Urban Flood Risk Management for the 21st Century

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Prevention pays but be prepared for the unexpected.

Three Questions

1. Is urban flooding on the rise globally?

2. If so, what are the factors driving the increase?

3. And, what can city-managers, policy-makers do about it?

Three Products

1. Expert Roundtable on Urban Flooding (March 17): Presentations can be downloaded here: http://bit.ly/lLej8X

2. Working Paper on Cities and Flooding: http://bit.ly/lbxm0x

3. Handbook on Integrated Flood Risk Management

Why Are We Doing This?

1. Urban flooding a serious and growing problem.
2. Multi-disciplinary-hydrology, land-use planning, risk assessment, risk financing and insurance.
3. Need to document several decades of project/AAA experience.

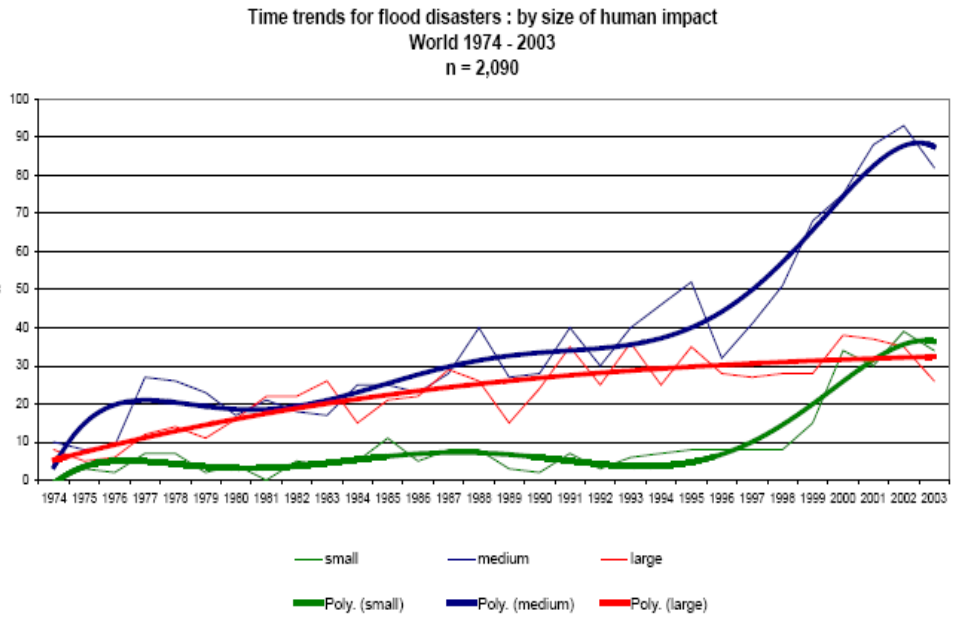
1. Is urban flooding on the rise globally?

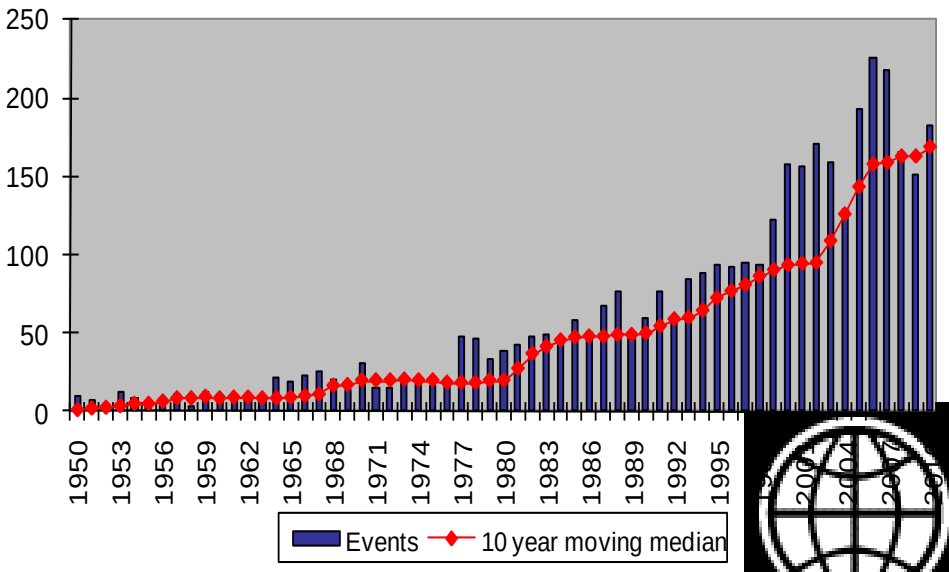
Are the impacts of global urban flooding on the rise?

World Bank Working Paper Summary

- **Urban flooding is an increasingly important issue.**
  - Brisbane, Rio, Ha Noi, HCM City, Ulaanbataar, Dakar, Mumbai etc. etc.
- **The impact of flooding is driven by a combination of natural and man-made factors.**
- **Two headlines:**
  - **Urbanization**
  - **Climate change**

- Flood events are becoming more frequent.
- Larger growth in medium and small floods.
- Deaths lower, particularly in the developed world.
- Other impacts from flooding are growing more steadily over time.





Number of reported flood eve

2. What are the factors driving the increase?

Increased Vulnerability

- Population growth
- Economic development
- Urbanization
- Poverty
- Lack of preparedness
- Changing demographics of populations
- Poor maintenance of existing structures and makeshift construction
- Building design without regard to flood risk
- Overcrowding leading to increased solid waste and flood debris
- Overreliance on defences

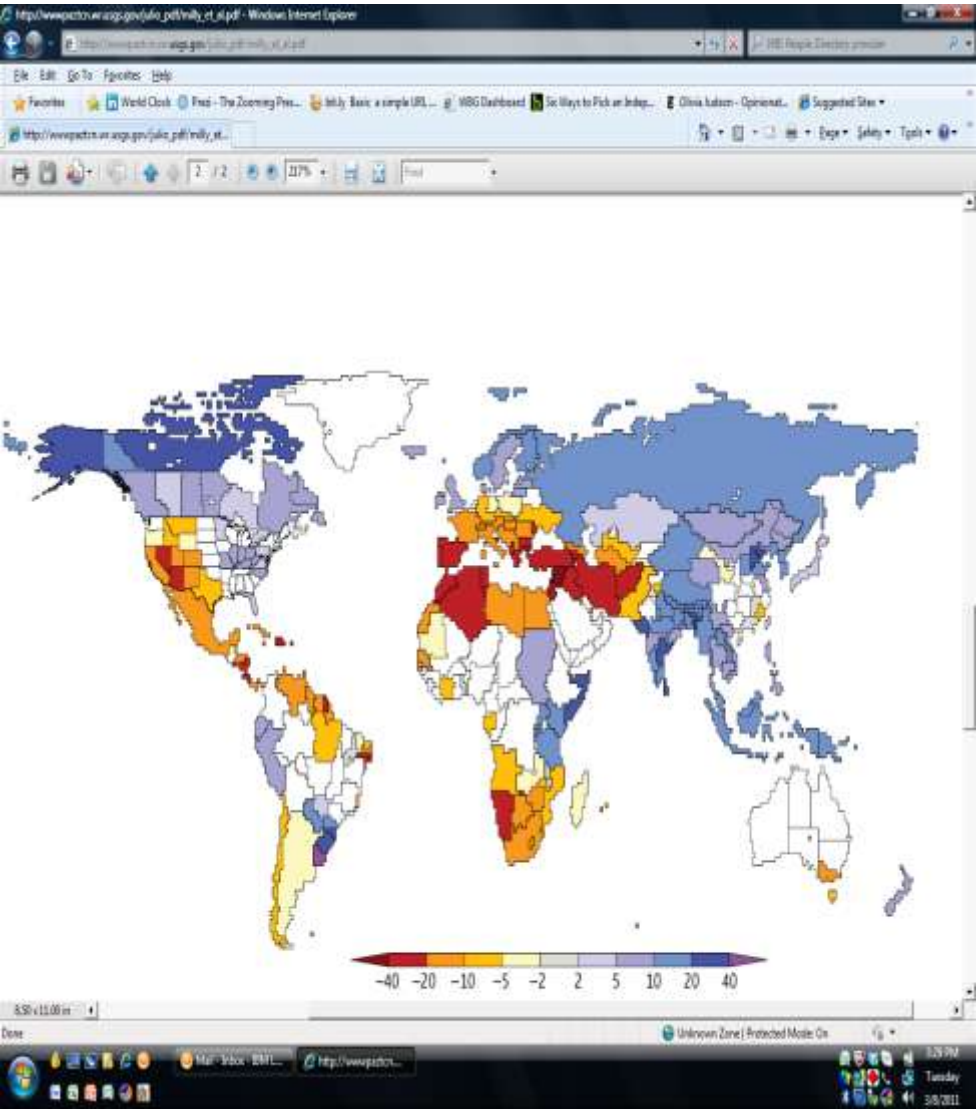
Climate Change and DRM

Decreasing Confidence

- Humans are affecting climate
- Models are predicting significant warming (Global Mean Temperature)
- Models are predicting sea level rise (magnitude and timing considerably uncertain)
- Models are predicting slight drop overall hurricanes but a higher percent of Cat 4 and 5.

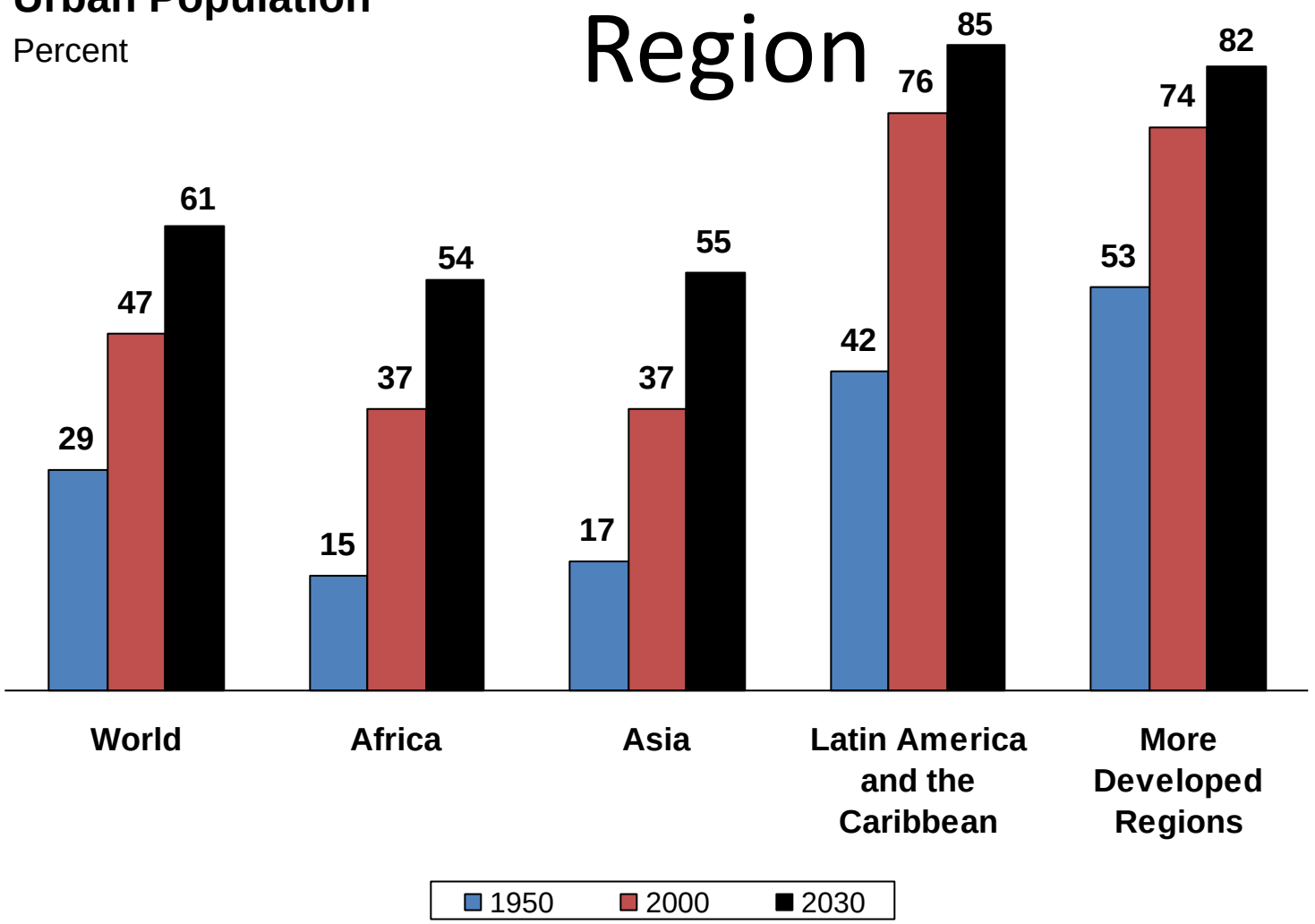
Source: Tom Knutson, Geophysical Fluid Dynamics Lab/NOAA

Stationarity is Dead!



- Decision making under deep uncertainty
- Resilience and Robustness
- Complexity and Cascading Failures
- NIMTOF

Trends in Urbanization, by Region



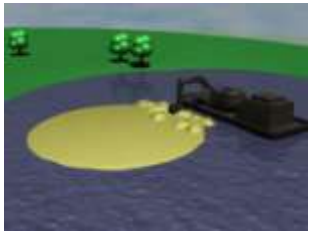
Source: United Nations, *World Urbanization Prospects: The 2003 Revision* (medium scenario), 2004.

3. What can city-managers, policy-makers do about it?

Measures to reduce flood risk

> 185 adaptation measures identified…..

- SAMs: Structural (*hard*) measures (# >100)
- *Collective: e.g. dikes, drainage systems*
- *Individual: e.g. wet or dry proofing*



- NSAMs: Non-structural (*soft*) measures (# > 85)
- *Collective: e.g. contingency plans, legislation*
- *Individual: e.g. risk consciousness, insurance*

… and counting

Source: Deltares

Strengthen four capacities* to reduce vulnerability

Coping capacity

Adaptive capacity

Threshold capacity

Recovery capacity

recurrence time

* Graaf, R. de, N. van de Giesen and F. van de Ven, 2007, Alternative water management options to reduce vulnerability for climate change in the Netherlands, Natural Hazards nov.

Source: Deltares

Vulnerability reduction approach

- Strengthen all four capacities
- SAMs show limited adaptability
- Most SAMs strengthen threshold & coping capacity
- SAMs require high *federal* or *regional* investments
- NSAMs require less, *local* or *individual* investments
- NSAMs require study (learning) and regular training
- SAMs can’t do without NSAMs

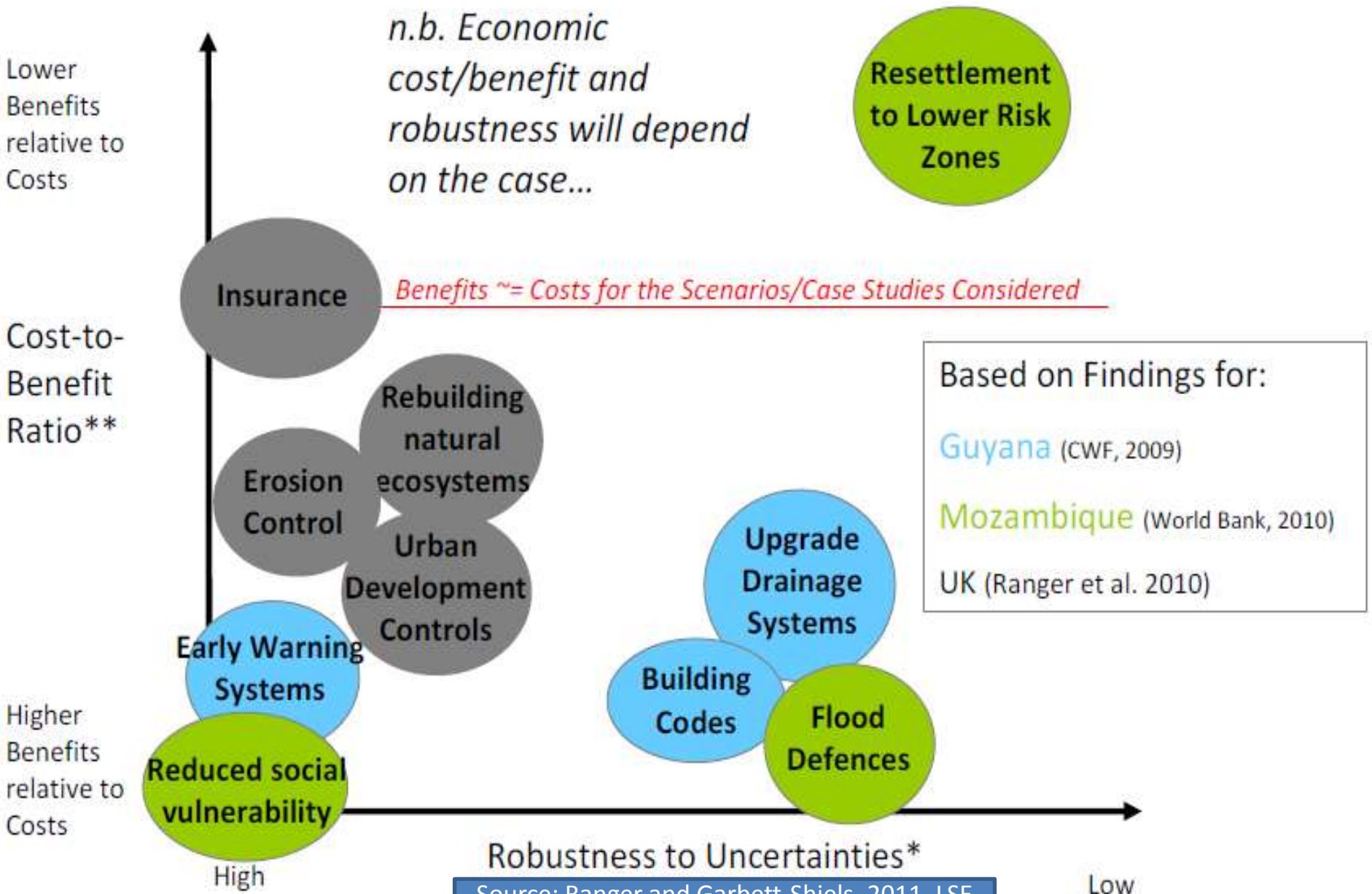


Dealing with Uncertainty in Decision Making

- **In many cases a range of 'no-regrets' options are available and will have immediate benefits and can enhance long-term flexibility to cope with climate change and other risk drivers;**

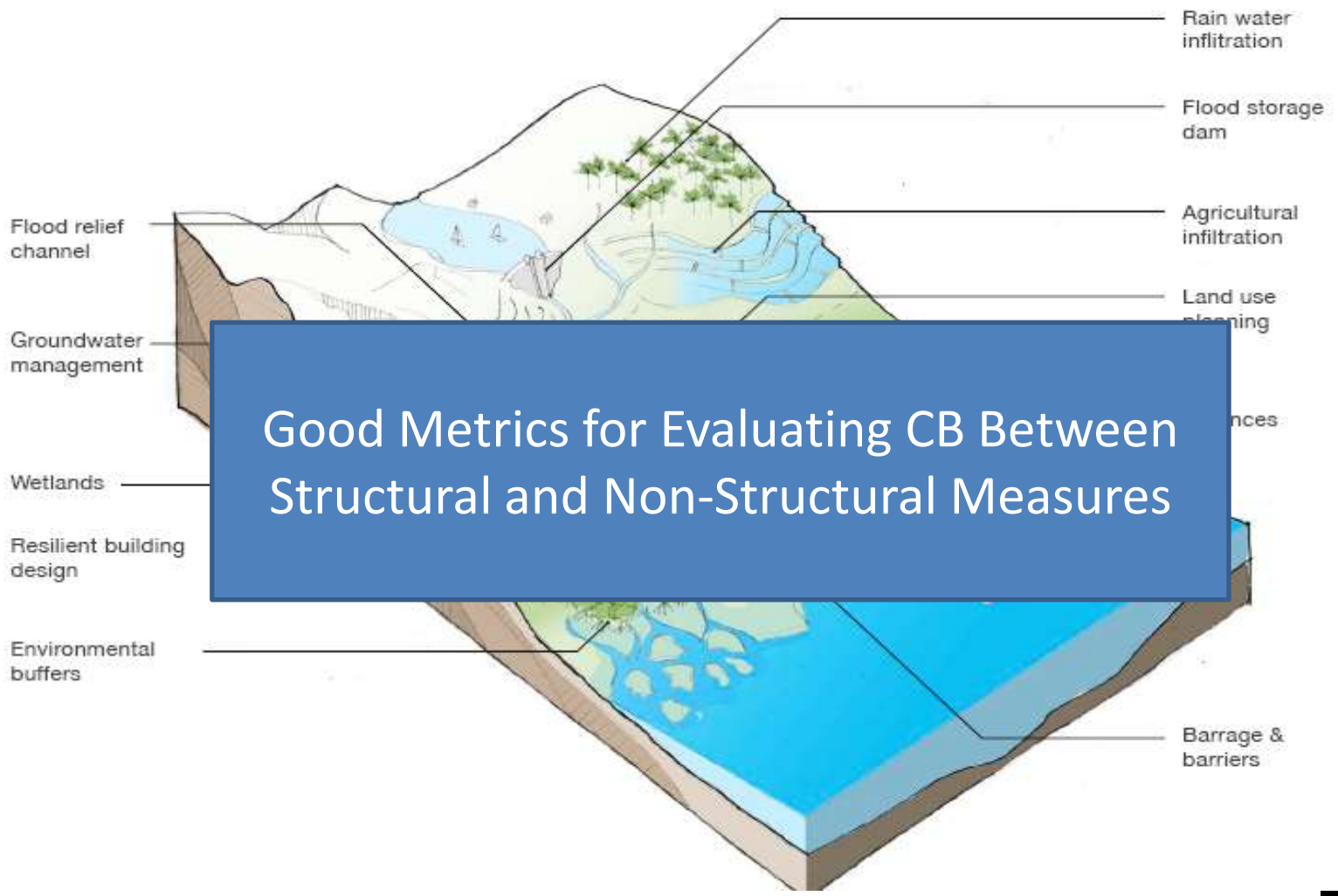
- Measures to better cope with current climate variability *(such as well-maintained drainage systems and early warning systems)*
- Measures to manage non-climate drivers of risk *(such as limiting building in exposed areas, managing erosion and increasing*
- *permeability of urban areas)*
- Measures to reduce systemic vulnerability or resilience to shocks *(insurance systems, emergency response planning)*
- Some measures with strong co-benefits *(such as natural ecosystem flood storage systems, regenerating mangrove areas,green urban spaces)*

Robustness to Climate Change Uncertainties



Source: Ranger and Garbett-Shiels, 2011, LSE

Integrated Flood Risk Management



Good Metrics for Evaluating CB Between Structural and Non-Structural Measures

Key Challenges

- So what's new?
- Multiple audiences
- Operational and policy relevance
- Typology of cities (coastal vs. non-coastal, small vs. medium vs. large)

Timeline

1. Regional consultations- May-June
2. Case studies (Good or bad practice)-by May 2011.
3. Comments on draft chapters-May-June 2011.
4. Suggestions on dissemination-July 2011.

Thank you!

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