The storyline approach as a scientific methodology for risk assessment of remote climate impacts on Europe

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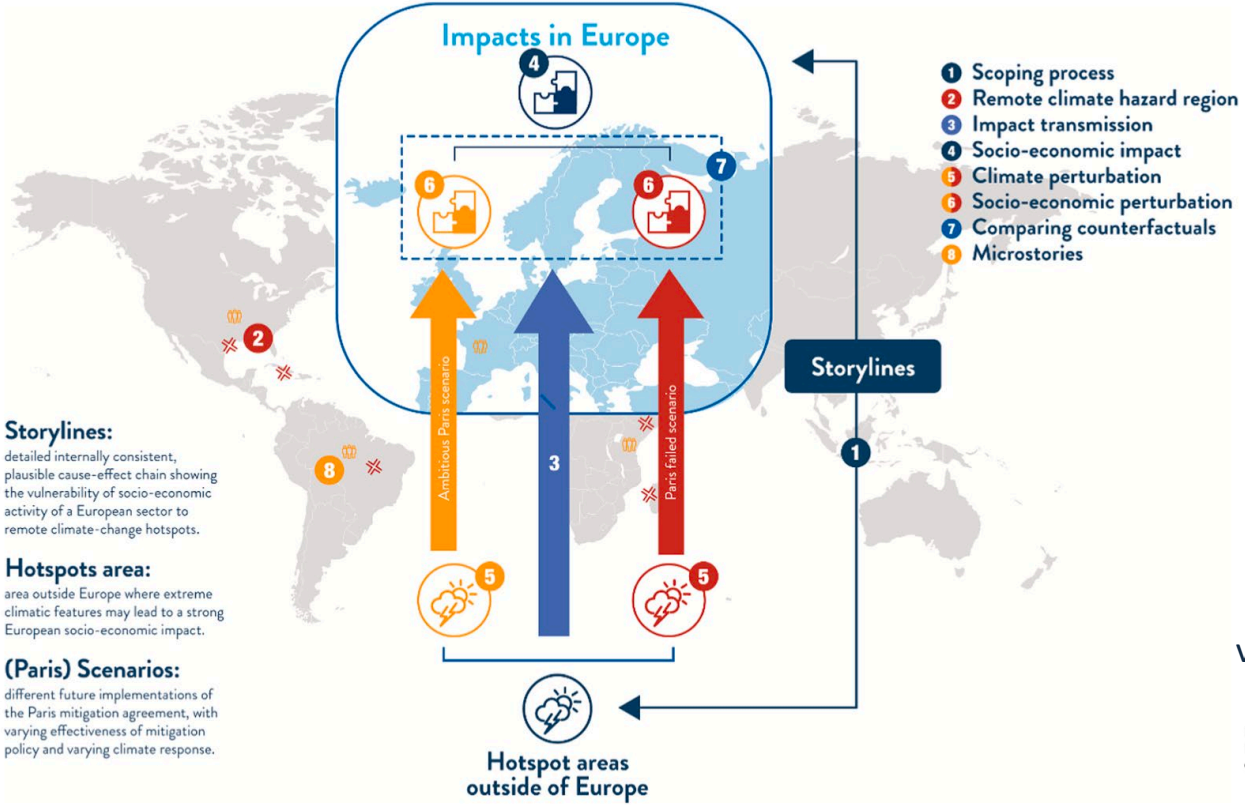
Design steps for climate event storylines



van den Hurk et al. 2023

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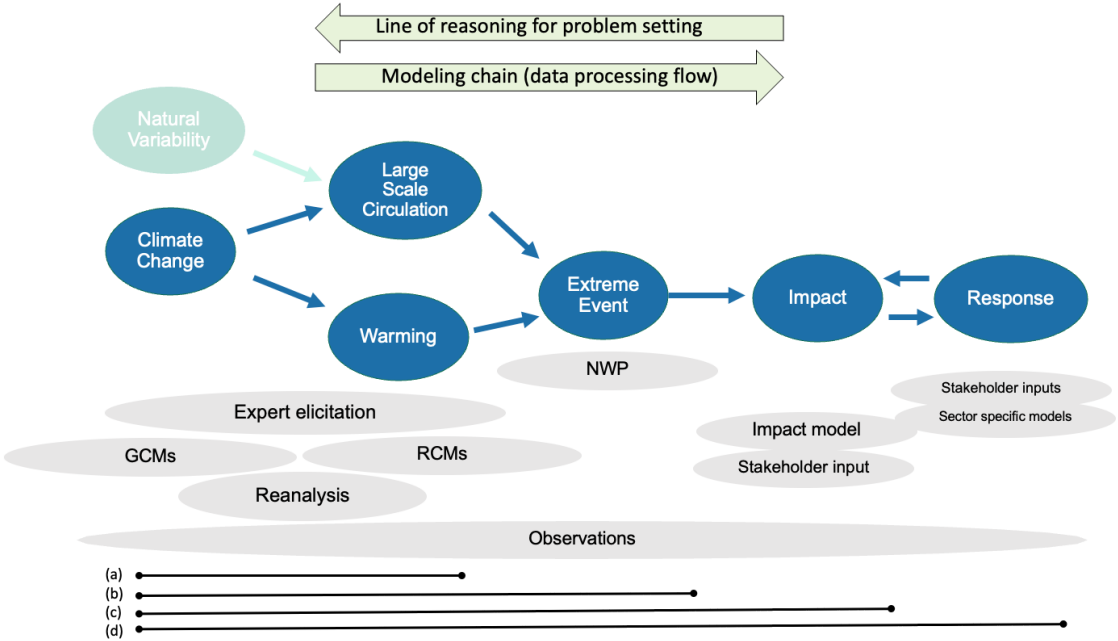
What Are Physical Climate Storylines

"a self-consistent and possible unfolding of a physical trajectory of the climate system, or a weather or climate event, on timescales from hours to multiple decades" Shepherd et al. (2018)



Baldissera Pacchetti et al (under review) Varieties of approaches to constructing Physical Climate Storylines: a review. *WIREs Climate Change*

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WPs: Sector	Historical events	Perturbations	Regions of remote hazard	Affected subsectors
WP3: **Agriculture & food production**	Drought impacts on crops (ENSO, events like 1997, 1983, 2012) Water scarcity	Climate: RCP2.6 vs. RCP8.5 Society: SSP1 vs. SSP3 vs. SSP5	1. Brazil, USA 2. West Africa (Ivory Coast, Ghana) 3. Indonesia	Soybeans Cocoa Palm oil
WP4: Financial impacts	13 Tropical cyclones in the Caribbean, North Atlantic, and Indian Ocean (2017 and 2018)	Climate: Temperature increase based on RCP2.6 vs. RCP4.5 vs. RCP6.0 vs. RCP8.5 Society: SSPs are not defined, but with stylized/arbitrary future projections of GDP per capita (except 3rd storyline)	1. Islands of EU countries: Caribbean, North Atlantic and Indian Ocean 2. Caribbean island nations 3. US Northeast	Public and private financial sector: 1. EU Solidarity Fund 2. Caribbean Catastrophe Risk Insurance Facility (CCRIF) 3. Trade and Private investments
WP5: International cooperation	1. Cyclone Idai (2019) 2. Locust infestations (2020) combined with multi-breadbasket failure (2007-2008)	Climate: no historical anthropogenic climate change Society: Not determined, only current socioeconomic conditions considered.	1. Cyclone Idai: Mozambique 2. Locusts: Horn of Africa	1. Human displacement 2. Major crops: wheat, maize, rice, soybeans
WP6: Global manufacturing chains	Hurricane Harvey (2017)	Climate: Temperature increase based on RCP2.6, RCP7.0, RCP8.5 Society: Current socioeconomic conditions, but SSP1, SSP3.	Texas and Louisiana, USA	1. Mining and quarrying 2. Natural gas and oil production
WP7: Sea level rise and coastal infrastructure	1. Storm Xaver (2013) 2. Storm Xynthia (2010) 3. Storm surge in Emilia-Romagna (2002)	Climate: Sea level rise under RCP2.6 vs. RCP4.5 vs. RCP8.5 Society: SSP1 vs. SSP3 vs. SSP5.	1. North Sea 2. Atlantic coast of France 3. Emilia-Romagna, Italy	Coastal Infrastructure

External guidance on storyline development based on RECEIPT research and lessons learnt

- Method
  - Document the effectiveness of the storyline approach as a scientific methodology for risk assessment;
  - Identify commonalities of the storyline development process

- Process:
  - 15 semi-structured interviews of consortium members
  - Published papers and deliverables
  - Participant observation

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Lessons Learned

- Storylines can complement other methods of climate risk assessment:
  - incorporating perspectives from within the scientific community and other stakeholder groups
  - adding realism;
  - increasing the accessibility of climate risk information.

- Development depends on context, aim, and specific application

- The storyline approach is not necessarily seen as a novel approach, but it does bring some novelty to already developed methods.

- The subjectivity makes them easier to criticise/challenge

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Guidance

- Make the aim of developing storylines explicit at the outset.
- Be clear and open about what are the key concepts that underlie storylines.
- Involve stakeholders at the beginning and throughout the process.
- Ensure stakeholders share aims and goals with the developers.
- Appoint a storyline "director" to maintain the coherence and continuity.

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Guidance (cont.)

- Recognise the necessary diversity of disciplines.
- Allocate adequate resources to non-scientific members.
- Be clear on how uncertainty is treated, if at all
- Limitations of the evidence should be acknowledged
- Where possible, draw on historical evidence of extreme events and their recorded impact(s)

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Conclusion

- Overall it was seen that:
  - The study was able to provide several additions to the criteria of realism, relevance, and risk orientation identified by van den Hurk et al. (2023).
  - Storylines are seen as a promising approach to develop climate risk information, as complementary to probabilistic risk assessments
  - Due to their nature, storylines are able to uncover assumptions, include multiple perspectives, and provide understanding of complex processes in a way that other approaches to climate risk assessments cannot.

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