Robust adaptation strategies to address a +4C world

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Challenges in water resource management

“Predict then Act” is no longer sufficient
1. Introduction
Robust Decision Support (RDS)

- **New approach to address the uncertainty** in water resources management
- Help answer **“What are strengths and limitations of our strategies/options?”**
- **Evaluate the performance of strategies** under various uncertain conditions with multi-stakeholder participation
Steps for RDS framework application

1. Identifying key actors
2. Formulating the problems (uncertainty, policy, relationship, performance indicators)
3. Model construction
4. Large ensemble of model runs
5. Result visualization
6. Trade-off analysis

Robust Strategy
5 case studies in Lower Mekong Region

1. **Cambodia**: Prek Thnot basin
2. **Lao PDR**: Champhone district
3. **Myanmar**: Chindwin River Basin
4. **Thailand**: Huay Sai Bat, Chi River Basin
5. **Vietnam**: Can Tho City, Mekong River Delta

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2. Key Findings
## Findings from Viet Nam case study

### System characteristics

- Uncertainties in rainfall & tide in 2015 and 2030
- Uncertainties in socio-economic (as planned vs fast development)
- Structural policies (increasing permeable areas, upgrading retention lake, upgrading drainage system)
- Non-structural policies (saving water and decentralized waste water treatment)
- Indicators
  - Flood (volume, level, duration)
  - Water quality (COD)

### Recommendations

- Increasing investments in domestic waste water treatment,
- Harvest rain water (large storage) during storms to replace ground water pumping during long dry seasons
- Increasing public awareness on clean water scarcity

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## Findings from Thailand case study

### System characteristics

<table>
<thead>
<tr>
<th>Uncertainties (X)</th>
<th>Management Strategies (L)</th>
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<tbody>
<tr>
<td><strong>A. Climate Change</strong></td>
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<tr>
<td>1. Average Climate</td>
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<td>2. Dry Climate</td>
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<td>3. Wet Climate</td>
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<td><strong>B. Land use Change</strong></td>
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<tr>
<td>1. Sugarcane to rubber in upper region and rice to sugarcane in middle region</td>
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<td>2. Expansion of irrigated areas in Lower region</td>
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<td>3. Combination of both 1 and 2</td>
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<tr>
<td>S0: No any action</td>
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<tr>
<td>S1: Dredging existing swamps at Nong Loeng Yai</td>
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<td>S2: Use groundwater as alternative water source</td>
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<td>S3: Shift cropping calendar</td>
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<td>S4: Weir/small dams construction in the upper region</td>
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</tbody>
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### Recommendations

- Without adopting any strategy, water scarcity situation is likely to be more serious in the future.

- Four water options
  - increasing existing retention storage
  - Using groundwater as an alternative source
  - shifting the cropping calendar;
  - construction of cascaded weirs.

- Among all strategies identified, the use of **groundwater as an alternative source (option 2)**, is considered as the best option under climate and land-use changes.

### Relationships or Models (R)

- **WEAP**

### Metrics of Performance (M)

- **Huai Sai Bat WEAP Model**

- A. Agricultural water coverage
- B. Domestic water coverage
- C. Industrial water coverage
- D. Environmental/Ecological flow

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Concluding Remarks