General Farming Systems Development Strategies

Consultancy Report No 8

by

Dr. J.H.D. Ludwig

Ha Noi
February 1997

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1 Introduction

The change of project executing agencies is normally accompanied by a reconsideration of project implementation concepts, activities and expected outputs. In the case of the "Social Forestry Development Project Song Da" (SFDP) the shift from the Forest Inventory and Planning Institute via the Ministry of Forestry to the Ministry of Agriculture and Rural Development (MARD) requires such an overdue reconsideration of project implementation priorities.

The main objectives of the consultant's short term expertise are to emphasize the relative importance of the agricultural sector within the context of Social Forestry Development by appraising the present types of farming systems, identifying constraints and identifying Farm System Development (FSD) strategies and project interventions (see Annex 1).

The overall project objectives aim at the improvement of the living conditions of the local population (mainly small-scale farmers) by applying ecologically and economically sustainable land use systems. The definition of land use differentiates between bare land with rocks or shrubs, forest land, agricultural land (land under crops, pastures, aquaculture and home/farm gardens), residential land and other land (e.g. transport, waterways, etc.). Therefore it is understood that the immediate project objectives (purpose) should not only concentrate on the implementation of social forestry development plans (see PPM in Lit. 6) but should also consider farming system development (see also Chart 2). In this context, it is recommended that the terminology of "land use systems" should in future be restricted to the above mentioned definition and should not be used for "farming systems" (see Lit. 2).

The discussion with the Vice-chairman of the District People's Committees in Tua Chua and Yen Chau (see Annex 2) and the Project Director in the Forestry Development Department of MARD resulted in the distinct understanding of the relative importance of FSD strategies within the context of SFDP. This change of mind within the project history is in conformity with the experience of UNDP/FAO projects in Vietnam (see Lit. 46). The planning and activities involved in smallholder social/ community Forestry Projects are markedly different from those of public-sector forest plantation projects. To the small-holder farmers, land-tenure rights and technical assistance are not by themselves sufficient to prompt investment of time and resources into forest activities.

Apart from undue logging in the past decades in Vietnam, the main cause of limited deforestation and forest degradation over generations through the ethnic mountain communities remains chronic rural poverty. Small-holder farmers may wish to protect their environment and agricultural land from over-exploitation, but their immediate needs to subsist and survive (food, water, fuel, shelter, health and education) take precedence. A poor farmer struggling to meet the subsistence needs of his family does not care about reforestation as long as he cannot meet his basic needs. Forestry development will not succeed in isolation and must therefore be seen as a component of a broader rural poverty mitigation strategy, considering FSD as an indispensable development tool.

Since it had been mentioned in the project offer of the funding agency that the target beneficiaries in the project area belong to the "poorest strata of the rural society" with an estimated yearly income of 50 to 90 US Dollars per person (see Lit. 6) the danger of the past project approach is that the poorest people are exactly those who have least capacity to participate in reforestation due to lack of land, food, labour, motivation, education, etc. In order to secure the success of the project, extension services, technical support, research and training have to be applied in the farming sector to increase the financial benefits of the small-holder household, since large doses of credits, incentives and subsidies are not available.

An extensive list of documents has been annexed to this report (see Annex 3, Lit. 23-85) reflecting project solutions experienced in Vietnam and in the context of upland farming systems in Asia.

2 Rapid Appraisal of Farming Patterns

In accordance with the terms of reference, rapid appraisals of farming patterns through household interviews were carried out in selected villages of Tua Chua District (Lai Chau Province) and Yen Chau District (Son La
Province). The results are described in the following chapter.

2.1 Household Interview Results in the Tua Chua District

As listed in table 1, two household interviews in each of the five villages of Singh Phinh Commune have been carried out covering socio-economic, land tenure, cultivation, cropping, animal husbandry, aquacultural, agroforestry and market-related subjects. Constraints mentioned by the interviewed persons and suggestions for improvements are discussed in chapter 3 of this report.

2.1.1 Socio-economic Situation

All ten households interviewed are classified as ethnic H'Mongs, a minority population which immigrated from Southern China to the higher and more isolated micro-watersheds of the northern watershed system of Vietnam some 300 years ago. Given that they represent a larger ethnic group and due to their isolated settlement patterns, the H'Mongs have conserved most of their cultural and agricultural traditions. Before they migrated from China they seem to have practised paddy cultivation which explains the art of terracing to be observed in above area.

The socio-economic situation of the H'Mong settlements is strongly influenced by the specific geographical features of this area. Located in a strongly dissected Karst terrain on 700 to 1,800 m altitude with rolling hill landscape, steep sloping (partly with a gradient of more than 40 %) and valley bottoms in micro-watershed areas, the climatic conditions characterised by low temperatures during the dry season (October to March) with occasional frost and rainfall mainly in two peak months in the rainy season with a total average of about 2,000 mm/year are not very favourable for rainfed upland and permanent irrigation farming.

With an average household size of 9.7 persons, the population growth-rate of the H'Mong is very high and the majority of the households interviewed had between 8 to 18 household-members. The number of the agricultural labour force is with approximately 3-4 persons comparatively low and "hidden" labour shortage for cultivation work is obvious. Division of specific work-loads between male and female household-members is practised, even with respect to children.

Educational standards are very low. Nearly all adult females are illiterate and only approx. 50% of the men can read and write. Due to lack of schooling facilities, only a very limited number of children, mainly boys, enjoy 1-2 years schooling. In locations closer to the commune school premises, school attending-rates are slightly higher.

2.1.2 Land Tenure

The majority of the households confirmed that they have inherited the paddy land from their forefathers which indicates a well established sedentary way of life and contradicts the common belief that the H'Mong are almost nomadic people practising swidden or shifting cultivation. In the process of land use reallocation, the individual plots of paddy land have been registered under private ownership rights over the past years, even if the official "Red Book Certificates" have not been handed out yet. Similar rights are established for the upland rainfed plots, which were partly cultivated some decades ago. Other resources which households claim to be privately owned are garden, fishpond and housing areas, individual trees, mainly on field boundaries, and especially Khiet trees for lacquer production.

2.1.3 Cultivation and Cropping Activities

The shifting cultivation practices, the H'Mong have been well known for, were not observed anymore in the area under study. The backbone of the food-economy is terraced rice cultivation in river- and riverlet-beds either under semi-permanent irrigation or rainfed conditions. Only one rice crop per year is cultivated on paddy land. For some years, the cultivation of a second crop (maize and/or interplanted maize plus beans, peas or pumpkins) has been introduced by 4 interviewed households supported by SFDP recommendations.

Rainfed upland cultivation with the main crops being maize and upland rice is practised with considerable knowledge about the different soil qualities. Intercropping and crop rotation of maize with beans in several years allows only occasional short fallow periods of 1-2 years, if at all. Hedgerow cultivation has been reported by some farmers, introduced in 1995, possibly supported by SFDP recommendations, but the acceptance by the households interviewed is questionable. A general yield reduction of 5-30% per year was
reported which is due to soil degradation and erosion, plant pests and climatic calamities. The possibility of slope terracing is recognised with a labour-input of 10 days for 0.5 ha terraced land of 10m width.

Extensive home gardens surround the homesteads where sugar cane, bananas and vegetables supplemented by tree-crops like plums, pears and paw paw are cultivated. One farmer cultivates a farm garden next to his upland plot with rape seed, another farmer will start cultivating 2 ha of tea on contoured upland slopes. Only 2 farms reported to raise fish crops in fishponds.

The total cultivated area per household varies between 0.9 ha and 6.5 ha, which results in an area of 0.08 ha to 0.71 ha available for one person. Only just over 10% of the cultivated land are paddy plots. One household, representing about 20% of the H'Mong smallholder farms in the commune, has no paddy land and livestock at all. The size of the paddy land ranges from 0.1 ha to 0.5, ha divided into 1 to 13 plots. The individual availability of paddy land per person is calculated between 0.01 ha and 0.07 ha. The upland plot resources are more extensive. Each farm household reported to cultivate between 2 to 8 plots of a size of 0.6 ha to 6.0 ha. Calculated on an individual basis, the upland cultivation varies between 0.06 ha and 0.64 ha per person.

The walking distances to the paddy and upland plots require a considerable amount of time spent (see Map 1). The average distance between the farm and the paddy plots were reported to be 5 to 75 minutes, to the upland plots between 10 and 120 minutes. In addition, water has very often to be obtained from sources located at considerable walking distances and the same applies to herding and fodder collection.

2.1.4 Animal Husbandry

For the H'Mongs' mixed permanent farming system, livestock traditionally plays an important role. Horses, buffaloes and cows are mainly raised as draft animals and pigs, chicken and ducks are reared for home consumption and cash income. Each farm household interviewed keeps between 3.8 and 14.3 livestock units, on average nearly ten, which adds up to 1.38 LTU per person with the exception of one smallholder rain fed farmer without any livestock (see Table 1). Within the large animal units, buffaloes and horses have the highest count.

In the dry season (November to April), fodder and grazing areas are paddy and rice/maize upland plots. During the rainy season (April to August) when paddy and upland plots are cultivated, fallow land and shrub/bush land on slopes are used for grazing. Small herds of 3 to 5 buffaloes, cows or horses are guarded by children or elderly persons during the cultivation period. In the dry season, free grazing is practised and animals are grazing freely throughout valleys and slopes for several days or weeks. On steep slopes, soil erosion-paths originating from animal grazing ("Viehgangeln") can be observed.

Livestock stabling is limited to horses and poultry. Some farmers keep pigstays. Buffaloes and cows are normally kept in open space under the barn structure or the large houses of the H'Mong. Manure stacks were generally not observed, with one exception, where, due to the assistance of the project, one trial farmer started to design such a structure.

Fodder is supplied as straw collected from paddy and upland rice plots and stored in small barns, and as grass freshly cut during land preparation. Small plots of grass cultivation in home gardens were observed on 2 interviewed farm household premises, obviously for horse feeding. Grass collection for horse stable feeding is very labour intensive, especially during the dry season when it takes hours to cut grass sufficient for one day's feeding and just fitting on a single packload.

Pigs are fed daily with maize, cassava, green feeds, fruit stems and soft tree-leaves collected from forest-, fallow- or boundary-land plots. Chicken food is mainly supplied freely since they are roaming round off the farm compound all day long.

Since indoor stock keeping is limited and proper manure pits hardly exist, fertilizer cultivated plots with manure are limited. If available, manure is only applied to paddy plots and not at all to upland rice or maize plots. Some of the trial farmers reported the use of chemical fertilizer on paddy plots.

2.1.5 Market Involvement

All interviewed smallholder farm households operate on a subsistence basis. After securing the subsistence requirements with staple food (crops and livestock products) some marketable surpluses are sold (see Table 1). Since food shortage (which actually means rice shortage) was reported by most of the households for 1 to 2 months in two years within the period of ten years, interview results confirm that with the exception of one
farm household no cereals were sold at all. Even farmers who normally sell rice suffer from shortages but use cash from livestock commodity-sales to buy it during the period of shortages at a later stage. The sale of beans normally concerns the surplus quantities of yields obtained from the second crop on paddy plots.

The most important source of cash income is animal husbandry. 70% of interviewed households sell chicken for a farmgate price of 17,000 to 20,000 Dong/kg, and 60% sell pigs or pork meat for a farmgate price of 10,000 to 12,000 Dong/kg. One farmer reported the regular sale of cows at a price between 0.7 and 1.5 million Dong, depending on weight and age. Fruits and vegetables from home gardens are normally part of the subsistence food. Only one household reported the sale of bananas for 10,000 Dong. The same applies to fish consumption of the two farmers who practise fish farming.

Sales of off-farm activity commodities contribute only marginally to the farm household income. Most of the households collect forest products like tubers for medical purposes, orchid flowers and mushrooms during the process of fuel-wood cutting. One farmer reported the sale of 700 kg of tubers at an individual farmgate price of 400 Dong/kg.

Marketing of the commodities is mainly oriented towards small village markets (if they exist) and by-passing traders. Since the distance to Tua Chua Market is on average 2-3 hours walking effort, only rare market visits were reported.

2.2 Household Interview Results in the Yen Chau District

As listed in Table 2, a total of ten household interviews has been carried out in three villages in the Commune of Chieng Dong, covering socio-economic, land tenure, cultivation, cropping, animal husbandry, aquacultural, agroforestry and market related subjects. Constraints mentioned by the interviewed persons and suggestions for improvement are discussed in chapter 3 of this report.

2.2.1 Socio-economic Situation

All ten households interviewed belong to the large ethnic group of the Thai who have migrated to the north-west of Vietnam some 700 to 800 years ago. They live in clearly demarcated villages and their large wooden houses are located closely to each other, thus leaving little space for home gardens. The backbone of smallholder mixed permanent farming is traditional paddy cultivation in fertile valley bottoms.

Contrary to the Tua Chua District, the geographical features of the villages observed (located between 300 and 600 m altitude) are better suited for upland slope cultivation with less steep slopes (a gradient of less than 25 %). Almost all villages located at this relatively low altitude are affected by dry and hot weather two months before and after the rainy season which brings less than 1000 mm on average during the peak months June and July.

The average household size of 6.7 persons of the interviewed households is much lower than in Tua Chua District and the number of household members varies between 3 and 13 persons. The number of the agricultural labour force per household lies with 3 to 4 persons even lower than in Tua Chua and creates distinct labour shortages during peak cultivation periods. The division of specific work-loads between males and females is similar to the habits of the H'Mong.

Due to better developed infrastructure, the closer location to urban centres and longer historical settlement tradition, the educational standard of the Thai is fairly high. Most of the children in the households interviewed attend schools since most of the villages can afford local schools and teachers. Illiterates were hardly observed with the household-heads interviewed and even some of the female adults are able to read and write.

2.2.2 Land Tenure

The land tenure situation with the Thais is similar to the H'Mong tenure system. Most of the paddy land has been inherited by the forefathers which might be traced back up to 6 generations. Upland plots were cleared over the past 30 to 40 years and claimed as privately owned.

In connection with the land use allocation in the past years, land re-allocation according to the new land law was carried out and criteria for the size of land for home construction, home garden size and size of irrigated
and upland plots applied. Many households lost paddy land, since the entitlement was calculated according to the number of household members resp. available labour force. It is obvious that the pressure on land resources became very high, at least in the households which were interviewed. In contrast to the households in Tua Chua, most of the Thai farms already obtained "Red Book Certificates" which guarantee certain user rights over 15-20 years by law.

2.2.3 Cultivation and Cropping Activities

The backbone of the Thai's smallholder permanent farming is paddy cultivation which has been developed along the rivers in flat or terraced plots since there is a large potential for further paddy area development. Therefore, all households interviewed reported to cultivate two types of paddy plots, one type of plot with two rice harvests and the remaining plots with one rice harvest (see Table 2). On the latter plots, a another second crop is sometimes cultivated (vegetables, beans, etc.). With an average of only 0.12 ha per household, the share of single crop paddy fields is normally larger. Generally, the size of irrigated plots lies between 0.02 ha and 0.10 ha per household, split into 1 to 8 plots. The total paddy land available per person ranges from 0.01 ha to 0.03 ha in the households interviewed. Some farmers mentioned poor maintenance of the irrigation system, mainly due to lack of proper technologies and labour input.

Due to population pressure, rainfed upland cultivation has increasingly been introduced. An average farm household cultivates between 0.5 ha and 2.4 ha on 1 to 8 plots on slopes which are very steep (a gradient between 30 to 40 %) without terracing and fallow periods. Intercropping and single cropping is practised in a cycle including maize, cassava and upland rice crops. Occasionally, manure is applied to the upland plots which reportedly only show little soil degradation. Yields are more or less constant over the years. Most of the households cultivate between 0.1 ha and 0.3 ha of upland crops.

A special type of cultivated land, namely vegetable plots, has been observed in three households interviewed which are located between home gardens and paddy land. These plots are irrigated if needed. Apart from vegetables, rape seed is also cultivated on land of a size between 0.01 ha and 0.03 ha per household.

Small home gardens are typical of the Thai homestead. Traditionally, fruit trees are planted, especially mangoes, longan, tamarind, apricot, apples, lychees, grapefruits, guava and sometimes timber trees. The steep decline of mango production over the past years is not only caused by pests and climatic irregularities but also by overaged stock. Coffee could also be observed in small quantities.

Finally, 50% of all households interviewed practise fish farming in fishponds from 300 qm up to 1,000 qm in size. Some of these ponds are located closer to the uplands plots, most of them close to the irrigated rice land.

With 10 to 30 minutes, the walking distances to the paddy plots are shorter than in Tua Chua (see map 2), to the upland plots with up to 80 minutes, however, still too far away for the limited labour force available.

2.2.4 Animal Husbandry

Thai households are characterised by a low number of buffaloes with 1-3 animals per household. Only 4 of the households interviewed had 2-3 cows. Horses were only observed in one household and they were only kept during the cultivation period for transport purposes and sold afterwards. Pigs and small livestock generate an important part of the cash income of the Thai household. 80% of the interviewed households keep between 1 and 6 pigs and all households raise chicken with a stock of as many as 50 animals. Total livestock units kept by each household range from 1.5 to 7.6 or 0.3 LTU up to nearly 1 LTU per person.

Most of the households reported fodder shortages, especially during the dry period between February and April. Since there are hardly any stables, the animals are left roaming free on fallow land and harvested fields as well as on slopes with natural vegetation. The size and quality of the limited grazing land is a major concern for animal husbandry. Often, grazing is restricted to common land under village or cooperative ownership. Fodder sources for large stock and small livestock are the same as in the households in Tua Chua.

Despite the lack of proper manure pits, it is more common with the Thai to apply manure both to paddy land and to upland rainfed plots. As a result of this practice, yields of maize and upland rice are kept fairly stable over the years.

2.2.5 Market Development
Market involvement of Thai households is more distinct than the one observed with the H'Mong in spite of the fact that all households in Yen Chau still operate on a subsistence basis. With the exception of one household, all of them sell maize in quantities of 1.5 tons to 5 tons per household and year. Farmgate prices between 1,200 Dong/kg and 1,500 Dong/kg are achieved. Only one household reported the sale of rice. The reason is the regular rice shortage of 1 to 5 months per year when the daily food is supplemented by cooked maize with cassava chips. The tree harvest from home gardens is mainly consumed by the producers and only three of the households interviewed sold grapefruits and tamarines for 500 Dong/kg and mangoes for 1-2,000 Dong/kg. Households with larger fishponds sell their fish-surplus for 13-15,000 Dong/kg. Great interest in extending aquaculture was observed.

Next to maize, the sale of livestock is the most important source of cash income. Especially buffaloes (0.6-1.5 million/animal), pigs or pork (10-11,000 Dong/kg) and chicken (18-20,000 Dong/kg) are sold regularly. Occasionally (20%) cows are sold for 0.6 to 1 million Dong/animal and one household reported to sell ducks for 15,000 Dong/kg.

Since the villages interviewed are located very close to the national road no. 1, the marketing of the commodities is no bottleneck and mostly they are brought by ox-cart to the markets located along the road.

2.3 Summary of Interview Results

The results of the household interviews can best be summarised by comparing individual items between H'Mong and Thai smallholder farming indicators (see Table 3). The most distinct difference can be observed in household size and cultivated area. In Tua Chua, the average household with 9.7 persons has 2.73 ha cultivated land to live from. In Yen Chau, the average household with 6.7 persons has to live from only 1.38 ha on average. Despite the large families of the H'Mong households, the cultivated land available per person (0.28 ha) is by 25% larger than the land available for the Thai families (0.21 ha per person).

The difference is most distinct with regard to the size of paddy land on hand. With 0.27 ha of irrigated rice plots, the H'Mong have more than double the size of the Thai households (0.12 ha). Even when taking into account that the families of the H'Mong are larger, the irrigated plots available per person (0.03 ha) are still 50% higher than the land the Thai families cultivate (0.02 ha/person). The cultivation of a second rice crop on paddy land (on average 0.06 ha) does not sufficiently compensate for the existing land shortage of the Thai households. The situation is similar with regard to the availability of upland plots where the H'Mong households have more than double the land under cultivation.

Access to land under cultivation is also different for the two ethnic minority groups. In the mountainous areas of the H'Mong settlements, the average walking distance to the paddy plots is nearly three times longer than in Yen Chau. The average distances to the upland plots are also longer for the households in Tua Chua.

On the other hand, the average Thai household has more home-/farm gardens, but smaller areas, and nearly four times the size and number of fishponds.

With respect to the importance of livestock raising and animal husbandry, the average H'Mong household keeps double the number of livestock units and on average 50% more livestock per person than the Thai households. This applies particularly to buffaloes, horses, pigs and ducks. Whilst the stock of cows and chicken is nearly equal, the difference is obvious with regard to horses. Whereas, for the H'Mong, the horse is the most important means of transport, the Thai normally use ox-carts for transport purposes.

Market involvement of Thai households is better developed than the one of H'Mong households. Whereas the Thai trade with 10 commodities, the H'Mong on average only sell 6 commodities. In Yen Chau households, maize is a main cash-commodity whereas in Tua Chua household grains are hardly of importance within the cash-economy. On the other hand, pigs and chicken are the backbones of H'Mong households to obtain cash (60-70%). For the average Thai household, the sale of pigs and chicken is more supplementary trading commodity.

On the whole, the comparison of the two ethnic groups and their family practices clearly demonstrates that the two operating areas of the project are very different. It is obvious that different project interventions and assistance efforts have to be applied to achieve the defined project objectives.
3 Constraints to Farming System Development and Suggested Improvements

The manifold constraints farming system development is confronted with have been described in numerous documents referring to Vietnam (see literature 23 to 48) and other upland farming systems in Asia and Africa (see literature 49 to 85). It is therefore the intention of the consultant not to report or to summarise this documented experience, but to concentrate on constraints encountered by the farmers interviewed in Tua Chua and Yen Chau households. At the same time, it was considered to be of interest to obtain information about the expectations of the target group with respect to potential improvements.

3.1 Constraints and Suggested Improvements in Tua Chua District

During the de-briefing meeting with the officials of the district (People’s Committee, Communist Party and District Administration), the following models were discussed which are in the process of implementation in order to subside the well-known constraints:

a. Crop variety improvement to secure food availability for rural households is the main concern,

b. Introduction of additional livestock, especially cows and goats,

c. Improvement of home garden cultivation by carrying out on-farm trials with fruit trees (especially plums and oranges), plantation crops (tea), shellac trees (Dalbergia huppeana) and Irish potatoes.

The main constraint for the administration is a weak extension service. With respect to the target group, they consider the lack of livestock control for free grazing, water shortage and too high birth-rates to be additional constraints.

The interview results with H’Mong households revealed a similar pattern of constraints, as there are:

a. Poor soil quality, soil erosion and decreasing yields on upland plots (35 points),

b. Lack of water for irrigation and household consumption (23 points),

c. Food (rice) shortage (20 points),

d. Lack of animal feed and pasture land (10 points),

e. Too long walking distances to farmland (9 points),

f. Lack of land (8 points),

g. Yield reduction through weed destruction (8 points),

h. Yield reduction through late rains (8 points).

The major constraints are somehow connected with natural shortages like soil loss, water-, feed-, and pasture land-shortages.

As a matter of interest, the majority of the improvements suggested by the households interviewed concern the field of supporting technical inputs, as there are:

a. Application of chemical fertilizer and pesticides (21 points),

b. Use of improved seeds, especially grains and tree seedlings (8 points),

c. Improvement of hedgerow cultivation (7 points),

d. Improvement of water resources and irrigation technology (6 points),

e. Additional food supply from commune administration (6 points),
f. Improvement of fodder resources (6 points),

g. Additional livestock (5 points),

h. Improvement of upland cultivation (4 points).

3.2 Constraints and Suggested Improvements in Yen Chau District

During the de-briefing with the vice-chairman of the People's Committee, no additional constraints were mentioned. Interview results of the Thai households show a different pattern than the constraints reported by the H'Mong households. Apart from the general climatic disadvantage of the micro watershed's location, it is mainly the shortage of livestock, land, rice supply and labour as the result of the higher population pressure which makes this area less favourable. The major constraints mentioned during the household interviews were as follows:

a. Lack of water and possibilities for irrigation (26 points),

b. Shortage of livestock for manure production and land preparation (20 points),

c. Shortage of land for grazing, paddy and fruit tree cultivation (16 points),

d. Shortage of rice supply (15 points),

e. Shortage of labour (12 points),

f. Lack of agricultural inputs (11 points),

g. Shortage of capital for additional fish production (5 points),

h. Lack of veterinary services (3 points).

The suggestions of the interviewed households on how to improve their farming situation are ranked as follows:

a. Availability of credit for agricultural inputs (31 points),

b. Availability of credit for livestock and fisheries improvement (23 points),

c. Improvement of extension services (20 points),

d. Availability of seedling for fruit trees (16 points),

e. Improvement of irrigation facilities (6 points).

4 Past Project Interventions towards Farming System Development

The project strategy for the first two operational years was described in the project activity report number one, entitled "Draft proposal for Implementation of the Concept on Community Forestry Development Plans" (see literature 5). As demonstrated in the SFDP strategy chart, project interventions were defined as:

a. Training

b. Applied Research

c. Forestry Extension Services
d. Market/Marketing System

e. Credit & Incentives

The major technical interventions to be addressed were the introduction of the following activities:

a. Agroforestry (home gardens, forest gardens, hedgerows, etc.),
b. Sloping agricultural land techniques (SALT),
c. Management of natural forest (including non-wood forest products),
d. Accelerated fallow development,
e. Establishment of forest and fruit tree plantation.

With the exception of the introduction of SALT, there was no reference to agricultural and farming system development which was not even mentioned.

In the plan of activities, more detailed descriptions of the planned implementation were defined, such as selection of test villages, community based analysis, definition of boundaries, actual land use appraisal, participatory land use planning, land allocation, forest and forest land agreements, definition of forestry activities, formulation of community forestry development plans, approval of community plans, participatory monitoring plus evaluation, and definition of on-farm research. On-farm research is supposed to cover only agroforestry and SALT activities.

The basis for project interventions regarding farming system development was available since April 1994 with the results of the agro-economic farm household survey (see literature 3). At the same time, the first agricultural extension plan for the Yen Chau District was elaborated, containing a number of farm system development components, such as on-farm trials for testing new rice and maize varieties, mango varieties, new chicken breeds, cage fishing trials, mulberry establishments and extension work on shell lacquer production.

One year later, the report on the agricultural systems and the agriculture-related activities of the SFDP in the Tua Chua District (see literature 19) added further farming system development trials with respect to apricot, tea and soy beans.

With the document on technology options for upland development in the Song Da watershed (see literature 15), potential project interventions were indicated for the first time during project implementation with respect to improvement of farmers' paddy land, home gardens, upland cultivation, livestock and grazing land.

5 Future Farming System Development Strategy

Since the term "Farming System" has been mixed-up with the term "Land Use System" throughout the project documents, especially in the agro-economic farm household survey (see literature 3), it seems to be appropriate to indicate some of the important definitions (see literature 78).

Farming systems are normally characterised by a permanent division within the holding between arable land and grassland, clearly demarcated fields and a predominance of annual and biennial crops. The activities of the farms serve to transform inputs into outputs. Several kinds of activities have to be distinguished, e.g. activities which produce crops, turn crops into livestock products, transform crop or livestock products into factory products, procurement activities including investments and farm maintenance works and marketing activities.

5.1 Classification of Farming Systems in the Project Area
In the process of adopting cropping patterns and farming techniques to the natural, economic and socio-political conditions of each location and the aims of the farmers, more or less distinct farming systems have been developed. As the household interviews showed (see chapter 2) no farm household is organised exactly like any other. However, farms producing under similar conditions tend to be similarly structured. The great variety of farm households that exist are grouped into one system and several sub-systems which again can be varied by different activity-mixes.

In accordance with the definition formulated above, the common farming system in the SFDP area is the Permanent Upland Farming System. Two sub-systems can be defined (see Chart 1):

a. Smallholder Rainfed Upland Farming (mainly in Tua Chua District)

b. Smallholder Mixed Permanent Farming

System (a), which possibly might be the succession-system of shifting cultivation, differs from system (b) by having neither irrigated crop cultivation nor any animal husbandry. The difference between the H'Mong and Thai smallholder mixed farming systems (see chapter 2.3) are an example of how the differentiated activities-mix can even be defined as "Sub-Sub-Systems". In one or the other way and share, the six sub-system activities (cultivation, cropping, agroforestry, animal husbandry, fisheries and forestry) determine the farming sub-systems.

Irrigation farming with wet rice cultivation proves to be a simple and highly productive permanent use of land in subtropical mountainous areas. With the problem of conservation of soil fertility in upland farming and increasing population pressure, there is an obvious tendency to concentrate production on what is topographically the lowest land with fertile soils and the possibility of irrigation in the valley bottoms.

As arable cultivation spreads at the expense of grazing areas, there is a tendency for farmers to reduce the number of animals kept, like in Yen Chau District. Upland slope grazing, seasonal fallows and harvest residues constitute the remaining fodder basis. With the reduction of grazing areas, the rearing of goats, pigs and chicken/ducks increases in relative importance. In requiring less grazing land and providing smaller units for sale or consumption, this kind of stock is better suited to the economic condition of smallholders.

**Chart 1 FARMING SYSTEMS IN THE PROJECT AREA**

**System: Permanent Upland Farming**

1. **Sub-System: Smallholder Rainfed Upland Farming (up to 20% in Tua Chua)**

**Activities:**

a) Cultivation
   - Rainfed slope cultivation

b) Cropping
   - Semi-permanent cropping (occasional fallows)
   - Single cropping
   - Intercropping

c) Agroforestry
   - Home garden

d) Forestry
- Collection of non-timber products

2. Sub-System: Smallholder Mixed Permanent Farming

Activities:

a) Cultivation
   - Rainfed slope cultivation
   - Rainfed contour cultivation
   - Rainfed terrace cultivation
   - Irrigated terrace cultivation
   - Irrigated pit cultivation (vegetable)

b) Cropping
   - Semi-permanent cropping (occasional fallows)
   - Single cropping
   - Intercropping
   - Multiple cropping (first/second crop)
   - Ley farming

c) Agroforestry
   - Home-/Farm gardens
   - Hedgerow cultivation
   - Perennial intercropping (tea/coffee with shade-trees)
   - Fruit gardens

d) Animal Husbandry
   - Livestock raising
   - Stabling
   - Seasonal grazing
   - Livestock transport support
   - Manuring

e) Fisheries
   - Fish breeding
   - Fish farming
5.2 Farming System Development Strategy

The supplies of biomass are crucial for the operation of permanent upland farming systems. An essential component of these systems is the emphasis on maintaining soil fertility through internal resource regeneration. Fertility levels of the light and shallow mountain soils are heavily dependent upon the application of farmyard manure.

Farmers have numerous ways to replenish soil nutrients and protect upland fields from loss of soil through erosion. Terracing is the most visible modification that H'Mong farmers have made on upland valley bottoms for soil conservation and cultivation. Crop rotation systems are another means of soil conservation. Intercropping legumes with crops can be used as a technique to increase soil fertility by conserving the soil through more complete plant coverage and root activities.

By far the most significant strategy for maintaining soil fertility is the transfer of nutrients from biomass (grass, harvest residues, etc.) via livestock. The fodder element is the linchpin in the permanent upland farming system. In the form of grass and fodder leaves, biomass is recycled through livestock to produce the valuable manure on which crop productivity depends. Seasonal fluctuations in fodder supply result in livestock being kept in stables for several months per year. At the same time, the proper collection of farmyard manure has to be ensured so that it is available in larger amounts for the distribution to farm plots when cultivation activities start.

H'Mong and Thai farming households with typically small land holdings also rely heavily on the common property resources of grazing land and forest to provide fodder and fuel wood. Estimates show that 4 to 6 ha of grazing and forest land are required to support each hectare of cropland in upland farming. High altitude grazing land provides biomass in times of scarcity in lower pasture land, thus relieving pressure on private and community fodder (grass and trees) near homesteads. Cut and carry fodder collection, normally practised at lower elevations due to labour shortage, ensures the retention of manure in the household or livestock shed and can later be distributed according to farm needs for compost.

The survival of farm livestock without the use of common property resources (e.g. communal pastures) would require diversion of a significant preparation of cultivated land from food and cash crops to fodder crops. The strategy of maintaining large numbers of livestock, many of which have marginal producers, can only be met through the exploitation of the free land provided by common property resources. Informal and formal norms of such a system have to be used by the farm communities to control the access of individual farmers to such common property resources. This control includes agreements to keep livestock from grazing on grasslands, fines and penalties for violations of regulations and imposition of grazing taxes or fees for provision of watchmen.

With the primary objective of hedging risks and securing the provision of basic food supplies, another basic strategy has to be employed to diversify production. Crop/livestock-based mixed farming facilitates the flow of varied products throughout the seasons. Besides supplying organic fertilizer, meat and draft power, dairy livestock could be introduced at an advanced stage of the strategy in order to produce milk, butter and cheese. The incorporation of further home garden development in the strategy (fruits and vegetables) may also result in additional nutrition for the farm household or cash-earning opportunities. Finally, the extension and improvement of the already existent fish farming systems have to be further developed and supported.

Since the development level of the H'Mong mountain people with a high rate of illiteracy and the Thai people with a highly developed handicraft tradition differ remarkably, equivalent strategies have to be adopted to support farming system development.

As the result of the individual elements described above, biomass-centred farming system development strategies can be recommended, incorporating different priorities with respect to the differentiated project areas, as follows:
Tua Chua District

Priority 1: Crop/livestock based permanent upland farming systems improvement strategy

Priority 2: Soil conversation strategy

Priority 3: Crop diversification strategy

Priority 4: Educational support strategy

Yen Chau District

Priority 1: Crop/livestock based permanent upland farming systems improvement strategy

Priority 2: Home garden improvement strategy

Priority 3: Aquaculture improvement strategy

Priority 4: Off-farm (handicraft) improvement strategy

5.3 Future Project Interventions

It is recommended to complement the development strategy based on land use planning by a farming system development component (see Chart 2). Whilst in the past the community based natural resource management was the main tool to achieve Social Forestry Development Plans, the new concept incorporates individual farm management tools in order to reduce the conflicting situation between forestry and agriculture. With this approach, the main causes of pressure on forest land are addressed, as described in the introduction chapter, and the micro-watershed becomes the focus point of activities. With this approach, the discussion about "collective ownership of the means of production" and "joint agreements on management" should defuse the existing conflict.

Project interventions planned in the past (training and extension assistance, applied research, market/marketing system and credit/ incentives) concentrating on social forestry development, will be complemented by interventions referring to farming system development, such as on-farm trial, training and extension service assistance, market information system design and establishment of opportunity cost and benefit analysis of agricultural and agroforestry commodities (see chart 2).

The development intervention strategies as described above can be detailed as follows:

Crop/livestock based permanent upland farming systems improvement strategy

a. Improvement of livestock sheds/stables and construction of farmyard manure pits,

b. Cultivation of fodder grass and other animal feed,

c. Increase of livestock number (incl. goats) for additional manure and cash income,

d. Introduction of dairy cattle.

Soil conservation strategy

a. Terracing of upland plots

b. Introduction of legume coverage and wind-breaking tree rows on terraces,

c. Extension of communal grazing land and introduction of new grass species,
d. Restriction of free grazing (control) and intensification of semi-permanent indoor stock keeping.

**Crop diversification strategy**

a. Introduction of second crops, intercropping and crop rotation on upland plots,

b. Improvements in home gardens not covered by agroforestry (e.g. vegetable, fodder grass, etc.)

**Aquaculture improvement strategy**

a. Improvement of pond structures,

b. Securing supply of fish fingerlings.

**Educational support strategy**

Supporting the search for funding agencies

**Off-farm (handicraft) improvement strategy**

Supporting the search for funding agencies

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**6 Specification of Tasks for future National and International Experts**

The endowment of the project with two long term international consultants is not sufficient to cover all the tasks connected to farming system development.

Long-term national expertise in the classic agricultural field of

- Food and tree crop development

- Cover crop and green manure development

- Animal husbandry

has to be introduced into the project, backed up by up to 6 man months of international consultancy in each field of development.

In accordance with the original project offer, an agricultural market information system covering agricultural and (agro) forestry commodities should be designed by an international consultant within 6 man months of fieldwork.

In order to select the appropriate mix of farming system strategies, a financial cost-benefit analysis of cropping, livestock and agroforestry components has to be carried out. At least 2 man months of international consultancy are required for fieldwork.

To underpin the results of successful community forestry development planning, further studies on kinship relations and social group behaviour should be implemented by an agro-sociologist (possibly national consultant) during 1 man month of fieldwork in each of the two districts.

Post harvest technologies will become more important whilst project activities proceed. Appropriate surveys about available technologies and potentials for improvement should be carried out by an international consultant within 1 man month of fieldwork.

Since the micro-watershed area is the natural environment of all project activities, there seems to be the need of looking more closely into the coherence of soil water household, microstructures, morphology, pedology, etc. Either national or international consultancy is needed to carry out field-tests during distinct climatic
ANNEX 1: Tasks for Short Term Expert

Name: Dr. Ludwig
Duration of Assignment: 33 days (5. January - 6. February 1997)

Time Table:
- 4 days preparation in Hanoi
- 16 days field-visits to Yen Chau (Son La) and Tua Chua (Lai Chau)
- 4 travel days for the a.m. programme
- 7 days for report-writing and presentations
- 2 days for international travels

Responsibilities:
The short-term expert will be directly working under the SFDP teamleader and his deputy

Language:
The SFDP's working language is English. For field-work the project will provide the necessary interpreter.

Reporting:
The final report of maximum 25 pages is to be written in English language. As word-processing programme MS-Word-for Windows 2 or 6 is required.

Objectives:
The Consultant's work will cover three main areas:

A. Analyse the present main types of farming systems in the project area.
B. Identify major technical, economic, organisational and institutional constraints to FSD in the project area
C. Identify suitable paths of development and intervention strategies for FSD in the project area

Tasks:
1. To analyse present farming patterns and systems in the project area, based on existing documents and field visits.
2. To identify in close co-operation with the appointed national expert and relevant counterpart and project-staff present major constraints to FSD in the project area.
3. To assess present FSD-interventions by the project.
4. To identify practical approaches to improved FSD strategies in the project area.
5. To identify future FSD-interventions by the project in support of respective programmes/activities of relevant counterpart agencies and third parties
6. To assist the project in the further specifications of the tasks of other STE to be assigned to the project in the field of FSD.

ANNEX 2: MISSION ITINERARY AND PERSONS METITINERARY

10.1.1997 Flight from Larnaca to Ha Noi
11.-15.1.1997 Meetings with project team and study of documents
16.1.1997 Drive from Ha Noi to Yen Chau
17.1.1997 Drive from Yen Chau to Tua Chua
18.-22.1.1997 Fieldwork in Tua Chua District
23.1.1997 Drive from Tua Chua to Yen Chau
27.1.1997 Drive from Yen Chau to Ha Noi
28.1.-8.2.1997 Meetings and design of draft report in Ha Noi
9.-10.2.1997 Flight from Ha Noi to Larnaca

PERSONS MET

Ha Noi: Günther Meyer, SFDP Teamleader
        Paul van der Poel, SFDP Social Forestry Expert
        Nguyen Tuong Van, SFDP Project Coordinator
        Prof. Dr. Nguyen Ngoc Lung, Director General FDP, MARD
        Hubertus Kraienhorst, Foreign Project Advisor (KfW-Project)
        Edwin Shanks, Extension Advisor, SCANDIACONSULT
        Dr. Bernd-Markus Liss, Forestry Consultant
        Dr. Elke Förster, GFA Representative
        Karl Kaiser, Agricultural Economist
        Otto Bernhard Schneider, First Secretary, FRG Embassy

Tua Chua: Mr. Tran Nhuong, Vice Chairman of People's Committee
         Mr. Quyet, Vice Secretary Communist Party
         Mr. Thuan, Vice Leader of District Office
         Mr. Them, Leader of District Office

Hang Do De: Giang A Tinh
            Giang A Ky

Thon Hai: Sung A Lang
          Giang A Sung

Thon Da: Vi A Giao
         Giang A Senh

Thon Mot: Sinh A Mang
          Giang A Tong

Ta La Cao: Sung A Chang
          Chang A Xa

Yen Chau: Mr. Sinh, Vice Chairman of People's Committee

Dong Tan: Hoang Van Nha
          Lo Van That
          Lo Thi Son

Ban Chai: Quang Van Khot
          Hoang Van Cho
ANNEX 3: LITERATURE

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(31) **MAFI**


(32) **MARD**


(33) **MOF**


(34) **Neave, Ian/Bui Ngoc Quang**

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