



Economic assessment of climate change adaptation options incorporating Bayesian networks: An integrated framework

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Publication date:
2013

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Citation (APA):

Gregg, J. S. (Author), Zhou, Q. (Author), Åström, H. L. A. (Author), Kaspersen, P. S. (Author), Drews, M. (Author), Halsnæs, K. (Author), Garrè, L. (Author), & Arnbjerg-Nielsen, K. (Author). (2013). Economic assessment of climate change adaptation options incorporating Bayesian networks: An integrated framework. Sound/Visual production (digital)

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Economic assessment of climate change adaptation options incorporating Bayesian networks: An integrated framework

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Purpose

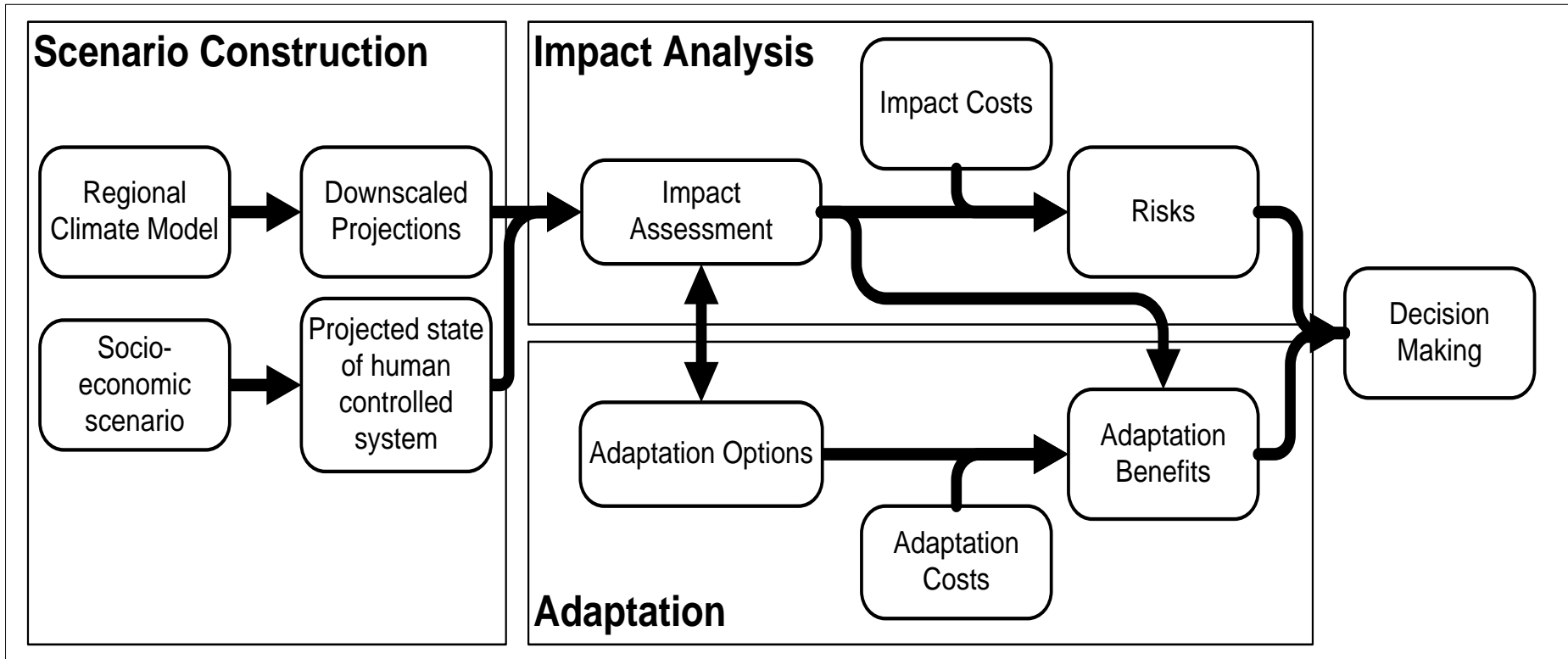
- A framework for climate change adaptation decision making
- Handles complex inter-relationships between impacts and adaptation options
- Flexible structure for applied climate change adaptation decision making.

Outline

- 1. Introduction
 - 1.1 Adaptation in the context of responses to climate change
 - 1.2 Analytical structure
- 2. Scenario construction
 - 2.1. Socioeconomic scenarios
 - 2.2 Climate modeling and climate scenarios
 - 2.3 Future System Scenarios
- 3. Impacts
 - 3.1. Impact Assessment
 - 3.2 Costs
 - 3.3 Risk
- 4. Adaptation
 - 4.1 Identification of Adaptation Options
 - 4.2 Bayesian Network Approach
 - 4.3 Adaptation Costs and Benefits
- 5. Discussion and Conclusions

Introduction

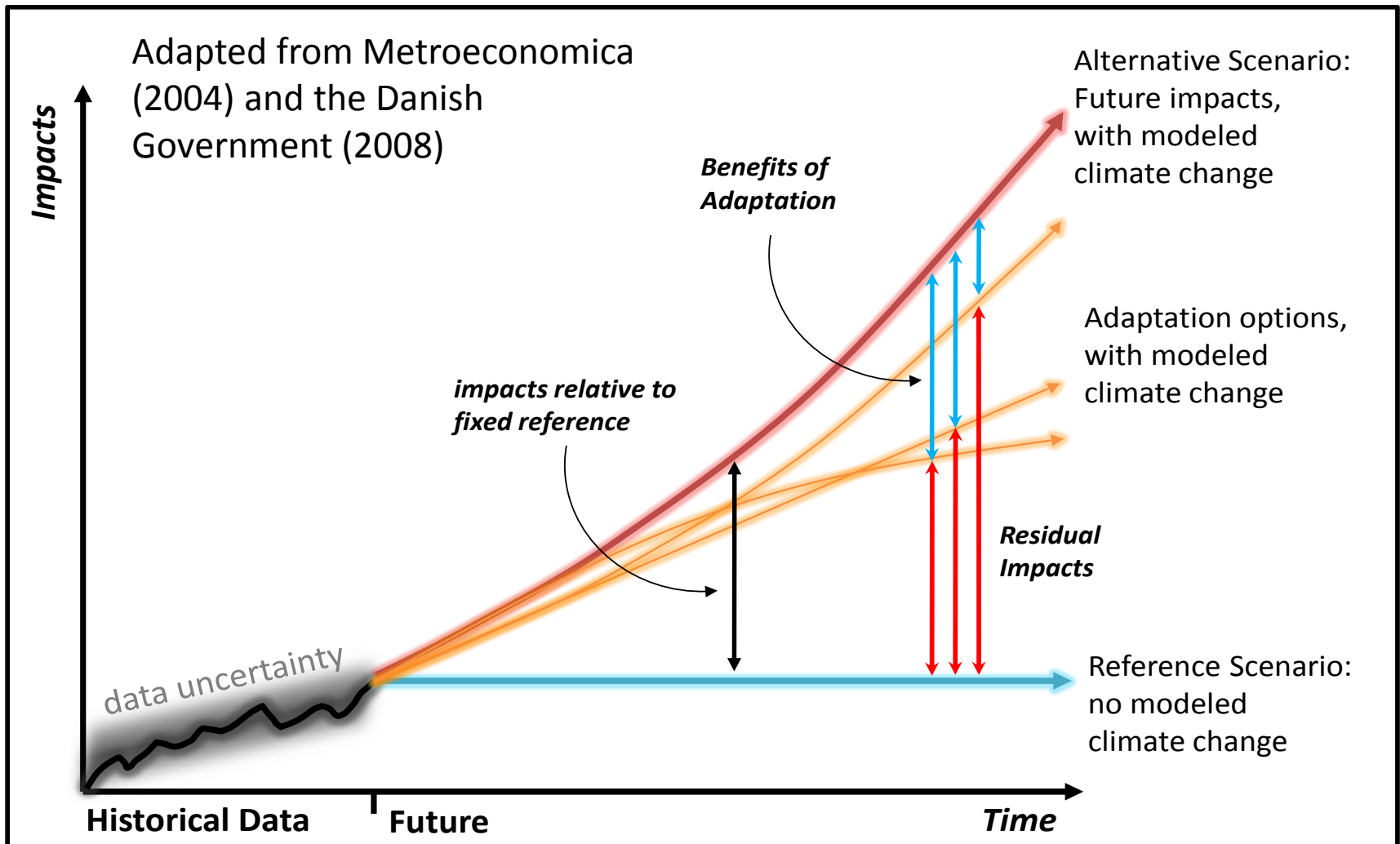
Analytical Structure



Scenarios

- Socioeconomic
 - Question of scale (Global vs. Local)
 - Uncertainty bracketed with scenario analysis
- Climatic
 - Regional climate models
 - Downscaling
- Coupled scenarios

Theoretical scenario development: understanding the risks from climate change and the benefits of adaptation measures.



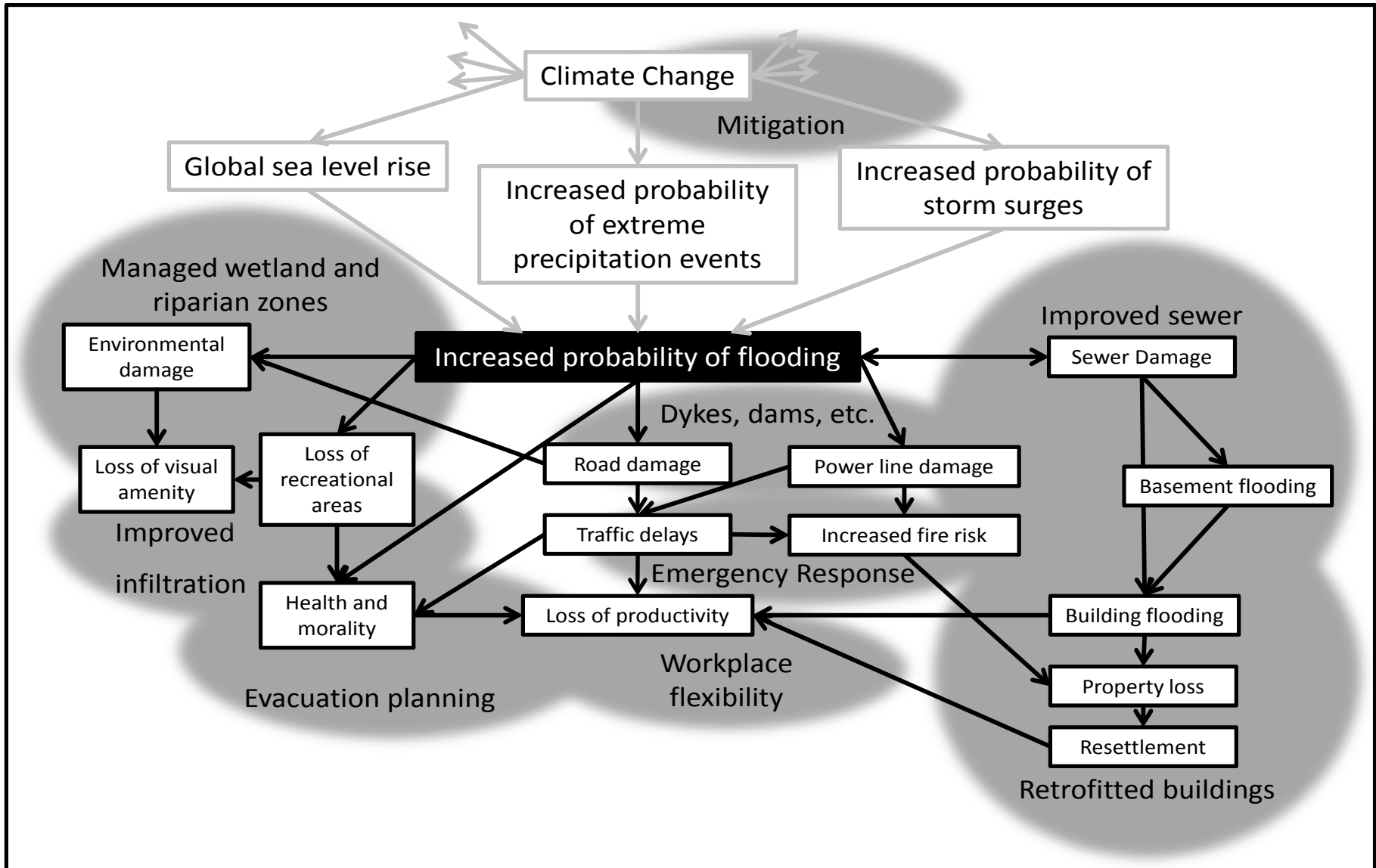
Impacts

- Assessment
 - characterize change in the climate variable or the extreme weather event (intensity, frequency and duration)
 - obtain spatially explicit information on asset exposure and vulnerability
 - develop asset specific thresholds and damage functions
 - quantify of both the physical and economic impacts
- Costs
 - Cost-Benefit-Analysis; Net Present Value with discounting
 - Multi-Criteria Decision Analysis
- Risk
 - probability of an extreme event multiplied by the consequence of an event

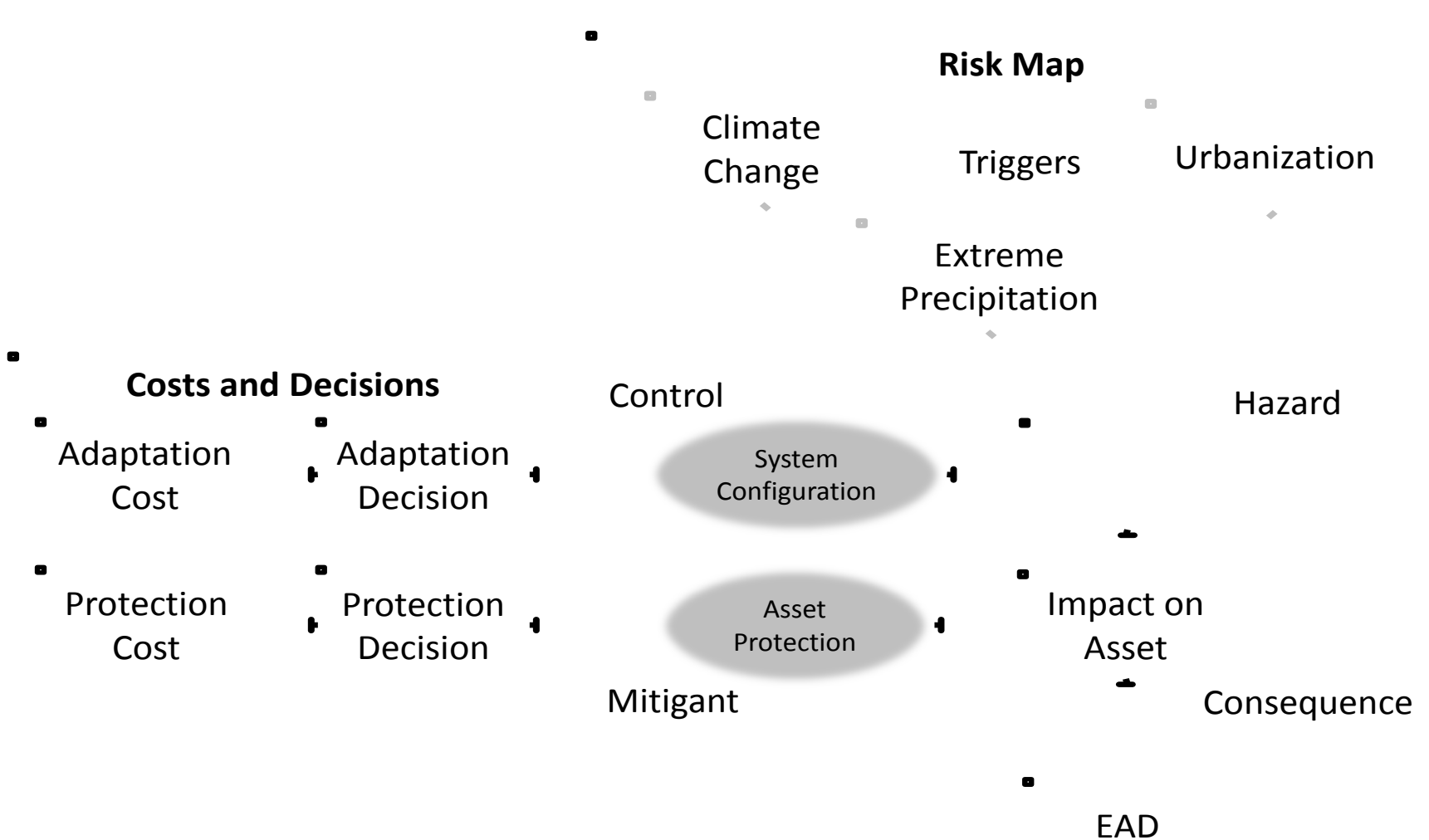
Adaptation Options

- Identification
 - Non-linearity
 - Mapping
- Bayesian Network Approach
 - used to quantify risk in the system
 - determine the probability distribution for each specific impact
 - Static → Dynamic
- Costs and Benefits
 - Priority setting
 - Uncertainty analysis

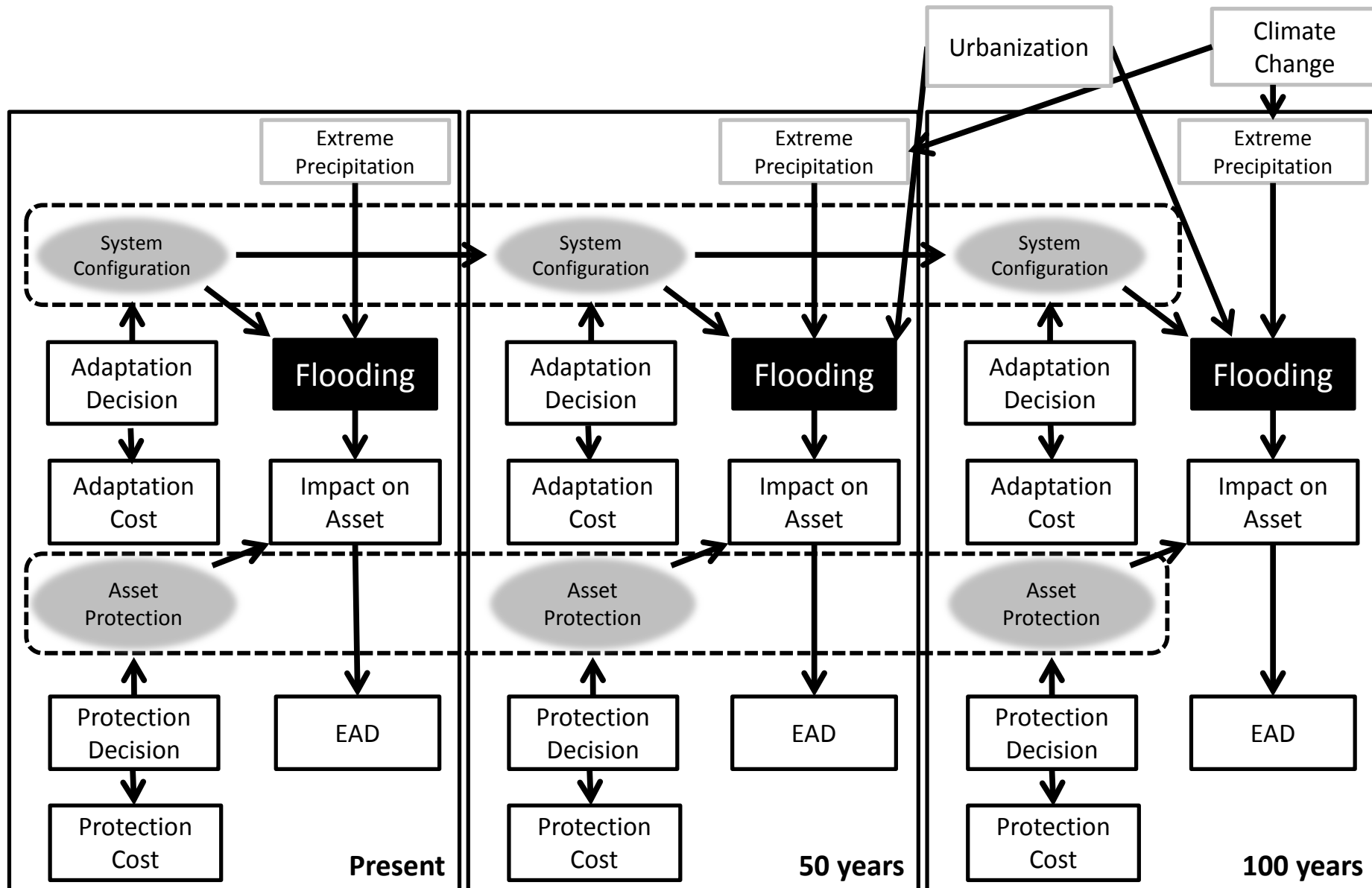
Linkages of impacts due to climate change for an urban area with adaptation options



A static ID for urban flood risk assessment



Dynamic ID for urban flood risk assessment under non-stationary conditions



Discussion and Conclusions

- + The main strength of the BN approach is the ability to represent complex dynamic systems and the inter-linkages between various nodes in the system.
- complex set of input data required for the analysis & can only deal with continuous values in a limited manner, and these types of variables are common in environmental assessment.

Status

- Submitted May 31, 2013
- One review completed
- Editor requested other reviewer names

Upcoming

- Transportation Analysis of Copenhagen

