

# Flood risk mitigation and indicators of social cohesion in the Western Balkans

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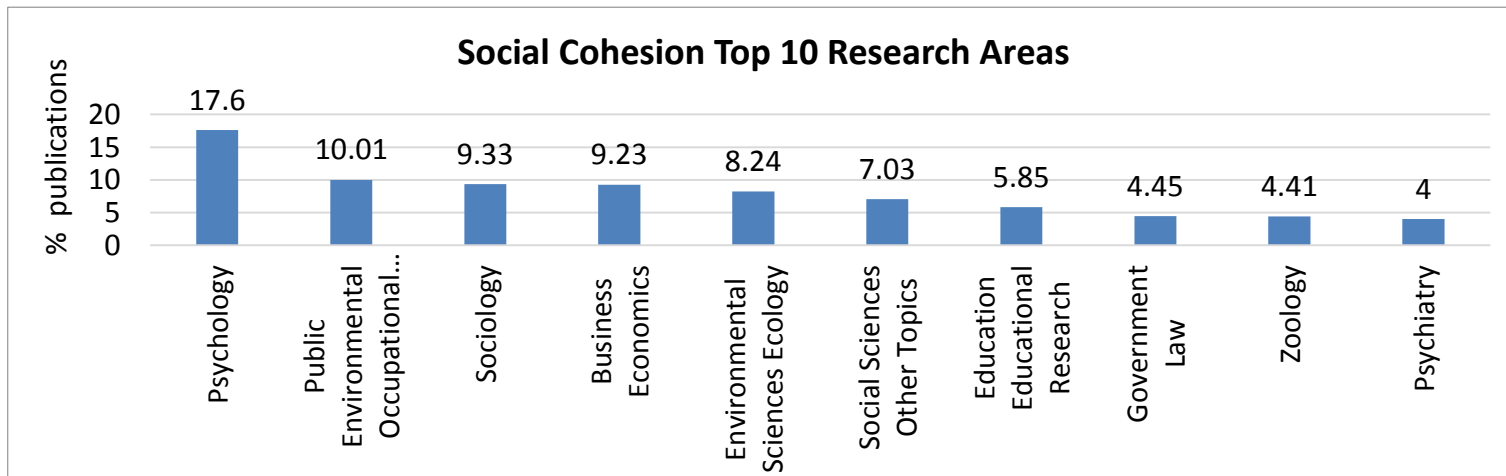
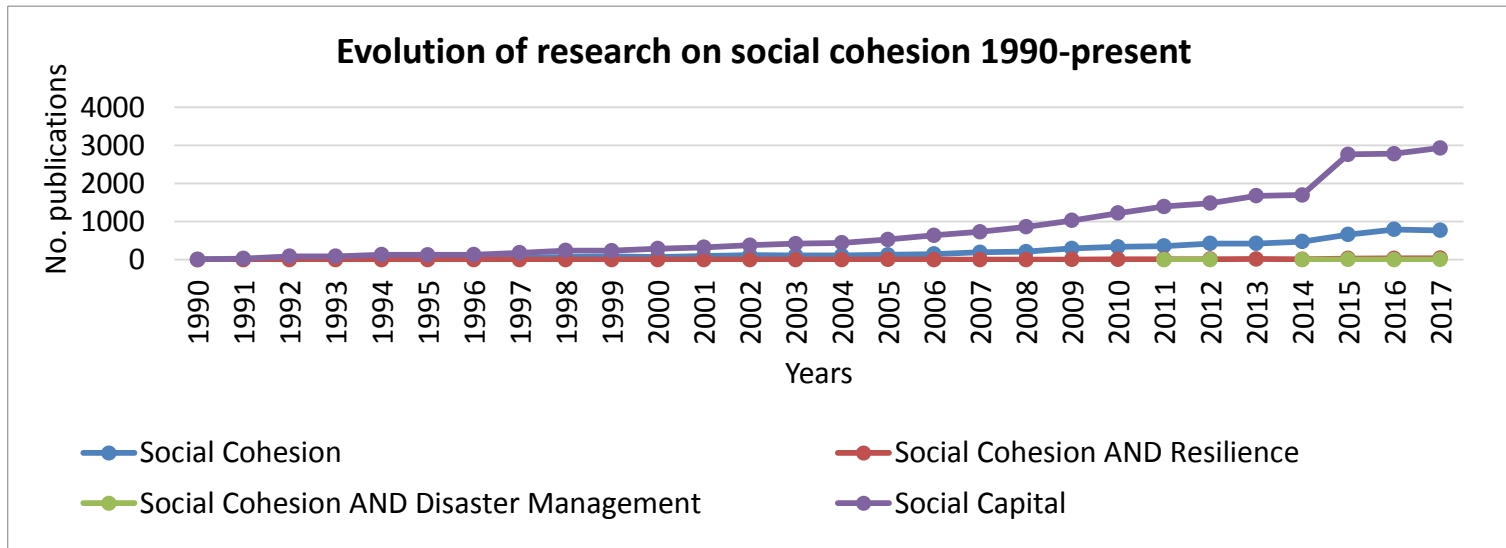
# Context of research

- EU Erasmus + project Knowledge for Resilient Society (K-FORCE)
- Increased occurrence and severity of floods in South Eastern Europe as a result of climate change
- Need for more empirical evidence for the link between social cohesion and disaster reconstruction



Source: UNDP

# Evolution and scope of research on social cohesion



Source: Web of Science

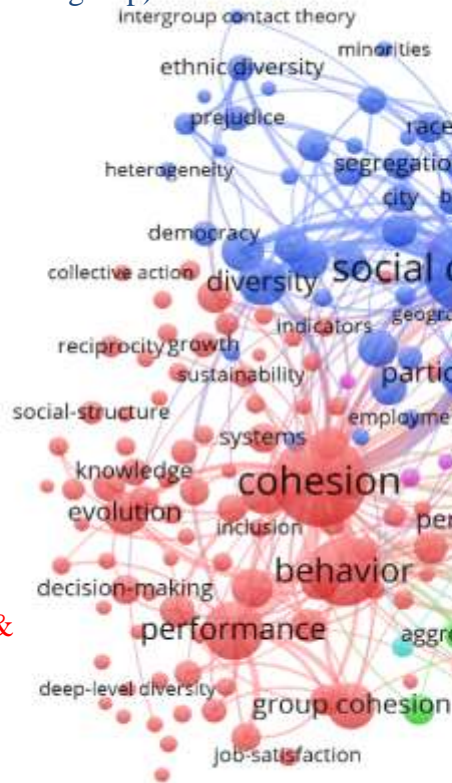
# Keyword cluster analysis of social cohesion

Collective perspective

Individual - institutions

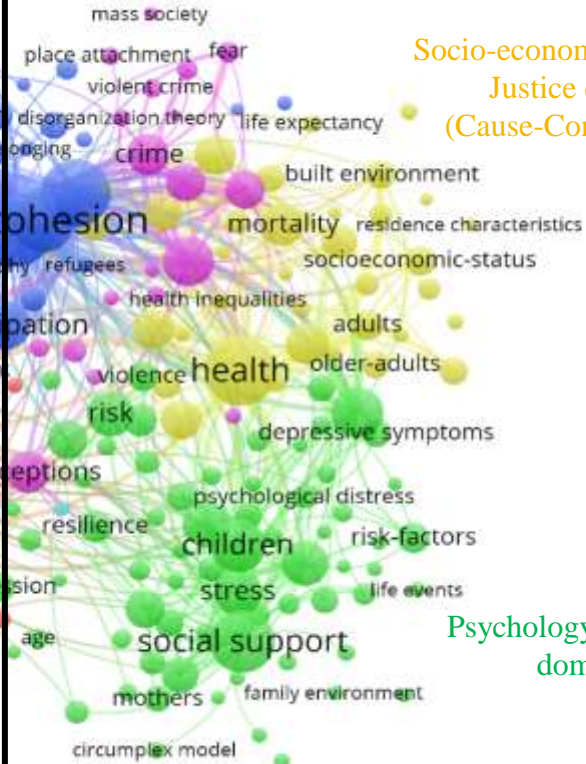
Conflict and Violence domain  
(threat from outside the group)

Social Sciences &  
Policy domain



Conflict and Violence domain  
(threat from within the group)

Socio-economic, Equity &  
Justice domain  
(Cause-Consequence)



Individual perspective  
Individual - individual

6000+ records  
Source: Web of Science

# Selected variables

Flood Exposure Variables
POSTt 1 if t ≥ 2015 (the occurrence of the major flood event in 2014) otherwise, = 0
Influ by Flood2014 if the country is influenced by the major flood event in 2014, it will be 1 for t ≥ 2014; otherwise, = 0
POSTt x Influ by Flood2014 interaction between the above two variables

(EM-dat The International Disaster Database)

Social Cohesion Variables	Pos (+)/Neg (-)	Perceived (P)/Observed (O)
<b>Trust in fellow citizens</b> (World Values Survey)	+	P
<b>Trust in institutions</b> (World Bank – Governance Effectiveness Score)	+	P
<b>Voting</b> - Parliamentary/presidential elections (International Institute for Democracy and Electoral Assistance)	+	O
<b>Helping a stranger</b> (World Giving Index)	+	P
<b>Donating money</b> (World Giving Index)	+	P
<b>Volunteering time</b> (World Giving Index)	+	P
<b>Rule of Law</b> (World Bank Development Indicators)	+/-	P/O
<b>Corruption</b> (Transparency International/World Bank Development Indicators)	+/-	P/O
<b>Crime</b> (World Bank homicide p/100,000 people)	-	O

Control Variables
<b>HDI score</b> (UNDP)
<b>Gini score</b> (World Bank)

# Regression model

$$Y_{ct} = \alpha + \beta_1 \text{POST}_t + \beta_2 \text{Influ by Flood 2014}_c + \beta_3 \text{POST}_t \times \text{Flood 2014}_c + \gamma X_{ct} + \varepsilon_{ct}$$

Adapted from Calo-Blanco A, Kovářík J, Mengel F, Romero JG. (2017)

$y_{ct}$  - indicator of social cohesion in a country  $c$  at a given time  $t$

$\beta_1$  - shows the average increase/decrease in the indicator between the period before and after the 2014 event for the unaffected *countries*

$\beta_2$  - difference between affected and unaffected *countries* before the 2014 event

$\beta_3$  - average difference in the evolution of the indicator between affected and unaffected *countries* from before the event to after the event

$\gamma X_{ct}$  - vector of control variables

$\alpha$  - region fixed effect, which can be arbitrarily correlated with the control vector  $X$

P-value (significance) : **LOWER** than 0.05 = **good fit**

R-squared (variation) : **HIGH** R-square = **high correlation**

# Preliminary Results (Serbia)

Social Cohesion Variables		Pos (+)/Neg (-)	Perceived (P)/Observed (O)	R-squared value	P-value	
<i>Trust &amp; social relations</i>	<b>Trust in fellow citizens</b>	+	P	<b>0.996</b>	<b>2.03e-09</b>	
	<b>Trust in institutions</b> (Governance effectiveness)	+	P	<b>0.912</b>	<b>0.0002</b>	
	<b>Voting</b>	Parliamentary	+	O	<b>0.78</b>	<b>0.0354</b>
		Presidential	+	O	0.542	0.139
<i>Altruism</i>	<b>Helping a stranger</b>	+	P	<b>0.981</b>	<b>0.0066</b>	
	Donating money	+	P	0.846	0.137	
	Volunteering time	+	P	0.718	0.311	
<i>Compliance</i>	<b>Rule of Law</b>	+/-	P/O	<b>0.895</b>	<b>0.0005</b>	
	Corruption	+/-	P/O	0.438	0.274	
	Crime	-	O	0.777	0.102	

R-squared (variation) : HIGH R-square = high correlation

P-value (significance) : LOWER than 0.05 = good fit

# Preliminary Conclusions & Future actions

- A pattern of social cohesion positively correlating with disaster recovery is at this stage of the analysis **not visible at the regional level**
- Variables that show the best fit:  
**Trust; Governance effectiveness; Helping a stranger; and Rule of Law**
- A more detailed analysis is in progress, incl. a number of additional social cohesion and control variables
- A follow-up study, using the same social cohesion indicators in relation to **seismic hazards**
- **2018-2019 Educational workshops** with K-FORCE participants from the Western Balkans (conceptualizing and measuring social cohesion for natural hazards)



# Acknowledgements & Contact Information

- [EU Erasmus + K-FORCE project](#)
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- [Danish Centre for Risk and Safety Management](#)



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