

Opportunities and limitations of spatial planning for disaster and emergency management

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1. Spatial planning and risk

- Risk is defined as: “Combination of the probability of an event and its negative consequences” (UN ISDR 2009).
- Spatial planning comes into play, because it takes decisions for society on whether and how space is used.
- Traditional risk management approaches:
 - Keeping hazard prone areas free of (further) development (primarily applied in developed countries with an effective law enforcement).
 - Relocation of endangered structures (widely applied in developing countries).
 - Globally relevant: building protection (or upgrading of existing structures).
- All approaches fail in regard to ubiquitous (= all areas are threatened) and systemic threads like pandemic.

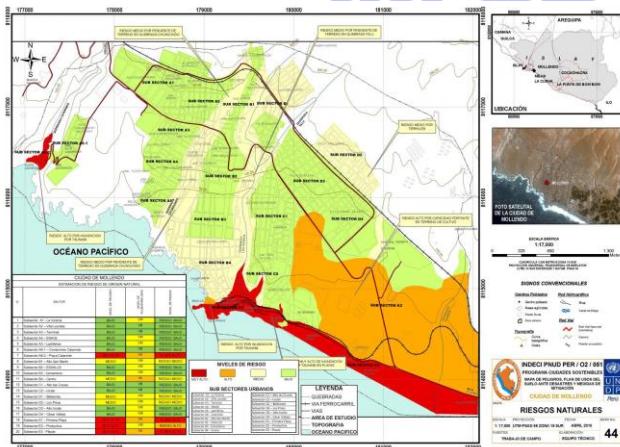


Figure 1. Natural Risk Map of the city of Mollendo. Source: Hazard Map, Land Use Plan for Disasters and Mitigation Measures for the city of Mollendo. INDECI, Sustainable Cities Program and UNDP 2010.

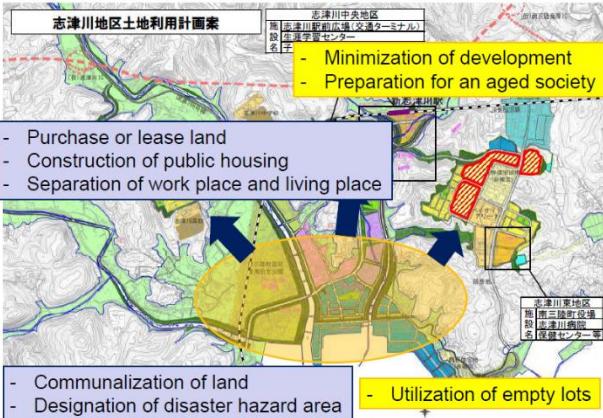
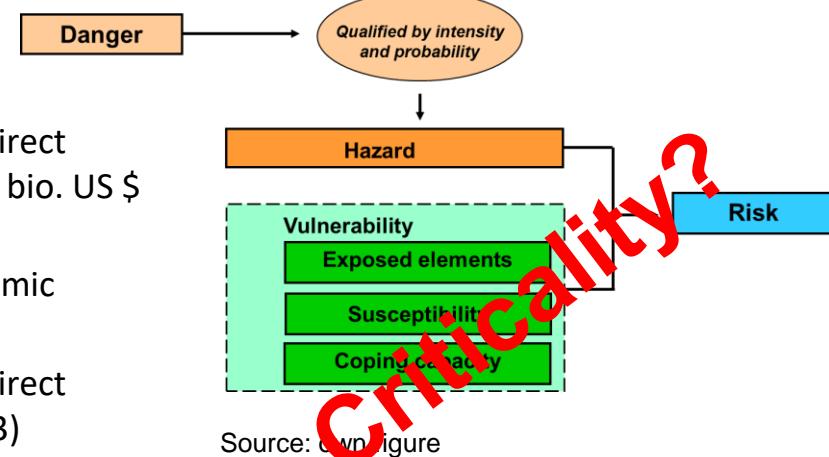


Figure 2. Risk mitigation plan. City of Ishinomaki. Japan. Source: Ubaura (2016)

2. Importance of systemic threads

- “Negative consequences” of extreme events are typically assessed through an examination of vulnerability – which is a place based concept.
- What is about indirect losses elsewhere?
 - Bangkok floods 2011: direct damages 45.7 bio. US \$, indirect economic losses due to disruptions of supply chains 259 bio. US \$ (World Bank 2012)
 - GEJE 2011: direct damages 335 bio. US \$, indirect economic losses about 600 bio. US \$ (Fujita et al. 2012)
 - Hurricane Sandy 2012: direct damages: 50 bio. US \$, indirect economic losses about 250 bio. US \$ (AON Benfield 2013)
 - CORONA pandemic: 3.5 trillion U.S. \$ in lost economic output (in a best case scenario!) (statista.com)
- Indirect losses are primarily caused by the disruption of services of critical infrastructures and supply chains.
- How comes criticality into play?
- As part of vulnerability? Or as an own factor?



Source: own figure

2. Importance of systemic criticality (II)

- Critical infrastructures: assets or systems, essential for the maintenance of vital social functions, health, safety, security, and economic or social wellbeing of people (Art. 2 Council Directive 2008/114/EC = common legal basis within the EU).
 - Criticality is a relative measure of the importance of an infrastructure in relation to the consequences of a disruption or failure for the security of supply of important goods and services to society.
 - Urgent need to identify those system elements whose disruption affects other elements most. Here, redundancy is required, e.g. in regard to
 - availability of medicine products
 - re-regionalization of supply-chains
 - staff resources for emergency management.
- Criticality \neq vulnerability, but is an additional factor for the evaluation of risks, based on a criticality assessment.

2. Importance of systemic criticality (III)

Criticality assessment scheme

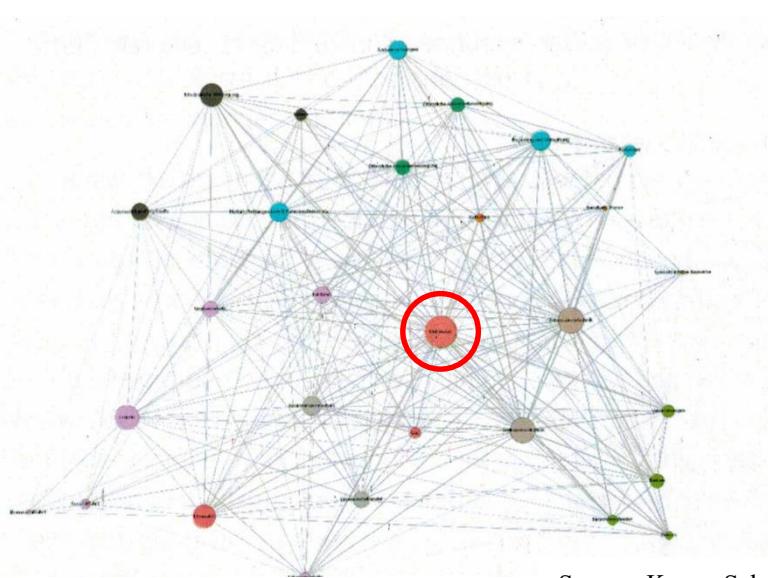
Systemic
criticality



Importance of sector
Interconnection x Centrality
(Sum of all interdependencies) (mean distance)



Importance of interconnections
Strength of cascading effects x time factor
(Severity of potential impacts) (duration of service disruption)



Source: Kruse, Schmitt,
Greiving (2020)

Ranking	Sector	Systemic criticality
1	Power supply	6,073
2	IT	4,841
3	Telecommunication	4,624
4	Emergency response	2,389
5	Water supply	2,310

N = 103 expert judgements

3. Conclusions

- Any risk management by spatial planning needs to be place-based. Planning authorities are legally responsible for managing the land-use of their area of responsibility.
- Cascading effects may take place elsewhere outside the exposed area. Spatial planning operates just for a specific territory that often does not capture entire networks.
- Systemic view runs counter to the areal-oriented view of spatial planning which is nonetheless ask to protect infrastructure facilities.
- Systemic view is primarily up to UN and EU levels, national governments, emergency management and infrastructure providers.
- Spatial planning can indirectly contribute to the mitigation of ubiquitous and systemic threads like pandemic by creating healthy living conditions (social distancing cannot work in densely populated (informal) settlements!).

Thank you for your attention!

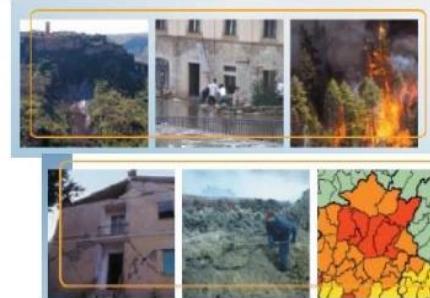
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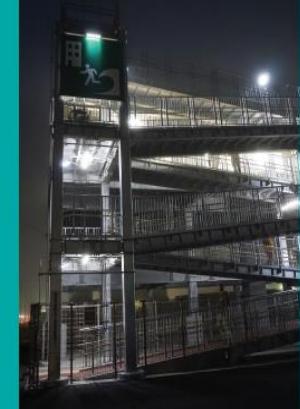


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