

# Vulnerability to Climate Change

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With the support of the  
Erasmus+ Programme  
of the European Union



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# *Outline of the presentation*

- Definitions of vulnerability and vulnerability assessment
- Vulnerability frameworks
- EU Member States –Vulnerability approaches
- Case study- RAMSES Project - Reconciling Adaptation, Mitigation and Sustainable Development for citiES.

<https://youtu.be/Du4JSGGrx-8>

# ***The purpose of Vulnerability Assessment***

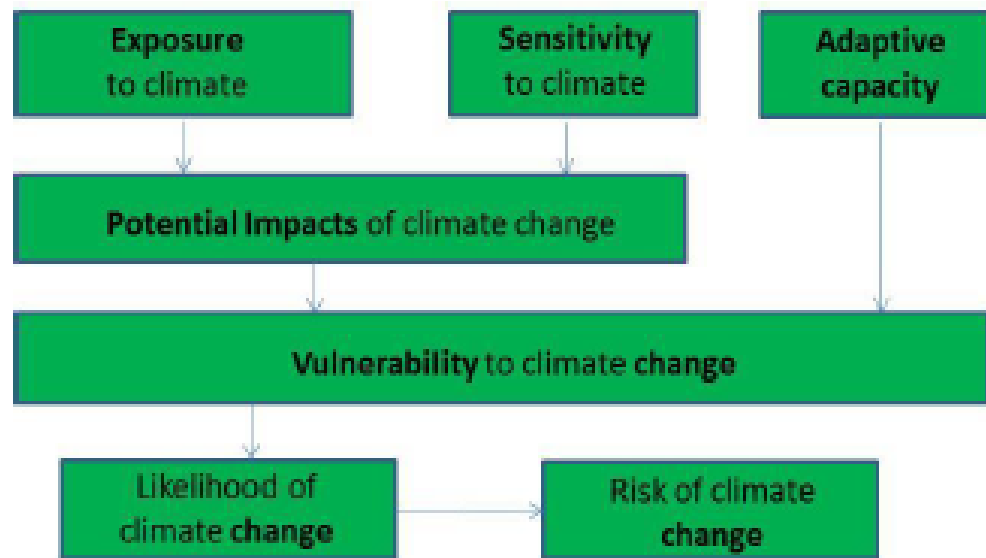
Patt et al. (2009)

- to improve adaptation planning,
- to frame climate change mitigation as an urgent problem (by contrasting impacts of unmitigated and mitigated climate change)
- to address social injustice, by exposing the differential burden of vulnerability borne by the socially disadvantaged, or
- to improve basic scientific understanding of vulnerability and improve the methods and tools used in its evaluation.

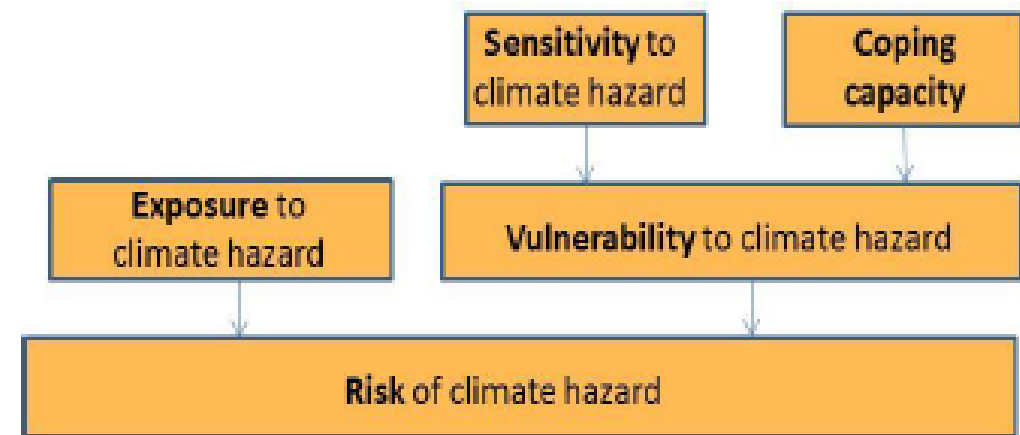
# *Definition of Climate Change Vulnerability*

- In 2001 vulnerability was defined by the Intergovernmental Panel on Climate Change (IPCC) as:
  - “The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes” (IPCC, 2001)
    - i. exposure,
    - ii. sensitivity
    - iii. adaptive capacity
- $V = f(E, S, AC)$  (Carter & Mäkinen, 2011)

# The evolution of the definition as per IPCC

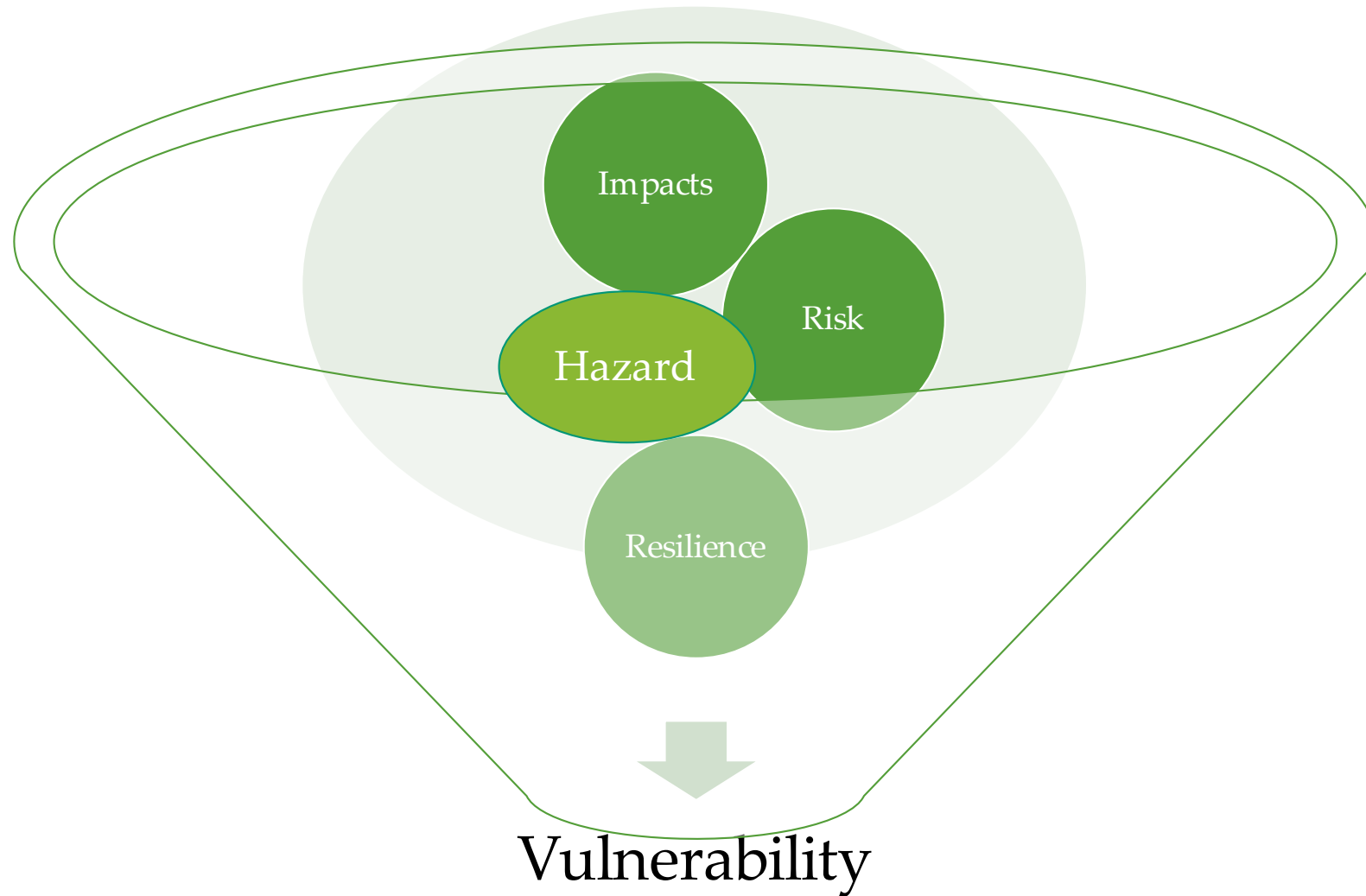


**2a. Framing of vulnerability assessment from a natural science/climate impacts viewpoint (subset of diagram from EEA (EEA, 2012))**



**2b. Framing of vulnerability assessment from a risk management, DRR and international development viewpoint – changes in terminology**

# *Concepts associated with vulnerability*



# *Examples of Frameworks for Vulnerability Assessments*

- IPCC Technical Guidelines for Assessing Climate Change impacts and Adaptation 1998
- UKCIP Risk, Uncertainty and Decision-making Framework
- UKCIP Wizard
- Climate-ADAPT Adaptation Support Tool
- PROVIA Guidance on Assessing Vulnerability, Impacts and Adaptation to Climate Change
- EU Adaptation Strategy Guidance
- Sustainable Livelihoods Framework (SLF)

## **UKCIP Risk, Uncertainty and Decision-making Framework**

- What climate change risks could affect my decision?
- What adaptation measures are required, and when should they be implemented?
- The key stages of the process are 1) Identify the problem and objectives; 2) Establish your risk tolerance level and decision-making criteria; 3) Identify and assess your risks; 4) Identify a range of adaptation options; 5) Appraise your adaptation options; 6) Make a decision; Implement the decision; and 7) Monitor the decision and evaluate any new information.

## **UKCIP Wizard**

- The Wizard is an online tool that supports those making adaptation decisions through the following steps:
- 1- Getting started; 2-Current climate vulnerability;
- 3- Future climate vulnerability;
- 4-Adaptation options; and 5-Monitoring and Review



# Climate-ADAPT Adaptation Support Tool

- 1. Getting started, preparing the ground for adaptation,
- 2. Assessing risks and vulnerability to climate change,
- 3. Identifying adaptation options,
- 4. assessing adaptation options,
- 5. implementation
- 6. monitoring and evaluation.

# PROVIA Guidance

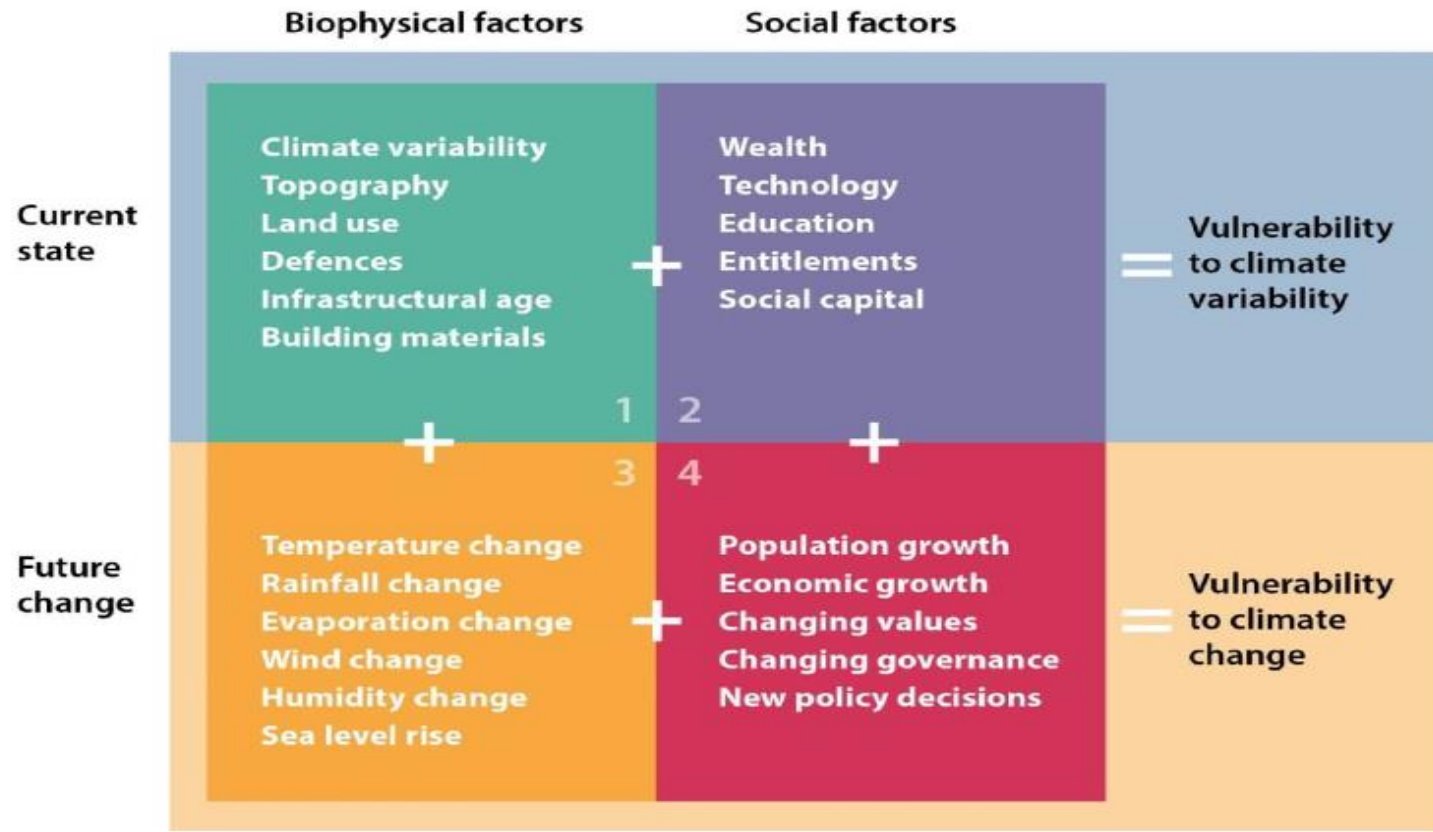


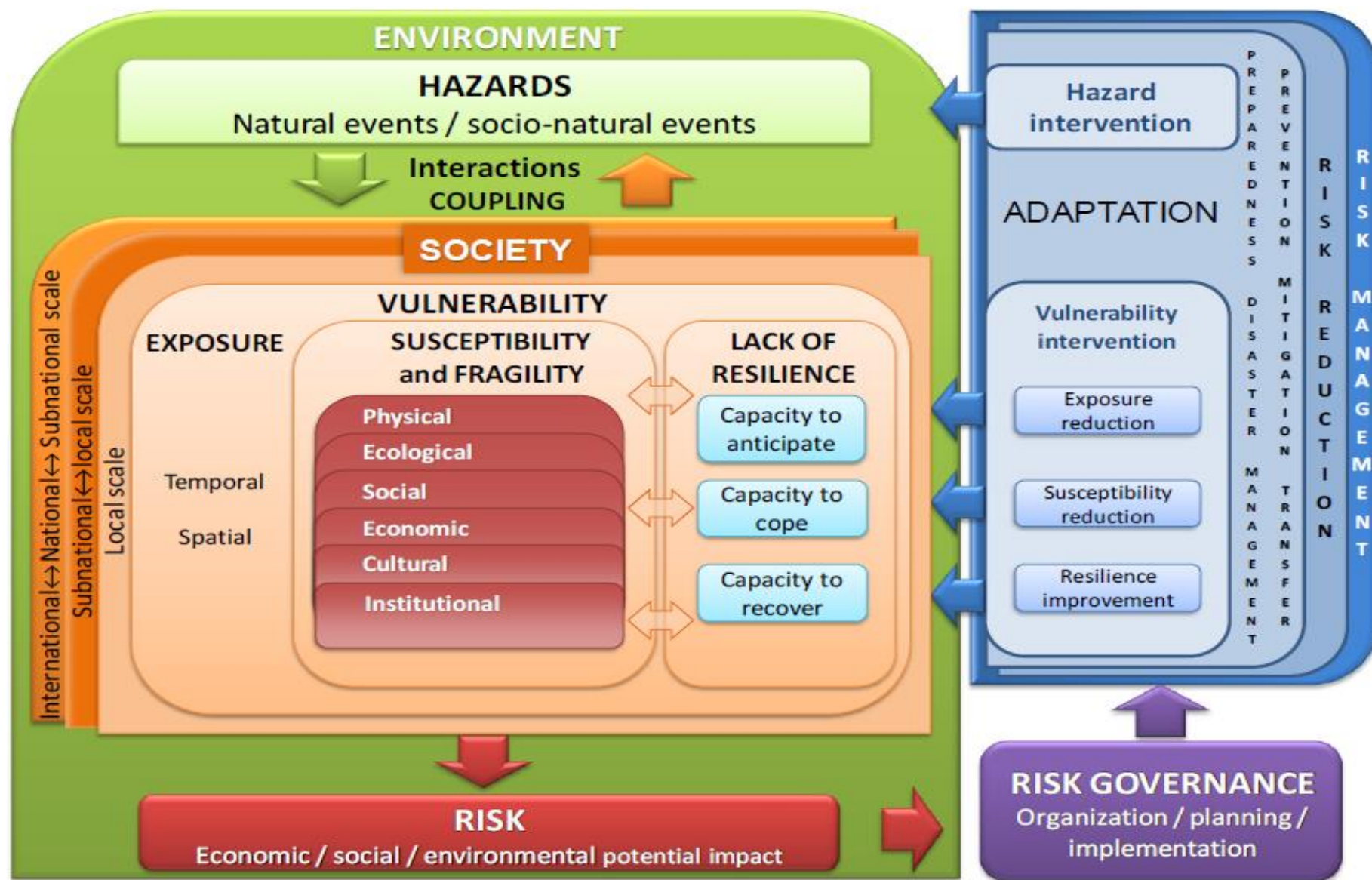
Figure 3. Current and future determinants of vulnerability to climate variability and climate change. Modified from (Preston & Stafford-Smith, 2009), (PROVIA, 2013)

# EU adaptation strategy Guidance

- 1. Analyse how past weather events have affected your country
- 2. Undertake a climate change risks and vulnerability assessment
  - a. Future trend (projection) of various climate variables based on ideally more than 1 climate scenarios
  - b. Expected impacts (both hazards) and population distribution, vulnerable population, economic activities and economic value.
  - c. Timescale: climate variables, impacts and vulnerability differentiated over short (2020s), medium (2050s) and long (2080s) term.
  - d. An indication of the level of confidence (high, medium or low) using statistics, probabilities or statements.
  - e. Assessment of socio-economic development and other non-climatic factors
  - f. Tailored so that the outcomes are policy relevant and have had end-user involvement.
- 3. Take trans-boundary issues into account –
- 4. Develop an approach for addressing knowledge gaps and for dealing with uncertainties.

# MOVE- Framework

- The MOVE procedure aims to fill the gaps in currently used methodologies by:
- addressing vulnerability assessment with a holistic approach to risk governances;
- building indicators that:
  - - allow assessment of interactions between components,
  - - are understandable by decision makers and stakeholders,
  - - are, as much as possible, quantified and spatialized, and
  - - have been validated in case studies and are reproducible;
- keeping track of the uncertainties inherent in risk assessments.



**Figure 3: MOVE conceptual framework of a holistic approach to disaster risk assessment and management**



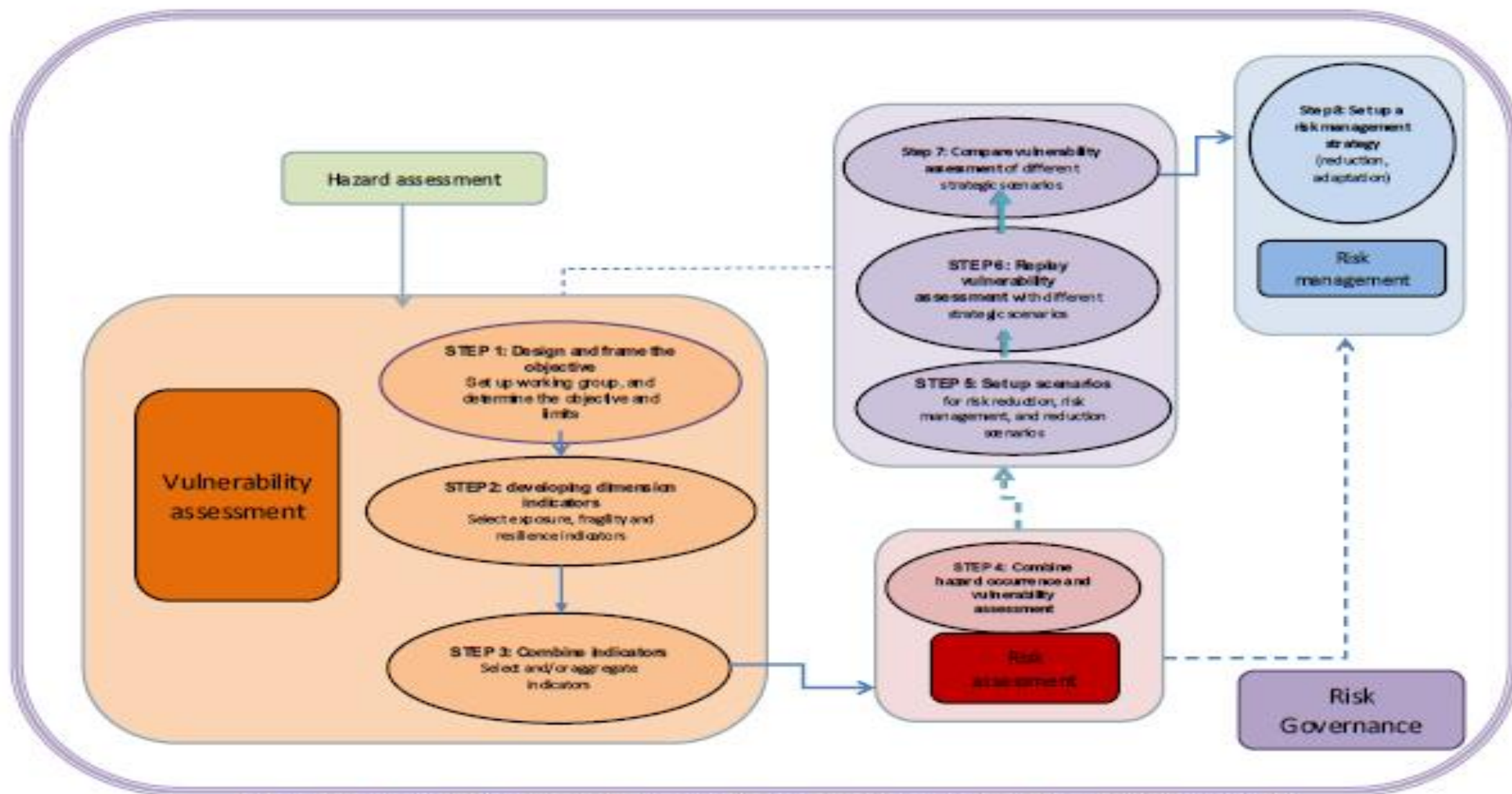


Figure 10: Procedural steps to apply the Move conceptual framework of vulnerability assessment.

# Example of Indicators

| Susceptibility/Fragility               |  |                           |   |  |  |
|--|--|---------------------------|---|--|--|
| Physical                               | Ecological                                       | Social                    | Economical  | Cultural / Patrimonial   | Institutional  |
| Efficiency of protection works         | Scarcity of ecosystem                            | People per household      | GPD   | Disruption of cultural practise (tourism, religious practices) | landscaping planning law and procedures  |
| Mobility of assets (strategic retreat) | Mobility of ecosystem                            | Unemployment rate         | Public funds availability (support beach protection works; cost of reposition of the infrastructures) |  | relation between the local / state authorities                                     |
| Beach reduction (destruction)          | Salinization of groundwater<br>Soil salinization | Ratio of Secondary houses | Disruption of productive activities<br><br>Touristic turn-over  |  | Information availability and citizens participation mechanisms in public decisions |
|  |  |                           | Professional dependence to the territory (example: fishing activities, tourism)                       |  |  |
|  |  |                           | Family income   |  |  |

*Figure 11: Examples of susceptibility/fragility indicators proposed in the NW Portugal coastal erosion case study.*

# Methods used for national vulnerability assessments in Europe

- Expert judgement or appraisal is the method used by all 28 countries.
- A literature review, or analysis of existing information
- Developing future climate projections using global emissions and socio-economic scenarios are other popular options.
- Modelling
- Engagement with stakeholders
- development of indicators.



# Literature

- Assessing Adaptation Knowledge in Europe: Vulnerability to Climate Change- Final Report © Ecofys 2016 by order of: the European Commission, February 2017
- Assessment of Vulnerability to Natural Hazards A European Perspective- Edited by Jörn Birkmann, Stefan Kienberger, David E. Alexander- Theoretical and Conceptual Framework for the Assessment of Vulnerability to Natural Hazards and Climate Change in Europe- Move framework

***Thank you for your attention!***

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