FEASIBILITY OF SMALL SCALE IRRIGATION WORLDS IN
SINH PHINH COMMUNES, TUA CHUA DISTRICT, LAI CHAU PROVINCE.

Consultancy Report No 5

by

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TABLE OF CONTENTS

Part I Report on the feasibility studies of small scale irrigation works of Sinh Phinh commune in Tua Chua district of Lai Chau province

1 Briefing of physical and socio-economic conditions of the Sinh Phinh commune
1.1 Location, topography, and river system
1.2 Population
1.3 Land and agriculture
   a Land

2 Irrigation works of the Sinh Phinh commune
   A Specific features of each work
      1 Hang De De dam
      2 C3 lake
      3 Hang Tau dam
      4 Vang Chua work
Part I: Report on the feasibility studies of small scale irrigation works of Sinh Phinh commune in Tua Chua district of Lai Chau province

1 Briefing of physical and socio-economic conditions of the Sinh Phinh commune

1.1. Location, topography, and river system

The Sinh Phinh commune is situated in the North of the Tua Chua district. It shares border with Ta Phinh commune in the North, Muong Bang commune in the South, Xa Nhe commune in the East and Trung Thu in
the West.

The commune is located in the mountainous area with the average altitude of 700 - 800 m. The lowest part is 280 m. This is a lime stone area with a lot of caves karsts.

In the commune there are two main river systems:

- The Nam Xeo which originates from Hang Do De and runs though Muong Bang with the length of 8 km.
- The Sinh Phinh (Ta La Cao) which starts from De De Hu, runs through Phi Dinh 1 and Phi Dinh 2 villages and then merges together and runs underground, appears again in Vang Chua and flows to Nam Muc river.

Thus there are narrow and small valleys located along those 2 streams.

1.2. Population

The population of the commune is entirely H’mong, totally 578 household with 4068 people.

The population of the commune lives in 12 different villages with Thon 1 and Thon 2 (626 and 504 persons respectively), which were the center of the district before 1984, as the most crowded villages. The least densely populated village is Phi Dinh 2 with 120 persons. (See table 1)

1.3. Land and agriculture

a. Land

Natural land size of the commune is 6608 ha, of which:

- Forestry land: 4577.8 ha (69.3%)  
- Agricultural land: 1937.5 ha (29.3%) including:
  - one crop paddy field: 86 ha  
  - permanent upland: 871 ha  
  - rotation upland: 599 ha  
  - cash crops: 242.1 ha  
- Other land: 93 ha

b. The total 86 ha of single crop paddy field in the commune is distributed scatterly along the 2 main streams. The productivity of the single crop paddy field is 2.3 tons/ha while that of upland rice is 1 ton/ha and maize 1 ton/ha.

According to the survey from extension center, income from agriculture (upland and paddy rice) accounts for 95.3% and that from forestry is 4.7%.

Remarks on natural and socio-economic conditions of Sinh Phinh commune:

- The commune is located totally in the upland area with the entire H’mong population. They live mainly on forest and extraction of forest products. The cultural living is still very low; thus more consideration is
needed. These are constraints to the dissemination of new techniques.

- Food mainly comes from upland cultivation (around 871 tons, including maize, rice, cassava), only 189 ton from paddy. Upland cultivation is taken place everywhere even on the land with the slope of 50 - 60 % instead of below 30%.

- Scattered settlement is the pattern of H'mong people. They live in the very remote parts in the forest area. Necessarily, they can protect forest if the land is allocated. However, it's not easy to control them if they themselves are not willing.

- Given by the existence of a very large area of bare land: 3486 ha (around 52.7% of the total land size and 76.1 % of the forestry land) and a very little forest coverage there is occurrence of water shortage in the dry season (as result of the absence of good water retention) and huge, sudden floods in the rainy season. In 1989 a huge flood occurred, swept way a lot of soil and stone and caused a great loss of nearly 30 ha of the agricultural land in the commune.

- The lowest temperature in the area goes down even to 5°. Due to the occurrence of lot of fog it's necessary to take into account the suitability of crops for better cropping seasonality and irrigation planning.

2 Irrigation works of the Sinh Phinh commune

There are 5 constructed irrigation works in Sinh Phinh commune:

1. Hang De De dam: 7 ha
2. C3 water reservoir : 20 - 30 ha
3. Dam Hang Tau: 30 ha
4. Dam Vang Chua: 30 ha (including opened land)

A Specific features of each work

1 Hang De De dam

- Made by stone: H = 1.5 m; B = 3 m
- Canal length: 750 - 800 m
- Designed irrigation area: 7 ha

Present state:

- **Water source**: In the Winter - Spring crop there is no water in the stream. In the Summer crop the available water is little due to the location of the dam near the watershed; the falling stone and soil have blocked part of water runoff into Hang de de.

- **Head Work**: The work was built long ago and is now filled with deposition, making the river bed in the upstream higher. The mouth of the dam has consequently been deposited. The water feeding possibility of canal is limited. In the other words, it can be said that the work is not operational any longer.

- **Canal and canal structures**: are completely broken. The possible reason is that the water feeding system at the head work is not working. This subsequently makes the canal and the canal structures not operational. Additionally, no maintenance of the canal has been made so far.

- **Irrigation area**: 7 ha is divided into 2 sub-areas, which, due to the unavailability of water only 1 crop
per year is possible. The width of the terrace is between 1.5 - 3 m.

2 C3 lake

The lake was designed to irrigate 20 -30 ha in Ta La Cao field. In 1989 due to a very huge flood the lake was broken. Presently, what can be seen is only the remaining of water feeder of the lake. The bed of the lake has been re-cultivated but the canal structures are completely broken. There is now a wooden made canal lying across the Hang De De stream.

3 Hang Tau dam

- The dam was built by stone (1980): \( H = 1.5 \) m; \( B = 5 \) m.
- Irrigation area: 30 ha
- The length of the canal: 3000 m.
  - **Water source:** The existing water source is 60 - 70 l/ s, sufficiently irrigatable to 25 - 30 ha. Due to low location and small water feeder very little water is fed into the canal. Water from Nam Xeo water source has also to be provided to Muong Bang field - the cradle of rice of the district.
  - **Head Work:** The dam was built in 1980 and there was too much deposition in the upper part. Presently, the height of the dam is too low to feed water to the canal. The mouth of the dam and the width of the canal are too small to get water to the canal. At present, water is only running in the first 500 m of the canal.
  - Present situation of the canal and works on it: the over 3000 m canal system runs along the hill side. Due to the absence of maintenance many parts of the canal have been broken. The upper part of the canal is too small to get the sufficient amount of water. There is no work available on the canal. This is the cause of erosion in some parts due to water rushing down from the mountain. In the upper part of the canal due to the use of water to run small hydro-electric generators by the local population that there is a water shortage to feed into the canal.
  - The irrigation area is 30 ha, mainly consisting of terrace field possible for only single cropping. Some time even in the rainy season there is a water shortage due to the broken system.

4 Vang Chua work

- Work at water source: The sides' wall of the canal faces toward the water flow and the mouth of the dam are made of stones.
- Irrigation area: 30 ha of rice of two crop / year.
- Length of the canal: 1800 m
- Works on the canal: 2
  - **Water source:** The water source at Ta La Cao river is estimated at 0.3 - 0.4 cb.m / s. Due to inappropriate work at the head work the water cannot be fed into the system.
  - **Head Work:** Improvement was made in 1991. Presently, it is still in a good shape but is not feeding water. The water level is lower than the mouth of the dam. The reason could be un-precise definition of water level in the dry season. Given by the existing situation it can be deduced that even in the rainy season, when there is no flood occurring, the possibility of feeding water to the work with the average water level of the head work is too limited to meet the capacity of the canal.
  - **Canal and canal structures:** The approximate 1800m canal system is still relatively stable, the
The number of works on the canal is not sufficient to meet the requirement of the area.

- **Irrigation area:** covers 30 ha of land located close to the irrigation canal. Due to the fact that the canal has not been operational for the last 3 years, the terrace field has been converted into upland field for maize and cassava. There remain now only 7 - 10 ha of land possible for the single crop paddy cultivation. Irrigation to this area is unstable and has to come from different sources.

5 Drink water Work in Thon 2.

A very small dam has been built to store water. The work, which was located too close to the ground, does not meet the hygiene requirement. There's no water pipe available. Drinking water provided for the area is coming from many different sources.

B Remarks on the irrigation works of the Sinh Phinh commune

1 Water source:

Two out of five irrigation works have access to water source in dry season, of which the Vang Chua is able to irrigate up to 100 ha, much bigger than the demand. The Hang Tau work - which is fed by the Nam xo water source - is able to irrigate 30 ha in case it has full access to the available water. However, the Nam xo source has to provide water to Muong Bang field as well.

Thus, with the exception of the Vang Chua part, the whole area will have to face the water shortage during the Winter-Spring crop if the Winter crop is promoted. Presently the water source is able to irrigate 40 - 50% total area of the commune.

2 The quality of the work at the water source

Out of the 5 a.m works:

- The C3 lake was completely broken in 1989.
- 2 works (Hang De De and Hang Tau) have been seriously broken. The top of the dam is of the same height or a little bit higher (10 cm) than the bottom of the drainage.
- 1 temporary dam (De Bau) made of stones.
- 1 existing irrigation work which is still in good shape does not work due to the higher location of the mouth of the dam compared to the existing water level.

Thus in addition to the fact that the available water is only sufficient for 50% of the area it is due to either degraded head work or inappropriate design that out of the 5 there is only 1 work operational and the water feeding capacity of which (Hang Tau) is reduced to 10% of the design.

Given by the fact that all these 5 works were made by the farmers with material and techniques provided by the state the quality of both implementation and techniques of those works is very bad.

3 Canals and canal structures

Most of the canal systems are broken and the bed is covered with grass and bushes. This weakens the water carrying capacity of the canals, leading to a great loss of water.

The design is not suitable to the works on the canal and the measures to protect canals from soil erosion and
deposition.

4 Irrigation and works management

The present situation shows the irrigation works have not been regularly protected and managed. Most of the works of the commune are managed by the so called management boards. Each village has appointed 1 person responsible for the monitoring of the work, which, however, has not been very well performed so far.

There is no village organization involved in the operation and maintenance of the works. The farmers consider the destruction of the canals is a usual thing and accept it.

C. Cause of those constraints

- The main cause for the absence of water sources is forest destruction. This is a prevailing cause throughout anywhere. With the reduction of water during the dry season, the forest destruction for cultivation in the very steep land or in the rocky hills covered by a very thin layer is the major cause to the occurrence of sudden floods that sweep away a lot of soil and stones. As the consequence 40 ha of cultivation land in Sinh Phinh commune are reportedly lost in 1989.

- The survey, design and implementation of those works have not been well performed, particularly the Vang Chua one (despite of the rich water source it is not possible to feed water into the canal system). It is, at the same time, observed that there is a lack of synchronization in the designing process (attention has only been given to the head work at water source rather than to the works on the canals.)

- There is a lack in the management of operation, maintenance and utilization of the works. No management organization at village level is existing or, if it is, no activity has been observed so far.

- The number of district staff is not sufficient enough to monitor the works though they are technically qualified. The reason for this is the far and uncentrated location of the works in reality.

- The irrigation technicians lack expedient equipment to design the works within their scope of capability (measuring machines). The district technicians pay rather more attention to the administrative management side of the work than to the irrigation systems management techniques.

- One issue to be addressed is the understanding, traditions and awareness of the local population (who entirely are the H'mong) which is too far important to be forgotten during the development and management of the irrigation and drink water systems.

III Direction for irrigation development of the commune.

3.1 Direction for irrigation planning of Sinh Phinh commune - Tua Chua district

- Period 1996 - 2000

- in 1999 improvement of the Hang De De work is made to irrigate 3 ha of Winter-Spring crop and 30 ha of Summer crop, the total estimated cost is 400 million VND.

- in 1996 the Vang Chua drink water system is built to provide access to water to 250 persons. The estimated cost is 250 million VND.

- Additionally, there is a hydro power project on Ta La Cao stream currently under consideration by the Japanese Government to set up a feasibility study for assistance.

3.2 Recommended priority list for upgradation and improvement of the existing irrigation works in Sinh Phinh
This part deals only with the improvement of the existing irrigation works rather than with the hydro power project on the Ta La Cao stream.

The following criteria are to be considered during the selection of the works:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water available in the dry season</td>
<td>2</td>
</tr>
<tr>
<td>2 paddy crops per year.</td>
<td>2</td>
</tr>
<tr>
<td>Shorter than 1.5 km canal system</td>
<td>1</td>
</tr>
<tr>
<td>Permanent or temporary work</td>
<td>1</td>
</tr>
<tr>
<td>Non complicated technical specification</td>
<td>1</td>
</tr>
<tr>
<td>Over 10 ha irrigation area</td>
<td>1</td>
</tr>
<tr>
<td>Use of locally available material</td>
<td>1</td>
</tr>
<tr>
<td>Convenience for management</td>
<td>1</td>
</tr>
<tr>
<td>Favourable implementation conditions</td>
<td>1</td>
</tr>
</tbody>
</table>

The following table is set up based on the a.m criteria:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Hang De De</th>
<th>C3</th>
<th>De Bau</th>
<th>Hang Tau</th>
<th>Vang Chua</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Water source</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2. 2 paddy crops</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3. Canal system</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4. Permanent work</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5. Tech. specification</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6. Over 10 ha irrig. area</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7. Material</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>8. Management</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>9. Implementation</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total points</strong></td>
<td><strong>6</strong></td>
<td><strong>4</strong></td>
<td><strong>5</strong></td>
<td><strong>7</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

From the table the following priority list is proposed:

1. Vang Chua
2. Hang Tau
3. Hang De De
4. De Bau
5. C3.

3.3. Notes

- The De Bau water source, which is located right on the bottom of the stream, may be flooded in the rainy season. What is needed is only to put rock into big iron baskets and put them around the water source up to the average height of 1.35 m. Investment fund is around 5 - 7 million VND, in some localities available fund for small scale irrigation systems can be used.

- The Hang Tau irrigation work is now fed by the water from the Nam xeo stream. On studying the improvement option consideration should be given to the balance of water sources to make sure that the Muong bang paddy field located in the lower part is as well accessible to water.

- For the Vang Chua work survey should be taken regarding the water elevation in the dry season, the height of the canal sides and the water feeder of the dam.

- The C3 lake: no stream is found in the area. Previously the lake was built to store rain water to provide water for the Summer crop and for drink. The making of lake should be carefully studied with respect to both economic and technical aspects.

IV Draft proposal and estimated cost for improvement of the works

4.1 Improvement of the Vang Chua irrigation system

Duty of the work:

- To irrigate 30 ha and
- To provide water to Dai Sinh

Proposal:

At present the water cannot be fed into the canal system, therefore, the improvement aims to:

- higher the water elevation in front of the dam to feed into the canal, in line with the designed water elevation and calculated water flow.

There are 2 two options:

- Option 1: To build dam by stone on the main stream and to make the water directing wall higher than the water feeder.

- Option 2: To build a direct water pipe from the upstream through a canal to the mouth of the dam.

- improve the canal structures and the irrigation system, including:

- build new structures in the necessary places : 3 works

- repair and dredge the bed of the canal.

Steps to be taken:

Following steps are to be taken for the improvement of the Vang Chua work:
• Initial surveying and selection of option. This activity is to be done in the dry season, before May 1996.

• Designing implement techniques with respect to the selected option.

• Implementing in the dry season of 1996 - 1997 (11/96 - 5/97)

**Estimated cost:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reparation at the head work</td>
<td>160 million VND</td>
</tr>
<tr>
<td>Canal structures</td>
<td>60 million</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>220 million</strong></td>
</tr>
</tbody>
</table>

**Feasibility of the work:**

- At present, the work is not operational. No area for Winter-Spring crop is available and very little for the Summer crop due to limited access to water.

- With the investment fund of 220 million VND the work can cover 30 ha, about 7 million of investment per hectare.

- As mentioned above the management to ensure the sustainability of the work is very weak. Therefore, the improvement issue is only addressed as long as the management factors are formed.

### 4.2. Improvement of the Hang Tau work

**The duty of the work:**

The Nam Xeo stream provides water to Hang Tau and Muong bang paddy field. Consequently, following issues are to be taken into consideration when addressing the duty of the work:

- The existing area of the Hang Tau and Muong bang paddy field.

- The water balance in the dry season to define the capacity of Nam xeo stream.

- Analysis and definition of the possible irrigation area of the Hang Tau and Muong bang.

**Contents of the improvement:**

- To improve the head work, including stone drainage. H is 2 m. L - 8 m (see the attached picture).

- To improve canal structures and the canal system, totaling 5 works

**Estimated cost:**

- Head work: = 60 million

- Canal structures = 35

- Total = 95 million

### 4.3. Improvement of the Hang De De work
Duty of the work:

to irrigate 7 ha of 2 crop paddy field.

Contents:

- to improve the headwork and the mouth of the dam + to build a dam with:
  - $H = 1.5m.$
  - $L = 5$ m.
- canal structure: 1

Estimated cost:

- Head work: 35 million
- Canal structures: 7 million
- Total: 42 million

4.4. Improvement of the De Bau work

Duty of the work:

to irrigate 5 - 7 ha of 2 crop paddy field.

Contents:

- to put iron baskets around the water source with the length of 35 m and average height of 1 m.
- to improve the up part of the canal.

Estimated cost: 10 million.

Sustainability of the work:

Due to the location of the water source in the bed of the stream it is flooded in the rainy season. When the water flow changes the stone and soils are swept away. Therefore, the work is for temporary use of 3 - 5 years.

Part 2: Some ideas about irrigation in the framework of the SFDP Song Da.

I Natural relationship between water sources & conditions of watershed - forest

1.1. Meteorological calculation to serve the irrigation development purpose is an indispensable factor which is decisive to the security of the work as well as to the amount of water available for the system.

The changes of the current depend on:

- The characteristics of the watershed
The absorbability characteristics of the watershed

Among the factors that characterize the above mentioned characteristics the surface of the area is decisive to the water elevation (high or low) and to the main current (in dry season). The surface of the area is dependent on the landuse capability and knowledge and the existing forest situation. In the watershed with low forest cover and unsuitable landuse flood has higher possibility of occurrence and with higher water elevation. The reducing water absorbability causes the amount of water in the dry season lower comparatively to the other areas with similar conditions but higher forest cover.

1.2. In the recent years the reducing forest coverage, unsuitable land use, increasing soil erosion have been the contributing factors to the occurrence of huge floods carrying away a lots of soil and rocks. This happened in Tua Chua and Dien Bien in 1989 -1990 and in Son La in 1991. Deposition found in the irrigation works has shortened their life span.

1.3. The increasing demand for food requires increase of crop, area and production of paddy rice. But no water is available for increase of crop (Winter crop) and the higher rice productivity requires an adequate provision of water on need, this consequently requires a stable water source with a good irrigation system. As the consequence, farmers finally have to clear forest to cultivate. Forest clearance for cultivation leads to flood, and then water shortages. The loop is repeated again and again, each time worse than the previous. The results of that is increasing poverty and reducing education. The socio-economic development targets are influenced by those vicious cycles.

1.4. The question given is how to solve the irrigation problems in the scope of the SFDP Song Da when the intervention to that vicious cycle starts from land allocation, effective land use, in the other words is to start from the forest.

II Looking for answers from the field study of the small scale irrigation works

2.1. Characteristics of the irrigation works

On the basis of the field studies conducted in the Chieng dong commune (YenChau - Son La) and Chieng Sinh (Sinh Phinh?) commune in Tua Chua - Lai Chau the followings are found:

General characteristics:

- The watershed river system is mostly dry at the time of the survey (January and February 1996), even no water runoff is found. Water shortage for Winter-Spring crop is found in 2 communes where the available water is enough to irrigate only 20 - 30 % of the total area.

- Most of the work are temporary or semi-permanent: In Chieng dong commune 100 % of the works are temporary, and 20% in Chieng Sinh. The others were built in a bad technical and quality conditions.

- The works are rapidly degraded due to bad initial technical conditions and natural impact as well as a bad maintenance and management.

- The canals are broken, and deposited. The number of canal structures is not sufficient.

- The irrigation area is small and mostly for one crop per year. The area of two crop paddy field is very limited due to water shortage. The areas possible to cultivate paddy have been already in use.

- The irrigation management units at village level are not existing or not strong enough to perform an effective management, operation, maintenance and utilization of the irrigation system. Farmers are not organized and lack a minimum knowledge of irrigation system management.

- The size of a commune in the mountainous area is relatively large and the irrigation areas are unconcentrated and far from the district town. The number of irrigation staff is not sufficient or the staff themselves has no means to manage the works. In those 2 communes of 2 districts all the
management activities are under the responsibility of the commune or villages.

- One common problem is that more attention is given to the construction of the work itself rather than to the management. The understanding of irrigation system management is not clear for both technicians and the leadership.

- The water sources are diminishing, the possible area have been opened. Thus, the investment to new irrigation scheme for newly opened areas or for multi cropping is very high. The cost for one permanent dam in Yen Chau is about 35 - 40 million VND and in Tua Chua a 45 - 50 million VND investment per hectare is required for the construction of reservoir.

**Distinctive characteristics of 2 districts:**

- The works in Sinh Phinh have larger irrigation area so the head - work is more solid. This is due to the topographical conditions of each area.

- In Sinh Phinh 100% of the population are the H’mong while in Chieng Dong 96.25% are Thai, 3.6 % H’mong and 1.2 % are the Kinh. The Thai have better knowledge and organization ability compared to the H’mong and the Thai live more in groups.

### 2.2. Comments

- Irrigation system is found in most of the irrigated rice fields(be it permanent or non permanent). Therefore, construction of new work to expand the cultivation area is not possible. What can be done with respect to the irrigation systems is to improve and reinforce the existing works. For Chieng dong commune, reinforcement means to combine those works. However, this is not an easy work due to the dissected topography and stability of the river system. This is also the reason of the existence of the temporary dams in Chieng Dong.

- The situation of the existing work shows the weakness of the management and utilization of both irrigation organization and water users. This is a common situation in the mountainous provinces.

- Due to the characteristics of the mountainous area and insufficient number of staff the management of the works have been assigned to the village and commune. It is difficult to overcome the situation that becomes even worse. In some mountainous provinces the management of the works has been assigned to the local authority. The handing-over of the technical work from the technician with scientific and technical knowledge to the people without scientific and technical knowledge can easily be a failure if it is not very well prepared (isn’t the irrigation work in Sinh Phinh commune of Tua Chua district an example ?)

- The participation of the farmers of the two communes in the management of the irrigation works is of different degrees due to the difference of ethnicity, customs and natural conditions. However, it is necessary to motivate them to participate in the management and utilization of those works. After the construction whether the works can be in its full effect or not depends very much on its users: the water users.

- The weakness in technical aspect as well as in work management in some places shows that training in some basic techniques of management and utilization of the irrigation scheme need to be provided. And the local people should be provided with the minimum means that enable them to implement the simple works without waiting for assistance from the province or government.

### 2.3. Try to give an answer instead of a conclusion

Only with the studies of 2 communes in 2 districts it is not convincing enough to give an answer to such a large area. However, with the limited experience from the other provinces after a long time dealing with irrigation activities in the mountainous areas the following answers are suggested: Irrigation development in the mountainous area as well as in these two districts in the framework of the SFDP Song Da need to start
with the management activities. The need for improvement of the irrigation works in those 2 communes is high. If investment is made to improve in each commune one work it can only solve the problems of a few number of population in a small area of the commune. Improvement of the works is necessary but management and maintenance are not only necessary but also urgent. In case investment for improvement in the two communes is available the management issue should be dealt with first.

III Proposed solutions rather than the answer

3.1. Methodologies of management and use of the works

In order to implement the management and use of the works in the scope of the project we need to carry the 3 following steps:

First phase

Supplementary data collection in Son La and Lai Chau provinces

- Objectives.
  - to be clear of seriousness and popularity of the present situation of irrigation management and maintenance.
  - to make influence to the people working in the field of irrigation work management and policy making.
- Contents (a detailed outline is necessary)
  - to collect data from Irrigation Department concerning the 2 irrigation works.
  - to choose in each province 1 work that covers 100 ha or more and another of 30 ha.
  - to choose the work for analysis and evaluation for the next phase.
- Duration: 30 men days. Should be ready before 7 / 1996

Second phase: training.

- Objectives:
  - To provide training in assessment techniques of irrigation work and in its management
  - To provide basic knowledge and methodologies to organize the association of water users at village level.
- Contents:
  - Select people for training
  - Training place
  - Methodologies of systematic assessment.
  - Venue for water conservation.
  - Technical issues
  - Content and concepts of the water users' association.
- Time and ways of organization
- A training course for both provinces: 4 days (at any time in 1996)
- An in-depth training course for technicians (including practices and evaluation): 1 week, either the end of November or beginning of December.

**Third phase**: Organization of the water users association at village level.

- Objectives: To set up water users association for the selected systems

- Contents:
  - Discuss with farmers
  - Organize the water users association
  - Give guidance to the irrigation management activity
  - Evaluate the activities of the association.

- Duration: dry season 1996 - 1997

### 3.2. Improvement and upgradation of the works

- The improvement and upgradation of the works are to be done accordingly to the second and the third phase of the training and organization of the water users association. During the evaluation of the selected works the technicians will propose the design and options for improvement. There should be the involvement of farmers from the water users association in the evaluation as well as proposal for improvement options.

- The district irrigation technicians are technically qualified enough to examine and to make the improvement design of the works in Sinh Phinh commune as well as of the similar works. They need to be supported with the technical tools in order to implement the work.