# Adapting to multiple water hazards in Sweden

## Who is affected by disruptions in critical infrastructures and vital societal functions?

SEI Stockholm Environment Institute

Unchain GA 20-22 October 2021 in Aix en Provence

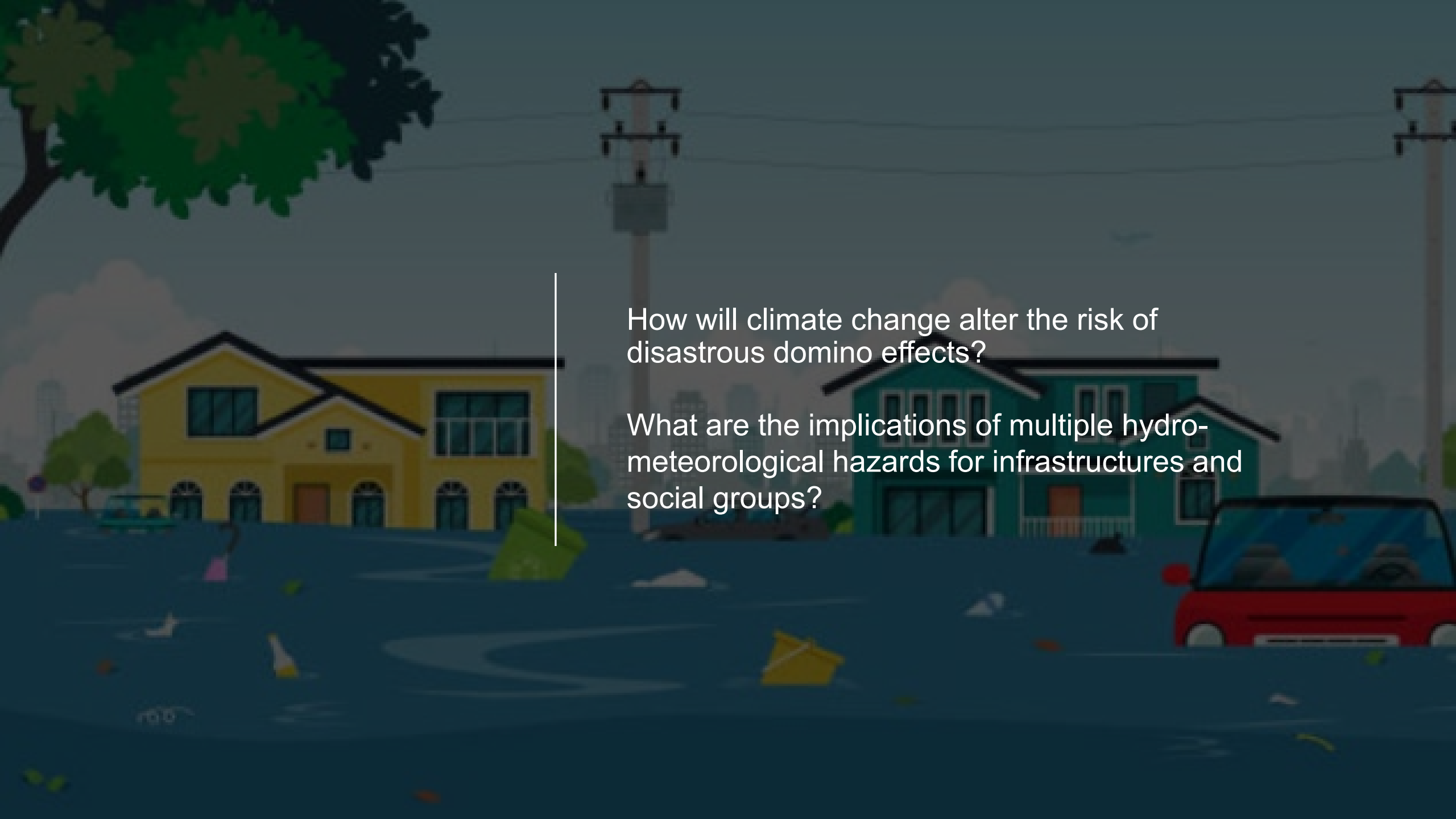
# HYDRO HAZARDS





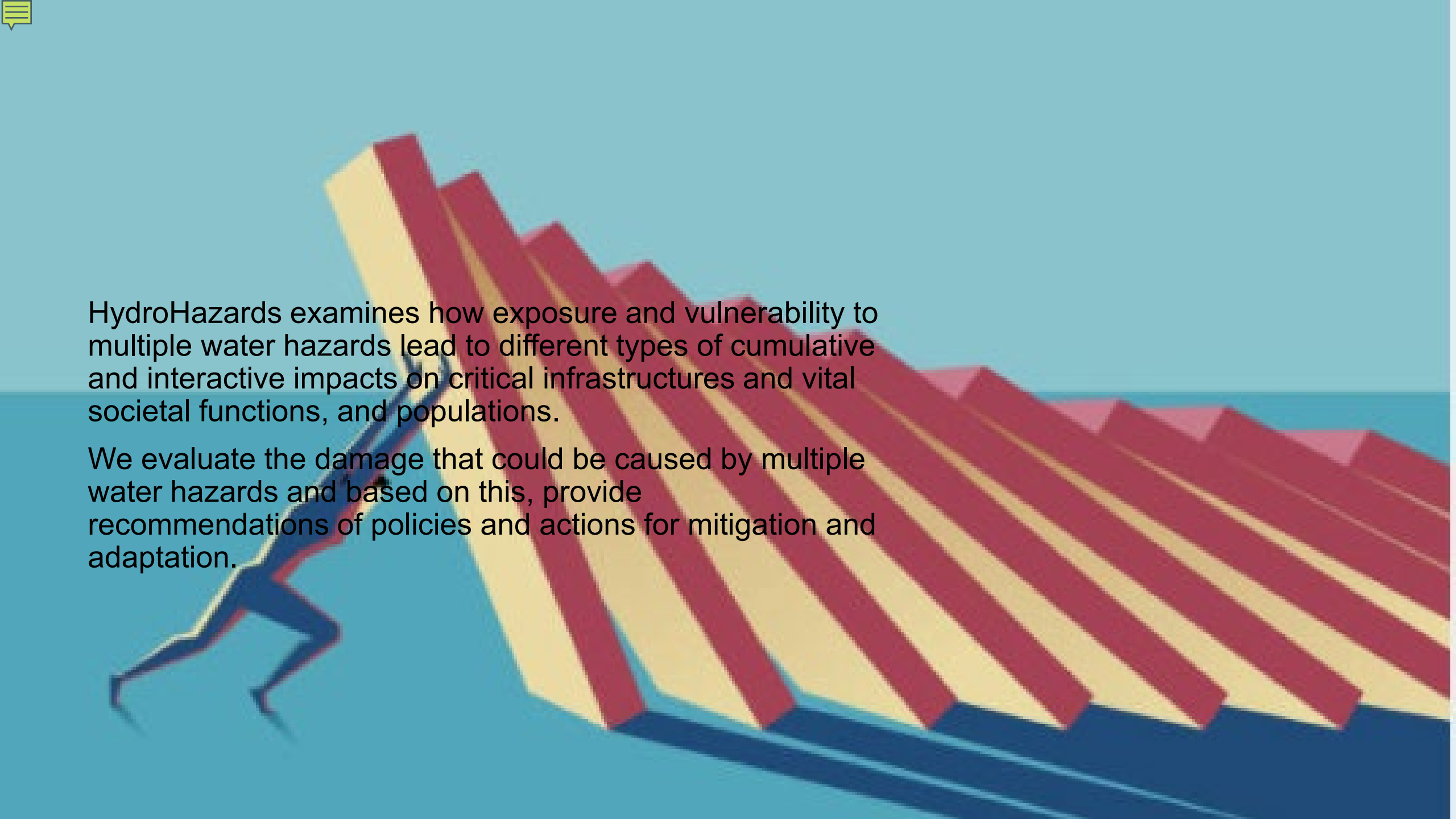

HydroHazards is funded by the Swedish Civil Contingencies Agency and Formas. The project started in January 2020 and will be finalized in December 2024.

# Background



How will climate change alter the risk of disastrous domino effects?

What are the implications of multiple hydro-meteorological hazards for infrastructures and social groups?



HydroHazards examines how exposure and vulnerability to multiple water hazards lead to different types of cumulative and interactive impacts on critical infrastructures and vital societal functions, and populations.

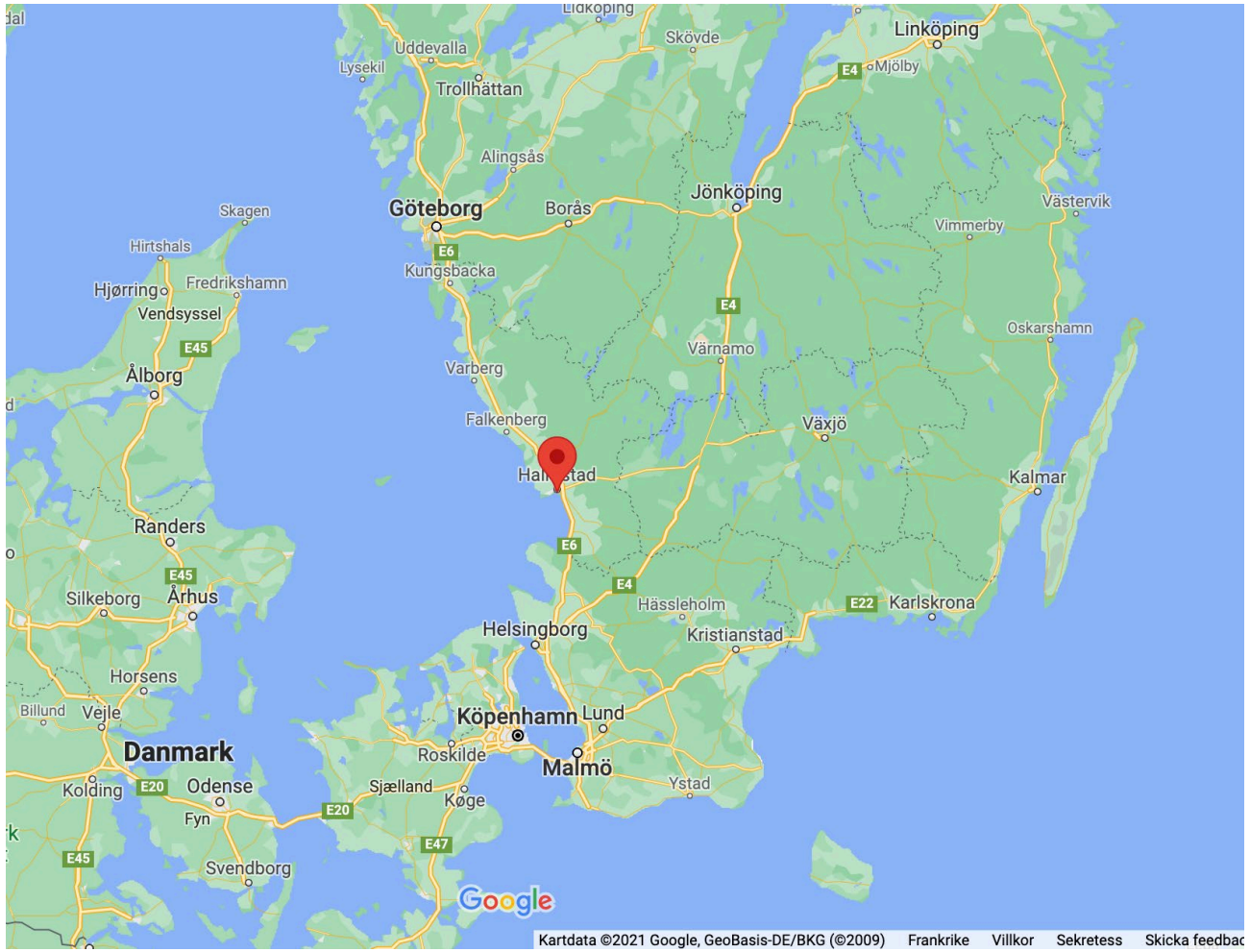
We evaluate the damage that could be caused by multiple water hazards and based on this, provide recommendations of policies and actions for mitigation and adaptation.

# Three types of multiple hazards interactions

1. **Preconditioned events**: one or more hazards can cause an impact, or lead to an amplified impact, only because of a pre-existing, climate-driven condition
2. **Multivariate events**: refer to the co-occurrence of multiple climate drivers and/or hazards in the same geographical region causing an impact
3. **Temporally compounding events**: where sequences of hazards cause an amplified impact compared to a single hazard

*Based on a typology of compound events by Zscheischler et al. (2020)*

# Case study of Halmstad municipality



# Case study of Halmstad municipality

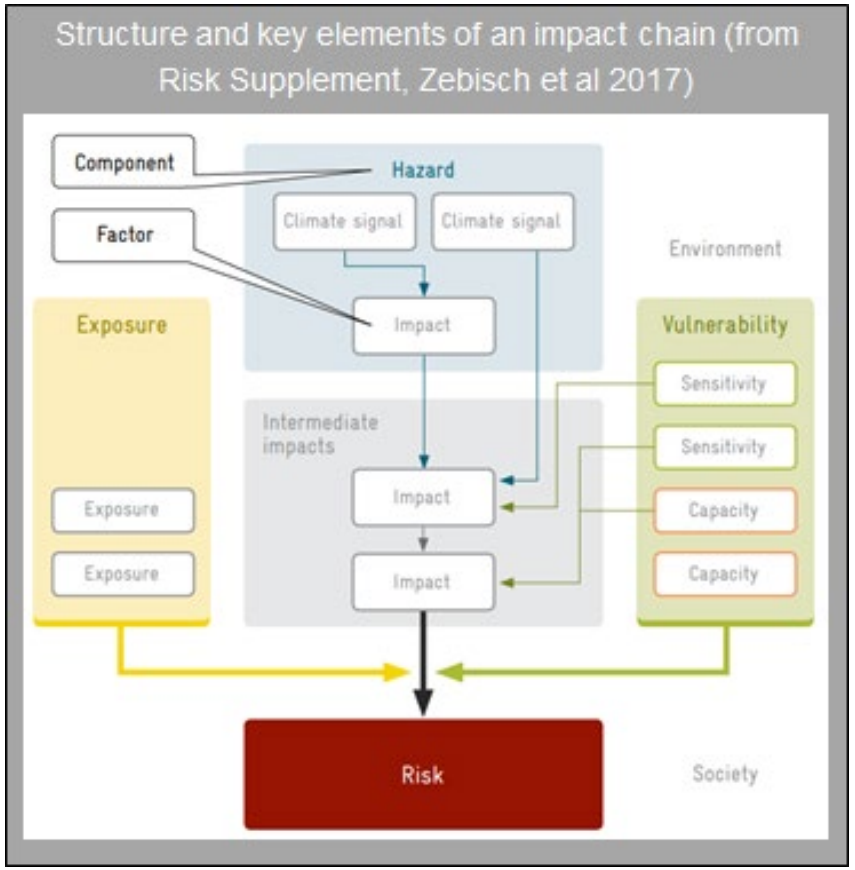
The aim of case study is to assess impacts and cascading effects upon critical infrastructures and vital societal functions and the resulting impacts on the population.

Questions:

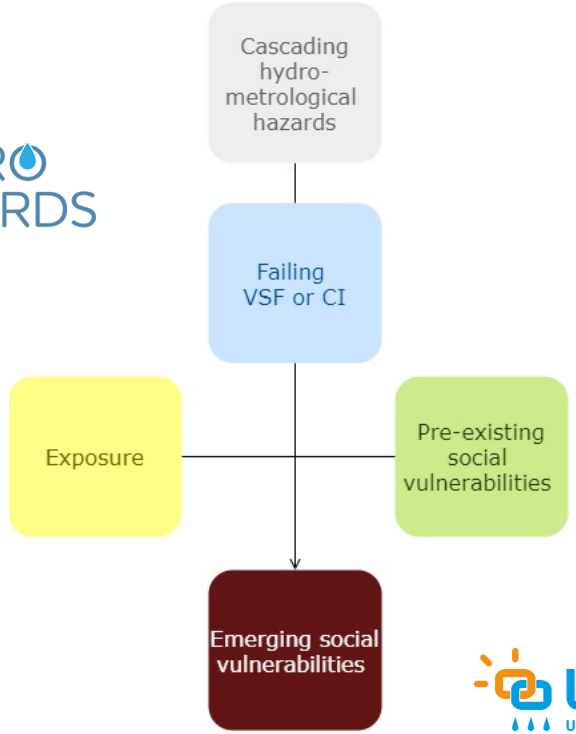
Who is affected by disruptions in critical infrastructures and vital societal functions?

- *Who is dependent on critical infrastructures and vital societal functions?*
- *What physical, social, economic or environmental factors or processes contribute to social vulnerability?*
- *Are there formal and informal structures and processes that can contribute to social vulnerabilities?*
- *What measures are available to reduce vulnerability?*

# Our approach




HYDRO HAZARDS




UNCHAIN
UNPACKING CLIMATE IMPACT CHAINS

# Case study process

- Meeting with national stakeholders and case study contact person (June)
- Document studies

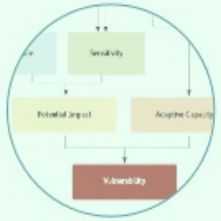
**Interviews**

**Workshop 1** (September)

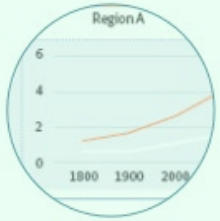
**Workshop 2** (October)

**Workshop 3** (February)

1
Prepare VA (Scoping)



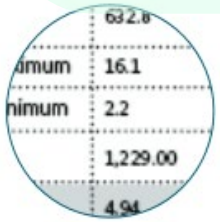
2
Developing Impact Chains



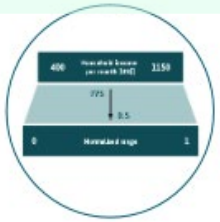

3
Identifying and Selecting Indicators

← Interaktiv

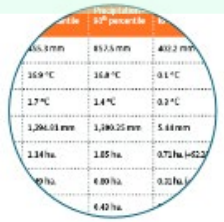
↙ Operativ



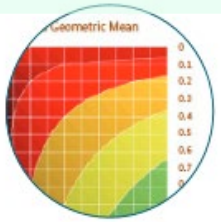

4
Data Acquisition and Management



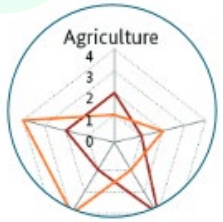
5
Normalizing/ Thresold Definition



6
Weighting and Aggregating Indicators



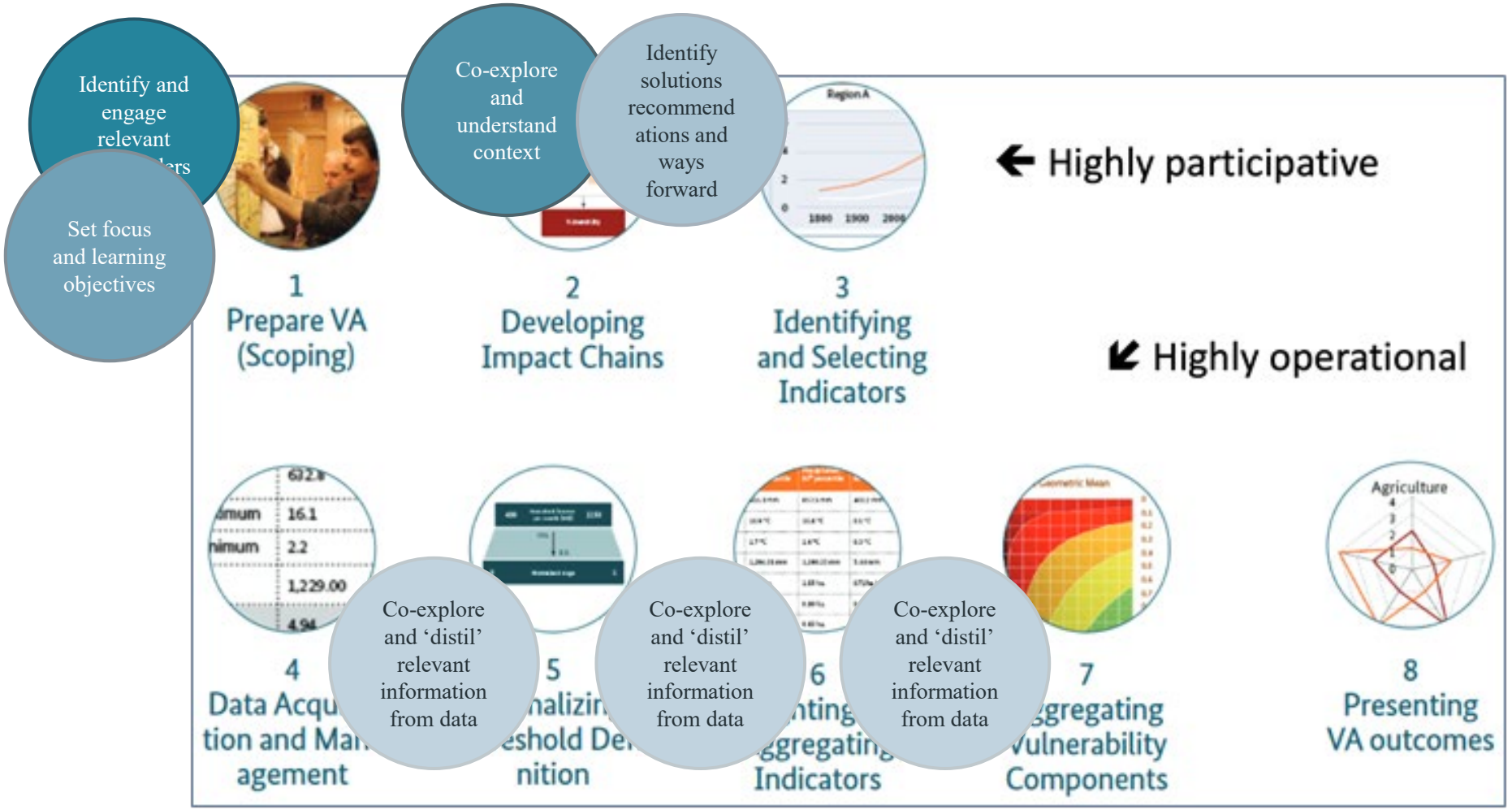

7
Aggregating Vulnerability Components




8
Presenting VA outcomes

**Workshop 3/4** (tbc)

# A combined approach

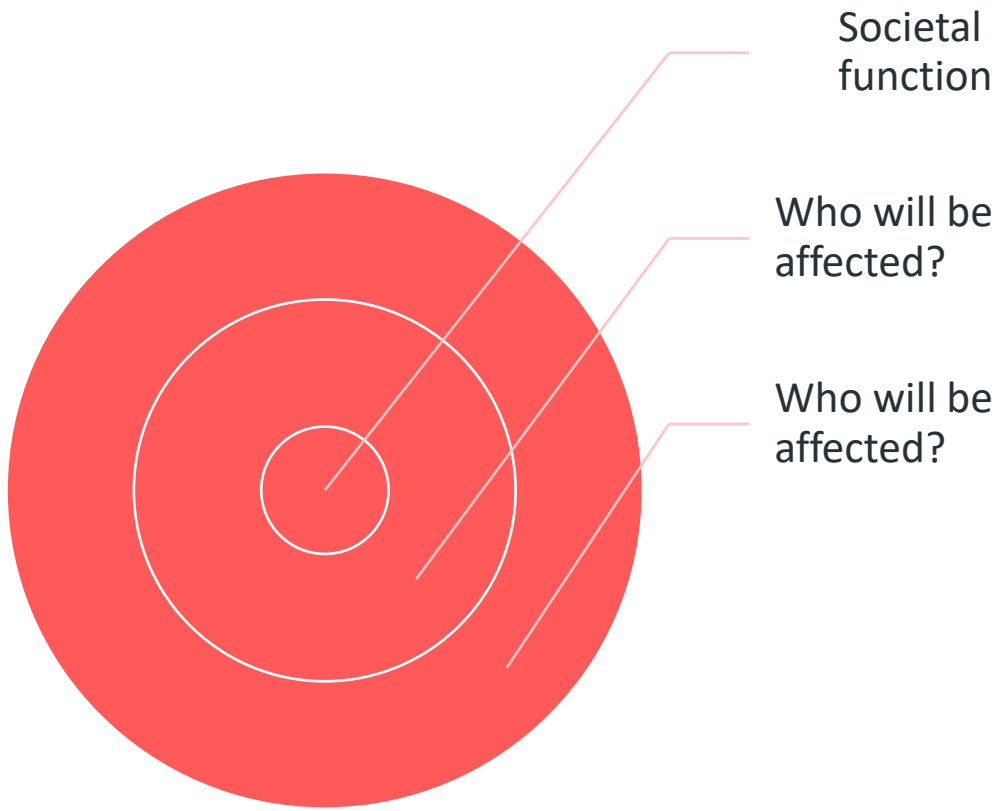


# Workshops

## Workshop 1

- Introduce participants to the projects,
- Explore currrent and future risks
- Create common understanding and basis for future discussions
- Prepare for workshop 2

## Workshop 2



# Expected outcomes

- Better understanding of the impacts of multiple hydrometereological hazards
- Identification of adaptation measures and strategies to manage social vulnerability
- Contribution to Swedish DRR policies and practices at national, regional and local level

# Thank you!

**More information: https://www.sei.org/projects-and-tools/projects/hydrohazards/**