

Research report of livelihood's opportunities and challenges of the communities living in region affected by hydroelectricity power dam Trung Son – Thanh Hoa

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Executive summary of research results and recommendations

- According to design, Trung Son hydroelectric dam will be built in the upstream of Ma River, close to Vietnam-Laos border, affecting directly to 4 communes of 3 districts in Thanh Hoa and Son La provinces. These communes all have underdeveloped infrastructure and social services. The building of hydroelectric dam will create many new livelihoods' opportunities but will also drop several traditional ones. The biggest benefit is the development of infrastructure, which facilitates production and services, residents have more chances to invest in agro-forestry and non-agricultural activities.
- Currently in process of institutionalization of resettlement policies, so authorities of 3 districts (Quan Hoa, Muong Lat and Moc Chau) in 2 provinces (Thanh Hoa and Son La) still do not have clear plans. Vietnam electricity corporation (EVN) has submitted files to Thanh Hoa People's committee in the document numbered 103/CV-ATĐTS-P3 on February 14th 2008 of management board of Trung Son hydroelectric project to suggest the agreement on content of Master plan of population movement and resettlement and Project of resettlement compensation and support. Thanh Hoa province's People's committee sent out the document numbered 634/UBND-CN on Feb 22nd to line agencies in the province to consult ideas to master plan of population movement and resettlement and compensation project of Trung Son hydroelectric project. Deadline to send feedbacks to People's committee is March 15th.
- The policy and rates of compensation of this project is different from other hydroelectric projects that have been done. Compensation policy and rates are based on Land law of 2003, Decree 197/2004/CP, Decree 84/2007/CP, consulting other resettlement projects. Compensation and support policies of project have reached nearer to international treaties in this field. However, the compensation rates have just focused on material compensation and partial support, not meeting requirements of resettlement and sustainable livelihood strategies.
- The living standards of the affected communities are rather higher than the results of other researches before this study. The analysis of different sources of income including production on the hill land, collection of forestry products, fishing activities, ... shows that the income of the communities is quite high, the lowest income has reached 12,2 million dong/family/year and average is 34 million dong.
- Several traditional livelihoods from forest and invisible capitals have not been taken into account in the plan of resettlement and compensation, for example the collected products from forest for selling or for daily consuming and livestock. Beside of this factor, time consuming needs to be taken into account for moving and resettlement : normally, it takes time for the family to move the house and belongings and the remote communities will help each other in important events. But for resettlement, many families will move to the new place in the same time, they do not have opportunity to help each other.

- It is very important to pay attention to reduce the costs for the communities during the time of resettlement and development of new livelihoods' activities. The Project should work with the government authorities to plan soon the resettled areas, the production areas. It is good to support the communities to develop the vegetable garden at household level, the breeding facilities for pig and chicken before moving, so basic foods are available to the resettled people. The resettled people will do not have to buy many things in the same time; it will reduce the costs of living during the resettlement process and development of new livelihoods' activities.
- The management of forest and production on the sloppy land is not very strict even on theory; the sloppy land and forest are allocated to households. All the people do not know exactly the border of their sloppy land and forest, they work on the land and forest of the other people and the dispute does not happen yet so far. This is the reason why the production on the sloppy land is uncontrollable. In addition, the communities are prioritizing the production of cassava and corn, it is easy to plan, it does not take time to take care of the plants, those crops depend less on the climate, the profit is high in the short term and the cost price is not very high. It is very important to develop solutions to maintain the income for the communities in one hand and to ensure the environmental sustainability in the other hand.
- Several agro-forestry activities supported by development support programs are not very effective (mango and other trees).The affected communities have all expressed the need of selection of the resettled areas that are more appropriate/plan of project.
- The communities had already developed their own plans to adapt quickly to the new situation. They had plan the strategy "taking the short term livelihoods to develop the long term livelihoods" to maintain the living. Short term livelihoods include upland rice, corn, cassava, lowland rice in new production areas, livestock development. Long term livelihoods include bamboo, fruit trees, and fish rising in cages.
- Farmers have been considering seeking for sustainable production alternatives, such as looking for places for terraced fields, planting and protecting forest.

Introduction

Vietnam electricity corporation (EVN) intend to build Trung Son hydroelectric power dam at the upstream head of Ma River. The construction will affect the living of local residents. A research needs to be done to identify level of influence on people' living.

- **Reasons for building the dam**

Trung Son hydroelectric power dam will be built in Trung Son commune, north of Quan Hoa district of Thanh Hoa province, bordering Muong Lat district (Thanh Hoa) and Moc Chau district (Son La). Ma river water dam lies downstream from Laos, then the flow stays in Vietnam at a dam which is 88m high, 353m long, creating a water dam on an area of 13km². Trung Son hydroelectricity project is a multipurpose project, including power generation and anti-flood. Supporting the development of Trung Son project is World Bank's response to formal need of EVN. The project is funded by WB, with its important policies (environmental and social policies) that need to be applied and respected.

The main concern is to restore, promote and improve livelihood of affected people. Total number is 633 households, with 3000 people, most of which are from Thai ethnic group.

- **Research objectives**

To provide a knowledgeable research and analyze opportunities and challenges to the social-economic and livelihood development of residents in related communes.

- **Expected results and suggestions of livelihood development for the coming time**

- 1, Actual state of mountainous livelihoods in Thanh Hoa
- 2, Overview of development plans of district and province.
- 3, Possible impacts of hydroelectric projects (dam, backwater, traffic) on local production and livelihood
- 4, Forecast of opportunities and challenges to mountainous development in next 5 years
- 5, Suggestion to mission team of WB of possible interventions to restore livelihood for affected households in the project's intervention area.

- **Activities the research team has done:**

- ✓ Document study (policy, strategy, reports of livelihood...)
- ✓ Interview with local authority and residents
- ✓ Visits to tentative resettlement places, where may be improved to cultivate wet rice, potential livelihood sources
- ✓ Participatory meetings, seminars at local level (to know about situation, future orientations)
- ✓ The research team communicated results, conducted validation of the results of the analysis with residents through meetings, receiving local residents' additional ideas,
- ✓ Synthesis, elaboration of reports and introduction of main factors to World Bank

- **Precisions on methodology**

1/ Apart from some documents of basic information, it is difficult to find suitable important and exact information in documents of policies, strategies, researches, livelihood sources

Therefore, we prioritized looking for information on the field, knowing that important solutions would mostly come from inside the communes.

2/ As a consequences, we spent more time on the field to interview, meet with farmers which are 2 exact information sources. In fact, we got to know expectations, ideas, specific need of farmers in particular and community in general.

We chose in random households to interview (one out of 7 from village leader's list of households, if the first households chosen is absent, take the next one)

Village leader chose households to meet basing on the condition: poor, medium, fair, with presence of women, village and commune representative (not households that took part in the interview)

In group meetings, we separate women, poor and vulnerable groups to get to know their livelihood, need and expectation.

We visited 5 related communes, 9/10 flooded villages, met commune and village leaders, 43 farmer households, organized 3 participative workshops with presence of 102 farmers to analyze the influence of the project and the livelihoods' opportunities.

1. Current situation of mountainous livelihoods in the region.

1.1. Brief introduction of related region

The planned Trung Son dam will affect 5 communes, cause flooded houses, land of welfare works, losing a remarkable part of current livelihood sources.

Table 1: some information on affected communes (source: communal people's committee)

| District | Commune | Natural area (ha) | Population (person) | No. of ethnic groups - percentage | Note |
|-----------|-----------|-------------------|---------------------|---|----------------|
| Quan Hoa | Trung Son | 7.860 | 2.602 | Thai 50, Muong 40, Kinh 10 | |
| Muong Lat | Muong Ly | 8.508 | 4.264 | Thai 13,4, Muong 7,1, Mong 79,5 | |
| | Trung Ly | 11.068 | 5.349 | Thai 34,8, Muong 4,4, Mong 59,5, Kinh 1,3 | Border commune |
| | Tam Chung | 12.157 | 3.197 | Thai 52,9, Muong 10,4, Mong 36,7 | Border commune |
| Moc Chau | Tan Xuan | 15.189 | 3.648 | Thai 41, Muong 24, Mong 36,2, Kinh 0,3 | Border commune |

1.2. A mountainous area with difficult conditions

✓ Traffic:

Apart from Tam Chung commune (Muong Lat town) connected with Hanoi by an asphalted road (280km, bendy, failed between Quan Hoa (Co Luong) and Muong Lat town), other communes do not have asphalted roads.

- Roads: narrow, difficult to travel, high slope, bendy, uneven.

Muong Ly commune does not have roads to commune centre. In rainy days, even motorbikes can not travel between communes and villages. From Muong Ly, Trung Ly to villages, there are only narrow paths along Ma river, only motorbikes can pass (though inter-communal paths)

+ Tan Xuan, Trung Son communes have roads that trucks can reach but they are sloping, narrow (Tan Xuan), bendy, with many crosses, rocks.

- Waterway is considered main way to transport goods along Ma river. Traveling by canoes on Ma river is very dangerous. Many transporters have their canoes wrecked when they passed falls or swift flows. The difficulty is multiplied when there are strong flows.

+ Tan Xuan commune's waterway along the streams to Ma river is main way to transport *luong* to sell. This region has only one advantage in terms of traffic for *luong* floats on Ma river (4 communes).

✓ Domestic use electricity

Apart from Tam Chung, no other commune has national network electricity. Farmers use power generation turbine, small hydroelectricity when there is *enough water*.

✓ Water

+ Domestic use water is short in dry season, dirty and buddy in rainy season. There have been projects of clean water that provided stream water pipes. Residents conduct vein water directly to their village to use, without filter or treatment.

✓ *Intellectual level*

Residents' intellectual level is low, most of them passed 4th or 6th grade, even many 1st grade. Some are illiterate. Women have lower education level than men. Mong ethnic group has lower education level than Thai. Many Mong women are illiterate (according to information from Tan Xuan commune women association chief).

✓ *Cultivation practice*

Farmers' cultivation practice is old-fashioned (prick and sow), slash and burn cultivation without fertilizer and soil improvement, depending solely on nature (good crop when natural conditions are favorable, failure crop when drought or too heavy rains). The evil deforestation to till the fields and shifting cultivation are spreading seriously on a large scale, affecting badly on environment, biological diversification... and water for cultivation.

✓ *Agricultural and forestry extension, veterinary staff*

Communal agricultural and forestry extension exist in title but lack profession, education, with weak operation.

Five communes affected by Trung Son dam do not have veterinarians or paravets, with no veterinary service. Therefore, diseases occur frequently in farmers' breeding, causing economic losses and no development. It is more difficult in the newly separated commune Tan Xuan as communal people's committee is temporary, with no telephone to communicate.

✓ *Expensive consumer goods*

Due to difficult traffic and high transport costs, goods and necessities are all more expensive than in district centre.

1.3. Agricultural system and activities:

Agricultural system consists of mainly upland fields with some wet lowland fields, cultivated by farmers according to their practice and experience, with few non-agricultural activities. Crop and domestic animal seedlings are mainly local ones.

1.3.1. Wet lowland fields:

Wet lowland fields in Muong Ly, Trung Ly, Trung Son are not considerable in surface, due to abrupt slope from Ma river to surrounding mountain tops. Wet lowland rice-fields gather mostly in Trung Son (Ta Ban village) and Tan Xuan commune (East and West Ta Lao village make up for 34% of total wet field area of the commune).

Table 2. Synthesis of wet lowland rice-field area, annual upland fields of 5 communes

| No. | Commune name | Wet field area (ha) | Annual upland field area (ha) | Total | % wet fields |
|-----|--------------|---------------------|-------------------------------|---------------|--------------|
| 1 | Trung Son | 42,8 | 250 | 292,8 | 14,3 |
| 2 | Muong Ly | 16 | 646 | 662 | 2,4 |
| 3 | Trung Ly | 40 | 1.596 | 1636 | 2,4 |
| 4 | Tam Chung | 62,6 | 686 | 748,6 | 9 |
| 5 | Tan Xuan | 71,3 | 915 | 986,3 | 7,2 |
| | Total | 232.7 | 4093 | 4325.7 | 5,4 |

Wet field area of Ta Ban village – Trung Son commune and West Ta Lao and East Ta Lao of Tan Xuan commune can all be cultivated with 2 wet rice crops.

1.3.2. Upland fields

Upland fields occupy a large part of cultivation area; even locals are destroying more natural vegetation, which greatly affect forests. There is no significant natural forest any longer.

The rotational cultivation practice on burnt-over land is: rice in year 1 – maize in year 2 – cassava in year 3 – leave fallow in 3-4 years then clear to grow rice. Farmers spend good soil to grow rice and maize, poorer soil for cassava, too poor for *luong*, which causes bad effects on potentials of subsequent industrial or perennial crops.

The shorter leave (fallow) time is and the thinner vegetation is, the poorer soil is. Current situation of growing rice, maize and cassava has made soil eroded and exhausted rapidly.

Cotton is planted on some upland fields in Tan Xuan, Tam Chung. Soybean is planted in some places in Muong Ly, Trung Ly. Annual plantation of rice, maize and cassava in 2-3 continuous years on poor soil does not allow harvest (typical in Muong Ly, Trung Ly). Soil is better in Tan Xuan but productivity of subsequent years is much lower than the previous year.

There is a trend of increasing area of maize, cassava due to market need. Area of upland rice also increases as demand for food increases in each household (yield from survey).

Agricultural system in Moc Chau district seems more favorable. The intended resettlement area for locals has already terraced fields. Farmers plant some vegetables around their houses; small (20- 30 m²) gardens are carefully fenced to get vegetables.

Table 3: Area of crops in 5 communes (source: communal people's committee)

| No | Commune | Wet lowland rice (ha) | Upland rice (ha) | Maize (ha) | Cassava (ha) | Bean, vegetable (ha) | Cotton, sugarcane (ha) | Luong (ha) |
|----|-----------|-----------------------|------------------|------------|--------------|----------------------|------------------------|------------|
| 1 | Trung Son | 42,8 | 178 | 100 | 150 | 0 | 2,5 | 2000 |
| 2 | Muong Ly | 16 | 380 | 220 | 45 | 1 | 0 | 273 |
| 3 | Trung Ly | 40 | 878 | 445 | 210 | 6,3 | 0 | 138 |
| 4 | Tam Chung | 62,6 | 270 | 320 | 94 | 2 | 0 | 0 |
| 5 | Tan Xuan | 71,3 | 397 | 364 | 109 | 0 | 45 | 550 |

The statistics are not highly reliable, because communal people's committee officials and commune leaders do not have enough statistics of their commune.

Table 4: Plantation schedule of some main crops on upland fields

| Month | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|-------------|---|---|---|---|---------------------|---|---|---|---|----|----|----|
| Upland rice | | | | | | | | | | | | |
| Maize | | | | | | | | | | | | |
| Cassava | | | | | | | | | | | | |
| Bean | | | | | | | | | | | | |
| Luong | | | | | Shoot season | | | | | | | |

| | |
|--|-------------------|
| | Planting |
| | Tending |
| | Harvesting |

- *Analyze current income sources of households*

Locals mainly do farm works, they earn their living by farming, breeding, forestry, picking available products in nature, some households are working in service sector or paid to work as communal officials.

Table 5: Position of income sources in household economy

| Main livelihood sources | | Notes |
|-------------------------|----------------------------------|---|
| Farming | Wet rice | Little, mainly for food |
| | Upland rice | Popular, preferred crop for food, main food source for residents |
| | Maize | All is sold for daily expenses |
| | Cassava | All is sold for daily expenses |
| | Vegetables, fruit trees | For daily food |
| | Other crop | Cotton newly planted in Tan Xuan, Tam Chung |
| Breeding | Buffalo, cow | Popular, increasing, income used to buy properties, equipments |
| | Pig | Little, local variety, taking full use to sell |
| | Chicken, poultry | Poor growth due to diseases, kept on upland fields |
| | Goat, horse | Little |
| | Fish | Kept in small ponds for food |
| Forestry | <i>Luong</i> | Best development in Trung Son, Tan Xuan, worst in T. Chung |
| | Forestry produce exploitation | Bamboo shoots, <i>bong chit</i> , <i>day nhot</i> , <i>ba muoi</i> , ... roots..... |
| Others | Fishing, snails, ... | For food and sale. More developed in Tan Xuan |
| | Service, grinding | Collecting <i>luong</i> , maize and cassava develops. Many rice grinding machines in villages. Grocery services |
| | Alcohol brewery | Rather popular, for home use and sale |
| | Weaving brocade, cushion, pillow | For home use (in tradition, there must be lots of blankets and cushions when a girl gets married) |

- ✓ Growing rice has fundamentally solved the problem of daily food for farmer households in the region.
- ✓ Maize, cassava and cotton are grown to sell for cash. As expressed in the survey, most of households need to expand area in future as there are advantages in collection system in commune : buyers invest and advance.
- ✓ Many households cultivate on large area, 3-5 times larger than necessary area for their living.

- **Mean income of households**

The survey in 43 households of 5 communes showed mean income of households as follows (in 1,000,000 VND): Table 6

| Commune | <i>Luong</i> | Rice | Maize | Cassava | Breeding | Forestry | Other | Mean/hh |
|------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| Trung Son | 22.6 | 9.2 | 2.9 | 11 | 8.9 | 3.7 | 8.8 | 67.1 |
| Muong Ly | 1.4 | 6 | 2.6 | 2.7 | 5.8 | 0.7 | 5 | 24.2 |
| Trung Ly | 4.9 | 7 | 5.8 | 3.5 | 11.2 | 0.6 | 1.5 | 34.5 |
| Tam Chung | 0.4 | 5 | 1.7 | 0 | 2.4 | 0 | 2.7 | 12.2 |
| Tan Xuan | 15.1 | 14.4 | 9.6 | 11.9 | 14.9 | 3.4 | 21.3 | 90.6 |
| Total | 44.4 | 41.6 | 22.6 | 29.1 | 43.2 | 8.4 | 39.3 | 228.6 |
| Mean/5com | 8.88 | 8.32 | 4.52 | 5.82 | 8.64 | 1.68 | 7.86 | 45.72 |

- ✓ Mean income/household is rather high, approximately 45 million dong/household/year. *Luong* provides the highest income in Trung Son, Tan Xuan
- ✓ Lowest income commune is Tam Chung (Mong ethnic group households). Highest income commune is Tan Xuan (90 million dong/household/year)

These statistics are much different from previous ones of Hydroelectricity survey

- **Table 7 - Earning of food/head (kg)** (statistics from survey in 43 households)

| Commune | inquired hh | Mouths | Rice | Maize | Total food | Cassava | Mean/head/year |
|-----------------------|-------------|--------|------------|------------|------------|-------------|----------------|
| Trung Son | 12 | 57 | 24900 | 13700 | 38600 | 75800 | 677 |
| Muong Ly | 14 | 60 | 20750 | 19050 | 39800 | 46100 | 663 |
| Trung Ly | 6 | 26 | 10700 | 14750 | 25450 | 15400 | 979 |
| Tam Chung | 2 | 13 | 1350 | 1500 | 2850 | 0 | 219 |
| Tan Xuan | 9 | 46 | 29400 | 44800 | 74200 | 67530 | 1613 |
| Total | 43 | 202 | 87100 | 93800 | 180900 | 204830 | 896 |
| Mean/5communes | | | 431 | 464 | 896 | 4763 | |

- ✓ Mean income of lowland field and upland rice/head/year is 431 kg. This amount is largely sufficient and even redundant for daily need of food.
- ✓ Maize's annual productivity is equivalent to that of rice. These are the 2 main food plants that make this region in excess of food, especially Tan Xuan commune. Each year, every household sells nearly 3-5 tons of maize on average.
- ✓ Cassava is planted popularly (trend to expansion), dried and sold to processing companies. Cassava is a short term crop that causes soil erosion and exhaustion.

1.3.3. *Bamboo luong*

Luong is mainly planted along the banks of Ma river and Quanh stream, many in Trung Son, Tan Xuan. *Luong* is hardly planted in Tam Chung commune due to too dry climate.

Table 8: *Luong* area of 5 communes (source: communes' people committee)

| No. | Commune | <i>Luong</i> area (ha) |
|-----|-----------|------------------------|
| 1 | Trung Son | 2000 |
| 2 | Muong Ly | 273 |
| 3 | Trung Ly | 138 |
| 4 | Tan Xuan | 550 |

- ✓ Income from selling *luong* contributes 19,4 % to total income of household.
- ✓ Farmers are considering the expansion of *luong* area, such as in Trung Son and Tan Xuan communes. Farmers plant cassava gradually as they plant *luong*. After 3 years of intercropping, the whole land is covered with *luong*, and farmers take care of *luong* from the 4th year.
- ✓ *Luong* grows well in humid and low land, (along river, stream, cross-valley), some families have produced *Luong* in upland and dried land, but the results are not so good.

1.3.4. *Breeding:*

Buffalo and cow breeding is being prioritized, playing an important part in households' income, with 2,4 animals/household on average. All villages plan area for buffalo and cow grazing. Buffalos and cows are mainly let for free-grazing, no household grow grass or food plants for animals. They are mainly kept for meat to sell.

Table 9: Cattle flock in 5 communes (source: communal people's committees)

| No | Commune | No. of hh | Buffalo, cow | Mean/hh | Pig | Mean/hh | Poultry | Mean/hh | Goat | Horse |
|----|-----------|-----------|--------------|---------|------|---------|---------|---------|------|-------|
| 1 | Trung Son | 571 | 1230 | 2.2 | 1200 | 2.1 | 8000 | 14 | 250 | - |
| 2 | Muong Ly | 727 | 1764 | 2.4 | 2394 | 3.3 | 9823 | 13.5 | 488 | 109 |
| 3 | Chung Ly | 894 | 1060 | 1.2 | 1954 | 2.2 | 7244 | 8.1 | 244 | 115 |
| 4 | Tam Chung | 596 | 1826 | 3.1 | 1600 | 2.7 | 9360 | 15.7 | 62 | - |
| 5 | Tan Xuan | 661 | 2187 | 3.3 | 2206 | 3.3 | 15570 | 23.5 | 162 | - |

Pig breeding: many households feed pigs but number of pigs per household is not abundant; 2,7 pigs/household/year on average. Farmers here produce good food for animal such as maize, cassava, rice bran. The current pig variety is 100% local (black pig), not selected. Without a breed production agency, farmers produce piglets themselves. The consanguineous symptom has weakened the pig flock. Farmers let pigs wander to take use of food.

Chicken breeding: this region has advantage in terrain, grazing area, high selling price. The local chicken variety has a very good quality, but the problem is diseases in the chicken flock.

Veterinary aspects : this is seriously short in the region. There is no veterinary service, no veterinarian so diseases are free to spread very fast.

1.3.5. *Aquaculture products:*

There are not many fish ponds, mainly in wide valleys (Tam Chung, Tan Xuan). People dig small ponds, 60- 80cm deep to lead stream water continuously to keep fish. Fish seedlings are brought from lowland, much more expensive than other places due to hard transport way.

Raising fish in cages: in Tam Chung now there are only 4 households who raise fish in cages, decreased in recent years due to many diseases that caused massive death of fish, with heavy losses. In the region affected by Trung Son hydroelectric project, there are precious fish varieties people catch from Ma river such as dwarf catfish, *doc* fish...which are specialties sold at very high prices. Some households raise *doc* fish in cages (Tam Chung).

1.3.6. *NTFPs:*

Rattan is rare due to overexploitation, and slash and burn practice has ruined seedlings. Bamboo family species such as *nua*, *vau*, *buong*, *lung* are natural forest plants, abundant and developing very fast. But their shoots are being over-exploited by locals, leading to species degradation. Communes such as Muong Ly, Trung Ly have many *le* plants, but exploitation of this species for handicraft is not popular.

Exploitation of bamboo shoots, *day nhot*, *ba muoi* roots, *bong chit*, *bong lau* is very popular. Other forestry products are also current source and contribute largely to income, like in Trung Son, with income of 3,6 million dong/household/year on average.

1.4. Non – agricultural activities

- *Service activity* (of farming households, no non-agricultural household)

Collecting *luong*, maize, dry cassava exists in every village. Not many households do it but it provides rather high income. Buyers advance capital for collectors. There is no input service activity such as seeds, animal, fertilizer, plant protection, veterinary medicine.

- *Grinding activity, forestry products processing*

This is a rather popular activity in villages. Every village has rice grinding machines, due to rather high yield in each village.

Table 10 : Synthesis of grinding households of 6 surveys

| Village | Ta Ban | Xuoc | Nang 1 | Tai Chanh | E. Ta Lao | W. Ta Lao |
|--------------------|--------|------|--------|-----------|-----------|-----------|
| Grinding household | 21 | 4 | 6 | 7 | 12 | 4 |

Main agricultural product in the region is maize, cassava dried by manual kilns with fuelwood of the mountain. Maize is shelled by motored machines. Apart from agricultural products, farmers also dry bamboo shoots, which is very popular on the mountains.

- *Brocade weaving, alcohol brewery*

Brocade weaving is traditional occupation of locals. Probably 100% Thai, Muong girls used to know weaving, but now very few girls do it. Every village still has weavers. They mainly weave in mornings or late afternoons. Weaving products are shirts, blankets and cushions, rarely sold but used for their own need when girls get married. The number of products brought to the husband family expresses the living standards of the wife family. Brocade materials are fibers bought in markets. Cushion materials are bulbul collected in woods.

Alcohol brewery is a popular activity. Every family having men knows alcohol brewery practices. Locals have large need of wine. Everybody drinks rice alcohol, even women. alcohol is used popularly in men’s gatherings and daily meals. Main materials for alcohol brewery are dry cassava, fresh cassava, rice; some families use maize as well.

- *Forest products collecting, fish and snail catching*

Bamboo shoot collecting is a very popular activity. Dry shoots are collected to sell for an income of 3-7 million dong/household/year. There is also exploitation of forest products from protection forest (Ta Ban village). Sometimes, locals ask for permission to exploit *nua*, *vau* once in 2 years to sell, and exploit wood to use.

Fish catching in Quanh stream (East Ta Lao, West Ta Lao, Ta Ban villages) is also remarkable income source. Fish is mainly used for home food; locals only sell when they catch a lot of fishes. Beside fish catching, locals also catch mountain snails to sell to Hoa Binh province as a specialty food (West Ta Lao, East Ta Lao villages).

Comment : in comparison to other provinces, forest and production on slope land is not well managed. Households still do it without a good management of authority.

2. Overview of land, rural and resettlement policies

2.1 Viewpoint, policy

Government's viewpoint is consistent for all development projects of population movement and resettlement. The viewpoint is shown in these following main directions: (i) Resettlement must ensure community features; (ii) Resettlement for farming households must base on production land; (iii) Resettlement planning should match with local social-economic development strategies; (iv) Local community should benefit from resettlement plan.

Currently in Vietnam, resettlement policies mainly focus on compensation for residents when the Government withdraws land. There may be some more regulations of support and establishment of resettlement area to create new accommodation for households. Policies relating to programmes, methods to help affected people restore their lives and livelihoods are not mentioned in the policies yet.

The research team has only been able to consider, assess, basing on the proposal that has not been commented and formally issued. The instructions for basis of social- economic development plans of Thanh Hoa and Son La and affected districts are not yet available.

Three meetings with 3 districts' People Committee (Muong Lat, Quan Hoa, Moc Chau) show that, up to now, these districts do not have any intention or plan for livelihood of residents affected by Trung Son hydroelectric project. There is no meeting or official document of livelihood and life stabilization for affected residents in those 3 districts.

2.2 Actual state of land and forest allocation for residents of 5 affected communes

Three districts of Quan Hoa, Muong Lat, Moc Chau have basically assigned land use right (*red paper or red book*) to households. Village leaders are assigned to keep "*red papers*" of land tenure, field land, production forest land, protection forest.

In theory, land has been allocated to each household. In fact, households use land without *red papers*, no clear borderline among households, especially upland fields where one can cultivate wherever he wants. The borderline is clearer in houseland tenure and wet rice-fields.

There are annual changes in position, upland field area left 3-4 years are different. One can cultivate wherever he wants. If farmers plant *luong* on land of rice, maize and cassava, the land naturally belongs to them.

Time of land use right depends on use purpose:

- + land tenure used for house and accommodation: long term use right
- + wet lowland rice-fields: 20 years
- + production forest land: 50 years

With 3 different use purposes, farmers are provided with 3 different papers. Households can trade, transfer, mortgage their land use right. Households' land area is different : largest 50 ha, medium 15- 25 ha, and least 1,5 to 2 ha.

2.3. District's agro-forestry development policies

Moc Chau district has clearer agricultural extension policies with system of extension staff to communes. Tan Xuan commune is newly separated from Xuan Nha commune, so it does not have any extension activity supporting farmers.

District extension staff says they had policies to support farmers in cultivating wet rice on terraced fields, but research team found out from farmers that they have not received any support when cultivating on terraced fields, or even they never have been told of this policy.

Muong Lat district has policies supporting plantation of fruit trees such as mango, litchi for seedlings, but in Muong Ly commune, the research team found out that the trees could not grow more. If there are products, they can not be sold due to lack of competitiveness.

Moc Chau has rather effective forestry policies supporting *luong* plantation in Tan Xuan commune, especially East Ta Lao village. There is almost no extension activity, farmers cultivate with traditional experiences "prick and sow", no intensive cultivation, no fertilizer.

The new maize seed brought to this region produces rather high productivity and big benefit, encouraging farmers to expand their area. Upland rice varieties are old but in good quality, upheld by farmers in traditional way. Private business and market influence farmers decisions and practices more than agricultural expansion. To date, there is no foreign project supporting rural and agricultural development in these remote communes.

2.4 Some disadvantages or drawbacks observed by the team

- The dam construction has not been approved and announced formally so leaders have not prepared suitable policies or they are waiting for support from higher authorities...
- Some leaders consider it having little effects or/and EVN should compensate (not responsibility of province and district).
- It is not clear whether land allocation is to protect environment or for locals to cultivate upland fields as they wish. According to our observation, most mountain tops or forests allocated to farmers have been used as upland fields.
- The current vicious circle: destroying watershed to slash and burn caused water source exhausted, so rice cultivation does not produce well, and farmers cultivate in higher positions to take moisture of cloud and dew for rice to seed, which makes the water source more and more exhausted...
- There is an overlapping among projects causing financial loss. For instance: housing project for residents in Trung Ly commune on project's area of resettlement, project of clean water for Ta Ban village of Trung Son commune (in process of survey and design), whereas village has to move its population...
- There are policies caring about immediate benefits, ignoring long term benefits and concerns, such as encouraging maize plantation expansion on sloping land causing more soil erosion; there are no measures to limit the disadvantages and ensure long term benefits.
- Non-synchronous policies, influencing on many aspects at the same time : it takes too long time for farmers to trust and promote production development and structure change.

3. Possible impacts of Trung Son hydroelectric project and forecast of opportunities and challenges to mountainous livelihoods development

3.1. Impacts on local livelihood and production

✓ *Construction of dam (Dam body):*

The dam construction itself hardly has impact on livelihood and production because it occupies not much land. There may be income for local laborers working in the construction.

✓ *Flooding system (causing flood in many villages and production land)*

This is main impact of the project, mainly negative impacts, though some positive sides.

Table 11 - For instance: Flooded area of Nang 1 village through survey

| Household | Area(ha) | Flooded (ha) | % | Luong area | Flooded luong | % | Dwelling land |
|-----------------|--------------|--------------|-------------|--------------|---------------|-------------|---------------|
| Vi van Dong | 7.9 | 3.3 | 41.8 | 3 | 3 | 100 | 0.03 |
| Vi van Bong | 9.01 | 3.04 | 33.7 | 3 | 3 | 100 | 0.03 |
| Dinh cong Diep | 9.06 | 1.06 | 11.7 | 3 | 1 | 33.3 | 0.05 |
| Ngan Van Tam | 17.22 | 1.02 | 5.9 | 1 | 1 | 100 | 0.02 |
| Luong Van Quoc | 4.7 | 0.5 | 10.6 | 0.5 | 0.5 | 100 | 0.02 |
| Dinh cong Tham | 9.4 | 2.1 | 22.3 | 2 | 2 | 100 | 0.05 |
| Ngan Vinh Thong | 12.73 | 2.53 | 19.9 | 5 | 2.5 | 50 | 0.02 |
| Dinh Van Xuan | 8.51 | 2.51 | 29.5 | 2.5 | 2.5 | 100 | 0.04 |
| Total | 78.53 | 16.06 | 20.5 | 20.00 | 15.50 | 77.5 | 0.26 |

* Flooded area accounts for 16% total area. Area of *luong* land is much more flooded as *luong* is planted along the river and stream banks.

* Dwelling land area is 100% flooded as the survey chose villages with flooded houses (according to resettlement document of hydroelectric project)

* 432 households in 10 villages are flooded (resettlement document), affecting greatly to life of families which already moved, lost their productive land, disordered the location of their neighbors and relatives. Impacts of culture, society (mainly on the cemetery).

* Water source for domestic use is lost.

* Place for small hydroelectricity to supply power is lost. It is more difficult to do above as the flows are weaker. A large area of *luong* plantation which is being harvested is lost, causing income losses for locals living along the river.

* Part of lowland wet rice-fields (mainly in Tan Xuan commune) is lost, affecting food security and increasing upland rice area. Cultivation area above is narrowed (though a large part of land has not been flooded), increasing pressure of slash and burn practice.

* Breeding stables are lost, affecting farmers' breeding activities.

3.2. Some positives sides of the hydroelectric dam:

3.2.1. Waterway: new and convenient waterway (on condition of good wharf near Trung Son dam, but impossible to transport *luong* from Muong Ly by floated rafts to Co Luong, Quan Hoa in the future)

3.2.2. Roads (asphalted roads for automobiles) :

Mainly to dam construction (main positive impact), direct influence on Trung Son (and Thanh Son) and indirect on upper communes, unclear plan from dam base upwards.

3.2.3. Network electricity: accompanying network electricity, from Co Luong to dam, but what about network providing electricity to relating (flooded) communes in the future ?

3.3. *Opportunities* (from initial time, what is sure so far)

* Road from Co Luong – Thanh Son – Trung Son – the dam (main opportunity)

(in the plan, the road will be built from beginning of 2009)

- Easy to trade agricultural products (maize, *luong*, pig, chicken...)
- Bring inputs for production up the mountains (seeds, fertilizers, ...)
- Easy to travel, meet, provide information.
- Tours on lake, visiting Thai and Mong group cultures

Indirect impacts on above communes (traders will reach the dam, which is 175 km (about 4 hours to travel) away from Ha Noi, with good road.

* Water reservoir:

- Transportation from the dam to above communes, transport of agricultural products from above region to dam base.
- Area for raising fish in cages (easy to sell and transport)
- Source for watering for good growth of crops (if there is electricity)
- Free fish catching on lake, aqua products
- Water-birds, ducks, geese can also be raised, thanks to this new source of water ...

* Network electricity (at least to dam construction)

- Processing agricultural products on the spot (increasing added value)
- *Luong* pre-processing and processing creating jobs
- Other non-agricultural uses ...

3.4. *Opportunities* (potential, need to be confirmed)

Flood reduction (Ma river water is better adjusted)

Road from Muong Ly to Muong Lat (water reservoir can not be used before 2013)

Electricity from the dam (national network electricity) to Muong Ly and Tan Xuan ?

Re-issue, adjust red papers, clarify the use of land and land planning

Replanning the dwelling site (after land planning), easier in related area for each house.

Opportunity of a separate agricultural development project for the region ?

Support (compensation) for social infrastructures (schools, medical centres, water) to replace or improve the situation (beginning of 2008); Ecotourism and development of such handicrafts as bulbul cushion to serve tourists and promote Thai culture.

3.5. *Challenges*

3.5.1. During implementation:

- Unclear process, not explained to farmers will cause inequality, obstacles and problems in compensation.
- Project only compensates for houses and fields, but not investment in agricultural and forestry development accompanying economic development of the affected household.
- Investment is only for convenience of the construction of the dam, not caring about upstream villages and families (asphalted roads and electricity stop at the dam base)

- If no early intervention is done to facilitate agricultural development, but waiting for last 1-2 years before the dam is finished, it will be more difficult and basically impossible to make up, to integrally compensate for the losses.
- Relying on current policies in 2 relating provinces with no special intervention, decentralization ...
- Management of crops systems will be essentially influenced by main traders.
- District and communal authorities are waiting for specific solutions

Other challenges and difficulties that may have negative impacts.

- Chicken and pigs continue to die of diseases, causing economic losses
- Due to unclear land mechanism and expensive agricultural products (maize, cassava), farmers will prioritize immediate benefits, reducing sustainability.
- Some social evils (such as drug addiction of young people in Muong Ly).

3.5.2. *Natural conditions for cultivation*

- Good preparation of resettlement place, minimizing costs for new life.
- The most important is to maintain remaining forest area. If the situation remains, there will be nothing sustainable after the construction of the dam.
- Really so, forests are vital condition to provide enough water for terraced fields which are partially restored. The situation is more dangerous if forest is not well protected or forest protection plants are not planted.
- Land is eroded and exhausted due to cassava plantation and system of upland fields, thus it will be more difficult to cultivate more crops in the future.

Table 12 : Comparison table of opportunities and challenges in the 2 intended resettlement sites of East Ta Lao village – Tan Xuan

| Criteria | Phieng Hang site | Thung Ngup site |
|--------------------------------|--|--|
| Geographical location | Near centre of Xuan Nha commune, hollow, far from old village, distant from Tan Xuan | High mountain top, cold weather, near old village, belonging to Tan Xuan commune |
| Terrain, slope, plain | Favourable terrain, little slope, large plain | Little slope, rather plain |
| Traffic | Convenient for road traffic | Difficult to make path, tracks |
| Dwelling land area | Enough for the whole East Ta Lao village | Only enough for 40-50% of households |
| Cultivation area | Large area | Little cultivation land |
| Wet rice-fields | Large area | No wet rice-fields so far |
| Cultivation soil | Sandy and poor soil | Rich soil |
| <i>Luong</i> land | Little | No <i>luong</i> land |
| Network electricity | Network electricity available | No network electricity |
| Water source | Good water source for production | No water |
| Natural income source | Far from place to catch fishes, snails and get bamboo shoots | Large availability of fishes, snails |
| Water source to generate power | Yes, but far | No |

* Locals should resettle into 2 communes, one part to Phieng Hang, another part to the side of old village to take full use of the old area to produce and plant more *luong*.

4. Possible interventions to restore livelihood for affected households

4.1. Premise conditions, prerequisite

4.1.1. Satisfactory compensation and resettlement for affected households:

- Though meeting many difficulties, good organization and implementation can still ensure livelihood and life that is as good as the old one or even better (few relating households, little flooded area). Results depend on situation of each village, region
- Livelihood restoration will be done better if basic conditions are satisfied.
 - Clear, exact and timely information of resettlement and compensation for relating households
 - Compensation process is done explicitly, coherently and sufficiently.
 - Relating households should be really cared because they have to suffer many consequences for the sake of the country; there is not only to care to the dam construction or the road from Co Luong to dam base.
 - Local authorities participate considerably to protect residents.

4.1.2. Timely intervention and favourable conditions

- Intervene opportunely, according to clear plan, without too many delays that offended residents.
- Farmer households and local authorities are ready to accept above mentioned conditions and support to quickly restore livelihood in which fields must be sufficient to cultivate and water must be sufficient to ensure productivity.
- Keep the forests (mainly upstream natural forests) for enough water and other ecological conditions for terraced fields.
- Join farmers to prepare early and readily resettlement sites to reduce costs (such as planting *luong* in advance, system of market and essential goods and services).

4.1.3. Clear planning of land plots

- Planning of land plots:
 - Residential area.
 - Water source (domestic use, hydroelectricity).
 - Plot of terraced fields.
 - Plot to continue upland fields.
 - Plot of *luong* plantation, near the lake or above)
 - Plot for breeding.
 - Plot to protect, restore forests

4.2. Other policies (apart from compensation and resettlement support policies)

- Develop education, medical infrastructure (necessary schools and medical centres)
- Protect cultural properties and local knowledges
- Provide local officials with short educational courses to serve their villages.
- Stretch national network electricity to relating villages
- Prioritize restoration of running water provision in resettlement site.
- Promote projects of infrastructure intervention.

4.3. Policies, measures of agro-forestry sector

4.3.1. Absolute and strict protection of remaining forest types

Through observation on the spot, there is increasing pressure on remaining forests: productive forest (bamboo *luong*,...), degraded natural forests and watersheds.

It is clearer when we talked with farmers and local authority. Farmers expressed that the movement would be easier if they can destroy part of forest area to expand production...

Strict forest protection policies is the most important, creating favourable conditions for resettlement and to keep most of livelihood sources. The difference of resettlement conditions in places where there are forest left and where almost no forest is left is clear.

Deforestation brings almost nothing, except for some immediate benefits (maize, cassava) but the consequences in terms of environment, society and livelihood will be rather huge: less possibility to accept resettlement site, less running water, less livelihood sources, lower income, remaining land disputes. This problem is also at larger scale: too much water in rainy season, too little water for hydroelectricity power plant in dry season.

4.3.2. Policies of land allocation:

Land has been assigned to each household, but in fact, the borderlines among households, especially upland fields, are not clear. One can cultivate wherever he wants. Eventually, because the land plots do not have explicit owner. Everyone can come to produce, exploit for immediate benefits because “everybody’s business is nobody’ business”.

Changes occur annually in the land area left 3-4 years without management. However, if farmers plant *luong* on land of maize and cassava, the land naturally belongs to them.

Due to unclear fixation of each household’s land, there are so many negative impacts. As no one has long term responsibility on each land plot, households compete to destroy forests (at least productive forest and waste land) to plant such short term crops. This problem does not encourage farmers to use land economically and protect forests.

4.3.3. Limit short term crops destroying soil

It is difficult to intervene directly, due to market pressure (new maize and cassava processing factories); it is also necessary to admit that these two crops bring about high productivity and economic effects in short time.

However, we still can intervene indirectly (propaganda, policy campaign) :

- + Strict prohibition of deforestation.
- + Only productive forest and forestry trees can be planted on protective forest land.
- + Forestry trees should not be replaced by short term crops
- + *Luong* forest should be planted after 3 years of short term crops (good policy in Trung Son, Tan Xuan communes)
- + Legume intercropping should be prioritised to cover soil and prevent erosion.

4.4. Improve capacity of local authority and farmers

4.4.1. Improve capacity of local authority and public actors

- Capacity of project management and participation
- Land use planning, plant new, protect and increase income from forest sustainably
- Participatory working with locals, democracy at grassroot level
- Gender.

- Better understanding of impacts on environment and of environment on life
- Sustainable rural and agricultural development

Send officials to agricultural and forestry expansion, veterinary staff (young, middle-aged), who then come back to work in commune, village to help other households in the village.

It will be easier to intervene to groups of households (5-10 households) with same activity (terraced field in the same place), same resettlement site or interest groups. Through survey, there were 36/43 households having need of terraced field cultivation, making up for 83,7% of households interviewed.

4.4.2. Partially change agricultural extension methods

Agricultural extension system must be present more frequently and assigned with more responsibility, prioritising sustainable cultivation, keeping fertility, organic fertilizing other than chemical methods.

Notice : Prioritising high-yield crops (maize, cassava) will increase deforestation, soil destruction and erosion. Then, extension has to promote local seeds that are suitable, easy to sell when transport is better, with high added value and local high quality specialty cultivars.

4.5. Specific way of implementing activities, ensuring livelihood in new conditions

4.5.1. Timely intervention:

- Early intervention will lead to choices and flexibility in intervention method and content; for instance, early intervention will help protect forest, keeping water to cultivate on upland fields, which ensures food source.
- In contrast, deforestation in a short time will cause big difficulties in later intervention.
- There should be early intervention (in terms of techniques and capacity building) to avoid planting too much cassava which harms the soil and exploits the remaining nutrients in soil. If we plant other crops (forestry trees or legumes), the soil will still be cultivated continuously and sustainably.

4.5.2. Intervention in right place:

Despite the possibility to combine with the common policies (projects numbered 661, 135, ..) and priority to support infrastructure for resettlement area, there should be special activities for 4-5 communes, 10 villages that are directly affected.

It is impossible to rely solely on common agricultural extension activities (essentially bringing in high-yield seeds) to solve agro-forestry problems in relating villages. There should be a separate independent organization with a small team of engineers for these 4-5 communes with a head office in one of these five communes (Trung Son?)

In the future, if there are possibility and results, activities should be expanded to all relating areas, even in the dam's lower section (other villages of Trung Son, Thanh Son communes)

4.5.3. Independent intervention (from current agencies, policies and programmes)

We are aware that intervention agency could not be completely independent, but it can be partially autonomous if it operates with World Bank's aid, for instance:

Independent intervention is necessary to intervene in right time, right livelihood activity, according to farmers' most urgent need.

At the same time, it allows keeping faith between the agency and farmers, avoiding possible pressure to Trung Son dam and other State agencies in charge of resettlement, compensation. It will allow, basing on plans of village and commune and actors in villages, to identify and meet farmers' need more effectively.

4.5.4. One centre with 4-5 dynamic and effective engineers

To establish a group of officials operating closely with farmers in 5 communes is established. One engineer is in charge of one aspect, providing, gathering information for one commune :

- + The centre is able to meet technical needs, prioritising implementing small trials and demonstrations, and support farmers to find seeds and consumption market.
- + To cooperate with basic collaborators selected by the village
- + To own a significant budget and relating regulations to buy seeds, implement trials and support terraced field cultivation at small scale.

If good results, expansion through main project and programs. This way of working also allows the understanding of situation at grassroot level, gathering information....

4.5.5. Early intervention allowing livelihood initiative for residents

- Livelihood planning right now, including short and long term livelihood
- Implement short term livelihood activities to raise long term livelihood activities

Maintain and promote good traditional livelihoods, base on the country's speciality to develop sustainable livelihoods

- Good traditional livelihood activities like breeding black pig, local chicken grazing
- Traditional specialities such as bulbul cushion to be studied and developed if possible.
- Local plants like "nhot" plant should be studied and promoted.

Guide farmers to join market more frequently.

- Farmers are producing in self-sufficient way. We need to guide them to produce more – but not exclusively - in market-oriented way.

5. Restore and develop livelihood for affected households

5.1. Cultivate terraced fields where it is possible, and protect forest

5.1.1. Reasons of priority for terraced fields

- More forest means more chances to cultivate terraced fields; in contrast, growing wet rice on terraced fields will increase awareness on forest protection.
- These two activities (terraced fields and forest protection) always go together.
- Cultivation area will be narrowed, as population increased and part of the area is flooded. The situation is more dangerous if the upland fields system is not sustainable.
- Cultivating on terraced fields will decrease land demand, at least 25% (wet rice productivity is 4 times higher than upland rice). Land pressure will decrease if there is no need to leave land like on upland fields, also more attention should be paid to fertilizing, mainly organic fertilizer that is hardly used today.

5.1.2. Requirements and conditions

- *Some requirements need to be met* (apart from land issues):
 - + Need to manage many area and households at the same time for it to be easier to be protected from diseases and birds destroying rice.
 - + Stricter control of cattle (localizing the grazing area, planning land plots).
 - + Guidance and demonstration of ways of using organic fertilizer more effectively.

- Investment (external aid), but with different levels

- 1) Land (*red papers*), techniques, seeds (intervention without significant subsidies)
- 2) Encourage farmers to join part of labour (job and income creation on the spot), according to area or volume. This mode should be preferred than using bulldozer.
- 3) More external investment to build ditches, buy pipes
- 4) Higher investment: to build concrete ditches and small dams

* Consider the possibility of building dam in Con Nao (Tan Xuan commune): keeping water for terraced fields (old and new, below), regulating water, producing power, convenient place for keeping fish in lakes and cages.

5.1.3. Speciality vegetable types of the region : develop vegetables already existing

5.2. Develop breeding, husbandry sustainably

5.2.1. Cattle, pigs and poultry:

- Breeding may be one of the region's strengths
- Keeping traditional breeds is also a suitable direction
- Easier to sell when there is asphalted roads in 1-2 years (at least to dam base)
- Special case: husbandry system in the above, remote farms (less diseases, mortality)

Conditions:

- Change ways of management, breeding practices, limit free-grazing, gather in places.
- Take full use of manure for vegetables, wet rice fields
- Grow elephant grass in most suitable places
- Intensify veterinary and prevention activities (veterinary education, vaccination)
- More regular training, awareness campaign
- After cow breeding, prioritise local chicken and pig varieties: do not raise with industrial food, use rice bran and maize produced with huge amount on the spot. It is necessary to give value to the local existing breeds other than bringing in new breeds....

5.2.2. Breeding other speciality animals:

The survey, visits and interviews showed that some households kept special animals like rats, porcupine. This does not provide high income but it is less dependent on cultivation area and resettlement place.

5.2.3. Develop aquatic products keeping: fish in cages, or in nets

- Tradition in keeping fish in cages and some speciality fishes species in Ma river
- Mainly in branches of the water reservoir
- Full use of grass, bamboo leaves. Grow elephant grass in convenient places.
- Priority to speciality fish varieties such as *lang* fish, with high economic value.
- Keep seasonal fish in top of branches (with small dams and nets).
- Easier commercialization of aquatic products due to roads to Mai Chau, Hoa Binh
- Make fish cages with bamboo *luong* culms.

Conditions:

- Produce and raise fingerlings on the spot (in branches of lake)
- Simple prevention of diseases system (limestone).
- Need of practical training of households ready to keep fish seedlings
- Water level in new lake does not change, rise or neap too much

5.3. Grow bamboo luong forest, other forestry trees and related activities

5.3.1. Bamboo luong:

Bamboo *luong* is the most important forestry of the region (except for Western part of Muong Lat (Tam Chung)). There are much market potentials (diverse products), possibility of pre-processing and processing to increase added value in the spot. This species does not destroy soil and contribute to protect environment and keep water.

Necessity to plant more and in higher position (on mountain sides, above water flood level) to compensate part of lost land area, and to plant early to harvest a remarkable amount since 2013-2014.

In Tan Xuan and Trung Son communes, authority encourages immediate plantation with cassava in last year of upland field cycle. To take benefits from project 661 to plant some areas now, and more support when planting forestry trees in Muong Lat (+ 1 million/ ha).

However, there are some problems and potentials that should be dealt with :

- 1) Early land planning so that farmers can plant from 2009, to start harvesting in 2013
- 2) A remarkable area near the lake, which most convenient for development of *luong*
- 3) See ways to protect the remaining areas, near the existing villages, but far way from houses later (for villages having to move far).
- 4) Explain to farmers benefits and potentials of *luong*, if farmers want to replace with industrial crops such as *Cassia* (not sustainable wood tree), even short term crops.
- 5) Establishment of small businesses should be supported in pre-processing some products on the spot, which increases advantages of *luong* and encourages farmers to maintain areas and plant more *luong*.

5.3.2. Other forestry trees:

- Priority should be given to protection of watershed by long term forest trees.
- Apart from *luong*, some other middle term forest trees (6-12 years) should be supported and encouraged to limit the encroachment of maize and cassava. Two species are commonly mentioned by farmers: *xoan* (growing wildly), *lat* (new plantation). These two species give rather good wood, used to build normal houses, and can also be processed on the spot if there is electricity.
- We suggest intercropping with *luong*, which creates mutual support and limit soil erosion after cutting *xoan* or *lat*.
- Other crops are also recommended (Canarium, *sau*) if farmers see it suitable, but not *Cassia* which has low long term added value, causing soil erosion after cutting all; moreover nothing is clear about what can be planted after one cycle of acacia

5.3.3. Fruit trees (to replant current fruit trees, close to the resettlement places)

5.3.4. Bamboo species growing wildly

- Through survey in 5 communes and 10 villages and visits, there are many bamboo species growing wildly: *nua*, *vau*, bitter bamboo shoot, *buong*, *lung*, *le*...
- Currently, only *nua* and some *buong* are sold or used in the family: large part of area of other species is gradually destroyed or burnt to plant short term crops.
- Uncontrolled exploitation of *buong*, *nua*, *vau* shoots is seriously degrading this forest. Collecting these bamboo shoots now brings about considerable income for households.

- However, it is necessary to maintain these crops due to these reasons:
 - + They prevent erosion (compared to short term crops), limit flood in rainy season and drought in dry season, in the region of Trung Son dam in the future.
 - + They partially contribute to maintain diversification of ecosystem (compared to upland system and short term crops) and to protect some precious animals left.
 - + These species give lots of shoots, if they are exploited reasonably, they will provide remarkable nutrient and income for households in the region.
 - + They are potentials in handicraft, much clearer after connecting with market and benefiting of roads or waterway for easy commercialization.

5.3.5. Rattan:

- There is almost no rattan growing wildly, not to mention *song* species
- Places where farmers recommend and are willing to tend should be encouraged to plant due to these reasons:
 - Easy to transport the products when no road (by motorbikes and small boats).
 - Big market (price doubled in 1 year, Vietnam imports 80% from outside)
 - More potentials for handicraft in the future
- Needs external support and encourage, strict care and management of community.

5.4. Pre-processing and processing on the spot, handicraft

5.4.1. Pre-processing of *luong* on the spot

- Most of other communes of Quan Hoa district where there is electricity (15/18 communes) have *luong* pre-processing workshops to make flooring slats and chopsticks, as well as workshop near Co Luong T-junction producing blind sticks from *vau* bamboo. By-products are sold to paper mills at increasingly high price, and have potentials of producing charcoal, even activated carbon on the spot.
- In the plan, there will be electricity in 2009, at least in Thanh Son and Trung Son (to the dam base). We hope that, for many reasons, there will be further electricity supply in flooded villages of Trung Son and Tan Xuan.
- So, raw materials are now sold at unstable and limited price but now they may maintain part of their added value (easier for villages with direct roads).
- Pre-processing on the spot may bring about the following benefits:
 - Show potential importance of *luong*, thus encourage more intensive cultivation.
 - Creates jobs on the field; more necessary if cultivation area is limited and if one wants households to depend less on agriculture (over 80-90% at present).
 - Gets more income through selling and pre-processing of by-products
 - Creates synergy (mutual effect) with processing of *xoan*, *lat* wood, handicrafts; clearer in the future if there is more rattan on the spot.

5.4.2. Handicraft:

- Many bamboo species are growing naturally.
- Potential of many rattans for handicraft combining both, in the future.
- Products will be commercialized easier in the future
- Skills on the spot to promote country's or ethnic minorities cultural character
- Current products to expand production: weaving brocade, cushion, blanket, ... Obviously, external support is necessary to find suitable market, adapted to new demand of producers and consumers.

5.4.3. Producing agricultural products on the spot

If there is electricity, added value will be kept through pre-processing some agricultural products produced, with huge amount on the spot, or by power generator (more costly).

At present, we can use to produce enough for commune and village but it is not economic effective when sold to the outside:

- + Rice husking on the spot (very popular in villages now), cassava powder grinding
- + shelled maize can be sold at considerably higher price.

5.5. Other livelihood activities

5.5.1 Livelihoods from forest' vegetation or waste land

Collecting and managing to sell some vegetable products from forest or waste land, is now very popular. It creates considerable income for many households. We can name some examples (in the most popular), except for bamboo shoots listed above:

- + *Bong chit* (used to make brooms), bulbul (used to make pillows, mattresses)
- + *Day nhot* (in damp places, streams in forest)

5.5.2. Creating jobs through many different activities

To create jobs and new income sources on the spot, we suggest:

- Facilitate manual terraced field, where possible, to ensure quality and cash reinvested in production, with higher quality norm than using machines.
- Hire out motor boats for transporting goods, residents in the region or tourists
- Ecotourism is potential, with forest, streams, bamboo *luong* and other bamboo varieties, stilt houses, traditional occupations, small paths suitable for walking or bicycles (mainly for foreigners), if local population can keep the forest.
- Priority may be given to small branches of lake, so that it is easy to create an attractive tourism route. However, it needs initial external support.

Table 13 - Synthesis of farmers' expectations through survey (43 households)

| Area | Expanded | | Preserved | | Narrowed/no info | |
|----------------------|----------------|-------------|----------------|-------------|------------------|-------------|
| | No. households | % | No. households | % | No. households | % |
| Terraced fields | 36 | 83.7 | 0 | 0 | 7 | 16.2 |
| Bamboo <i>luong</i> | 23 | 53.5 | 14 | 32,5 | 6 | 13.9 |
| Maize (upland) | 23 | 53.5 | 15 | 34.8 | 5 | 11.6 |
| Upland rice | 5 | 11.6 | 22 | 51 | 16 | 37.2 |
| Cassava | 21 | 48.8 | 8 | 18.6 | 14 | 32.5 |
| Average ratio | | 50.2 | | 27.5 | | 22.3 |

Annexes, appendices:

1. List of households surveyed
2. List of officials providing information
3. List of households joining livelihood meeting
4. General synthesis
5. Synthesis table of 43 surveyed households' income
6. Synthesis table of net income of 32 households
7. Synthesis table of income in food