

# Summary: Nam Theun 2 Technical Reviews

## Commissioned by International Rivers Network and Environmental Defense

By May 2005, the World Bank and Asian Development Bank are expected to decide whether or not to finance the US\$1.3 billion Nam Theun 2 hydropower project in Lao PDR. If completed, the project would displace more than 6,200 indigenous people and negatively affect the livelihoods of up to 100,000 villagers living downstream.

The World Bank claims that the project has been carefully planned so that, unlike past hydro projects, people displaced or otherwise threatened will not be left worse off. As well, the Bank claims that the dam's negative environmental impacts can be successfully mitigated.

Because an independent review of the developers' plans is not possible in Lao PDR, International Rivers Network and Environmental Defense invited several experts in Thailand and the US to review the November 2004 drafts of the Nam Theun 2 Social Development Plan, Environmental Assessment and Management Plan, and Watershed Management Plan (SEMFOP-1). The reviews are available at [www.irn.org](http://www.irn.org).

The reviewers found serious flaws in the Company's assessment of the Nam Theun 2 Project's environmental and social impacts. This not only casts doubt on the project's technical and economic viability, but also suggests that the risk of social and environmental failure is unacceptably high. The reviewers' key findings are summarized below:

### **Part 1: Hydrology**

#### **Hydrologists Dr. Peter Willing and Karla Knoop found that:**

1. Due to the paucity of hydrological data, and questionable statistical analysis techniques, "the project is high risk for meeting its power generation predictions and for estimating project impacts."
2. The Nam Theun 2 Environmental Assessment and Management Plan (EAMP) contains no hydrologic analysis, but contains references to unpublished supporting work. For much of the critical hydrologic analysis on which depends the entire assessment of the performance of the project and its environmental consequences, the Nam Theun 2 project sponsors have not provided the underlying data or explained the methodology used, thereby making robust independent analysis impossible.
3. The project plans are based on a maximum of 18-years of stream flow and rainfall records, which is not a statistically valid basis for deriving 100-year and greater flood estimates.
4. Hydraulic modeling did not include the upper and middle reaches of Xe Bang Fai River even though significant changes in water elevations will occur and impacts should be assessed.
5. The project developers have undertaken no analysis of how global climate change might affect flows in the Theun River.

*Review of Hydrology Component of the Environmental Assessment and Management Plan for the Proposed Nam Theun 2 Hydropower Project, by Peter Willing Ph.D. and Karla Knoop, January 20, 2005.*

## **Part 2: Water Quality Impact Assessment**

### **Aquatic Ecologist/Microbiologist Dr. Guy Lanza found that:**

1. The data used to characterize the baseline water quality in the project area is wholly inadequate, and as result, accurate predictions of the water quantity and quality changes that will occur in the reservoir and downstream rivers are not possible.
2. No effective mitigation strategies are offered in the EAMP to address the potential for prolonged anoxia and resulting releases of nutrients and toxic gases in the Nakai reservoir, which will result in the loss of adult and juvenile fish and fish eggs.
3. The EAMP fails to comprehensively examine the possibility for toxic blooms of cyanobacteria and algae in the reservoir, which can produce severe sickness and mortality in humans, wildlife and livestock.
4. The EAMP provides no data on aquatic macroinvertebrates, which play a vital role in establishing and maintaining good water quality and are an important source of food to many fish and other species.
5. The reservoir will expand the habitat for vectors of major waterborne diseases known to inhabit the project site. As a result, diseases such as malaria, dengue fever, schistosomiasis, and liver fluke can quickly spread, posing additional health risks for the resettled populations.

*Review of the Water Quality Assessment (Environmental Assessment and Management Plan) for the Proposed Nam Theun 2 Hydroelectric Project, Guy Lanza, Ph.D., Aquatic Ecologist/Microbiologist, Environmental Sciences Program, University of Massachusetts, Amherst, USA, January 2005.*

## **Part 3: Downstream Fisheries Impacts on the Xe Bang Fai River**

### **Fisheries and aquaculture specialist David Blake found that:**

1. Nam Theun 2 “is likely to have multiple serious, negative impacts on the aquatic resources of the Xe Bang Fai and Nam Phit rivers. As predicted in the Social Development Plan, the Nam Theun 2 project is likely to cause a ‘collapse in the aquatic food chain’ from the Nam Phit down to the Mekong.”
2. The EAMP lacks scientific and rigorous analysis of impacts. Predictions of impacts on downstream fisheries are based on three dry season surveys only. No study of fish species and migrations during the rainy season has been conducted, despite a recommendation from NTPC’s fisheries consultant in 1996.
3. The EAMP has not been updated to reflect design changes (in particular, greater turbined flows down the Xe Bang Fai river) since the original impact predictions and recommendations were made in 1996. As water levels will be more than twice as high as was assumed in 1996, many of the predictions of potential impacts are now outdated and underestimated.
4. The submergence of rapids, which are an important habitat and spawning ground for fish and many other aquatic organisms, will have a major impact on the ability of these organisms to survive.
5. No assessment of the project’s impacts on non-fish aquatic organisms important for human consumption (i.e., mussels, shrimps, and aquatic plants) has been conducted.

*A Review of the Nam Theun 2 Environmental Assessment and Management Plan as it pertains to impacts on Xe Bang Fai fisheries, David Blake, Mahasarakham, Thailand, January 2005.*

#### **Part 4: Compensation for Downstream (Xe Bang Fai) Communities**

##### **Fisheries and small-scale aquaculture specialist David Blake found that:**

1. The Nam Theun 2 Power Company (NTPC) makes the unjustified assumption that loss of wild fisheries can simply be replaced by introducing aquaculture or animal-raising options to impacted villagers. This assumption shows that NTPC does not comprehend the social, economic and practical problems involved in attempting to introduce novel livelihood strategies to numerous geographically widespread rural communities, hitherto inadequately informed or prepared for the changes which they will experience post operations.
2. NTPC's goal of completing all mitigation and compensation activities within five years of commercial operation is unrealistic, and, if implemented, will leave villagers without adequate long-term livelihood options.
3. The Company wrongly assumes that aquaculture can be a direct replacement for lost capture fisheries, which ignores local experience and the fact that cultured fish do not have the same economic, nutritional or cultural value in the diets of Lao villagers. Based on experience in Lao PDR and Thailand, no more than 20% of households are likely to take up aquaculture. Due to the costs of purchasing fish seed and food, the poorest families would most likely miss out on the benefits of this activity.
4. It is unlikely that there will be adequate human resources or supporting infrastructure in the area to provide sufficient fish seed or offer training and extension services.
5. Proposals to introduce alternative livestock production lack form and substance, nor do they build on the experience of the Theun-Hinboun Power Company, which has spent three years attempting with mixed results to introduce small livestock in dam-affected villages. The proposition that cattle will be preferred by villagers over small livestock and are feasible for mass extension is unrealistic given local constraints.

*Review of the Adequacy of Compensation Measures for Communities Living Along the Xe Bang Fai River, Nam Theun 2 Hydropower Project, Lao PDR, by David J.H. Blake, January 2005.*

#### **Part 5: Agriculture and Livestock Development Plan for Resettled Villagers**

##### **A rural development specialist found that:**

1. Irrigated farmland and intensive livestock-raising are two of the livelihood options offered as compensation by the Nam Theun 2 Power Company to resettled households but there is a high risk of failure for both.
2. The resettlement site has extremely infertile soils that will require high inputs of both organic and inorganic fertilizers and lime. Villagers will be provided with support for these inputs for a period of 3-8 years. Because villagers have never had to make such high inputs before, the Social Development Plan notes the "very real likelihood" that villagers will not be willing - or able - to do so once the project ceases support. Cropping systems and fertilizer schemes proposed are untested and therefore experimental.
3. Though irrigated land for dry season rice cropping has been promised, the Social Development Plan acknowledges that this may only be feasible "in the longer term."
4. The villagers will need to rely on markets for their livelihoods, yet the Nakai Plateau is an extremely remote area. In the early years of resettlement the construction camps will likely provide a market for the produce. However, if permanent markets do not develop, villagers will lose their market base after construction is complete, which will coincide with the cessation of agricultural support.

5. The reservoir will flood 45,000 hectares of prime buffalo raising pasture and the resettlement area does not have enough replacement land to support the resettlers' existing buffalo herds. Proposals for alternative forage production are inadequate, risky and untested.

*Review of Agriculture and Livestock Development Plan for the Nam Theun 2 Hydropower Project*, published by International Rivers Network, January 2005.

## **Part 6: Nam Theun 2 Reservoir Fisheries**

### **Fisheries Biologist Eric Theiss found that:**

1. The Social Development Plan presents the Nam Theun 2 reservoir fishery as one of four livelihood options for the 6,200 people displaced by the project but this presumption "is a precarious gamble at best."
2. Rather than introducing fish species into the reservoir, the reservoir fisheries plan recommends closing the dam gates after the migratory season and allowing native species to adapt to the changed conditions. However, the reservoir is likely to be anoxic (lacking in oxygen) during the first few years after impoundment as a result of decomposing biomass left in the inundation area. As fish cannot survive without oxygen, most of the fish trapped during the initial filling of the reservoir are likely to die during the initial years after dam construction.
3. Dam operations will shrink the reservoir to less than a fifth of its size during the dry season, which eliminates most of the underwater habitat. As the reservoir level decreases there will be less and less water capable of sustaining fish life. The deeper and relatively stagnant parts extending back from the dam are likely to be uninhabitable due to anoxic conditions.
4. Assuming there are fish to catch, the shallow depth and seasonal muddy drawdown of the reservoir would likely make subsistence fishing too costly and time consuming. Villagers would have to transport boats, outboard motors, and fishing equipment over long distances through deep mud to the lakeshore and back again.
5. At best, a small number of fish species could survive in the reservoir; at worst, the reservoir "will become largely devoid of life, except for invasive aquatic weeds and small islands of survivor fish species near the tributary mouths."

*Reservoir Fisheries Predictions for the Nam Theun 2 Hydroelectric Project*, Eric Theiss, Fisheries Biologist, Sustainable Environment Foundation, February 2005.

## **Part 7: Forestry Development Program for Resettled Villagers**

### **A rural development specialist found that:**

1. While NTPC has proposed community forestry operations for resettled villagers, the SDP admits that the profitability of the venture is unlikely. Past illegal logging activities have dramatically reduced the availability of quality timber in the resettlement area. In order to ensure profitability, tax concessions must be secured and post-harvest chemical treatment of timber must take place, but both of these are uncertain. If either one fails to materialize the viability of the entire plan will be jeopardized.
2. Villagers will lose a major part of their income from the collection and sale of non timber forest products (NTFPs), many of which will disappear once the reservoir is flooded. The community forestry area can be used to harvest some NTFPs, but a 1997 survey reveals that due to the poor soils, this area will produce "very few NTFPs". There are few plans for a substitute NTFP base. In addition, the SDP does not address the fact that NTFP collection

currently occurs in the proposed community forestry area by villagers who do not live on the Nakai Plateau. Their access to these NTFP collection sites will presumably be lost when the forestry development program is initiated.

3. The SDP recommends the establishment of the Nakai Plateau Village Forestry Association (NPVFA) to manage the forest area and harvest, process and sell the timber on a sustainable basis. Profits will be distributed equally between all the resettled households. From a managerial perspective, the operation of this association seems particularly optimistic given the present capacity of villagers and government staff.
4. NTPC plans to fund the forestry program mainly in the first year. After this time the forestry association will be on its own. Given the complexity and uncertain economic viability of the operation, NTPC should offer financial support for the first 5 years at least, until the forestry association establishes its viability.

*Forestry Development Program for the Nam Theun 2 Hydropower Project: An Independent Analysis*, Published by International Rivers Network, February 2005.

### **Part 8: Review of the Watershed Management Plan (SEMFOP-1)**

**Independent experts with extensive experience in conservation and development in the region found that:**

1. The management of the Nakai Nam Theun 2 National Protected Area (NNT NPA) will be funded primarily by contributions from NTPC of US\$1 million per year. The provision of substantial funding alone is unlikely to result in the sound management of NNT. The main constraint to improved management of the area is poor institutional commitment and a lack of secure property rights for local people, not funding. If funds are used inappropriately, greater environmental degradation and negative impacts on the livelihoods of NNT's residents are possible and perhaps even likely.
2. Protected area management has a poor track record in Lao PDR. Independent monitoring of the SEMFOP, with linkages between funding and performance, is essential. The monitoring arrangement proposed in the SEMFOP fails the test of independence.
3. The SEMFOP proposes to use part of its funding to improve access into NNT. However, some of the most significant threats to the protected area, such as unsustainable wildlife trade, unsustainable commercial sale of some NTFPs, illegal encroachment logging, and excessive population growth, are likely to be made worse, not better, by increased access. This is especially true in light of the additional pressure on NNT that will result from the influx of around 20,000 construction workers and their families into the area.
4. The NNT NPA has several inherent management advantages, such as partial insulation from the insatiable market for natural resources, low population density, remarkably diverse agricultural systems, and the relatively stable, secure livelihoods of many of its residents. The SEMFOP does not adequately focus on simply protecting these advantages.

*Review of the Nakai-Nam Theun Social and Environmental Management Framework and First Operational Plan (SEMFOP-1) for the Nam Theun 2 Hydropower Project*, compiled by Environmental Defense, February 2005.