

# Scenarios of social-environmental extremes

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# WHY A SCENARIO OF SOCIAL-ENV. EXTREMES

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## HOW TO BUILD SUCH A SCENARIO

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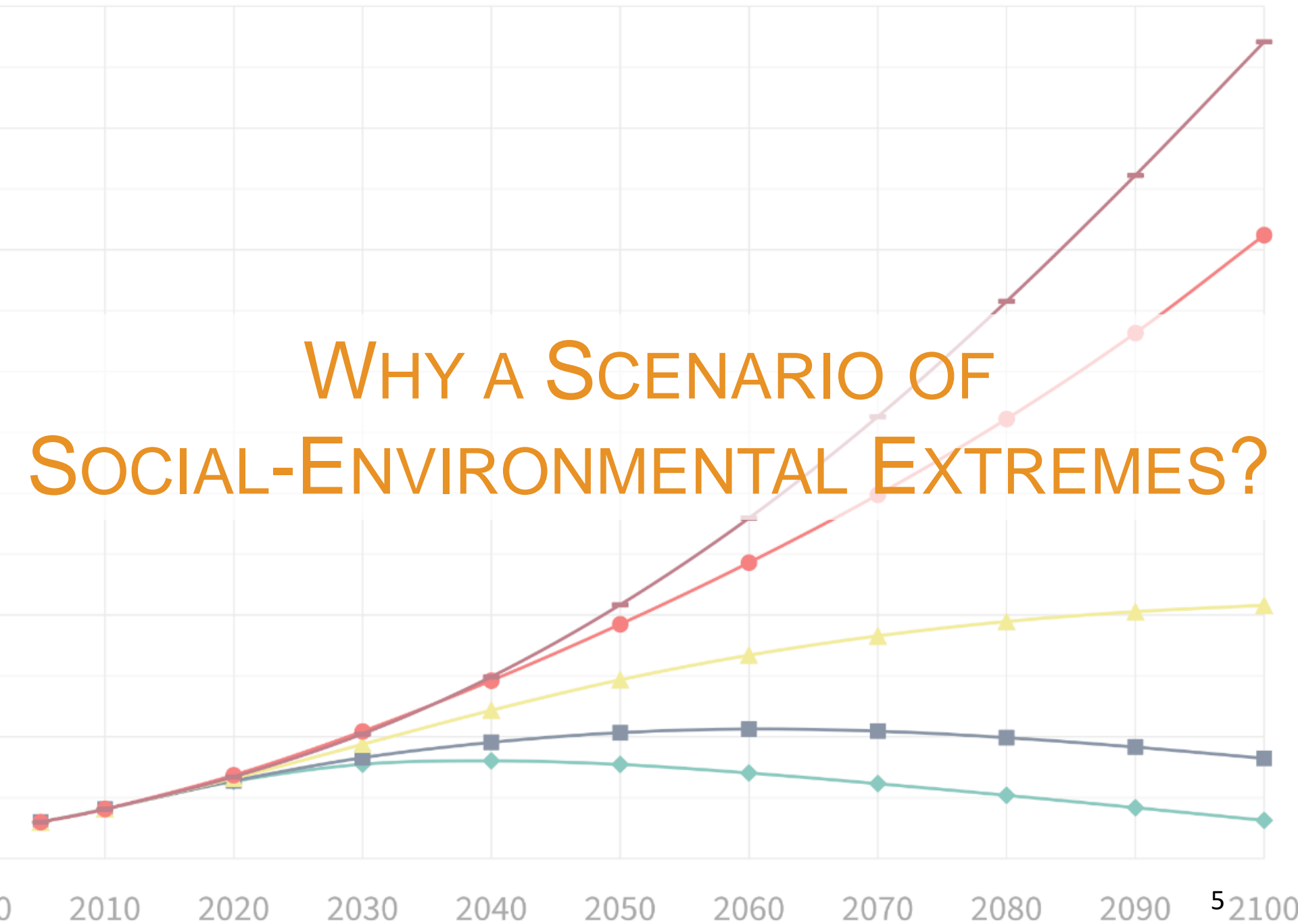
## HOW TO BUILD SUCH A SCENARIO

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## A PRACTICAL EXAMPLE

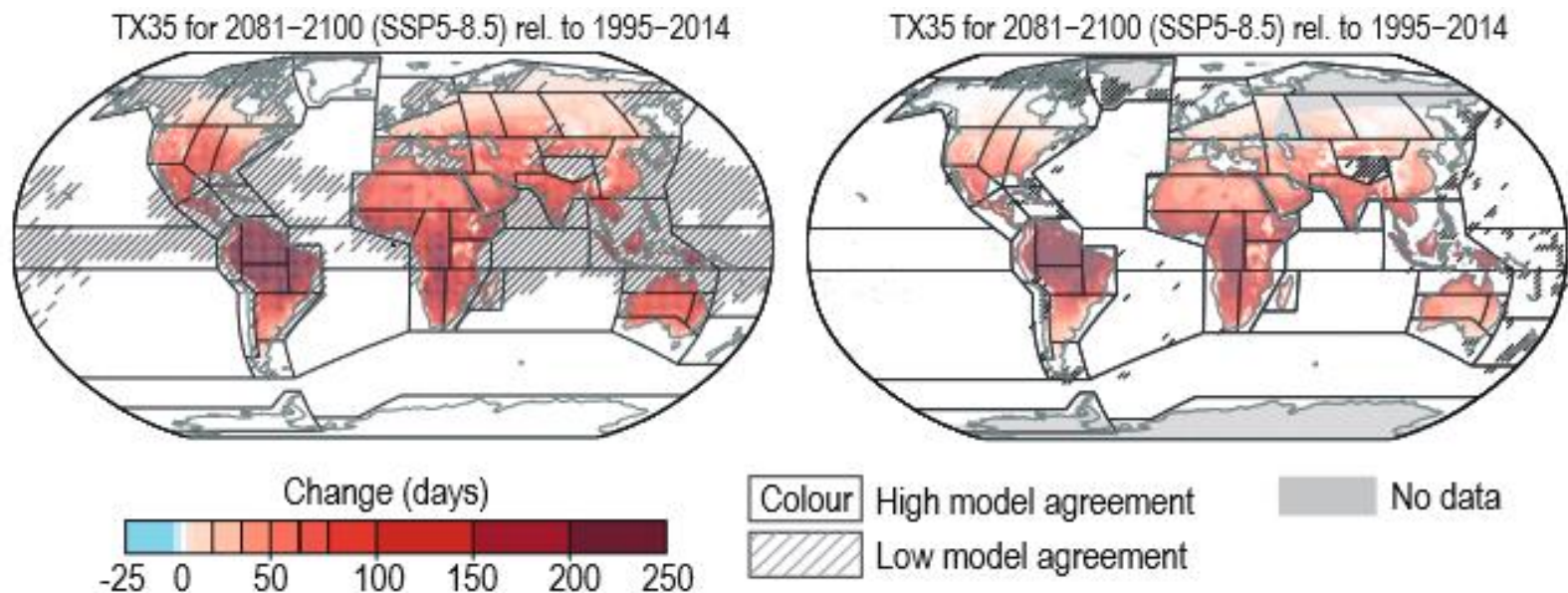
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# WHY A SCENARIO OF SOCIAL-ENVIRONMENTAL EXTREMES?



# WHY EXTREMES?

**IPCC AR6:** a number of environmental extremes will become more severe and/or widespread.



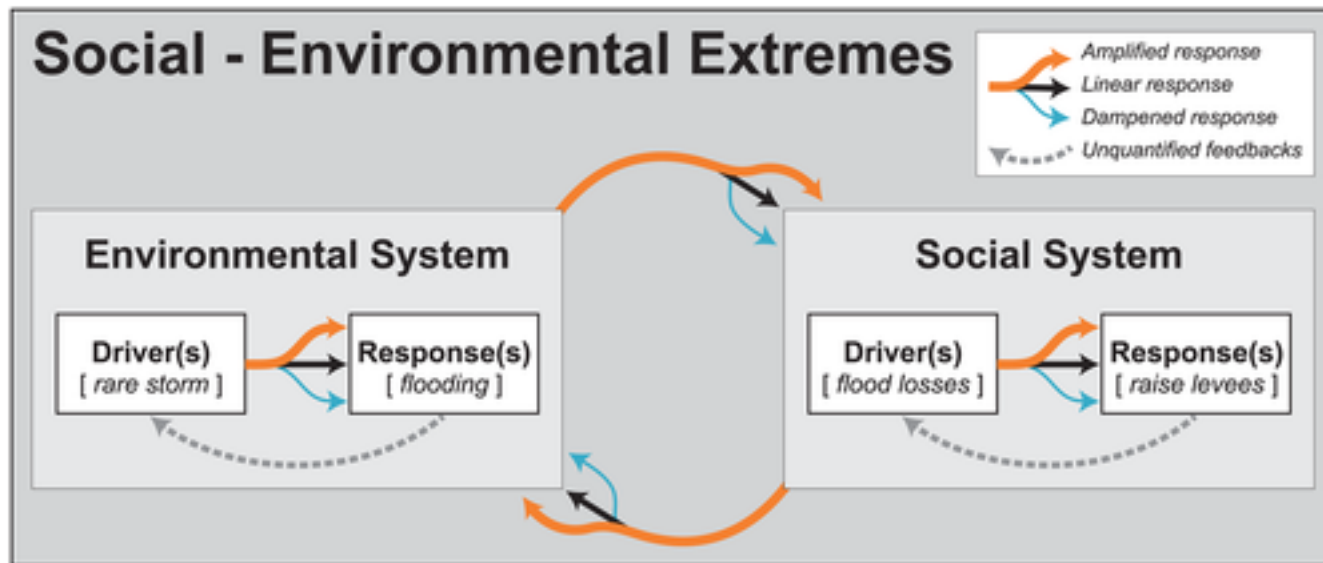
Projected changes in no. of days with  $T_{\max} > 35^{\circ}\text{C}$ , CMIP6 (left) and Cordex (right). Source: IPCC AR6 WG1.



# WHY "SOCIAL"?

Environmental extremes have high and unequally distributed social costs.

In the Anthropocene human beings alter the Earth System.



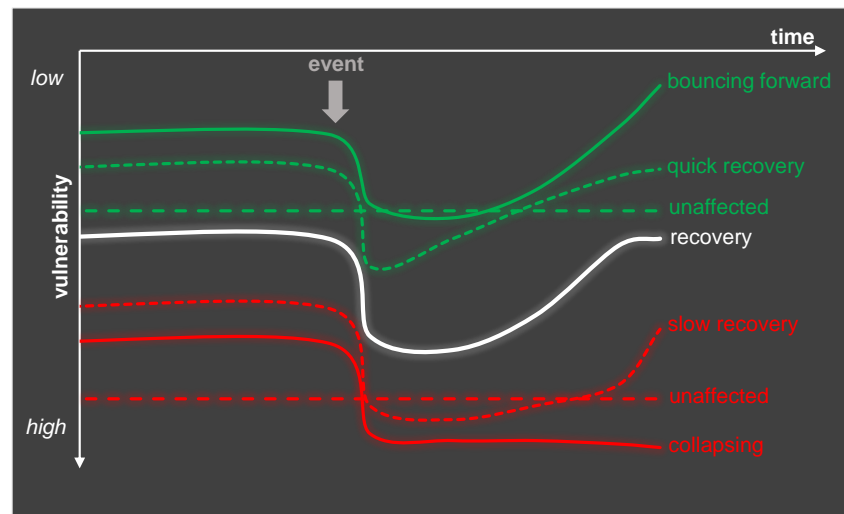
Causality in a social-environmental system. Source: Balch *et al.* (2020).

# WHY A SCENARIO?

**Unprecedented** extremes likely in many regions.

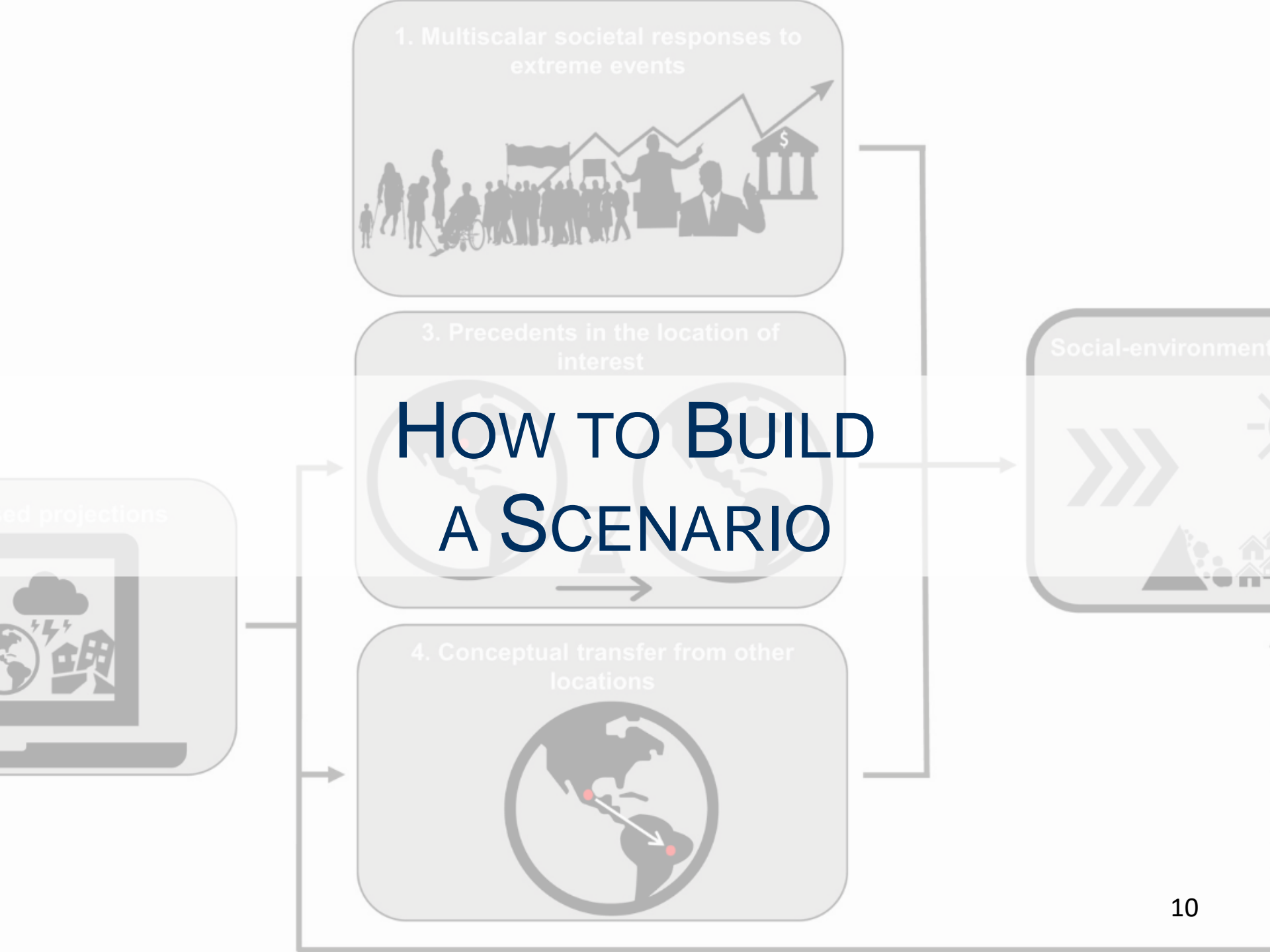
What possible societal responses will these extreme occurrences elicit?

- Immediate response
- Recovery trajectory



Differential recoveries from extreme events. Source: Rusca et al. (2020).

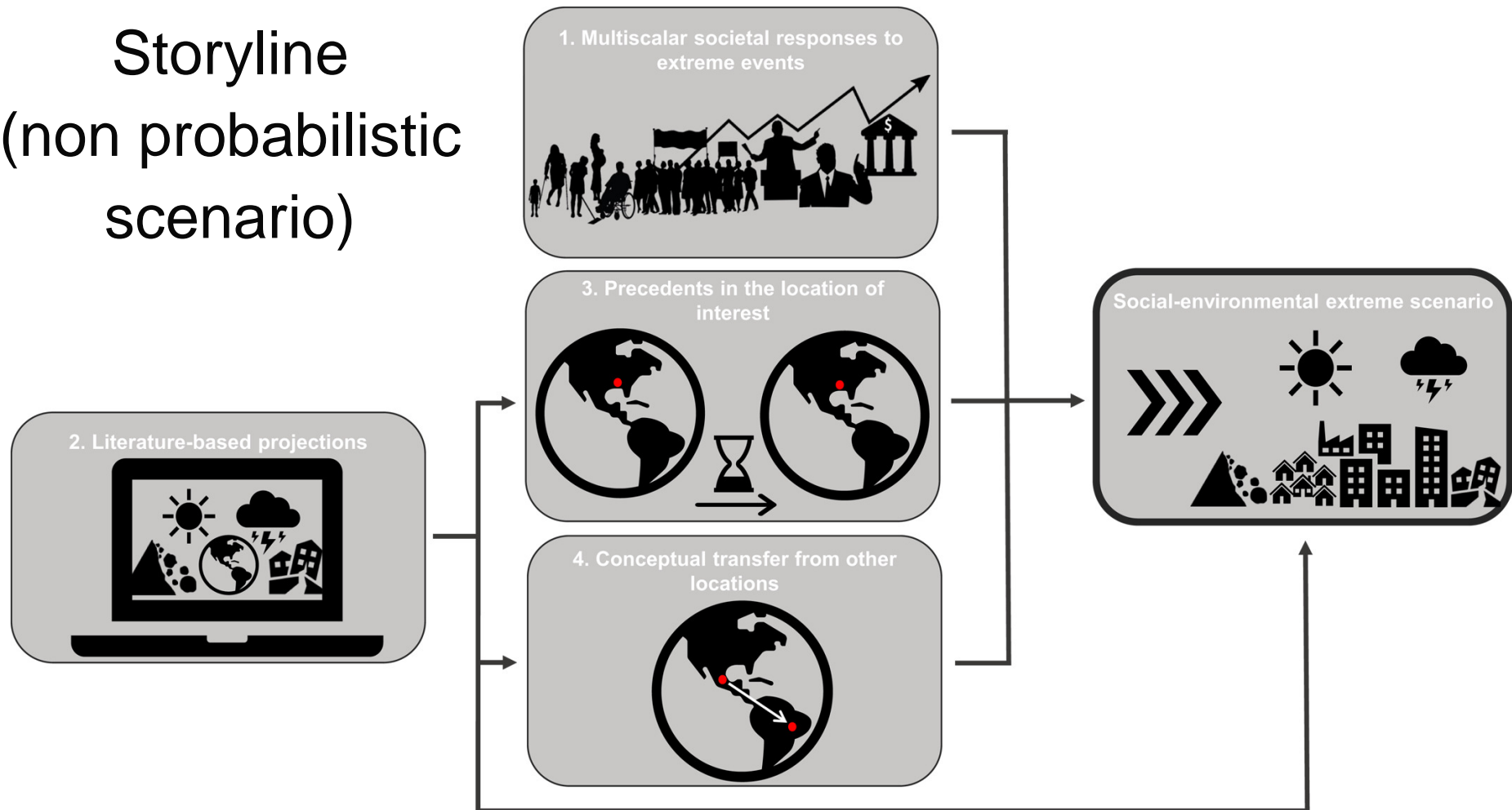




# HOW TO BUILD A SCENARIO

## Storyline

(non probabilistic scenario)



The Social-Environmental Extremes Scenarios Approach.

Source: Rusca et al. (2020)

An aerial photograph showing a vast residential area in Houston, Texas, completely inundated with floodwater. The water is a deep blue-grey color, covering the streets and surrounding the houses. The houses are small, with dark roofs, and are scattered across the landscape. In the background, the Houston skyline is visible, with several tall buildings rising above the haze. The sky is a pale, hazy blue. The overall scene depicts the extensive flooding caused by Hurricane Harvey in 2017.

# A PRACTICAL EXAMPLE: HOUSTON UNDERWATER



# HOUSTON UNDERWATER



# HOUSTON UNDERWATER

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## Background conditions in Houston:

- Unequal insurance cover.
- Informal racial segregation.
- Low-income neighbourhoods low-lying & close to industrial areas.
- Pro-growth local government.

## Past events:

- Differentiated socio-economic recovery.
- Lack of transport for mandatory evacuation.
- Weakening of work protection legislation.
- Gentrification vs. “Katrina Ghettos”.

# HOUSTON UNDERWATER

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## A hindcast of Hurricane Harvey:

- Pro-growth model: “quintessentially American tale”.
- Crucial role of housing.
- Aftermath of flooding: uneven access to basic services.
- Aftermath of flooding: Industrial pollution in poorer neighbourhoods.
- Gentrification of low-income neighborhoods outside the flooded area.

# WHY A SOCIAL-ENV. SCENARIO?

- Unravel societal responses of unprecedented extremes.
  - Extremes viewed as social-environmental processes
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## HOW TO BUILD A SCENARIO

- Combine climate and social sciences.
  - Leverage past events and future climate projections.
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## A PRACTICAL EXAMPLE

- Here a hindcast for flooding in Houston.
  - Work underway on a "real" scenario for drought in Maputo
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# Thanks!

Rusca, M., Savelli, E., Di Baldassarre, G., Biza, A. and Messori, G.. Anthropogenic droughts are expected to exacerbate water inequalities in postcolonial cities. *Nat. Clim. Change*, in review.

Rusca, M., Messori, G., & Di Baldassarre, G. (2021). Scenarios of human responses to unprecedented social-environmental extreme events. *Earth's Future*.

Balch, J. K., Iglesias, V., Braswell, A. E., Rossi, M. W., Joseph, M. B., Mahood, A. L., et al. (2020). Social-environmental extremes: Rethinking extraordinary events as outcomes of interacting biophysical and social systems. *Earth's Future*.