Physical vulnerability database for critical infrastructure multi-hazard risk assessments

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Critical infrastructure at risk

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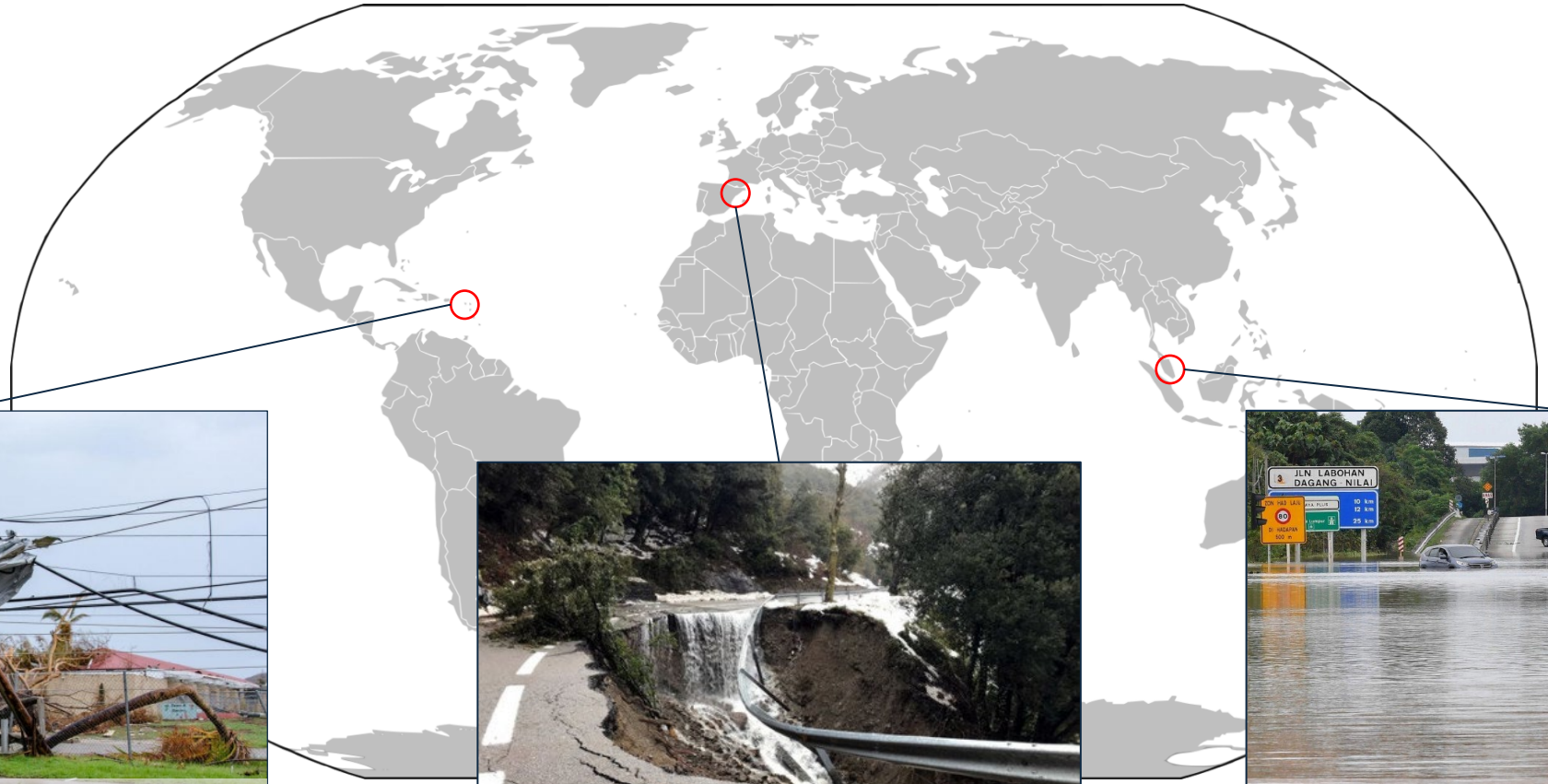
Past events



Hurricane Irma in U.S. Virgin Islands, 2017

Storm Gloria in Spain, 2020

Flooding in Malaysia, 2021

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Risk framework

Hazard: the threatening event (including its probability and geographical extent)

Exposure: the elements (e.g., people, buildings) in the area that could be affected

Vulnerability: the (lack of) resistance of the exposed elements to the hazard

Risk = Hazard x Exposure x Vulnerability

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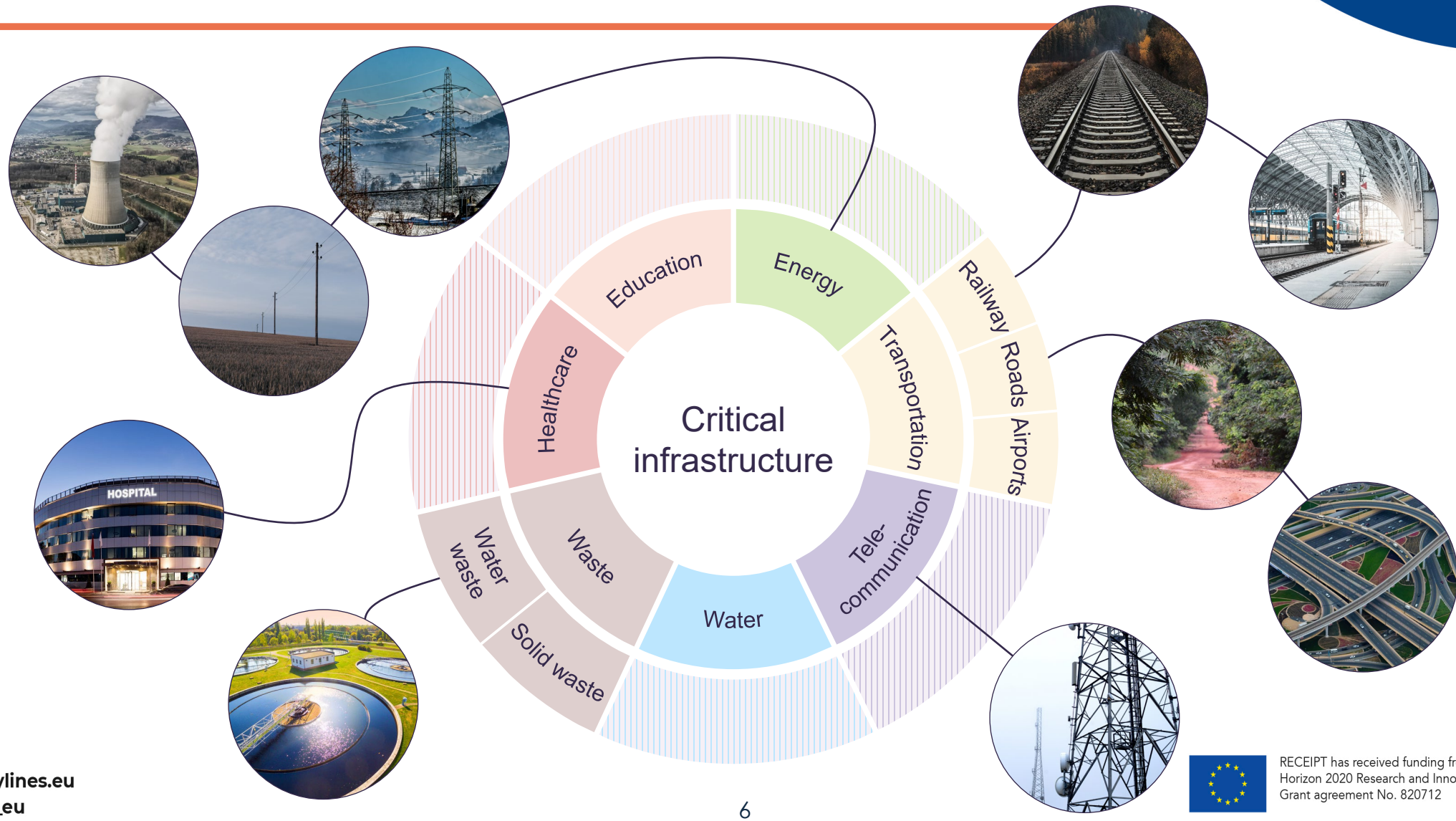
Categorization of critical infrastructure



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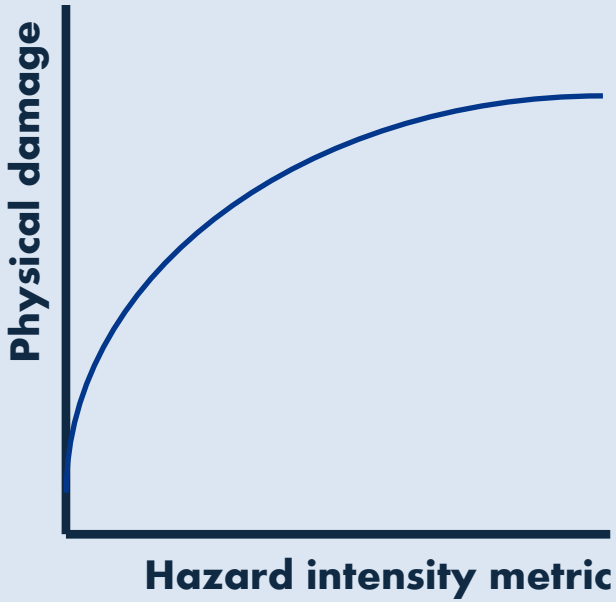
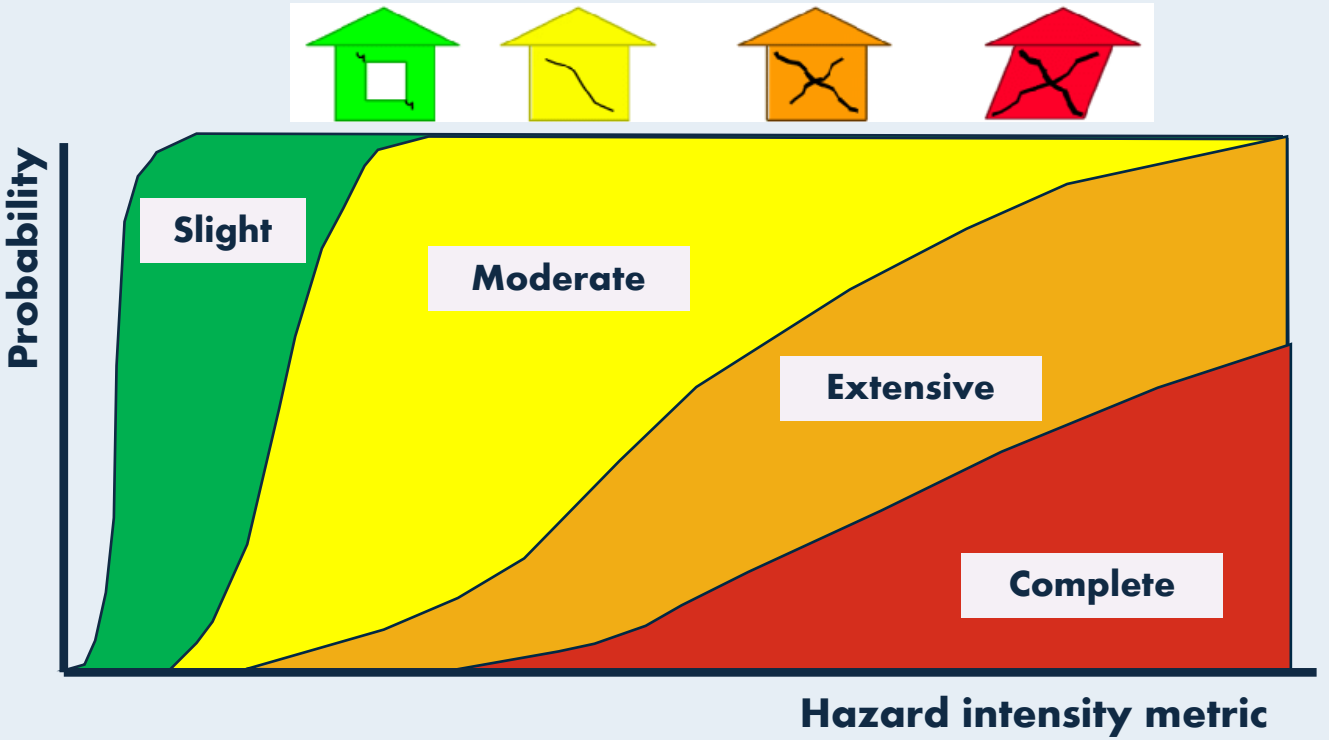
Vulnerability of infrastructure

Vulnerability curve



Fragility curve



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Vulnerability of infrastructure

- Review on the physical vulnerability of infrastructure
  - review not limited to academic peer-reviewed literature
  - including an overview of various characteristics per curve (e.g., derivation methodology, geographical application)

- Harmonized database for critical infrastructure fragility and vulnerability curves
  - contains 749 sets of fragility and vulnerability curves for a wide range of hazard-assets combinations

Nirandjan, S., Koks, E.E., van Ginkel, K.C.H., Pant, R., Ye, M., Aerts, J.C.J.H., Ward, P.J. (in progress). Review article: physical vulnerability database for critical infrastructure multi-hazard risk assessments – a systematic review and data collection. Natural Hazards and Earth System Sciences.

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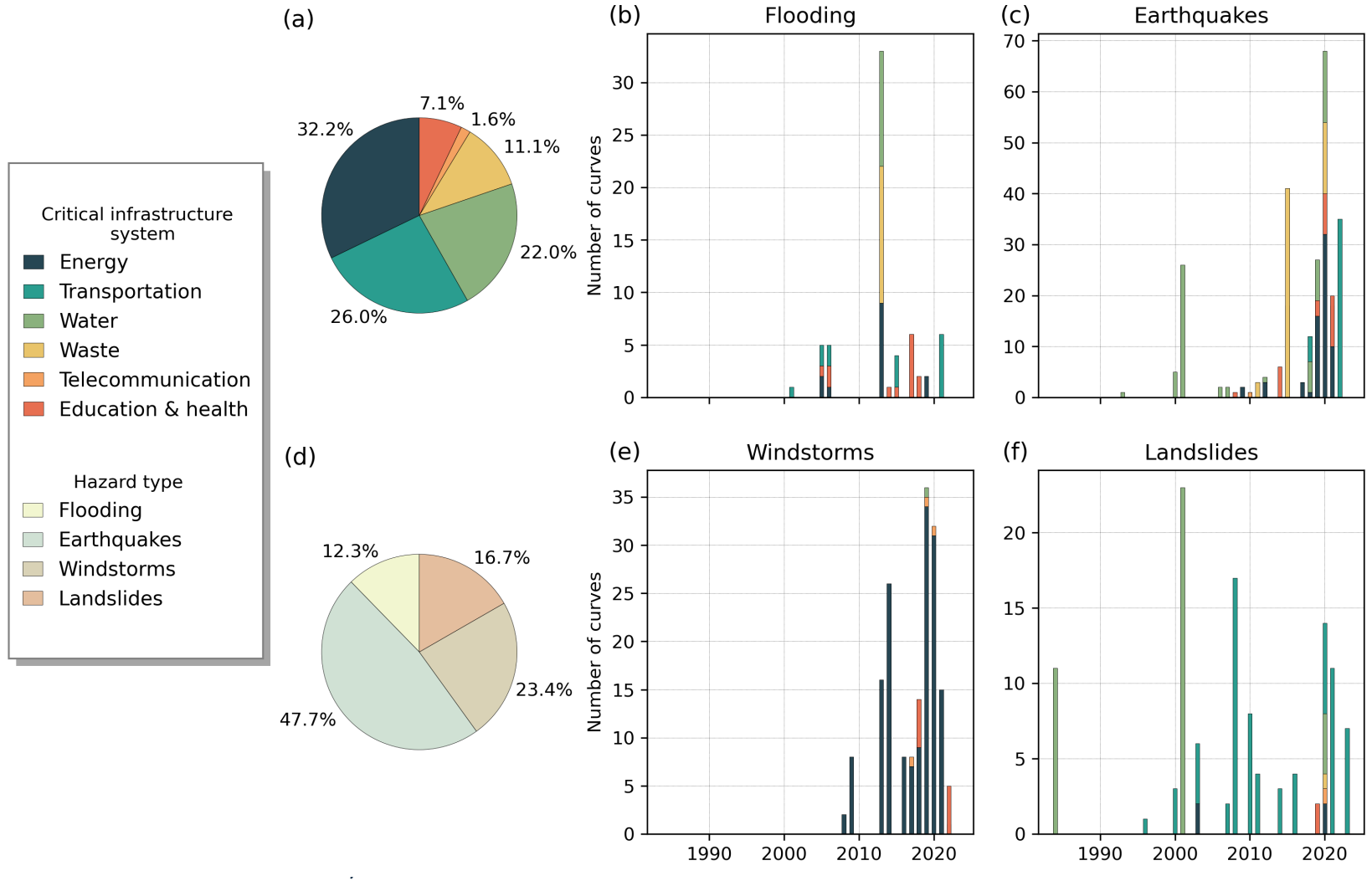
Coverage of vulnerability data

- Significant focus on energy, while telecommunication is underrepresented
- Significant focus on earthquakes
- Windstorms largely focused on energy (89%)
- Clear characteristics of curves per hazard



“new infrastructure investment without strengthened resilience is analogous to pouring water into a bamboo basket”

Coalition for Disaster Resilient Infrastructure, 2023

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Or approach me after the session

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