Outline of Presentation

- Summary

1. Background
2. Modelling Approach
3. Modelling Results
4. Conclusion and Key Messages
The hydrologic modelling assessment is the foundation for the subsequent analysis in this study.
CONNECTION OF INDICATORS

- WATER RESOURCE DEVELOPMENT SCENARIOS
- HYDROLOGICAL MODELS
- BIORA
- SOCIAL
- ECONOMIC
- WELLBEING EMPLOYMENT SOCIAL COHESION
- SECTOR VALUES GDP CONTRIBUTIONS
- HABITAT BIODIVERSITY
- FLOW SEDIMENT QUALITY
- INFRASTRUCTURE LAND-USE
MODELLING FLOW, SEDIMENT AND QUALITY

Soil and Water Assessment Tool – SWAT (DSF)

Water resource IQQM (DSF)

Hydrodynamic, sediment and water quality – ISIS (DSF)

DSF Assessment Tools (DSF)

Water/Sediment Resource - eWater SOURCE

WUPFIN 3D-EIA Model Tonle Sap

WUPFIN Assessment Tools

Data from MC

MRC Knowledge Base
To assist in predicting development impact on economic, social and environmental condition, the following selected developments are modelled:

- Dams in the Upper and Lower Part
- Flood Protection Structure and Food plain Infrastructure
- Irrigation development
- Agriculture and Forest cover reduction and increase
- Navigation
- Domestic and Industrial Water use
Definition of Scenarios

**Combined Main Scenario**

- **M1** Early Development 2007
- **M2** Development 2020
- **M3** Development 2040

**M3CC** With Climate Change

- Expected sector modifications
- Changing only definition of each corresponding sector

**2007 Development**

- Under construction and planned future change of related six sectors
- Anticipated future change of related water six sectors

**Sub-Scenario**

- Hydropower
- Agriculture
- Land use Change
- Irrigation
- Flood protection
- Climate Change
### MODELLING APPROACH

#### Detail of Sub scenarios

<table>
<thead>
<tr>
<th>№</th>
<th>Description</th>
<th>Sub Scenarios Name</th>
<th>Detail information of sub-scenarios</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Planned Development 2040 with CC Wetter</td>
<td>C2</td>
<td>M3 with climate change (GFLD)</td>
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<tr>
<td>2</td>
<td>Planned Development 2040 with CC Drier</td>
<td>C3</td>
<td>M3 with climate change (GISS)</td>
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<td>3</td>
<td>Planned Development 2040 without HPP</td>
<td>H1.a</td>
<td>M3CC without dams development (consider only dams in M1)</td>
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<td>4</td>
<td>Planned Development 2040 without HPP</td>
<td>H1.b</td>
<td>M3CC with Chinese dams and tributary dams but without ALL LMB mainstream dams</td>
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<td>5</td>
<td>Planned Development 2040 with HPS1</td>
<td>H2</td>
<td>M3CC with all dams in MB in 2040 = M3CC</td>
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<td>6</td>
<td>Planned Development 2040 with HPS2</td>
<td>H3</td>
<td>M3CC (with all dams but only mainstream dams are with mitigation and operation)</td>
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<td>Planned Development 2040 without iRR</td>
<td>I1</td>
<td>M3CC without iRR</td>
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<td>8</td>
<td>Planned Development 2040 with High Level</td>
<td>I2</td>
<td>M3CC with High Level iRR</td>
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<td>Planned Development 2040 without ALU</td>
<td>A1</td>
<td>M3CC without ALU</td>
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<td>10</td>
<td>Planned Development 2040 with High Level</td>
<td>A2</td>
<td>M3CC with High Level ALU</td>
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<td>11</td>
<td>Planned Development 2040 without FPF</td>
<td>F1</td>
<td>M3CC without Flood Protection</td>
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<td>12</td>
<td>Planned Development 2040 with FPF2</td>
<td>F2</td>
<td>M3CC with Urban protection at 1:100 ARP (100 year return period) + floodplain management 1:20 ARP</td>
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<td>13</td>
<td>Planned Development 2040 with FPF3</td>
<td>F3</td>
<td>M3CC with Joint Operation among mainstream dams and selected tributary dams for flood management and protection</td>
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MODELLING APPROACH FOR LANDUSE AND IRRIGATION

Landuse Changes – Model In SWAT

Irrigation Changes – Model In IQQM/SOURCE
**MODELLING APPROACH FOR HYDROPOWER**

**Tributary and China Dams** - Model in IQQM/Source include rule curves and sediment Nutrient Trapping

**Mainstream Dams** - model in ISIS Hydrodynamic and Sediment/Water Quality. Include Sediment Flushing and other operations according to Scenario

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Numbr of Project</th>
<th>Annual Energy (Gwh)</th>
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<td>Development 2020</td>
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<tr>
<td>Development 2040</td>
<td>130</td>
<td>46824.3</td>
</tr>
</tbody>
</table>
MODELLING RESULTS
MODELLING RESULTS

TSS: Reservoir Trapping by Region & Flux to Delta

TOTN: Reservoir Trapping by Region & Flux to Delta

TOTP: Reservoir Trapping by Region & Flux to Delta
MODELLING RESULTS

Delta fisheries
MODELLING RESULTS - SUBSCENARIOS

Climate Change

Hydropower
MODELLING RESULTS - SUBSCENARIOS

Irrigation

Land Use Change
Methodology for Modelling is to use Accepted **DSF Tools/Models** together with **eWater** and **WUP-FIN Models** familiar to MCs.

- Hydropower projects in the Mekong Basin **reduce wet season flows and increase dry season flows**. However, The differences in total flow volumes were subtle.

- **Reduced sediment and nutrient transport downstream** caused by hydropower projects in the Mekong Basin, except for H1a.

- **Dam mitigation measures** have the effect of increasing the sediment load reaching Delta.

- **Full hydropower development** (other than scenario H1a and H1b) reduces lake, floodplain and coastal fisheries production 40% to 70% depending on the area.

- **Issues associated with change** described in sector studies, bio resource assessment, socio and macro economics.
Thank you