

IMPEDIMENTS IN THE COMMUNICATION OF WARNINGS EMITTED BY EARLY WARNING SYSTEMS FOR NATURAL HAZARDS

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1. Introduction

- natural hazards are an increasing threat to humanity due to the ongoing climate change
- adequate response measures during an actual event depend on the efficient communication of warnings [1]
- the recent flood disaster in the Ahr-Valley 2021 suggests considerable impediments in the communication and perception of warnings

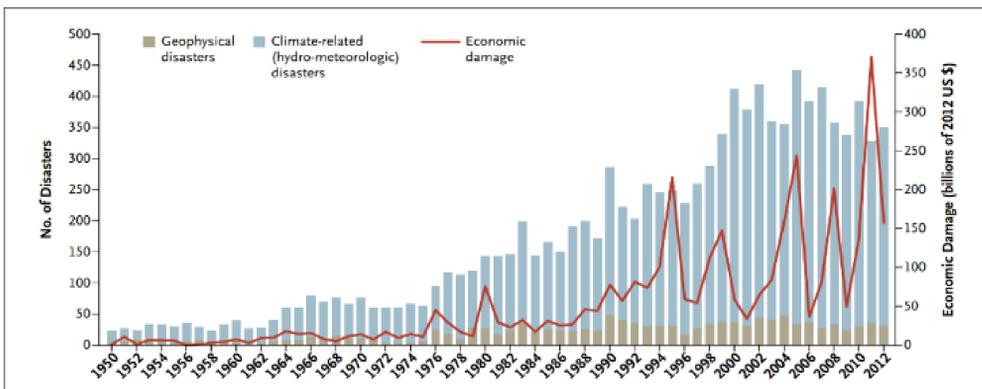


Figure 1: Numbers and Types of Natural Disasters, 1950-2021 [3]

2. Research Background & Related Case

- federal structure leads to decentralised and distributed communication of warnings
- disaster management comprising mitigation, preparedness, response and recovery measures is not aligned between states [2]
- flash floods in the Ahr-Valley on 14/15th July 2021: over 180 people died; the Ahr rose to more than 5 meter above usual water level, destroying ~500 buildings and ~60 bridges completely, while damaging ~3.000 buildings and causing a damage of ~20bn \$



Figure 3: The city of Altenburg before and after the flooding

3. Research Method

Interview analysis with six experts in early warning systems, disaster management, risk assessment and flood forecasting



Figure 4: Affiliations of interviewees

4. Interview Results

Area	Problem	Possible mitigation
	Authorities did not adhere to EFAS warnings	No need, false understanding and vagueness of EFAS warning: only subsidiary and too inexact for local evacuation
Organisation of warnings	Federal organization does not provide direct communication between neighbours	Coordinating role of the state through its subsidiary actors such as Federal Office for Civil Protection and Disaster Assistance Horizontal communication Shared data platform
Assessment of risk by transmitting authorities	Underestimation of risk Lack of adequate risk maps	More prior information for decision makers Investments in research and general risk awareness Precise assessment of the actual risk exposure
Sensitivity and preparedness of citizens	Lack of risk awareness and necessary procedures Warnings cannot be understood or interpreted Refuse of evacuation Dependence on social media surroundings	More regular evacuation drills More information in beforehand of the actual event Investments on risk awareness supporting research programs Prior information about warning signs such as sirens Recipient addressed formulation of warnings Personal communication from firefighters Not identified

5. Discussion

- organisation and communication of warnings is **working considerably better than depicted** by the media after the Ahr-valley disaster.
- current system and established warning chains are **approved and regarded as efficient** even though the extent of the event was underestimated
- omittance of evacuations was the result of **weighting up** by nature **vague rain warnings against high evacuation costs**
- major improvement potential of prior education and training could be addressed by **information platforms** providing necessary risk knowledge and e-learnings options

6. Conclusion

- factors influencing a successful communication of warnings were identified and discussed
- multiple impediments were deduced
- gained insights deliver concrete and realisable suggestions for improvement in the actual communication of warnings during the event of natural hazards as well as in the management of prior information and preparedness measures

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