



DRAFT TECHNICAL REVIEW REPORT FOR THE LUANG PRABANG HYDROPOWER PROJECT– WATER QUALITY AND AQUATIC ECOLOGY

THE 9TH MRC REGIONAL STAKEHOLDER FORUM

**DAY 1: THE 2ND REGIONAL INFORMATION SHARING ON PRIOR CONSULTATION FOR LUANG PRABANG
HYDROPOWER PROJECT**

05 FEBRUARY 2020, LUANG PRABANG, LAO PDR

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Main Review Findings (1)

Water quality and Aquatic Ecosystem Health (1)

1. LPHPP documentation provides a **good overview and assessment** of water quality and aquatic ecology in the dam area based on MRC WQ data, previous studies carried out for Xayaburi and Pak Beng PCs, and a **SINGLE field survey** carried out by developer at 5 stations in the dry season only (a few days in Feb 2019); **Developer indicated additional surveys carried out but information not provided.**
2. **Water quality in the region is Class A or B** and thus suitable for domestic consumption and agricultural use;
3. Total densities and diversity of **phytoplankton and zooplankton** were commensurate with samples taken during surveys at Xayaburi and Pak Beng, but the diversity and abundance of **benthic macroinvertebrates** are inexplicably low;
4. One of the key water quality issues anticipated is **degradation of flooded riparian vegetation** and the consequent **anoxic conditions**.

Main Review Findings (2)

Water quality and Aquatic Ecosystem Health (2)

5. **Water quality and aquatic ecology monitoring programme** is proposed for the construction and operational phases, including the same parameters, methods and frequency as outlined in the preliminary assessment.
6. **The water quality monitoring frequency** has been **increased to bi-monthly** for key contaminants, but continuous monitoring equipment (e.g. Sondes) should be installed in conjunction with the hydrological monitoring equipment; and
7. The developer has proposed ongoing monitoring programmes for water quality and aquatic ecosystems, but no indication is provided as to how this will be used to support adaptive management – **Developer requested to provide proposed monitoring programme with budget**; and
8. Monitoring should assess both **water quality and ecological health** and evaluate the performance of the **mitigation measures**.

Main Review Findings (3)

Environmental Flows (1)

1. Based on the CIA-TBIA report, the main **downstream flow alterations** will be caused by the Lancang HPP cascade, which has caused a flattening and widening of the hydrograph;
2. LPHPP will not alter the **hydrograph** further as it is a run-of-river scheme, with a **short retention time** (i.e. 3-9 days), but indication **daily water level** in the impoundment may fluctuate between 312 and 312.5 m;
3. **Specific e-flows** from the LPHPP not warranted but need **hydrological modelling** to assess the potential impact of regulated flows on the **spawning habitat** for key fish species in the remaining free-flowing (if any) area immediately downstream of the dam.
 - Note 25-km reach downstream of LPHPP likely to be compromised by operation of Xayaburi HPP

Main Review Findings (4)

Environmental Flows (2)

4. **A full Environmental Flows Assessment (EFA)** is unnecessary specifically for LPHPP and should be integrated in **the CIA** of the upper Lao HPP cascade.
5. CIA-TBIA lacks any assessment of the implications of multiple dams proposed in the upper cascade in Lao PDR and **the interrelationships between dams and their cumulative effects on flows, water quality and aquatic ecology, both in the local area and the larger transboundary effects.**

Public comments from 8th RSF and MRC's address in 2nd Draft of TRR

Public comments from 8 th RSF	MRC's address in 2 nd draft of TRR
1. No WQ and AEH monitoring proposal and budget provided	MRCs to request programme and budget from developer for review and comment.
Developer commented JEM not part of PDG2009	Suggestion is monitoring programme aligns with JEM methodologies, which follow international standards. It is not linked to PDG2009 or 2019.
2. Insufficient information provided on WQ and AEH from developer direct studies	Request review of additional information collected as part developer ongoing monitoring studies.
3. Issues raised about impact and importance of LPHPP of free-flowing section downstream of dam.	Impact needs assessing because operation of Xayaburi will effectively eliminate the free-flowing section compromising importance to aquatic biodiversity, including fish.

Recommendations

- **Full EIA**, based on in-depth studies, needed before any decisions on impacts can be made.
- **Monitoring** of water quality and aquatic ecology is initiated as soon as possible, using the protocols outlined in JEM programme;
- Monitoring should continue throughout the construction and operational phases, and be supported by **dedicated budget** provisions;
- **Lost habitat**, particularly for species that require flowing water, needs to be quantified. This should include lost habitat from the future Sanakham HPP to Chiang Saen.
- The area between the LPHPP dam and the headwaters of the Xayaburi HPP is critical: developer should establish a **habitat, water quality and species baseline** before construction starts.
- **Coordination of operation of** multiple dams proposed in the upper cascade in Lao PDR is urgently needed for ensuring national flows, water quality and aquatic ecosystem.



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DRAFT TECHNICAL REVIEW REPORT FOR THE LUANG PRABANG HYDROPOWER PROJECT– FISH PASSAGE AND FISHERIES ECOLOGY

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Prof Ian G. Cowx and Dr Martin Mallen-Cooper, International Experts



Contents of Presentation

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II. Main review findings

- Fishery monitoring and baseline conditions
- Fish passage design
- Transboundary Fisheries Impact and Risk Assessment

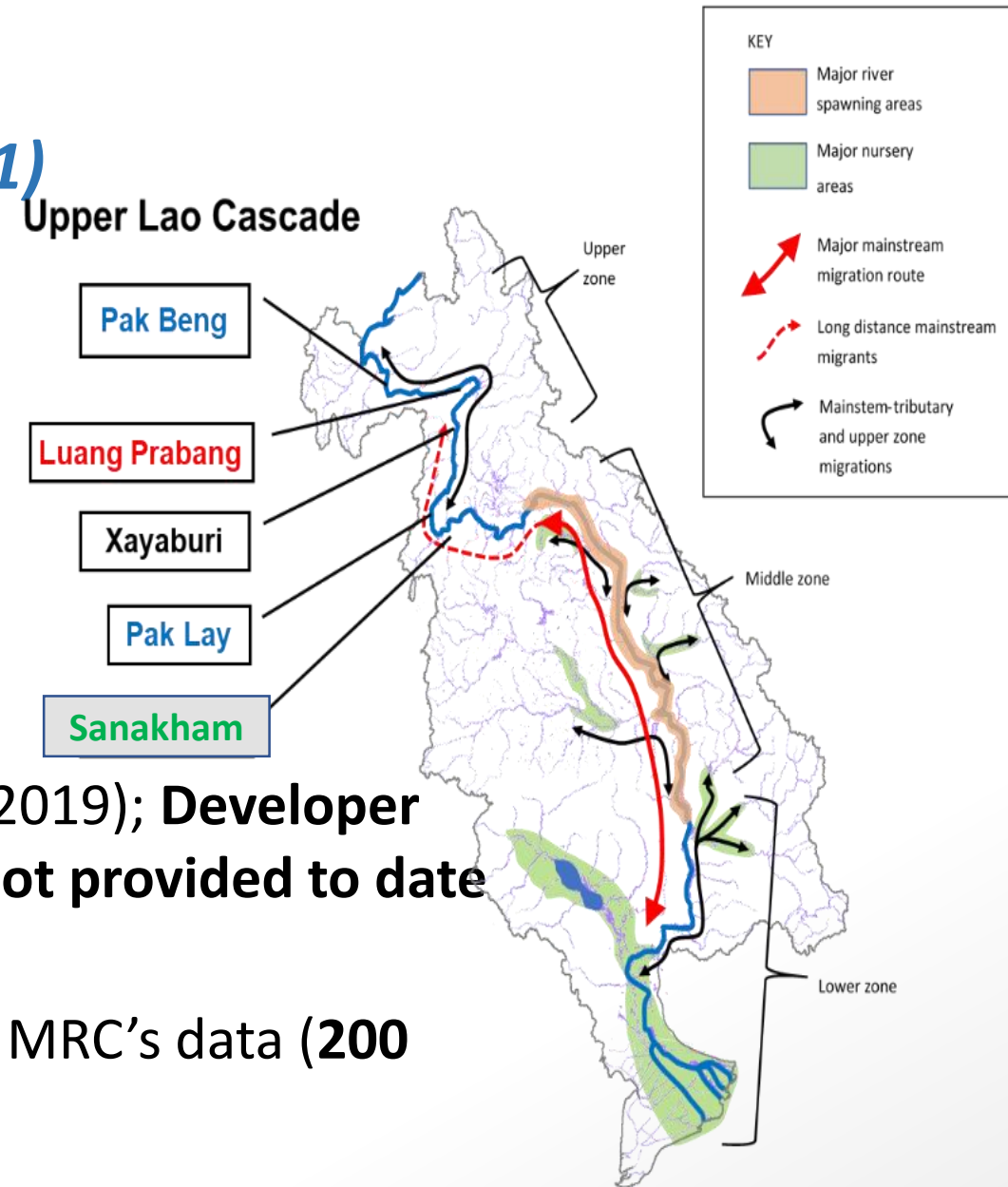
III. Public comments from 8th RSF

IV. Recommendations

Main Review Findings (1)

Fishery monitoring and baseline conditions (1)

1. LPHPP EIA fisheries assessment recognizes the **importance and diversity of the fish fauna** in the upper Lao ecological zone;
2. LPHPP documentation provides reviews fisheries based on MRC fisheries studies, previous studies carried out for Xayaburi and Pak Beng PCs, and a **SINGLE field survey** carried out by developer at 5 stations in the dry season only (a few days in Feb 2019); **Developer indicated additional surveys carried out but data not provided to date as indicated during field visit (Dec 2019).**
3. The **160 fish species** found commensurate with the MRC's data (**200 fish species**);



Main Review Findings (2)

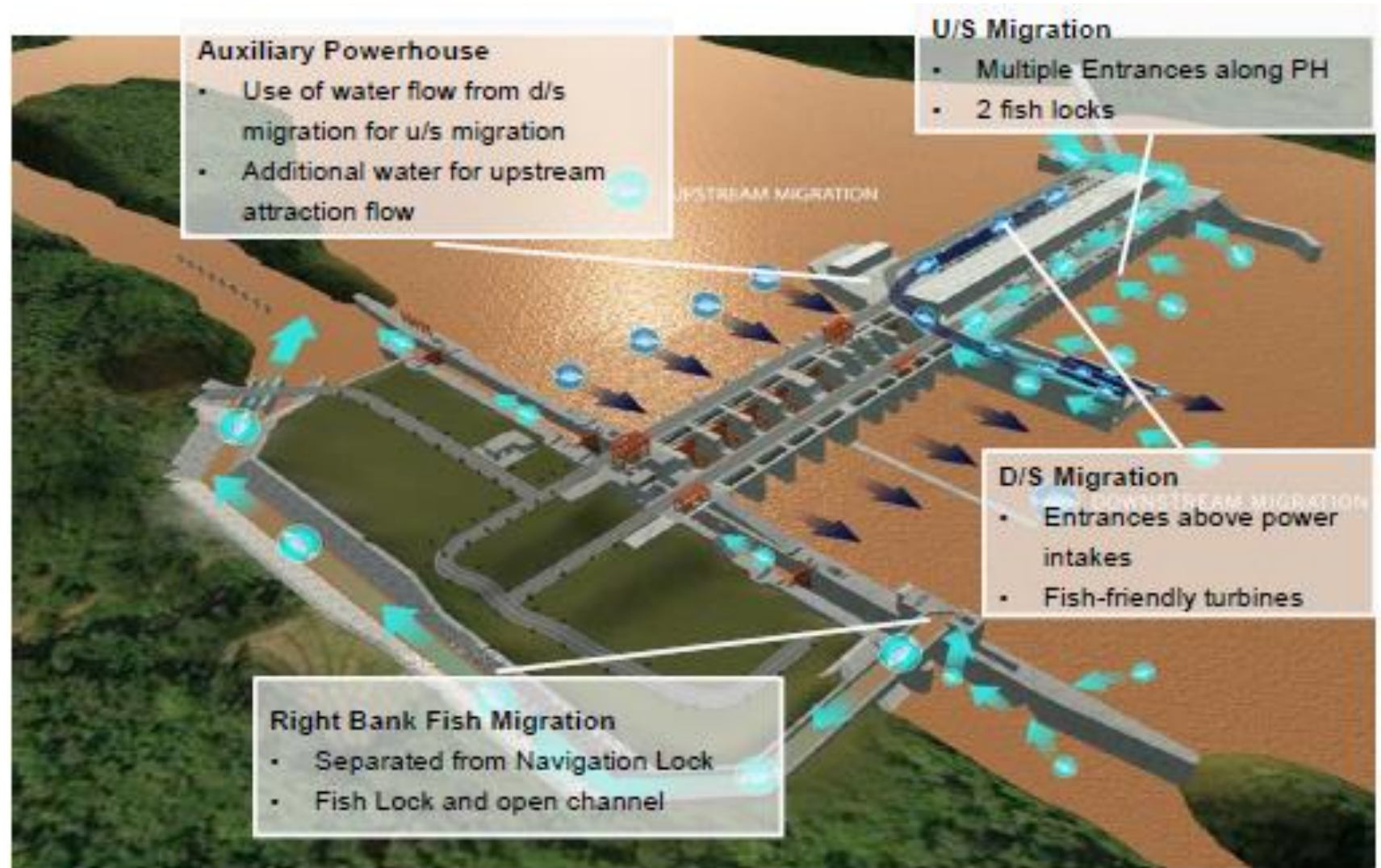
Fishery monitoring and baseline conditions (2)

4. Further consideration of the **loss of spawning and nursery habitat** for migratory and rhithron fish species in the region caused by the 156-km long impoundment needed;
5. Crude estimate of the **fish biomass** from the local area was carried out based on household consumption and human population density, but this needs reappraisal;
6. Developer proposes a **monitoring programme** for fish and fisheries during the construction and operational phases similar to that carried out at Xayaburi HPP, but **details of the methodologies lacking**.
7. The reported monitoring of fish abundance and diversity and fisheries is very limited, and not adequate to establish a baseline to assess future changes. **Recommended that a monitoring programme is established as soon as possible and is based on the protocols outlined in JEM.**

Main Review Findings (3)

Fish passage design (1)

LPHPP documentation proposes **fish passage facilities** for **both upstream migration** of adult fish and **downstream** moving larvae, juvenile and adult fishes at the dam.



Main Review Findings (4)

Fish passage design (2) – Upstream fish migration

1. Proposal for **two fish locks** on left bank near the powerhouse, plus **another lock/bypass system** associated with the navigation lock on the right bank;
2. Project requires analysis of further options;
3. **Ramp** like collecting structure downstream will collect fish migrating upstream along the left bank - design needs hydraulic modelling to confirm its functionality;
4. **Fishway entrances** provided at multiple locations above draft tubes, and near the spillway for the separate fish lock associated with navigation lock; but will likely require more entrances at spillway after modelling.
5. Recommendation that **10% of low** river discharge and **1% of 1-year flood** provided to attract fish has been included in the design.



Main Review Findings (5)

Fish passage design (3) – Downstream fish migration

6. Four major routes for downstream-migrating fish:
 - i) through the **impoundment**;
 - ii) diverted at the **turbine screens** and passing down the **bypass**;
 - iii) passing through **the screens and through the turbines**; and
 - iv) passing through the **spillway gates**;
7. Documentation suggests **flow velocities** through the reservoir sufficient to ensure downstream fish larval drift, but no hydrodynamic modelling presented – high risk;
8. Concept of **diverting fish via a screen** (angled bar rack) to a bypass can be effective, but more details needed to evaluate effectiveness – high risk;
9. EIA indicates “**fish-friendly**” **Kaplan turbines** will be used, but more data are needed to evaluate injury and mortality through the turbines – high risk.



Main Review Findings (6)

Transboundary Fisheries Impact and Risk Assessment

1. No comprehensive **cumulative and transboundary fisheries** risk and impact assessment provided;
 - Developers argue LPHPP will not affect the lower Mekong ecosystem, because any flow impacts will likely be moderated by Xayaburi HPP;
2. **Disruption to fish migration and reproductive capacity**, and reduction in sediments, and associated nutrient dynamics, on **fisheries downstream** need to be evaluated;
3. More detailed evaluation of **cumulative impacts of the upper Lao cascade of HPPs** on fisheries and aquatic biota is required:
 - cascade will transform region from fast flowing lotic habitat to lentic environment.
 - Question utility of fish passage facilities if minimal spawning habitat to complete life cycle.

Public comments from 8th RSF and MRC's address in 2nd Draft of TRR

Public comments from 8 th RSF	MRC's address in 2 nd draft of TRR
<p>1. Is there a baseline on the fish assessment that we can assess any differences and impacts, to judge the success of the mitigation measures?</p>	<p>MRCs to request programme and budget from developer for review and comment. Developer confirms additional activities are ongoing on regular basis at the project site and in alignment with Xayaburi. MRCs to request review of additional information collected as part developer ongoing monitoring studies.</p>
<p>2. The number of fish species before dam project was 160 species. The MRC research has shown 200 species. How can this be?</p>	<p>Differences likely caused by some species listed in MRC studies only found in Tributary headwaters.</p>

Public comments from 8th RSF and MRC's address in 2nd Draft of TRR

Public comments from 8 th RSF3. 3.	MRC's address in 2 nd draft of TRR
<p>3. With regard to fish pass, have MRCS preliminary findings been addressed by GoL?</p>	<p>Developer noted proposals in TRR to improve the efficiency of the system and will study the implementation thereof. This would not be considered a “re-design” but optimisation of the present concept.</p>
<p>4. Fish passage in LPHPP seems very different to XBR with the absence of fish ladder. Is this because the XBR fish ladder is inefficient or because there are different conditions?</p>	<p>Tail water level variations at Xayaburi much greater (>15 m) than LPHPP (max 7 m) due to Xayaburi back water, therefore developer considers no need for fish pass. Appropriate hydraulic modelling required to show design effective</p>

Recommendations

1. Documentation submitted provides considerable information to support the PC with respect to Fish Passage and Fisheries Ecology but **additional information** should be requested to allow scientifically sound decision-making regarding the extent of the impacts of the LPHPP.
 - **Full EIA, based on in-depth studies, needed** before any decisions on impacts can be made.
2. **Highest risks** are passage: i) of larvae through reservoir, ii) passage of large fish at screens, iii) passage of small fish through turbines.
 - **Full details of fish passage design and modelling required before decision on efficacy**

3. Relationships between impact of LPHPP and other dams requires full assessment:
 - **Need to determine the practicality of constructing fish passage facilities at future HPP dams in upper Lao cascade**
4. **Examination of the transboundary and cumulative impacts** of LPHPP in relation to Pak Beng and Xayaburi needs further assessment.
5. **Programme for fish management and monitoring required**
 - Develop detailed monitoring and mitigation programme, especially to mitigate or compensate for loss of fisheries
 - Develop sustainable fishery management system
6. **Operation coordination network** of upper cascade dams in Lao PDR should be urgently established to ensure effective fish passage from future Sanakham HPP to Chiang Saen.



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