

## Adaptive Capacity to Climate Change: Concept and Approaches for the Water Sector in Malaysia

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## Vulnerability & Adaptive Capacity in CC Adaptation

- The scenarios of CC:
  - Warming since industrial revolution: +0.76 °C
  - Projected future warming: +0.2 °C per decade
  - Changes in rainfall amounts & patterns
- Adaptation measures are necessary to avoid or cope with potential adverse impacts of CC
- Extent of CC Impact ← Degree of vulnerability
  - Exposure
  - Sensitivity
  - Adaptive capacity

## Adaptive Capacity: Definition & Evolution of Understanding

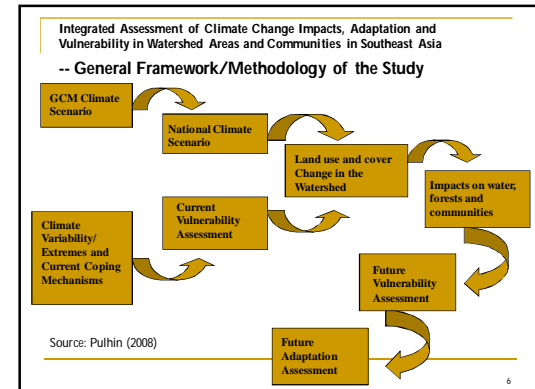
- Adaptive capacity – ability of a system to:
  - Moderate the impacts
  - Take advantage of the opportunities
  - Cope with the consequences
- Evolution of understanding – links closely with vulnerability
  - End-point approach
  - Starting-point approach

## Adaptive Capacity: End-Point Approach

- Design and implementation of adaptation:
  - Future climate change
  - Vulnerability in biophysical factors
- Uncertainties in the approach:
  - Climate scenarios
  - Climatic effects on sectors
  - Future socio-economic conditions
  - Unknown if adaptive capacity assets will be drawn in time of need
- Shortcomings:
  - Highly dependent on climate scenarios (CC may alter in a different way than expected) → adaptation measures may become inappropriate

## Adaptive Capacity: Starting-Point Approach

- Adaptive capacity of the present's system:
  - Socio-economic factors + Biophysical factors
  - Enhancing the present's ability to respond to stressors and secure livelihood
- Pro:
  - Practical for coping with changes and uncertainties
  - Promote sustainable development
  - Facilitate cheaper adaptation strategies
  - Target the poor and vulnerable groups more effectively



### Water Management and Climate Change

- Water management has always adapted to changes
  - Water availability; demand; occurrence extreme events; etc
  - CC is just one of the pressures
- Potential implications of CC on water sector
  - Drought-related stresses; flood events; water quality problems → could impact across many other sectors
  - Effects of climate variability on hydrology and water resources
- Assessment of CC impacts (AR3-AR4)
  - Projection of effects with hydrological model driven by scenarios based on climate model simulations
  - Inclusion of current sensitivity/vulnerability & non-climatic drivers in projections & socio-economic aspects

### Adaptation in Water Sector

- Development of adaptation techniques in the past largely independent of CC
- Adaptation options:
  - Supply-side management (e.g. building reservoirs or structural flood defences)
  - Demand-side management (e.g. managing demand or changing institutional practices)
- CC is increasingly being considered explicitly
  - Methodologies vary between and within countries depending on institutional arrangements for water resources planning

### Adaptive Capacity to Climate Variability & CC

- Institutional:**
  - capacity of water-related institutions; ability of water managers; etc
- Resources:**
  - wealth of nations; etc
- Technological:**
  - state of technology and framework for dissemination; etc
- Regulatory:**
  - legal framework for water administration; etc
- Cultural:**
  - perception on risks; mobility of human populations to change; etc
- Governance:**
  - complexity of management arrangements, etc

### CC Adaptation: Malaysia's Experience

	CC in Asia: Malaysia Country Report	Initial National Communication
<b>Duration</b>	1992-1994	1998-2000
<b>Funding</b>	ADB	GEF/UNDP
<b>Scope</b>	Water resources; agriculture; coastal resources	Agriculture; forestry; water resources; coastal resources; public health; energy
<b>Outputs</b>	Malaysia Country Report	INC + Background report (5 sub-reports)

### Assessment Approach

- Impact assessment approach
- Limited consideration on adaptive capacity
  - Current/Future ability to cope with future CC
- CC modeling & projection: highly uncertain

### Approach of Adaptation Measures

- Proposed adaptation strategies – not directly on CC:
  - Supply-side management
  - Demand-side management (INC)
- Types of adaptation & factors addressed:
  - Engineering or structural → physical or natural systems
  - Regulatory, institutional, planning and behavioural → human system
- Could improve ability to face projected future CC
  - Moderate the potential damages
  - Cope with the probable consequences

### Next Steps?

- Principle hazards/issues & prioritisation
- Interventions & factors that determine/enhance adaptive capacity
- Characteristics of measures that enhance adaptive capacity
- Approach in integrating CC adaptation

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## THANK YOU!

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