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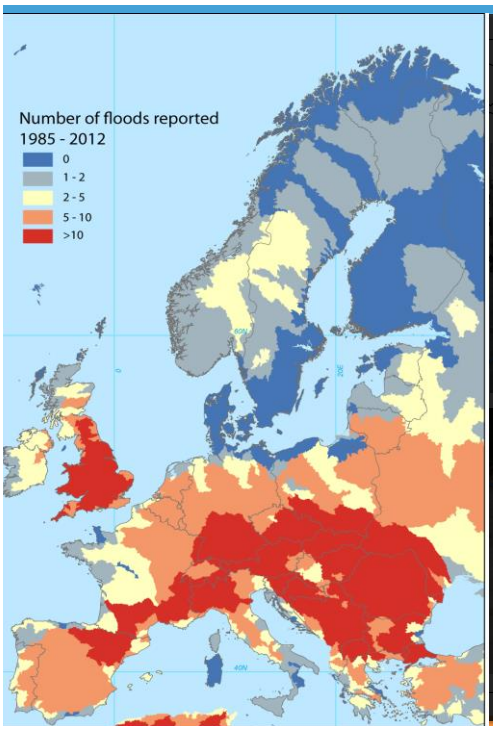
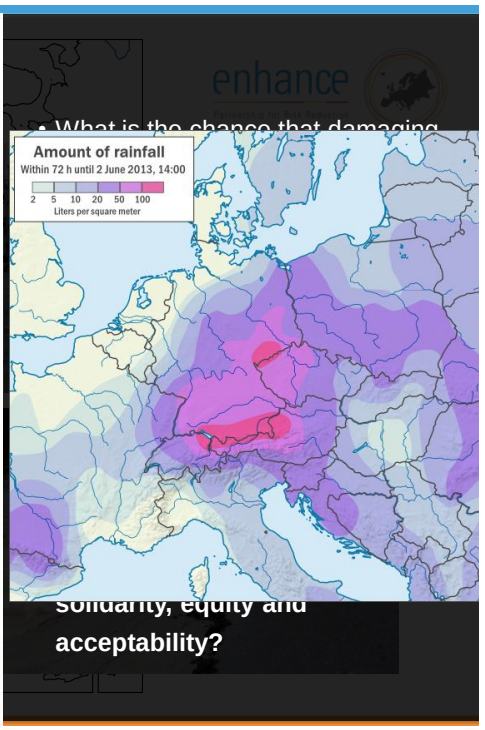
Increasing stress on disaster risk finance due to large floods

Brenden Jongman, Stefan Hochrainer-Stigler, Luc Feyen, Jeroen Aerts, Reinhard Mechler, Wouter Botzen, Laurens Bouwer, Georg Pflug, Rodrigo Rojas & Philip Ward

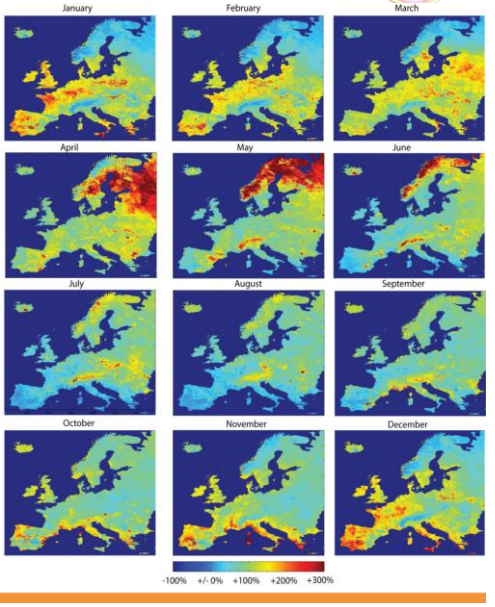




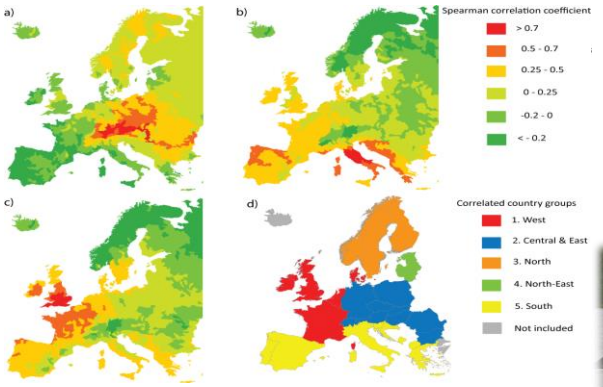
Floods driven by large atmospheric patterns

Understanding the dynamics of river flows

Datasets on **daily river discharges** can help to **identify spatial and temporal patterns**



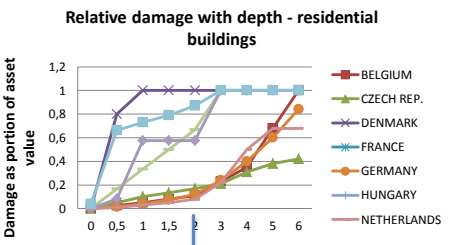
Continental relationships in flood occurrence

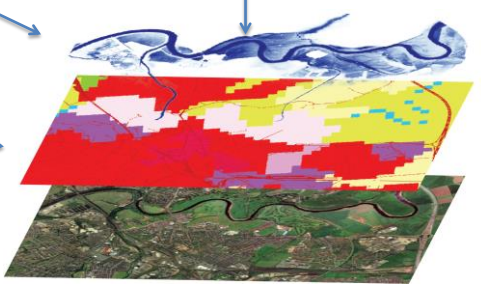


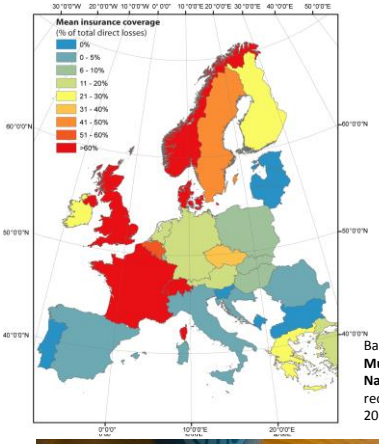
Flood risk across countries is **correlated** due to atmospheric patterns and river systems

Jongman et al., *Nature Climate Change*, 2014

Modelling flood damages







Based on **Munich Re NatCatSERVICE**, received March 2013

Incorporating correlated risks

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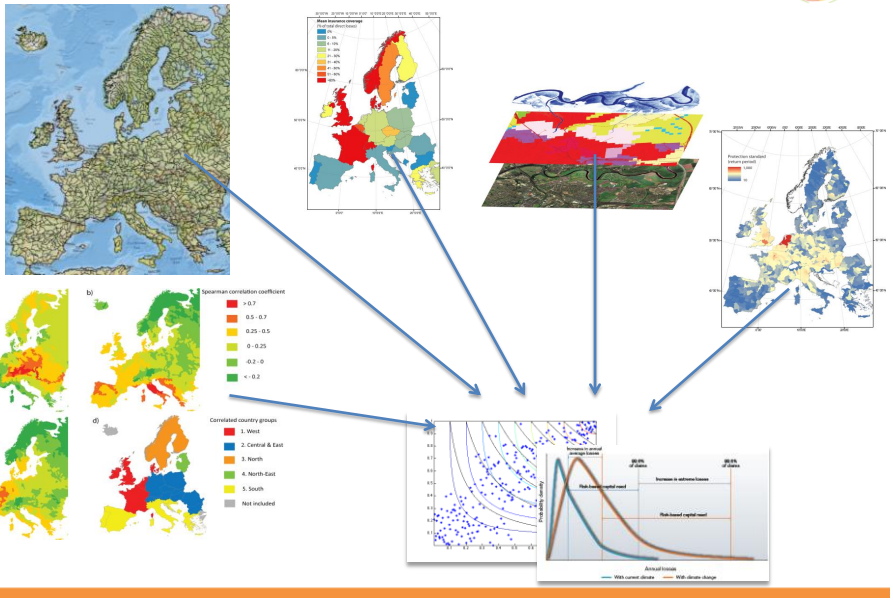
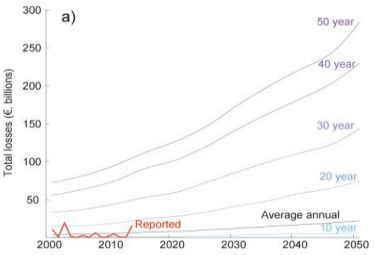


Probabilistic trends in European flood risk

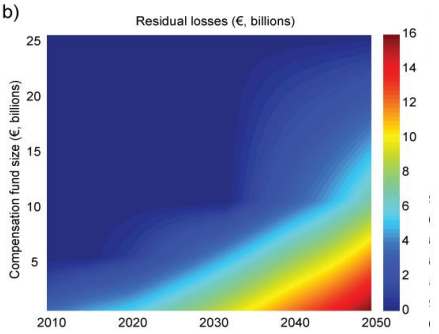


Jongman et al., *Nature Climate Change*, 2014

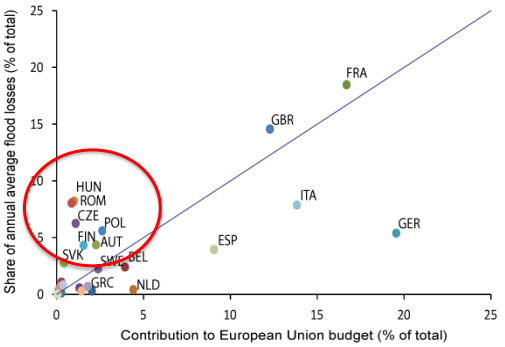
Options for risk sharing and reduction

Reducing and financing losses

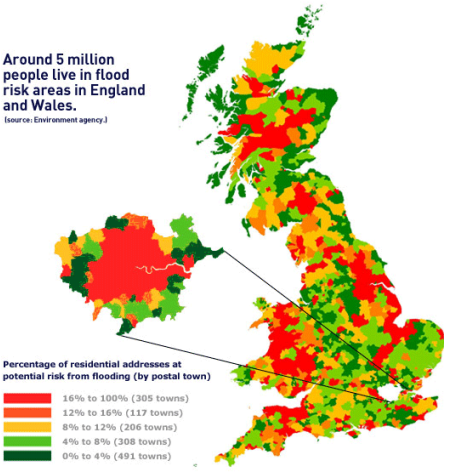
Or more European solidarity?

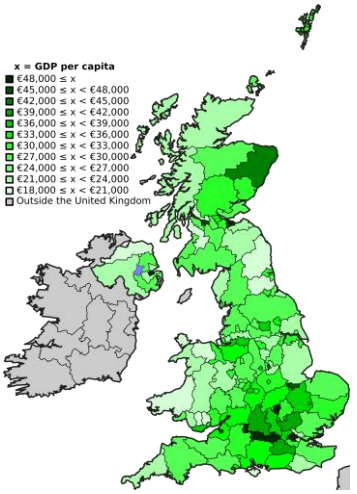


But.. who pays and who benefits?



Solidarity is relevant at all spatial scales





Incentives are key

Source: popular Romanian web forum

Managing increasing risks

- Adaptation options have **different efficiency, equity and acceptability implications**
- Emphasis should be placed on **incentivizing risk reduction**
- Physical protection measures, insurance schemes and public solidarity funding are **complementary measures** and should be optimized in harmony
- **Risk correlations should be taken into account** in international risk reduction and risk financing initiatives

Thank you for your attention

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Further reading:

Jongman, Hochrainer-Stigler, Feyen, Aerts, Mechler, Botzen, Bouwer, Pflug, Rojas & Ward. Increasing stress on disaster-risk finance due to large floods. *Nature Climate Change* **4**, 264–268 doi:10.1038/nclimate2124 (2014)

Trends in European flood risk

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- Increase in expected losses, especially for extremes

  2/3 due to socioeconomic growth, 1/3 due to climate change

- Strong rise of 1/200 insured loss (Solvency II capital requirement)

  from ~€ 116 billion in 2013 to ~€ 236 billion by 2050

- EU Solidarity Fund budget increasingly prone to depletion

  regional differences in risk may lead to subsidizing effects

Location	Country	Estimate from literature	Source	Estimates from model	
				Exact location	Range in vicinity
Styria region	Austria	~100	46	51 - 162	
Kopenhagen	Denmark	>120	48	151	30 - 170
Carlisle	England	100 - 200	49	158	127 - 158
London	England	75 - 1000	48	500	230 - 500
Thames river - other	England	0 - 100	50	153 - 233	
Hamburg	Germany	~650	48	154	127 - 154
Köln	Germany	200	51	151	149 - 158
Central Danube	Hungary/ Romania/ Bulgaria	'Low' - 100; higher in cities	46	25 - 190	
Dublin	Ireland	~70	48	150	50 - 150
Cremona	Italy	200	52	155	152 - 185
Naples	Italy	20 - 50	48	28	28 - 128
Meuse river	Netherlands	250 - 1,250	47	1,000*	1,000*
Glasgow	Scotland	<150	48	107	52 - 150

Supplementary Table 2| Validation of estimated flood protection standards