Poverty - Environment Initiative (PEI) Lao PDR
Issues Brief 06/2010:

Investments in hydropower

This issues brief series is developed by the Poverty-Environment Initiative of Lao PDR to address poverty and environment issues in the current development and national planning processes. The purpose of the briefs is to provide evidence-based information and practical policy recommendations to support transformation of the Lao economy towards a sustainable pro-poor development path.

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BRIEF The Government of Lao PDR (GoL) believes that development of Lao PDR's hydropower potential will play a crucial role in the socio-economic development of the country. The 12 hydropower projects that are already in operation make electricity the second highest source of export revenue for the country. Beyond increasing export revenues, hydropower benefits may include the generation of clean energy, rural electrification and rural development, as dam developers often invest in building roads and schools for affected communities. In addition, the reservoirs of multi-use dams can support irrigated agriculture, which supports higher yields than rain fed agriculture.

However, the negative effects of dam construction can be substantial and may include displacement of people, flooding of natural habitats, damage to fisheries, changes in quantity, quality, and timing of water flows, as well as changes in quantity and quality of sediment transported by the river.[1] Because Lao PDR's mostly agrarian population is highly reliant on river systems, particularly floodplain wetlands for fish, irrigation, crop fertilization and transportation, it is also highly susceptible to significant changes to hydrology, sediment transport and aquatic ecosystems that can be caused by dams.

This issues brief outlines policy options that the government and other decision-makers may consider to ensure that hydropower helps, instead of hinders livelihoods of Lao citizens and the country's downstream neighbors.

Siphandone (Photo: IUCN Lao PDR)

[1] Ledec, George & Juan David Quintero. November 2003. "Good and Bad Dams". The World Bank.

1. Hydropower development in Lao PDR

Hydropower is a renewable energy source that has the potential to provide Lao families with clean, low cost electricity. The GoL aims to give 90% of the population access to electricity (currently almost half the people of Lao PDR have no electricity) and use the income from sale of power to neighboring countries to develop the economy and help remove Lao PDR from the least developed country list by 2020. The GoL has shown a clear interest in continuing to develop hydropower projects with 7 more projects under construction, approximately 20 in the planning stage and 50 in the feasibility stage.[2]

The Government supports hydropower development in Lao PDR because it will increase export revenue and will thus provide funding to relieve poverty. The GoL explains that revenues from hydropower projects can relieve poverty through supporting, "expansion of health, education, and other social services; improvements in transportation, communications, water supply, electrification and other infrastructure; and increasing the resources of the Lao Government's environmental agencies to improve the effectiveness of their protection programs".[3] However, such a connection is difficult to make unless poverty reduction financing processes are established to guarantee benefit sharing for those directly affected by the scheme (such as those displaced by a project and those reliant on downstream ecosystem services). For example, rural electrification agreements may help to ensure benefits from hydropower projects reach local communities.[4]

By the end of 2010, Lao PDR's electricity exports are expected to increase by about 150% largely due to new hydropower projects, like Nam Theun 2 (NT2), a World Bank-supported 1,075 MW dam built on the Nam Theun River, a tributary of the Mekong in Khammouane province. As of September 2010, NT2 has been producing electricity for 8 months and has already generated about US$160 million, contributing about three percentage points to the Lao economy which is projected to grow by 7.8% overall in 2010.[5] NT2 is expected to generate US$240 million in 2011.[6] 1,000 MW are for export to Thailand and the remaining 75 MW are for domestic use.[7] (Box 1 provides more detail on the NT2 project). The GoL estimates that less than 2% of the country's hydropower resources have been developed and that about 18,000 MW of technically exploitable hydropower can be produced in Lao PDR's major Mekong sub-basins and in minor Mekong and non-Mekong sub-basins (this estimate excludes the mainstream Mekong).[8]

Realized and proposed investments in this sector are marked by a variety of investors, models and scales: pico/small/large hydro; mainstream and tributaries; domestic use and exports. Major investors in hydropower include: multilateral development agencies such as the World Bank and Asian Development Bank (ADB); international companies, such as Electricite de France (EDF), China North Industries Corporation (Norinco), Sinohydro and Russian State Oil; companies from neighboring countries, such as Chor Kan Chang (Thailand); and banks from other countries, such as the Export-Import Bank of China (Exim) and Thailand's Kasikorn Bank.

Box 1: NT2 setting an example for best practices?

The environmental and social sustainability of the NT2 dam project is still being hotly debated and it is likely too soon to predict what the project's legacy will be. Despite this, it is already clear that the project goes above and beyond many other dam projects in its attempts to offset environmental damage and provide long term assistance to communities displaced by the dam. Examples of these best practices include: revenue sharing arrangements to direct revenue to poverty alleviation efforts, US$1 million per year for 25 years (after the start of commercial dam operation) for watershed management above the reservoir, and the creation of the 4,000 km^2 Nakai-Nam Theun National Protected Area.

(*Source: Nam Theun 2 Power Company. www.namtheun2.com).*

[2-3, 8] www.poweringprogress.org (accessed November 2010).

[4] Skinner, J., Niasse, M., and Haas, L. (eds.) 2009. Sharing the Benefits of large dams in West Africa. Natural Resource Issues NO.19. International Institute for Environment and Development, London, UK.

[5] The World Bank. 2010. *Lao Economic Monitor September 2010.*

[6] The World Bank. 2010. Lao *Economic Monitor May 2010.*

[7] The World Bank. "NT2 project overview and description"; www.worldbank.org (accessed November 2010).

2. Investing in Sustainable Hydropower: Policy Options

Not all hydropower investments have equal impacts on the environment, local people and the Lao economy. Decision-makers and investors must carefully manage investments to maximize the positive effects (measured in terms of revenue, flood control and so on) while minimizing the negative (in terms of area flooded, people displaced, etc.). To ensure that these investments provide the benefits anticipated, while avoiding substantial and irreversible damage to the livelihoods of Lao people and the country's down-stream neighbors, decision makers in Lao PDR may want to consider the following policy options:

2.1 Strategic level options

A Strategic Environmental Assessment (SEA) could be conducted for the entire Hydropower Sector in Lao PDR to include both tributary in addition to mainstream projects – this would help to organize and prioritize hydropower investments in terms of location, project design and operation, as well as identify rivers, stretches of rivers, wetlands and aquatic species that require special attention to protect them from risks associated with hydropower development. In large river systems such as the Mekong, as a general rule, dams on tributaries have less overall impact than those on the mainstream; dams higher in tributaries have less impact than those lower down[9], and multiple dams on the same tributary will have less total impact than the same number of dams spread over different tributaries.[10] In addition to cumulative and trans-boundary impacts, this SEA could also investigate how these impacts may be influenced by climate change.

Approach mainstream dam proposals with caution. Since 50% of the Lao population lives within 5km of the mainstream Mekong, their fishing and riverside agriculture-based livelihoods may be very vulnerable to possible changes caused by mainstream dams. The Mekong River Commission's (MRC) mainstream hydropower SEA, released in November 2010, indicates that mainstream projects could completely change the environment and society of Lao PDR and its downstream neighbors. As such, the MRC has called for a 10 year moratorium on mainstream dams until the impacts of these dams are better understood.[11]

While Lao PDR may remain interested in mainstream dams, it is beneficial to focus on understanding potential environmental and social impacts, in-country and trans-boundary implications, and risks before approving these projects. It may also be preferable to treat mainstream proposals with caution until impacts are better understood and mechanisms can be put in place to assess and compensate for inevitable transboundary impacts, (including a recourse mechanism to deal with grievances). This may help Lao PDR to avoid possible transboundary conflict with its neighboring countries.

Reference to International standards. Decision-makers may consider only allowing projects that demonstrate adherence to sustainability standards, such as those of the International Hydropower Association (IHA) and the recommendations from World Commission on Dams (WCD), which require an Environmental and Social Impacts Assessment (ESIA) and an Environment and Social Management Plan (ESMP). Projects that meet sustainability criteria make better business sense and are more likely to support the goals of hydropower development for Lao PDR.

Consideration of compensatory payment for natural resource conservation and ecosystem management from electricity exports. Decision makers in Lao PDR should consider whether the protection of the watershed area of each hydropower reservoir is properly accounted for in the allocation of revenue streams from power sales.


Photo: IUCN

[9] Ledec & Quintero, 2003.
[10] WWF. May 2010. "River of Giants: Giant Fish of the Mekong."
[11] Mekong River Commission. October 2010. Strategic Environmental Assessment of Hydropower on the Mekong Mainstream".

Box 2: Impact on Fisheries

The Mekong River Commission's July 2010 publication on "Impacts on Fisheries" indicates that should Mekong dam development plans be fully implemented, by 2030, the state of fisheries in Lao PDR will fundamentally change. As of 2000, Lao citizens consumed approximately 43 kg of fish per capita per year. This adds up to about 220 kilo tons/year for the country as a whole. Fish is undeniably essential to the country's food security. The majority of this fish is caught in river-flood plains. However, if full dam development plans proceed, just 15 kilo tons will be caught in river flood-plains, despite the fact that demand for fish will continue to rise.

Though reservoir and rice-field fisheries and aquaculture are expected to grow, growth rates could be affected by a number of factors. For example, how will shallow waters and pesticides affect fish? And will Lao PDR have the resources to successfully create reservoir fisheries? Despite some unknowns about how well reservoir fisheries will be able to compensate for the decrease catch in river flood-plains, there is no doubt that hydropower development will cause a large drop in the biodiversity of the Mekong. For example, if 6 mainstream dam projects go forward, at least 41 mainstream species out of 262 in the area upstream of Vientiane will be threatened and the Mekong Giant catfish will become extinct in the wild.

While lowland rice farmers may benefit from reservoir fisheries (in spite of their limited diversity), fishermen living along rivers and floodplains, particularly the landless and ethnic minorities, are most likely to suffer as a result of dwindling fish populations. For example, if the Upper Lao cascade of 6 mainstream dams is built, about 76,290 Lao citizens, mostly ethnic minorities living below the poverty line, will be put at risk since they are so dependent on natural resources, like fish.

(Sources: Kent G Horte. August 2010. Presentation on "The BDP fisheries assessment and the future for LMB fisheries" at the 3rd Regional Stakeholder Forum on Mekong Basin Development Plan; Mekong River Commission. June 2010. "Technical Note: Impacts on Fisheries"; Mekong River Commission. October 2010. Strategic Environmental Assessment of Hydropower on the Mekong Mainstream")

In addition, a "biodiversity offset" approach could be put in place to provide compensatory payment for the losses caused by the construction and operation of each hydropower scheme. These funds should be used to conserve other forest and river areas of high biodiversity. Payment for protected areas management (including wetlands sites protected under the Ramsar Convention) is particularly important.

Meaningful local, civil society and international participation in decision-making about hydropower investments. Instead of simply notifying local people that a dam will be built in their community, local people and local civil society organizations should be involved in the planning, debates and decision making process early on. These stakeholder consultation processes could be mandated under the new *Water Law* currently being developed, and could be facilitated through the River Basin Committees (RBCs) that are being established in major rivers basins. For meaningful participation to occur, the GoL could diligently follow its policy of disclosing information (such as ESIA reports) on proposed hydropower projects to the public. Given the transboundary impacts of dam construction, the country's long-term hydropower development strategy also needs to be integrated with those of its neighboring countries through basin-wide planning processes facilitated by the MRC to avoid riparian damage.

2.2 Individual Hydropower Project Level

***Full cost-benefit analysis (CBA) of investments*.** The calculation should take into account not only benefits, but also the full cost to the environment and society, including the costs of implementing the proposed project over other uses of the river, now and in the future. As part of the analysis, sufficient attention must be paid to the mitigation, compensation and benefit sharing arrangements.

Existing regulations and processes including those for ESIAs, environmental and social management plans, compensation schemes, etc., should be strictly enforced for projects of all sizes and types. A new requirement for each project to additionally conduct a cumulative impact assessment could also be added. This would ensure an understanding of the complex impacts that can result from more than one dam being built on one river or river system. It is important not only that these assessments be carried out, but that their findings act as key factors in deciding whether or not a project should be approved.

Given the large burden that enforcing these regulations puts on WREA, international donor organizations could support the GoL by funding projects for NGOs experienced with ESIAs, environmental monitoring plans and other processes to help WREA improve its capacity in these areas. Investors should also support efforts to enforce regulations and minimize impacts by strictly following ESIA, environmental and social management plans, compensation schemes and other requirements.

Alternative design options that are economically viable and produce the required electricity while having a smaller impact on the environment should be considered for each project. These include: run-of-river schemes; dams that block only part of the river; schemes that off-take of water from part of the channel to pass through turbines outside the river channel; as well as design features that minimize changes in oxygen levels and temperature of water released from dams, and maximize the passage of sediment through the dams. While there are numerous improvements that can be made to the design of dams, it should be noted that a meeting of the world's leading inland fisheries experts convened by the Fisheries Programme of MRC concluded that fish ladders, fish lifts and fish passages will not be effective as part of mitigation plans for large dams in the Mekong.[12]

[12] Mekong River Commission. December 2008. "Catch and Culture", v. 14 no. 3.

What is PEI?

The United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP) support the Poverty-Environment Initiative (PEI), a program that aims to mainstream poverty and environmental issues into national level planning and development processes. The objective of PEI in Lao PDR is to ensure that the country's rapid economic growth generates inclusive and sustainable development. PEI supports the strengthening of institutional capacity in national development planning and private investment management, the development of guidelines for social and environmental impact assessments, and the generation of evidence-based research on the social and environmental costs of land use decisions. The project is coordinated by the Ministry of Planning and Investment with project components managed by the Department of Planning, Investment Promotion Department, National Economic Research Institute and the Department of Environmental and Social Impact Assessment of the Water Resources and Environment Administration.

www.unpei.org/programmes/country_profiles/lao-pdr.asp

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