ISH0306 - Consultancy for the Development of Guidelines for Hydropower Environmental Impact Mitigation and Risk Management in the Lower Mekong Mainstream and Tributaries

MRC Mitigation Guidelines for Sustainable Hydropower Practice on the Lower Mekong Basin

By Leif Lillehammer and many more

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Mekong River
Mae Nam Khong
«Khong, the Mother of Water»
Introduction - Study objective

Providing measures, GUIDELINES and good industrial practice and state of the art insight into the sustainable development of hydropower in the Lower Mekong Basin. By also linking it to the Mekong 1995 Vision

“an economically prosperous, socially just and environmentally sound Mekong River Basin”

Assessment in LMB, UMB, GMS and Internationally
Introduction - Process for Risk and Impact Mitigation Assessment

Article 7 – Mekong Agreement (1995) «To make every effort to avoid, minimize and mitigate harmful effects......»

Mitigation Hierarchy

**Avoidance** = Identifying alternative sites or technology to eliminate Impacts (Master plans, Pre-feasibility, Feasibility)

**Minimization** = most often used prescribing actions during design, construction and operation stage to minimize or eliminate impacts

**Compensation** = used to offset residual impacts identified at different stages
Introduction - Process for for Risk and Impact Mitigation Assessment

MRC Generic Practical Process for Risk and Impact Mitigation - Project Life Cycle

- Master Plan
- Feasibility Study
- Project Design
- Project Construction and Operation

- SEA, CIA, EIA
- Avoid Impacts
- Understand the characteristics of the impact
- Research mitigation options
- Design and Operation measures, rules and procedures, offsets, conditions

Avoidance
Minimization
Compensation
Study Scoping and Planning
Geographic Scope

Twofold:
1) A general assessment at the basin level for the Lower Mekong, including its tributaries (Phase 1 and 2)
2) A more detailed assessment of the 5 mainstream cascade dams planned to be constructed in Lao PDR (Phase 3 and 4) and downstream mainstream dams (Phase 4)
Study Phases - ISH0306 Regional and National Consultation

Output 1, 2a, 2b: Inception Report
May 2015

Outputs 3 & 4: Interim report #1
September 2015

Outputs 5a, 5b: Interim report #2
November 2016

Output 6a, 6b, 6c, 7, 8: Final Report Training Communication
October 2017

Council Study

National and Regional

We are here!

National and Regional

National and Regional

Regional

We are here!

2015

2016

2017
Basin Scale Risks and Impacts Examples

Distribution of Sediment Loss (2040)
Connectivity Loss (Fish Migration)

- **Historic:** 100%
- **2007 (no mainstr.):** 90%
- **2020 (no mainstr.):** 80%
- **2040 (no mainstr.):** 70%
- **2040 (2 mainstr.):** 60%
- **2040 (11 mainstr.):** 50%

Legend:
- **50 % passability**
- **0% passability**

**LMB Mainstream dams**
- Existing
- Planned

**Existing/Planned dams**
- 2007
- 2020
- 2040

**Recorded migratory species**
- 0
- 1-5
- 6-10
- 11-15
- 16-20
- >20

Map:
- 0-150
- 300
- 800 Kilometers
Overview of 2\textsuperscript{nd} Interim Phase

Constitutes the following:

1. Case Study – Lao Cascade: Testing of Mitigation Options and analysis of scenarios (Detailed Modelling and Assessment) – Impacts on Environment, Power Generation and Economics

2. Update Guidelines and Manual with Basis in Case Study Results

3. 2\textsuperscript{nd} Interim Phase Knowledge Base (Report, Data Inventory Sheet, ISH0306 Library)
Overview of Final Phase

Constitutes the following

1. **Case Study continuation**
   **Conceptual level assessment** –
   - Lao Cascade: Alternative scheme layouts and Partial Cascade Development (based on 2nd Interim Phase)
   - Downstream Dams (alternative layouts and design options)
   **Assessment of Modelling Results**
   - Liaison, coordination and assessment of the HP Thematic Council Study Sub-Scenarios (all mainstream dams)

2. Review and Update of the PDG and HDS – (part of Discussion Notes on Research Needs)


4. Training and Communication Documentation
Overall Guiding Principles
(Mekong 1995 Agreement supported by Strategic Planning Guides and PDG)

- International Policies and Safeguards
- Cooperation on International River Basins
- Robust Governance Base line data informs decisions
- Multidisciplinary approach
- Engage stakeholders – protect rights and entitlements
- Equitable share benefits and costs
- Address Poverty and Food Security
- Maintain Basin wide ecosystem integrity

Guidelines and recommendations for planning, design and construction of new hydropower

Guidelines and recommendations for operation of existing and new hydropower

Specific Mitigation Options (including impacts, risks and vulnerabilities)
- Risk and Impact Theme
- Project life cycle
Exampmples Specific Mitigation

Mitigation hierarchy

Avoidance

Minimisation

Compensation

Alternative Sambor dam Wild and Loucks, 2015

Diversion channel

Ramping (limit water level change)

Sediment flushing and sluicing

Joint releases of flood pulses

Aerator
Case study (Phase 3 and 4) points toward that the investigated risks needs basin or catchment management approaches.

Institutions and Cooperation
More Joint Action and Benefit Sharing?
Mitigation Issues and Techniques Basin Scale

Joint Operation of tributary systems

- Coordinated Flow Releases (3S System)
- Coordinated Flushing and Sluicing (Nam Ou example)

Siting in Relation to (Fisheries) Connectivity
Mitigation Issues and Techniques Basin Scale


Site-by-site planning
- Plan and develop dams **site-by-site**
- **No strategic vision** on final cumulative impacts and benefits

Strategic assessment
- Evaluate impact and benefits of dam portfolios on **network scales**
- Make **informed decisions** and select **optimal trade-offs**

**System reconnaissance**
- Spatio-temporal diversity in basin-scale sediment transport

**Predictive modelling**
- Modeling network-scale cumulative dam impacts

**Optimal portfolio selection**
- Evaluate a large number of dam portfolios

Moving from site-by-site to strategic perspective on sediment trapping
Main Deliveries Final Phase

• Vol 1 - Updated Guidelines Version 3.0 (with Inputs from the Case Study)

• Vol 2 - Updated Manual Version 3.0 (with inputs from the Case Study)

• Vol 3 – Knowledge Base (Structure, Usage, manual and Update on regional and international practise)

• Vol 4 - Case Study Report Version 2.0 (including downstream dams and inputs from Council Study)

• Vol 5 – Discussion Note on Review of Update of PDG (2009) and HDS (2001)

• Vol 6 – Final Closure Report
Thanks for your attention