EXPERIENCE WITH THE PDG
FEASIBILITY STUDY REVIEWS OF MEKONG MAINSTREAM PROJECTS ON BEHALF OF GOL

MRC Sustainable Hydropower Practice Forum #4
Vientiane, August 11th, 2017
1. HPP REVIEW AT LAO PDR LEVEL BEFORE PNPCA
EXPERIENCE WITH THE PDG
HPP REVIEW AT LAO LEVEL

Internal review at Lao PDR level before PNPCA

Mekong River as an international river
• LMB under the influence of Yunnan Cascade
• 4 riparian countries as members of MRC and 1995 agreement
• Use of international standards

Main concerns at the scale of the catchment area
• Flow management and safety
• Transit and continuity: flood, sediment, fish, boat
• Transboundary and cumulated impacts

Project review process
• PDG as guidelines

=> Internal HPP review at Lao PDR level before submission to MRC for PNPCA
Internal review at Lao PDR level before PNPCA

CNR as GoL Engineer on the Mekong mainstream
- Feasibility Study reviews of 4 Mekong mainstream HPP
- 4 issues: Hydrology, Dam safety, Navigation, Sediment transportation
2. SCOPE OF WORK
General Scope of Work

Feasibility study review according to MRC PDG and international standards

- Compliant
  - PNPCA, Detailed design, ...
- Not fully Compliant
  - Revision of the feasibility study
- Not Compliant
  - Performed additional investigations or redesign

CNR
- HYDROLOGY
- SAFETY OF DAM
- SEDIMENT TRANSPORTATION
- NAVIGATION
EXPERIENCE WITH THE PDG

SCOPE OF WORK

General Scope of Work

Dam Safety
- Including review of Hydrology and flood safety
- Control of dam stability
- Analysis of induced HPP impacts
- Operation in accordance with run-of-river specificities
- Discharge monitoring and forecasting
- Compliancy with international standards

Navigation
- Control of design according to international standards and MRC guidelines
- Control of lock accessibility
- Improvements of river navigability versus current state taking into account existing navigation

Sediment transportation and river morphology
- Review of input and methodology
- Review of design in order to ensure sediment continuity
- Operation and monitoring proposed for sediment transportation management
Experience with the PDG

Scope of Work

Project Feasibility Study Review

Review of Pakbeng and Sanakham HPP feasibility study in 2014-2015
EXPERIENCE WITH THE PDG

SCOPE OF WORK

Project Feasibility Study Review

Review of Paklay and Phou Ngoy HPP feasibility study in 2016-2017
3. FS REVIEW: DRIVING PRINCIPLES
PDG as part of reference documentation

International standards
- MRC PDG (final version of August 31\textsuperscript{st}, 2009) including background and guidance
- WB Operational Policy on safety of dams
- ICOLD Bulletins about safety of dams

FAQ by the developers about the PDG: As P stands for “preliminary”…
- Do we have to consider the PDG while developing a project on the mainstream?
- What will be the impact on the design of the project when MRC issue the final version?
- When will the final version be available?

The design guidance recommended in this document is preliminary and advisory in nature. The intention is to provide developers of proposed dams on the Lower Mekong mainstream with an overview of the issues that the MRC will be considering during the process of prior consultation under the 1995 Mekong Agreement. Responsibility for ensuring compliance with national standards and provisions of the 1995 Mekong Agreement remains with the project developers. MRC may commission an international expert group to assist in the interpretation of such requirements.
Main concerns addressed during FS review

4 issues to address
• Hydrology
• Sediment transportation and hydraulics
• Dam safety
• Navigation

Monitoring
• Need for accurate site specific data for design and demonstration of the efficiency of the technical solutions proposed by the developer
• Input data useful for both design phase and operation phase
• Generally a lack of data in the FS

Documentation provided by the developer
• Reference to international standards (including PDG)
• Every management plan that is required must be delivered
• Consistent with existing regulation

Design, construction and operation
• Developers and their design institutes are usually familiar with design and construction.
• Most of the time, there is a need to improve capacity regarding operation, operation preparation before COD and operation of run-of-river HPP in particular.
Main concerns addressed during FS review

Run-of-river concept

- No storage
- No regulation capacity
- What is flowing in is flowing out

- Need to go back to natural flow conditions if all gates opened and power house turned off.
- In particular, need to go back to natural conditions in case of flood event.

- Operation pattern of the project is mandatory and must be consistent with run-of-river concept.

- Need for flow monitoring and forecasting
Main concerns addressed during FS review

Xayaburi as a benchmark
- Xayaburi HPP is currently under construction.
- It will be the first mainstream dam in Laos to start operation, including the first navigation lock to start operation in Laos.
- Xayaburi design features 7 spillway gates and 4 Low Level Outlets.
Main concerns addressed during FS review

Consistency of the Mekong cascades

- Regarding both design and operation
- **No weak point** along the cascades of 5 HPPs that are planned upstream Vientiane
- The spillway capacity of each single project must be consistent with the spillway capacity of the projects located both upstream and downstream.
- Every project shall feature LLOs. Final design of LLOs (number, size, elevation) depend on each project characteristics.

- Operation patterns of each project must follow run-of-river concept.
- Need to recover natural like flow conditions upstream Vientiane during flood event: a good design will allow having flexible operation and avoiding retro-fitting, which is very expensive.

- **Need for coordination during operation** => under discussion with GoL
4. SOME LESSONS LEARNED
Main issues

- Navigation
- Fish Passage
- Sediment transport
- Water quality and aquatic ecology
- Safety of Dams

- Only 40 pages!
EXPERIENCE WITH THE PDG
SOME LESSONS LEARNT

PDG is not only a guideline but also a framework

4.2 Guidance on sediment management and river morphology

The following section provides preliminary guidance on sediment management and river morphology for developers proposing mainstream dams in the Lower Mekong.

General requirements

120. Developers should design mainstream dams to pass fine suspended sediment and coarse bed-load material in a way that most closely mimics the natural timing of sediment transport dynamics in the river.

121. Dams and intake structures should be designed to minimise the deposition and entrainment of sediment near the dam ensure long-term safe operation. Particular care should be taken to avoid sediment deposition that poses risks for the safe working of the flood passage capacity of the dam.

<table>
<thead>
<tr>
<th>No.</th>
<th>Guidance regarding sediment management</th>
<th>Final Stage</th>
<th>CNR comments</th>
<th>Priority (PNPCA, Construction, Operation)</th>
<th>Answer / Address of the issue by the Developer</th>
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Objective assessment of project compliance

- All along the review process from inception phase to final review
- Compliancy progress are easy to display
PDG facilitates progress monitoring

Objective assessment of project improvement
• By comparing compliancy tables at several FS review stages
• Compliancy progress are easy to monitor

Example
Table of compliancy - Interim stage

Example
Table of compliancy - Final stage
Objective assessment of project improvement

- By comparing compliancy tables at several FS review stages
- Compliancy progress are easy to monitor
- The target is to be 100% compliant for each topic.
**Check list**
- The principle of a check list is fine for developers, design institutes, reviewers, governments…
- This practice can be shared among several users.
- Additional issues can be addressed through the same principle (example of hydrology in order to detail flood assessment, operation, impact of operation, monitoring and forecasting)

**Some additional issues to consider**
- Operation in general (including operation pattern and clarification on water resource and flood management)
- Operation and Maintenance:
  - On the long run, i.e. after the concession period once the project is transferred to GoL
  - In the interest of GoL and riparian countries
  - Because it may have an impact on the project design.
- Coordination at the level of the whole river cascade
- Specificities of run-of-river dams
- Consider projects under construction as a way to improve PDG and to include more issues about construction for instance
4. CONCLUSIONS
EXPERIENCE WITH THE PDG
CONCLUSIONS

PDG: a shared and common reference framework

Through the use of PDG
• PDG provides a clear overview of the issues to address before PNPCA.
• Based on PDG, there is room for discussion and project improvement.
• GoL makes the final decision at Lao level.

PDG as a reference… but not the only one…
• Mainly because of the “P”
• Projects must also be compliant with several international standards. PDG may help to summarize all these standards into one document in the case of the Mekong River.

From PDG to “FDG”
• How can a “P” be changed into a “F”?
• Some issues to add
• From “should” to “shall”
• Using clear and objective PDG is in the general interest at the scale of the whole Mekong catchment area (including main tributaries if possible).

Next steps after project review
• Follow-up of project construction
• Follow-up during construction and operation is the next key issue to address.
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ขอบคุณสำหรับความสนใจของคุณ
ภูมิณฑ์ยินดีที่มีการปฏิบัติตามที่คุณสั่ง
Cám ơn vì sự quan tâm của bạn
Thank you for your attention
Merci pour votre attention