

**A Review of the Adequacy of Compensation Measures
for Communities Living Along the Xe Bang Fai River
Nam Theun 2 Hydropower Project, Lao PDR**

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EXECUTIVE SUMMARY

As it stands, the Mitigation and Compensation Programme for the impacted villages along the mainstream Xe Bang Fai and its tributaries is overly ambitious, poorly reflects actual experience in the region and leaves many questions unanswered. The programme is lacking in detail and no feasibility study has been completed to examine the various recommended options. The Nam Theun 2 Power Company (NTPC) makes the unjustified assumption that loss of wild fisheries and edible aquatic organisms can simply be replaced by introducing aquaculture or animal-raising options (i.e. *'fish for fish'* or *'livestock for fish'*) 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 and thousands of households, hitherto inadequately informed or prepared for the changes which they will experience post operations.

The programme is not based on any actual example of successful mitigation and compensation in the region. There is no evidence that NTPC is utilising the experiences – both positive and negative - from the nearby Theun-Hinboun Hydropower Project or other projects in Laos in trying to mitigate and compensate for such massive changes to the river ecosystem. This is a major failing of the current plan. The experiences from these projects shows that replacing lost subsistence livelihoods takes a long time and is rarely successful. In this context, NTPC's stated goal of completing all mitigation and compensation activities within 5 years of commercial operation is unrealistic and, if implemented, will leave villagers without adequate long-term livelihood options.

This report makes the case that aquaculture should not be considered as a direct replacement to capture fisheries, as cultured fish do not have an equal economic, nutritional or cultural value in the diets of Lao villagers. Even if villagers did decide to take up aquaculture in any numbers (unlikely to exceed 20% of households even under ideal circumstances), 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. The poorest families would most likely miss out on the benefits of this activity, due to a tendency for risk aversion and general asset deficiency such as land and capital, important prerequisites for the proposed forms of aquaculture.

One of the main constraints to widespread adoption of aquaculture in Lao PDR is a lack of easily utilisable agricultural wastes that could be used as feed or manure in a pond or rice-fish culture system. Without an adequate source of food for the fish, having a pond is no guarantee that a farmer will be able to successfully or profitably raise fish, even for home consumption. This issue has not been adequately considered in the SDP. Furthermore, NTPC is still claiming that fish catches and yields in tributaries and associated wetlands in the Xe Bang Fai floodplain will not be negatively affected by the project, *"but more likely to be positively impacted"*. Hence, NTPC is not prepared or planning for the scale and extent of the likely impacts that will occur.

Plans to introduce alternative livestock production lack form and substance at present, and the proposition that cattle will be preferred by villagers over small livestock and are feasible for

mass extension, given local constraints to production, is unrealistic. The attempts by the Theun-Hinboun Project during the past three years to establish small livestock in impacted villages demonstrate that it is a slow and gradual process with many pitfalls along the way.

Plans for loss of riverbank gardens; impacts on household water supplies; and options for reduced access across the Xe Bang Fai and tributaries are similarly lacking in detailed forethought, or consideration of secondary impacts which may occur. Particularly, the potential for accidents to occur as a result of fluctuating water levels on Sundays and Mondays, as operation is halted in accordance with Thai power needs, has not been well considered. If public awareness, adequate warning methods and alternative access routes are not in place well before project operation, the potential for fatal accidents is high. Particularly vulnerable will be women, children and the elderly.

If Nam Theun 2 proceeds in its present form, the potential for impoverishment and food insecurity of the most vulnerable and poorest sectors of society will be increased, while intra-community and community-NTPC conflicts will almost certainly arise. A full economic analysis and feasibility study of the various options presented should be conducted prior to project approval in order to ascertain the viability of mitigating and compensating for impacts along the Xe Bang Fai River.

OUTLINE OF REVIEW

This report primarily reviews parts of the Mitigation and Compensation Strategy for the Xe Bang Fai communities contained in Chapter 40 of the Nam Theun 2 Hydroelectric Project's Social Development Plan (SDP)². Special emphasis is placed on:

- Compensation Strategy for Impacts on Fisheries
- Compensation Options for Loss of Riverbank Gardens
- Compensation Options for Impacts on Domestic Water Supplies

As a result of past experiences from other hydropower dams in the Lower Mekong Basin and the over-riding significance of capture fisheries in Lao people's livelihoods, diets and culture, the fishery and living aquatic resource issue is given primary consideration. Secondary to fisheries is the loss of riverbank gardens from heightened water levels and erosion caused by increased flows and fluctuating water levels. Both of these activities are major livelihood components of the communities living along the Xe Bang Fai River and its major tributaries. Other issues are given proportionately less space, but are still important.

The Mitigation and Compensation Programme is written with the understanding that the Nam Theun 2 Project's impacts on the Xe Bang Fai river will be similar to those described in the Environmental Assessment and Management Plan (EAMP), plus further potential impacts described in Chapter 31 (Environmental Impacts) and Chapter 32 (Livelihood Impacts) of the SDP. The predictions contained in Chapter 31 and 32 make it clear that impacts on fisheries and aquatic ecosystems will, in fact, be more grave and far-reaching than those first outlined in the

² Available at http://www.namtheun2.com/gallery/lib_sdp.htm

rather cautious, outdated and incomplete treatment of potential impacts provided in the EAMP. Little or no comparison or referral to other mitigation and compensation programmes from the region is made in the SDP, a serious weakness of the proposed plan.

INTRODUCTION

To understand the approach that THPC has taken to the issue of mitigation and compensation it would be useful first to repeat the definitions used in the SDP. The definition of compensation, as stated in Chapter 40 of the Mitigation and Compensation Strategy (p.2, Section 40.2) is as follows:

“Compensation relates to assistance to be provided to PAPs³ and/or PAVs⁴ for any negative socio-economic impact caused by the change in Xe Bangfai flows and water quality due to the NT2 Project. Thus, compensation will be applicable to impacts such as:

- *Reduction in mainstream fisheries catch;*
- *inability to establish dry season riverbank gardens and field (sic) due to increased river levels and erosion; and*
- *Difficulties in dry season crossing of the XBF river*

The level of actual compensation required will be confirmed before project commissioning and actually assessed regularly after project commissioning. As a general rule, the type of compensation to be given will be identified by community review and consensus, on a household by household basis for riverbank gardens and on a village by village basis for fisheries and crossing of the Xe Bangfai.

However, it is possible to present the compensation options as having three general types, as follows:

- *Direct restoration or rehabilitation of impacted livelihoods, such as ‘fish for fish’, gardens for gardens’ and the like;*
- *Restoration of impacted livelihoods in terms of rehabilitation of incomes or protein – for example, the development of cattle raising programs to compensate for loss in fish catch;*
- *Thirdly, the community may decide that they do not require income or food-based livelihood restoration as such, but more community development type activities.”*

REVIEWER’S COMMENTS ON OVERALL STRATEGY

Superficially, the compensation strategy outlined above may seem like a logical, reasonable and equitable approach to the issue of providing compensation to the many thousands of households scattered over a wide geographical area that will be impacted by the NT2 Project. But this initial impression gradually dissipates on closer consideration of the full socio-economic, environmental and cultural contexts of local livelihoods in the Xe Bang Fai basin, plus the realisation that the programme is not based on any actual example of successful mitigation and compensation in the region. The two obvious cases for comparison, both supported by multilateral development banks, are the Pak Mun Hydropower Dam in Northeast Thailand and

³ PAPs – Project affected persons

⁴ PAVs – Project affected villages

the Theun-Hinboun trans-basin diversion dam in a neighbouring river basin to the Xe Bang Fai. However, there is no evidence that NTPC is utilising the experiences – both positive and negative - from these and other projects in trying to mitigate and compensate for such massive environmental and social impacts. This is a major failing of the current plan.

The experiences from these projects, and many others in Laos, shows that replacing lost subsistence livelihoods takes a long time, is rarely successful, and that a major impediment is the lack of capacity and political will of the Lao government. In this context, NTPC's goal of replacing lost livelihoods within five years of commercial operation date (COD) is completely unrealistic. At Theun-Hinboun, now six years after COD, many villagers remain without adequate compensation for lost fisheries and riverbank vegetable gardens, and while there have been some successes, many challenges remain.

Furthermore, the basic rationale for compensation provided by NTPC is riddled with flaws in logic and inconsistencies. For example, NTPC states that "*The level of actual compensation required will be confirmed before project commissioning*", but recognizes that it will be impossible to accurately understand the actual losses until after COD.⁵ NTPC itself admits that baseline surveys on village infrastructure, livelihoods and economies have not been completed, and that adequate discussions have not taken place with villagers on what kind of compensation they would like.

With such a poor level of planning, it is unlikely that impacted communities and individuals will know their entitlements to compensation before COD, making adequate planning before impacts are experienced difficult. In addition, communities are unlikely to be fully informed of the scale of impacts before COD by NTPC, whose message to villagers has changed from "*more water equals more fish*" to, "*we expect up to an 80 % decline in catches*" in a fairly short space of time.

Likewise, there is no clear explanation for why fisheries impacts are to be compensated on a village by village basis and riverbank gardens are to be compensated on a household by household basis. Both riverbank gardens and fishing operations are conducted on different scales by different households. Each family's level of investment and reliance on the fishery varies, and so should the level of compensation they are entitled to, just as is planned for riverbank gardens. To approach fisheries compensation on a village by village basis could seriously compromise the ability of those most impacted by the changes to receive fair compensation for actual losses and adjust to new conditions post-COD.

COMPENSATION STRATEGY FOR IMPACTS ON FISHERIES

A key component of the compensation strategy overall is the partial replacement of wild capture fisheries with aquaculture.⁶ Prior to COD, a number of pilot aquaculture programs will be tested to measure their technical and social feasibility for mass extension to PAPs. NTPC points out however that (p.12), "*it must be understood that the results of the pilots and ensuing scaling up implementation prior to COD can only be indicative, and not a test of the real future situation –*

⁵ p. 1, Chapter 32, Description of Livelihood Impacts.

⁶ Section 40.12, p.11, Chapter 40

because the Xe Bangfai has not yet been impacted and thus there may be little incentive for riparian peoples to be fully involved in the pilot activities.”

Although NTPC admits that the actual extent to which fisheries are negatively impacted will not be known until after the start of operations, and while villagers have never had the benefit of an exposure trip to a hydropower project-impacted river elsewhere⁷, the SDP asserts that (p.12), “*It is expected that many of the affected communities will suggest that the impacts on fish catch are compensated by programs to produce or catch fish by other means. Thus, the objective of such a fisheries replacement program is to develop systems for the raising of fish which could replace the loss of those fish currently caught in the Xe Bangfai.*” Eight potential ‘compensation options’ are then presented.

While the various ‘*Fish for Fish*’ aquaculture compensation options give the impression that the impacted villagers are going to be able to choose a suitable ‘off-the-peg’ option to suit their local circumstances, the reality of aquaculture extension in rural Lao PDR is not quite as simple as the SDP strategy suggests. Experiences to date in Lao PDR suggest that adoption of fish culture is a slow and gradual process, and initial practice by (subsidised) pilot farmers in no way guarantees adoption of activities by the mass populace. Moreover, even subsidising operational costs for the first year will likely lead to dependency on the inputs and ensure little long-term adoption and sustainability of the programme. Do NTPC have a contingency plan in the event of non-adoption of the fish culture options?

NTPC proposes that they, together with the GoL, develop and fine tune appropriate aquaculture options for the XBF floodplain villages, which can then be extended to PAPs after the commencement of operations. In fact, aquaculture technologies appropriate for poor people in SE Asia, including Lao PDR, are already well developed (Edwards, 1999; Friend and Funge-Smith, 2003). What is lacking is effective mass extension of low-cost technologies and appropriate management practices designed specifically for poor people (Friend and Funge-Smith, 2003). Thus, NTPC should not waste time and money in trying to find suitable aquaculture technologies for the area - they already exist - but should focus on how to ensure mass uptake of them across the area **before** impacts are felt, how to compensate those who fail to adopt the options presented, and whether the supposed benefits will outweigh the actual costs and losses sustained.

Many issues are simply not addressed in the current draft of the SDP, including whether the aquaculture options presented are free or come at a financial cost? How much will a pond or adaptation of paddy fields cost? Who will pay for inputs? Will villagers have to take out loans and if so, from where? If the methods recommended fail, will they have to pay back the loans?

There are gaping holes in NTPC’s approach which must be addressed, or this plan will join the legion of other failed development initiatives scattered across the Mekong basin (Sluiter, 1992). Chief amongst these flaws, are a number of assumptions, including:

⁷ This idea has been proposed to NTPC and GoL on several occasions in the last six months, including at the World Bank Technical Workshop in Bangkok, and senior NTPC staff have expressed a willingness to implement such a study tour for PAPs, but no action has apparently been taken to date.

- That the options proposed will be technically appropriate, economically viable and profitable to all economic sectors of society.
- That fish culture has sufficient infrastructure to support its development at the present time, including provision of seed and markets.
- That there is sufficient human resource capacity, both locally and nationally, to extend such a huge programme involving new production technology to PAPs with little or no previous experience of fish-raising.
- That farmers will have sufficient on-farm resources to feed and fertilise the fish ponds or rice-fish paddies.
- That one kilogramme of cultured fish is equal in value, both in terms of nutrition and economic value, to one kilogramme of wild-caught fish currently utilised by riparian people.
- That more severe flooding across parts of the XBF floodplain will not potentially render rice-fish culture untenable in the rainy season.
- That there will be potentially positive impacts of the project on fish yields and catches in the Xe Bang Fai tributaries and mainstream Xe Bang Fai upstream of the confluence with the Nam Phit.

These are just some of the issues that the report fails to address, but would be crucial in considering such a strategy's chances of success or failure. Below is a brief consideration of each point in turn.

ASSUMPTION 1: That the options proposed will be technically appropriate, economically viable and profitable for all sectors of village society.

From a purely technical viewpoint, all eight options could be considered feasible on paper and there are examples of each to be found in all the Lower Mekong Basin countries, including Lao PDR. Various development projects have extended and promoted small-scale pond aquaculture and rice-fish culture systems in irrigated and rain-fed areas of Lao PDR over the last decade or so, with varying degrees of success. One of the most successful of these was the UNDP-funded Provincial Aquaculture Development Project, which worked in five provinces of Lao PDR between 1997 and 2000 (Funge-Smith, 2000). In one province, Sayaboury, there was a 96 % increase in fish ponds in villages the project worked in over the three-year life of the project. However, the number of families owning ponds in any one village never exceeded 20% of the entire number of households, and was more commonly around 5 – 15%. This pattern is repeated across most of Lao PDR. Two of the main lessons from this project were that aquaculture is mainly seen by villagers as a component of their livestock-raising activities, rather than a replacement for capture fisheries, and that the poorest sectors of any village are far less likely to participate in fish culture due to the high cost of inputs (Funge-Smith, 2000).

Other projects have specifically looked at the constraints of entry into aquaculture of the poorest groups, such as the landless or land deficient, which are normally the most heavily reliant on living aquatic resources for subsistence (MRC, 2003). Most parties with experience in small-scale aquaculture appreciate that it is a long, gradual process of local community engagement to ensure the high participation of all income groups. The compensation options proposed are incompatible with helping more than a fraction of PAPs in the short to medium term, and even

then there is a real danger that any benefits will only go to the better-off members of the villages, who are likely to be chosen for pilot testing the options.

In any case, basic calculations show that even under ideal conditions and according to data provided by NTPC of an assumed 'typical pond' with surface area of 500 m², the pond fish culture option provided could only hope to provide approximately 50%⁸ of the predicted annual loss in fish catch by the average household. Where the other 50% lost fish and replacement nutrition will come from is not explained, nor who will pay for the pond construction and pond inputs required to get this level of production? The options, as they stand, present more questions than answers.

In addition to fish ponds, the SDP recommends fish farming in rice fields. However, this is even more risk-prone and uncertain than pond culture, and presupposes that a family is sufficiently rice secure to want to risk conversion of paddy land to refuge ponds or trenches (rice security comes first and foremost in the priorities of most *Lao Loum*⁹ villagers). Common causes of low yields and entire loss of stocked fish in rice-fish systems include: flooding (expected to worsen in large parts of the XBF floodplain in future); drought and insufficient depth of water in fields (exacerbated by low retaining bunds and high infiltration rates); lack of feed and fertiliser inputs; aquatic organism poisoning through inappropriate use of pesticides and chemical fertiliser; high natural predation rates; and theft. The latter cause is commonly cited by villagers in many parts of Lao PDR as a reason for not stocking rice fields with purchased fry, as the fish are then considered a 'common resource' (Funge-Smith, 2000).

ASSUMPTION 2: That fish culture has sufficient infrastructure to support its development at the present time, including provision of fry and markets

Lack of access to fish seed (fry and fingerlings) is one of the main constraints to fish culture in most parts of Lao PDR (Guttman and Funge-Smith, 2000; Sverdrup-Jensen, 2002). The supply is so constrained that Lao farmers have to rely on imported fry from neighbouring countries to satisfy local demand, but even these do not reach remote villages, and many farmers will only stock mixed species wild-caught fry in their ponds. This reduces the costs to the farmer, but may not enhance pond productivity as many of the stocked fish tend to be predators. In Khammouane and Savannakhet Provinces, large numbers of fry are brought in each rainy season from Thailand. Despite efforts by some projects to improve the supply of fry through localised spawning and nursing networks, it takes many years before supply catches up with demand.

Regional experts acknowledge that the answer to increasing fry supply does not lie with building big centralised hatcheries, but continuing with the demand-led, farmer-first approach of supporting local small-scale hatcheries (Friend and Funge-Smith, 2002; Phillips, 2002). However, strong pressure will be on NTPC to overcome the fish seed deficit in the XBF

⁸ The assumptions used for this calculation are that the average annual yield of such a pond will be 932 kg/ha/year (based on average production from 28 farmers in Savannakhet Province participating in UNDP's Provincial Aquaculture Development Project), and that the average loss of wild caught fish in Xe Bang Fai per household will be 93.98 kg/year.

⁹ *Lao Loum* refers to lowland Lao ethnic groups who principally practice wet rice agriculture as their main agricultural livelihood.

floodplain villages quickly and they will almost certainly support the centralised provincial hatcheries of the GoL. These hatcheries are likely to be plagued with corruption and inefficiency, and will have problems in distributing seed to the villages. In the meantime, the opportunity to build up sustainable, small-scale local hatcheries will be lost.

Wherever the fish seed comes from, it will mostly be available from May to August, coinciding with the rainy season rice crop. This will allow stocking of ponds or rice fields at this time of year, but there is unlikely to be a reliable source of fish seed available for stocking in dry season irrigated rice fields (January to April). This will limit the production of rice-fish outside of the flood-prone rainy season. Furthermore, apart from one species (*Barbonymus gonionotus*), virtually all other commercially available species from government and private hatcheries are exotics, carrying further risks of escapes and negative impacts on the native fish biodiversity and wider aquatic ecology.

Similarly, the SDP does not address the issue of markets for fish and the supply chain to customers. Where is the wild capture fish from the Xe Bang Fai presently sold and at what price? Which species are most in demand? Will fish traders be due compensation if the supply of wild riverine fish declines abruptly? Are consumers in Thailand and Lao cities going to be negatively impacted? Is there sufficient demand for cultured fish in the villages, or will villagers continue eating mainly wild fish, even after a crash in supply? What are complimentary alternative foods to wild fish? On the Nam Hinboun, villagers did not turn to aquaculture, but to harvesting edible non timber forest products (NTFPs) and wild animals after a sudden decline in wild fish following the Theun-Hinboun dam (Blake et al., 2004, in prep). Sales of rat traps boomed in local markets.

ASSUMPTION 3: That there is sufficient human resource capacity, both locally and nationally, to extend such a huge programme involving new production technology to PAPs with little or no previous experience of fish-raising.

One of the main development constraints in all key agricultural sectors in Lao PDR is the lack of capacity at local, district, provincial and national levels to implement bottom-up, participatory training programmes *en masse* to the rural population, which comprises over 80% of the population (Sverdrup-Jensen, 2002). This is especially true of the capture fisheries and aquaculture sectors, which have been traditionally awarded only a tiny proportion of the overall national budget for developing the agricultural sector. (Guttman and Funge-Smith, 2000).

As a result, there are unlikely to be adequate numbers of trained staff to implement such an ambitious programme in the XBF floodplain. There are just not sufficient numbers of local, district and provincial staff available to be able to train and give aquaculture extension support to the sheer number of affected people. Currently, the Provincial and District Livestock and Fisheries Unit (LFU) of Khammouane Province is hard-pressed just to meet the needs of the livestock sector, including vaccination, disease control, treatment of sick stock and control of animal movements, and has little time for fishery or aquaculture issues.

Who is going to be responsible for implementing such a large scale aquaculture programme, as presently envisaged? i.e. 8,000 + households in at least 89 mainstream XBF villages and 66

Hinterland villages. The SDP (p.14, Section 40.12.5 Integration of Compensation Options) claims: “*Development, promotion and sustainable maintenance of such production systems depend in part on a serious extension effort on the part of relevant GoL agencies – especially the local DAFO (District Agriculture and Forestry Office) - and the development of key private sector enterprises.*” Given the paucity of government resources in this area, it is unclear how NTPC intends to implement such an ambitious programme beyond spending an estimated US \$10 million on it, 26% of which will disappear in technical assistance (i.e. consultant wages) and administration costs.

ASSUMPTION 4: That farmers will have sufficient on-farm resources to feed and fertilise the fish ponds or rice-fish paddies.

One of the main constraints to widespread adoption of aquaculture in Lao PDR is a lack of easily utilisable agricultural wastes that could be used as feed or manure in a pond or rice-fish culture system. Without an adequate source of food for the fish, having a pond is no guarantee that a farmer will be able to successfully or profitably raise fish, even for home consumption (Phillips, 2002).

Where on-farm agricultural surpluses exist (usually just rice and its by-products), their use in fish culture competes with feeding other livestock such as pigs, chickens and ducks. As these livestock are mostly raised free-range, their manure is not available as a potentially useful pond input unless the farmer can be persuaded to pen the animals. Even when livestock is penned, the quantities of manure are often limited (see Table 30-15, p. 25, Chapter 30 of SDP, July 2004 draft), and there are conflicts of interest with other parts of the farming system for its use. i.e. should the farmer put the manure on his/her rice field, vegetable patch, or in the fish pond? Often the fish pond would be the most profitable option, but the farmer is usually unaware of this and uses it elsewhere in the farming system, leading to much lower than optimal returns from fish culture. Successful and productive small-scale fish-raising is very dependent on the wise and efficient use of limited on-farm resources, often through maximising the integration of livestock, crops and fish components. If the farmer is forced to rely on purchasing feed for the fry, this may make aquaculture unprofitable and beyond the means of the typical farmer.

ASSUMPTION 5: That one kilogramme of cultured fish is equal in value, both in terms of nutrition and economic value, to one kilogramme of wild caught, native fish.

The stated objective of the ‘*fish for fish*’ approach is that the Fisheries Compensation Programme will, after scaling up, (p.14, Chapter 40) “*compensate the total loss of fish and aquatic products, soon after COD, in terms of weight of protein produced*”. In other words, whatever the decline in capture fisheries turns out to be, NTPC believes that it can stimulate equal or greater fish production through its compensation programme.

If, by way of an example, the NT2 Project leads to a “maximum” decline in annual fish catches of 731,838 kg, as predicted in Table 32-5, then the Mitigation and Compensation programme would undertake to provide an additional 730 tonnes of fish for PAPs, which works out at about

94 kg/impacted household/year¹⁰. To a non-local aquaculture consultant, not familiar with the limitations and constraints of small-scale aquaculture expansion in the lower Mekong basin, this might seem like an easily obtainable production target. However, even if it were possible to provide over 8,000 families with suitable fish culture facilities and with adequate support to be able to raise on average 94 kg/HH/year, then would this be a fair like-for-like swap for the wild native fish they have lost? In the researcher's opinion, the answer is negative, due to a number of reasons connected to both economic and cultural values, plus nutritional factors of each fish category.

For a start, there is the actual economic value of 1 kg of cultured fish versus 1 kg of wild native fish. According to the SDP, imputed income from the average household fish catches, determined from the 2001 XBF Survey is based “*on the assumption that the average return on fish and other aquatic products is US\$ 0.8 / kg*”. No justification was used as to how this figure of US\$0.8/kg was arrived at, nor whether it varies according to species, size, time of year, location or other relevant variables. Therefore, it is interesting to note that Warren (2003 and 2004) in his study at 7 village sites along the XBF, has reported, “*The average price of fish (depending on species and size) sold by villagers to fish traders is very approximately 10,000 to 12,000 kip per kilogramme. This converts to around US\$ 1 per kilogramme sale price*”. This still masks the fact that as well as species and size, wild fish prices also vary according to season i.e. they closely follow the laws of economic supply and demand.

As demand for fish is relatively constant, but supply varies according to season, the price of wild fish goes up and down. Generally-speaking, wild fish are cheapest in the late rainy season and early dry season and most expensive during the late dry season and early part of the rainy season (i.e. March to May), when fish are relatively scarce. Some fishermen target particular high value species which may fetch up to US\$3/kg at certain times of the year.

Culture fish by comparison do not exhibit much variability in prices as the market is evened out by a steady supply of fish from farms (mostly in Thailand) throughout the year. All major markets along the Mekong sell culture fish derived from Thailand, especially during periods of wild fish scarcity in Lao PDR. In March 2004 (personal observation), for example, fish prices at Lak Sao market were as follows:

Live catfish (*Clarias* sp.) from Thailand – 18,000 kip /kg (i.e. US\$1.71 / kg)

Fresh tilapia (*Oreochromis niloticus*) from Thailand – 16,000 kip/kg (i.e. US\$1.52 / kg)

The implications of this differential in sale prices to local villagers if they lose a significant part of their wild fish catch and took up aquaculture as a replacement is that they would be selling fish according to the Thai wholesale price, which would be approximately one third less than the above quoted prices (i.e. about US\$1.00 / kg for tilapia) for most of the year, and yet people will need to purchase fry and possibly food as well. Wild riverine fish, by comparison, which are becoming ever scarcer, can expect to increase in price following construction of the NT2 Dam, as demand from wealthier Thai and Lao consumers is likely to remain strong. There might even be a surge in wild fish prices locally in the XBF valley before completion, as traders exploit the relatively high spending power of dam construction-related staff in the area, making fish less and

¹⁰ This figure is based on the estimation that 7,787 households in villages next to the mainstream XBF and Hinterland will be impacted, as shown in Table 32-3 of Chapter 32

less affordable to local villagers, who will be tempted to sell to the new market. PAP's will thus be caught in a vicious cycle, as they try harder to exploit a rapidly depleting resource, but eating less and less fish themselves, as observed in Northeast Thailand.

The second issue when comparing the values of wild caught and culture fish relates to their different dietary and nutritional values. Wild fish display a staggering array of shapes, sizes, palatability and nutritional characteristics. With at least 130 identified species in the XBF river alone¹¹, the local population are presently consuming a large variety of fish species on a daily basis. Fish that is not eaten fresh is processed into a variety of products such as dried, salted, soured, smoked and fermented fish, which not only adds variety to the diet, but also adds value (if they are sold), and helps see villagers through occasional periods of fish scarcity. Cultured fish, being limited to just a handful of species in Lao PDR, do not offer the same dietary variety or lend themselves to the same range of processing methods. Apart from this, villagers generally regard them as inferior in taste and palatability ("*bor saep*" – not delicious – is a frequently heard comment by Lao people about cultured fish in comparison to wild fish).

In terms of nutrition, fish are important sources of essential amino acids (like lysine) and essential oils, and vital sources of micronutrients like zinc, iron and Vitamin A, which is needed to prevent and treat a widespread deficiency causing eye infections and blindness amongst people in the region (Sverdup-Jensen, 2002). As most small wild fish are eaten whole, including the head, tail, bones and guts, they contain greater quantities of these micronutrients, and are especially rich in dietary calcium. This has led some researchers to describe wild fish and aquatic products such as frogs and shrimp as "*the milk of Southeast Asia*", due to their essential role in supplying calcium (Jensen, 2001). By contrast, because of the way they are cultured and market demands, aquaculture species are not generally caught and eaten small (too expensive) or whole (bones are discarded), and so do not offer the same nutritional benefits that would otherwise be derived from a wild fish diet. Again, this raises the possibility that the food security and nutritional status of some of the poorest and most vulnerable members of the impacted communities may be at risk as a result of the Nam Theun 2 Project.

ASSUMPTION 6: That more severe flooding across parts of the XBF floodplain will not render rice-fish culture untenable in the rainy season

The role of flooding in the Xe Bang Fai valley is a contentious issue, and one that should be considered seriously by all stakeholders before the Nam Theun 2 Project is approved. NTPC claims that they will not be responsible for flooding along the Xe Bang Fai during the wet season because of their commitment to stop electricity generation when the Xe Bang Fai is close to overbank flooding. However, it will be almost impossible to avoid some degree of extra flooding in the middle and lower reaches of the Xe Bang Fai when 220 to 330 m³/s of extra water are released into a river with complex and relatively poorly known hydrology. If it does, conditions in the rainy season will not only become more hazardous for rice cultivation, but also for fish culture. Fish stocked in paddy fields for rice-fish culture may be washed out or may escape into the surrounding floodplain, when bunds go underwater. This not only brings economic losses to the farmer, but also risks ecological impacts to wetland ecosystems and biodiversity, through the

¹¹ This is certain to be a gross underestimate of the actual fish biodiversity in the entire Xe Bang Fai basin, with Kottelat (1996) estimating up to 150 species in the lower Xe Bang Fai alone.

spread of exotic fish culture species. This may include disease transmission and competition with native species for particular ecological niches, although to date there has been little research on these potential negative impacts (Kottelat, 2001; Welcomme and Vidthayanon, 2003).

ASSUMPTION 7: That there will be potentially positive impacts of the project on fish yields and catches in the Xe Bang Fai tributaries and mainstream Xe Bang Fai upstream of the confluence with the Nam Phit.

Chapter 32 (Section 32.3.5, p. 9) of the SDP states, “*All fish yields outside Xe Bangfai mainstream between the confluences with Nam Phit and the Mekong River are not expected to be adversely impacted, but more likely to be positively impacted. Fish will try to find food in such locations that they are not able to find in the Xe Bangfai mainstream after COD*”. The SDP also predicts that due to the backwater effect caused by the increased flows, catches will increase in the mainstream Xe Bang Fai upstream of the Nam Phit confluence and that the slightly increased area, duration and frequency of flooding on the floodplain will have a similar positive impact on fish productivity in associated seasonal wetlands. There is absolutely no scientific or ecological basis on which to make these assumptions. The lessons from tropical river systems around the world are that due to connectivity of ecosystems and natural flow principles (Arthington, 2002), when one part of the riverine flow regime is massively altered, the species diversity and productivity of other connected parts of the whole system will be adversely impacted.

Hence, in the case of Nam Theun 2, negative impacts will not just be confined to the mainstream Xe Bang Fai, but will be felt in the tributary streams and wetlands and in the mainstream Xe Bang Fai upstream of the Nam Phit confluence. While it is conceivable that there might be a temporary “escape response” by fish into tributaries after COD, leading to a rise in catches, this “benefit” will be short-lived and unsustainable. The experience from the Nam Hinboun River and other altered rivers in Lao PDR and Thailand is that fishers that are no longer able to catch sufficient fish in their traditional fishing grounds change their focus to tributary streams and other wetlands, thus leading to heavier fishing pressure at these venues and often eventual over-fishing. Greater fishing effort in other venues could be misconstrued by dam proponents as a “positive impact”, thus avoiding the need to provide adequate compensation to these people.

IMPROVED NATURAL FISHERIES MANAGEMENT

The Mitigation and Compensation Strategy author/s suggest “Improved Natural Fisheries Management” as another option for compensation of fisheries losses in the mainstream Xe Bang Fai.¹² In principle, this idea has more merit as a starting point, rather than promoting just aquaculture as a distinct or separate activity. As Phillips (2002) commented, “*The direction of policy and development efforts towards aquaculture as an “easy” means of increasing fish production could result in a dramatic loss of wild fisheries resources. Unless attention is paid to both wild fisheries and aquaculture, food security could be reduced, in particular for poor people.*”

¹² Section 40.12.4, p.13, Chapter 40, SDP

In the case of the XBF River and floodplain, if the NT2 Project goes ahead, fisheries and small-scale aquaculture need to be considered as mutually reinforcing approaches to rural development and poverty alleviation. There is a real danger, however, that “*improved natural fisheries management*” (in whatever form), will become considerably more difficult to implement post-COD. There are several reasons for this, as illustrated by the experiences from the Nam Hai and Nam Hinboun rivers downstream of the Theun-Hinboun Hydropower Project. According to personal observations in March 2004, the following common factors should be considered:

- a) The new hydrological and geomorphological conditions will have such profound and destabilising effects fairly soon after start of operations that fish populations will relocate to more favourable areas, or, in the worst case scenario, be killed by anoxic conditions or temperature shock. Fish that do migrate to more favourable conditions, e.g. move upstream past the Nam Phit confluence into the Upper XBF, will more than likely be intercepted by fishers upstream, and a temporary increase in catches may result. This phenomenon was reported as occurring in villages upstream of the Nam Hai - Nam Hinboun confluence in early 1998, after the project started operation in January 1998 (Warren, 1999). It appeared that the fish were seeking to escape from the highly turbid, cooler and stronger flow conditions in the dry season. However, this increase in catches appears to have been a temporary phenomenon in the first year of operations, and was enjoyed by relatively few villages.
- b) One of the main impacts noticed by fishers on the Nam Hinboun was a rapid in-filling and shallowing of deep pools, as sediment washed down from the banks of the Nam Hai was deposited further downstream. Villagers reported all along the Nam Hinboun that formerly deep pools had shallowed up considerably, some by as much as 60 – 70 %, and were no longer acting as important dry season fish refuges. The importance of deep pools in the Mekong as dry season fish holding areas has been well documented and they are undoubtedly crucial habitats for many species at a critical time of year (Poulsen et al., 2002; Baird, 2004).
- c) Traditional fishing methods and gears become obsolete and are replaced by more modern, efficient and in some cases, destructive techniques of fishing, leading to over-fishing and eventual resource depletion. This is partly a function of altered riverine conditions, greater scarcity of fish, and increased availability of manufactured imported nets and materials.
- d) Many villagers, unable to catch enough fish in the mainstream Nam Hinboun, switched their efforts to small tributaries or adjacent wetlands and these have subsequently been over-fished and depleted of fish stocks. This is also likely to occur on the Xe Bang Fai.

These changes added further strain to the rapidly declining riverine aquatic resources, putting more pressure on villagers to discard more traditional and selective methods of fishing, thus making implementation of a sustainable fishery management plan more challenging, yet paradoxically, more essential than ever.

While Section 40.12.4 (p.13 of the Mitigation and Compensation Strategy) contends that, “*Experience in the region has demonstrated that with the planning and implementation of participatory natural fisheries (river and wetland) management, natural fisheries yields can increase significantly.*”, it does not recognise the fact that this experience has mostly been gained

in communities that have not just suffered a sudden and serious decline in their river's living aquatic resource base, as is expected to occur along the XBF river. This will make the circumstances and conditions under which a true participatory co-management programme can be planned and implemented all the more problematic for local staff and villagers, particularly as it seems that communities have not been fully informed about the anticipated fish and aquatic resources declines in the XBF system. Even up to late 2003, visitors to the XBF reported that villagers were still being told by local officials that, "*More water, equals more fish*" (Letter from Shannon Lawrence to Carole Brookins, World Bank, January 26, 2004). The loss of trust and confidence in NTPC and its agents when impacted villagers discover that they have been misled may be very hard to regain and may even lead to local conflicts in the future.

DEVELOPMENT OF ALTERNATIVE LIVESTOCK PRODUCTION

The Mitigation and Compensation Strategy includes a short section devoted to developing alternative livestock production systems as an option for replacing lost protein and income from decreased wild fishery production.¹³ It argues that "*development of livestock raising, especially cattle, may be the preferred option*", but does not state whether this is the supposed preference of villagers, GoL, or NTPC's consultants.

It would appear that this section was written by someone with very little experience of smallholder livestock raising needs in Southeast Asia. It is overly simplistic and uses faulty logic in coming to the few conclusions it makes. Like other sections, it relies on a few false assumptions which do not stand up to scrutiny.

ASSUMPTION 1: That villagers will be made fully aware of the losses they can expect in aquatic resources and thus will be in a position to freely and fairly decide which "option" (i.e. 'fish for fish' or 'livestock for fish') is most suitable for them.

If villagers have not been given impartial, free and fair information in so-called "consultations" or given their prior informed consent regarding the NT2 Project, then it is very unlikely that they will be in a position to decide on suitable livelihood options until after power generation commences, by which time they will already be suffering negative impacts and retroactive compensation measures will have to be applied. There is not sufficient data available at present to be able to say how much protein loss or income loss each household will suffer, as available baseline data at the household level is still too basic and generalised. The amount of effort and resources required to get adequate baseline data across the Xe Bang Fai basin will be phenomenal and take at least several more years of field data collection. It will then take several years for livestock production or aquaculture production to be implemented and productive. Yet the SDP is predicated on the assumption that the XBF communities will have their livelihoods restored within 5 years of COD, an entirely unrealistic proposition.

¹³ Section 40.12.3, p.13

ASSUMPTION 2: That wild caught fish and livestock are comparable products or items which can be compensated for in a 'like for like' deal, whether in terms of protein content or cash value.

As with fish, it is fair to assume that it is far more expensive to raise 1 kg of livestock meat (with all the attached risks), than the present popular modes of fishing, where with one gill net set overnight, a fisher can catch an average of 1.84 - 2.81 kg of fish (Warren, 2004), and has few apparent risks, bar external environmental change.

By the same token, 1 kg of pork, beef, chicken or duck meat is not equivalent to 1 kg of fish flesh. There are many ways the nutritional benefits of each could be compared, including crude protein and fat contents, but instead it would be most useful to focus on one parameter alone, the amino acid lysine. The bulk of protein in rural Lao diets is derived from rice, which is nutritionally incomplete and does not include sufficient quantities of lysine (Phillips, 2002). Lysine deficiency causes malnutrition in children and lowers the general health of adults. Funge-Smith (2000) calculated that if present fish consumption were to be replaced by an equal amount of meat in a hypothetical rural diet, the lysine deficiency would drop to 76 % of the daily requirement. Hence, in terms of nutrition and food security, on a weight-for-weight basis, fish and meat cannot be considered products of equal value.

In reality, as most livestock raised at the household level in Lao PDR is destined for sale and not for home consumption (LECS 2, 1999), whereas most fish is consumed within the household (69% on average along the XBF mainstream, according to NTPC, 2004), this could further complicate the implications for future food security if livestock-raising is promoted at the expense of wild capture fisheries.

ASSUMPTION 3: That cattle will be the preferred livestock option for impacted households, and are a suitable livelihood choice.

Cattle provide few benefits to their owners on a daily basis, beyond the manure they produce (which may or may not be utilised in Lao villages). They are essentially savings accounts, and are usually sold for cash when a large sum of money is required. It is wrong to think that the regular income (often daily) provided by wild fish can be adequately compensated for by large livestock (especially cattle), which can only provide income after long intervals, measured in months or years. It is often only the relatively wealthier households who keep cattle, as they can also be a liability when they are sick and need treatment, and death from disease epidemics or disasters is not uncommon. It is perhaps symptomatic of the problems surrounding cattle-raising in the XBF valley that the average number of cattle owned per household at the moment is only 1.4 animals (Table 30-15, p. 25, Chapter 30). Yet it appears that NTPC has not researched the likely reasons for this.

ASSUMPTION 4: That pigs and chickens require a more intensive feeding programme than cattle.

The intensity of feeding is a function of the chosen rearing method, breed and livestock density and little to do with the animal being raised. A single cow kept in the rainy season can require a more intensive feeding programme (like cut and carry grass on a daily basis) when all the fields are devoted to paddy production, than pigs and chickens left to root and scratch around the house (a typical Lao village scenario). If promotion of dry season pumped rice irrigation is practiced on a massive scale, then this too will limit free range grazing available for cattle in many villages. Pigs and chickens only require an “intensive feeding programme”, if the farmer decides to raise them intensively, an unlikely scenario for more than a few of the wealthiest families for some time to come.

One of the main advantages of the present system of free-range or penned small livestock raising like chickens, ducks and pigs (often native breeds), is the animals’ ability to utilise agricultural by-products, like rice bran and broken rice, plus household scraps, and convert it into protein efficiently, unlike intensive farming systems which often require expensive external inputs and high investment costs to be successful. Cows and buffaloes, while serving a valuable purpose in the overall farming system, can be a risky proposition for poor farmers. Small native livestock play a more important role in food security and livelihoods for the poorest sectors of society, and they also make better candidates for integration with fish ponds. The plan as it stands is lacking any realistic vision or sufficient detail to stand up to any more than superficial scrutiny. The attempts by the Theun-Hinboun Project during the past three years to get small livestock established in impacted villages demonstrate that it is a slow and gradual process with many pitfalls along the way.

COMPENSATION FOR LOSS OF RIVERBANK GARDENS

According to the SDP, “*compensation for loss of riverbank fields and gardens will be assessed on a village by village basis and, where required by a village or households, on a household by household basis. The focal concern is the importance of these gardens to livelihoods and nutrition.*”¹⁴ To compensate for the losses in productive cropping land that will occur, “*NTPC is committed to provide assistance to re-establishing cropping and gardening activities, as requested by the communities themselves.*”

Household gardens will be impacted by the effects of direct flooding in the dry season and from erosion. NTPC estimates that 190 hectares of riverside crop fields and 16 hectares of riverbank vegetable gardens will be affected.¹⁵ At the moment, the estimated amount of compensation allocated for purchase of new land and establishment of new irrigation systems is US\$633,000. It should be borne in mind that riverside gardens and fields may vary in extent and value from year to year, so one year’s data is insufficient to estimate impacts. There will be problems adequately preparing villagers for the ‘shock’ of the initial year’s water releases when their incomes and

¹⁴ Section 40.13.1, p.16

¹⁵ See Table 40-6, p. 17, Chapter 40, SDP, for further details of the estimated losses and compensation costs for riverside cropping and vegetable gardens.

livelihoods will be falling on many fronts, and cooperation and goodwill may be in short supply. Unless there is adequate preparation of alternative livelihood sources before COD, then it is likely that cash compensation will be required to tide villagers over for the losses that they incur, until such time as livelihoods are restored.

The lessons from the Theun-Hinboun Hydropower Project on the downstream Nam Hai and Nam Hinboun may be instructive for the type of losses and methods of compensation that will be required. However, it should be pointed out that losses and damage to gardens and fields on the Xe Bang Fai are likely to be much higher for the simple reason that fluctuations in dry season water level are estimated to be up to 5 m above normal, versus 1 – 2 m on the Nam Hinboun. THPC have tackled the damage to riverbank gardens by providing alternative plots of one rai (1,600 m² per family) in cleared forest land nearby the river, to which water is pumped from a pontoon-mounted, diesel-powered pump. These have been in place for one to two years, and all costs of establishment, extension plus pumping and maintenance costs have so far been met by THPC. Eventually each family should have a steady income from the sale of fruit and vegetables, but this could take many years to achieve profitability. In the meantime, the company will have to pay for the fuel and maintenance costs of the system. It would be naïve of NTPC to think that they can achieve a better outcome than THPC, especially given the much larger impact area.

In addition, the replacement of a highly sustainable system of agriculture (Blake, 2001), with low dependence on external inputs, with a new system of agriculture far more reliant on external inputs (especially water and fertiliser), will increase costs and lower the sustainability of the farming system. If the THPC model is followed and new gardens are established on forest land adjacent to the river, this will lead to loss of public forest land and its benefits to the community. The costs of loss of wood and NTFPs gathered on that land must also be valued and fairly compensated for by NTPC prior to its conversion.

COMPENSATION FOR IMPACTS ON DOMESTIC WATER SUPPLY

According to the SDP, the Project will provide alternative means of household water for those villages dependent on Xe Bang Fai flows, and will develop these sources prior to COD.¹⁶ The project will provide shallow or bored deep wells in 78 villages, and will construct two piped water supply systems in Mahaxai town, one on either bank of the Xe Bang Fai river. The total cost of compensatory water supply schemes is estimated to be about US\$257,000.

These measures have the potential to improve the quality of life of impacted villages greatly, if implemented in an efficient and timely manner. However, the history of previous hydropower projects in Lao PDR, where implementation of compensation measures has been left to government agencies, does not inspire great confidence that the situation in the Xe Bang Fai-impacted villages will be any better. For example, at the Nam Leuk Hydropower Project, part-financed by ADB and the Overseas Economic Cooperation Fund (OECF) of Japan, water supplies for villages downstream of the dam were provided more than four years after the project was completed, and villagers were expected to pay the connection costs to the system.

¹⁶ Section 40.14, p. 18

Lessons from the Theun-Hinboun Hydropower Project point to the difficulties in securing reliable water supplies for impacted villages, even eight years after construction of the dam has been completed (Blake et al., in prep.). Common problems are drilling into solid rock and being unable to complete wells, collapse of wells due to loose sandy soils and unpotable water (e.g. due to iron leachate contamination).

COMPENSATION FOR REDUCED ACCESS ACROSS THE RIVER

The SDP recognises that the increased water levels in the Xe Bang Fai River during the dry season will make all current temporary river crossings impossible or more difficult to use.¹⁷ These include temporary bamboo bridges and foot or vehicle access crossing points, both across the main river and the many tributaries, which will have higher levels from a backwater effect, some for many kilometres upstream. NTPC states that they will devise alternative river crossing methods in consultation with villagers.

However, apart from the pure convenience factor of existing river crossings there is also the issue of safety. Many families currently get to their fields, gardens or nearby villages by foot, wading across at fording points or borrowing a neighbour's boat if the water is too deep. The villagers know the river well, including the location of deep and shallow points and the strength of the current at any given height. The generally clear water through the dry season assists in picking a route across the river.

Post operations commencement, the situation will change immediately and the river will become deep, fast-flowing and turbid even in the dry season. In short, the hydrological and geomorphological characteristics of the Xe Bang Fai will totally change, and local ecological knowledge from generations past will have less relevance under the new regime. On nearly every downstream "reservoir river" (Roberts, 1996), there are reports of increased accidents and loss of life, as villagers find it increasingly hard to predict the altered hydrological conditions (e.g. Se San river in Cambodia reported in Anon. 2000).

On the Downstream Channel and Xe Bang Fai, the waters will be particularly treacherous in the dry and wet seasons, with an extra 220 – 330 m³/s of water coursing down it. There is the added dangers posed by the variability of water levels and flows on the weekends and Mondays, as turbines are shut and opened according to Thai power needs. If public awareness, adequate warning methods and alternative access routes are not in place well before Project COD, the potential for fatal accidents caused by NTPC's operations is very high indeed. Particularly vulnerable will be women, children and the elderly. This issue is only briefly dealt with in Chapter 40 of the SDP (p.8, Section 40-8, River Safety and Awareness). There is no mention of compensation procedures and financial redress for any accidents, which is a serious oversight on the part of NTPC.

¹⁷ Section 40.15, p.20

SUPPOSED “PROJECT BENEFITS” – IRRIGATION

This section claims: *“The NT2 project will improve the potential and economics of irrigated agriculture development through the provision of a reliable water resource in the Xe Bangfai during the dry season. ...During the dry season, the constant NT2 project discharges will also reduce energy requirements for irrigation pumps due to the increased water levels and therefore the distance, which water is lifted. This reduction in pumping costs will be especially beneficial for those communities utilizing relatively expensive diesel pumps, compared to electric pumps, for their irrigation schemes.”*¹⁸

Apparently, a total annual saving of about US\$50,000 could be made in reduced pumping costs, *“based on current irrigated areas only”*. However, there is reason to believe that the figures used for present irrigation areas are over-exaggerated. One reason for this is central government policy, which encourages the expansion of dry season irrigated rice, but does not closely monitor reported versus actual planted areas. Hence, it is quite common for District officials to report areas irrigated, when in fact they have been abandoned during the dry season due to the poor economics of the enterprise or problems with the pumps (as reported by Shoemaker et al., 2000, for several villages). In addition, the estimates rely on 2001 data, when it is clear that since this time many schemes have been abandoned and irrigated areas have contracted. With the recent sharp rise in world oil prices to over \$US50 per barrel, affecting fuel, fertiliser and transportation costs, the economics of dry season rice cultivation become even more unattractive to farmers. Thus, there may be only a fraction of the reported area currently irrigated in the dry season, which would affect the purported economic ‘benefits’ of the raised water level.

Nevertheless, it is clear that NTPC, the GoL, and the World Bank have made up their mind to support large scale dry season irrigation. The risks and costs that follow poorly planned and implemented promotion of dry season rice irrigation along the Xe Bang Fai valley are pointed out in Shoemaker et al., 2001 (p. 56 – 60). Anecdotal evidence suggests this pattern of over-estimated benefits and under-calculated costs has been repeated all over Lao PDR during the last decade or so. Just recently, villagers in Sayaboury Province recounted to the author how the 2004 dry season’s harvest of paddy rice fetched less money than the rainy season crop, and thus made it unprofitable. Villagers claim they want to stop dry season rice or change to planting higher value crops.

Likewise, reports from the villages on the Nam Hinboun which have been encouraged to take up dry season pumped irrigation rice as a compensation measure for lost fisheries paint an equally negative picture of the economic reality of this activity. After an initial high yield the first year, the yields plummeted in the second year due to various problems with seeds, fertiliser and opportunistic blight.¹⁹ THPC handled this setback by absorbing the capital cost themselves. This was the right thing to do under the circumstances, but it highlights the risks of the venture.

The intensification of agriculture through dry season irrigation also leads to greater use of artificial fertilisers and pesticides. The various threats from greater agro-chemical use are not

¹⁸ Section 40.10.1, p. 9

¹⁹ Personal communication, Bobby Allen Jr, THPC General Manager, and anonymous.

well appreciated in Lao PDR at local levels of government. Most pesticides available at the market place are labelled in foreign languages and tiny script, and little attention is paid to safety warnings and instructions for use. The potential impacts of these hazardous chemicals on the aquatic environment and user safety are serious. Furthermore, intensifying irrigated agriculture and increasing output of fish from rice fields are not necessarily compatible activities. NTPC should be aware of this before deciding which approach to take.

Finally, the SDP does not appear to consider the possibility that the Xe Bang Fai Plain may be susceptible to problems of soil salinity. It is actually a geological extension of the Khorat Plateau of Northeast Thailand, which suffers from widespread soil salinity problems, exacerbated by massive deforestation, reservoirs and irrigation projects. In many areas, such as Rasi Salai in Sisaket Province, the soil salinity and other ecological problems have led to the abandonment of a large irrigation scheme and dam, just six years after it was built. The possibility of a similar thing happening in the Xe Bang Fai Plain should be thoroughly investigated before plans for more irrigation schemes are commissioned. Shoemaker et al., (2001) reported that in Ban Tha Phoxay (Xaibouly District, Savannkhet) water in two of the village's four wells is too salty to drink or use for domestic purposes, attesting to the presence of a sub-surface salt layer in the Basin.

CONCLUSION

The Mitigation and Compensation Program developed for the Xe Bang Fai communities lacks adequate detail has not incorporated or drawn from the experiences and lessons from other regional dams, a major deficiency of the current program. The solutions proposed by NTPC are top-down and technocratic, and fail to consider the many impediments to replacing lost aquatic resources, vegetable gardens and other livelihood sources that exist in Lao PDR. The current plans are likely to engender corruption and bad practice by national and local implementation agencies. Before project approval, it is recommended that a full economic analysis and feasibility study of the various options presented should be conducted in order to ascertain the viability of mitigating and compensating for impacts along the Xe Bang Fai River.

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