



# Living polders: dynamic polder management for sustainable livelihoods, applied to Bangladesh

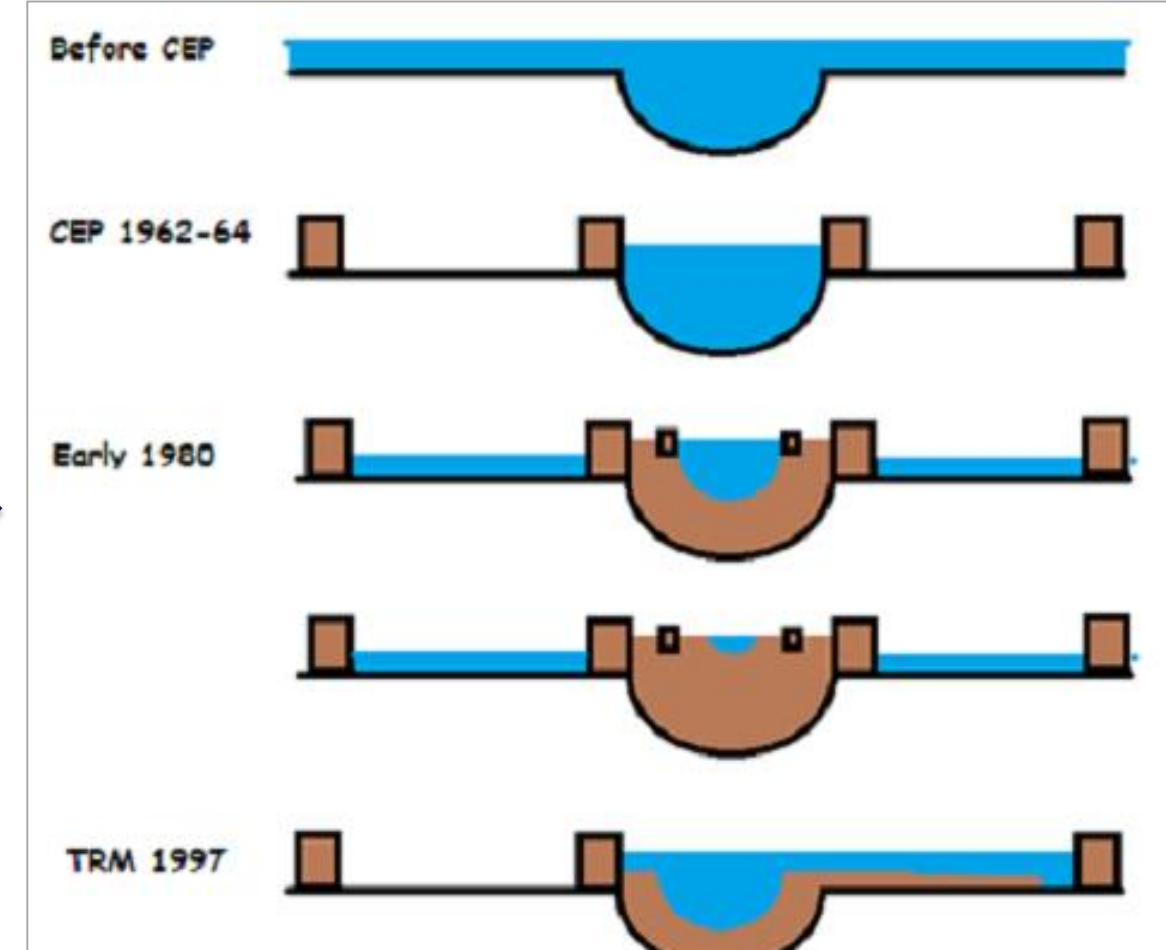
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## Why polders?

- Tidal flooding
- Riverine floods
- Storm surges
- Population growth
- Food security
- Urbanization



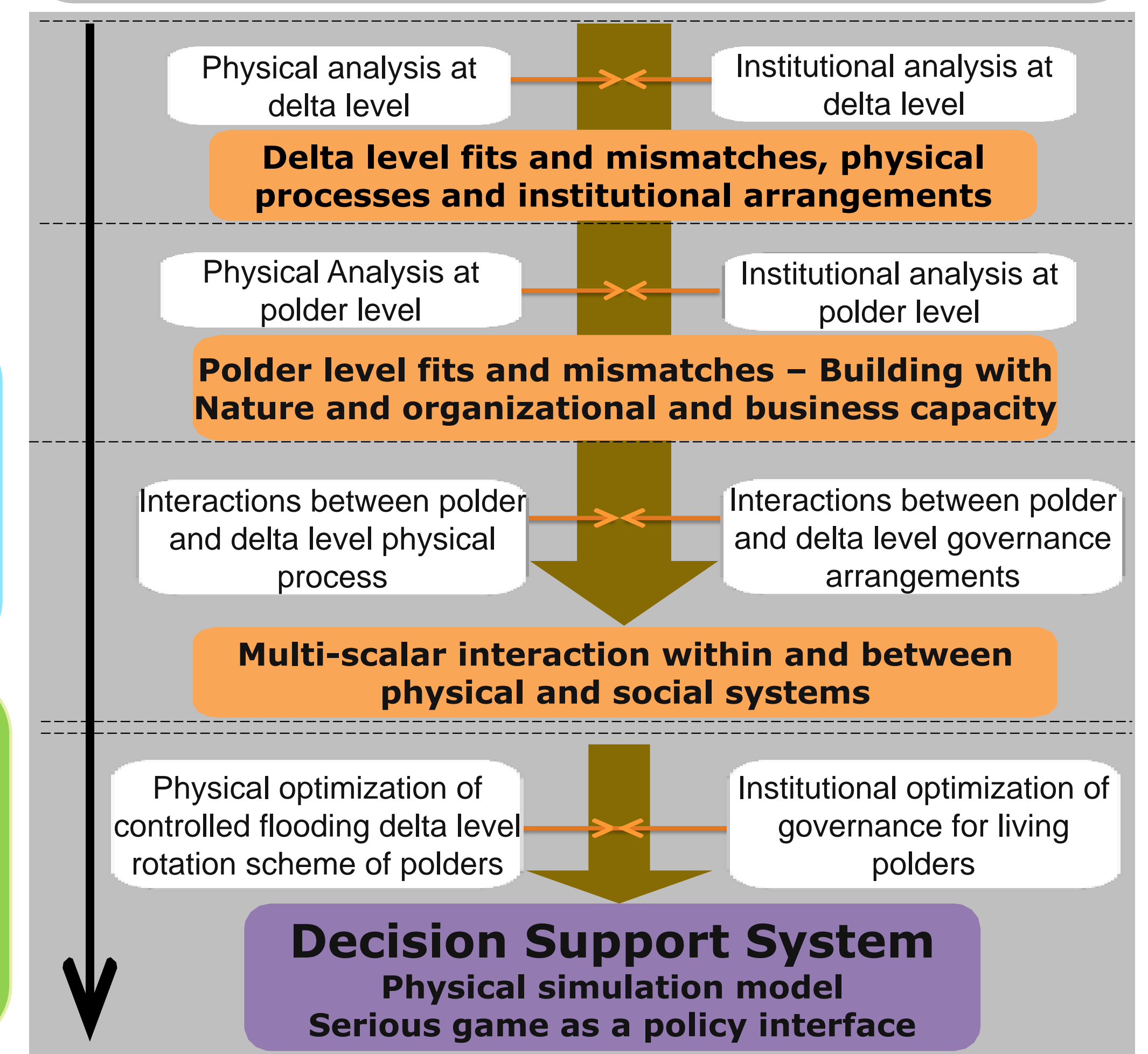
Polders in Bangladesh



Change of river morphology

## General Approach

To combine physical processes and institutional arrangements at delta scale and polder scale to optimize the delta level rotation of controlled flooding of the polders to raise the land



## The Problem of delta

- Natural disasters, food security, population growth and urbanization drove the polderisation
- ~140 polder constructed during early 1960s; a population of ~60 million at present
- Polderization caused siltation of riverbeds, land subsidence, leading to salinity intrusion
- Spontaneous breaching of polder dikes and bottom-up forms of sediment management in the river (1990s)
- Re-allowing sediment rich water inside the polders allows for keeping up with the rate of sea level rise
- This became known as Tidal River Management (TRM)

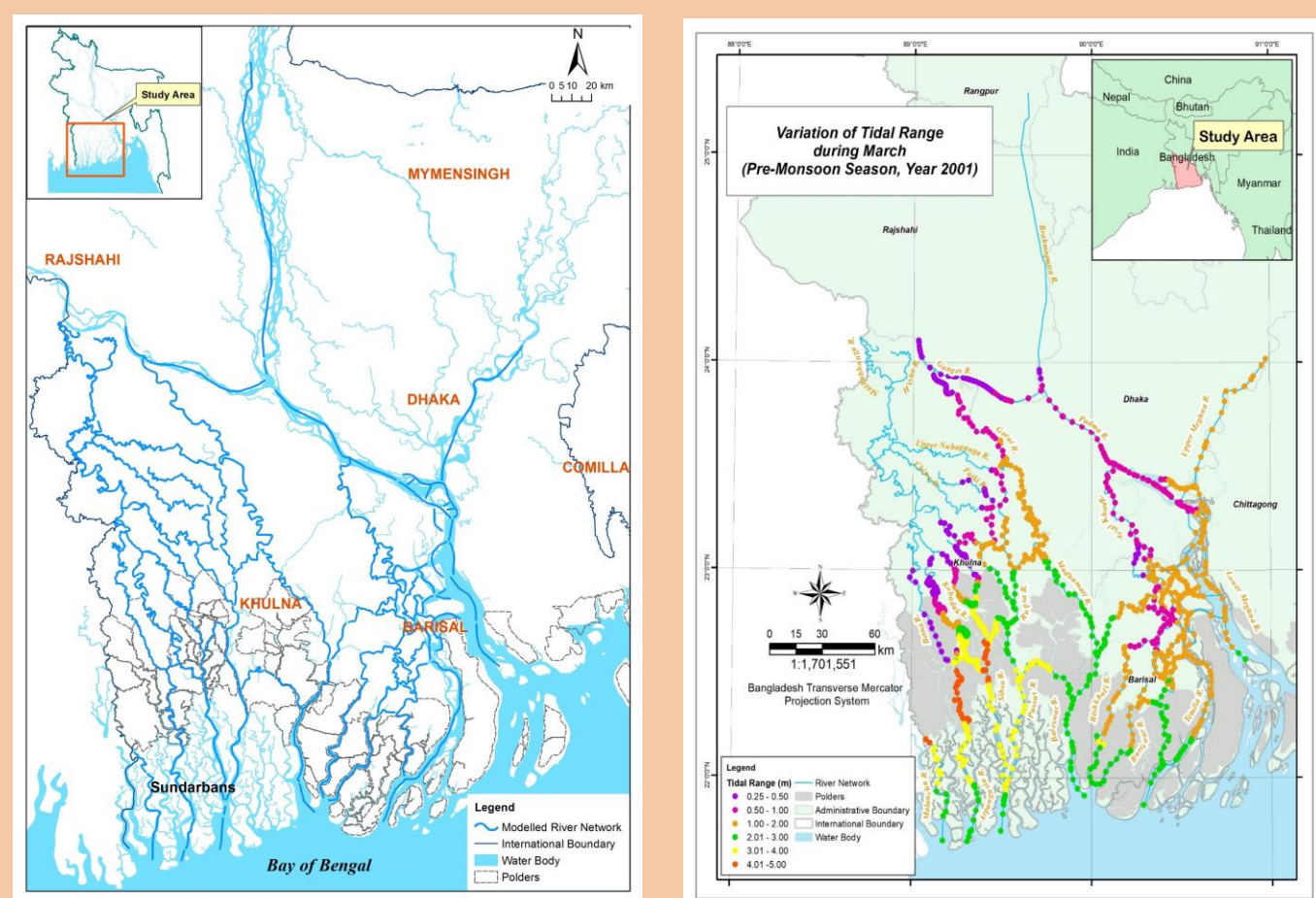
## Objective of the study

Enhance sustainable livelihoods of polder communities through controlled flooding and sedimentation

## Expected Outcomes

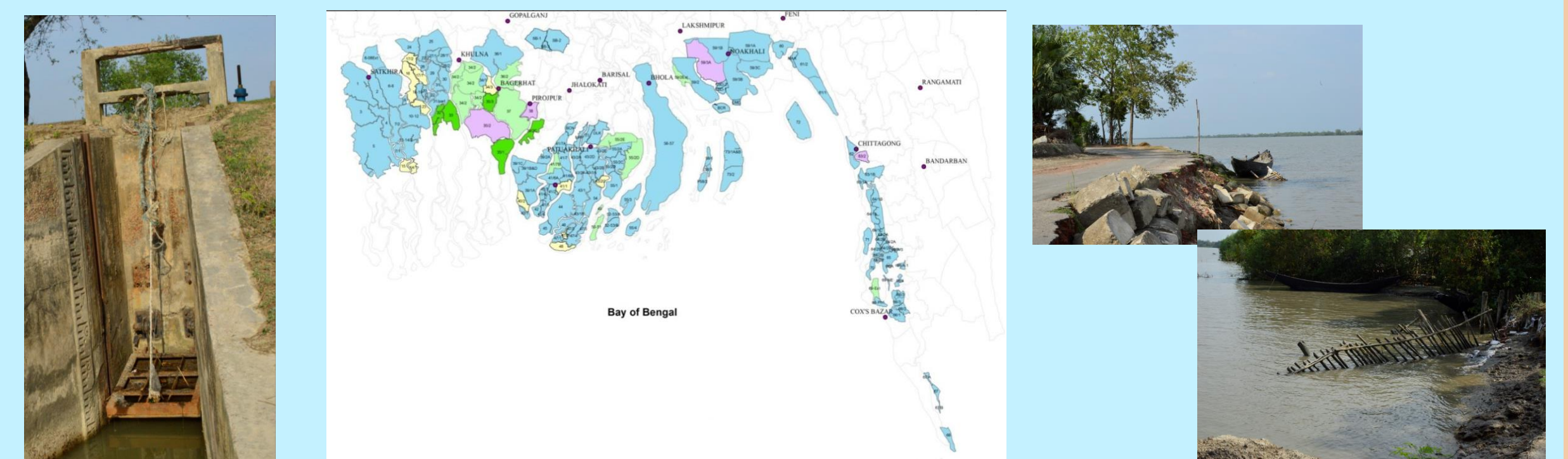
- Spatiotemporal hydro-morpho-dynamic models
- Comprehension of current and optimal governance arrangements
- Decision support system.

## Delta level fits and mismatches, physical processes and institutional arrangements

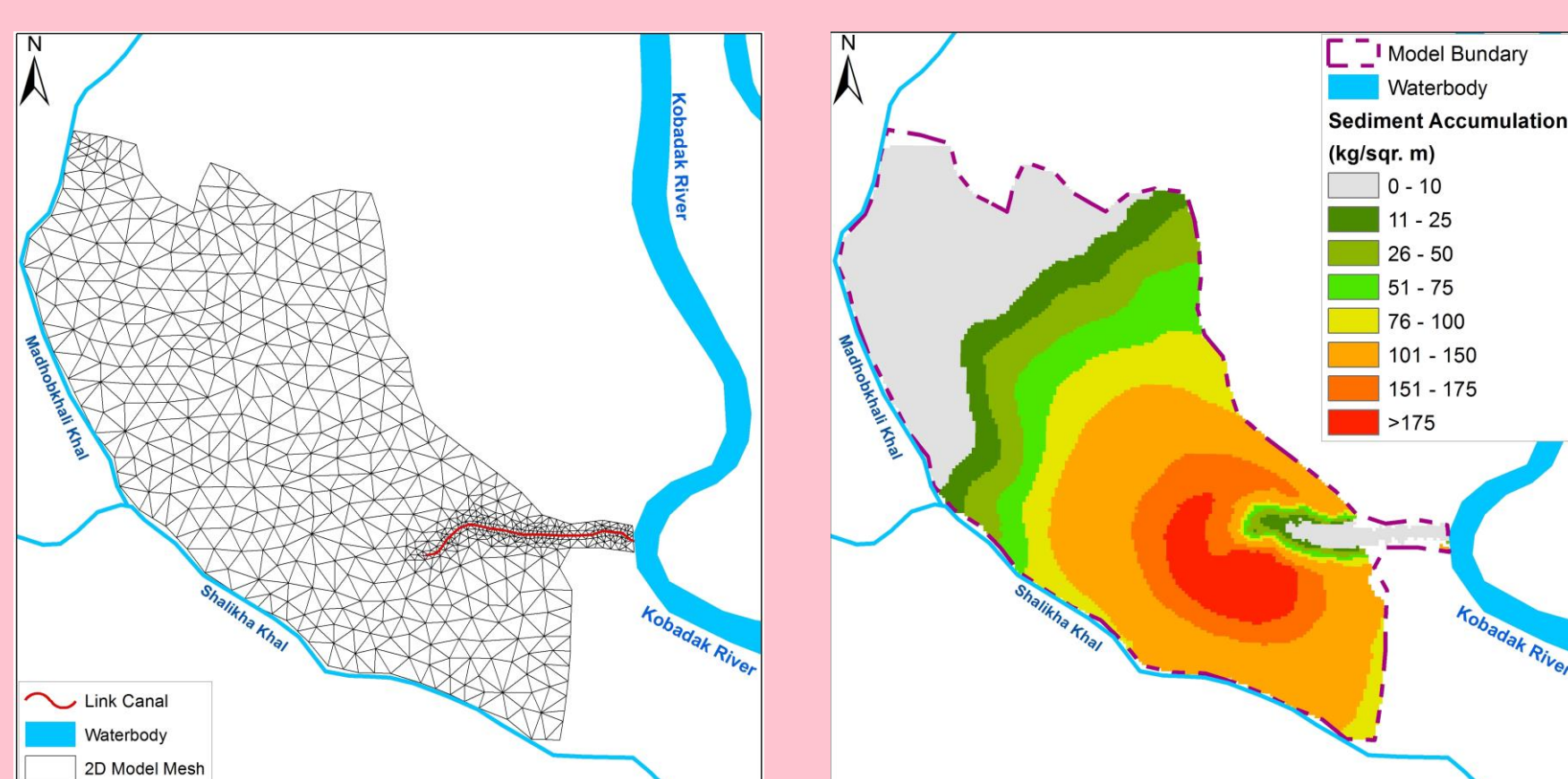


- Delta scale one dimensional hydro-morphodynamic model
- Investigate the movement of sediment for different present and future scenarios

## Institutions and Trade-offs between Infrastructure-Resilience and Livelihood-Vulnerability in Socio-Hydrological Systems

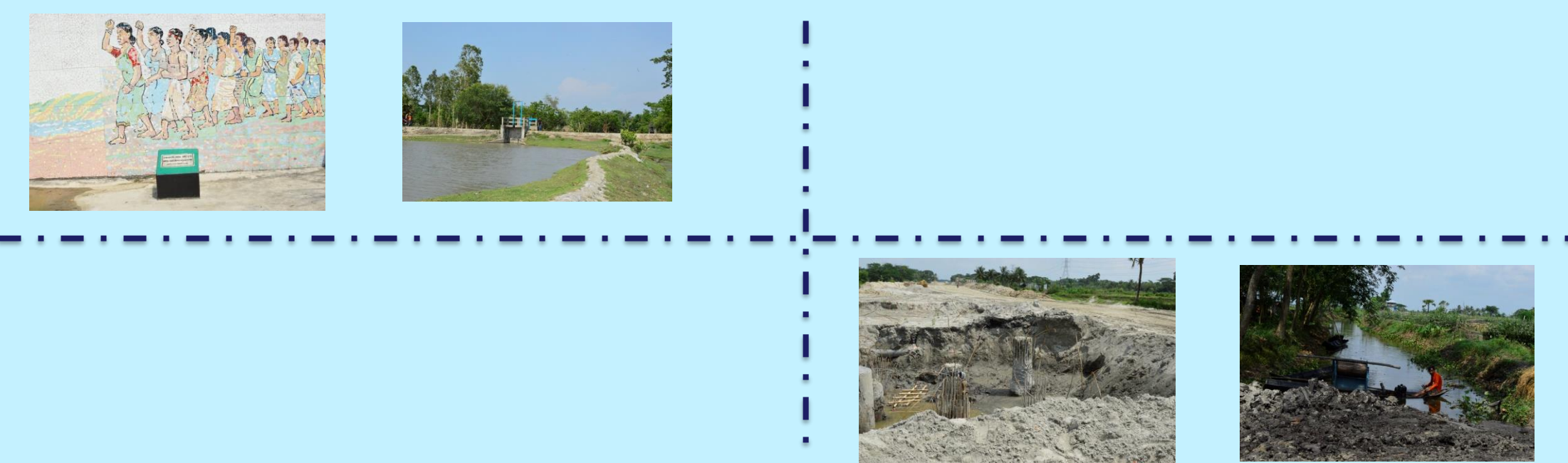


## Polder level fits and mismatches, Building with Nature and, organizational and business capacity

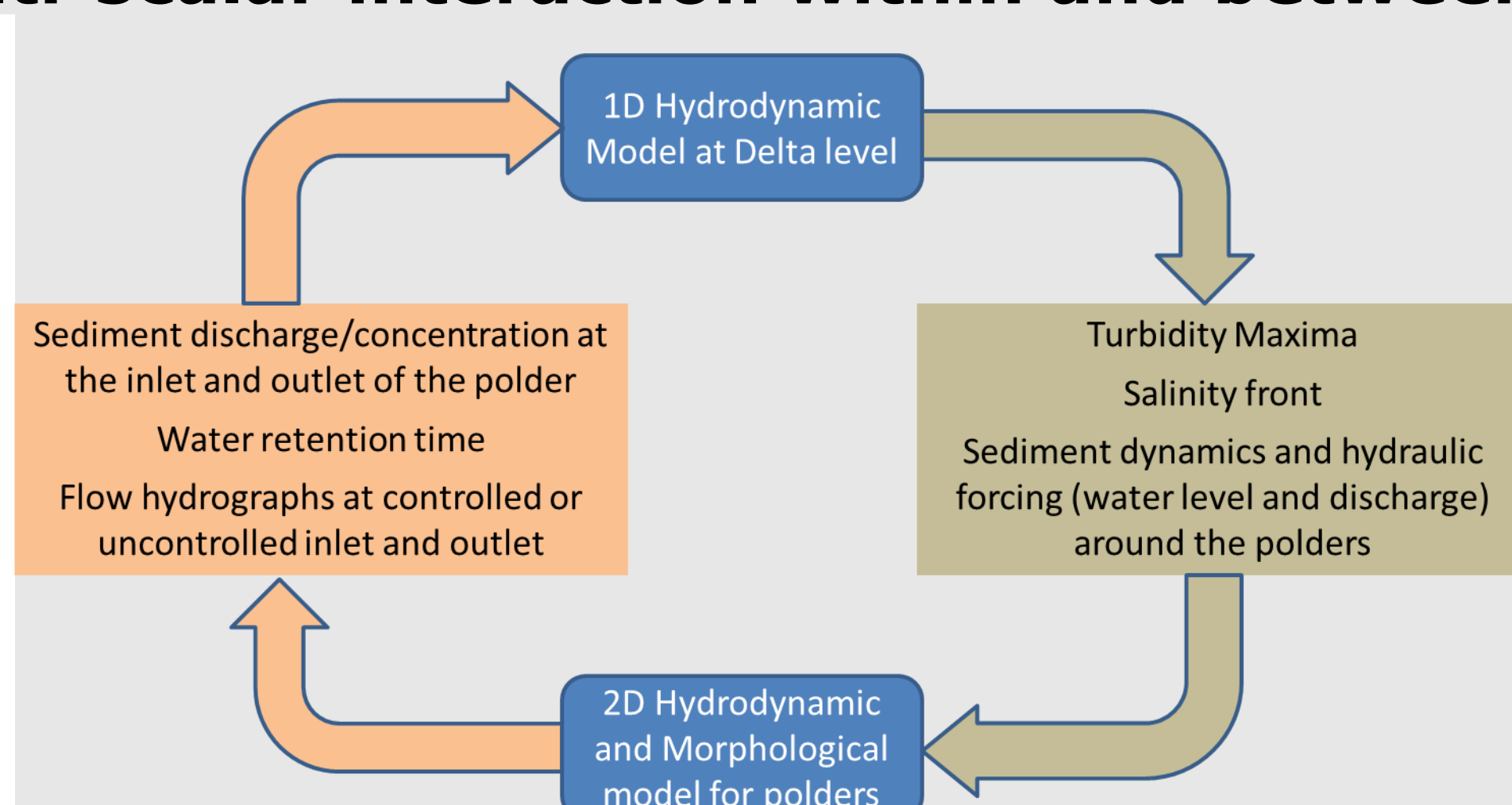
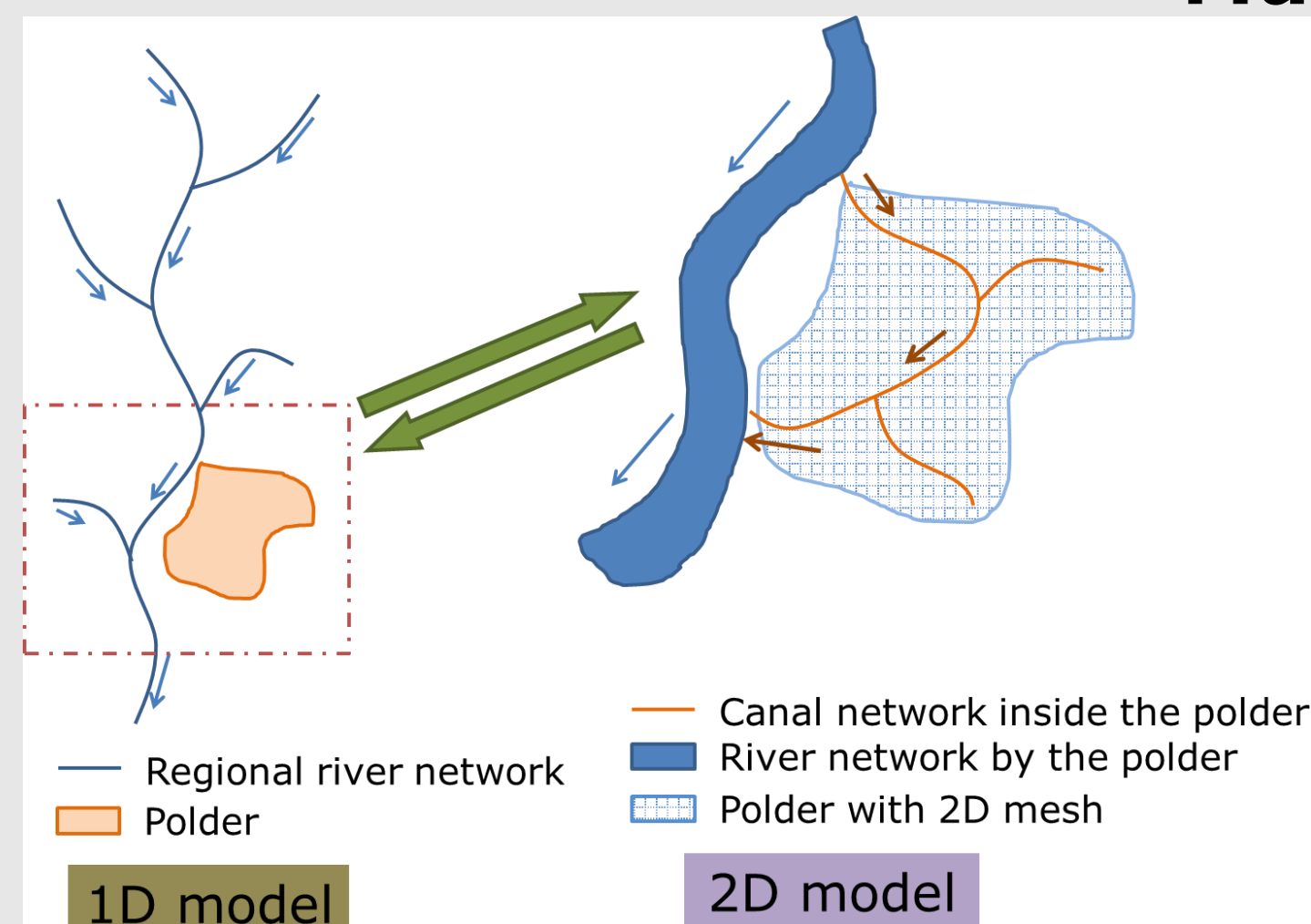


- Polder scale two dimensional morphodynamic model
- Investigate the movement of sediment for breaching of dike

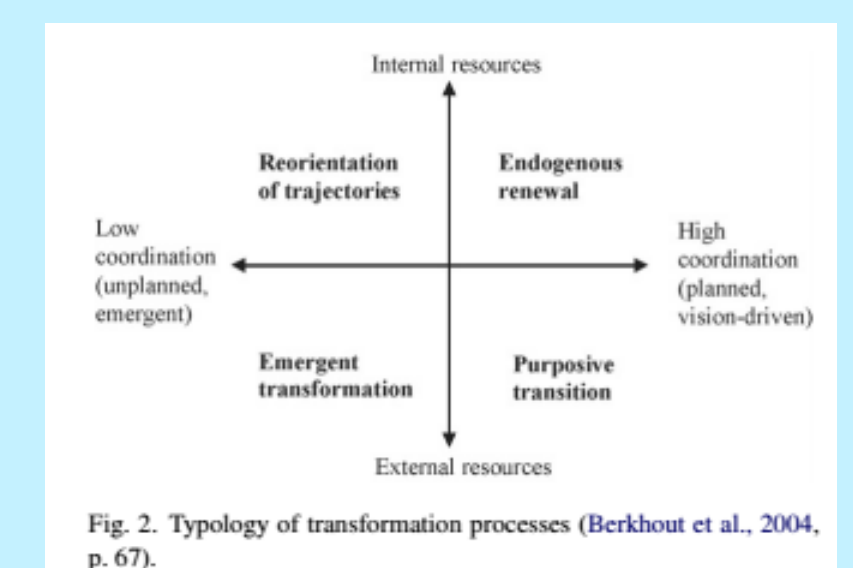
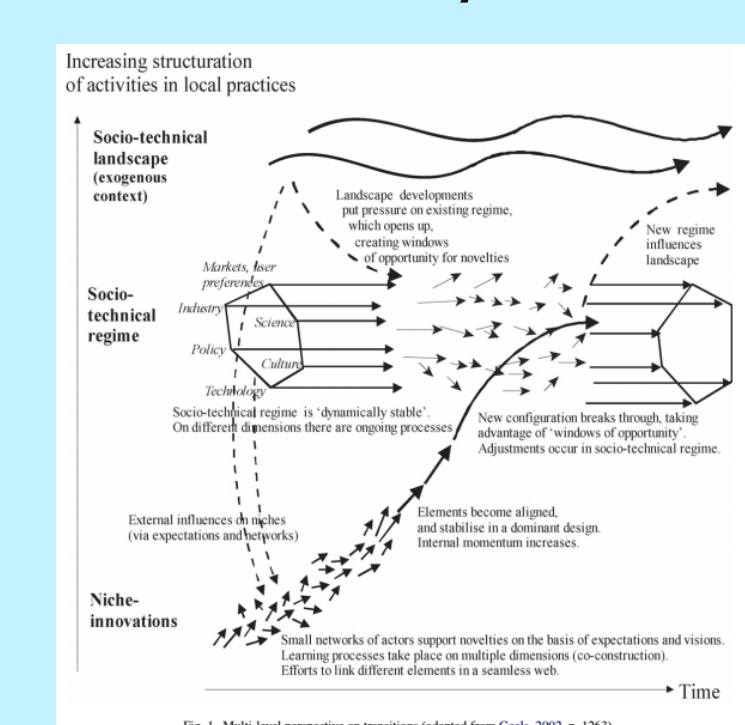
## Path Dependencies in Resilience, Vulnerability and Governance Experiments associated with Social-Hydrological Systems



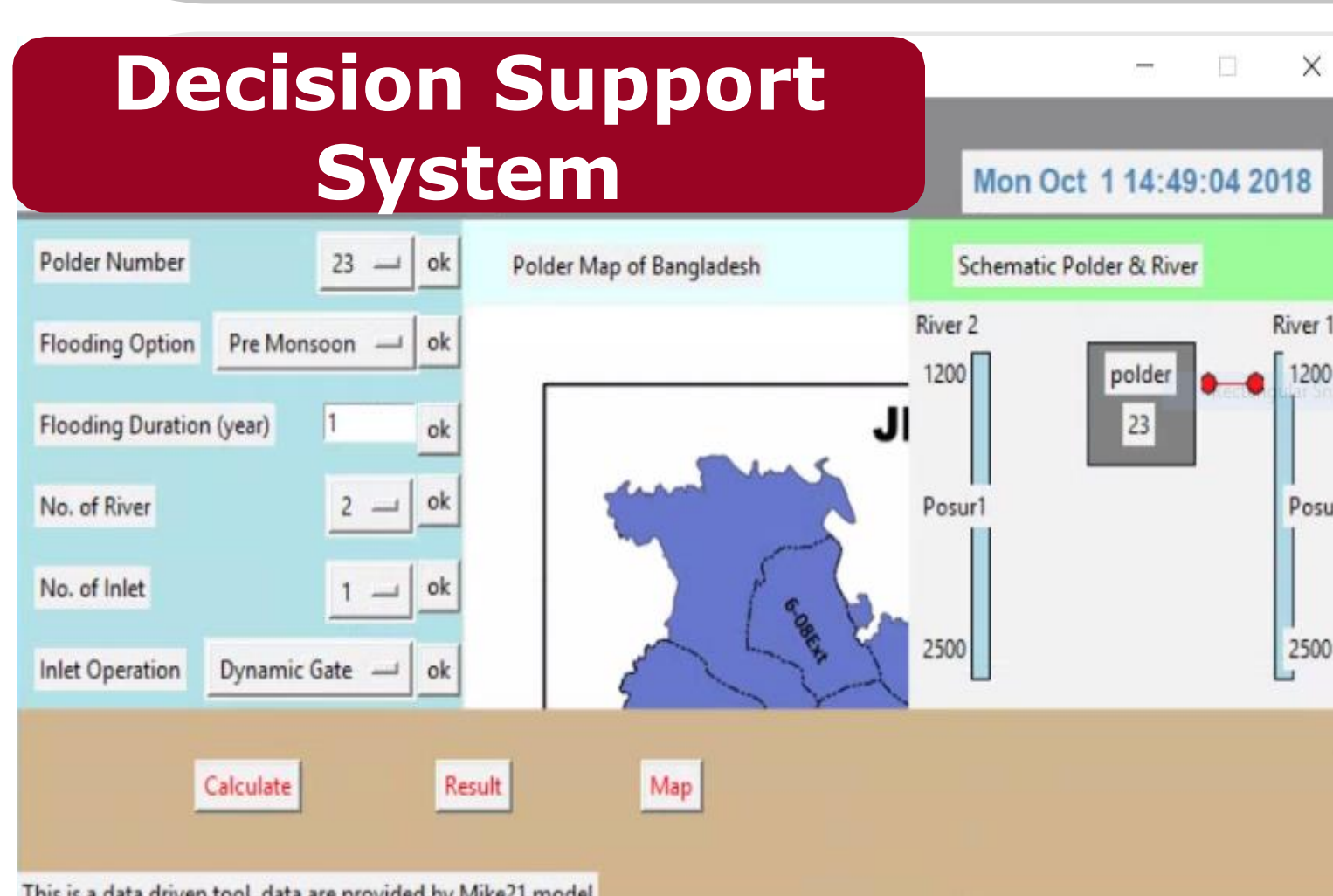
## Multi-scalar interaction within and between physical and social systems



## Tidal River Management in Polders, Innovation Systems & Sustainability Transitions in Social-Hydrological Systems



## Decision Support System



## Multi-scalar interaction within and between physical and social systems

Physical Analysis

Institutional Analysis

- Interactive tool with data driven model
- Combining physical and institutional scenarios
- Selection of scenario results in indicative maps and tables
- Serious gaming with stakeholders participation
- Most acceptable polder inundation rotation scheme induced by stakeholders