# Risk-oriented vulnerability assessment for climate change

A standardised, modular approach
for cities and infrastructures

Dr. Daniel Lückerath
Researcher, Fraunhofer IAIS
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Motivation

- Provide a standardised process
  - for conducting a risk-oriented assessment of climate change impacts and vulnerabilities
  - for urban areas and infrastructures
  - that can be adapted to local conditions
  - is supported by guidance and tools

IVAVIA

IPCC AR 5
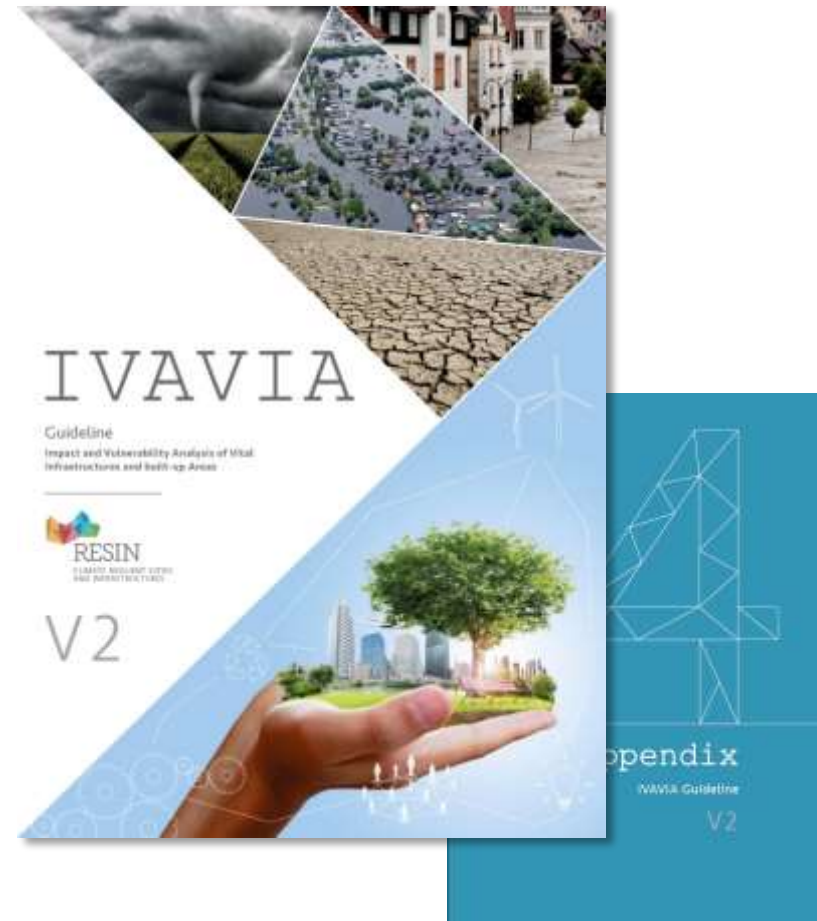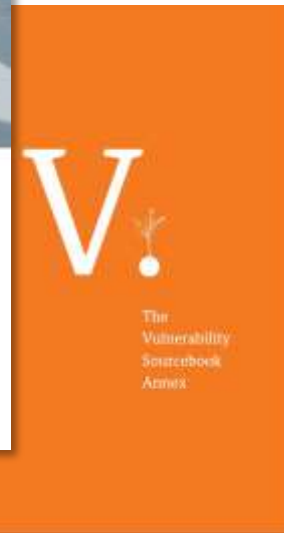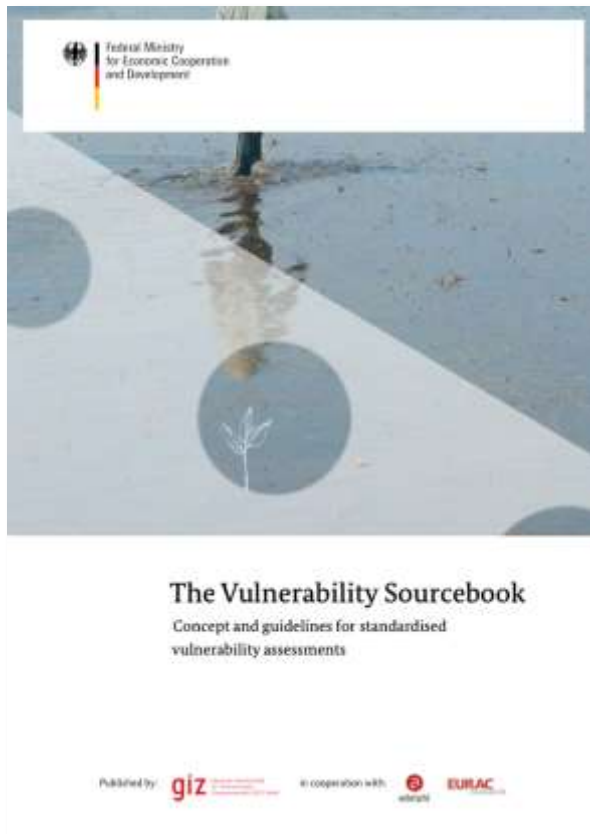
Source: BMZ, 2014. The vulnerability sourcebook. Concept and guidelines for standardised vulnerability assessments. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bonn and Eschborn, Germany, 2014.

How does it work?

Which hazards and drivers are relevant to my city?

M0 Selecting Hazards and Drivers

How do I start the assessment process?

M1 Preparing for Vulnerability Assessment (VA)

Qualitative stages

What are the cause-effect relationships relevant to my city?

M2 Developing Impact Chains

Quantitative stages

How do I want to measure influencing factors and what data do I have available?

M3 Identifying Indicators and Data Acquisition

How do I combine the gathered data?

M4 Normalisation, Weighting, and Aggregation of Indicators

How do I assess vulnerability/risk?

M5 Aggregating Vulnerability Components to Risk
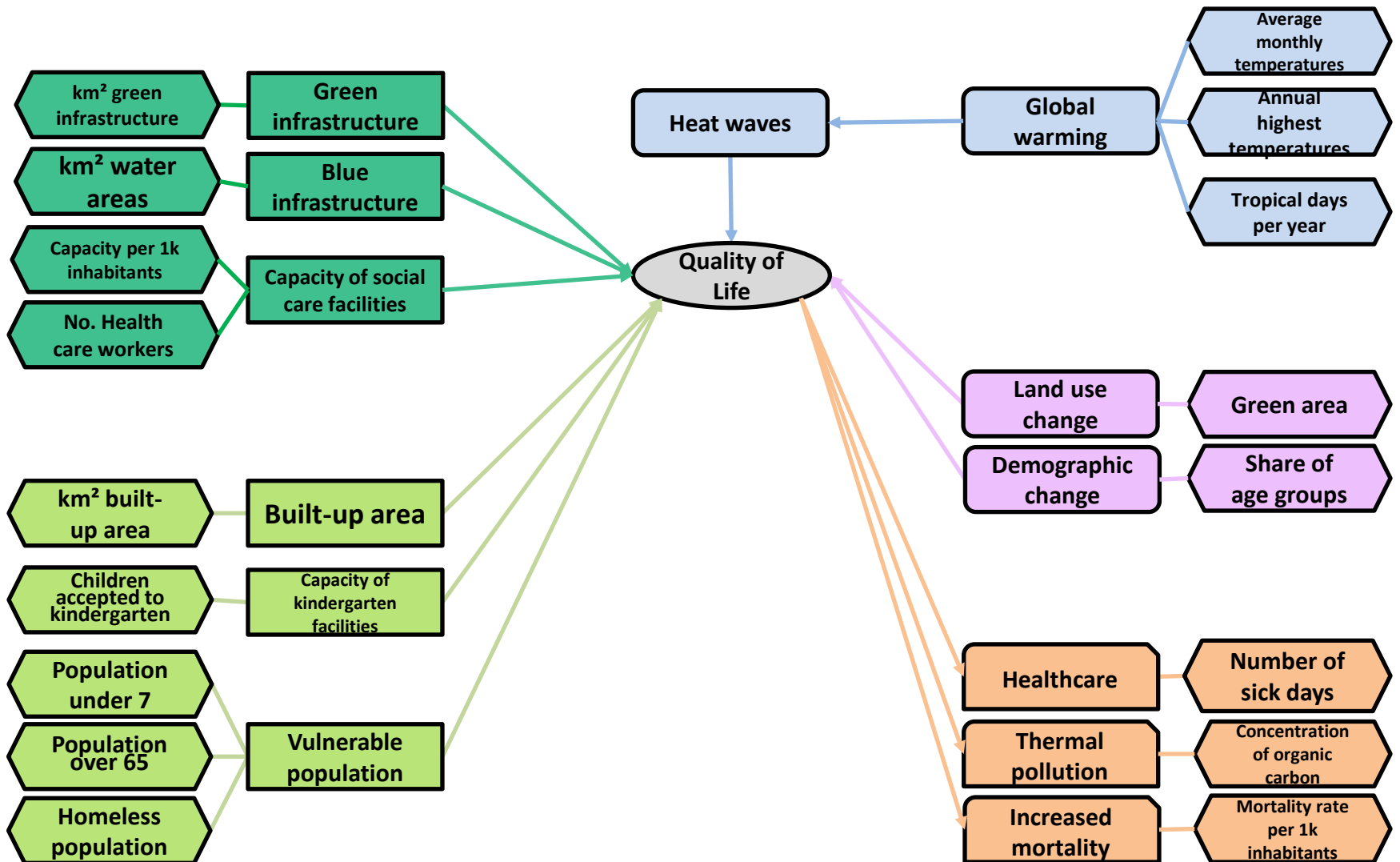
Presentation

How do I present the results?

M6 Presenting the Outcome of Your VA to the Stakeholders

Developing Impact Chains

Developing Impact Chains

Developing Impact Chains

→ Qualitative, structured assessment of alleviating / intensifying factors and potential impacts

- Highly valuable for
  - building a common understanding
  - communicating cause-effect relationships
  - identifying relevant areas where actions could be taken
  - identifying further stakeholders that might be helpful during the assessment

Data acquisition

- Data for all identified indicators has to be acquired. Requires
  - interaction with multiple departments, external institutions, open source frameworks
 - analysis and clean-up of data

→ Easily the most resource intensive / time consuming step
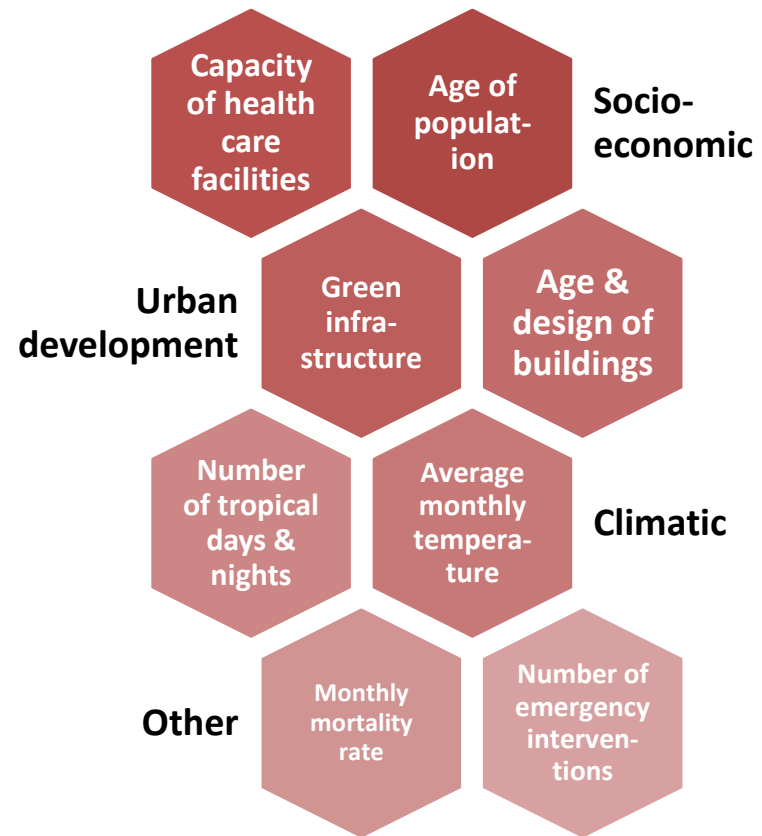
Vulnerability / Risk

- Indicator data is aggregated to composite scores for sensitivity, coping capacity, and vulnerability

- Impacts and probabilities are estimated using historical data of indicators and/or damage functions, combined with vulnerability score

Vulnerability / Risk
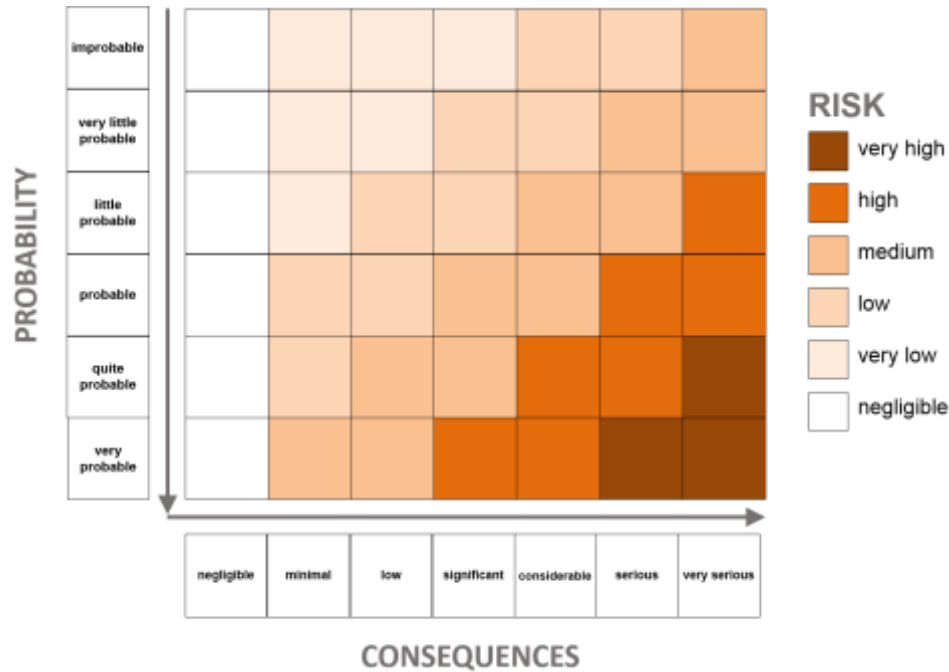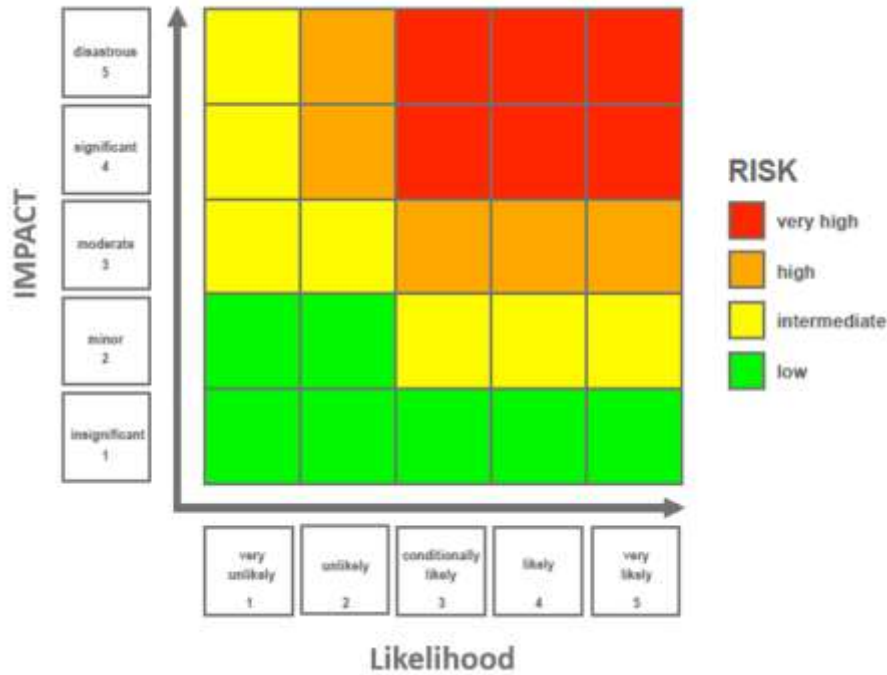
- Classify impacts and probabilities using discrete, ordinal classes

- Impact/probability pairs are assigned to risk classes using a risk matrix

- National/regional standards or guidelines exist
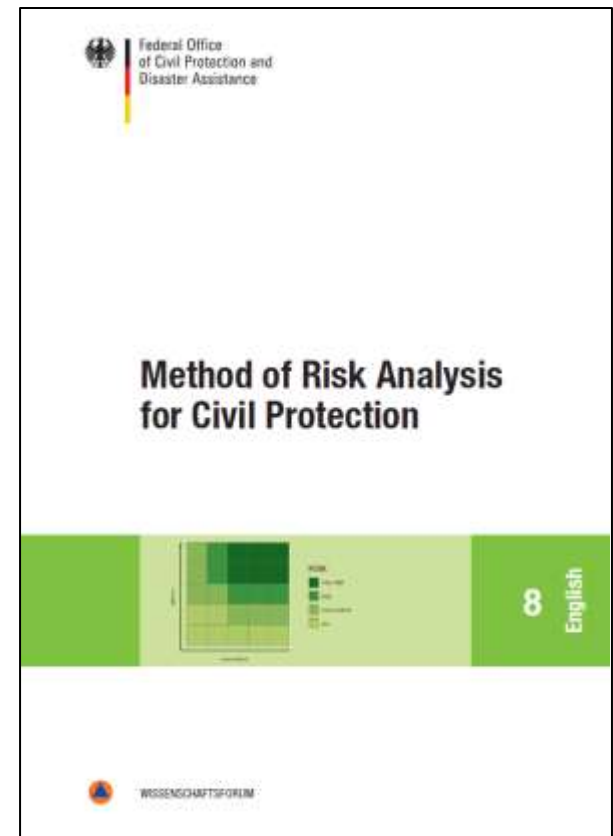
Source: German Federal Office of Civil Protection and Disaster Assistance: method of Risk Analysis for Civil Protection. Wissenschaftsforum, Volume 8. 2011.
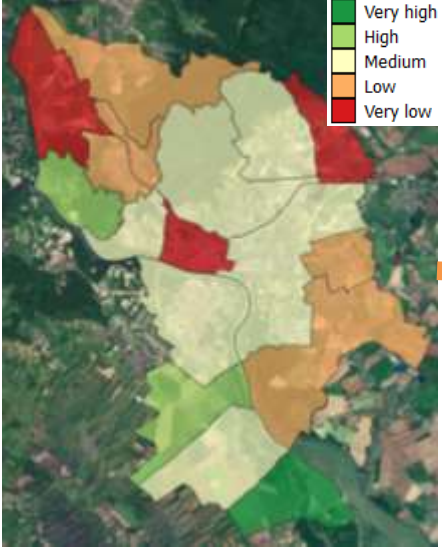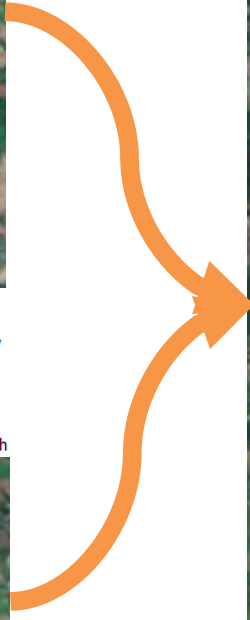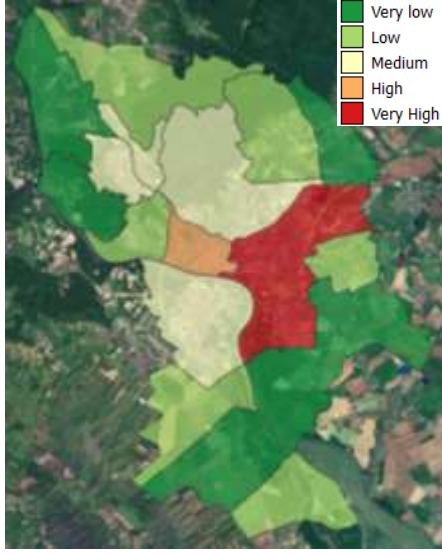
Source: German Federal Office of Civil Protection and Disaster Assistance: Method of Risk Analysis for Civil Protection. Wissenschaftsforum, Volume 8. 2011

Source: Solaun, K., Gómez, I., Urban, J., Liaño, F., Genovês, A., 2014: Integración de la adaptación al cambio climático en la estrategia empresarial. Guía metodológica para la evaluación de los impactos y la vulnerabilidad en el sector privado. Oficina Española de Cambio Climático, Ministerio de Agricultura, Alimentación y Medio Ambiente. Madrid, 78 pg
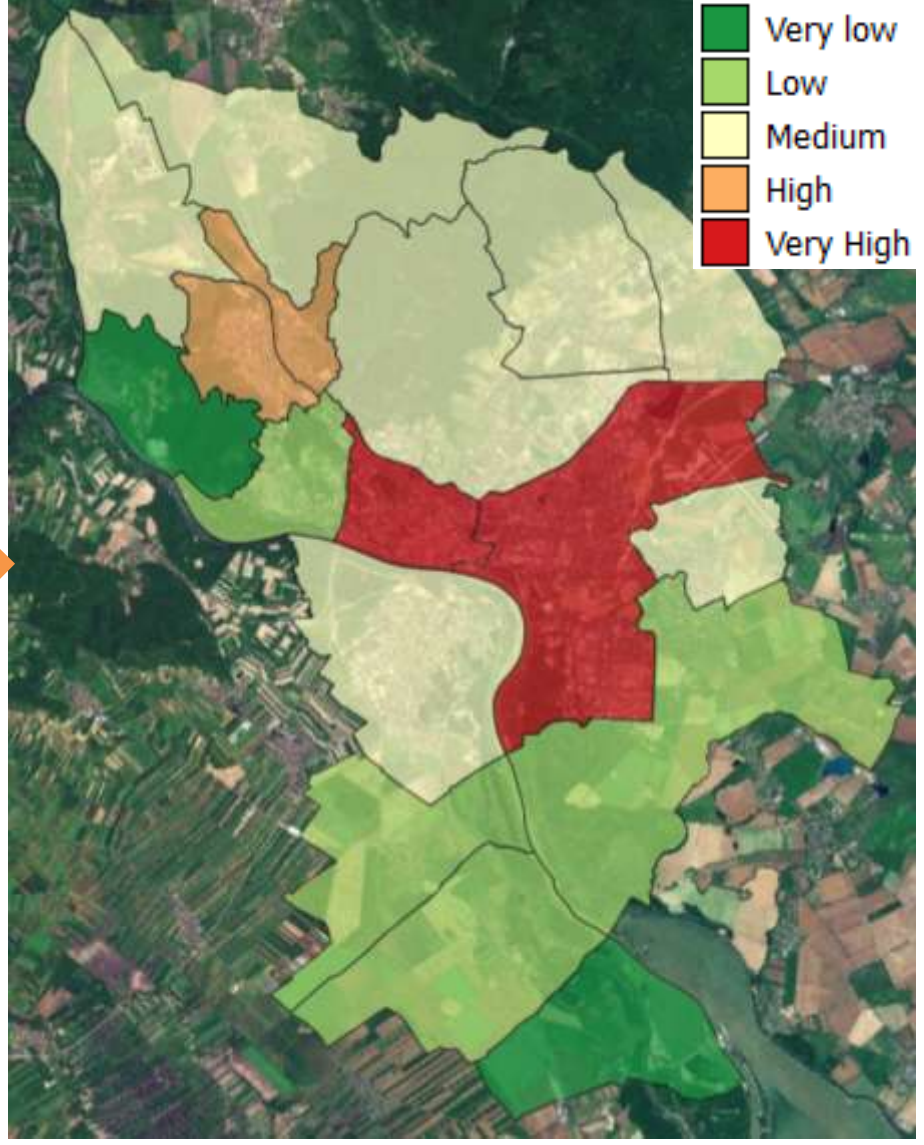
Results

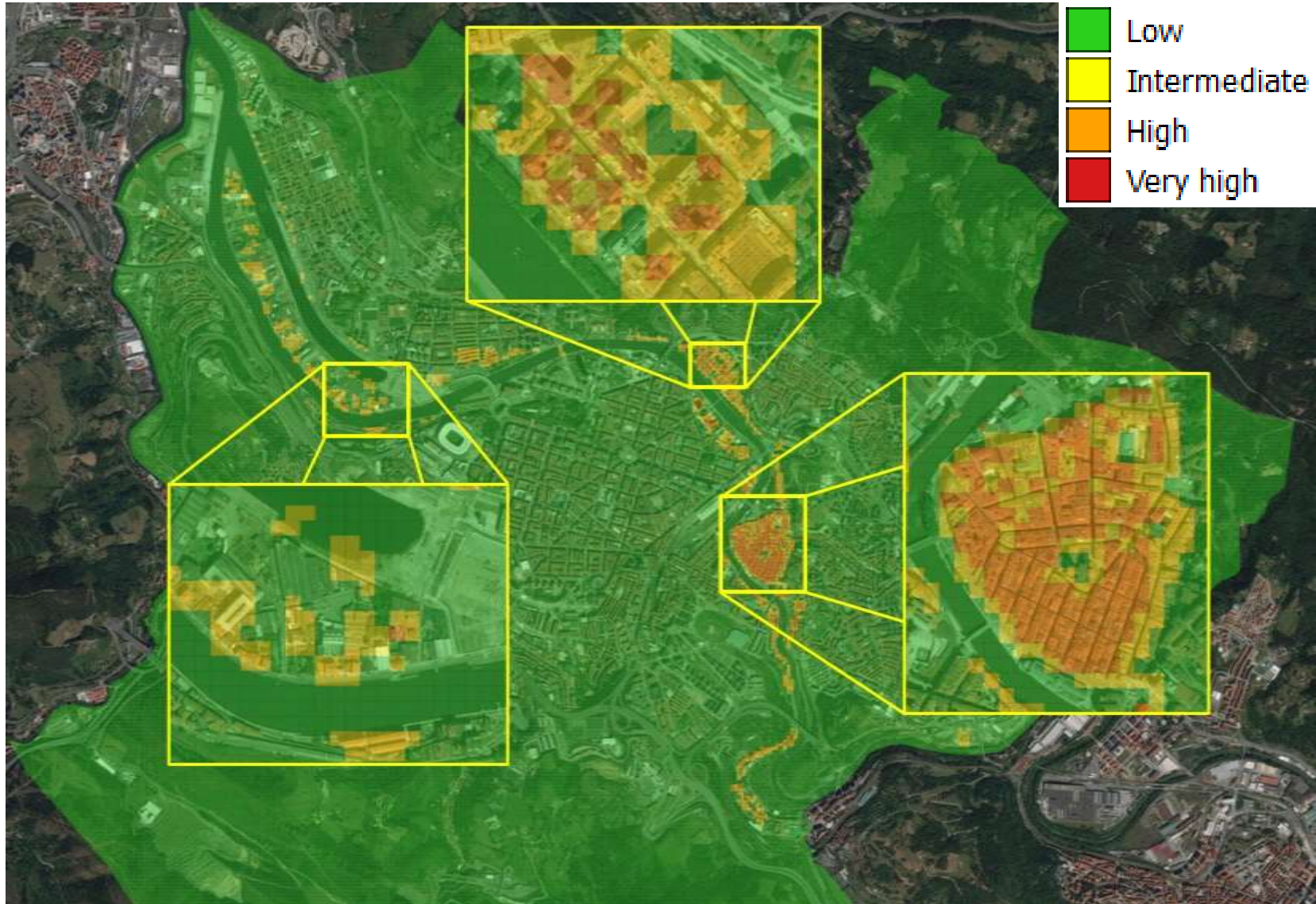
Coping Capacity

Legend:
- Very high
- High
- Medium
- Low
- Very low

Sensitivity

Legend:
- Very low
- Low
- Medium
- High
- Very High

Vulnerability

Legend:
- Very low
- Low
- Medium
- High
- Very High

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Results

Conclusions

- Standardized, modular process for conducting a risk-oriented assessment of impacts and vulnerabilities
- Qualitative stage: Only limited resources available or quantitative assessment previously conducted
    → Impact Chains for qualitative, structured assessment of alleviating / intensifying factors and potential impacts
- Quantitative stage: Resources available or no quantitative assessment previously conducted
    → Maps to identify areas most at risk for further adaptation planning
- Presenting the results: Objective and target audience are key!

Thank you!

resin@iais.fraunhofer.de

daniel.lueckerath@iais.fraunhofer.de