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# Flood risk adaptation

A detailed decision support tool

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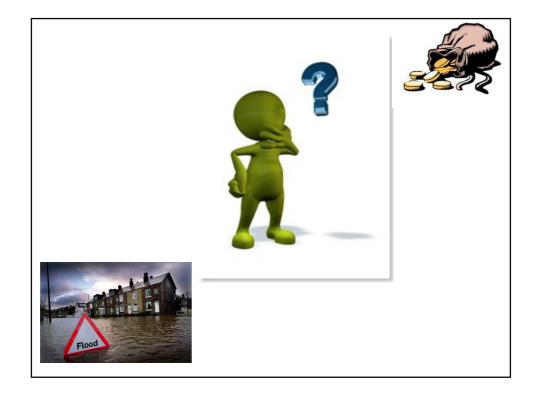


# Research projects 2006-2010



- CCI hydr project:
  - KULeuven Faculty of Engineering Prof. Willems
  - Royal Meteorological Institute
- ADAPT project
  - Université de Liege HACH Prof. Pirotton
  - Université Libre de Bruxelles CEESE Prof. Hecq
  - University of Antwerp ECOBE Prof. Meire
  - KULeuven HIVA K. Bachus
  - Arcadis Prof. De Sutter

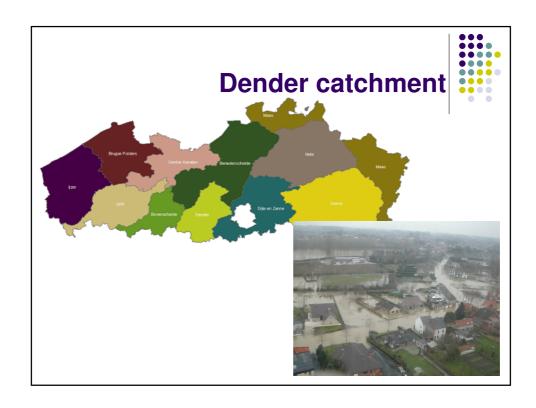
# Probability Exposure elements-at-risk (depth, velocity, duration, ...) Probability Exposure elements-at-risk (market value properties, WTP avoidance heath inpacts, ...) Probability Consequence Flood risk



# **Research challenges in DSS**



- Integrating climate change projections
- Integration socio-economic scenarios
- Integrating social and non-monetary impacts
- Integrating micro-scale information
- Spatial distribution of risks
- Integrating knowledge on uncertainties



# **Detailed decision support tool**



- Climate change and hydrological analysis
- Impact assessment limited to residential units
  - Exposure
  - 2. Intangible impacts social impact on the individu
  - 3. Tangible impacts material effects on the houses
- 3. Multi-criteria evaluation

## 1. Hydrological analysis Integration of climate change projections



#### **Hydraulic projections**

nder basin

Winter season: highly uncertain: increase or decrease in ion = wetter river peak flows depending on scenario

net effect depends on precise value of precipitation and evapotranspiration

itation = dryer = increases

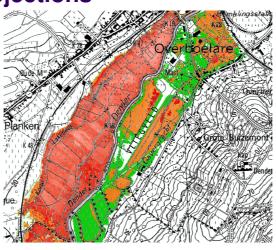
Summer season: more clear

Peak flows increases up to 35% in high scenario

intensities increases

1. Hydrological analysis Integration of climate change projections

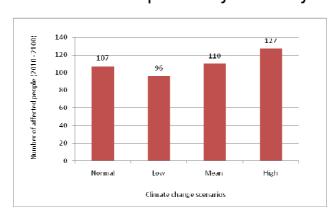




# 2. impact assessment exposure



• Cadastral-based expert dasymetric system



# 2. Impact assessment intangible impacts

#### Susceptibility:

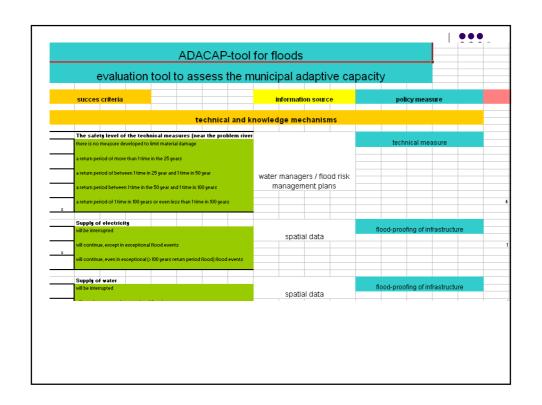
- Lack of resources
- •Lack of information and knowledge
- Lack of political power
- •Lack of healthy status
- •Certain beliefs and customs

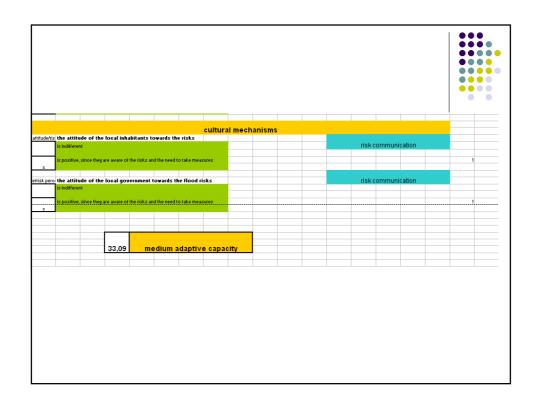


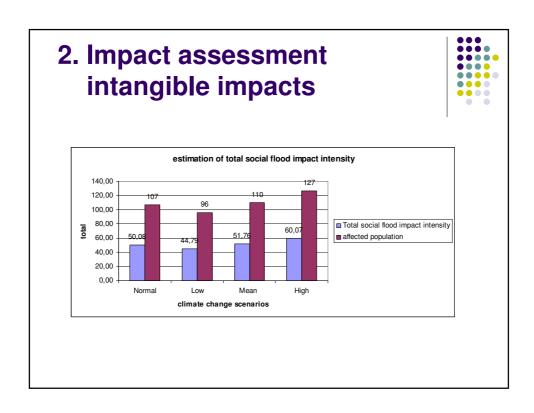
Flood characteristics

# Adaptive capacity of community:

Social, economic, cultural, knowledge, institutional mechanisms



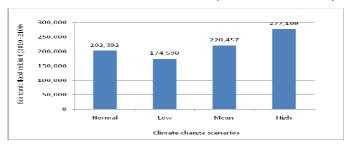




# 2. Impact assessment tangible impacts



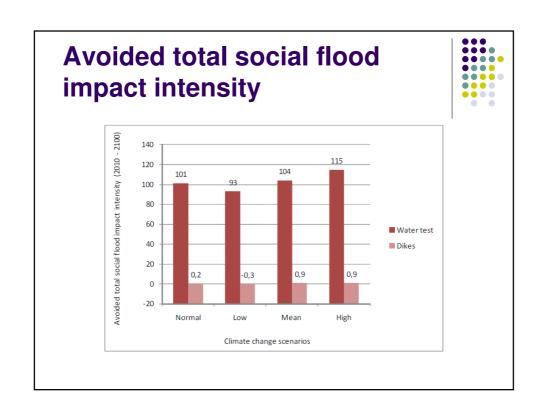
- Material damage to the house function:
  - ICPR 2001: International Commission for the Protection of the Rhine damage function
    - Location data (cadaster)
    - House value and content (insurance sector)

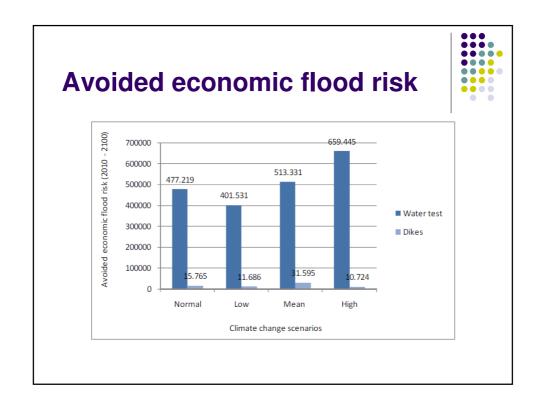


#### 3. Multi-criteria evaluation



- Extended CBA
  - Prioritizes the use of monetary effects
  - Framework to deal with non-monetary information
- Evaluation of two type of measure packages
  - Heightening and reparation of dikes, transversal dikes, installation of outlets
  - Watertest





### **Multi-criteria evaluation**



- Input in decision matrix
- Standardizing decision matrix
- Attributing weights to decision criteria
- Ranking measures
- Calculation of the economic net present value

Dikes: ENVP is negative

Watertest:

low scenario: ENVP = 540000 euro
high scenario: ENVP = 1 million euro

## Conclusion



- Coping with uncertainty
  - Robust strategies
  - No regret
  - win win options
- Finding the balance between increasing accuracy and flexible applicability



# Thank you for your attention

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