



# APPROACH AND METHODOLOGY FOR ASSESSMENT OF THE LUANG PRABANG HYDROPOWER PROJECT – WATER QUALITY, ENVIRONMENT & FISHERIES, AND SOCIO-ECONOMICS

THE FIRST REGIONAL INFORMATION SHARING ON LUANG PRABANG HYDROPOWER PROJECT  
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# **WATER QUALITY AND ENVIRONMENT**

# Scoping of the review

- Vol 1 - Executive Summary;
- Vol 2 - Main Feasibility Report;
- Vol 4 Part I – ESIA;
- Vol 4 Part III – EMMP;
- Vol 5 - TBIA & CIA; and
- Vol 6 Annex 6.6 – ESIA.



- ❖ Primary water quality, phytoplankton, zooplankton and benthic macroinvertebrate data;
- ❖ Methodologies for collection;
- ❖ Current status of the aquatic environment and aquatic species present;
- ❖ Cross-check of the documents submitted against the PDG clauses; and
- ❖ Final Technical Review Report will detail quantitative aspects of water quality and aquatic fauna, evaluation of the proposed monitoring strategies and mitigation measures to maintain a **heathy aquatic environment**.

## Preliminary findings - Water quality and Aquatic Ecosystem Health

- The 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 the Xayaburi and Pak Beng PCs, and the analysis of samples collected by the developer at five stations in the dry season (a few days in Feb 2019);
- **A water quality and aquatic ecology monitoring programme** is proposed for the construction and operational phases.
- **The water quality monitoring frequency** should be increased to weekly for key contaminants, and continuous monitoring equipment (e.g. Sondes) should be installed in conjunction with the hydrological monitoring equipment; and
- **Robust monitoring programme, with sufficient budget**, to assess impacts during the construction and operational phases needs to be provided; and
- Monitoring should assess **water quality and ecological health** and evaluate the performance of the **mitigation measures**.

## Preliminary findings - Environmental Flows

- The main **downstream flow alterations** will be caused by the Lancang HPP cascade. The 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).
- **Daily water level** in the impoundment may fluctuate between 312 and 312.5 m, suggesting that **hydropeaking** may be employed.
- **Specific e-flows** from the LPHPP are not likely to be warranted. However, **hydrological modelling** will need to be employed to assess the potential impact of regulated flows and **hydropeaking** on the **spawning habitat** for key fish species in the area immediately downstream of the dam.
- **The free-flowing reaches** of the river immediate downstream should be mapped.
- **A full Environmental Flows Assessment (EFA)** is unnecessary specifically for LPHPP and should be integrated in **the CIA** of the upper Lao HPP cascade.

# Proposed methodology

- **Additional information**, mostly with respect to detail, is required to allow for scientifically sound decision-making regarding the extent of the impacts of the LPHPP.
- The approach to the technical assessment to be undertaken expected to include:
  - **Gather all available data** from the MRC, LNMC and Developer as well as line agencies;
  - **Visit the LPHPP dam site** and have detailed discussions with the Developer's scientists and engineers on water quality and ecological health management matters and the remnant flowing reach of river downstream of the dam;

# Further information and investigation (1)

- Confirm the adequacy of **EMMP proposals** with respect to water quality and aquatic ecology, in line with accepted good practices and standards;
- Explore the reasons for the virtually absent benthic macroinvertebrate fauna and revise the **monitoring programme** accordingly;
- Confirm adequacy of **water quality management** during construction; including measures proposed to avoid, minimize or mitigate the impacts. Identify other mitigation options to be considered if required;
- Assess whether the impacts of water level fluctuations of 0.5 m per day is related to **hydropeaking** for power generation;



## Further information and investigation (2)

- The potential **changes to the ecosystem** as a result of the changing hydrological regime from a running river to an impoundment are acknowledged but not described fully or investigated. Thus, there is a need to assess the likely changes in **water quality and aquatic ecology in the impounded reach** and how this will affect downstream ecology;
- The EIA mentions the **natural flow regime** will be maintained but how this is maintained given the practicality of the operating regime is not fully explained and how the integrity of the reach immediately downstream of the dam is protected needs further explanation;
- Propose, in conjunction with the sediment expert, appropriate impact **mitigation measures** for addressing sediment retention and water turbidity upstream and river starvation and water clarity downstream.

# FISH PASSAGE AND FISHERIES

# Scoping of the review

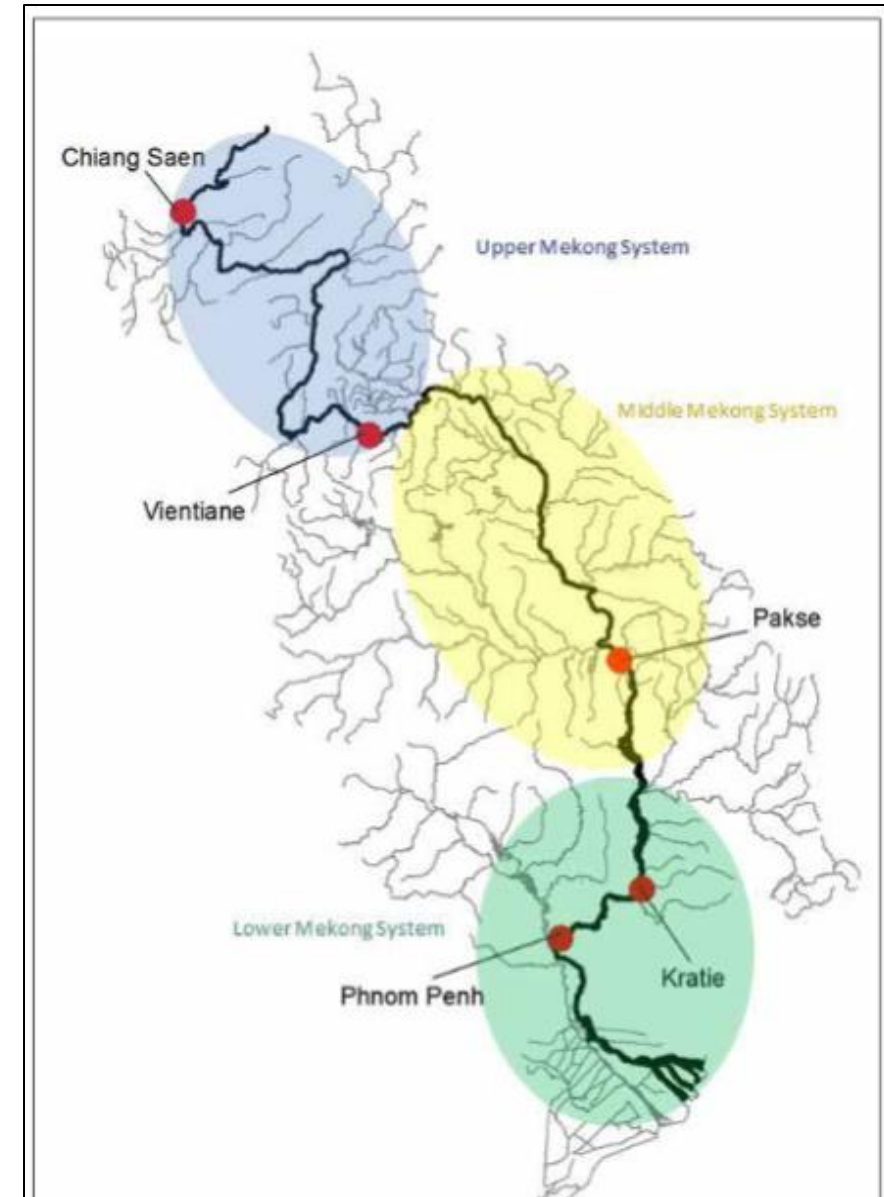
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- ❖ Primary fisheries data, mainly of **species presence, methodologies for collection, and design concepts for the fish passage facilities;**
- ❖ The final Technical Review Report will cover detailed aspects of **fisheries ecology and exploitation**, evaluation of the proposed **passage design** and **cumulative and transboundary fisheries impacts.**

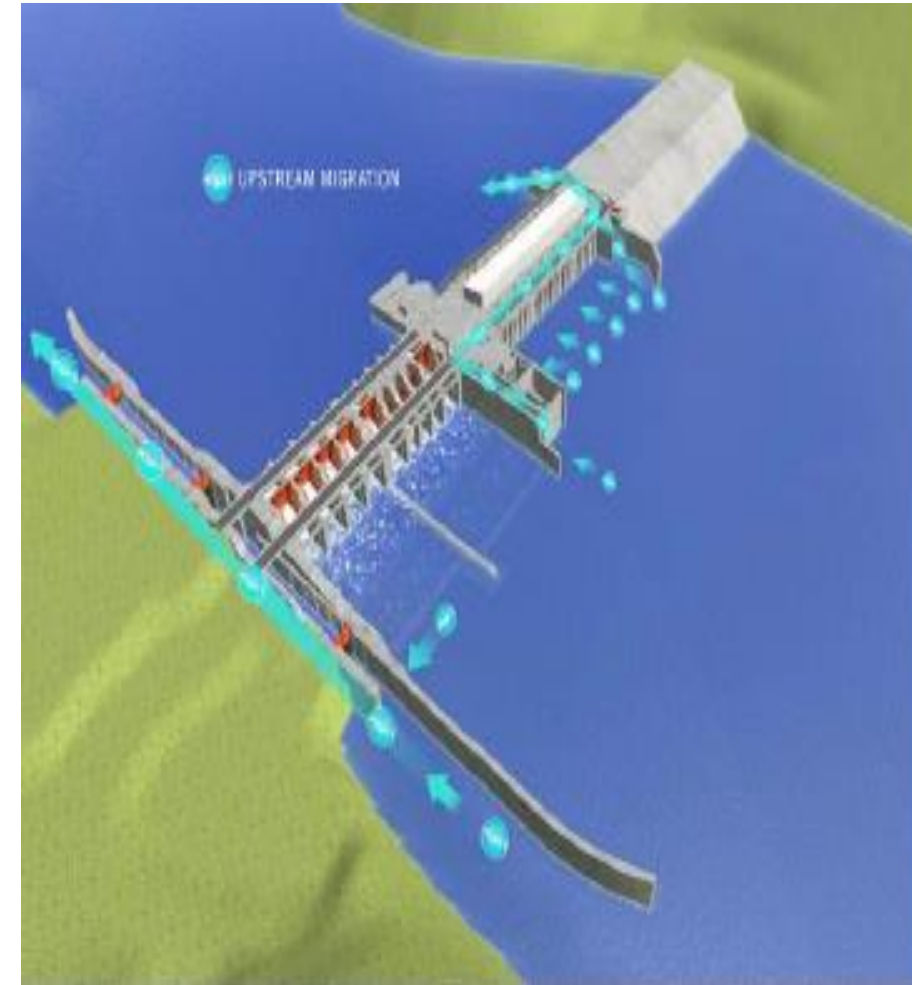
# Preliminary findings - Fishery monitoring and baseline conditions

- The LPHPP lies in **Zone 1** of the **Mekong's Ecological Reaches**, or in the **upper fish migration system**;
- The results (**160 fish species**) are commensurate with the MRC's data (**200 fish species**);
- Reports recognize the importance of breaking down the species into guilds, but only discusses **three guilds** (migratory **white fishes**, **grey fishes** and **black fishes**);
- Further consideration of the **loss of spawning and nursery habitat** for migratory and rhithron fish needed;
- 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 different methodologies lacking**.



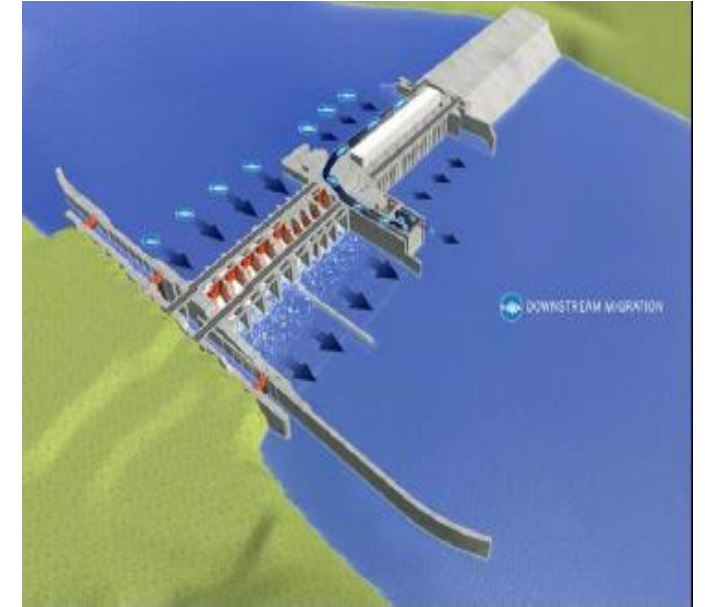
## Preliminary findings - Fish passage design: Upstream fish migration

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



# Preliminary findings - Fish passage design: Downstream fish migration

- 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;
- Flow velocities through the reservoir sufficient to ensure downstream fish larval drift, but no hydrodynamic modelling presented;
- Concept of diverting fish via a screen (angled bar rack) to a bypass can be effective, but more details needed to evaluate effectiveness;
- ESIA indicates “fish-friendly” Kaplan turbines will be used, but more data are needed to evaluate injury and mortality through the turbines.



# Preliminary findings - Transboundary Fisheries Impact and Risk Assessment

- No comprehensive **transboundary fisheries** risk and impact assessment provided;
  - Argue LPHPP will not affect the lower Mekong ecosystem, because any flow impacts will likely be moderated by Xayaburi HPP;
- **Disruption to fish migration and reproductive capacity**, and reduction in sediments, and associated nutrient dynamics, on **fisheries downstream** need to be evaluated;
- More detailed evaluation of **cumulative impacts of the upper Lao cascade of HPPs** on fisheries and aquatic biota is required;
  - cascade will transform the region from fast flowing lotic habitat to a lentic environment.

## Methodology and Further information and investigation

- **Additional information**, mostly with respect to detail, is required to allow for scientifically sound decision-making regarding the extent of the impacts of the LPHPP.
- **The approach** to the technical assessment to be undertaken will include:
  - **Gather all available data** from the MRC, LNMC and Developer as well as line agencies;
  - **Visit the LPHPP dam site** and have detailed discussions with the Developer's scientists and engineers on fisheries and environmental aspects and the proposed fishpass design;
  - **in-depth assessment** of the design of the fish passage facilities;
  - **Re-examination** of the transboundary and cumulative impacts of LPHPP in relation to **Pak Beng and Xayaburi**.



# SOCIO-ECONOMICS

# Scoping of the review

- Vol 1 - Executive Summary;
  - Vol 2 - Main Feasibility Report;
  - Vol 4 - Part I – ESIA; Part II – SIA; Part III – SMMP; Part IV – SMMP; Part V - REMDP
  - Vol 4 – Part II – SIA;
  - Vol 4 Part III – EMMP;
  - Vol 5 - TBIA & CIA; and
  - Vol 6 Annex 6.6 – ESIA.
- ❖ Document reported potential positive and negative socio-economic impacts (local and transboundary)
  - ❖ Review the methodology, data and process for the socio-economic assessments and the mitigation measures proposed by the developer
  - ❖ Identify additional potential impacts (livelihoods, living conditions and wellbeing), and mitigation measures
  - ❖ Recommend further issues for in-depth study

# Preliminary findings (1)



- The Cumulative and Transboundary Impact Assessment notes loss of food production – e.g. fisheries, agriculture, leading to protein intake reduction and worsening health outcome, due to land being inundated and river changes.
- It quotes two studies by MRC, and IFRReDI (Inland Fisheries Research and Development Institute) done in Cambodia, showing livelihoods from fisheries could be reduced by 30% or more due to dam developments (in general not specific to LPB)
- Overall social and economic issues of transboundary natures are not discussed in much detail.

## Preliminary findings (2)

- 26 villages in three provinces Luang Prabang, Oudomxay and Xayburi, with over 2000 households of nearly 10,000 people would be affected.
- Around 30% of households are considered vulnerable (due to having an aging head), although household income levels indicate no poverty (per national poverty line of 235,000 kip/month/person)
- The main livelihoods identified are rice farming, slash and burn, vegetable gardening, livestock raising, local business and NTFP, also buoyant navigation with nearly 2,400 trips (50-100 passengers) passing in 2018.
- **Pre and during construction impacts are considered high.**
- Compensation for loss of land and assets and livelihood support are the main measures. However there is no concrete financial provision.

# Proposed methodology

- SIMVA (Social Impact Monitoring and Vulnerability Assessment) reports and database.
- RSAT (Rapid Basin-Wide Hydropower Sustainability Assessment Tool), the Design Guidance final draft.
- Other internationally accepted methodology – e.g IFC guidelines.
- Desk study, discussion among MRCS team, with developer and Lao Govt, and engagement with other stakeholders.





## Further information and data requested

- Financial information for compensation and resettlements.
- More elaboration on possible transboundary impacts, from impacts on sediment flow downstream, other hydraulic changes, and fisheries/fish passage efficacy, and their specific possible impacts on livelihoods and well being.
- Potential contributions to a Hydropower Development Project Joint Fund to help with transboundary mitigations?



**THANK YOU**

*One Mekong. One Spirit.*