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SEA OVERVIEW OF CONCLUSIONS

REGIONAL MITIGATION ASSESSMENT WORKSHOP
Ho Chi Minh City
28-29 June 2010

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SEA OF HYDROPOWER ON THE MAINSTREAM MEKONG

Strategic options for LMB mainstream development

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1. Not to proceed with the mainstream projects
2. Defer a decision on whether or not to proceed and in what form and circumstances
3. Proceed with mainstream development on a gradual phased basis
4. Proceed with rapid development of all 12 projects

Focussing down on the strategic concerns

THEME	KEY ISSUES
Power & Energy	1. 2. 3.
Economic systems	1. 2. 3.
Hydrology & Sediment	1. 2. 3.
Aquatic	1. 2. 3.
Terrestrial& agriculture	1. 2. 3.
Fisheries	1. 2. 3.
Social systems	1. 2. 3.
Navigation	1. 2.
Climate change	1. 2. 3.

Issues
- Sediments and nutrients
- Fisheries
- Livelihoods
- Foreign direct investment
- Power security

Projects by significance of impact – groups and individual projects

Geographic area (area and country by significance of impact)

Ranking significance of impacts

- For economic, social and environmental impacts the SEA Team and stakeholders conducted ranking based on significance of impacts for:
  - Geographic areas
    - Hot spot geographic areas
    - LMB countries
  - Individual projects
  - Project clusters

Results of national impact significance assessment

THEME	ISSUE	LAO PDR	CAMBODIA	THAILAND	VIETNAM
Hydrology and sediment	Changes in patterns of maximum water levels, rates of rise and predictability				
	Changes in sediment transport and deposition				
	Changes in nutrient transport				
Terrestrial ecosystems and agriculture	Habitat loss and degradation				
	Changes in Land use				
	Changes in irrigated agriculture				
	Changes in River bank gardens				
Aquatic ecosystems	Change in productivity of aquatic habitats				
	Changes in populations of rare and endangered species				
	Changes in water quality				
Fisheries	Changes in long distance migration				
	Changes in fish species biodiversity				
	Changes in fish production				
Social systems	Changes in poverty and natural resource based livelihoods				
	Changes in health and nutrition				
	Social effects of resettlement, land acquisition and loss of access				
	Changes in cultural values and patterns				
Economics	Contributions to national economy - Export earning				
	Contributions to national economy - Foreign Direct Investment				
	Contributions to local economies (district and community level				
Energy and Power	Achieving energy security				
	Meeting national energy demands				
	Meeting local energy needs				
Climate change	Relative emissions of green-house Gas				
	Direct impacts of climate change on hydropower projects - extreme events & dam security				
	Combined effect of climate change and mainstream dams on food security				

Large negative | Negative | No impact | Positive | Large Positive | Not relevant

Observations on national impact significance scoring

- Benefits are focussed on power & economic themes
- Risks are focussed on natural & social systems, particularly:
  - Fisheries
  - Hydrology & sediment
- Lao placed highest significance on power benefit, Vietnam placed the lowest significance
- High concern over increased poverty in all countries (despite high economic benefits) reflect distributional issues

National ranking according to workshop feed back

Benefits

1. Lao PDR
2. Cambodia
3. Thailand
4. Vietnam

Costs

1. Vietnam
2. Thailand
3. Cambodia
4. Lao PDR

Project ranking: criteria

ECONOMIC CRITERIA	ENVIRONMENTAL CRITERIA	SOCIAL CRITERIA
1. The cost per unit of energy 2. The total net annual benefit 3. The net annual benefit per unit of energy	1. Sediment & nutrient load 2. Wetland & floodplain productivity 3. Fisheries productivity	1. No. of people directly affected

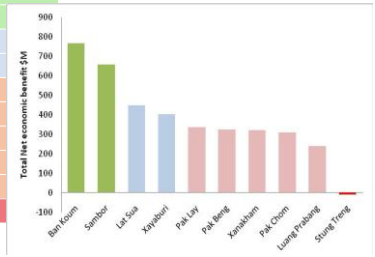
Power sector economic benefit ranking

PROJECT	PROJECT COST AT COMMISSIONING			ANNUAL ECONOMIC COST (BASED ON PROJECT LIFE AND 10% DISC. RATE)			CALCULATION OF ECONOMIC BENEFITS BASED ON: 1. DOMESTIC POWER SUPPLY VALUED AT REPLACEMENT COST 2. EXPORTS VALUED AT 85% OF REPLACEMENT COST OF IMPORTER 3. ECONOMIC COST OF PRODUCTION											RANKING OF ECONOMIC BENEFITS (Power Sector)	
	Budget (2009 $) M$	IDC M$	Cost at Start M$	Capital Cost M$	Annual Oper. Cost M$	Total Annual Cost M$	Mean Annual Energy GWH	Energy Cost $/MWH	Energy Cost Rank	Annual Power Supply GWH LA	TH	CA	VI	Net Annual Economic Benefit M$ LA	TH	CA	VI	TOTAL	Unit Benefit $/MWH	Total Benefit Rank	Unit Benefit Rank
Pakbeng	1,319	330	1,649	166	13.2	179.5	5,268	34.1	4	527	4,741	0	0	283	62	0	0	325	61.7	6	6
Luangprabang	1,555	389	1,944	196	15.6	211.6	5,437	38.9	6	544	0	0	4,894	187	0	0	54	240	44.2	9	9
Xayabuly	1,286	321	1,607	162	12.9	175.0	6,035	29.0	1	604	5,432	0	0	332	71	0	0	403	66.8	4	3
Paklay	1,340	335	1,675	169	13.4	182.3	5,421	33.6	3	542	4,879	0	0	273	64	0	0	337	62.1	5	5
Sanakham	1,174	294	1,468	148	11.7	159.8	5,015	31.9	2	502	4,514	0	0	262	59	0	0	321	63.9	7	4
Sangthong-Pakchom	1,465	366	1,832	185	14.7	199.4	5,318	37.5	5	532	4,786	0	0	247	62	0	0	310	58.3	8	7
Ban Kum	2,456	614	3,070	310	24.6	334.2	8,434	39.6	7	4,217	4,217	0	0	712	55	0	0	767	91.0	1	2
Latsua	1,180	295	1,475	149	11.8	160.6	3,504	45.8	9	3,504	0	0	0	450	0	0	0	450	128.3	3	1
Sambor	4,181	2,091	6,272	633	41.8	674.4	14,870	45.4	8	0	2,974	1,487	10,409	0	39	508	114	660	44.4	2	8
Stung Treng	2,949	1,180	4,129	416	29.5	446.0	4,870	91.6	10	0	974	487	3,409	0	13	-59	37	-9	-1.8	10	10

- **Total Benefit rank:** Net annual economic benefit for a project
- **Unit Benefit rank:** Net benefit in $ for each MWH produced by a project
  - Only 10 projects considered for economic ranking

Power sector ranking

	TOTAL ANNUAL BENEFIT ($) from power production
1	Ban Koum
2	Sambor
3	Latsua
4	Xayaburi
5	Pak Lay
6	Pak Beng
7	Xanakham
8	Pak Chom
9	Luang Prabang
10	Stung Treng



Social and environmental ranking

	SOCIAL
1	Thakho
2	Don Sahong
3	Pak Chom
4	Ban Koum
5	Xanakham
6	Latsua
7	Xayaburi
8	Stung Treng
9	Luang Prabang
10	Pak Lay
11	Sambor
12	Pak Beng

	ENVIRONMENTAL
1	Thakho
2	Pak Beng
3	Luang Prabang
4	Xayaburi
5	Pak Chom
6	Don Sahong
7	Pak Lay
8	Xanakham
9	Latsua
10	Ban Koum
11	Stung Treng
12	Sambor

	"DOUBLE BOTTOM" LINE
1	Thakho
2	Don Sahong
3	Pak Chom
4	Ban Koum
5	Xayaburi
6	Xanakham
7	Luang Prabang
8	Latsua
9	Pak Beng
10	Pak Lay
11	Stung Treng
12	Sambor

Triple-bottom line ranking (10 projects)

	SOCIAL
1	Pak Chom
2	Ban Koum
3	Xanakham
4	Latsua
5	Xayaburi
6	Stung Treng
7	Luang Prabang
8	Pak Lay
9	Sambor
10	Pak Beng

	ENVIRONMENTAL
1	Pak Beng
2	Luang Prabang
3	Xayaburi
4	Pak Chom
5	Pak Lay
6	Xanakham
7	Latsua
8	Ban Koum
9	Stung Treng
10	Sambor

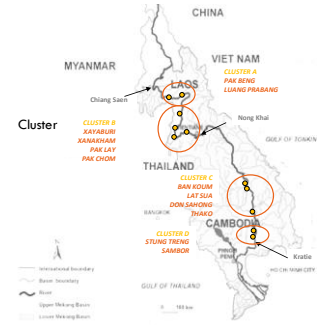
	TOTAL ANNUAL ECONOMIC BENEFIT
1	Ban Koum
2	Stung Treng
3	Latsua
4	Xayaburi
5	Pak Lay
6	Pak Beng
7	Xanakham
8	Pak Chom
9	Luang Prabang
10	Sambor

Triple-bottom line ranking (10 projects)

RANK	"TRIPLE BOTTOM LINE"
1	Ban Koum
2	Xayaburi
3	Xanakham
3	Latsua
3	Pak Chom
6	Pak Lay
6	Pak Beng
6	Stung Treng
9	Luang Prabang
10	Sambor

Project clusters

CLUSTER	PROJECTS
Cluster A	• Pak Beng • Luang Prabang
Cluster B	• Xayaburi • Xanakham • Pak Lay • Pak Chom
Cluster C	• Ban Koum • Lat Sua • Don Sahong • Thakho
Cluster D	• Sambor • Stung Treng



Project cluster economic rankings

CLUSTER	Total Net Economic Benefit $M for the cluster	TOTAL BENEFIT RANK
A	565	4
B	1371	1
C	1217	2
D	651	3

Project cluster rankings

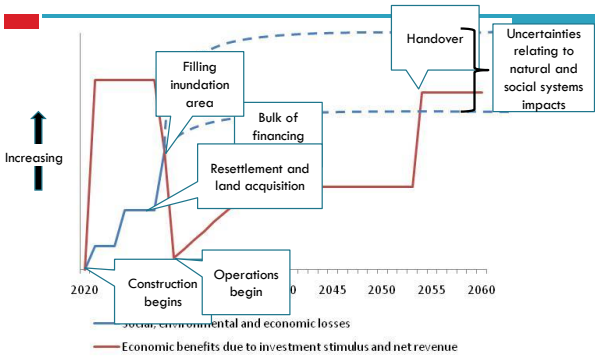
	CLUSTER	PROJECTS
1	A	• Pak Beng • Luang Prabang
2	B	• Xayaburi • Xanakham • Pak Lay • Pak Chom
3	C	• Ban Koum • Lat Sua • Don Sahong or Thakho
4	D	• Sambor • Stung Treng

Social and environmental concerns

	CLUSTER	PROJECTS
3	A	• Pak Beng • Luang Prabang
2	B	• Xayaburi • Xanakham • Pak Lay • Pak Chom
1	C	• Ban Koum • Lat Sua • Don Sahong or Thakho
4	D	• Sambor • Stung Treng

Triple bottom line

Illustrative balance of costs and benefits



Some points relating to costs and benefits

- Natural systems and species are characterized by threshold effects or tipping points beyond which recovery is difficult
- Already, many habitats and species assemblages in the LMB are close to that point
- Mainstream dam development – even when limited to one dam – may push some systems beyond their tipping point
- Within the project concession periods, potential direct and indirect negative impacts may represent a net cost to the LMB.
- Comparative analysis through valuation of costs and benefits is difficult especially for natural and social effects.