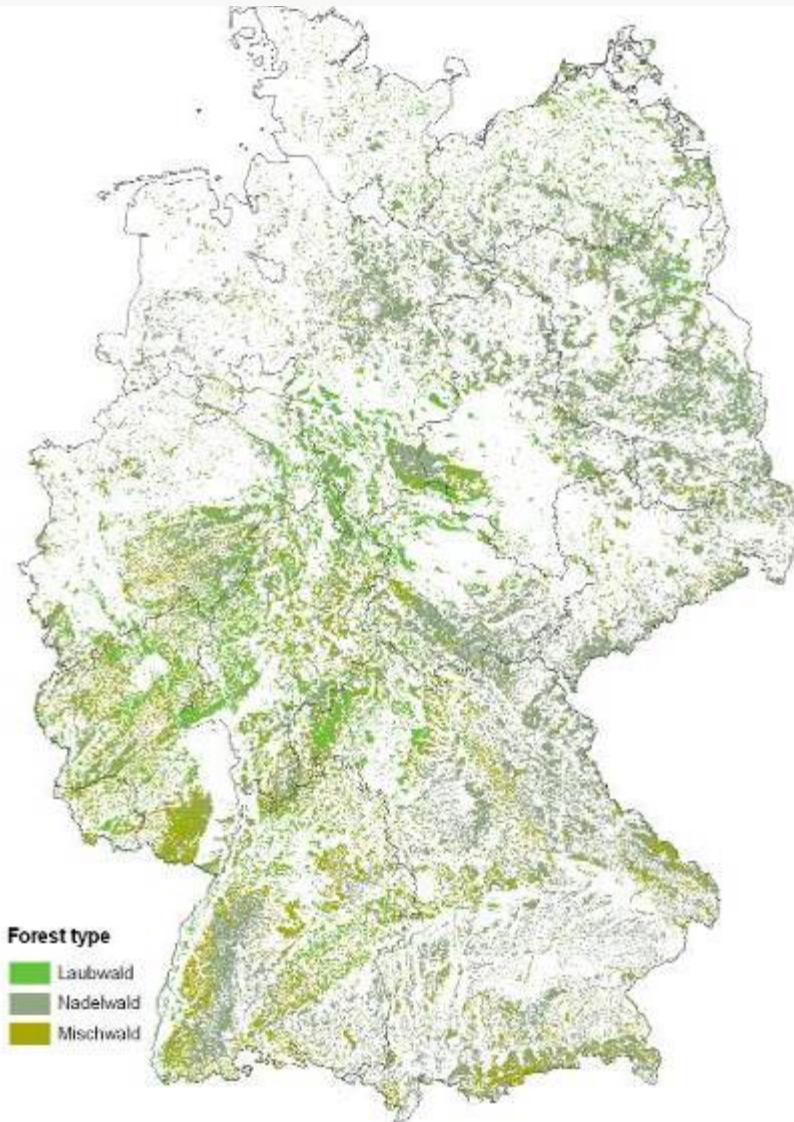
Data: Federal statistical office 2007,
BKG 2007



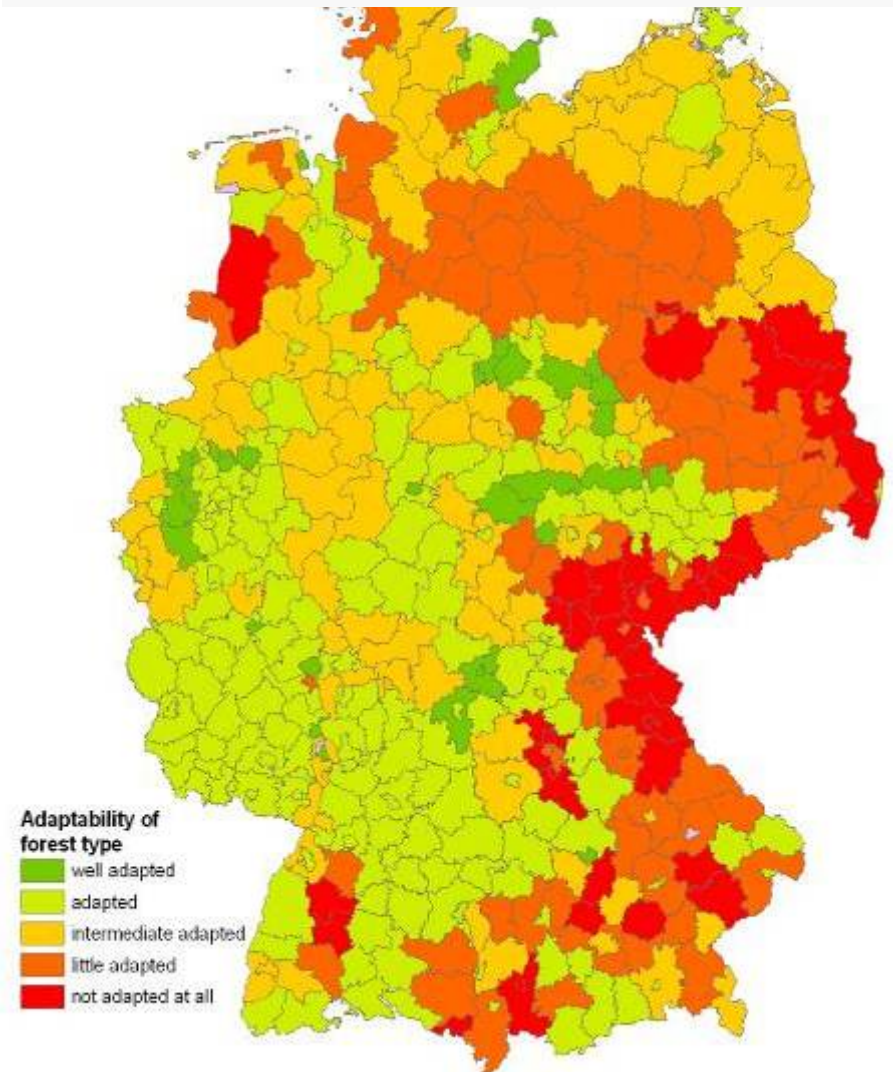


Ecological Vulnerability

DISFLOOD - Marion Damm



Aggregation to county scale
enables integration



Dr.

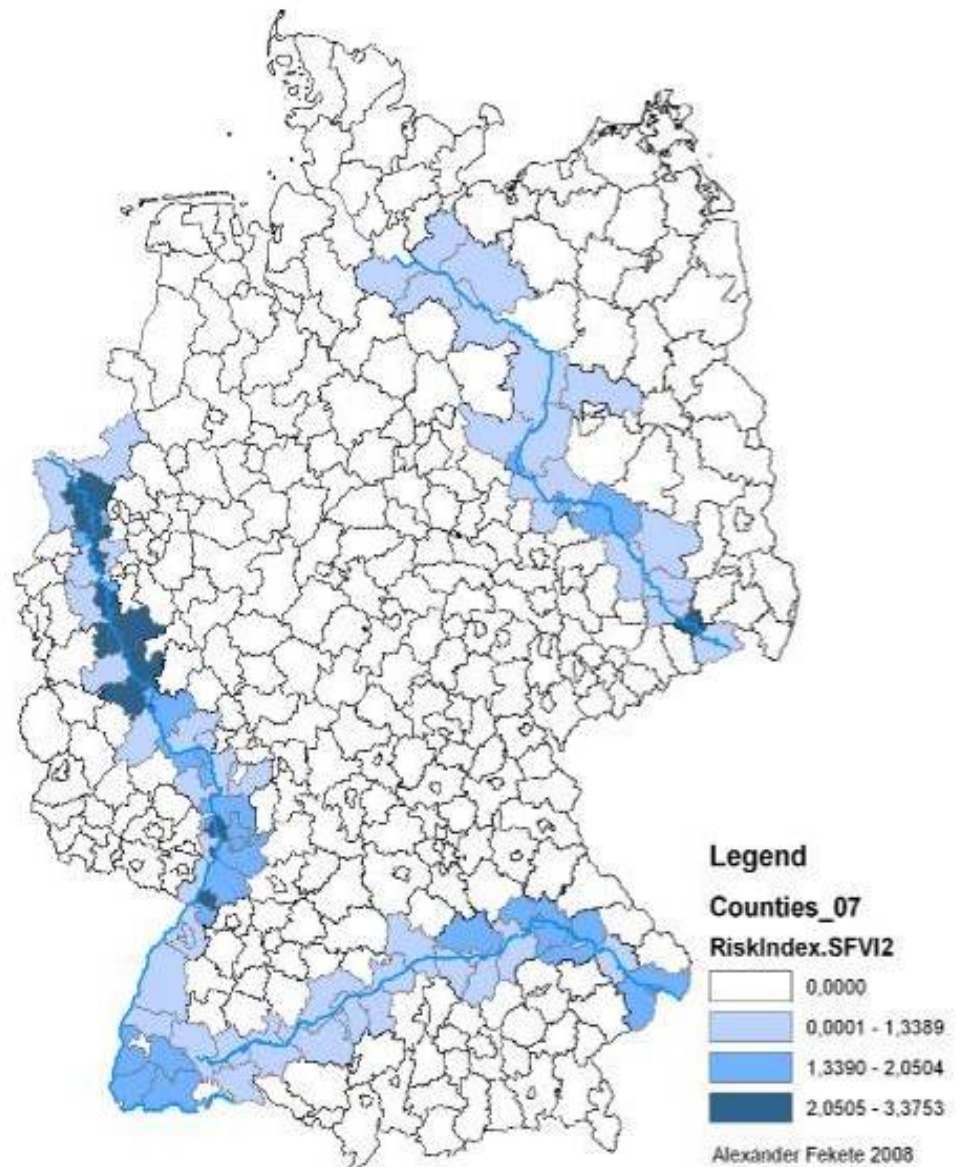
Dr.irkm

Hazard-Specific Vulnerability

- Flood experience
- Critical infrastructure
- Early warning systems

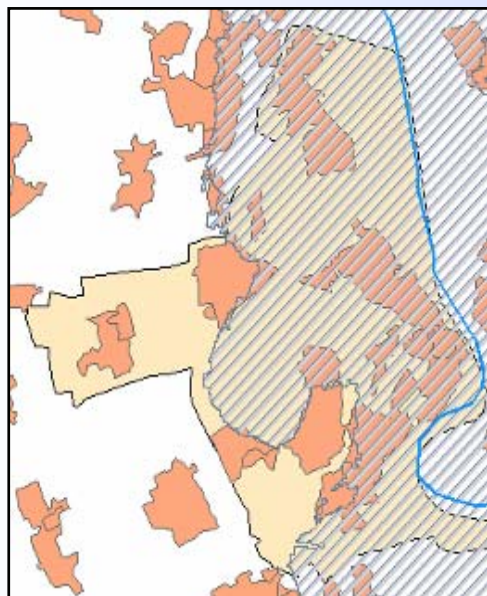
Scale implications:

Availability only for certain areas

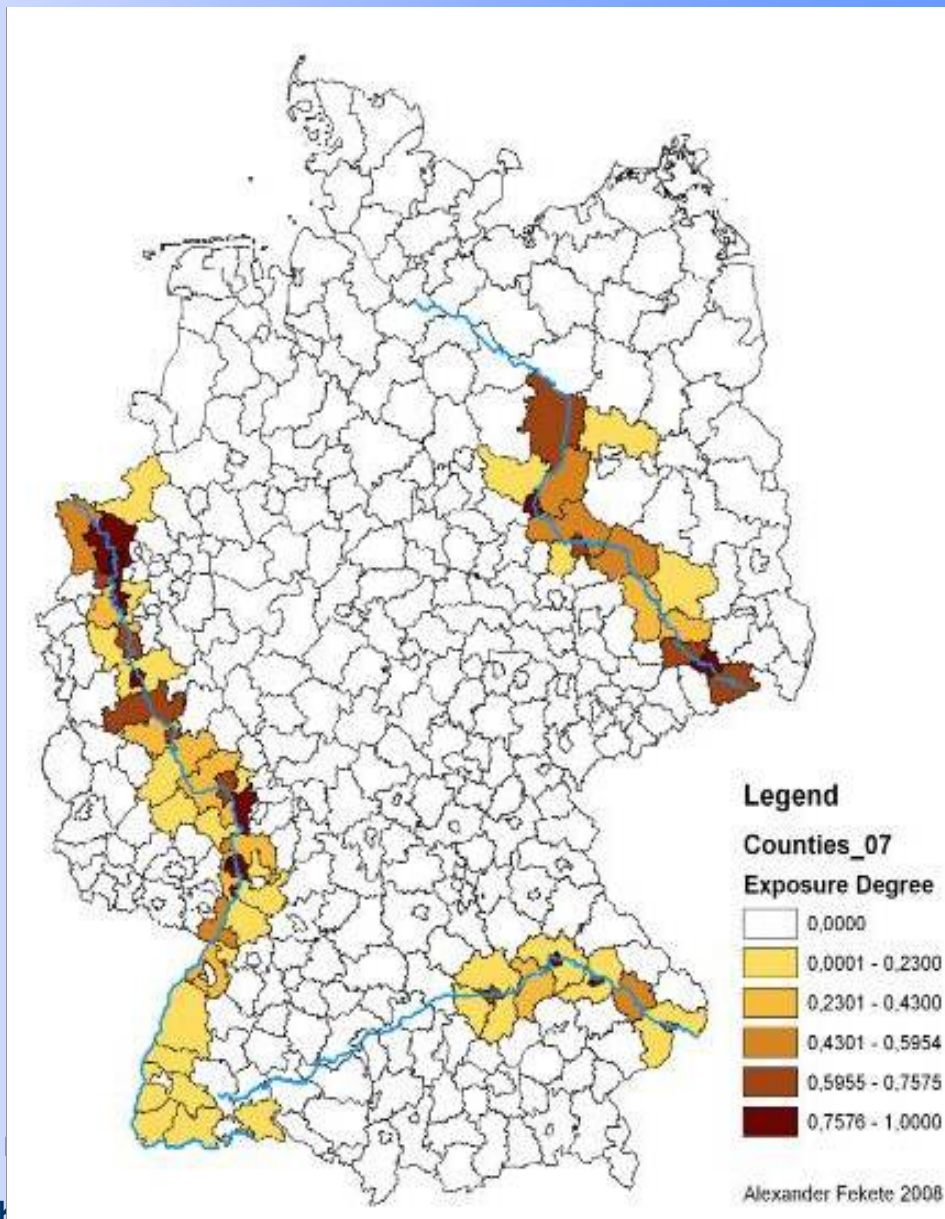


Exposure-Degree

- Percentage of flooded settlement area per county



Data: CORINE 2000, HQ
extreme IKSR 2001





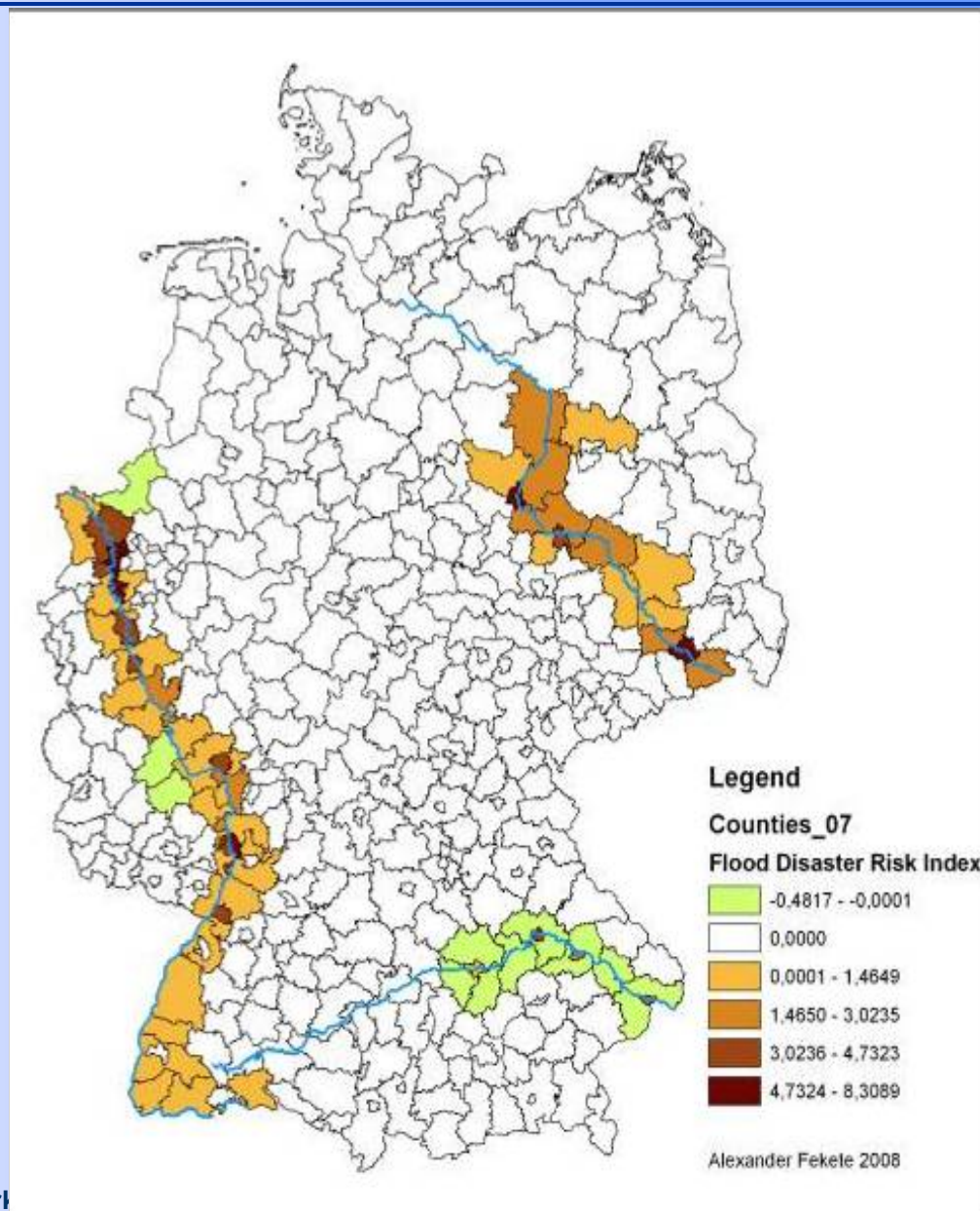
Integration: Hazards & Vulnerability

Risk = f(hazards; vulnerabilities)

Vulnerability = exposure, sensitivity,
capacities = the internal predisposition

Outlook - Disaster Risk Index

- Combines social and ecological vulnerability
- Combines hazard and vulnerability parameters
- Data is normalised,
- equal weighting,
- ranks after standard deviations





Scale Implications

- Multiple-scale problems

HIERARCHY

Constraints level:
e.g. economic and political
dynamics of the country

Level of focus:
Vulnerability Phenomenon

Reductionist components:
Validation by household
questionnaire

Lit.: Gibson et al. 2000,
O'Neill 1988



Scale of the Hazard

Scale implication:

Extreme event data
more suitable for sub-
national scale

Legend:

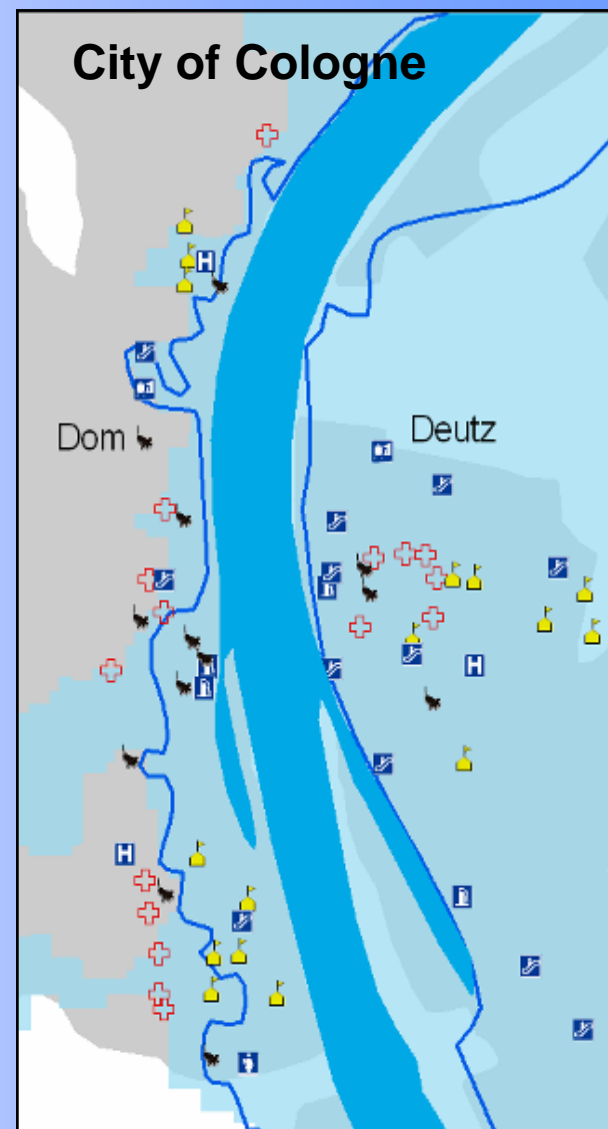
Blue line: HQ100

Blue area: HQ extreme

Symbols: Infrastructure

Outlook: more detailed study on local
level – BBK study (Birkmann)

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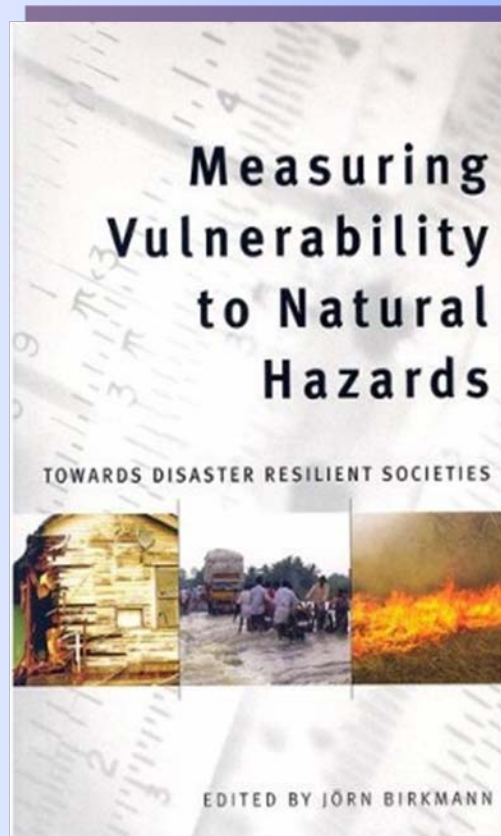
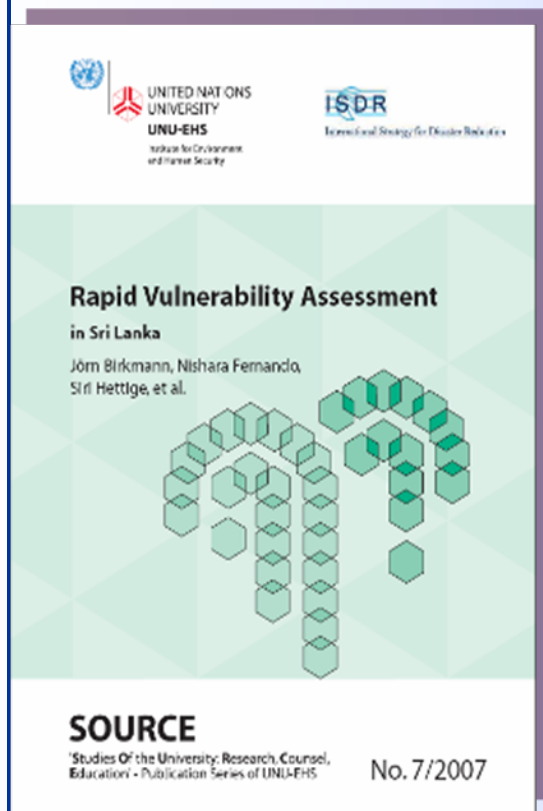


Fekete 2007



Literature/Reports

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