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## INTRODUCTION

In Germany the severe flood in August 2002 caused losses of €11.6 billion and hence the highest loss due to natural hazards after 1945. In its aftermath, a number of political changes on flood policies in Germany and Europe, e.g. the EU flood directive, were launched aiming at an improved risk communication and management. The question arises, whether flood-affected private households are now better prepared than in 2002. Therefore, residents' coping capacities during four flood events in Germany that happened after the flood in 2002 were analysed in detail.

## DATA AND FLOOD EVENTS

Computer-aided telephone interview campaigns with private households that suffered property damage due to flooding in 2005, 2006, 2010 or 2011 were performed (Figure 1). The obtained data were statistically analysed and compared to results from a similar investigation carried out by Thieken et al. (2007) after the flood in 2002.

Catchment	2002	2005	2006	2010	2011
<b>Total n</b>	<b>1697</b>	<b>305</b>	<b>156</b>	<b>349</b>	<b>209</b>
Danube	26 %	90 %	26 %		
Elbe/Labe	74 %	10 %	74 %	46 %	10 %
Oder/Odra				45 %	2 %
Rhine				9 %	88 %

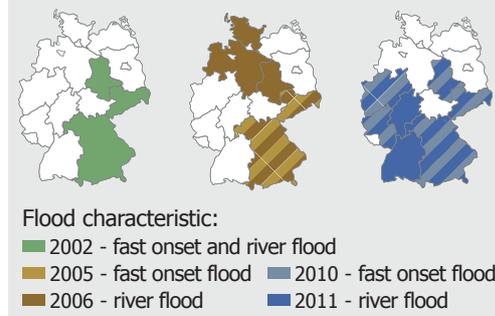


Figure 1. Numbers and shares of interviews with respect to the affected river catchment and federal states where  $\geq 5$  interviews were performed.

## PREPAREDNESS

Regarding the precautionary behavior before the flood events, more than 43 % of all interviewees (2005–2011) gathered information on flood hazards and safety measures as well as participated in networks. Less popular measures were practical flood-proofing and building retrofitting (Figure 2). Yet, in all years, especially in 2011, precaution of private households improved a lot compared to 2002.



## References

Thieken A. H., Kreibich H., Müller M. and Merz B. (2007). Coping with floods: preparedness, response and recovery of flood-affected residents in Germany in 2002. *Hydrological Sciences Journal*, 52(5), 1016–1037.

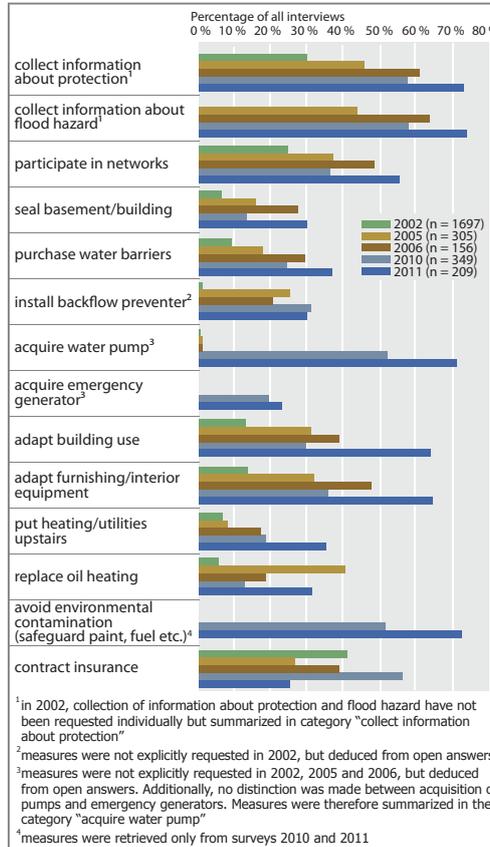


Figure 2. Precautionary measures performed by private households before the respective flood events.

## RESPONSE

In case of a flood event, 48–80 % of the people knew very well how to protect themselves and their households, especially due to comprehensive warnings by authorities. With more than 50 %, the most frequent emergency measures undertaken by all interviewees were to put moveable contents upstairs and to drive vehicles to a flood-safe place. On average, nearly all measures were evaluated to be effective (Figure 3). The comparison with 2002 clearly shows that the flood response capacity of the people has improved, especially in 2006 and 2011. Though, in 2005 and 2010, average lead time was shortest due to the fast onset flood character of the events. Many people stated that they could have done more, if they had been warned earlier.

## CONCLUSION

Regarding people's capacity to cope with floods, this study shows that much has been achieved since 2002. A larger part of people knew that they are at risk. Yet this knowledge did not necessarily result in actual building retrofitting or flood proofing measures. Accordingly, the benefits and damage reduction potentials of these actions still have to be communicated in a better way. The results of 2005 and 2010 differed from those of 2006 and 2011 as flood affected people had to deal with shorter lead times, less time to take precaution measures and consequently suffered damage to a greater extent than people did in 2006 or 2011. Therefore, it is most important to further improve early warning systems and communication channels, particularly in hilly areas with fast onset flooding. The better performance of 2006 and 2011 might also be explained by more flood experience and greater awareness.

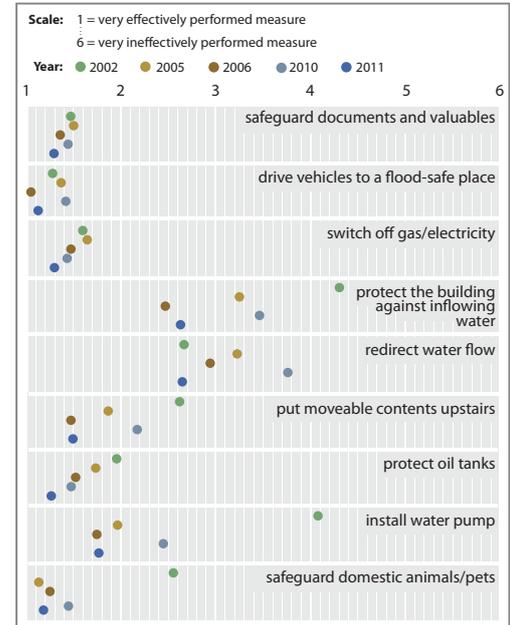


Figure 3. Average effectiveness of emergency measures as evaluated by the people interviewed.

## DAMAGE AND RECOVERY

60 % and 47 % of all respondents (2005–2011) suffered damage to buildings and household contents, respectively. Median losses in individual years differed substantially (Figure 4). 14 months after the respective flood events, at least 60 % of respondents reported the building or furniture status to be very good or good.

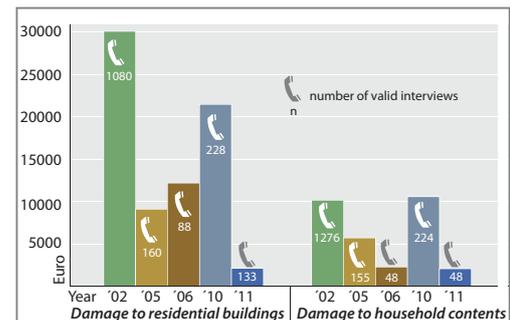


Figure 4. Median damage of buildings and household contents (values corrected by building cost index and consumer price index, reference year 2013).