

# DON SAHONG MEKONG DAM

## ----- *MADE SIMPLE* -----

Questions and Answers about Don Sahong Hydropower Project



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ENERGY AND MINES

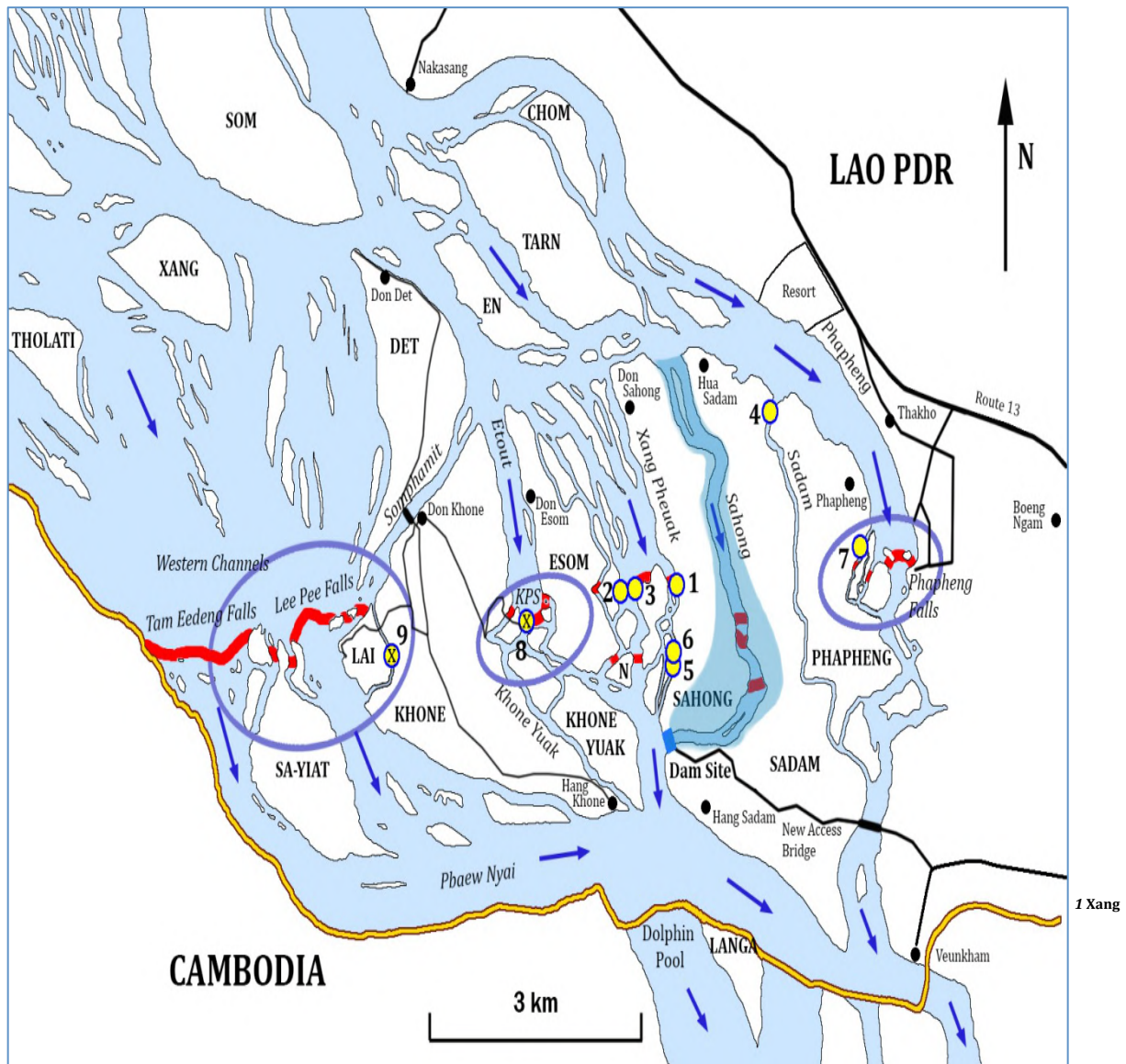
Public Relations Program  
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# Fast Facts

Location	Sahong Channel, Khone Falls area, Champasak Province, Lao PDR 160 km south of Pakse Km 719 from Mekong Delta
Owner	Don Sahong Power Co., Lao PDR
Cost	US\$500 million
Dam height (max)	25 m
Embankment length	6,800 m
Headpond volume	12 million – 25 million m <sup>3</sup> (seasonal)
Catchment area	553,000 km <sup>2</sup>
Headpond level	70-73 masl (seasonal)
Turbines	4 x 65 MW bulb-type
Rated head	17.8 m
Rated discharge	1,600 m <sup>3</sup> /s
Maximum capacity	260 MW
Energy generation	2,000 GWh p.a.
Completion	2019





Fish passage sites are numbered in the order of the date they were first modified. Sites 1 to 7 were modified between 2011 and 2016. Modifications to sites marked X are planned in 2017-2018.

- 1 Xang Pheuak Noi
- 2 Hou Wai
- 3 Luang Pii Teng
- 4 Hou Sadam
- 5 Luang San
- 6 Nyo
- 9 Somphamit Koong
- 7 Sompordan
- 8 Khone Pa Soi
- 9 Somphamit Noi

# Q&A

## Mekong Agreement

### **Q1. What is the 1995 Mekong Agreement?**

**A.** The Agreement for the Cooperation on the Sustainable Development of the Mekong River was signed in April 1995 by Cambodia, Lao PDR, Thailand and Vietnam. The Agreement affirms and expands the “Spirit of Mekong Cooperation” by setting forth mutually accepted and fair objectives, and principles of cooperation for sustainable development and utilization of the Mekong River Basin. In 2003, the Mekong River Commission (MRC) adopted Procedures for Notification, Prior Consultation and Agreement (PNPCA), strengthening the commitment of the four countries to work together to address the protection of the environment and the ecological balance in the Mekong Basin. The objective of the PNPCA is to promote better understanding and cooperation among the Member Countries in a constructive manner to ensure sustainable development, management and conservation of the water of the Mekong River. The Procedures recognize the sovereign equality and territorial integrity of the Member Countries; the principle of equitable and reasonable utilization; respect for rights and legitimate interests; and the need for good faith and transparency.

### **Q2. What is required under the Mekong Agreement with regard to proposed development projects?**

**A.** Depending on the proposed use of water, a Member Country must submit a project under either the Notification or Prior Consultation or Specific Agreement procedures.

**Notification:** The Notification requirement applies to (a) intra-basin use and inter-basin diversion on the tributaries, including Tonle Sap; (b) intra-basin use on the mainstream during the wet season. The Notification process includes submission of a feasibility study report, implementation plan and schedule, along with other data.

**Prior Consultation** is required for (a) inter-basin diversion from mainstream during wet season; (b) intra-basin use on the mainstream during the dry season; and (c) inter-basin diversion of surplus quantity of water during the dry season. The Prior Consultation process is aimed at arriving at an agreement. In addition to the information and data required for Notification, the country proposing the project under Prior Consultation must provide additional technical data and information on the proposed use for evaluation of impact on riparian states. There is a six-month timeframe.

**Specific Agreement:** Any inter-basin diversion project on the mainstream during the dry season must be approved by all members of the MRC’s Joint Committee composed of one high-ranking official from each country. In the event that the MRC is unable to agree, the discussion can be raised to the Ministerial level.

### **Q3. What is Prior Consultation?**

**A.** Prior Consultation is a process for the MRC Member Countries to discuss and evaluate benefits and associated risks of any proposed water-use, which may have significant impacts on the Mekong River mainstream's flow regimes, water quality and other environmental and socio-economic conditions. Any Member Country that intends to proceed with the project is required to notify the other three countries and provide them with available data and information. The process enables the notified countries to assess possible impacts on their territories and comment on the proposed use. The process also aims for the MRC Joint Committee, who is a body comprising one high-level government official from each Member Country to reach an agreement to achieve an optimum use and prevention of waste of water, and to issue a decision that contains agreed upon conditions for the project. The prior consultation is not about approving the proposed water use. Rather it provides the opportunity for the country proposing the project to listen to the concerns raised by the other Member Countries and, based on this, consider measures to address such concerns. This is because, as specified by the Procedures for Notification, Prior Consultation and Agreement (PNPCA), the prior consultation is neither a right to veto the proposed use nor a unilateral right to use water by any Member Country without taking into account the others' rights.

### **Q4. What are the steps for deciding how to proceed with Prior Consultation?**

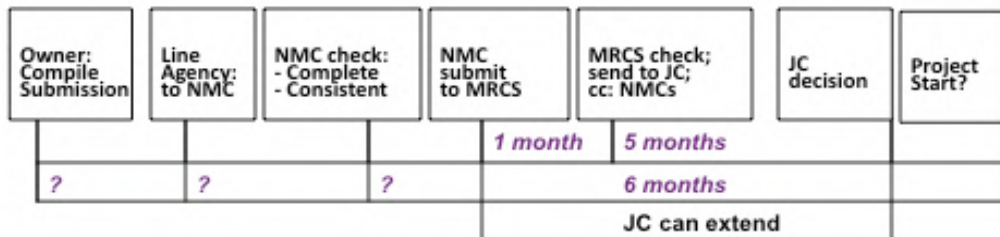
**A.** As set forth in the Mekong Agreement, the steps are:

**Submission:** The process officially begins when the MRC receives the submission from the relevant government agency of the country proposing the mainstream development through the country's National Mekong Committee. After a check on compliance with documentation requirements, the MRC Secretariat then forwards the submission to the other three Member Countries through their Joint Committee Members.

**Evaluation:** Once the submission is received by all Member Countries, a process of technical review will start, coordinated by the MRC Secretariat. They will collectively consult on the proposed mainstream development and request further information, as needed. The review will determine compliance with MRC procedures on flow regime and key environmental and social impact areas including the extent to which any trans-boundary impacts have been adequately addressed.

**Reaching Agreement:** After consulting, the aim is to reach a common agreement among the MRC JC Members on how to proceed. The MRC's goal is to assist Member Countries in finding sustainable solutions for the river and its peoples.

## PNPCA Prior Consultation Requirements



M/S reply: Form A II B  
(via NMCs: includes LAs)

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## DON SAHONG HYDROPOWER PROJECT Prior Consultation Roadmap

- 30 Sept 2013: Submitted to MRCS for Notification
- 11 Nov 2013: Presentation and 1<sup>st</sup> site visit
- 16 Jan 2014: Initial Assessment presented to Joint Council (JC)
- 7 Mar 2014: Technical workshop on Preliminary Design Guidelines
- 11 Mar 2014: Presentation and 2<sup>nd</sup> site visit
- 28 June 2014: Resubmitted to MRCS for Prior Consultation
- 12 Dec 2014: Regional public consultation, Pakse
- 28 Jan 2015: End of six-month consultation period

>Prior Consultation completed, but Lao PDR says it remains open to “post consultation”

- 15 July 2015: Technical workshop on fish passage/channel improvements

**Q5. Is the Don Sahong Hydropower Project (DSHPP) on the mainstream of the Mekong River?**

A. All of the water flowing through the Khone Falls area might generally be described as part of the Mekong River. More than a dozen branches of the river separate upstream of Khone Falls, and spread over more than 10 km, before reuniting downstream at the border with Cambodia. Sahong Channel, the location of the project, is one of the many channels in this broad segment of Mekong River.

**Q6. Is DSHPP considered a mainstream dam?**

A. No. The Don Sahong project does **not** include a dam spanning the mainstream. As it is being built entirely within the Sahong Channel, it does not carry the full mainstream flow in either the wet or dry season. The Sahong Channel currently carries about 5% of the total annual flow of the Mekong River through Siphandone. This cannot be considered a significant proportion of the flow of the mainstream. By contrast, the Somphamit and Phapheng channels account for about 54% and about 30% respectively – or 84% of the mean annual flow.

**Q7. Why did Lao PDR first submit DSHPP under Notification, then agree to the more detailed Prior Consultation?**

A. After years of study, the Lao PDR submitted the Don Sahong Hydropower Project to the MRC under Notification because the project is an intra-Mekong use of water that does not change the overall flow in the Mekong mainstream. At the MRC Council Meeting on 26 June 2014, the Lao PDR acceded to requests from MRC Members and agreed to undergo the formal Prior Consultation process in furtherance of the spirit of cooperation embodied in the Mekong Agreement. Doing this enabled Member Countries to help some identify further options for DSHPP to avoid, minimize and mitigate any possible harmful effects, resulting in a better project. In doing so, the Lao PDR formalized and expanded the exchange of ideas with the other Member Countries and the MRC Development Partners, including donor governments and regional and international organizations.

**Q8. Is MRC approval required to build dams on the Lower Mekong?**

A. No. The 1995 Mekong Agreement established a voluntary framework and procedural rules to ensure cooperation of the Governments of Laos, Thailand, Cambodia and Vietnam for sustainable development of the Mekong River Basin. While it promotes cooperation, the Mekong Agreement also respects Member Countries' sovereignty and right to develop. Specific Agreement of the Members is required only when a project diverts water from the mainstream of the Mekong in the dry season. Run-of-river projects proposed by the Lao PDR are a non-consumptive use of Mekong River water.



**Q9. What concerns emerged during Prior Consultation?**

A. At the regional public consultation meeting on the Don Sahong Hydropower Project held in Pakse on 12 December 2014, MRC's expert groups found that impacts on water quality and ecosystems, trans-boundary water quality, hydrology, sediment or navigation will be negligible, once the DSHPP is operational. The flow of the Mekong River will remain unchanged. The project will not divert any water to or from the river. It has virtually no storage potential, and the numerous other existing channels that bypass the project will act as natural spillways. The Lao PDR has maintained all along that fish migration across Khone Falls is the only serious environmental concern. The MRC's Fish Passage and Fisheries Expert Group raised some legitimate concerns, which have been or are being addressed. There was no suggestion that the design of the project needed to be revised; however it was agreed to make physical modifications at some additional sites on the river's channels to enhance fish passage, and this additional work has commenced.

**Q10. Was Prior Consultation for Don Sahong completed?**

A. Yes. The combination of the two procedures gave MRC members and development partners more than a year (from September 2013 to December 2014) to engage in dialogue about potential impacts of the DSHPP. Two site visits and two Technical Workshops were organized to provide stakeholders with first-hand information and up-to-date research findings. The Purpose of the Prior Consultation process is to determine whether the proposed water use would have significant impacts on the Lower Mekong Basin, and if so, how to minimize or mitigate them. It was demonstrated that the DSHPP would not have significant impacts on water flow or water quality and that impacts on fish migration could be mitigated. Following completion of the six-month Prior Consultation procedure, the Lao PDR indicated that it would be open to "Post Consultation" or further discussion during the pre-construction and construction phases.

**Q11. What was MRC's decision in the case of Don Sahong?**

A. In January 2015, members of the Joint Committee (JC) could not reach an agreement on what conditions could be applied to the construction and operation of the dam that would address the concerns of the notified countries. Therefore, they decided to refer the matter for guidance to the higher MRC governance body, the MRC Council. After further deliberations, the MRC Council announced in June 2015 that there are still differing views among the countries on whether the prior consultation process should come to an end, and that the matter must now be referred to their respective governments for resolution. Article 35 of the 1995 Mekong Agreement stipulates that in the event that the Commission is unable to resolve a difference or dispute, the issue shall be referred to the governments for resolution through diplomatic channels. If they find it necessary or beneficial, the governments can resort to mediation by mutual agreement according to the principles of international law. This means that each country's Prime Minister's cabinet, Ministry of Foreign Affairs, or other national agencies can communicate with their counterparts as they choose or see fit.

**Q12. Did MRC Member Countries have a voice in the process?**

A. In the case of the Don Sahong Hydropower Project, the Member Countries have gone through the established technical channels of the MRC and the Secretariat to discuss their concerns. Therefore, within the context of the PNPCA and of the mandate of the MRC, Lao PDR has had the opportunity to listen to the other Member Countries' concerns. The Joint Committee could not agree on which conditions could be applied to the construction and operation of the dam that would address the concerns of the notified countries, and decided to refer the matter to the MRC Council. The Council decided that the matter had to be taken to the governmental level. Agreement in this case, does not mean a decision to go ahead or cancel the project. The prior consultation is not a process to seek approval from all the Member Countries. The decision to proceed or desist rests with the country proposing it, in this case Lao PDR, which has stated that it will continue to cooperate with the MRC and that it is committed to ensuring the sustainable development of the project.

**Q13. Do MRC Members Thailand, Cambodia and Vietnam support the project?**

A. The governments of Thailand, Cambodia and Vietnam have been consulted at every step. On a government-to-government basis, the riparian countries support Lao PDR's policy of sustainable utilization of the Mekong River.

## **Key Energy Policies**

**Q14. Why is Lao PDR building dams on the mainstream of the Lower Mekong?**

A. Laos is rich in natural resources but poor in terms of capacity, infrastructure and workforce to spur industrialization. When the World Bank and Asian Development Bank urged Lao PDR to attract private investment, hydropower was deemed to be the best opportunity. Since its founding, Lao PDR has gained valuable experience in hydropower development. For example, Nam Theun 2, completed in 2010, has been praised as a model of economic, environmental and social sustainability. Hydropower already accounts for about one-third of the nation's capital wealth and further development is needed to aid economic growth and lift Lao people out of poverty. Laos has the potential to develop as many as 100 hydropower dams with a total capacity of 26,000 MW. Nineteen hydropower projects with installed capacity larger than 15 MW are in operation. Twenty-five projects larger than 15 MW are under construction. Preparatory work is underway for nine more projects larger than 15 MW.

**Q15. How does hydropower development serve national energy policy?**

A. The national energy policy of Lao PDR is to maintain and expand affordable, reliable and sustainable electricity so that the electrification ratio exceeds 90 percent by 2020 and renewable energy accounts for 30 percent of supply by 2025, with a reasonable feed-in tariff. With the goal of being the "Battery of Southeast

Asia,” Laos is tapping its very large hydropower potential with the participation of private developers. Hydropower development is the only way to create enough capital growth to enable Laos to leave Least Developed Country status by 2020. Hydropower development is seen as a catalyst to help bring Lao people out of poverty.

**Q16. Why does Lao PDR choose hydropower over other forms of energy?**

A. Hydropower is reliable, clean, zero-carbon-emission and affordable, renewable energy that does not pollute the environment or consume water. No other method of power generation provides the additional benefits of water for irrigation and human consumption, as well as flood control and infrastructure improvement. Like many other countries, Laos wants to reduce dependence on fossil fuels, gas, oil and coal. Nuclear energy is not currently an option.

**Q17. Why doesn't Lao PDR heed the call of environmental activists who seek to stop hydropower development on the Mekong?**

A. Perhaps more than any other country, Lao PDR depends on the Mekong River for its survival. In Laos, the Mekong plays an iconic and spiritual role in people's lives, sustains livelihoods, serves as a highway for the transport of goods and passengers, and attracts tourism. At the same time, Laos, like the nations of Europe and the Americas, has a sovereign right to develop resources within its boundaries for the good of its people. The task of harnessing the Mekong to provide a better future for the Lao people will be done in a practicable sustainable manner.

**Q18. What does the Lao Government mean by sustainable development?**

A. Though it is a poor country, Laos is committed to meeting international hydropower sustainability standards developed by organizations including the Asian Development Bank and World Bank. In particular, the Lao Government strives to meet the policies and practices for sustainable development of the International Hydropower Association (IHA) as set forth in its Hydropower Sustainability Assessment Protocol. The protocol is a tool that promotes and guides hydropower projects, providing a framework for governments to evaluate more than 20 issues in planning, developing and operating hydropower projects. The key aspects of sustainable development are environmental, social, technical and economic. The assessment scores performance from one to five with five representing proven best practices, and three representing basic good practice. Laos is committed to do whatever is most practicable to achieve a score of at least three of the total five marks.

# Environmental Issues

## River Flow / Fish Migration/ Dolphins/ Sediment

### **Q19. Will DSHPP cut off migration on the only fish path across the Khone Falls?**

**A.** No. Two other channels supported fish migration in the dry season before the closure of Sahong in January 2016, and those and other channels have been modified to accommodate fish migrations in both directions in both seasons. The statement that the food security of “millions of people” will suffer is pure speculation and exaggeration designed to scare the public and win support for anti-dam groups. Extensive studies and investigations confirm that the proposed project will cause no significant impact to the full mainstream flow of the Mekong; nor will it affect fish migration or sediment passage to any degree that would harm downstream communities. Furthermore the Lao people also rely on the Mekong for their livelihood and we intend to enhance and improve their lives and the lives of their children as well as the fisheries sustainability of the area.

### **Q20. Will the operation of DSHPP power station prevent flows from reaching the Phapheng Falls?**

**A.** DSHPP will be operated so as to always provide a minimum flow over Phapheng Falls of at least 800 m<sup>3</sup>/s. This will be achieved by regulating or reducing the flow through the turbines when necessary to ensure the minimum flow is met. An automatic river flow monitoring station on the river just upstream of the Falls will be linked with the power station control room and will automatically adjust turbine flow when necessary to ensure flow over the Falls is not reduced below the guaranteed minimum.

### **Q21. Will the planned 5 m deep excavation at the inlet prevent flow from reaching the Phapheng Falls?**

**A.** The Sahong Channel inlet requires deepening by about 5 m so that the station can generate at its normal capacity during the dry season. This excavation cannot cause the flow over the Falls to be reduced to unacceptable levels because; (a) the main river channel immediately upstream of the inlet is between 15-20 m deep – much deeper than the 5 m deepened Sahong Channel inlet, and (b) the turbines will control the flow into the Sahong Channel – the excavation at the inlet will not control the flow.

### **Q22. Will the additional flow for Sahong Channel mean that flows in Xang Pheuk Channel are reduced – especially in the dry season?**

**A.** No, modeling of the river system indicates there will be a small reduction in water levels across the downstream section of the Xang Pheuk inlet (by a few centimeters in some conditions). DSHPP will carry out minor works to clear vegetation and rock outcrops around the inlet area so as to ensure that flows through Xang Pheuk are maintained at current levels.

# Fish Migration

**Q23. Will the Don Sahong project have a fish passage system like the technology being applied at Xayaburi?**

A. No. Unlike the artificial concrete fish passage systems being constructed at Xayaburi, the Don Sahong project will improve natural river channels to enhance their existing function as fish passages. After studying the terrain of the Khone Falls area in dry and rainy seasons, the developer has modified several channels and plans to continue further modifications to enhance fish passage.

**Q24. Which species occurring around the Khone falls are migratory species?**

A. All fish species in the area migrate upstream/downstream to some degree – it's just a matter of the distance they travel, be it one kilometer or 1,000 kilometers.

**Q25. How can the developer be sure the modified river channels will be adequate for the numbers and the diverse species that use them?**

A. The seven main channels which cross the falls are each much larger than any fish passage which has been constructed to bypass a dam anywhere, and any one of those channels is large enough to accommodate many species and sizes of fish. Fish which attempt to swim upstream past the falls at present swim into all of the main channels, but at present some fish do not make it through, either because (1) they are caught, especially by fish traps, which are large and numerous, (2) they encounter a waterfall or cascade which is too high or fast for them to pass, or (3) there is insufficient water in the channel at the time. So the main approaches to improve fish passage are to (1) remove fish traps from channels where they are blocking fish migration, (2) flatten waterfalls or cascades or construct channels so that fish can pass around them and (3) enlarge the upstream entrances of channels to increase flow through them, effectively enlarging the size of the channel and attracting more fish into it.

**Q26. How can DSHPP expect to provide migration pathways to suit 200 fish species in the region without detailed knowledge of each species?**

A. There is no accurate estimate of the number of migrating fish species. What is known is that all species that migrate through the multiple channels across the Khone Falls are instinctively trying to move to other habitats for spawning, feeding or refuge. The project has now modified three channels, which cross the falls in different places and all now provide alternative pathways for fish species with a range of swimming capabilities. The main channel is Xang Pheuk where ongoing modifications and removal of fish traps will provide better passage than was formerly provided by Sahong Channel. Another channel, Sadam, had no significant natural barriers and the main modification has been to deepen the upstream inlet, thereby increasing the flow and ensuring adequate water for fish migration during the dry season; fish traps, which are barriers to migration, have also been removed. A small side-channel of Phapheng Falls (Sompordan) was recently modified to allow fish passage.

**Q27. What are the ecologically and economically most important species that migrate?**

A. All of the fish caught at Khone Falls is eaten or sold by local people, so they are all important, and most fish are migratory to some extent. Most of the common fish are catfishes, carps or loaches, and the importance of individual species varies from year-to-year as they become more or less abundant in response to varying environmental conditions.

**Q28. What if improved passages do not compensate for the damming of Sahong?**

A. Other channels are being modified to improve fish passage success using adaptive management techniques that will ensure that fish can migrate through the area year-round. By taking an adaptive approach to development, any impediments to migration that are detected can be reduced over time.

**Q29. Many people say it is harder to catch fish than in years past. Why is this?**

A. The total fish catch may in fact be increasing, but it is being divided among more fishermen, and in particular commercial fishers are increasing their catch and selling to traders to supply distant urban markets. Pressure on the fishery has increased since the 1990s with increasing population, more fishers, more fishing gear and more traders. Roads make it easier to sell fish. A 2007 World Bank study found that fishing pressure is the main threat to the trans-boundary fishery between Kratie, Cambodia, and Pakse in Lao PDR. This is especially true between May and July when fish are migrating to breed.

**Q30. Isn't this area full of large fish traps?**

A. There are several types of large traps, which are considered traditional in this area. But in recent years more traps were built and their average size increased, so in some places they had completely blocked fish migrations. Under the Lao Fisheries Law of 2009 the large traps, which block channels, are illegal, so in May and June of 2016 the responsible Lao agencies removed most of the large traps at Khone Falls.

**Q31. What is being done to reduce illegal and destructive fishing to enable greater numbers of fish to spawn upstream?**

A. The Lao Fisheries Law of 2009 made the use of traditional basket-shaped lee traps and luang khang traps illegal because they block fish migrations and in particular target large fish on spawning migrations in the early wet season. With the support of DSHPP, a Don Sahong Fisheries Management Committee has been set up to implement a Don Sahong Fisheries Management Plan. The committee's top priority is to reduce illegal and destructive fishing. District authorities have removed large traps to make it easier for fish to migrate upstream for breeding. In addition to removing traps, local officials seek to stop the use of explosives, poisons and electro fishing that kill and injure fish and other animals. Local people oppose these methods because they harm fish and benefit only a few greedy fishers.

**Q32. Is the project responsible for poisoning fish?**

**A.** No. Over the past five years there have been instances where fishermen from Laos and Cambodia have been found using poisons in conservation zones, and some have been arrested. Shops in the area have been selling insecticides and electro fishers. In early 2016, two Cambodians died after eating poisoned fish. None of this is directly related to the project. Apparent increases in destructive fishing in 2016 may be the result of low fish catches generally caused by an extended drought, and pressure from traders to provide commercially valuable fish to export to urban centers distant from Khone Falls. DSHPP actively supports enforcement of the law by the responsible GOL agencies through the Fisheries Management Committee.

**Q33. Is there a program to monitor fish migration?**

**A.** Fisheries monitoring commenced in 2009 and has progressively increased in intensity and sophistication over the past two years. This effort will be sustained throughout the construction phase (2016-2019) as part of an adaptive management strategy that requires monitoring results to assess performance. Thereafter the EIA proposed that monitoring would continue for a further 10 years during the operational phase. This could be extended by the ongoing adaptive management process. As with all instream bioengineering works, the modified channels are being assessed to ensure they are replacing Sahong Channel. DSHPP has committed to carry out additional modifications if needed to ensure successful fish passage. The effectiveness of fish passage is being assessed by comparing the species composition, size-classes and abundance of fish caught downstream of all three channels (Xang Pheuak, Sadam and Sahong) with fish caught upstream of all three channels using appropriate statistical tests. The results will be reviewed by an independent panel and published in an internationally recognized peer-reviewed scientific journal. Trapping of migrating fish and underwater cameras are also used to monitor fish making their way upstream in the dry season.

**Q34. What has been learned about fish migration over Khone Falls?**

**A.** Prior studies have identified the main migration periods and species and the project's monitoring has confirmed the same patterns. Fish migrate past the falls for feeding, spawning or refuge. Because water levels are lowest in the dry season, fish migration at that time is the most challenging problem to be addressed by the mitigation measures. DSHPP and critics of the project disagree on whether the mitigation measures are feasible. The Lao Government and the developer believe that because fish attempt to swim through all channels at Khone Falls, removing barriers to their passage will simply enable them to continue on their migrations up alternative channels. Therefore the situation is quite different to that at other dam sites at which artificial concrete fish passages cannot simulate a natural river and do not provide enough water relative to the flow of the river to fully mitigate loss of fish passage via the natural river channel.

**Q35. What has been done to improve fish passage through Khone Falls?**

A. The Don Sahong dam will block one of seven main channels. Fish attempt to ascend all of these channels however, waterfalls, rapids and traps may obstruct their way. Sahong Channel was probably one of the best channels for passage but for many years it was obstructed by manmade and natural obstacles. Sadam and Xang Pheuak Channels were also passable over the years. Improvements have now made them more passable. DSHPP has made physical improvements to seven sites on three main channels. Passage will become easier when illegal fishing gear and large traps blocking channels are removed.

**Q36. What is involved in mitigation?**

A. In Sadam, Xang Pheuak Noi and Somphordan channels, modifications were made so that more water can flow down them. This is particularly important during the dry season. In Xang Pheuak Noi, Luang Pee Teng, Wai, Nyooi Koong and Luang San, waterfalls were broken down. In Wai, a bypass was created around natural rock obstacles in 2014 and expanded in 2016.

**Q37. What happens if measures to mitigate fishery impacts are not successful?**

A. DSHPP is very confident the mitigation measures will be successful. DSHPP has set an ambitious target of increasing the success of fish migration across the Khone Falls. This confidence is based on: 1) a detailed understanding of the hydrology and morphology of neighboring natural channels and experience in modifying them to improve fish passage; and, 2) a program to reduce the pressure on fish stocks migrating across the Khone Falls. The sustainability of the fishery resource, particularly its diversity, is currently under threat from overfishing. DSHPP will provide strong support to fishery management agencies to develop and maintain critical migration pathways as conservation zones (capability building) and to better understand fish migration and spawning patterns in the Siphandone region. DSHPP is also actively developing alternative livelihoods and providing training for local people to provide them with alternatives to fishing.

**Q38. How will DSHPP ensure that Sadam has enough water to support fish migration?**

A. The project is mandated to ensure that future dry season flows in Sadam will either exceed or match existing natural flows. DSHPP has already deepened the upstream inlet of the Sadam channel. If necessary the inlet will be deepened further to ensure the flow will match or exceed a baseline for natural dry season flows.

**Q39. What design criteria ensure the passages will work for all of them?**

A. The most important design feature is to reduce the gradient at obstructions in other channels to replicate the gradients in Sahong Channel, which was probably the most important fish passage before it was closed in January 2016.



**Q40. Is there evidence to demonstrate these fish passes are working?**

A. Monitoring results prior to construction show similar dry-season catch rates upstream and downstream in Sahong, Xang Pheuak and Sadam Channels with successful fish passage through each of these channels. Fish could be observed moving through both these channels in the 2015 dry season, and results from the company's monitoring program to date show similar catch rates downstream and upstream in these channels as in Sahong Channel. In June and July 2016, locally caught fish were in abundance at area markets and prices for many kinds of fish were low, due to the ample supply.

**Q41. What will DSHPP do if/when the fish that will certainly be attracted to Sahong dam discharge, do not continue upstream on their migration via an alternative channel, and are simply harvested by local fishers?**

A. Fishing at the outlet of the powerhouse will not be practical or possible for the fishers. This area will be managed by the project to avoid exploitation of any fish accumulation in the area prior to their further upstream movement. Currently fish are attracted to other impassable obstructions (e.g., Phapheng Falls). Local knowledge is that eventually these fish swim back downstream and search for alternative pathways. With monitoring and adaptive management, obstructions will be removed to permit fish passage throughout the period of project operation.

**Q42. What is DSHPP doing to investigate whether the new pathways will compensate for the damming of HSH and the loss of that migration path?**

A. DSHPP will maintain and further develop the fisheries monitoring program, which has been in place since 2009 to test the effectiveness of fish passage.

**Q43. Will DSHPP use fish-friendly turbines?**

A. Yes. DSHPP will be using bulb turbines, which are termed 'fish friendly' because they rotate at a relatively slow speed compared to other types of turbines which are usually installed at projects which have higher heads, reducing the risk of a turbine blade striking the fish. Given the axial flow configuration of the bulb turbine flows go straight through without having to pass through bends or elbows. The estimated rate of mortality of downstream-migrating fish at the project satisfied the MRC preliminary design guidance criteria of 95% survival. This estimation took into account fish migrating downstream through other channels and a screen to exclude larger fish.

# Dolphins

**Q44. Will construction noise and increased flows from the dam during the dry season have a negative impact on dolphins?**

**A.** Excavation activities are isolated from the river by cofferdams. No underwater excavation is required or permitted at the powerhouse site, which is nearest the dolphin pool. Even with increased dry season flow through Sahong Channel during operation, this flow would not pass through the dolphin pool. Most of the inlet excavation and all of the downstream excavation will be undertaken in dry conditions, due to the temporary cofferdams being in place as noted above.

**Q45. Will underwater blasting related to the project harm the Irrawaddy dolphins nearby?**

**A. No underwater blasting is being carried out.** The project EIA and Engineering Status Reports both clearly state that underwater blasting will not be permitted below the downstream cofferdam in order to protect the dolphin population.

**Q46. Will boat traffic over the dolphin pool increase during construction?**

**A.** The new access road and bridge that now link the project with the mainland eliminate the need to use barges to bring construction equipment to the site. As the people of Sahong and Sadam islands now have direct access to mainland, there has been a significant reduction in local boat traffic.

**Q47. What are the biggest threats facing the dolphin population?**

**A.** The real risks to dolphin survival in the Mekong have been well documented. They are: disturbance from tourism activities; capture in gill nets and other fishing gear; being struck by boats or their propellers and unexplained high mortality rates of calves and juveniles. In the long run, any species requires a minimum viable population size for survival; for a vertebrate species this means hundreds of individuals are necessary for long-term survival. In the absence of concerted intervention, it is predictable that dolphins will become extinct in this part of the Mekong.

# Sediment

**Q48. Will Don Sahong remove sediment from the river system?**

**A.** No sediment will be removed from the river system, although a small volume will be permanently deposited in Sahong Channel. Firstly, 92% of the Mekong sediment load will naturally be transported down the existing channels other than Sahong Channel. Of the 8% that enters the Sahong Channel, a small proportion will settle in the headpond during the first 2-4 years of operation (between 2% and 4% of the total per year, depending on natural flow variation). When the trapped volume reaches 2-4 million tons, an equilibrium condition is reached. After that, the

headpond will trap no further sediment. All sediment entering the headpond will pass through the turbines and continue downstream over the duration of a dry/wet season. To put the total volume of trapped sediment into perspective, over the developer's 25-year concession period, the percentage of sediment that can possibly be trapped in the headpond is 0.12% of the total sediment load measured at Pakse.

**Q49. Will discharge from DSHPP carry sediment flows to the dolphin pool?**

A. No. The dolphin pool is separated from the power station discharge flows by a shallow reef of rock in the main river just beyond where the discharge exits into the main river. Power station discharge will therefore be channeled directly downstream and will have no discernible impact on the dolphin pool. Any small amount of sediment that may be introduced due to the small extent of underwater excavation above the inlet of Sahong will be transported over Phapheng Falls, avoiding the dolphin habitat. In any case, sediment concentrations in the flow from Sahong Channel will be similar to those at all channels, which cross the falls.

**Q50. What did MRC experts say about the potential impact of DSHPP on sediment flow and water quality downstream?**

A. At the regional public consultation meeting in January 2015, expert panels reported that operation of DSHPP would have no significant trans-boundary impacts on sediment balance, hydrology, water quality or ecosystems.

## **Design / Technical features**

**Q51. What is the purpose of the Don Sahong Hydropower Project?**

A. The primary purpose of the project is the generation of electricity to spur development of the south of Lao PDR. DSHPP will not only contribute to national development and poverty eradication. It will bring direct and indirect benefits to the local communities and the region, and at the same time, significantly reduce production of greenhouse gases, a contributor to climate change phenomena.

**Q52. Will DSHPP create a big reservoir?**

A. An excellent dam site measured by most environmental criteria, DSHPP's reservoir volume is very small compared to every other major hydropower project in the Mekong Basin. Less than 200 ha of land will be flooded by the headpond. These physical characteristics mean that changes in water quality and sediment transport downstream are minimal. That's important because these processes have caused environmental and social impacts elsewhere. The energy density (efficiency of hydropower energy production) of the Don Sahong project is higher than any other existing or planned hydropower project in the Mekong Basin.

**Q53. Why was this location chosen?**

A. The project sits atop a natural dam called Khone Falls. There are seven main channels that spill over the falls. Water has been diverted down Phapheng Channel during dam construction, avoiding any need for costly excavations, and Phapheng will continue to function as a natural overflow for Sahong Channel.

**Q54. Did Lao PDR consider alternatives to the Don Sahong site?**

A. Studies were conducted of other sites in the area, such as Thako, Xang Pheuak, and Tad Somphamit, but investigations determined that hydropower projects at the other sites were not economically feasible. Area residents also raised cultural concerns about sites close to Phapheng Falls. Other hydropower schemes have been considered in the past in other branches of the Mekong near the project site. However there is a finite amount of water available through the area as a whole, and it would not be economically viable to build more than one hydropower station in the Siphandone area if the water had to be shared between stations.

**Q55. Is DSHPP being built to international standards?**

The Lao Government has retained world-renowned consultants, with vast experience developing successful and environmentally friendly hydropower projects on Europe's international rivers. These consultants, including U.S.-based AECOM and the Finnish firm Pöyry, have conducted technical and environmental studies to ensure that the projects built on the Mekong will be designed and built to best international practice in development of hydropower. The approved design is technically superior, economically viable and sustainable, and without significant impact on the river or natural environment in Lao PDR and beyond its borders. The project is being constructed by Sinohydro, a Chinese-state enterprise that has constructed hydropower projects in Asia and elsewhere around the world.

**Q56. How much power will DSHPP generate?**

A. Calculated average energy generation is 2,000 GWh per year.

**Q57. Will DSHPP operate as a peaking hydropower station?**

A. No. The station is a run-of-river scheme. There will be insufficient water storage for the station to operate in a peaking mode.

**Q58. Will water levels there fluctuate from day to night?**

A. No, the power station turbines will operate continuously from day to night following the natural flow variation in the river, which is a further reason why there will be no peaking or within-day regulation of turbine flows.

**Q59. Can water quality be assured during and after construction?**

A. The risk of water quality impairment during construction is significantly reduced by the fact that almost all works are done on dry land, behind cofferdams. Appropriate mitigation measures are in place. During operations, the small size of the head pond means the maximum water residence time will be four hours, so there will be almost no change in water quality. Sediment retention will be minimal

after two-three years of operation so scouring or flushing operations to remove sediment build up will not be necessary

**Q60. How much rock will be excavated from channels and where will it go?**

**A.** Approximately 2.7 million m<sup>3</sup> of rock is being excavated, mostly from within the Sahong Channel. The excavated material will be used to construct the embankments and powerhouse barrage, with all additional excavated material placed inside against the embankments. There will not be the need for any permanent spoil disposal areas outside the boundary of the project embankments.

**Q61. What impact would a dam breach have downstream?**

**A.** The risk posed by a theoretical breach of the DSHPP embankments is low, as the embankments are relatively low (about 20 m maximum height). During a significant flood event the downstream water level will be less than 10 m lower than the head pond level, as water levels in the Mekong River downstream of the embankments are >10 m more than dry season water levels, and the potential outflow from the Don Sahong Dam's head pond in the event of an embankment breach will be small in comparison to the total river flows downstream during a flood event. Any surge resulting from dam failure would be significantly dampened by the time it reaches significant population centers downstream.

**Q62. Is the foundation for the power station sufficient?**

**A.** The powerhouse site has had extensive geotechnical investigation including 31 drill holes to a maximum depth of 70 m totaling 811 m, in-situ testing for compressive strength and permeability, and laboratory testing. The investigation results confirmed that the foundation conditions for the power station are suitable.

## **Trans-boundary issues**

**Q63. What trans-boundary impacts are anticipated?**

**A.** Because the Cambodian border is very close, the trans-boundary impacts are the same as the downstream impacts which, as above, have been identified as minimal. With respect to sediment transport there would be minimal change in the first two years of operations then no change as DSHPP turbines pass all sediment. Regarding flow variation, there is a change in the distribution of flow between channels crossing the falls, but no change in total flows downstream. Regarding water quality, there is no change as retention time is very short (maximum is less than four hours). With respect to biota, the ESIA did identify a potential negative impact on aquatic biota downstream, but this can be mitigated by modifying other channels (Sadam and Xang Pheuak) to become better fish migration passages and secondly by supporting fishery management in Lao PDR to reduce the fishing pressure on spawning migrations as a benefit for the regional fishery. Irrawaddy dolphins living close to the project site will not be affected by the project for the same reasons.

**Q64. Did DSHPP consult with Cambodian residents during the planning stages?**

A. As documented in the Cumulative Impact Assessment report, a limited consultation process was carried out in Cambodia to obtain the views of people, agencies and NGOs that may be affected by the DSHPP.

**Q65. Does DSHPP plan to make another assessment of trans-boundary impacts?**

A. No, the project will not repeat these assessments. DSHPP has clearly demonstrated in the EIA and in several engineering studies that there will not be any downstream trans-boundary impacts on regional sediment transport, water flow, or water quality. MRC experts did not dispute these broad conclusions. The ESIA did identify the potential for negative impacts on aquatic resources and mitigating these impacts has been and will continue to be the main thrust of the construction and operations work. DSHPP has established detailed monitoring programs to measure the success of fish passage across the Khone Falls and has already improved fish passage through several channels as alternative dry season pathways to Sahong Channel. The project EIA found the cumulative and trans-boundary impacts of DSHPP on the living aquatic resources would be insignificant if engineering and social interventions effectively mitigate the barrier effect of the Don Sahong Dam and other natural obstructions in neighboring channels. The key to effective mitigation will be adaptive management.

**Q66. What studies have been shared with neighbor countries and MRC experts?**

A. More than 30 studies have been completed and others are still underway. Among the major project studies conducted are the following:

- Initial Feasibility Study
- Detail Feasibility Study
- Engineering Status Report (update to the Feasibility Study)
- Environmental Impact Assessment (EIA) and associated Environmental Monitoring and Management Plan (EMMP)
- Social Impact Assessment (SIA) and associated Social Monitoring and Management Plan (SMMP)
- Hydrology, Hydraulics and Sedimentation Studies
- Cumulative Impact Assessment (including trans-boundary impacts)
- Resettlement Action Plan
- Fisheries Studies

## Social Impact

### **Q67. Will local people suffer due to the loss of land or livelihood?**

**A.** Fourteen households on Don Sahong Island were relocated to a new village less than 2 kilometers away. A temple, school and clinic have been built. The area of land taken up by the project is relatively small. The increase in the inundated area is only 125 ha. The livelihood of local peoples has been partly based on exploitation of fish, with a significant part of the catch caught by methods that are currently illegal and which target fish on their spawning migration. Local people will continue to catch fish for household use using legal gears, but commercial fishing catches will be reduced by trap removal and control of destructive fishing by explosives, poisons and electro fishers. Most local people understand that maintaining their livelihood by fishing is becoming harder because of increasing competition for fish by people all along the Mekong, including downstream in Cambodia, from where many fish must migrate to reach Khone Falls. The DSHPP is supporting measures to diversify livelihoods, including aquaculture and other crops.

### **Q68. How will the project affect the income of local residents?**

**A.** The project has hired some local people to fill various roles, including as construction workers and on the fisheries monitoring program and for fish passage restoration. Some local people are supplying goods and services to the project, and the provision of a road, school and additional traders has reduced their cost of transport and some goods. The project is supporting local people to develop alternative livelihoods including aquaculture and agricultural projects.

### **Q69. What benefits will DSHPP bring to the Siphandone region?**

**A.** As part of the preparatory works, the developer has built a road bridge from National Route 13 near Veunkham to Sadam Island crossing Phapheng Channel. The 340 m bridge opened in August 2015. When the power station is constructed, there will be formal road access to Don Sahong Island. These roadways serve 400 residents in the area, and have already provided a new level of convenience for residents by reducing reliance on small boats. In addition to improving road access, the project is creating employment opportunities for local people during construction and operation. Rural electrification will be extended throughout the region and improvements will be made to sanitation, health care, educational and cultural facilities. Tourism will increase as will trade and services.

### **Q70. What measures are being taken to compensate people who are directly impacted by the project?**

**A.** Fishers within Sahong will lose income from the loss of fish traps but will be offered opportunities to develop livelihood alternatives and be assisted to achieve replacement income from new sources. A compensation package will be arranged for directly affected people on a case-by-case basis. As in other major hydropower projects in Lao PDR, affected people have obtained better housing and infrastructure and more economic opportunities than they had.