

Changes in Hydrological Risk Perception and Implications for Disaster Risk Reduction

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Some background

People and hydrological hazards



Some background

Risk



(UNDRR)

Some background

Perception of risk

not sufficient, but *necessary*

Dynamic

Longitudinal data

Some background

Lack of longitudinal data

Lots of cross-sectional studies, very few time series



No more than a dozen longitudinal studies within flood risk

Some background

Lack of longitudinal data



Risk awareness
& adaptation dynamics



heterogeneous trajectories?

Some background

Lack of longitudinal data



Survey data → used for *parameter estimation*

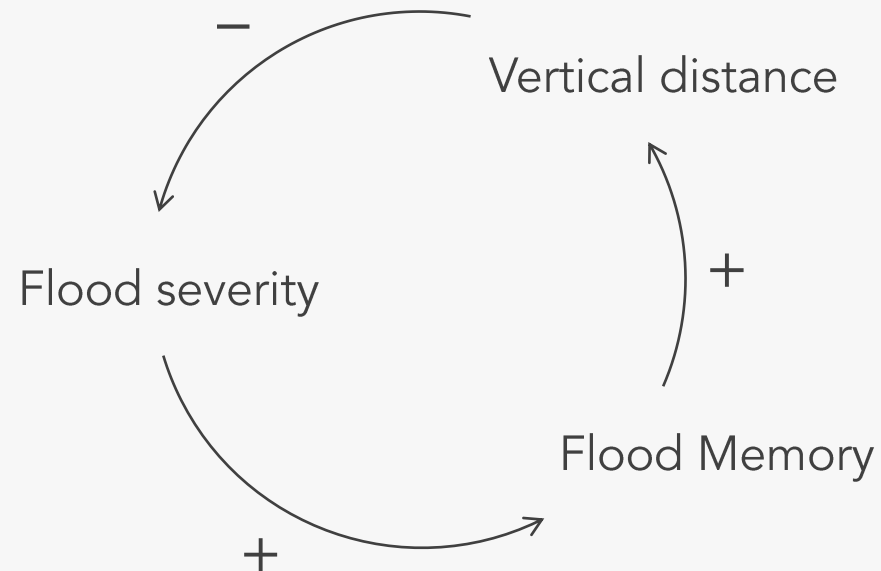
Lack of longitudinal data on risk awareness leads to **biased** parameter estimation in flood risk models

Barendrecht et al. (2019) *WRR*

Some background

Human-water systems

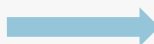
Sociohydrological models \longrightarrow explain risk generated by the interplay of water and society



Ridolfi et al. (2020), *Hydrol. Res.*

Some background

Human-water systems

Sociohydrological models  explain risk generated by the interplay of water and society

Social variables  structural uncertainty

Some background

Structural uncertainty

Reduced when:

A) Results rely on empirical data

B) Convergent results are obtained through different methods

Some background

Some examples

Longitudinal studies usually adopt a single data collection method

Panel



same respondents over time

Repeated cross-sectional



different respondents at each time

Case study 1

Romagnano & Vermiglio (TN)

Debris flows

Romagnano

Urban

Hit in 2000 and only two other times in the past century

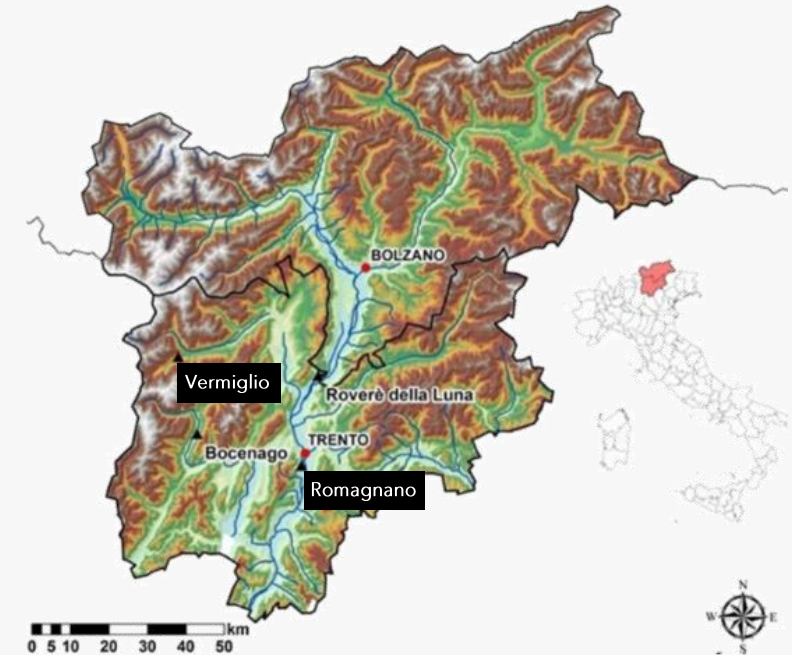
High inhabitants turnover

Vermiglio

Alpine

Hit in 2000 and 2002, exposed to avalanche risk every year, many other debris flows in the same valley

Little inhabitants turnover

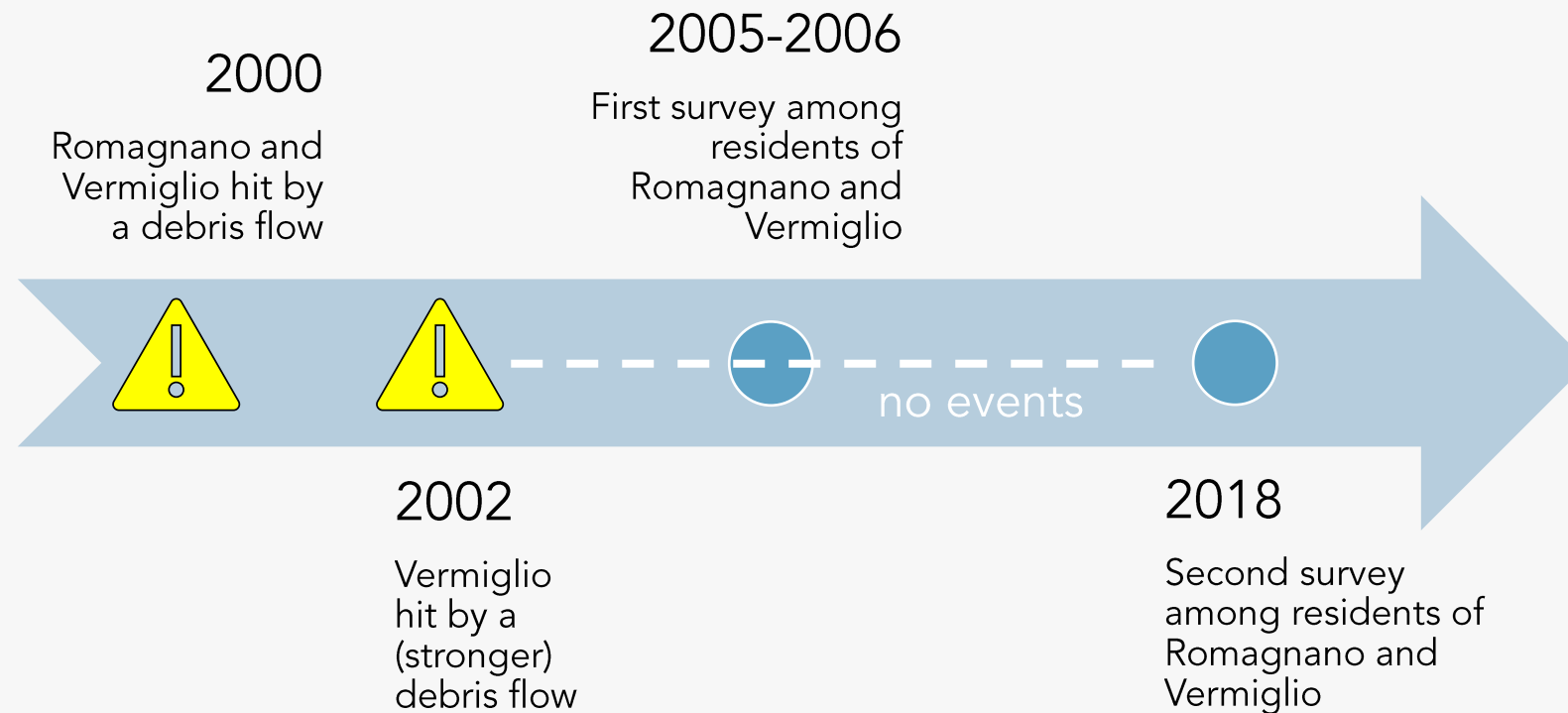


(Scolobig et al. 2012)

E. Mondino, A. Scolobig, M. Borga, F. Albrecht, J. Mård, P. Weyrich & G. Di Baldassarre (2020) Exploring changes in hydrogeological risk awareness and preparedness over time: a case study in northeastern Italy, *Hydrological Sciences Journal*

Case study 1

Timeline



E. Mondino, A. Scolobig, M. Borga, F. Albrecht, J. Mård, P. Weyrich & G. Di Baldassarre (2020) Exploring changes in hydrogeological risk awareness and preparedness over time: a case study in northeastern Italy, *Hydrological Sciences Journal*

Case study 1

Methods

No info about previous interviewees

Repeated-cross sectional approach:

two rounds of surveys – 2005 (conducted by Scolobig et al., 2012) and 2018

Data collected through questionnaires (face to face interview)

Representative sampling (according to age and gender)

2018 questionnaire built upon 2005 one

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Case study 1

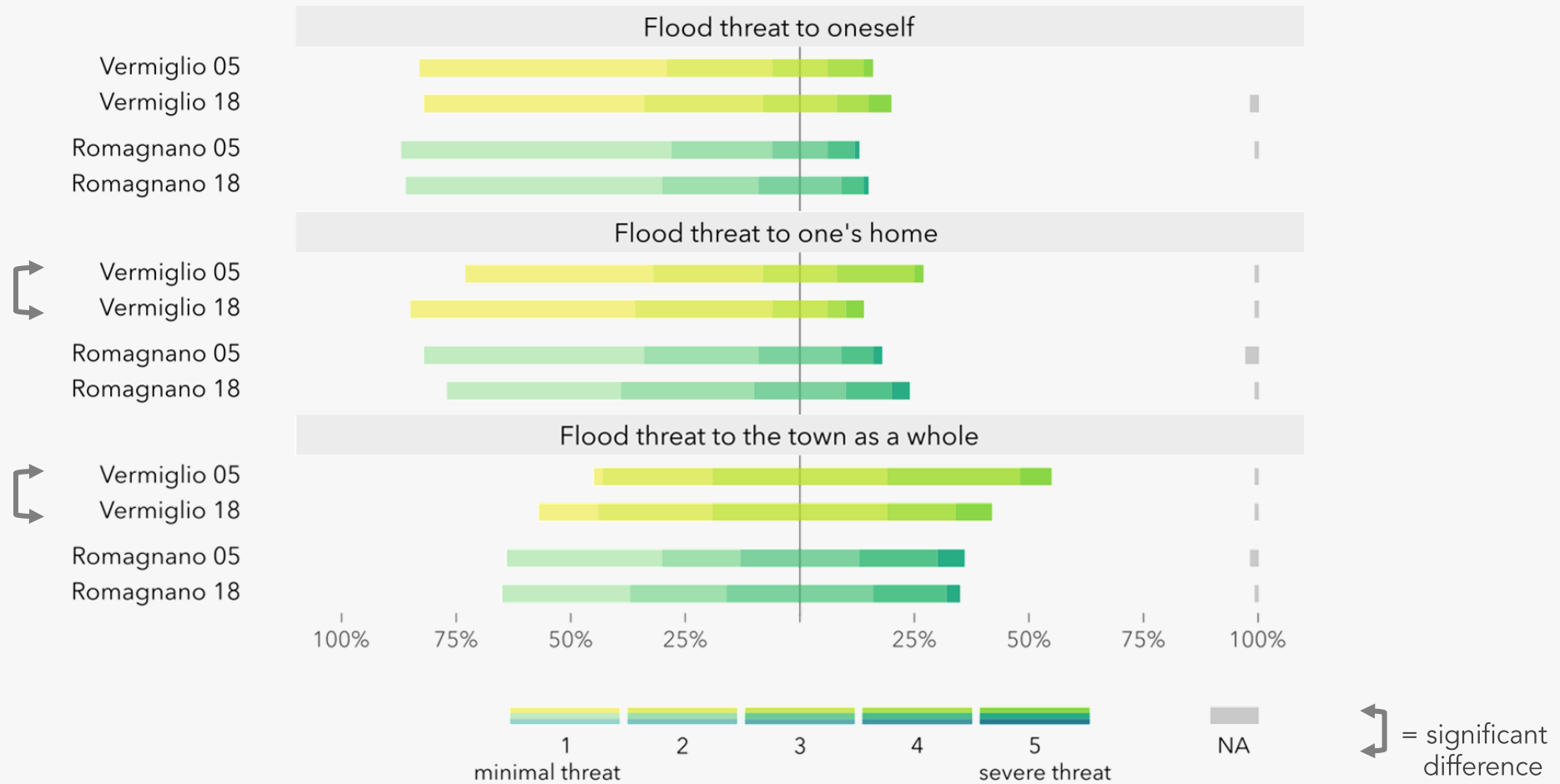
Variables



E. Mondino, A. Scolobig, M. Borga, F. Albrecht, J. Mård, P. Weyrich & G. Di Baldassarre (2020) Exploring changes in hydrogeological risk awareness and preparedness over time: a case study in northeastern Italy, *Hydrological Sciences Journal*

Case study 1

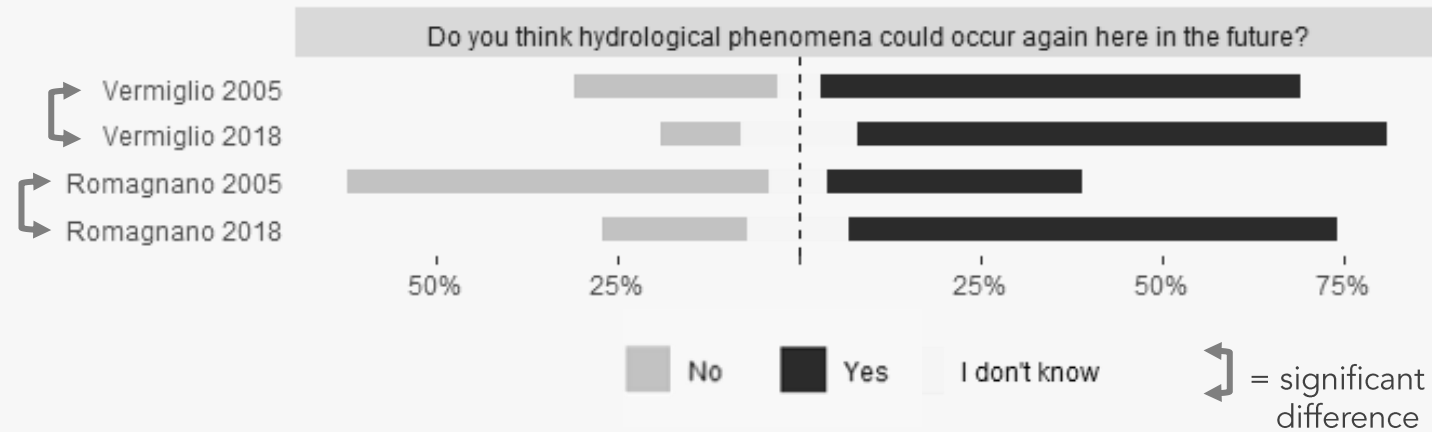
Risk awareness



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Case study 1

Future likelihood



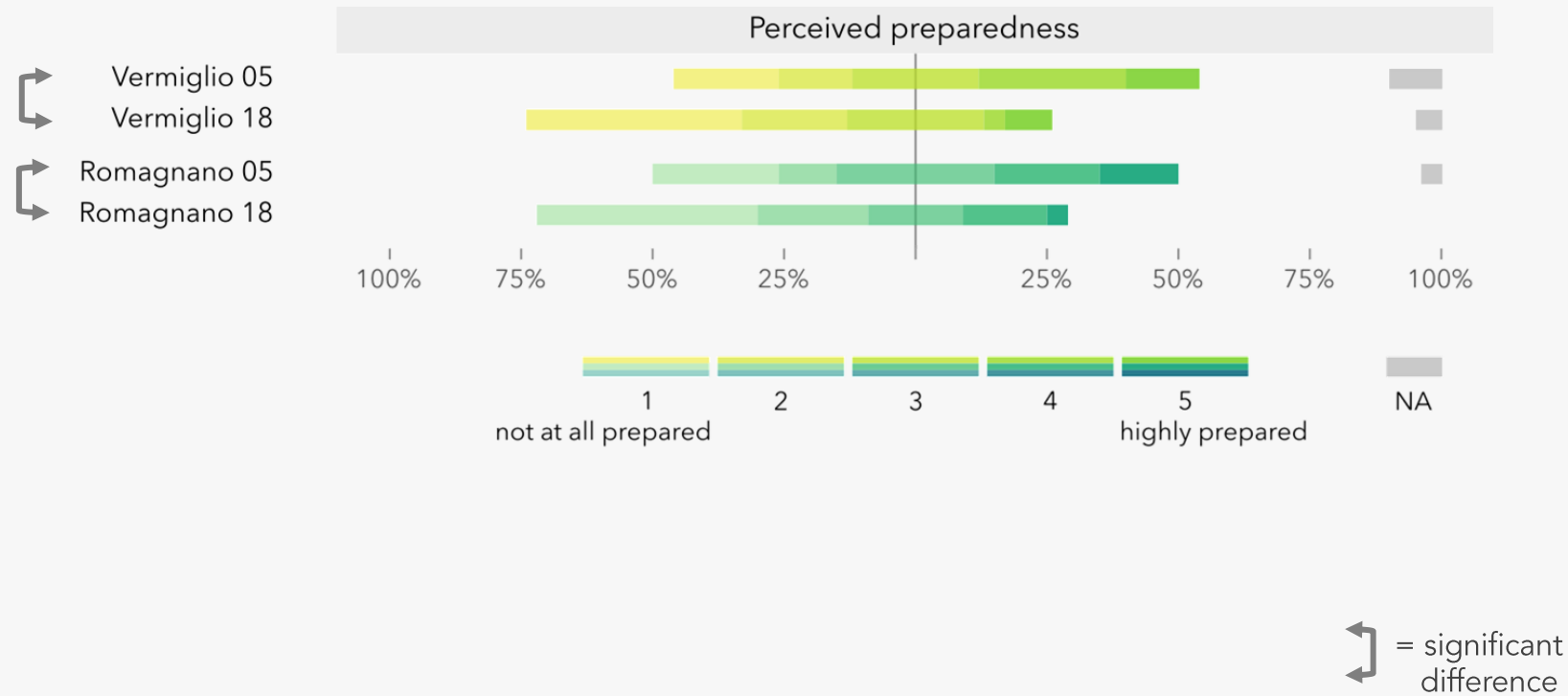
Counterintuitive?

Occurrence of events elsewhere → *availability heuristic*
(confirmed by open-end questions)

E. Mondino, A. Scolobig, M. Borga, F. Albrecht, J. Mård, P. Weyrich & G. Di Baldassarre (2020) Exploring changes in hydrogeological risk awareness and preparedness over time: a case study in northeastern Italy, *Hydrological Sciences Journal*

Case study 1

Perceived preparedness

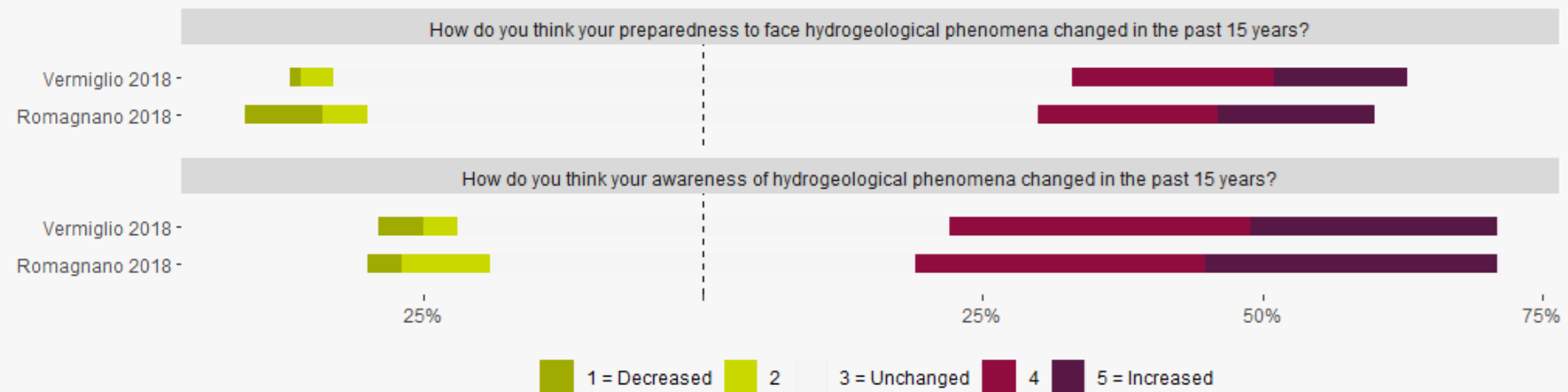


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Case study 1

Self-assessment

→ To understand how their perception compares to the actual data



→ In line with the increase in perceived likelihood of hydrogeological phenomena

E. Mondino, A. Scolobig, M. Borga, F. Albrecht, J. Mård, P. Weyrich & G. Di Baldassarre (2020) Exploring changes in hydrogeological risk awareness and preparedness over time: a case study in northeastern Italy, *Hydrological Sciences Journal*

Case study 1

Self-assessment

Why has your risk awareness increased?

1. Growing old
2. Experience with the hazard
3. Occurrence of events elsewhere

Why has your risk awareness decreased?

1. No information received
2. No events in a long time
3. Lack of direct experience

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Case study 1

Self-assessment

Why has your preparedness increased?

1. Personal experience
2. Growing old
3. Experience with the event

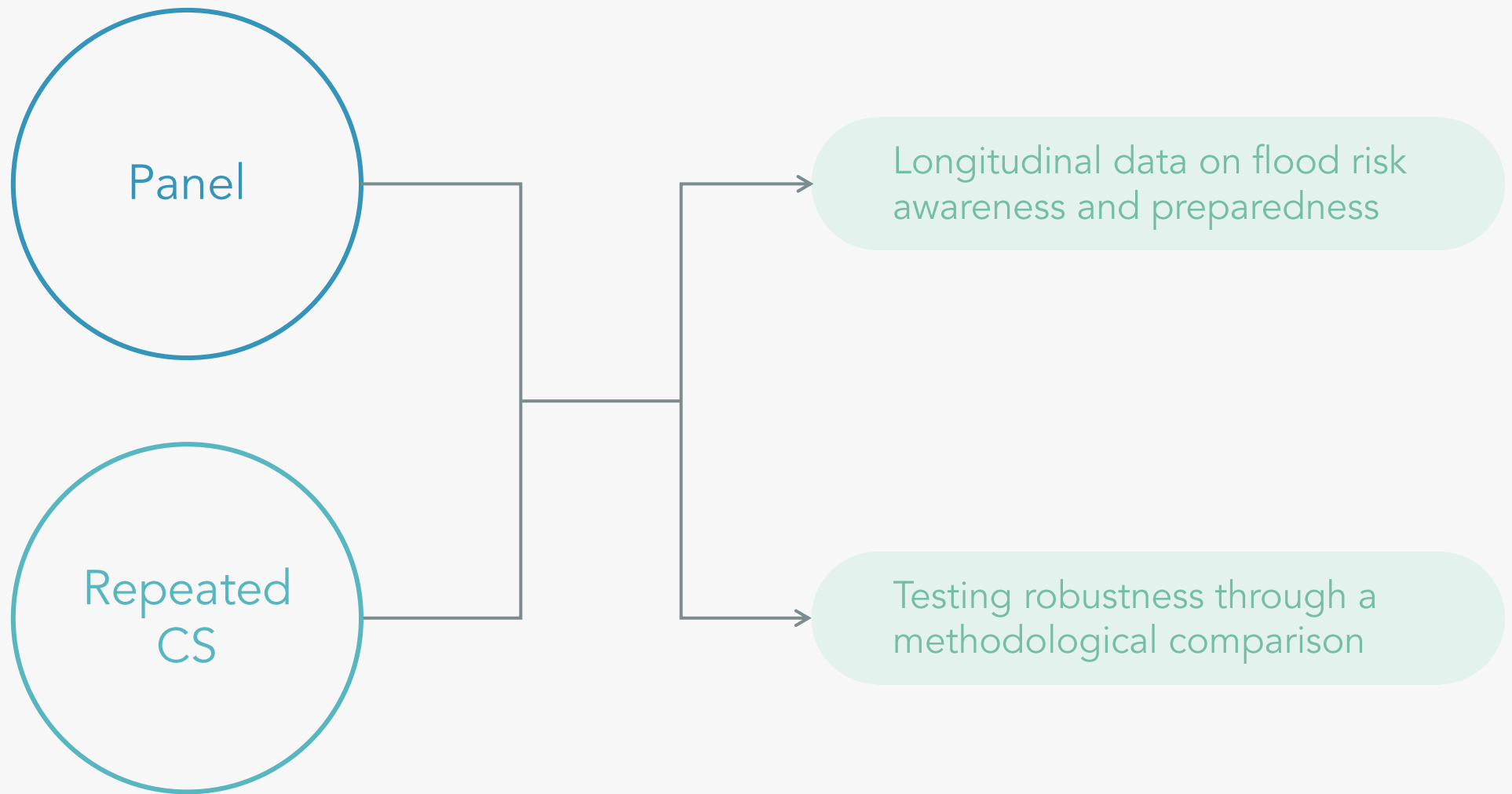
Why hasn't your preparedness changed?

1. No information/training received
2. No events in a long time
3. Lack of direct experience



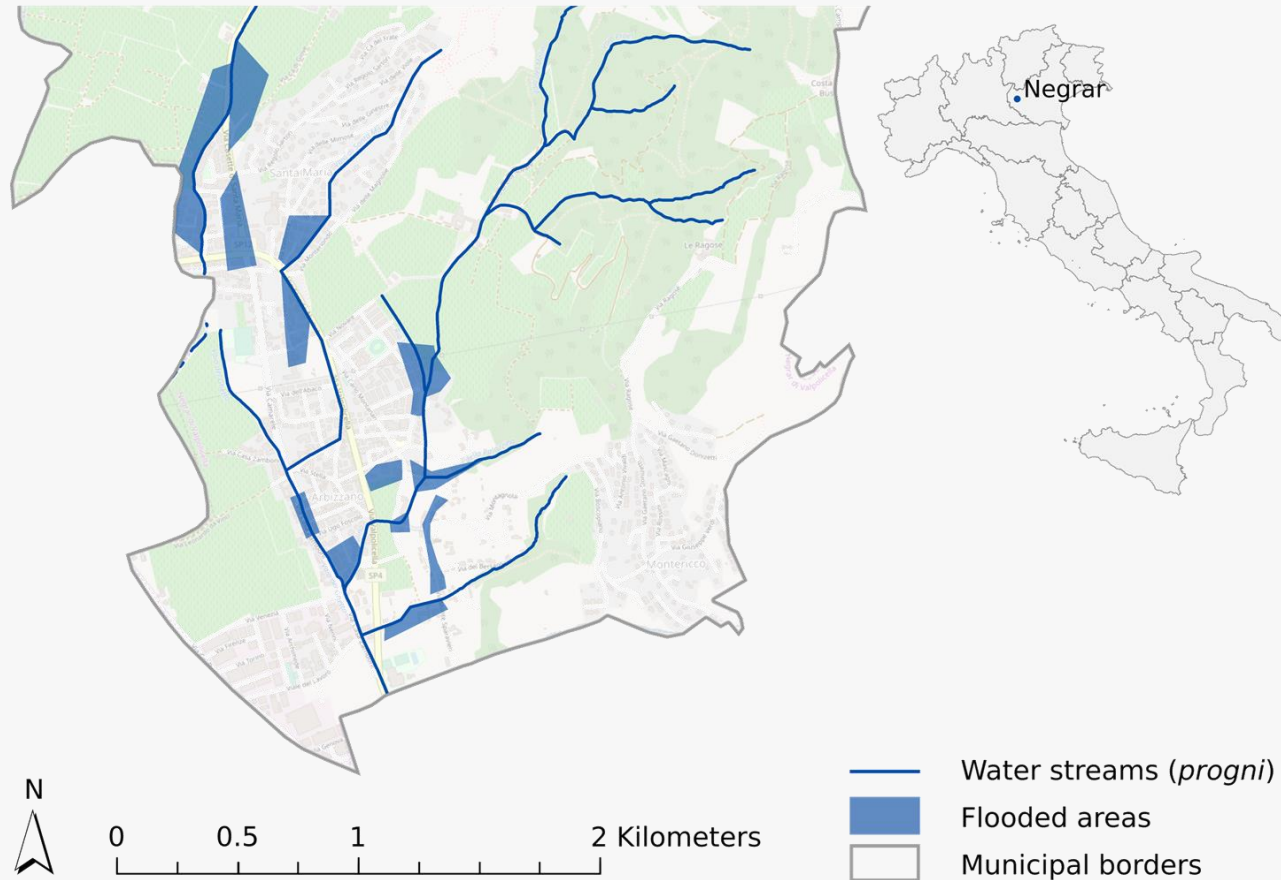
Same reasons reported for a decrease in awareness

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Case study 2

Negrar (Valpolicella, VR)



September 1st, 2018



Mondino, E., Scolobig, A., Borga, M., & Di Baldassarre, G. (2021) Longitudinal survey data for diversifying temporal dynamics in flood risk modelling, *Nat. Hazards Earth Syst. Sci.*

Case study 2

First round of data collection (time 1)

February 2019

Initial sample

146 inhabitants completed the survey

survey conducted face-to-face

only one person per household

Mondino, E., Scolobig, A., Borga, M., & Di Baldassarre, G. (2021) Longitudinal survey data for diversifying temporal dynamics in flood risk modelling, *Nat. Hazards Earth Syst. Sci.*

Case study 2

Second round of data collection (time 2)

February 2020

Panel

84 former respondents completed the survey

survey conducted face-to-face / by telephone

Repeated Cross-Sectional

150 inhabitants completed the survey

survey conducted face-to-face / by telephone


none of them completed the survey at time 1

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Case study 2

Samples

Initial sample + Panel sample = Panel study

146 at time 1  84 at time 2 42% attrition rate
(125 agreed to be re-contacted) (58% of those who agreed)


To correct for attrition bias  Inversed Probability of Attrition Weighing (IPAW)

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Case study 2

Samples

Initial sample + Repeated CS sample = Repeated CS study

146 at time 1  150 at time 2

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Variables

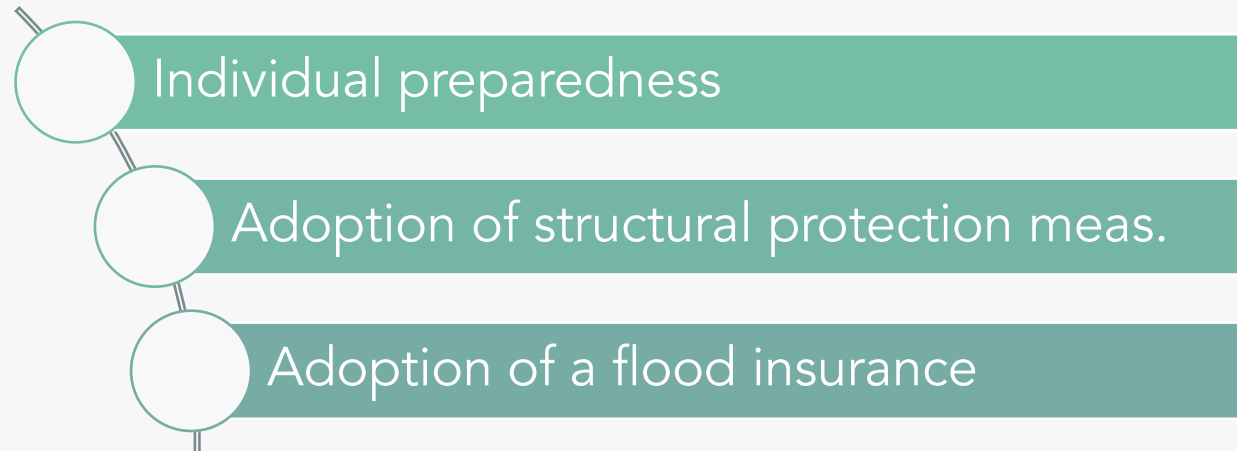
Risk awareness



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Variables

Preparedness



Mondino, E., Scolobig, A., Borga, M., & Di Baldassarre, G. (2021) Longitudinal survey data for diversifying temporal dynamics in flood risk modelling, *Nat. Hazards Earth Syst. Sci.*

Main results

Awareness

	Repeated Cross-Sectional		Panel		Robustness for SH models
	Entire sample	Significant interactions	Entire sample	Significant interactions	
General feeling of safety	No change	–	No change	–	Robust
Threat to self	No change	<i>Damage</i> (Increased in respondents who suffered high damage)	No change	–	No
Threat to home	No change	–	No change	–	Robust
Threat to town as a whole	No change	–	No change	–	Robust
Expected future damage	Decreased	–	No change	–	No

Mondino, E., Scolobig, A., Borga, M., & Di Baldassarre, G. (2021) Longitudinal survey data for diversifying temporal dynamics in flood risk modelling, *Nat. Hazards Earth Syst. Sci.*

Main results

Preparedness

	Repeated Cross-Sectional		Panel		Robustness for SH models
	Entire sample	Significant interactions	Entire sample	Significant interactions	
Individual preparedness	No change	<i>Damage</i> (Increased in respondents who suffered low damage)	Increased	<i>Damage</i> (Increased in respondents who suffered low damage)	Robust

Mondino, E., Scolobig, A., Borga, M., & Di Baldassarre, G. (2021) Longitudinal survey data for diversifying temporal dynamics in flood risk modelling, *Nat. Hazards Earth Syst. Sci.*

Take-home message

To conclude

On average, no changes in risk awareness

BUT

Perceptions evolved differently over time for different groups of individuals

Take-home message

To conclude

e.g. gender:

Women have a higher risk awareness right after the event (survey round 1), but then it decreases over time



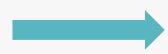
increased trust in authorities for flood protection

Men more stable risk awareness over time

Take-home message

To conclude

Improving the representation of socio-demographic heterogeneity in sociohydrological models.



Grouping individuals depending on certain characteristics