Critical infrastructures and flood risk governance

Florence Nick, Simone Sandholz

United Nations University – Institute for Environment and Human Security (UNU-EHS)
Urban Futures and Sustainability Transformation Programme (FAST)

Climate Resilience Initiative (CRI)
07 July 2022, Maastricht, NL
• “Critical” → to maintain society’s basic needs and functioning

• 2 types: technical basic & socio-economic service infrastructures (BMI, 2009)
• Fully functional infrastructure important to support emergency response and human security
• Highly **interconnected and interdependent**: e.g., failure of power supply → disrupted water supply and communication infrastructure

➢ Requiring **cross-sector cooperation** between critical infrastructure (CI) suppliers, authorities, emergency response actors
2021 Floods in Germany

Regions in Germany affected by flood

- 13-16 July heavy rains esp. in 2 federal states, likely related to climate change (Wwa, 2021)
- Interrupted warning chains
- Amount and energy of water unexpected
- Damages of infrastructures over 11 billion EUR
- Roads, bridges, railroad tracks, power/water and gas pipelines, communication infrastructure **severely damaged or destroyed**
Research after 2021 Floods

What is the role of CI in flood risk governance (FRG)?
What are lessons learned from the 2021 floods?

Qualitative interviews in March/April 2022 with key stakeholders for emergency response and critical infrastructure

• Representatives from 2 infrastructure suppliers
• Representatives from 2 health departments
• Representatives from 2 emergency responders: fire fighter and group discussion with 5 volunteers from technical relief agency (THW)
• 4 representatives from a municipality (mayor, public affairs manager, chief of fire department, mobility manager)
# Preliminary findings:
## Roles, responsibilities and role of CI

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Responsibility for risk governance</th>
<th>Reliant on CI to make informed and timely decisions &amp; response</th>
<th>Other needs</th>
</tr>
</thead>
</table>
| **Emergency task forces** (“Krisenstab”) | Monitor and coordinate emergency response  
Provide feelings of security                                                                              | Communication and information, roads, electricity               | Staff ➔ experienced coordinator and with technical knowledge |
| **Municipal government**            | Coordinate and support emergency response  
Provide feelings of security                                                                              | Communication and information, electricity                      |                                                       |
| **Infrastructure suppliers**       | Maintain critical infrastructure                                                                    | Communication and information, roads                            | Staff ➔ more and with technical expertise              |
| **Relief operations**              | Maintain critical infrastructure, rescue people  
Provide feelings of security                                                                              | Communication and information, roads, water, electricity        | Paperwork to deliver support; equipment, coordinator   |
| **Health departments**             | Monitor water quality against legal standards                                                       | Communication and information, roads, water, electricity        |                                                       |
Preliminary findings:
Challenges during emergency response

Regional train
DPA (2021)

Cut off communities.
POLIZEI/DPA (2021)

Damaged roads and pipelines.
POLIZEI/DPA (2021)

Damaged bridges.
DPA (2021)
Preliminary findings:
Challenges during emergency response

• Interrupted power supply → limited communication
• Damaged roads → limited access to emergency site

• Paperwork/bureaucratic communication & support procedures
• Understaffed and overwhelmed
  ➢ Insufficient coordination between relief organizations
  ➢ Insufficient support on site to repair/maintain CI
• Poor communication between different stakeholders

➢ Difficulty to make timely and informed decisions

Limited information
Support delay & insufficiency
Emergency response: Responsibility to provide feelings of security to citizens

Coping strategies
• Firefighters: Innovative water system
• Plan for all circumstances
• Communication through direct private channels (WhatsApp)
• Online platform was created to easily connect those in need for support with other infrastructure suppliers and craftsmen who offered support
• Ad hoc engagement of those with practical and technical experience as coordinators
Preliminary findings:
Role of CI in flood risk governance

- CI needed for basic functioning and highly interdependent → all are needed

Examples:
- Electricity and transportation needed for information & communication
- Information & communication for informed & effective decision-making for flood risk & response
- Staff and equipment for functional CI
- Good coordination supports efficient collaboration
1 – **Functional infrastructure is essential for informed and effective decision-making**
   - **Cascading impacts** of infrastructure disruptions very visible
   - Climate-proofing of CI must be a priority

2 – **Coordination & organizational aspects should not be underestimated**
   - **Clarity** about roles, responsibilities and capacities important
   - Efficient workflows between those who **knew each other well**

3 – **CI and their governance require strong consideration in overall flood risk governance**
   - Coordination and collaboration between stakeholders are key
   - How can risk governance be enhanced to support effective functioning of CI during crises?

➢ Next: Develop recommendations for improving preparedness & climate resilience of CI and flood risk governance
Thank you

Special thanks for your support:
Christine Heinzel, Aljoscha Mayer, Stefan Mönnich, Nathalie Sänger, Sophie van der Heijden
References


