Deltas in Times of Climate Change II
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Data for vulnerability assessments

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DELTAS
SUSTAINABLE DELTAS 2015

BELMONT
FORUM

DFG

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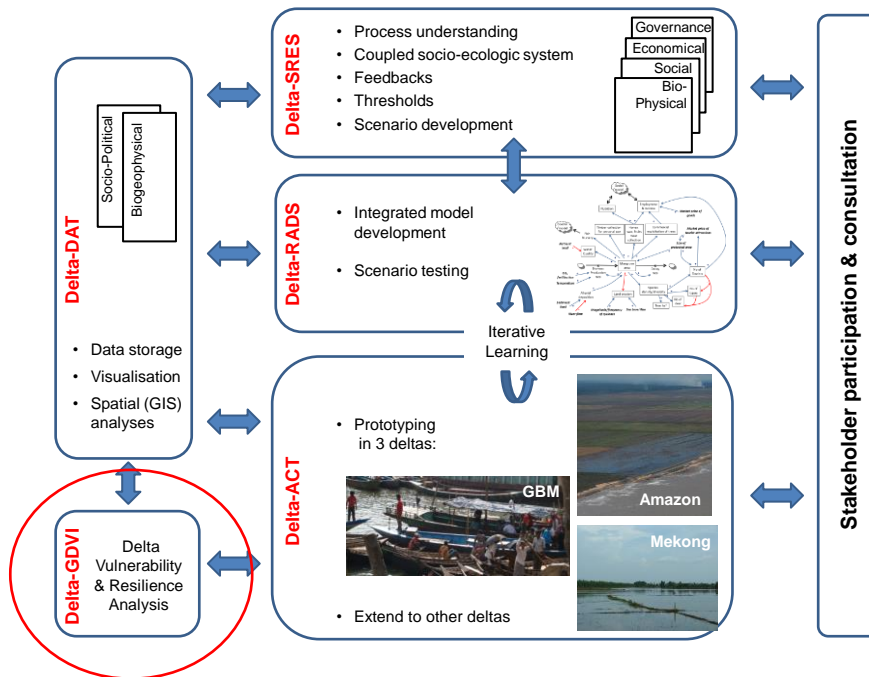
Vulnerability Assessment in DELTAS

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- **Overall goal**:

  – To advance our understanding of the spatial variability of vulnerability at the sub-delta level
  – To develop an unified framework and assessment method to compare and eventually prioritize between vulnerable sub-delta regions
  – To support informed management plans and decisions at the sub-delta scale to reduce vulnerability

Work steps

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- **Develop a framework** for assessing vulnerability

- **Define** appropiate **sub-delta areas** for assessment

- **Select indicators** that are quantifiable at the sub-delta scale

  – Apply a **flexible indicator development** process that combines scientific and local stakeholder-based approaches

- Conduct an assessment in the three **demonstration deltas at the sub-delta scale**

- Draw **lessons** for application in other delta environments

How do we proceed?

Comprehensive **review** of vulnerability assessment frameworks and indicators in delta context (ongoing)

Local consultations in the three demonstration deltas at the sub-delta scale (Mekong: 2-3 April, GBM: 3-4 September 2014, Amazon: early 2015)

Identification of a **set of indicators as a joint outcome** of the desk-based review and the 3 local consultations
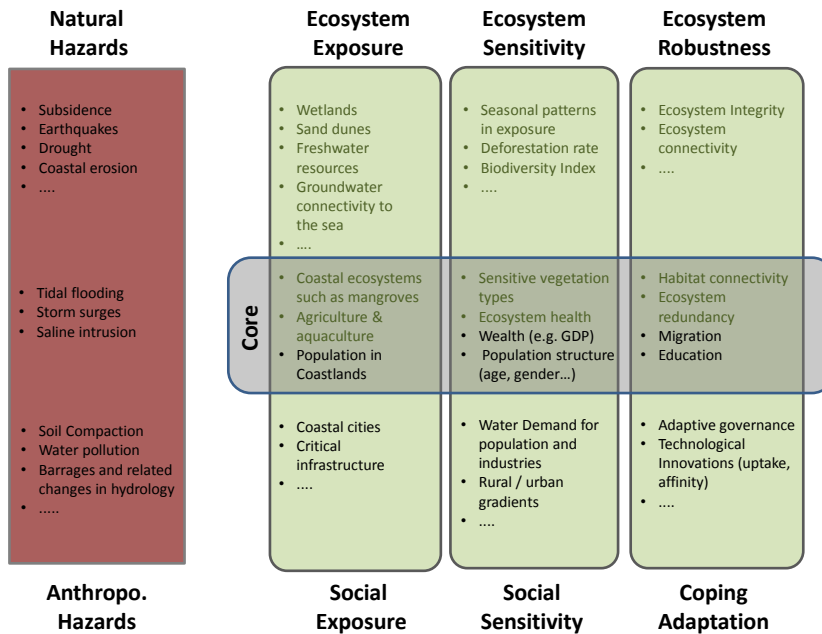
Collection of secondary and spatial data following the identification of indicators, model assessments

Feedback to the model deltas
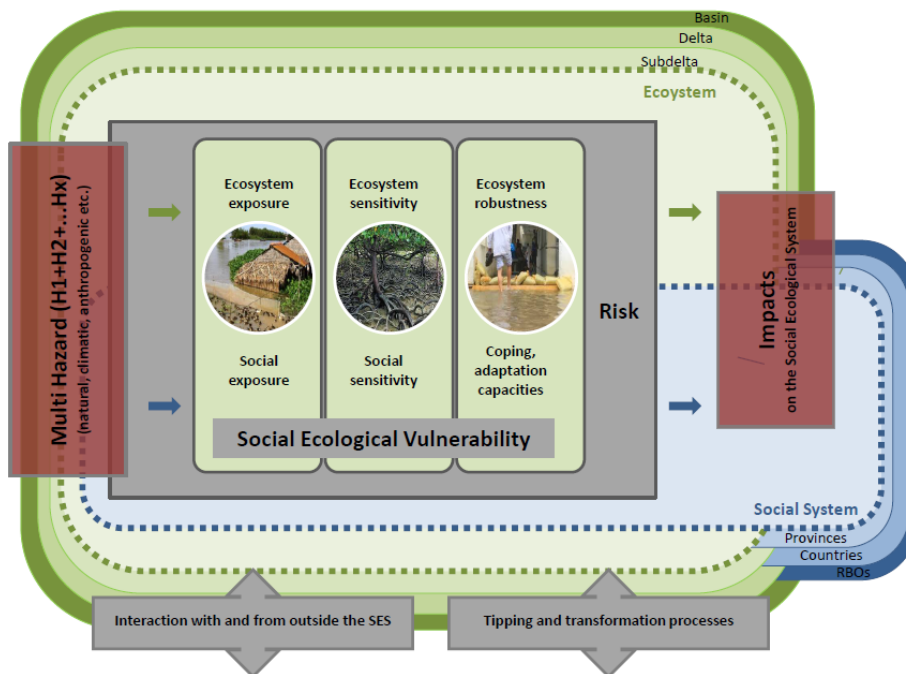
Sebesvari & Renaud 2014, after Turner et al. 2009, Garschagen 2014, Kloos et al. forthcoming

Global Delta Vulnerability Index – Coastal areas (modular system, work in progress)

Natural Hazards	Ecosystem Exposure	Ecosystem Sensitivity	Ecosystem Robustness
• Subsidence • Earthquakes • Drought • Coastal erosion •	• Wetlands • Sand dunes • Freshwater resources • Groundwater connectivity to the sea •	• Seasonal patterns in exposure • Deforestation rate • Biodiversity Index •	• Ecosystem Integrity • Ecosystem connectivity • ....
• Tidal flooding • Storm surges • Saline intrusion	**Core** • Coastal ecosystems such as mangroves • Agriculture & aquaculture • Population in Coastlands	• Sensitive vegetation types • Ecosystem health • Wealth (e.g. GDP) • Population structure (age, gender…)	• Habitat connectivity • Ecosystem redundancy • Migration • Education
• Soil Compaction • Water pollution • Barrages and related changes in hydrology •	• Coastal cities • Critical infrastructure •	• Water Demand for population and industries • Rural / urban gradients •	• Adaptive governance • Technological Innovations (uptake, affinity) • ....
Anthropo. Hazards	**Social Exposure**	**Social Sensitivity**	**Coping Adaptation**

Progress: consultation process in the Mekong, GBM

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Identification of :

- Relevant sub-delta regions
- Hazards
- Impact chains
- First set of indicators
- Data sources
- Experts as partners for the 2 deltas

Different indicators between deltas for a same coastal hazard (Mekong vs. GBM example)

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Dimensions	Mekong	GBM
Exposure (S)	Value of damage of infrastructure by erosion; % population; % rice land% land lost to coastal erosion	Population density; Density of buildings; % pop living 5 km from the coastline; % pop of rice/aquaculture /monoculture farmers; % area protected by polders....
Exposure (E)	Distance of 4 ppt salinity line from river mouth; Duration of 4ppt salinity level ; rate of forest degradation;	Contiguity of the forest; Biodiversity index; Tree density; area covered by fresh water bodies
Sensitivity (S)	% household access to tap water; Income gap between rich and poor; Average income per capita; Price of freshwater in the dry season	% malnourished persons; % people below the poverty line; Per capita GDP; % dependents; % of pop not dependent on agriculture or fisheries systems; % families with access to clean water supplies; % people who receive remittances; Nature and duration of migration
Sensitivity (E)	Ratio of fallow land/total area of production land; % of mangrove area damaged	Rate of biodiversity decline; Rate of deforestation; Per capita production of mangrove products
Ecosystem robustness	% area of mangrove planted when compared to total area land suitable for forestry	% coastline protected by sea walls or sand dunes; Rate of biodiversity change
Coping/adaptive capacities	Freshwater mixing; Rate of migration; legal documents on salinity regulation; $ value of salinity control projects; Capacity of freshwater supply stations; Number of salinity monitoring stations; knowledge on CC	% outward migration; % pop with access to EWS; % pop with access to rehabilitation programmes; % pop with access to evacuation services; % pop with food reserves; % homes at safe height from storm surge; % of people with access to roads; Level of investment in biodiversity conservation; % pop with insurance; % with immediate family living in nearby city/Dhaka/abroad; % pop with savings

Data for indicators

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- Data for vulnerability assessments are more readily available in national or international databases.

- Examples include
  - PREVIEW Global Risk Data Platform for hazard exposure
  - WHO/UNICEF Joint Monitoring Programme statistical data
  - GDP, GINI index for social sensitivity
  - Enviromental Performance Index (EPI, Yale University)
  - Human Development Index (HDI, UNDP)
  - Global Environment Outlook Data Portal (UNEP, data from FAO, WRI, World Bank etc.)
  - World Development Indicators (World Bank)
  - Corruption Index (Transparency International)
  - ....

Data for indicators

- At sub-national (or here sub-delta) scale these indicators can become meaningless (scale-mismatch)

- Deltas doesn´t match necesserily state, province etc. boundaries

- Local, regional databases are available but aligned with constrains in

  - Access (e.g. in terms of language, in terms of not necessarily digitized info, in terms of cost and feasibility – especially in the context of global assessments)

  - Quality, reliability

  - Fragmentation (dealing with one national database as opposed to provincial or district reports)

Indicators and date sources

Type	Indicator	Data Sources	Scale
Ecosystem Exposure	Size of the entire area of the assessed sub-delta	BBS (Bangladesh Bureau of Statistics)	District
Ecosystem Sensitivity	% of sandy soils (related to water-holding capacity)	Soil map: SRDI: Soil Resources Development Institute (2010 the latest version)	Map: Upazilla level 1:50,000
	% of rain-fed agriculture in the drought-prone area	BBS	District/ Upazilla
	% of area under GW irrigation	Barind Multipurpose Development Authority (BMDA)	Upazilla
	% of area permanently covered by water	DAE (Department of Agricultural Extension)	Upazilla
	% covered by drought-sensitive ecosystem types	DAE and AIS – Agricultural Information System www.ais.gov.bd	District/ Upazilla
Ecosystem Robustness	Grade of agricultural diversification (number of crops produced on an area exceeding a certain % of the overall area)	DAE / AIS	Upazilla
	% of area covered by trees	Forest Department, BMDA	Upazilla

Questions for the discussion

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- What kind of criteria are commonly used for the deliniation of sub-delta areas?
- What sources of important datasets are used in the community?
- Who is collecting what data and where we could aim for synergies?

Thank you!

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