





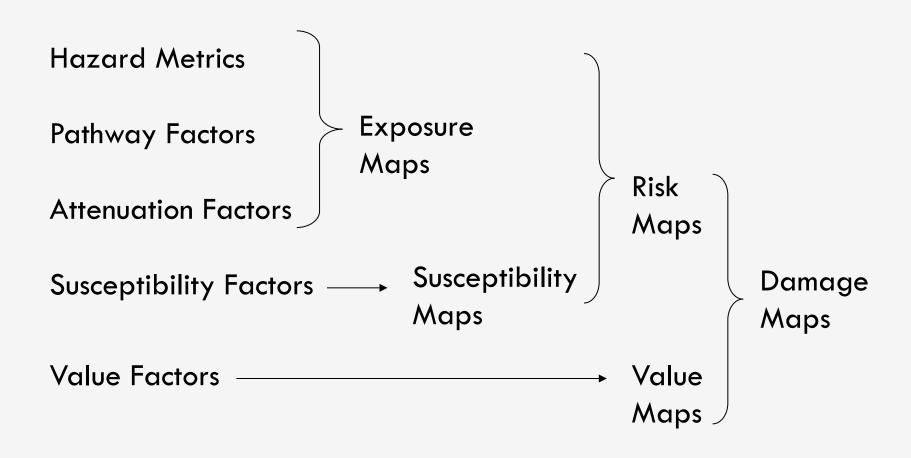
On evaluating the benefits of risk prevention: the KULTURisk integrated assessment framework (KRIAF)

## KULTURisk-IAF background (1/3)

- Definitions are inconsistent and unstable
- □ At least two distinct research streams: DRR & CCA
- □ A "one-size-fits-all" approach seems impossible
- Very hard to unify the terminology in use
- □ IPCC-SREX has provided a new reference
- In the assessment of costs and benefits non physical aspects are crucial: go beyond direct tangible costs

# KULTURisk-IAF background (2/3)

The RRA methodology (KR Del. 1.2)

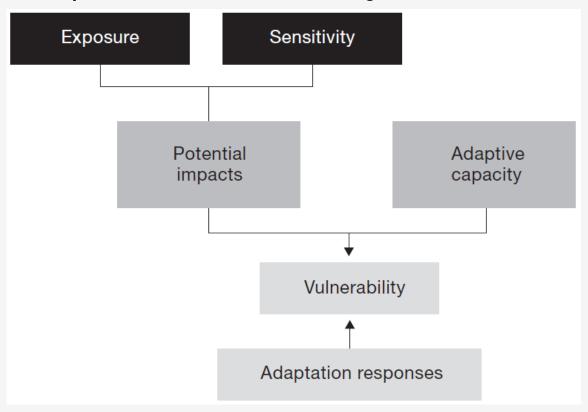


# KULTURisk-IAF background (3/3)

The notion of total costs (KR Del. 1.4) Damage to private buildings and contents Direct Damage to vehicles and capital assets Destruction of infrastructure such as roads, railroads Erosion of agricultural soil Loss of life Destruction of harvest Injuries Damage to livestock Loss of memorabilia Evacuation and rescue measures Psychological distress Business interruption inside the flooded area Damage to cultural heritage Clean up costs Negative effects on provisioning Health costs ecosystem services (Reconstruction of defence measures) **Tangible** Intangible Disruption of public services outside the flooded area Trauma Cost of traffic/transport disruption Mental illness •Induced production losses to companies outside Bereavement the flooded area (e.g. suppliers of flooded companies) Loss of trust in authorities •Loss of tax revenue due to migration of companies Loss of jobs (societal disruption) in the aftermath of floods Negative effects on regulating and cultural Temporary housing of evacuees ecosystem services Indirect

## Searching for a reference framework 1/n

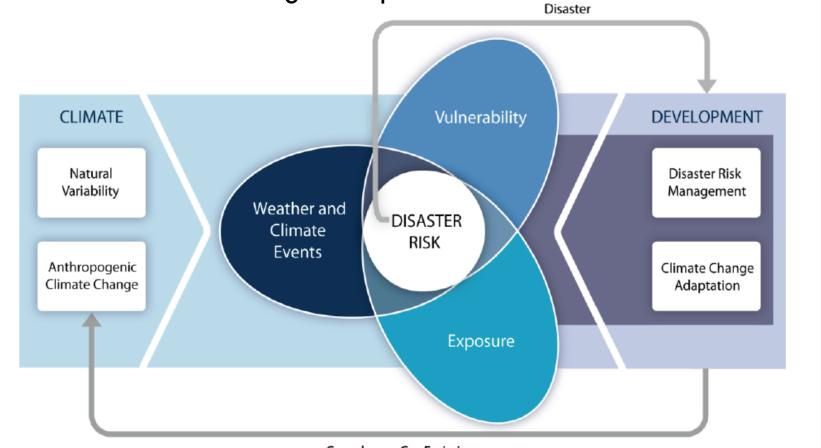
#### Adaptation to climate change



Vulnerability = f (exposure, sensitivity, adaptive capacity)

## Searching for a reference framework 2/n

Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation

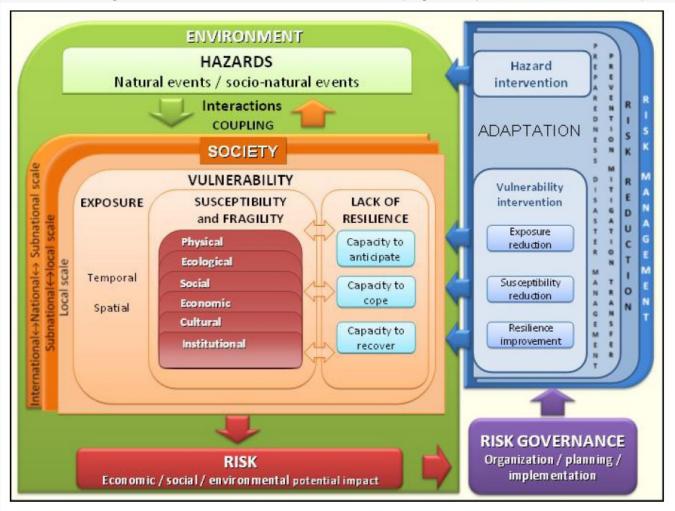


Greenhouse Gas Emissions

IPCC-SREX, 2012

## Searching for a reference framework 3/n

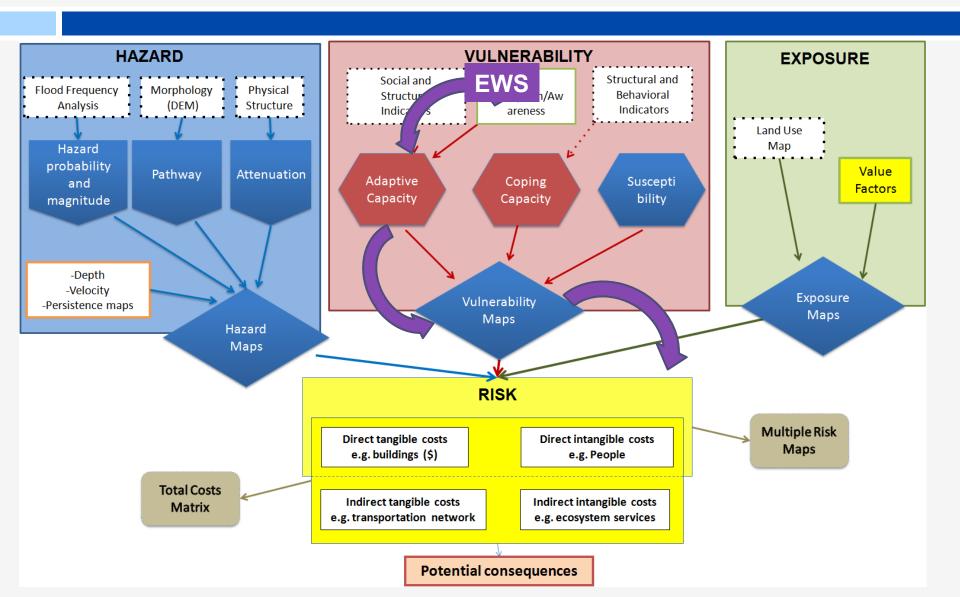
An integrated non directional (cyclic) framework (MOVE)



## Searching for a reference framework 4/n

Probabilistic risk assessment (CAPRA) Hazard Module Exposure Module Vulnerability Module Damage & Loss Holistic Risk Evaluation Module (Risk) (Indicators) Risk Retention and Land Use Planning & **Emergency Response** Financial Risk Transfer Scenarios & Planning Zoning Cost-Benefit Analysis for Prevention / Mitigation

#### The KR framework: KRIAF

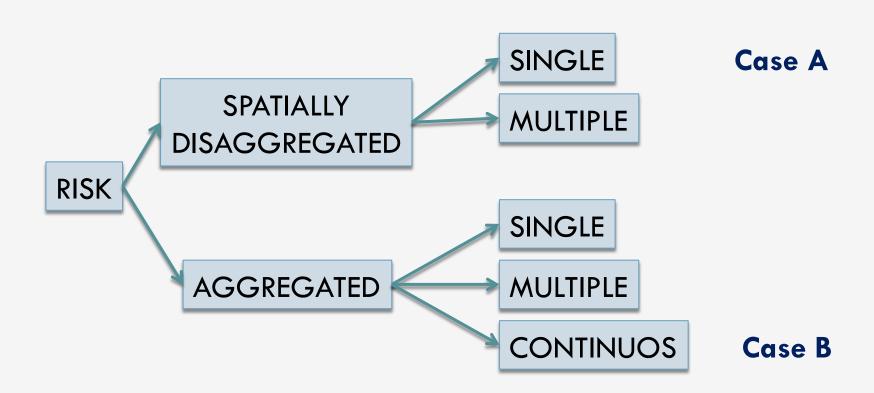


## Operationalisation of the framework

#### Main issues:

- Identification of application contexts: scenarios and measures (baseline vs. alternatives)
- Indicator selection
- Normalisation
- Weighting
- Aggregation
- Uncertainty

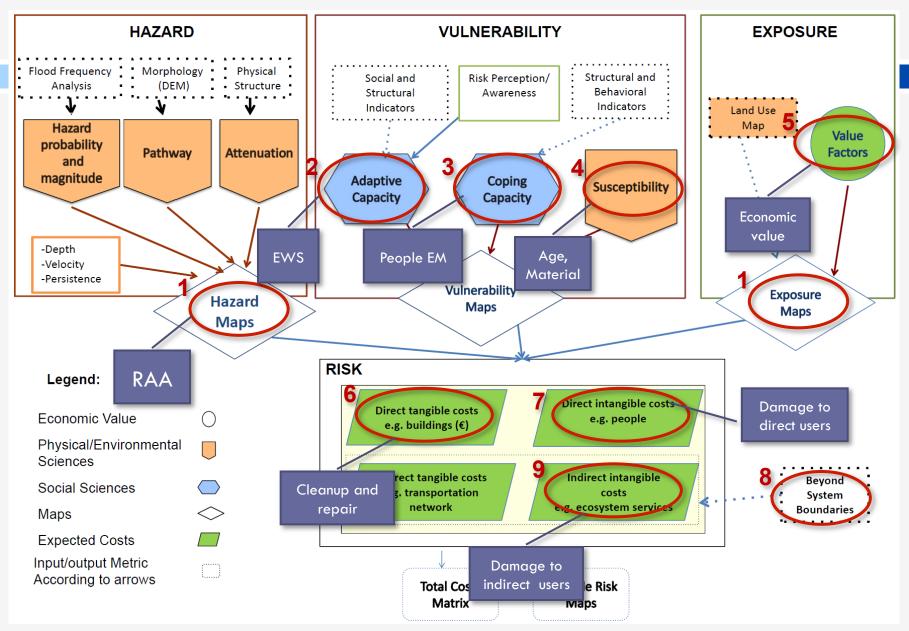
### Valuation cases



## KRIAF approach to Case A

- 6 risk assessment maps (1 per each receptor: people, residential, commercial and industrial buildings, infrastructure, agriculture, cultural heritage, environment)
- RRA to assess physical/environmental risk
- Selected RRA inputs or outputs used by SERRA to assess social and economic dimension
- Capacities maps
- Overlaying (spatial MCA)
- □ 1 to 4 maps corresponding to cost quadrants [DT, DI, (IT, II)
- Outcomes:
  - Identification of hot spots
  - Spatial scenario analysis (ex ante valuation of measures)

#### **CULTURAL HERITAGE IN THE KRIAF**



Balbi et al., 2012; Giupponi et al., 2012

# CULTURAL HERITAGE IN THE KRIAF WORKFLOW EXAMPLE

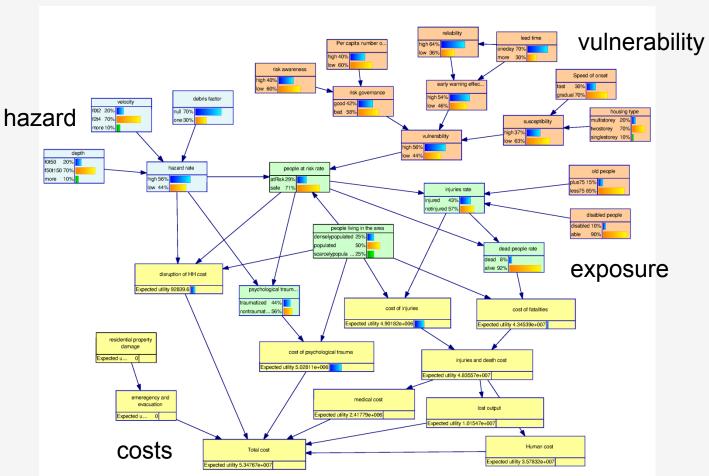
- 1. RRA maps of Exposure and Inundation (Hazard) → classes 2. Indicators of EWS; 3. People involved in emergency measures; Normalised V index 4. Age; material; % of multi-storey 0-1 5. Value factor: value transfer functions/tables 6. Classes ↔ V index x (€/m²) Cleanup & repair (DT) 7. Damage to direct users →
- 8. Contingent valuation, value transfer, etc.
- 9. Damage to indirect users → €

## KRIAF approach to Case B

- 6 risk assessment functional analyses (1 per each receptor: people, residential, commercial and industrial buildings, infrastructure, agriculture, cultural heritage, environment)
- 1 to 4 aggregated values corresponding to cost quadrants [DT, DI, (IT, II)
- Outcomes:
  - Monetised and probabilistic quantification of risk
  - Scenario analysis (ex ante valuation of measures)
- Potential to be applied on a spatial object basis (e.g. grids)

## KRIAF implementation for people case B

#### **EWS**



## KRIAF key messages:

- An integrated framework for the assessment of risk has been developed by the KULTURisk Project
  - allowing for integrated assessment of the potential benefits of measures to cope with flood risk,
  - going beyond the 'traditional' approaches to RA, by enhancing the consideration of social and economic dimensions of vulnerability, and
  - providing solutions for the assessment of 'total costs', but,
  - not guaranteeing and even searching for full monetisation,
     and
  - requiring tailoring of the approach adopted for risk assessment to case specific contexts
- compliance with EU and national legislation to be finalised
- generalised implementation rules to be consolidated through case study implementations