

Agriculture and Livestock Development Plan for the Nam Theun 2 Hydropower Project: An Independent Analysis

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Executive Summary

The Nam Theun 2 Power Company's (NTPC) Agricultural and Livestock Development Plan – contained in Chapter 21 of the Social Development Plan (SDP) - forms one important component of the livelihood system for the 6,200 people to be displaced by the Nam Theun 2 Hydropower Project. Each resettled household will be given a total of 0.66 hectares of irrigated farm land. The SDP also proposes the adoption of intensive livestock raising techniques, requiring high levels of labor and inputs in the form of feed and animal health care.

The plan's underlying basis is to integrate all resettled villagers into the market economy by transforming them from subsistence to cash crop farmers. However, this plan is unsustainable and has a high likelihood of failure. Villagers will need to sell vegetables in exchange for rice, and will need to continually make high levels of inputs into their land. If villagers suffer income reductions because of cold winters, drought, market price reductions, or the inability to sell produce, then a vicious downward spiral will lead to the collapse of their farming plots. This could lead to a serious food security situation amongst resettled communities.

Some of the major concerns regarding the viability and sustainability of the SDP are as follows:

- The resettlement site is located on extremely infertile soils that will continually require high inputs of both organic and inorganic fertilizers and lime. Villagers have never had to make such enormous inputs into agricultural fields and as such the SDP notes the “very real likelihood” that villagers will not be willing - or able - to make the necessary inputs. Many of the proposals for cropping systems and fertilizer are as yet untested, and NTPC is still conducting experiments to determine what crops will be able to grow on the land.
- While the project promises dry season irrigation, the SDP acknowledges that dry season rice paddy production may only be feasible “in the longer term”, and as a result, DS crops will be limited to vegetables, maize and sorghum.
- The project is to provide resettled villagers with full support for a period of only three years after the preparation of farm lots. The project states that it will “possibly” provide organic fertilizer inputs for the eight-year “transition period” however this is by no means guaranteed. It is quite likely that villagers will be unable to sustain the high level of inputs required after the project ceases support, jeopardizing their long-term food security.
- If the agriculture program fails villagers may resort to upland rice production. However, any upland farming done after the filling of the reservoir will involve a much smaller land area, resulting in shorter fallow periods, decreased soil fertility, and an increase in weeds. These changes will necessitate the use of agro-chemicals, including toxic herbicides, to clear the land each year. These chemicals will likely pollute the reservoir, affecting reservoir fisheries.
- In the early years of resettlement the construction camps will provide a market for the produce from resettled villagers. However, as the area is so remote, it is quite possible that villagers will lose their market base after construction is complete, which will coincide with the cessation of agricultural support. This will leave villagers without sufficient food or income to feed their families.

- The inundation of the reservoir will result in the loss of 45,000 ha of prime buffalo raising lands. The buffalo forage measures provided by the SDP are inadequate, risky and untested. Without the possibility of forage production, there will not be enough grazing lands in the new resettlement areas to support the current buffalo populations. The corresponding social and economic losses that will result should not be underestimated.

Soil Quality and Sustainability of Agriculture

Each household will be given 0.5 hectares of irrigated land and “up to” 0.16 hectares of rice land per household. This is a relatively small amount of land per household. The latest draft of the SDP does allow for two further cropping zones to be allocated, one in the reservoir drawdown area and the other in upland areas currently under degraded forests. However, the SDP admits that at this stage cropping in these areas would be experimental, that it would take time to make the necessary fertility improvements to the soil in the upland areas, and that “the exact nature of the drawdown zone of the reservoir is difficult to predict, and will only be known after some years of operation of the reservoir.”² Therefore, neither of these additional areas are guaranteed to be productive and fertile farmland.

What is of more concern is that the quality of the soil in the resettlement areas is poorly suited to crop production due to its “erosion susceptibility, high acidity, poor nutrient content and high absorption of Phosphorous”.³ “In general” the SDP states, the soils are “heavily leached and infertile”.⁴ What is surprising, however, is that with the exception of the pilot village area, the project has not even undertaken detailed soil surveys for most of the resettlement area.⁵

NTPC is currently experimenting in the pilot village to see what vegetables will be able to grow on the poor quality soils. The latest draft of the SDP notes that wet season yields of maize and peanuts in the pilot villager were “only fair, and will have to be improved if the cropping of these crops would prove to be [a] viable alternative to rice growing.”⁶ There are no results presented for the dry season crops.

The viability of a dry season (DS) paddy crop also remains in doubt, despite the company’s efforts to obfuscate this fact. The April/May release of the SDP clearly stated that a dry season paddy crop “may prove to be an optimistic assumption” due to the high clay contents and high percolation losses in the soil.⁷ Since this time, no further attempt has been made to determine if DS paddy is feasible: a paddy crop is not even being trialed in the pilot village this dry season. Yet instead of admitting this, the company has edited the latest release of the SDP, specifically deleting the line “this may prove to be an optimistic assumption”. This appears to be a deliberate attempt to avoid mentioning doubts about the feasibility of the DS paddy crop.

² Section 21.5.3, p. 16.

³ Section 21.5.6, p. 20.

⁴ Section 21.3.1, p. 5.

⁵ “Detailed soil surveys have not been conducted in each resettlement area”, Section 21.6.1, p. 23.

⁶ Section 21.7.1, p. 24.

⁷ April/May draft SDP, Section 21.6.1 p.10

The project does admit that nothing will be able to be grown on any farm land without the extensive addition of lime, organic and inorganic fertilizer, and rock phosphate or dolomite to improve soil quality. These additions will be provided to the villagers for anywhere from 3-8 years after resettlement, but then villagers will be required to pay for these inputs themselves. The project recognizes that the optimum levels of inputs that the project will provide to resettled households will not be sustained after the initial project support.⁸

The SDP estimates that each resettled household will have to continue to add a **minimum** of 500 kilograms of organic fertilizer to their 0.5 ha agricultural fields every year.⁹ Using the company's own calculations¹⁰ of 10 cents per kg of organic fertiliser, this means that villagers would have to spend \$50 per year on organic fertiliser per household. The company clearly doesn't foresee villagers being able to sustain such inputs into their agricultural systems as the SDP states that "farm generated animal manures will eventually have to become the main source of organic fertilisers".¹¹ However, it is doubtful that farmers will be able to obtain the required 500kg of livestock manure after the project stops supplying organic fertiliser 3 to 8 years after resettlement. Firstly, many farmers may only have 2 buffalo,¹² and secondly, buffalo are expected to be allowed to graze on grasslands, upland forest areas and the drawdown zone. It will not be practical for farmers to collect buffalo dung over such a wide area.

In addition, it is unclear how much lime would be needed to stabilize PH. The SDP notes that at the beginning the highly acidic soils will need an application of between 2 to 5 tons per ha of lime to neutralize aluminum.¹³ While the project "envisages" that liming will not be required after the third year of cultivation, the project also warns that due to the inherently high acidity, soils will need to "carefully monitored by soil sampling and PH testing" by the District Agriculture and Forestry Office (DAFO) in order to ascertain whether or not further applications of lime are necessary¹⁴. If additional lime is required, there is no provision for the project to make this available, and at present prices in Thakek of 20,000 Kip (approximately \$2) per 50 kg bag, a one ton addition of lime would cost 400,000 K (gate price) or approximately \$40, without accounting for transport and trader profits. Without support, villagers may not be able to afford to purchase such high volumes of fertilizer and lime.

Finally, the SDP states that "the use of compound inorganic fertilizer will be necessary particularly for paddy, maize and vegetable crops".¹⁵ For irrigated paddy, the SDP admits that 50 kilograms per hectare of urea should also be added to optimize yields.¹⁶ However, the project admits that after the first three years of support, the villagers are unlikely to maintain the use of chemical fertilizer due to its high costs, and instead would revert to the use of only organic fertilizer.¹⁷ Under this assumption, it then becomes apparent that villagers will be unable to grow

⁸ See Section 21.6.1 p23

⁹ Footnote [a] Table 21.16, p.41

¹⁰ See Appendix K-5

¹¹ Section 21.5.6, p. 20.

¹² Section 21.1.1, p. 2.

¹³ Section 21.3.2, p.7 This has increased from 1-2 ton estimates in the previous draft of the SDP

¹⁴ Section 21.5.6, p. 20.

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ Section 21.6.1, p. 23.

paddy, maize and vegetable crops after the first three years of project support. This calls into question the viability of the entire agriculture development plan.

Cultural barriers

It is clear that the land preparation, intensified cropping patterns, high inputs of fertilizer, and the maintenance of irrigation systems is a highly complex operation that requires a high degree of commitment, knowledge and perseverance. Villagers have no tradition of making such inputs into their farmlands. Most villagers on the plateau have traditionally practiced upland rotational farming methods where farmlands are rotated each year on a 7-12 year cycle to ensure the continued fertility of the soil in symbiosis with nature. The farmers that have paddy fields in the proposed reservoir area (a floodplain) benefit from the intermittently occurring floods that deposit rich soils onto the plain, and the buffalo that fertilize the paddies while grazing during the off season. This natural system - which has been in use for hundreds of years - is at complete odds with the proposal to add 1 ton of fertilizer per hectare per year.

The SDP proposes that it will overcome some of the problems associated with farmers' lack of knowledge about soil quality, intensive agriculture and intensive livestock-raising by simply training villagers in modern methods of agriculture and animal husbandry. This over-simplistic assertion fails to appreciate 1) the length of time villagers have been practicing their present agricultural techniques, 2) the amount of time it has taken for these practices to evolve in modern-day industrial society, and 3) the extent of background knowledge, both cultural and scientific, that is a necessary prerequisite before such concepts can be fully understood.

While some villagers may take to the new agricultural practices, it is not realistic to assume that all the villagers, (whose average education is barely touched on in the SDP, but which an independent Lao researcher states as 63% of villagers with no schooling, and 31% with only primary level schooling)¹⁸, can have a complex understanding of soil composition and improvement methods. It is therefore not surprising to read that farmers in the pilot villages are reverting to planting upland rice, as this is what they know and understand.¹⁹ The SDP attempts to diminish the practice of swidden farming systems practiced by farmers asserting that the "farmers remain desperately poor when practicing these swidden systems" and goes on to state that "swidden cultivation will no longer be possible or allowed in the resettlement area due to pressure on land and forest resources"²⁰. While rotational swidden farming may not bring the villagers of the Nakai Plateau an income, it does give them a level of food security which the project does not.

As farmers are to be given full assistance from the project for 3-8 years in agriculture, a scenario can be foreseen whereby the project - which has been providing industrial quantities of fertilizer and lime to villagers - announces that successful harvests have been reaped, declares the agricultural livelihood project a success, and promptly finishes its activities in this sector. In the next few months/years the left-over supply of fertilizer is expended and villagers who cannot afford to purchase the required amount of fertilizer are left without. With declining harvests, and

¹⁸ Author wishes to remain anonymous, p. 116.

¹⁹ Section 21.6.1, p. 23.

²⁰ Section 21.3.2, p. 6.

little help from district officials who do not have the budget to provide fertilizer or lime, villagers will revert to upland farming methods in an attempt to secure their food security. However, with a considerably smaller area with which to farm, extensive deforestation will occur and shorter fallow periods will lead to the continual degradation of farming lands which will require the use of a variety of polluting and toxic agro-chemicals.

Indeed, judging from the latest version of the safeguard documents it appears that this scenario is already playing out in the Nong Boua pilot village. Reports from the pilot village indicate that villagers are unable to sell their produce, and the SDP mentions a massive increase in villagers with upland farming plots. In the wet season of 2003, 1.59 ha of upland swidden rice was planted by 13 families in the village. However, in the following wet season, all but 2 of the 30 households planted upland rice to give a total planted area of 9.83 ha, more than six times the upland rice production for the previous year. This increase occurred despite the fact that the project discourages villagers from growing upland rice. Meanwhile, the total area of non-upland rice crops planted in the 2004 wet season had plummeted to only 2.04 ha, from 7.62 in 2003. This decrease was not explained by the SDP, but we can presume that villagers are attempting to secure their own food security such as they always have done.

What is clear from the SDP plan is that villagers' agricultural livelihood systems will be based on a model of high inputs. Villagers will need to spend a minimum of \$50 a year on fertilizer, plus possible liming, phosphate and urea costs, as well as hybrid seeds. This will all contribute to the input costs of farmers and will decrease their long-term food security by making these previously subsistence farmers entirely dependent on the sale of their crops. Villagers will not be aware of these associated costs until the project ceases its support after 3-8 years, at which time villagers will be hit all at once with expenses and inputs that they have never had to pay for before. If lifting rural incomes were as easy as the project supposes, then we would expect rural development projects in Laos to be far more successful than they have been in the past. This sudden change in inputs and the required expenses are likely to put villagers into debt rather than bring them out of poverty.

Pest Management and Pesticide Use

The SDP notes that the use of intensive agriculture "inevitably will increase the incidence of crop pests and diseases"²¹, however many of these effects may not be realized until after the project ceases agriculture support. Due to the close proximity of the agricultural activities to the reservoir, any agro-chemical use will have a direct impact on reservoir fisheries. A recent study by FAO-IPM on pesticide use in Lao PDR concluded that it is "not enough to simply not promote pesticides and hope that people will not use them, concerted strategies and action are essential to stop the use of pesticides in the Lao PDR."²² The study found that pesticide use is increasing in Laos and that Folidol, a pesticide classified in the highest level of toxicity, is both widely available and used in Laos despite being officially banned by the Lao government.²³ The project will attempt to stop agro-chemical use by giving villagers training in Integrated Pest Management. The SDP also states that there should be programs of farmer training to support

²¹ Section 21.5.7, p. 21.

²² Vientiane Times, *The Path to Pesticides?*, 15 October 2004, p. 12

²³ Vientiane Times, *The Path to Pesticides?*, 15 October 2004, p. 12

IPM and recommends the use of “Farmer Field Schools” to implement IPM training. While this is commendable, experience from other projects in Laos shows that training alone will not suffice, and that many villagers will still resort to pesticides and fertilizers to increase yields.

The project recognizes one of the “likely sources of pollution (in the reservoir to be) fertilizer and pesticide use in the village irrigation schemes”²⁴, and has proposed a water quality monitoring project to be run by the company for the “entirety of the project”,²⁵ presumably 25 years. However, if crops cannot be grown in sufficient quantities, or if they cannot be sold, farmers may revert to upland rice farming - for which the SDP states that the extension program should not provide any support. Any upland farming done after resettlement, when the reservoir has taken the majority of villagers’ agricultural lands, will involve a much smaller land area. This smaller land area will mean shorter fallow periods, that will in turn lead to decreased soil fertility, and an increase in weeds. These changes will necessitate the use of agro-chemicals, including toxic herbicides to clear the land each year as weeds become established.

The SDP states that farmers could be persuaded to not use pesticides by marketing organic produce that “could enable the farmers to sell produce into niche markets in Vientiane or across the border in Thailand.”²⁶ However, this assumption seems rather optimistic given the total lack of an organic produce market in Vientiane, and the equal lack of any organic certification system in Laos (not to mention the prohibitively expensive \$3,000 cost of foreign-based organic produce certification)²⁷. Hence it seems that there will be little in the way of commercial incentives to stop villagers using toxic agro-chemicals.

Given all of the above circumstances, there is a real risk of long term agro-chemical contamination of reservoir fisheries as a direct result of 1) the intensive agriculture methods proposed by the SDP and 2) the lack of support for upland swidden rice cultivation. Given the proximity of resettled villages to the reservoir, there is a real risk that the use of any toxic agro-chemicals will lead to the long-term contamination of the food chain and water supply.

Markets for Produce

The issue of markets is a particularly important one for villagers on the plateau. At present villagers have a modest degree of food security, with paddy and upland rice cultivation as well as buffalo-raising and non timber forest product (NTFP) collection. The SDP notes that at present there are “no existing traders based on the Plateau exporting Nakai agricultural produce (crops, vegetables, fruits).”²⁸ All these market linkages will have to be initiated by the project. The high cost of inputs means that villagers are entirely dependent on the sale of cash-crops for their livelihoods. If cash crops cannot be sold in one year, there will not be a sufficient amount of cash for villagers to purchase all the necessary inputs for the following year, nor to purchase rice for consumption.

²⁴ April/May draft SDP Section 24.5.1.1, p. 20.

²⁵ April/May draft SDP Section 24.7.4, p. 44.

²⁶ Section 21.5.7, p. 21.

²⁷ Vientiane Times, *Organic products need certification*, 13 October 2004, p. 11.

²⁸ Section 21.12.6, p. 62.

Rice is an essential part of the diet for the people of Laos, and the people on the Nakai Plateau are no exception. Rice is eaten with every meal. This rice has traditionally been grown by the farmers on the plateau in both sedentary paddy fields as well as in upland swidden farming. The SDP states that the villagers on the Nakai Plateau are not currently self sufficient in rice, but what it fails to mention is that in a year with a bad rice harvest, villagers are blessed with a safety net and can fall back on buffalo, NTFP or timber sales in order to purchase rice. Resettled villagers will have only 0.16ha of irrigated paddy per household, not enough to satisfy their subsistence needs. During local consultations, villagers have consistently expressed their anxiety about the small size of the paddy fields proposed under the project. In such a situation there is the potential for villagers to be faced with a food security emergency in the event that they cannot sell their produce. Already in the pilot village there have been reports of villagers who are unable to sell their cabbages asking other villagers, yet to be resettled, to trade their cabbages for rice. Hence the urgency with which markets must be found for village produce.

Throughout the consultation process villagers have expressed the concern that there will be no market for them to sell their goods.²⁹ The project anticipates that markets will automatically improve with the construction of new roads, however the SDP at the same time notes that “even with the anticipated road improvements the Nakai Plateau will remain relatively remote.”³⁰ The Nakai’s remoteness will be a disincentive for traders to purchase produce if that produce is available closer to major trading centers such as Thakek. Markets and marketing will be essential to the success of the SDP, however there is no certainty that markets will be forthcoming. This problem will be particularly relevant for fruit sales (which make up a significant portion of the Gross Margin Calculations) because the same fruit will be available all over the country, and is likely to be produced closer to large markets than the fruit produced in Nakai. The SDP states that the Nakai villagers will have an advantage because the cooler climate will enable them to grow fruit in the dry season, but they also state that there is a danger that fruit will be damaged by the colder weather.

In the early years of resettlement the construction camps will provide a market for the produce from resettled villagers. While this is certainly an appropriate short-term solution, there is a danger that after construction is completed villagers will lose their market base, which will coincide with the cessation of agricultural support.

Livestock

The SDP states that Buffalo comprise the “single most valuable traded product from villages on the Nakai in terms of value and in 2002 this trade earned Nakai villagers an estimated total of US\$250,000.”³¹ As is common in other traditional cultures, the ownership of buffalo is culturally significant, and buffalo ownership is a reflection of wealth and social standing. The flat floodplain of the plateau is particularly well-suited to buffalo-raising and currently provides important grazing grounds for buffalo. Buffalo herds of 50 or more are not uncommon and buffalo are often used as a security bank in times when money is urgently needed (be it for social needs such as weddings or for emergencies such as family illness or a failed rice crop).

²⁹ Preliminary results from Nakai Plateau Village Consultations - June 2004.

³⁰ Section 21.12.5, p. 58.

³¹ Section 21.12.1, p. 54.

The SDP notes that the trading of buffalo is already well established on the plateau. It is clear that buffalo play a vital role in village life as well as in the village economy. The loss of buffalo production for the people on the Nakai Plateau could not only be economically disastrous, but could also be a great cultural upheaval for communities on the plateau. Presently, there is only minimal animal husbandry practiced with buffalo on the plateau. Buffalo are generally allowed to wander freely around, except when rice crops are growing, in which case temporary fences are erected to keep them out. However, despite the lack of animal husbandry, a growth rate of 20% is reported in the SDP.

The inundation of 45,000 ha of prime buffalo-raising land³² will essentially mean that the raising of buffalo as the people on the Nakai presently know it will cease to exist. Many villagers have expressed anxiety about their buffalo herds and fear they will have to sell their herds after resettlement because there will be nowhere to keep them and nowhere for the buffalo to graze. Until recently, the project also admitted that there would be insufficient grazing land in the resettlement area for current herds of buffalo. In fact, the SDP states that “it is generally assumed that buffalo raising in the future will be restricted to a smaller area and thus it will be difficult to raise the same or more buffaloes than currently raised.”³³ However, curiously, the latest November 2004 draft of the SDP refers to a 1997 study by Margules Poyry, which claims that there is sufficient forage supply in the resettlement area to meet the demands of current stocks. It is unknown why this study was omitted from earlier drafts of the SDP: one might infer that its late inclusion is an attempt to placate villagers’ fears.

Even assuming that the 1997 study is correct, it is unclear where this forage supply is situated in relation to the resettled villages. Figure 9.2 in the SDP reveals that the topography at the southernmost end of the reservoir – south of resettlement villages Khone Khen and Done – appears to be more likely to cater to potential forage lands than the central and northern resettlement areas. Clearly there is a need to specifically identify which areas are suitable for livestock foraging, as villagers north of Done Village would be unable to access the southern flat areas.

In any case, the SDP admits that there will probably be a need for additional buffalo forage grounds due to increases in herd numbers and because the forage potential predictions for the resettlement area may be overly optimistic.³⁴ The project proposes a number of different solutions to this. These include developing intensive forage plots, utilizing the reservoir drawdown zone, the upland forest areas, and cultivation of shrub and tree legumes. There are problems with each of these proposals. The challenges of providing sufficient buffalo grazing sites have similarities to the problems of providing appropriate agricultural land as the soils are generally poor in the resettlement area and do not provide a sufficient amount of nutrients for the buffalo without appropriate inputs of lime and fertilizer.

³² Section 21.8.2, p. 30.

³³ Ibid.

³⁴ Section 21.8.3, p. 31.

(a) Intensive forage production in irrigated farm plots

The SDP proposes that farmers establish plots on their irrigated farmlands to establish a reliable source of forage for livestock. It suggests doing this in two ways: the establishment of perennial swards and the production of annual or semi-annual dry season crops. Both would require treatment with lime, phosphate and nitrogen due to the poor quality of the soil, and villagers would need to cut and carry the feed to the animals, thereby necessitating stall feeding. The SDP notes that “labour demands with stall feeding can be considerable.” The SDP never states exactly how much land will be required to produce forage, nor how many buffalo could be fed with 0.5 ha devoted to forage production. In addition, the SDP notes that no perennial crops “have been evaluated for the suitability to the local environment.”

The idea that villagers would dedicate part of their small irrigated plots of land for forage production for buffalo is completely unrealistic. Reports have been circulating from the plateau to this effect. Villagers claim that the small amount of irrigated land provided under the SDP will need to be entirely devoted to cash crop production. This is not surprising, as buffalo have generally been allowed to roam free and have required little maintenance. The SDP also notes that there is a risk that villagers will be unwilling to pay for inputs such as fertilizer and lime simply to grow forage production for livestock.

(b) Development of the reservoir drawdown zone

The SDP proposes that the drawdown zone of the reservoir be utilized as a forage area for buffalo. It states that drawdown forage would offer a “very important and high potential contribution to animal production” as the occurrence of the drawdown will occur at a time when “feed in the dryland areas (especially good quality feed) is most scarce and animal live-weights are declining during a period when nutrition is below maintenance levels.”³⁵ However, despite the importance attributed to drawdown forage, a close reading of the SDP reveals that there is no certainty that the drawdown zone will successfully accommodate forage potential. The SDP states that “assessing the potential contribution of the drawdown areas for increased forage production before the reservoir has been filled is not an easy task.”³⁶ The SDP highlights the low inherent fertility of the soil, the low base nutrient status of the reservoir water, wave action and deposit of silt as factors that can “potentially limit the forage potential of the drawdown area”.

The SDP also gives an estimate of 4,500 – 5,000 ha of potentially usable drawdown area however this number is based on calculations drawing a 9 km radius around the resettlement villages and does not take into account the fact that much of this land will be inaccessible because it is on islands in the middle of the reservoir. The agricultural section of the SDP discusses this problem in more detail, and as can be seen from figure 21-8, the drawdown zones that can be utilized are limited to a much smaller area in the immediate vicinity of the resettlement areas, an area of about 2,293 hectares. However, the SDP goes on to state in the agricultural section that

³⁵ Section 21.8.3, p. 32.

³⁶ Section 21.8.3, p. 33.

it is assumed that around 60 % [of this area] will be either too steep, subject to erosion or for some other reason not suitable for cropping, thus leaving about 1,380 ha of drawdown zone which may be suitable for cropping.

This must also be the case for livestock forage and we can only assume that the 5,000 ha estimation of buffalo grazing area is a factual error.

In terms of management the SDP states that any drawdown areas would need to be “carefully managed to prevent overgrazing” and notes that such management will “not be an easy task” as there is no ownership of the drawdown zones and that the management concept would be a “totally new concept to the resettled households.”³⁷ Such a management system would also be quite labor intensive as villagers would need to rope off large sections of land to stop buffalo from endangering themselves in muddy areas, as well as damaging pastures, and the continually receding drawdown zone would create a constant need for villagers to adjust the roped off areas. It is questionable whether villagers would have the time to undertake such an enormous task as they will in theory be busy harvesting their DS crops.

(c) Development of upland forest areas

While the SDP lists grazing in upland forest areas as one of the potential forage sites for buffalo, there are a number of problems with this scenario. The SDP highlights the fact that one of the “main constraints to productivity will be the low soil fertility”³⁸ of upland forest areas. It goes on to note that “without on-going inputs of phosphate and possibly also lime ... the results [of forage production] are unlikely to be particularly good.”³⁹ Villagers cannot be expected to increase their costs to include inputs of fertilizer and lime to grazing areas and the SDP also states that it would not be financially viable to do so. Furthermore, to what extent these upland areas can be utilized even with fertilizer inputs is unknown. The poor feasibility of upland forest areas as forage potential for livestock is supported by villagers on the plateau who report that their buffalo do not like to eat the grass in the forested areas behind the resettlement area. Buffalo may also damage much-needed NTFP resources and young saplings in regenerating forests. This would require complex and careful management.

(d) Leguminous fodder shrubs

The SDP proposes planting a range of shrub and tree legumes around farm peripheries and along the contour strips of terraces to supplement livestock’s otherwise insufficient diet, while at the same time providing stabilization of farm terrace structures. This appears to be a reasonable idea. The only foreseeable problems are that the shrubs will require small inputs of phosphate and that the harvest gained from these shrubs would be minimal.

³⁷ Section 21.8.3, p. 32.

³⁸ Section 21.8.3, p. 34.

³⁹ Ibid.

(e) Urea treated rice straw

The provision of urea treated rice straw as proposed in the SDP appears promising as a low cost feed alternative for buffalo, however the major drawback of this scheme will be the small amounts of rice straw that farmers can process from their 0.16 ha of rice paddy. As yet it is still uncertain whether or not a dry season paddy will even prove feasible,⁴⁰ and if it does not, the volume of obtainable rice straw will only be 320 – 480 kg per household per year. Table 21.13 notes that buffalo require 2,738 kilogram of dry matter per head per year, meaning that this would satisfy about on-sixth to one-eighth of a buffalo's feed requirements.

(f) Mineral Supplementation

The SDP states that there is a “potential risk” of “severe phosphorous deficiency in cattle and buffalo” after resettlement, particularly because of the increases in stocking rates and because forage under the pine forests (“where the poorer soils tend to occur”⁴¹) “will constitute a far larger portion of the diet.”⁴² In response to this potential nutrient deficiency the SDP, among other things, proposes that buffalo be fed bone meal. This suggestion is made despite the fact that bone meal based livestock feed has been linked to the outbreak of Bovine Spongiform Encephalopathy (BSE), commonly known as mad cow disease, and to this extent the feeding of bone meal to livestock has been banned in a number of countries across the world.⁴³ It would be irresponsible of the project to promote such activities in the Lao PDR.

The buffalo forage measures provided by the SDP are missing numerous calculations and other calculations appear to be incorrect. Without the possibility of forage production, there will not be enough grazing lands in the new resettlement areas to support substantial buffalo populations as they exist today. The corresponding social and economic losses that result from buffalo production should not be underestimated. Buffalo are a central theme in villagers lives, providing long term economic security for those that rear them. Their disappearance will endanger the long term economic security of villagers, not least because the SDP supposes that 46% of villagers' income post resettlement will come from buffalo. Villagers will be totally dependent on the livelihood projects provided by the project, and the failure of these could push the villagers into a cycle of extreme poverty.

⁴⁰ April/May draft SDP, Section 21.6.1, p. 10.

⁴¹ Section 21.8.3, p. 33.

⁴² Section 21.8.3, p. 34.

⁴³ <http://www.thepigsite.com/FeaturedArticle/Default.asp?Display=985>

Conclusions

The resettlement area for the Nakai villagers is located on extremely infertile soils that will continually require high inputs of both organic and inorganic fertilizers and lime. Villagers have never had to make such enormous inputs into agricultural fields and as such the SDP notes the “very real likelihood” that villagers will not be willing - or able - to make the necessary inputs. If villagers suffer income reductions because of cold winters, drought, market price decreases, or the inability to sell produce, then a vicious downward spiral will lead to the collapse of their farming plots. In this situation villagers are likely to resort to their knowledge of upland rice cultivation in order to have sufficient rice. However insufficient areas in which to conduct upland rice cultivation will lead to decreasing rice yields through the decline of soil quality, because of shortened fallow periods. This will leave the people on the plateau, who lack any political power, extremely vulnerable.