

The MRC Regional Stakeholder Forum

14th – 15th December 2017

Vientiane, Lao PDR



MRC Council Study - Results of Hydropower Thematic Areas

Hydropower Team

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Outlines of Presentation

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- 2) Hydropower Scenarios**
- 3) Key Findings**
 - I. Model Results**
 - II. Ecological and Environmental Impacts**
 - III. Socio-Economic Assessment (SEA)**
 - IV. Macro-Economic Assessment (MEA)**
- 4) Overall Key findings – Hydropower Thematic**



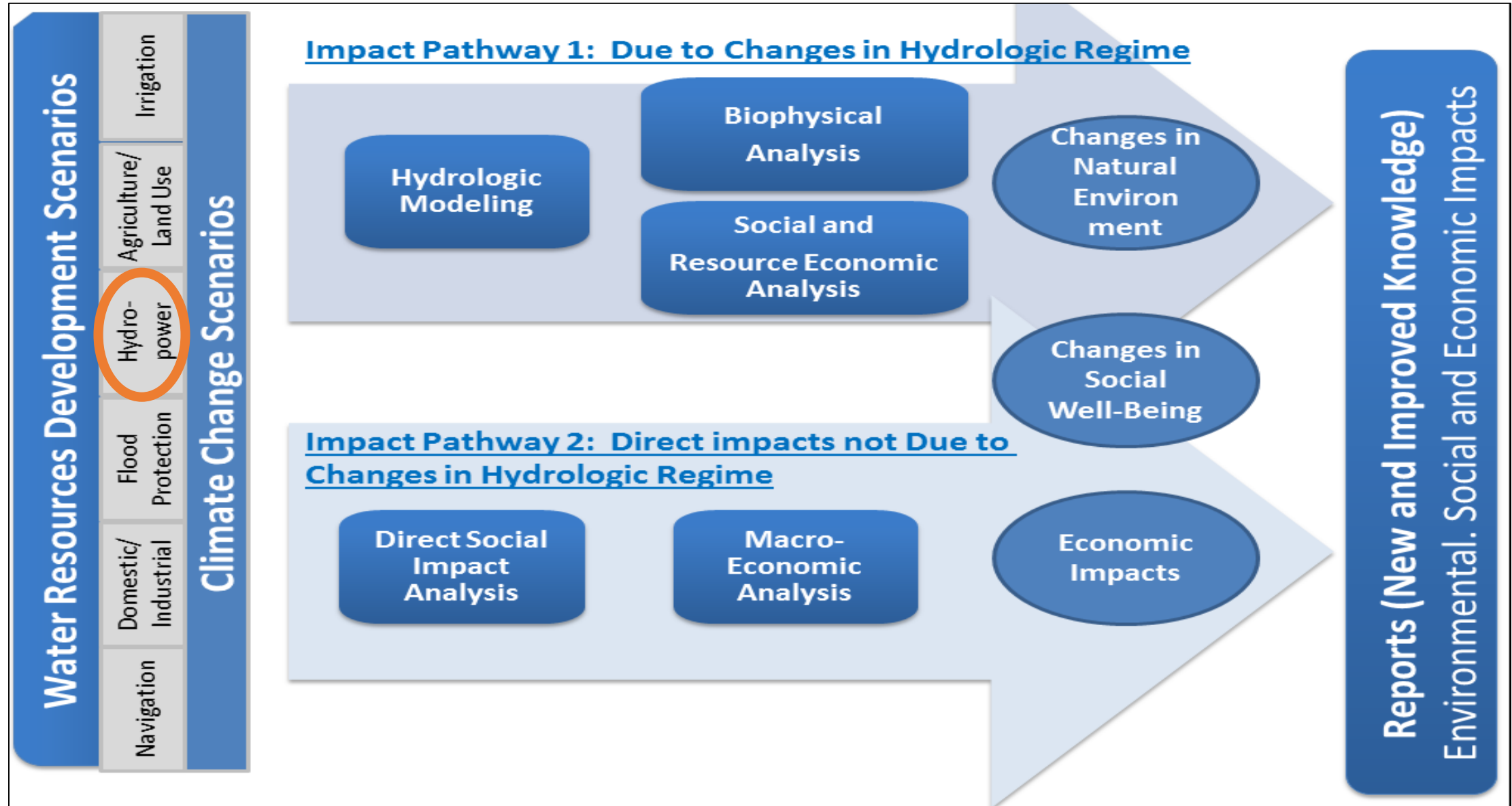
1. Objectives

- **Present** : the assessment of
 - The **Impacts** (**Positive** and **Negative**) including
 - The **cumulative impacts** (**Positive** and **Negative**) of hydropower development in the mainstream and tributaries of LMB.

- **Focus** :
 - How the dams can **influence** fisheries, river flow, sediment and nutrient flux in terms of quantity, quality, timing
 - The resulting **transboundary positive and negative impacts** on environmental, social and economic parameters in the mainstream corridor, floodplains and Delta as well as coastal processes.

- **Estimate** :
 - The various **economic benefits**
 - The updated **assessment of sediment transport and the effect of change on geomorphology and fisheries.**

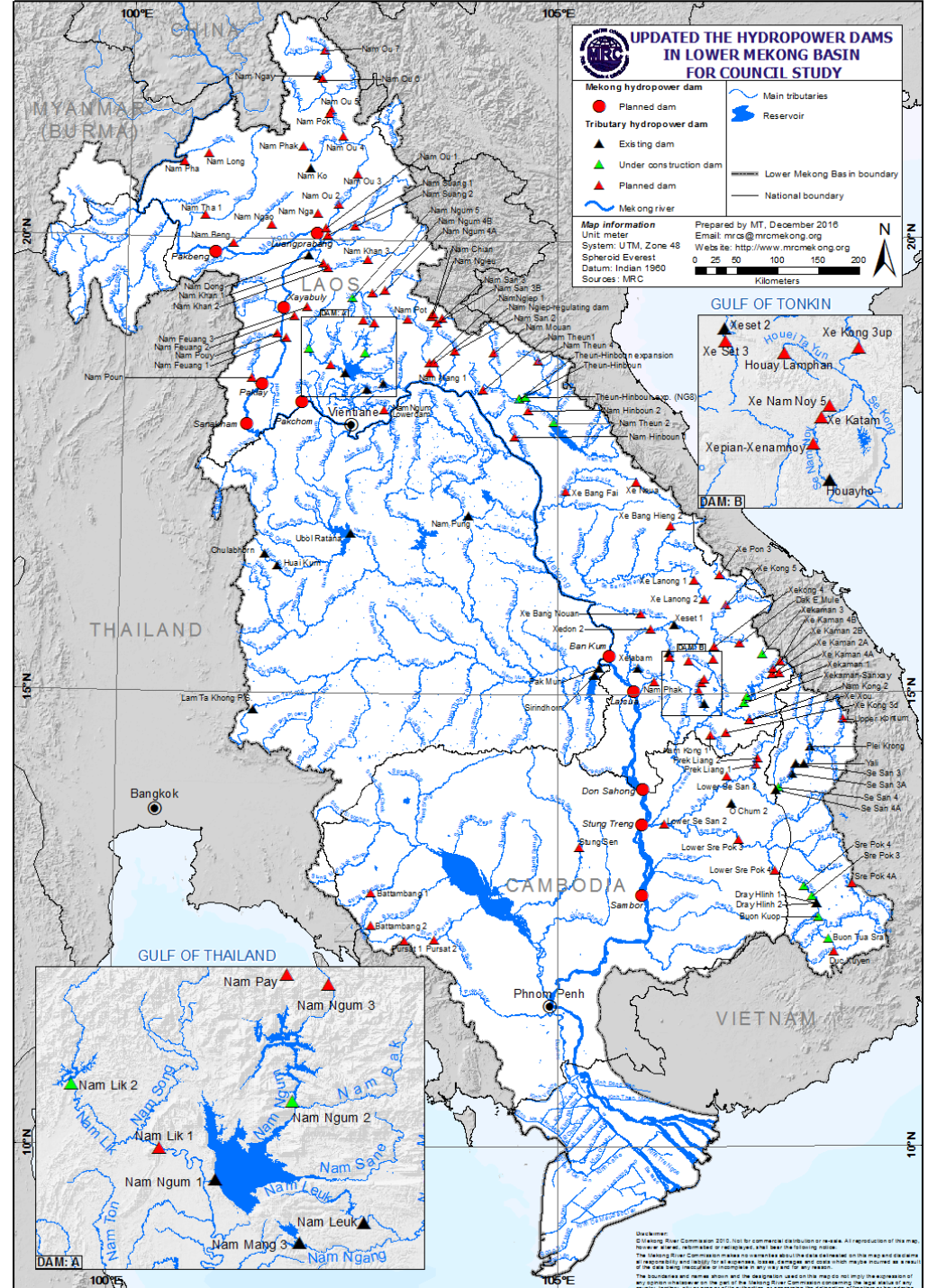
1. Approach





Hydropower Projects on the Lower Mekong and Tributaries

- Majority in **Lao PDR**



2. Hydropower Scenarios

The additional 4 sub-scenarios have been developed to test effects of water resources development in the hydropower sector

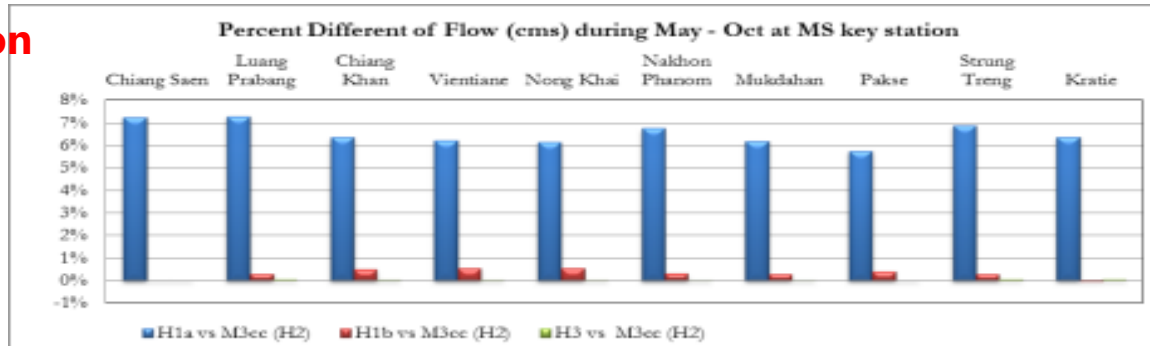
Scenarios				Level of Development for water-related sectors						Climate	Flood-plain	
				ALU	DIW	FPF	HPP	IRR	NAV			
M3CC	Planned Development with climate change	Scenario	2040	2040	2040	2040	2040	2040	2040	2040	More seasonal	2040
H1a	Planned Development 2040 without HPP			2040	2040	2040	2007	2040	2040	2040	More seasonal	2040
H1b	Planned Development 2040 without mainstream HPP			2040	2040	2040	Only tributary	2040	2040	2040	More seasonal	2040
H2	Planned Development with climate change	Scenario	2040	2040	2040	2040	2040	2040	2040	2040	More seasonal	2040
H3	Planned Development 2040 with Mitigation			2040	2040	2040	2040 with Mitigation	2040	2040	2040	More seasonal	2040



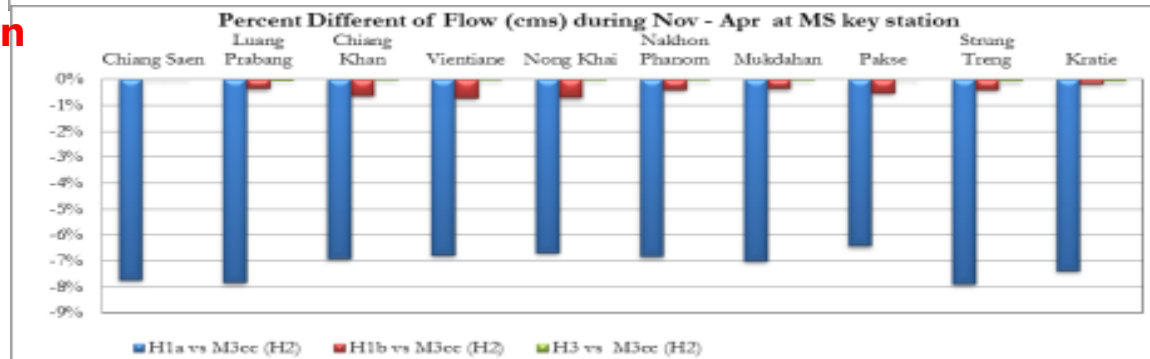
3.1 Key Findings - Model Results : Flow Level

The average flow (cms) and percentage change from sub-scenarios

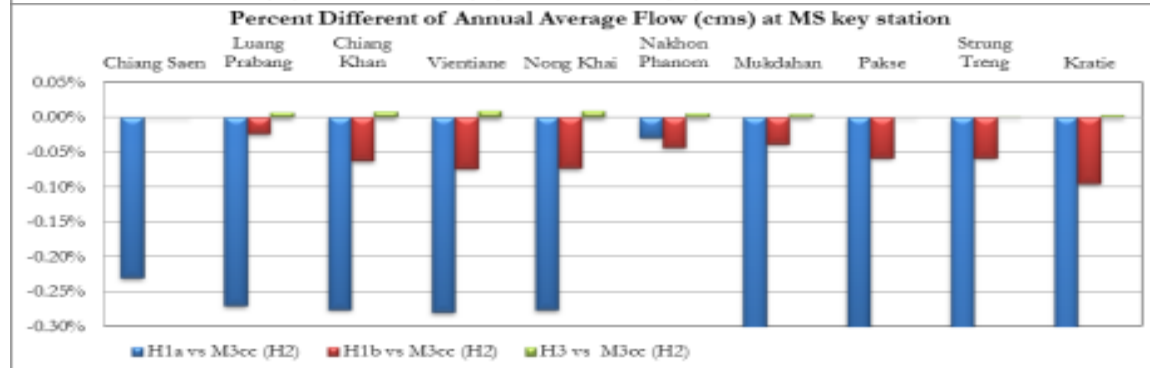
Wet Season
≈ +7%



Dry Season
≈ -7%



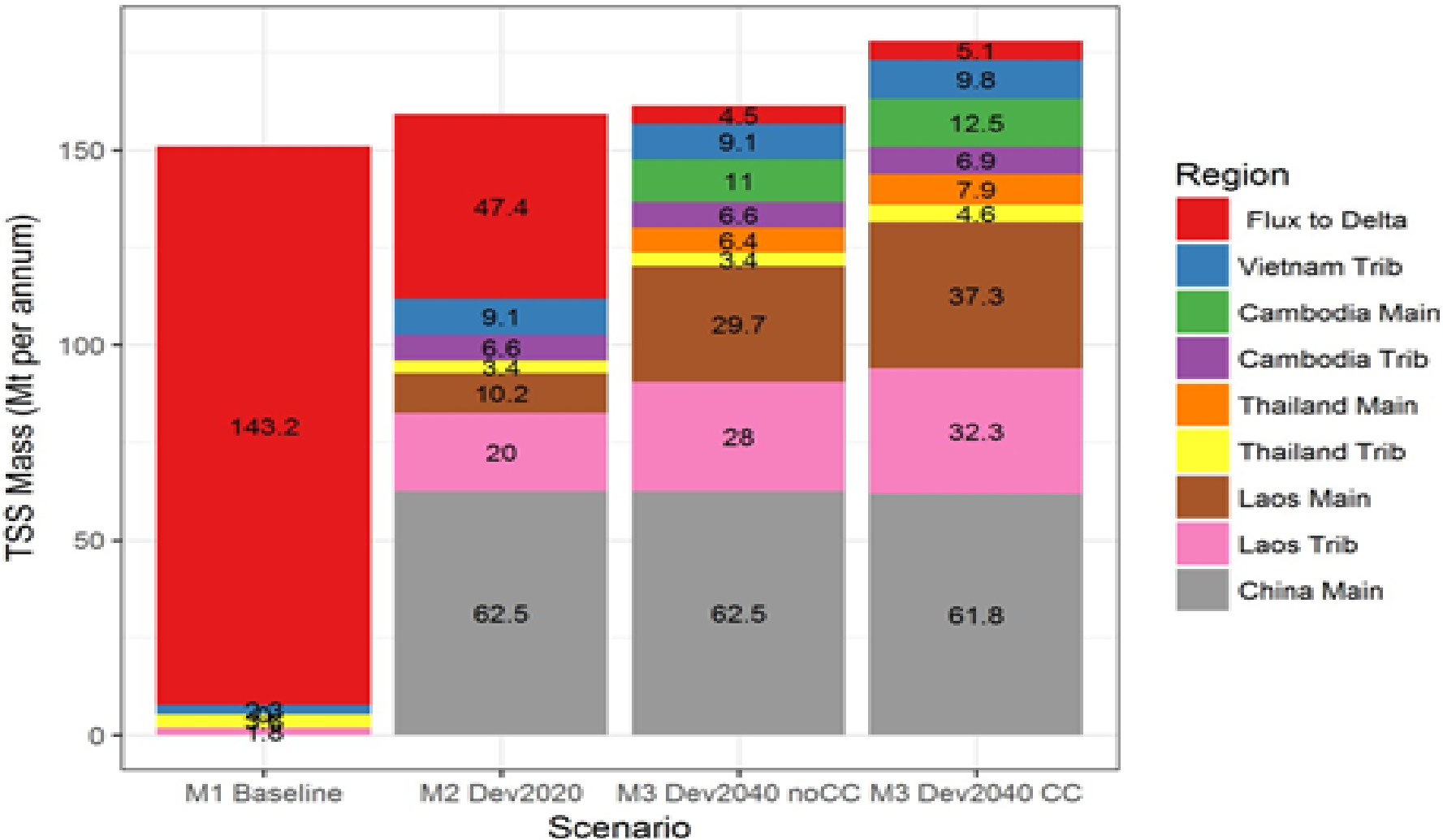
Avg.
≈ -0.3%



- The seasonal and transboundary effects of hydropower development
- The flow change in **M3CC** compared with **H1a**
 - Around **7% reduction** in flow at all key stations during **Wet season**
 - Around **7% increase** in flow at all key stations during **Dry season**.
 - The **annual average flow**, the difference in percentage is **less than 1%** only.

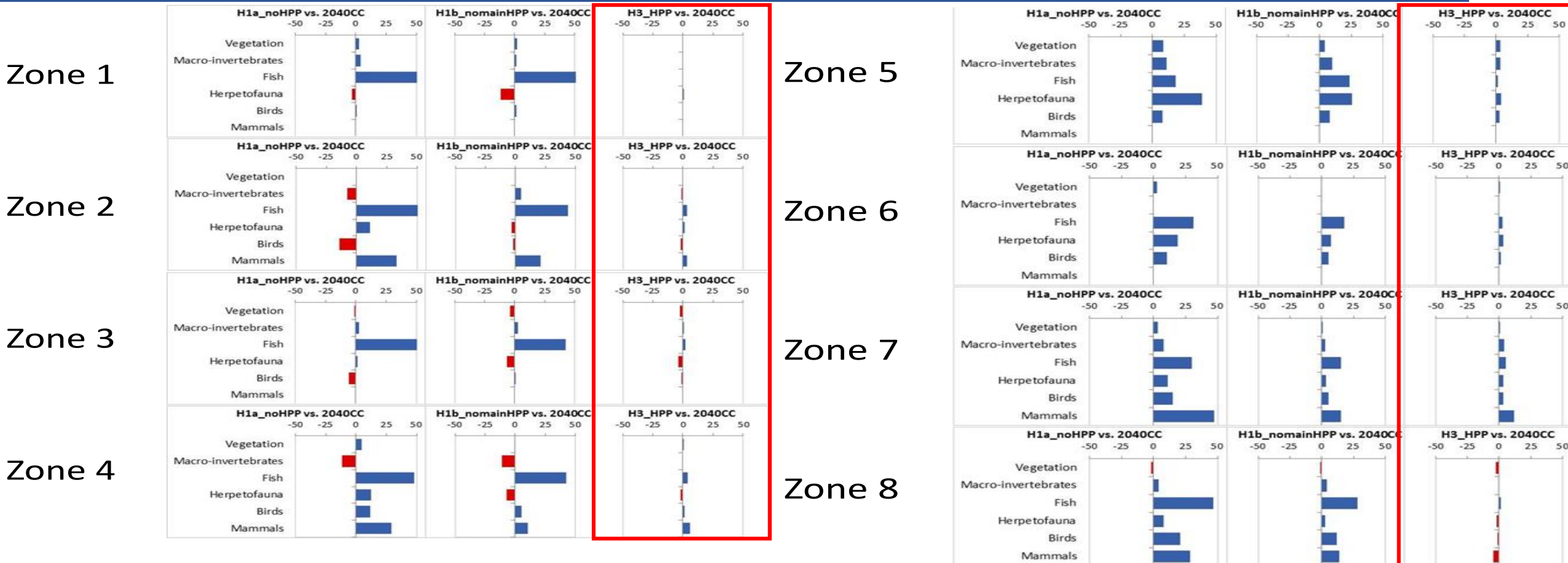
3.1 Key Findings - Model Results : Sediment

TSS: Reservoir Trapping by Region & Flux to Delta



- Under both the 2040 Scenarios with and without climate change impact: the anticipated **most significant change** is the reduction in **sediment flux to the delta**.
- Large part of this reduction is due to the **trapping of sediments** in dams in the **Upper Basin and in tributary dams of the LMB**.
- The impacts from mainstream hydropower dams on river flow connectivity include trapping of sediment and alteration of flow regimes. These impacts can be **substantial** and **far-reaching**, and **overshadow** those from all other planned water-resource developments in the LMB.

3.II Key Findings - Ecological and Environmental Impacts



- The difference in health for geomorphology (habitat quality) between 2040CC and the hydropower sub-scenarios
 → Confirms **Negative Impacts** from Hydropower Development
- The **sediment flushing measures** included in **H3** yielded slight **improvements in river condition** relative to Scenario 2040CC in **the lower reaches of the LMB**.
- **The effectiveness of fish passages** in the main channel dams were assessed at **50%** which is also important for the improvement of the **ecosystem integrity condition**

3.III Key Findings - Socio Economic Assessment

Relative changes in the value (US\$) of *Fish Production*: by corridor zone across development scenarios

Fish production	M1-M2		M1-M3		M3-M3CC		M2-M3	
	\$'000	%	\$'000	%	\$'000	%	\$'000	%
SIMVA Zone								
Zone 2-Mainstream - Lao	-54,378	-39%	-95,312	-67%	-3,290	-7%	-40,934	-47%
Zone 3 A - Lao - Mainstream	-143,710	-34%	-222,263	-53%	-14,056	-7%	-78,553	-28%
Zone 2 B-Upper Thailand	-25,767	-41%	-33,888	-55%	-385	-1%	-8,122	-22%
Zone 2 C-Lower Thailand	-27,831	-39%	-45,975	-65%	-959	-4%	-18,143	-42%
Zone 3 B Thailand-Mainstream	-259,429	-37%	-407,490	-58%	-20,071	-7%	-148,062	-34%
Zone 3 C Thailand-Songkhram	-55,141	-40%	-86,611	-63%	-4,266	-8%	-31,470	-38%
Zone 4 A Cambodia-Khone Falls to Kratie	-9,125	-15%	-20,696	-33%	214	1%	-11,571	-22%
Zone 4 B Cambodia-3S	-2,126	-15%	-4,822	-35%	50	1%	-2,696	-23%
Zone 4 C Cambodia Kratie to Viet Nam border	-77,002	-18%	19,223	4%	2,284	0%	96,224	27%
Zone 5 A Cambodia-Tonle Sap river	-100,060	-18%	-177,125	-32%	15,506	4%	-77,065	-17%
Zone 5 B Cambodia Tonle Sap lake	-81,782	-15%	-149,746	-27%	-37,783	-9%	-67,964	-14%
Zone 6 A Viet Nam Delta - freshwater	-102,828	-2%	-170,567	-3%	97,470	2%	-67,739	-1%
Zone 6 B Viet Nam Delta - saline	-108,712	-8%	-176,644	-13%	99,795	8%	-67,933	-5%
Total	-1,047,892	-25%	-1,571,918	-38%	134,509	-2%	-524,026	-21%

- Changing value for **fish production** in corridor zone = **\$1.57 billion loss**
- The **negative transboundary effect** would have on the **fisheries** sector and will most affect **Thailand** and **Lao PDR** (as % change between scenarios)

3.IV Key Findings - Macro Economic Assessment

Net present value of the hydropower sector in billion US\$ compared to M3CC

Difference to M3CC	in \$B	H1a - M3CC	H1b - M3CC	Tributary	Mainstream
Cambodia	B\$	-11.9	-4.4	7.5	4.4
Lao PDR	B\$	-36.1	-17.1	19.0	17.1
Thailand	B\$	-81.1	-61.8	19.3	61.8
Vietnam	B\$	-26.7	-15.2	11.5	15.2
LMB	B\$	-155.7	-98.4	57.3	98.4

- Within the hydropower sector **substantial benefits** occur across the border as the import of **cheap electricity** generate **large economic gains** in **Thailand** and **Vietnam**.
- The economic benefits within **Lao PDR** and **Cambodia** as the host countries of mainstream and tributary dams are likely to receive the **smaller fraction** of economic returns.

3.IV Key Findings - Macro Economic Assessment

Economic benefit changes in % of fisheries sector income compared to M3CC

% → M3CC	H1a	H1b	H3
	no HPP	no Main	HPP with mitigation
Cambodia	+27.5%	+9.6%	+9.6%
Lao PDR	+124.2%	+63.9%	+2.5%
Thailand	+97.3%	+46.2%	+1.6%
Vietnam	+13.8%	+7.0%	-0.2%
LMB	+37.9%	+16.9%	+4.7%

- The **hydropower** interventions considered by the selected scenarios have the **strongest influence on economic indicators**.
- **Substantial trade-offs** need to be expected in the **fisheries sector**, which is likely to **increase food security risks** for various areas in the lower Mekong basin.
- **Hydropower development** with adequate mitigation measures ensuring **sustainability of other sectors** is overall the most economically positive approach for the region and, in a transboundary sense, for the individual countries.

4. Overall Key findings – Hydropower Thematic

- **Hydropower** emerges as the sector with highest relevance to **contribute to macro-economic growth** for the lower Mekong basin with a **nearly half** of the combined sector growth under 2040 plans
- However, **hydropower is also linked to the highest trade-offs**: About **26%** of the hydropower gains would be **lost in the fisheries sectors** under the **medium plan** development scenario and **15%** for the **long term** development scenario. **Implemented mitigation measures** could **reduce** in the long term development scenarios **fish losses** by an estimated **11%**



Thank you

