



CRITICAL REVIEW OF THE PÖYRY COMPLIANCE REPORT  
ABOUT THE XAYABURI DAM  
AND THE MRC DESIGN GUIDANCE  
-FISH AND FISHERIES ASPECTS-

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## EXECUTIVE SUMMARY

This report is a critical review of the Pöyry Energy AG study about the Xayaburi dam project and its compliance with i) MRC Design Guidance; ii) the comments submitted by each MRC member country during the Procedures for Notification, Prior Consultation and Agreement (PNPCA) and iii) the terms of the "Prior Consultation Project Review Report on the Xayaburi Project". This review focuses on fish and fisheries aspects only.

The Pöyry Compliance Report is mainly characterized by the fact that:

- i) its technical sections dealing with fish and fisheries identify the unclear characteristics and weaknesses of the proposed fish passes, and acknowledge that the Xayaburi project does not comply with at least a quarter of the MRC guidance points regarding fish pass design, structures, and efficiency;
- ii) its Executive Summary misrepresents the content of the technical sections, provides a conclusion of overall compliance that is contradicted by its own technical analyses, and recommends a way forward that itself does not comply with one of the MRC Guidance points.

More specifically, the technical section of the Pöyry report addressing fish and fisheries issues in the Xayaburi project highlights the weakness of the EIA done, as well as the lack of clear design specifications and probable poor performance of the proposed fish pass facilities. It acknowledges that the Xayaburi project does not comply with at least eight of the 29 MRC guidance points regarding fish pass design, structures, and efficiency.

Thus by stating that *"the Xayaburi HPP has principally been designed in accordance with the applicable MRC Design Guidelines"*, the Executive Summary does not reflect the content of the section dealing with fish and fisheries. The terms of the Executive Summary are also inconsistent and self-contradictory: the Xayaburi dam plans are said once to be in accordance with the "applicable" MRC Design Guidance points, but the report also repeatedly underlines that additional conditions must be met before the project actually complies with these guidance points.

Regarding fish and fisheries issues, the Pöyry compliance report actually does not review whether the project has complied with the MRC Prior Consultation Project Review Report, and does not mention whether the recommendations submitted by the MRC member countries have been taken into consideration.

Last, Pöyry's recurrent recommendation to start the construction despite knowledge gaps, to undertake additional environmental studies during the construction phase and to make subsequent adaptations during that phase contradicts points 64 of the MRC Guidance. This recommendation is also at odds with the precautionary principle underpinning the MRC design guidance and the values of the Sustainability Guidelines of the International Hydropower Association.

# 1 INTRODUCTION

## 1.1 THE XAYABURI PROJECT AND THE MRC PROCEDURES

The Xayaburi dam, proposed by the CH. Karnchang Public Company Ltd. from Thailand, would be constructed on the Mekong mainstream in Lao PDR. This 1,260 MW dam would be 830 m wide and 49 m long, creating a 60 to 90 km long reservoir; it would feature a navigation lock and two fish passes.

In line with Article 2 of the 1995 Mekong Agreement, the Mekong River Commission (MRC) formulated “a consistent approach to evaluate the design, operation, impact and mitigation measures for any proposed mainstream dam”, which resulted in the publication in August 2009 of the “MRC Preliminary Design Guidance for Proposed Mainstream Dams in the Lower Mekong Basin”. That document provides dam developers with “design guidance in the form of performance targets, design and operating principles for mitigation measures” and “an overview of the issues that the MRC will be considering during the process of prior consultation under the 1995 Mekong Agreement”.

On 20 September 2010, the Government of Lao PDR officially notified the MRC of its intention to proceed with the Xayaburi project. From then on, the project was subject to the Procedures for Notification, Prior Consultation and Agreement (PNPCA) put in place in 2003. This process included a review by an MRC internal Task Group (review in particular of dam design and operations, fisheries, sediment transport, aquatic ecosystems and navigation) and by two groups of regional and international scientists on fisheries and sediment. The project review by the MRC Secretariat was finalized in April 2011 and “highlighted a number of areas of uncertainty on which further information is needed to address fully the extent of transboundary impacts and mitigation measures required”.

At the end of the PNPCA process, “Cambodia, Thailand and Viet Nam raised their concerns on gaps in technical knowledge and studies about the project, and predicted impact on the environment and livelihoods of people in the Mekong Basin” (MRC press release, 19 April 2011).

On 5 May 2011, the Government of Lao PDR commissioned the Pöyry Energy AG consulting company to report in particular on whether:

- the Xayaburi Power Company has complied with and satisfied the MRC Design Guidelines
- the comments submitted by each MRC member country during the Prior Consultation (PC) process have been taken into consideration;
- the GOL and the Owner have complied with and satisfied the terms of the "Prior Consultation Project Review Report on the Xayaburi Project", dated 24 March 2011.

The present report is a review of the conclusions of the Pöyry report, focussing on fish and fisheries issues only.

## 1.2 CHRONOLOGY

The Xayaburi documents relevant to fish and fisheries sections commented in the Pöyry report are based on a review of (Pöyry report page 6):

- the Feasibility Study completed in 2008 and updated in March 2010,
- the Outline Design including drawings (March 2010),
- the Engineering Procurement Construction (September 2010, revised after the MRC Scoping Assessment in November 2010),
- the Concession Agreement signed on 29/10/2010
- the 2008 Environmental Impact Assessment prepared in August 2008 and updated in February and August 2010.

and these documents are reviewed in particular against

- the comments submitted by each of Mekong River Committee (MRC) member countries during the Prior Consultation (PC) process completed in April 2011
- the terms of the "Prior Consultation Project Review Report on the Xayaburi Project", dated 24 March 2011.

Thus, the PNPCA process, its Project Review Report and the conclusions of the MRC Member countries were produced between 6 months and one year **after** the Xayaburi project documents reviewed by Pöyry were published. For this reason, the Xayaburi project documents reviewed could not possibly have taken the PNPCA comments into account before publication.

Yet, it is unclear what is meant when the Pöyry report:

- states that comments of the member countries were considered or partly considered (Table 3.1 page 55);
- analyzes the compliance of the dam with the Technical Report of the MRC (page 56).

## 2 DETAILED REVIEW OF THE POYRY REPORT

The Pöyry report is characterized by a contradiction between the Executive Summary and the technical part of the report dealing with fish issues (section 2.2). Simply stated, the Executive Summary does not reflect the actual content of the report. The technical content of Section 2.2., although succinct, is precise and shows a good understanding and experience of the topic reviewed. This section questions the project design, underlines a number of critical issues, and proposes several options to improve the background studies and the fish passage facilities. We review below these points and cite in italics the terms of the Pöyry report.

### 2.1 QUALITY AND GAPS OF THE EIA

#### 2.1.1 CONCLUSIONS OF THE TECHNICAL REVIEW IN THE PÖYRY REPORT

- *“Biological/ecological guidance have yet to be taken fully into consideration, since EIA, EMP, SIA and RAP are weak concerning aquatic fauna and all related issues.”* (p. 25)
- *“The missing baseline data concerning fish species, migration pattern, behaviour swimming ability, biomass, economic value, etc, should be carried out with the utmost urgency.”* (p. 26)
- *“Baseline data, like how many people and to which extent [they] are using the aquatic fauna and flora [...] need to be developed.”* (p. 26)
- *“It is strongly recommended to carry out [...] an aquatic baseline investigation concerning important habitats [...and] a fish survey: which species occur [...] abundance, [...] total fish biomass and larval drift [... and] select target species.”* (p. 26)
- *“Investigations on trans-boundary effects also need to be carried out.”* (p. 26)

The identification in the Pöyry report of the five points of the EIA that remain to be addressed (fish species impacted, their economic importance, habitats impacted, trans-boundary impacts, and target species for the fish pass design) highlights by contrast the poor quality of this EIA, the impact assessment questions that remain unanswered, that the mitigation measures proposed are not underpinned by studies and that it is therefore impossible to claim that they will be efficient.

By identifying the five points that the EIA fails to address (fish species impacted, their economic importance, habitats impacted, trans-boundary impacts, and target species for the fish pass design), the Poyry report reflects the poor quality of this EIA. It also reveals by contrast the Impact Assessment questions that have not been addressed or answered by the EIA. Last, it underscores that the mitigation measures proposed are not underpinned by any site-specific study, which does not provide any grounding to the claim that they will be operational and efficient.

### 2.1.2 CONCLUSIONS OF THE EXECUTIVE SUMMARY IN THE PÖYRY REPORT

- *“Feasibility study, EIA SIA, and EMP RAP though acceptably in compliance with the MRC design guidance, need to be expanded and refined further.”* (p. 12)
- *“With additional investigations (trans-boundary issues in regard to hydrology, baseline investigations on fauna, flora, habitat and socio-economy), which the developer plans to start as soon as possible, it should be possible to fully meet the MRC Design Guidelines requirements.”* (p. 10)

Pöyry invokes plans of the developer and uses these plans as a justification for a future—and yet hypothetical— way of meeting of the MRC Design Guidance requirements. This:

- falls beyond the commissioned review of existing documents;
- highlights a bias of the consultant in favor of the developer, and
- shows that at this point the Xayaburi studies reviewed by Pöyry do not actually meet the MRC Design Guidance requirements.

## 2.2 FISH PASSAGE FACILITIES

### 2.2.1 CONCLUSIONS OF THE TECHNICAL REVIEW IN THE PÖYRY REPORT

#### 2.2.1.1 Upstream fish passage facility

- *“The current situation [is] that the knowledge concerning the specific requirements of the aquatic fauna on the fish passage facilities is not sufficient.”* (p. 25)
- *“The presented design of the pools is very schematic, size and location of the slots and orifices in partition walls between the pools are not described.”* (p. 23)
- *“From the impression of the Feasibility Report several questions are still open and will have to be decided by developing the detailed design of the fish ladder.”* (p. 24)

#### 2.2.1.2 Downstream fish passage facility

- *“The general layout of the downstream fish passage facility is not described in detail.”* (p. 24)
- *“There are several open questions which need to be solved.”* (p. 24).
- *“The entrance structure is not clear.”* (p. 24)
- *“During minimum tailwater level of 236 masl [i.e. dry season low water level, downstream of the dam] the fish will fall 4 meters.”* (p. 25)

#### 2.2.1.3 Generic conclusions about fish passage facilities in the Pöyry report

- *“It is not clear whether the originally designed fish passage facility would be suitable to cope with the high amount of biomass, which will have to pass upstream and downstream.”* (p. 27)
- *“The migration pattern and the amount of biomass need to be assessed and it needs to be verified whether the envisaged designs are capable for handling the biomass, especially during migration peaks.”* (p. 27).

The technical analysis of the Pöyry report therefore confirms the findings and conclusions of (a) the MRC Fisheries Expert Group Report to the PNPCA, (b) the PNPCA report and (c) the WWF

“Review of the fish and fisheries aspects in the Feasibility Study and the Environmental Impact Assessment of the proposed Xayaburi dam”. The following are the relevant findings from the aforementioned sources:

- (a) Expert Group Report, p. 7: *“An array of problems was found with the proposed design at Xayaburi dam in relation to suitability for the Mekong fish fauna.”*
- (b) PNPCA report, p. 35:
  - *details on fish-bypass facility design are not clear;*
  - *the feasibility of fish-bypass facilities is not clear;*
  - *lack of hydraulic information;*
  - *no direct measures to mitigate or compensate for loss of fisheries are outlined ;*
- (c) WWF report, p. 6: *“The fish passage facilities are not based on experimentation, some of their features are not precisely detailed, and several of their characteristics are unlikely to be compatible with the passage of dominant Mekong fish species.”*

The above conclusions result from the review of the project documents by more than ten independent scientists:

- three international fisheries, environment and fish passage senior scientists and three independent Cambodian, Thai and Lao senior fisheries and environment scientists (PNPCA report Annex 1C);
- four international independent fisheries, fish pass and environment scientists (WWF report);
- plus significant inputs from scientists from at least 3 MRC Programmes (Environment, Fisheries and Integrated Sustainable Hydropower; PNPCA report Annex 1C).

### **2.2.2 CONCLUSIONS OF THE EXECUTIVE SUMMARY IN THE PÖYRY REPORT**

As opposed to these convergent conclusions, the Executive Summary of the Pöyry report contradicts its own technical analyses and states that:

- *“In general, the planned system is quite comprehensive, employs a state-of-the-art technology and covers all operational conditions of the scheme.”* (p. 10)



## 2.3 COMPLIANCE WITH MRC GUIDELINES

### 2.3.1 CONCLUSIONS OF THE TECHNICAL REVIEW IN THE PÖYRY REPORT

- *“The main issues recognized concerning the compliance with the MRC Design Guidance on baseline data require still further investigations and improvement.”* (p. 25)
- *“The general guidance has partly been taken into account by the developer.”* (p. 25)
- *“Biological/ecological guidance has yet to be taken fully into consideration.”* (p. 25)

### 2.3.2 CONCLUSIONS OF THE EXECUTIVE SUMMARY IN THE PÖYRY REPORT

- *“The Xayaburi HPP has principally been designed in accordance with the applicable MRC Design Guidelines.”* (p. 14).
- *“The structure for the current project stage is satisfactory and in principle in compliance with the MRC Guidelines.”* (p. 10)
- *“With additional investigations [...] it should be possible to fully meet the MRC Design Guidelines requirements relating to the Xayaburi HPP.”* (p. 10)

The conclusions of the Pöyry compliance report are inconsistent and self-contradictory: the Xayaburi dam plans are said to be in accordance with the “applicable” MRC Design Guidance points, but the report also repeatedly underlines that additional conditions must be met before the project actually complies with these guidance points.

### 2.3.3 CRITICAL REVIEW OF THE COMPLIANCE OF THE XAYABURI PROJECT WITH SOME OF THE MRC DESIGN GUIDANCE POINTS REGARDING FISH AND FISHERIES

Among the 193 points of the MRC “Preliminary Design Guidance for proposed mainstream dams in the Lower Mekong Basin”, 29 specific points relate to fish and fisheries (points 63 to 89). The Pöyry report explicitly examines the Xayaburi dam plans’ compliance with only one of these points (Point 62, cited on p. 28). Compliance with the other 28 points is not reviewed in detail.

We examine below some of these points and the comments of the Pöyry report about the corresponding issue.

**MRC Guidance point #63. Consideration should be given to multiple systems at each site [...]**

Pöyry report, p. 25: *“A multiple system has not been included in the original outline design.”*

**MRC Guidance point #64. The planning and design of the fishways should be fully integrated into the dam design concept from the earliest stages of planning.**

Pöyry report, p. 10: *“Adaptations are recommended to be done already during the early construction phase.”*

Pöyry report, p. 11: *“Adaptations are recommended to be carried out during early construction phase.”*

Pöyry report, p. 14: *“The above mentioned concerns can be remedied with the additional investigations recommended to be carried out during construction phase.”*

**MRC Guidance point #66. Facilities should be designed to cater for the upstream and downstream movement of the most important species at any site, under the seasonal flow conditions during the periods when the species migrate.**

Pöyry report, p. 23: *“The velocity of the water through slots and orifices [...] is probably too much for Mekong species.”*

**MRC Guidance point #68. The preferences, tolerances and biological attributes of the target fish species relevant to successful movement through the facilities should be clearly established.**

Pöyry report, p. 23: *“Basic knowledge concerning the fish species of the Mekong river, their swimming ability and behaviour needs to be greatly improved.”*

**MRC Guidance point #69. The peak biomass likely to be using the facilities must be determined and the appropriate structure sizing of fishways, cycle time of fish locks and/or lifts, and water availability established.**

Pöyry report, p. 27: *“The migration pattern and the amount of biomass need to be assessed and it needs to be verified whether the envisaged designs are capable for handling the biomass, especially during migration peaks.”*

**MRC Guidance point #72. The fishways should cater for the largest operational ranges practical, within the biological and hydrological requirements of the fish species concerned. [...]**

Pöyry report, p. 24: *“There are several open questions which need to be solved during the detailed design phase:*

- the velocity within the channel is not clear and should be adapted within the physiological limits of the fish species*
- the entrance structure is not clear and currently it seems to be behind the trash rack of the power intake.*
- the water depth sufficient for large-bodied fish species.”*

**MRC Guidance point #81. The period of captivity and interruption to the normal movements of the fish should be as short as possible.**

Pöyry report, p. 27: *“No upstream migration facility is included in the original design for the second part of the construction period (year 3-7) and the migration pattern will also be stopped.”*

**MRC Guidance point #86. Monitoring programmes should be established to quantify the effectiveness of the fishways. [...]**

Pöyry report, p. 25: *“The Management Plan on biological/ecological monitoring has not been developed.”*

Thus, the Pöyry compliance report acknowledges in its main text that the Xayaburi project does not comply with MRC guidance points regarding fish pass design, structure, and efficiency. By recommending that investigations and adaptations be undertaken during the construction phase, the Pöyry report itself is in conflict with MRC Guidance point #64, which stipulates that the planning and design of the fishways should be fully integrated into the dam design concept from the earliest stages of planning.

#### 2.3.4 COMMENTS OF THE PNPCA REVIEW AND OF THE MRC MEMBER COUNTRIES

The Pöyry report does not discuss whether the Xayaburi project complies with the points made in the MPCA Review report.

Just one of the many concerns expressed by the MRC Member countries is reviewed in the Pöyry report (on p. 14).

We briefly review below the conclusions of the Prior Consultation Project Review report and those of the governments of Thailand, Cambodia and Viet Nam with regard to the fisheries aspects in the Xayaburi project documents, and compare these conclusions with the ones in the Pöyry report.

##### MRC Prior Consultation Project Review report, April 2011

- “The mitigation measures currently proposed in the design for upstream and downstream passages as well as provisions for migration during construction are not optimal and do not yet follow the Preliminary Design Guidance of MRC.” (p. 98)
- “With regards to water quality and aquatic ecosystem health, the review found that the design of the Xayaburi project as well as management and mitigation plans do not yet reflect the MRC's Preliminary Design Guidance or international best practice.” (p. ii)

##### Position of the Kingdom of Thailand, PNPCA conclusions, April 2011

- “Regarding to fish ladder, the current model cannot accommodate fish migration in term of number and species.”
- “The details of mitigation measures both in terms of methodology and responsible organization are not clearly identified.”

##### Position of the Kingdom of Cambodia, PNPCA conclusions, April 2011

- “There are considerable technical studies, justification and modification needed.”
- “Need for a comprehensive study and assessment of transboundary environmental impacts including the cumulative impact assessment.”
- “It is questionable on how the review report recommendations are further taken into account by the notifying country and/or project developer.”

##### Position of the Socialist Republic of Viet Nam, PNPCA conclusions, April 2011

- “The associated Environmental Impact Assessment (EIA) study carried out by the project's developer [is] inadequate, lacking appropriate and comprehensive assessments of the transboundary and cumulative impacts.”
- “Though standard mitigation measures were mentioned in the project design, i.e. fish ladders, [...] it was felt, nevertheless, that there was insufficient evidence that those measures would help mitigate the negative impacts of the project in reality.”

##### Conclusions of the report of the Pöyry consultancy commissioned by the Government of Lao PDR, August 2011

- “*The Xayaburi HPP has principally been designed in accordance with the applicable MRC Design Guidelines*” (Executive Summary, p. 14).

### 3 CONCLUSIONS

The technical section of the Pöyry report addressing fish and fisheries issues related to the Xayaburi project highlights the weakness of the EIA done, the unclear design and likely performance of the proposed fish pass facilities, and the fact that these structures do not comply with multiple MRC Design Guidance recommendations. By stating that *“the Xayaburi HPP has principally been designed in accordance with the applicable MRC Design Guidelines”* (p. 14), the Executive summary of the Pöyry compliance report contradicts the section of the report dealing with the fish and fisheries and is inaccurate. Furthermore, the report’s recommendation to undertake additional studies and adaptations during the construction phase does not comply with a central MRC Guidance point, and contradicts the precautionary principle underpinning the MRC Design Guidance as well as the precautionary values of the Sustainability Guidelines of the International Hydropower Association.