Longitudinal Survey Data in Modelling Human-Water Systems

A call for diversifying temporal dynamics

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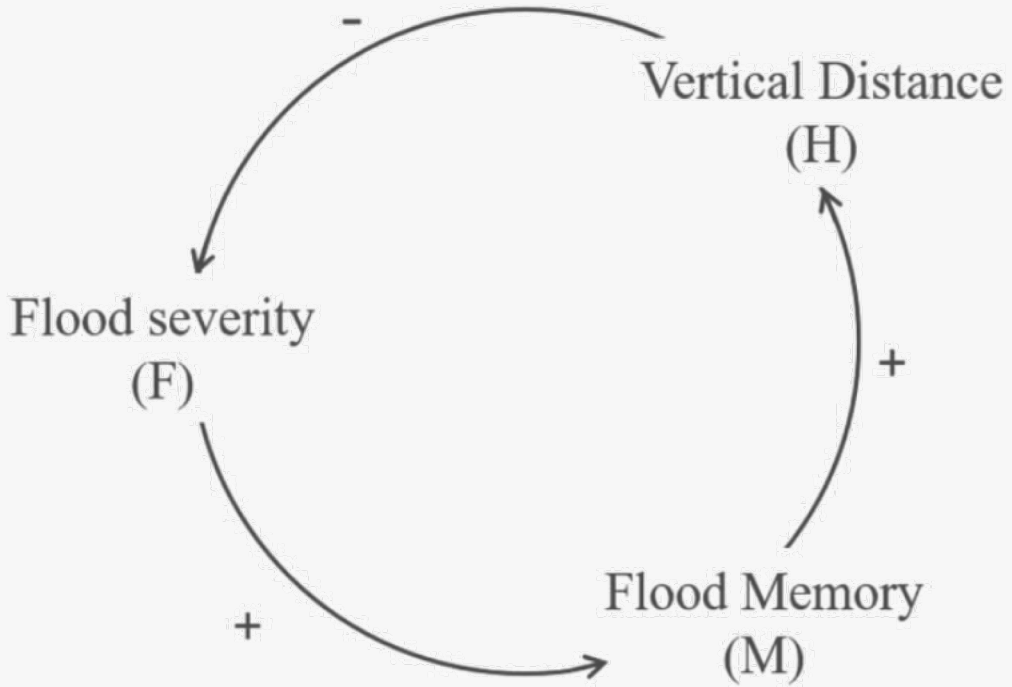
Human-water systems

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



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

Human-water systems

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

Social variables → **structural uncertainty**

Structural uncertainty

Reduced when:

A) Results rely on empirical

B) Convergent results are obtained through different methods

Structural uncertainty

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Lack of longitudinal data

Temporal dimension

Lots of cross-sectional studies, very few time series

↳ Only ~10 longitudinal studies within flood risk awareness

Lack of longitudinal data

Survey data (empirical) ⟶ 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*

Structural uncertainty

Reduced when:

A) Results rely on empirical data

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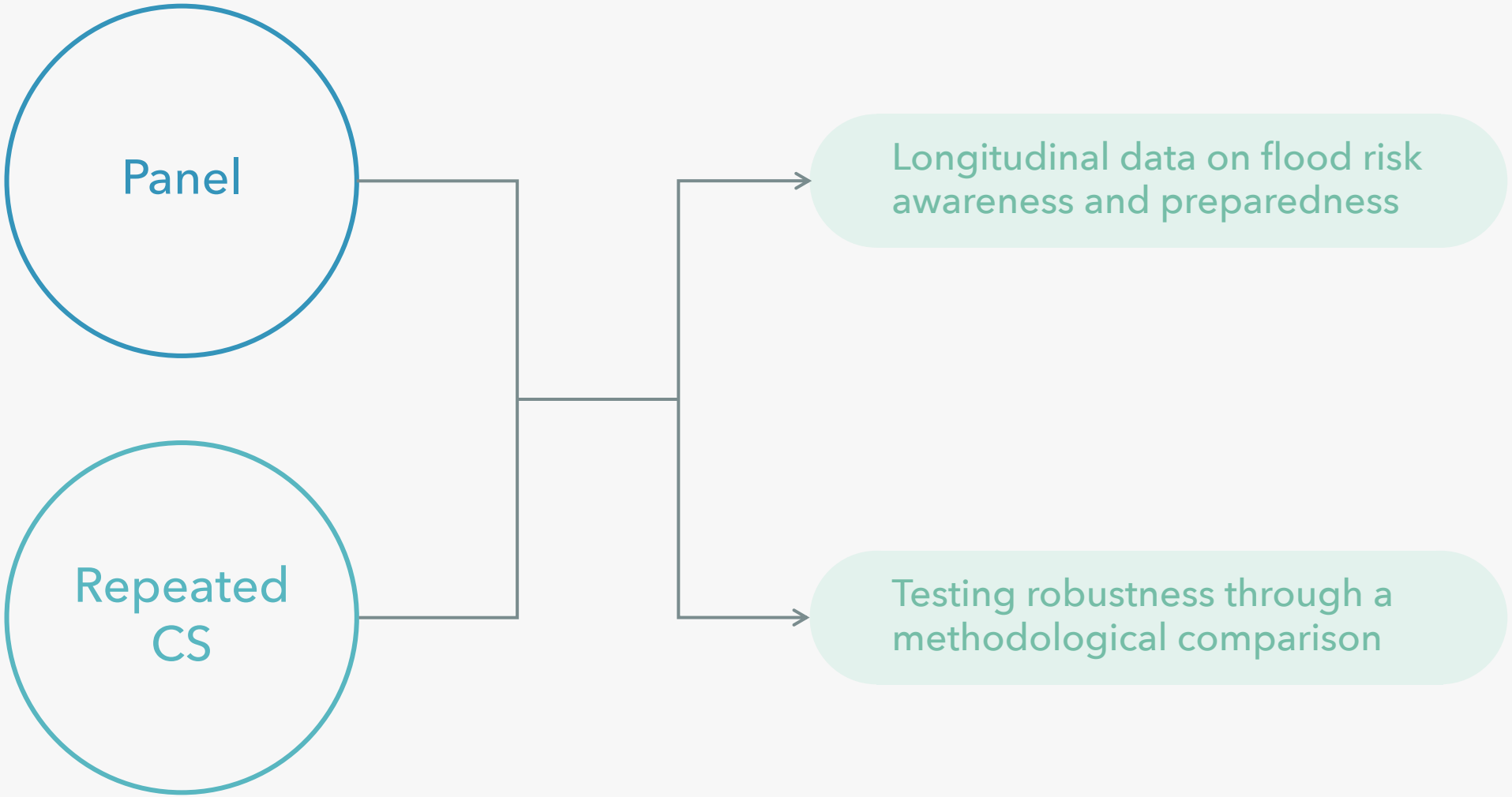
Robust data

All the studies so far adopt a single data collection methods

- ~~Cross-sectional~~ (no temporal dimension)
- Longitudinal – panel
- Longitudinal – repeated cross-sectional


Panel
Repeated CS
Longitudinal data on flood risk awareness and preparedness
Testing robustness through a methodological comparison

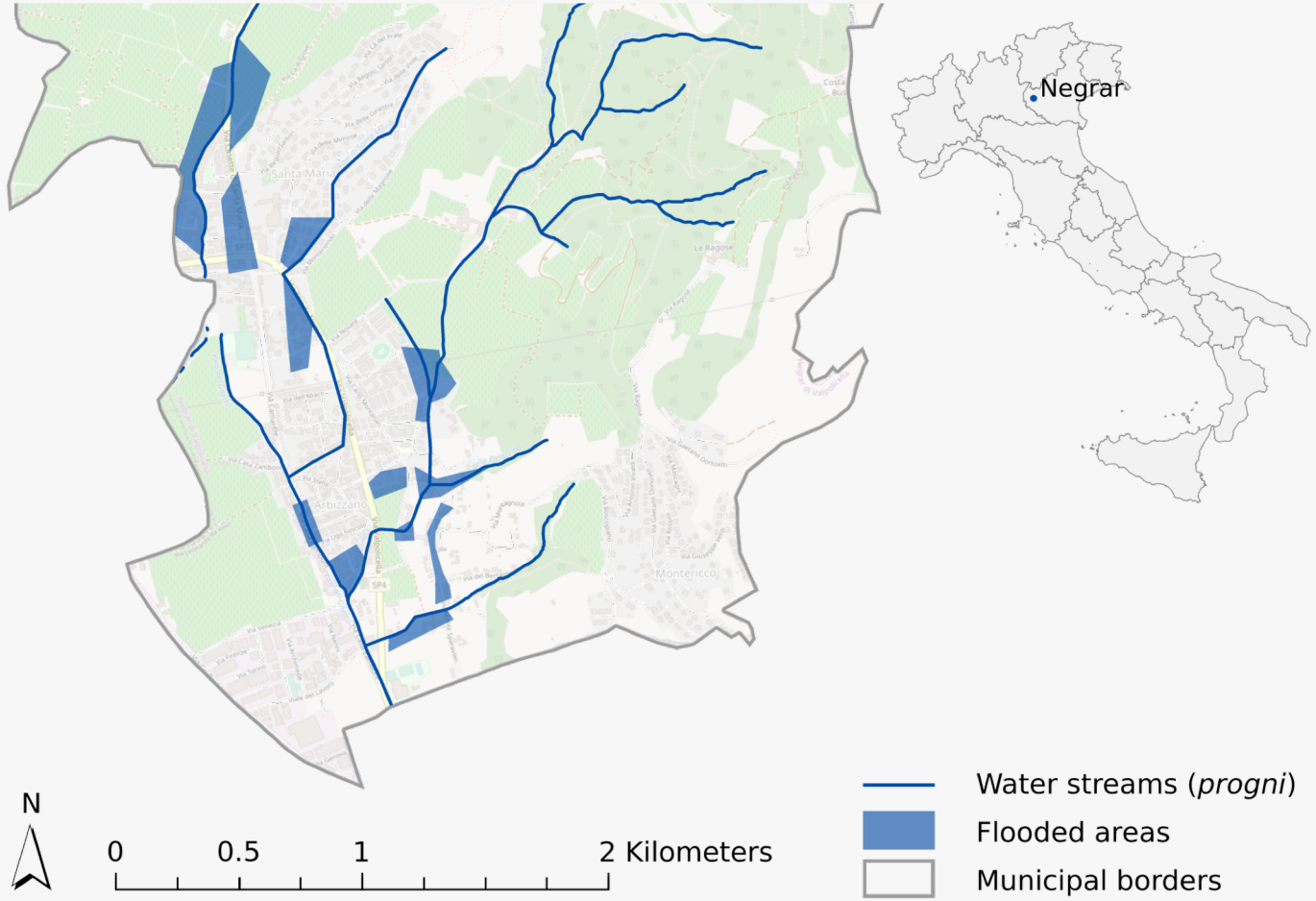
Two approaches

Panel → people interviewed at *time 2* are the same who were interviewed at *time 1*
no others are interviewed

Repeated CS → No person interviewed at *time 1* will be interviewed at *time 2*

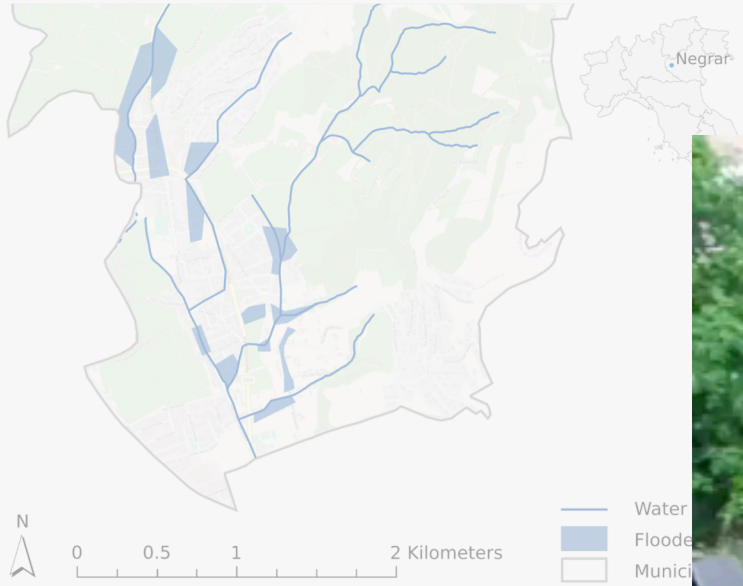
Case study

The village of Negrar



Case study

The flash flood



September 1st, 2018

Video credits: Laura Vignola

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

Second round of data collection (time 2)

February 2020

Panel

84 former respondents completed the survey

survey conducted face-to-face / by telephone

Repeated CS

150 inhabitants completed the survey

survey conducted face-to-face / by telephone

none of them completed the survey at time 1

Samples

Initial sample + Panel sample = Panel study

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

42% attrition rate

Samples

Initial sample + Repeated CS sample = Repeated CS study

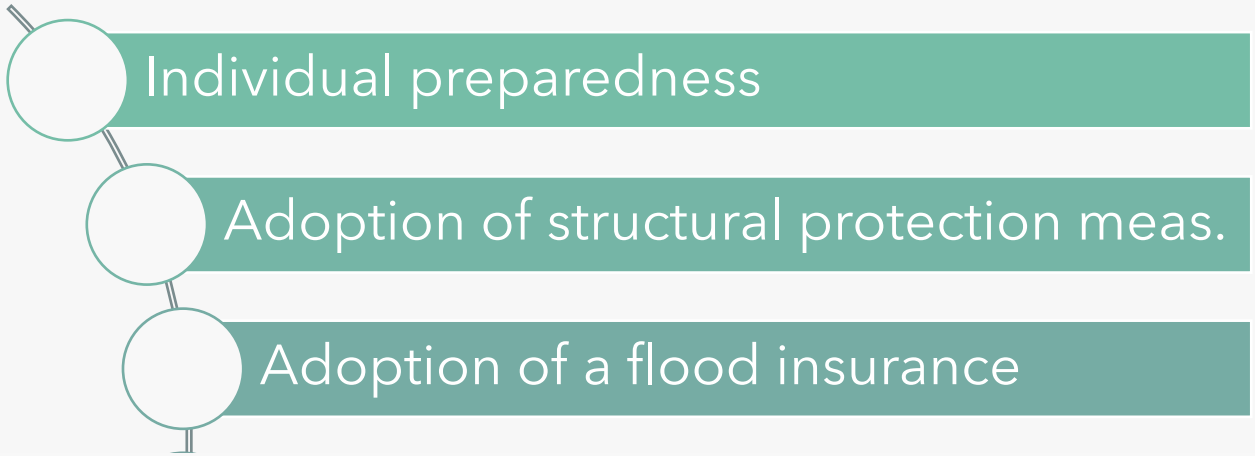
146 at time 1 ⟶ 150 at time 2

Variables

Risk awareness

Knowledge & Trust

Preparedness



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	*Damage* (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

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Knowledge & Trust

	Repeated Cross-Sectional		Panel		Robustness for SH models
	Entire sample	Significant interactions	Entire sample	Significant interactions	
Local sources	No change	Gender (Increased in men)	No change	–	No
Official information	No change	–	Increased	–	No
Trust in administration (risk communication)	No change	–	Increased	–	No
Trust in administration (protection works)	No change	*Gender* (Increased in women)	No change	*Gender* (Increased in women) *Damage* (Increased in respondents who suffered low damage)	Robust

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Preparedness

	Repeated Cross-Sectional		Panel		Robustness for SH models
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Individual preparedness	No change	*Damage* (Increased in respondents who suffered low damage)	Increased	*Damage* (Increased in respondents who suffered low damage)	Robust

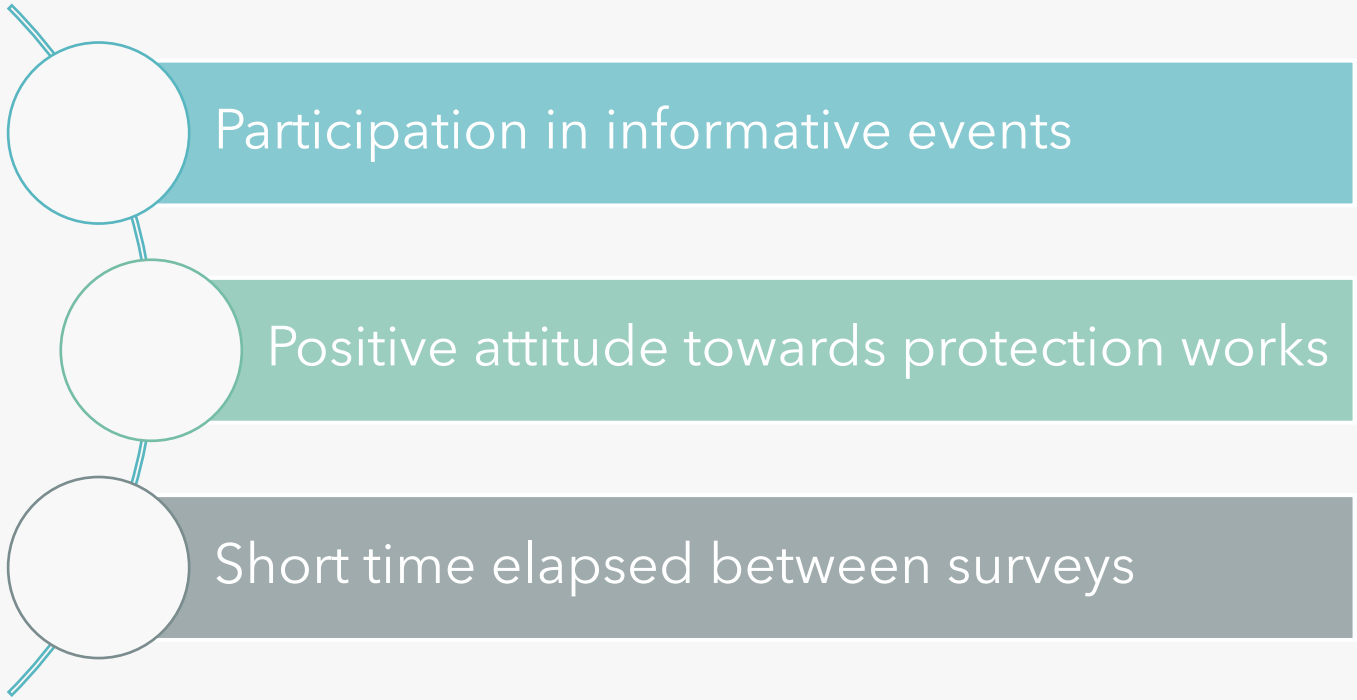
To conclude

Temporal dynamics

Methodological comparison

Temporal dynamics

No changes in risk awareness



Methodological comparison

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

→ Grouping individuals depending on certain characteristics

- middle ground between a system dynamics and an agent-based modelling (ABM) approach
- embracing social diversity, while not losing the lumped approach (generalisable, user-friendly)