

Chapter V

Farming Systems of the Study Area

In order to understand the contribution of NTFPs to the household economy of Tat hamlet, it is necessary to understand their farming system as a whole. This chapter will discuss different characteristic features of the existing farming systems of the Tay of Tat hamlet with special emphasis on system components, their relationship to each other, production and their contributions to the household's economy.

5.1 Farming system components and their interrelationships

Vietnam's mountain areas have a wide variety of different farming systems reflecting adaptation to specific local natural environmental factors (climate, topography, altitude, soils) and social factors (religious beliefs, access to land ownership, and the extent and access to market). The farming system of the Tay in Tat hamlet is distinctive, falling within the category that Rambo (1995b) has labeled as "composite swiddening." In this system, each household simultaneously manages both permanent wet rice fields in the valley bottoms, shifting swidden fields on the hillslopes, and exploits wild resources of the forest. As result of adaptation to changes in political, economic and social circumstances, especially the increase of population over the time, the farming system of Tat has therefore become more diverse and complex with incorporation of a wide range of components, including cultivation of wet rice in the paddys and hill rice and cash crops in the swiddens,

livestock, forest extraction, as well as non-farm work in order to satisfy their demands for food and cash as well. A farming household manipulates each of those components with their management skills in order to extract output that can be generated from each component. These components are intertwined in such a way that one can hardly think of a farming system in the absence of any one component. Although agricultural activity absorbs the largest share of the labor force it is less productive than other activities per unit of labor employed. Although the system provides food, fuel, timber and non-timber forest products, as well as cash and employment to the households, all the subsistence farming households in the study area are not able to produce sufficient food to meet their needs.

Figure 6 shows the interrelationship among different components in the study area. In relation to animal production, crops provide feeds to livestock. Although, cassava is low-value crop in the region but it is still a major crop in the study area because of its important role in maintaining animal production in the commune. According to the local farmers, cassava tuber is a major and popular source for feeding pigs in the region. However, in the better-off households, almost all tubers of cassava were used mainly for pig raising while poorer households used only small cassava tubers to feed pigs, whereas big tubers are often used for human food, especially in the time of food shortage. Apart from that, the local people also collect young cassava leaves to eat as vegetable and to use as fish food. Rice is the main staple to the households; however, by-products from rice such as rice bran, and concentrates are also considered as one of the most important pig feeds, while unfilled

rice grains are fed to chickens and ducks. Rice bran sometimes is also used to feed fish.

Crops provide feed to animals and in turn crop production receives power and manure from the livestock. The survey shows that the cropping system in Tat is a low external input system. In the 60 households that were interviewed, most farmers use cattle as the major draft power for crop production. However, this relationship is stronger among the better-off households compared to poorer households who have no cattle, so they have to rent cattle to plough their land or they have to prepare the land by hand. In many cases exchange labor is employed based on reciprocity. Traditionally, manure from cattle and pig is the main fertilizer source utilized for rice production. Although people apply chemical fertilizer for rice nowadays, most still also apply manure before transplanting. Manure from livestock is especially important to the poorer group, who could not afford to buy chemical fertilizer for their crops. Owners of fishponds use manure from cattle frequently to feed fish.

Besides the relationship with animal production, the crop system also links with forest. Forest influences crop production by providing compost materials and materials to make agricultural equipment (ploughs and poles) and fences that protect crops from livestock. Farmers reported that one month before planting rice, they collect leaves in the forest to mix with manure for compost which is then mainly applied to the paddy fields. In addition, forests act as safeguard to cropland against soil loss through erosion and landslides. Forest resources, especially play an important role in providing capital as inputs through the collection and sale of timber

and NTFPs by households. Most interviewed farmers noted that their cash income from selling forest products is partly used to invest in crop and livestock production through buying inputs. Details of the collection and utilization of NTFPs will be discussed in the next chapter.

The forest, moreover, is also closely linked with livestock. The forest is major sources of the herbaceous species, which are used for animal feed. Most of the cattle in Tat freely graze in the forest area. Many kinds of wild plants like wild banana and vegetables from the forests are the main food sources that farmers collected for pig raising. In turn, the excreta, which falls from the cattle that graze in the forest is a good nutrient source to increase forest tree growth.

Due to the limitations set by poor transport, market and communication infrastructure, non-farm activities in this area are not really developed. However, this activity is a component of the production system in the area which is partly related to all of the other components of the system like crops and animals. Besides providing investment capital for crop production, some by-products of non-farm activities such as wine making, are used for pig raising. Non-farm activities help local farmers generate cash to cushion effectively times of environmental and economic stress, such as buying additional food at time of food shortage or crop failure.

Farm households are the basic unit of production and consumption so that all those farming components directly or indirectly are influenced by the household's demands for goods and services. Farming household is virtually linked with all those components and play a key role in the overall operation of the system as a system

manager and decision-maker. Since household's activities always revolve around the household's welfare of providing food needs to its members through rational use of available resources, it contributes to the system in a number of ways providing labor investment for the long-term sustainable use of the resources.

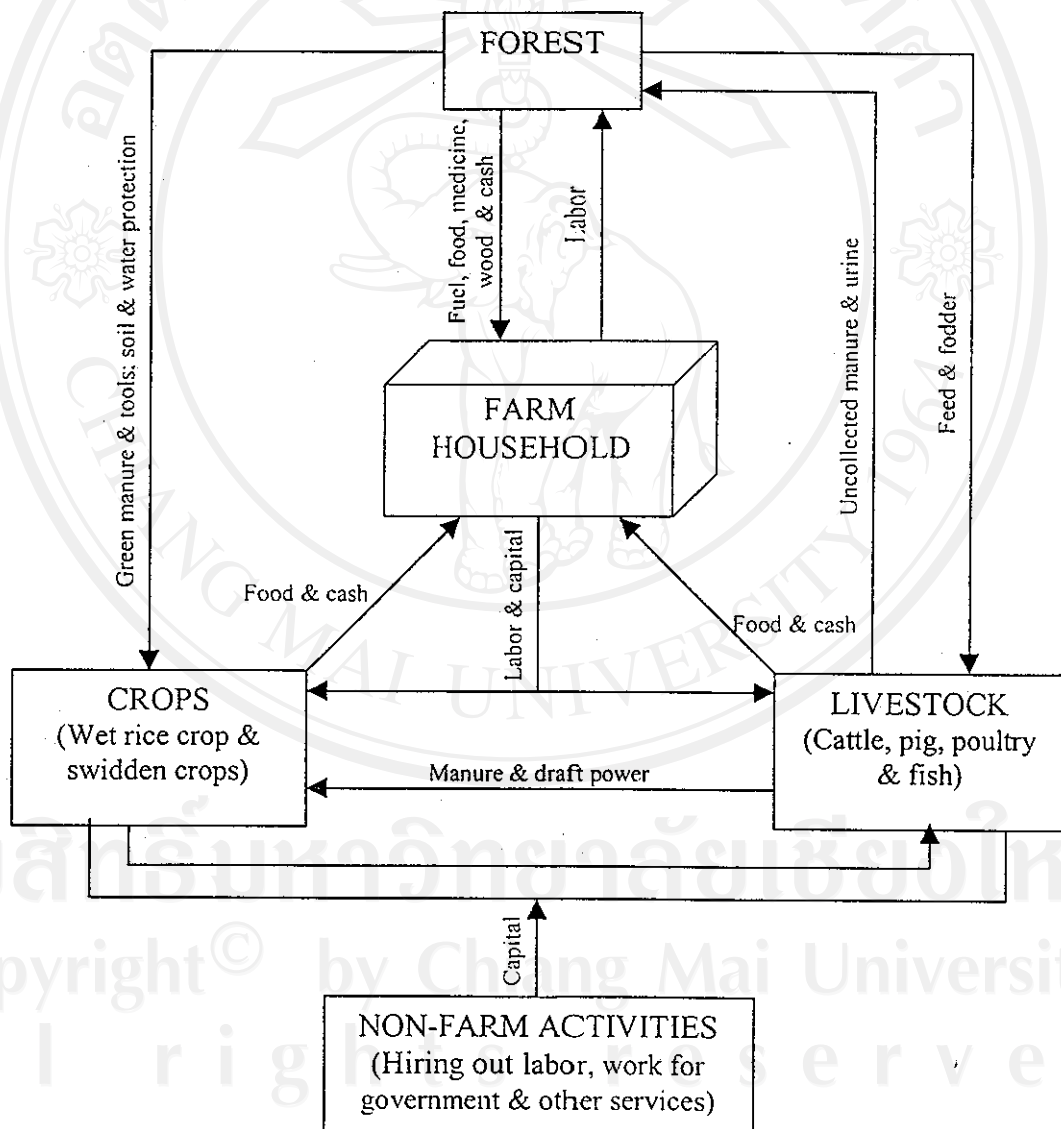


Figure 6: Farming system of the study area

5.2 Cropping systems

5.2.1 Cropping pattern

Cropping systems of the studied areas are very diverse depending upon biophysical and socio-economic settings of the farmers and the households. Based on land type and elevation, there are swidden crops such as rice, maize, cassava, ginger, arrowroot and paddy rice (Figure 7). Both wet rice and upland rice provide the staple food for household use while maize is only a supplement. Cassava is planted for both household consumption and livestock feed. Arrowroot and ginger, on the other hand, are planted mainly for cash. Rice, cassava, and ginger swiddens are monocultural but arrowroot is often inter-cropped with corn. Wet rice fields are built in a series of terraces rising like steps from the stream in the middle of the valley, where water is available. Most of the wet rice fields can cultivate two crops per year, spring and summer. Upland rice, however, can be grown only once a year because the fields are located on the sloping land where water is provided only by rainfall and soil fertility is entirely dependent on natural conditions.

Traditionally, farmers used to grow only rice and cassava as the main crops on their swidden fields. Recently, the free market, which enables farmers to sell cash crops more easily has brought about change in their cropping systems. According to Rambo *et al.* (2000) in 1994 the cropping system in Tat was mainly based on rice and cassava only. As most of the farmers nowadays, plant arrowroot and ginger for cash, cassava is planted in the swidden field mainly for home consumption where the soil is no longer fertile and not suitable for other crops, usually after one or two crops of corn and arrowroot have been harvested.

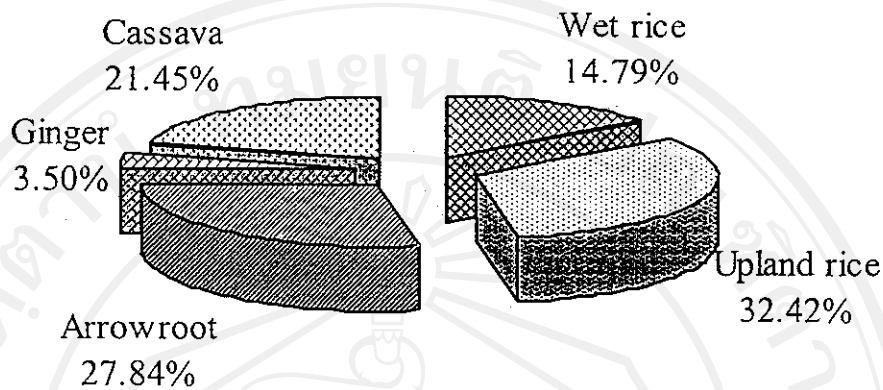


Figure 7: Percentage of land area under different crops in the study area

Source: Survey, 2002

However, due to the system of land allocation the swidden fields are in fixed locations, and new land should not be cleared to make more swidden fields. In addition, increased population pressure has forced the shortening of the fallow period so that productivity of swidden crops, especially hill rice, is not high. So, people either have to intensify their wet rice production in order to meet their stable food needs or grow more cash crops on their swidden in order to buy rice. However, with only small amount of wet rice area, which cannot provide enough stable food people have had to clear additional forested area to use for swidden crops in order to meet their food needs.

Besides the above mentioned crops, the villagers also grow many other crops like taro, pumpkins, squash, beans, papaya, and some other kinds of green vegetables in their swidden fields for home consumption.

5.2.2 Seasonal calendar

Table 6 represents the seasonal calendar of the main swidden crops at Tat. Land preparation of swidden cash crops and cassava will be done in January to February. Ginger and arrowroot are planted in the same season, from February and March, and harvested in November and December. Arrowroot and maize are planted together in the swidden fields but have different planting and harvest times. Usually, about one month after the maize seeds are planted, arrowroot is planted on maize field. Maize can be harvested earlier, about in May or June. Cassava is also planted at about the same time as other crops, starting at the beginning to the end of March. Depending on the variety, farmers usually harvest tubers after three to six months. However, the Tay people can keep fresh tubers in the field and harvest throughout the year. Land preparation of upland rice is done in April, then farmers will wait for the first rain in late of May and then start sowing. The harvesting is completed in October to November. Most farmers still use local rice variety. Weeding in swidden crop normally will be started one month after planting activities are finished.

Paddy rice has two crops per year. The spring crop starts in January and is harvested in the middle to the end of June. The main varieties of this crop are CR 203, C 70, Tap Giao, Ai Mai Huong. The summer crop runs from the beginning to the middle of July and harvested in the end of October or early of November.

The seasonal calendar indicated that the cropping activities are carried out throughout the year in the region. Farmers, moreover, manage their farm labor in agricultural at the same time as NTFPs gathering activities which not only provide

them food during workload in agricultural, and before harvest or during food shortage but also provide them cash inputs which they can invest into other activities.

Table 6: Seasonal calendar of some main crops in the study area

Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Land clearing & burning		***** +++++++ ***** ----- YY YY YY										
Sowing/Planting		*** YYY	+++++++	*****								
Weeding				*****		+++++++	*****					
Harvesting				*****			*****	*****	*****	*****	*****	*****

Key: ***** Upland rice
 ++++++++ Cassava
 ***** Corn
 ----- Arrowroot
 YY YY YY YY Ginger

5.2.3 Crops production

The main source of income of the Tay is from agricultural production. Although paddy rice area occupies a small portion of land, rice from paddy is very important in contributing to the stable food supply of the family, especially in recent years since new techniques have been applied in agriculture production which contribute to the increase rice productivity. For example, in year 2000 the local rice varieties have been replaced by high yielding variety (HYV). In addition, farmers are now applying chemical fertilizers (e.g. Nitrogen, urea and phosphorus), pesticides,

and insecticides to the paddy fields, so that rice production has reached 3.5 ton/ha compared to 2.8 ton/ha in 1996 (Tan Minh People's Committee, 2001). Some farmers, however, report that the HYVs have a lower yield than local varieties. This is because HYV results in high yield only when all requirements for inputs are met. Besides, the HYVs are very susceptible to pests and diseases and yields can be easily and drastically reduced if pests and diseases are not prevented.

Traditionally swidden rice is also considered as a main food source of the local people. Recently, due to the shortened fallow period, rice production has been decreasing. Wet rice production is now the prime concern of the local households. The two main kinds of planted swidden rice are glutinous rice and non-glutinous rice. The average yield of swidden rice ranges from 06 to 1.0 ton per ha and there is only one swidden rice crop per year. The area of rice swiddens is much greater than that of paddy fields, however, rice from the swiddens is still very important in meeting household consumption needs.

The second most popular swidden food crop after rice in this area is cassava. It is cultivated by most of the farm households. Cassava does not require high fertility soil and has diversified uses: cassava tuber and flour is used to supplement rice in times of food shortage, particularly by the poor households; it is also used to make wine. Cassava, moreover can also be used to feed animals. Cassava leaves are eaten by people as a vegetable and used as fish food. At the moment, cassava yield is around 9 tons/ha. Cassava is rarely sold owing to its low market value.

Since the upland rice has low yield, people are growing arrowroot on a larger scale. Cash income from selling this crop can be used to buy additional rice for home consumption as well as purchasing other household necessities. Planting arrowroot is easy and not labor intensive. It requires little time for weeding because of its dense leaves quickly cover the land surface preventing the colonization of grass. Arrowroot yield is as high as 12 tons/ha. Ginger is also grown in Tat for cash purpose, but on a smaller scale than arrowroot because of the limited market for ginger. Corn and other crops are sometimes grown as inter-crops in swidden fields for home consumption.

5.3 Livestock management and production

Livestock is an integral component of the farming system in the study area. A range of livestock species such as cattle, pig, chicken, duck and fish are raised by the farm households. Result from survey shows that 55% of respondent households raise buffalo, 58% of households raise cattle, while the number of households raising pigs is much greater (72%), and 52% of the households have fish pond in their homegarden or nearby their houses (Table 7). In terms of economic status, however there are differences among them. As is illustrated in the table, the better-off groups are more likely to have livestock than the poor.

Table 7: Households raising livestock in the study site

Kind of livestock	Buffalo	Cow	Pig	Fish aquaculture
	----- % -----			
Worse-off households	20.0	30.0	50.0	45.0
Medium households	65.0	60.0	75.0	45.0
Better-off households	80.0	85.0	90.0	65.0
Average of total	55.0	58.3	71.8	51.7

Source: Survey, 2002

Traditionally, cattle are allowed to range freely in the forest and fallow fields. In addition to cash income contribution, indirectly cattle contribute to household by supplying draft power for paddy cultivation, drawing timber from the forest, and provide manure for crop as well. People consider cattle as a “cash store”. They are sold when the households need cash to build a new house, for a wedding, or for other major expenditures. The number of households raising cattle has been increasing recently, because cattle are easily sold for a high price. At present, the price of a mature cow is around one to two million VND (about 70US\$ to 140US\$). However, because of high investment capital and long business cycle requirement, the better-off households group has a larger number of cattle than the medium and the worse-off. The local people often use heads of cattle as one of the indicators of household status.

On the average, most of the households in Tat hamlet have at least one head of cattle, of which each household own 1.3 head of cow while the average head of buffalo per household is only 0.8 head. These numbers however, differ among household economic groups (Table 8). The rich have 4 times more cattle than the poorer group and nearly 1.5 fold more than the medium group. The number of

buffalo that the rich owned was less than the medium group however, but higher in comparison to the poor.

Table 8: Livestock holding by household groups in the study site

Kind of livestock	Buffalo	Cow	Pig
	-----Number of heads-----		
Worse-off households	0.30	0.5	0.90
Medium households	1.20	1.45	1.50
Better-off households	1.10	2.15	2.45
Average of total	0.87	1.37	1.62

Source: Survey, 2002

Livestock, particularly small animals like pigs, are raised by most households in Tat. Results of the survey indicate that seventy-two percent of the interviewed households raise pigs (Table 7). The number of pigs raised by rich households is three times greater than the number raised by the poor (Table 8). Most people usually raise local varieties. Generally, the growth rate and weight of pigs at slaughtering time are not high, but the local people can make use of left-over food or by-products of wine making and wild plants in the forest to feed their pigs. These local pig varieties are also highly resistant to diseases. Some better-off households, however, go to the town market to buy hybrid piglets with high productivity. Some households buy prepared animal feeds for pig raising. Pig raising is considered an important element of the livelihood system both for household use and sale for cash. However, it has not developed much because of the lack of investment and limited availability of effective disease prevention methods.

A number of chickens are kept by the households for home consumption. Not all households, however, raise chickens because they are afraid of disease. Shortage of disease prevention methods usually results in chickens dying in large number.

Many households in Tat have constructed small ponds to raise fish. Most are for home consumption although some are sold. Carp of several species and Tilapia are the most commonly raised fish. They are fed banana and cassava leaves, weeds, rice bran, and buffalo and pig manure. Cultivation is not very intensive and production is low due to the physical condition as well as lack of knowledge in raising fish. Lack of disease prevention methods for fish results in massive death of the fish population.

Since the need for cash income is increasing nowadays, Tat people are intensifying their livestock raising activities, but poor investment, lack of veterinary services, and inexperience in raising livestock have all contributed to the low production or failure some time.

5.4 Home gardening

Homegarden includes homestead and homegarden cultivating areas. Almost all households in studied area have homegardens, but most are small. The area under home gardening varies from the minimum of about 50m² to the maximum of about 800m² depending on the households. The gardens include various species of fruits like banana, jack fruit, papaya, pomelo and some kinds of vegetables. Growing other species of trees in homegardens is uncommon in this area. Because of a long tradition of collecting wild vegetables from the forest for home consumption, local people are

not very concerned about their garden productivity. Homegardens, therefore, play only a minor role in the economy of Tat households.

5.5 Forest products collection

Non-timber forest products play a very important role in the daily life of the Tay people. There is a wide array of such products such as firewood, bamboo, vegetables, medicinal plants, and others. Presently, all households in the hamlet engage in non-timber products extraction. Collected products like bamboo shoots and forest vegetables, and less commonly, wildlife, are important foodstuffs of the Tay daily meals, especially during the time of food shortage. Medicinal plants are used mainly to cure common ailments like toothaches, bellyaches, and headaches. All households collect fuel wood, the only fuel they use, from the forest. Besides collecting NTFPs for home consumption, such as bamboo poles and bamboo shoots, broom grass, medicinal plants, etc. are also collected for selling. It is estimated that non-timber products make up more than 34 percent of total household income on the average, detail will be discussed in the next chapter.

Besides NTFPs, timbers for house construction and for other uses are also collected from the forest. Some people also cut logs for sale. However, it is difficult to know the quantity of logged timber in the whole year utilized by the households since the tree cutting from the forest is now considered illegal.

5.6 Non-farm activities

In the upland area, most of the households are agricultural farmers and there are few opportunities for non-farm work within and outside the community. Cash earned from services such as motorcycle drivers, sellers or dealing as middlemen in the village and some salaries from working for government in the commune are the major sources of non-farm cash revenue. However, most income that is generated from non-farm activity is earned by the better-off group. Wage labor brings supplemental cash income to the landless, however, but such work is only available during the peak period. Because cash incomes of upland people are low, any non-farm incomes provide important source to household income as well as benefit the community.

5.7 Household income sources

As mentioned above, the farming system in Tat hamlet is diverse and complex with incorporation of a wide range of components. Consequently, farm households have diversified income sources. Income of the farm households, therefore, can be divided into seven major sources: income from wet rice crop, swidden crops, livestock, home gardening, income from NTFPs and TFPs extraction, and income from non-farm activities.

It was found that the main income of farmers in Tat hamlet comes from crop cultivation and extraction of NTFPs. Income from other sources like livestock, homestead gardening, logging and non-farm work is supplementary. As is illustrated

in Table 9 or Figure 8, among seven major income sources of the Tay, income from forest accounts for a largest proportion (44%) to the households, of which income from NTFPs accounts for more than 34% and 10% is the proportion of TFPs, while about 21% and 15% are the proportion of income from swidden crops and wet rice cultivation respectively. Income from livestock also plays an important role in household livelihood with total share of income is more than 12%, while the share of income from homegardens is small (slightly over 1%). Non-farm income, however, accounts for about 7% which is considered as one of the important sources in providing cash income to the households. This usually comes from government work, hiring out labor and other services like middlemen in buying forest products and so on.

Table 9: Household income from different sources

	Total income (Thousand VND)	Percentage
Wet rice cultivation	83,247.50	15.20
Swidden crops	112,510.50	20.55
Livestock culture	65,945.80	12.04
Home gardens	7,829.40	1.43
Non-timber forest products	185,789.00	33.93
Timber forest products	52,550.00	9.60
Non-farm activities	39,700.00	7.25

Source: Survey, 2002

Note: 1US\$ = 14,000VND

Although rice from paddy is considered as the most important source that provides stable for the family and the most productive system that farmers prefer to have. With only a small amount of paddy area does not provide enough staples for a

family; these needs are added by swidden cultivation. This is reflected by proportion income from each source. Thus swidden crops still play an important role in household economic activity in upland systems. Although the productivity of swidden crops is decreasing nowadays due to decreasing soil fertility, the local people still practice it in order to sustain their needs. This finding supports previous research which has shown that the farmers continue to practice swidden cultivation of upland rice although they realize that its productivity is not as high as before, with yields only about one-thirds of paddy rice (Rambo *et. al.*, 2000).

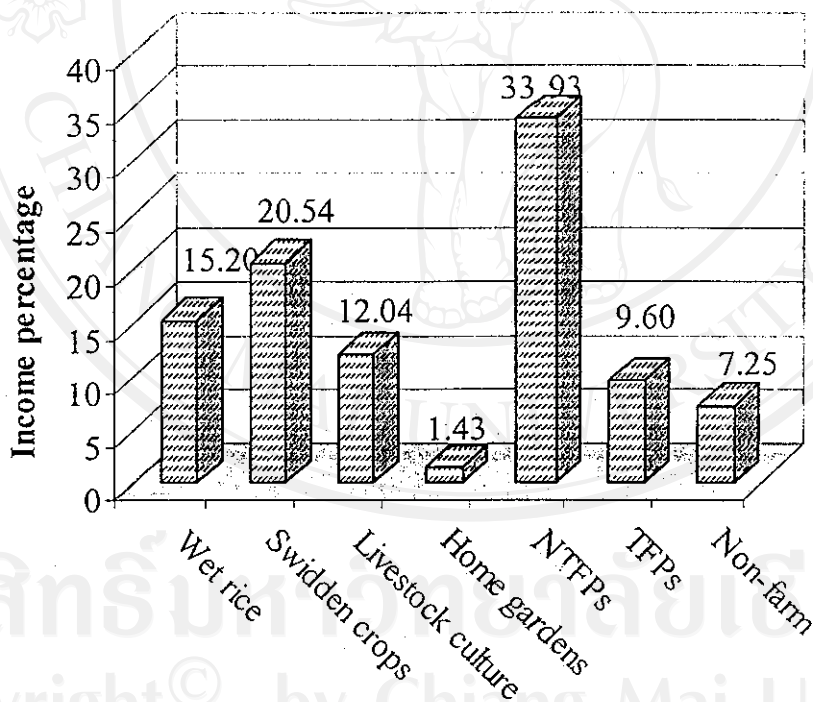


Figure 8: Household income from different sources

Source: Survey, 2002

Regarding the economic status of people in Tat, there are differences in income and income sources (Table 10 or Figure 9). It was found that although income in all household groups comes mainly from NTFPs collection, the share of income of

worse-off households is much greater (about 48%) compared to the other two groups where it is 34% for medium households and 26% for the better-off households. Income coming from swidden cultivation for the poorer group is also the highest. In contradiction to the share of income from NTFPs, the income from wet rice sources of the poorer group is lowest, only 9% while the proportion of the better-off is two times greater (nearly 19%) and 15% for the medium group. Similarly, since the poor are less involving in the livestock production, their income from this source is much lower (9%) compared to 15% of the rich and lower than the medium groups, as well. As mentioned above, the poor group has no or less paddy land to cultivate and normally lack of finance capital to invest into the production activities. Thus, the poor have to rely on the forest either by opening up more swidden fields illegally or increasing the exploitation of forest product in order to meet their food needs. Although non-farm income contributes a smaller portion of income to the total household economy, it is still important in providing additional income to the limited

Table 10: Percentage of income from different sources by household economic status

	Worse-off	Medium	Better-off
	%		
Wet rice cultivation	9.38	14.55	19.04
Swidden crops	20.37	24.25	17.6
Livestock culture	9.19	10.94	14.56
Home gardens	0.96	1.89	1.33
Non-timber forest products	47.66	33.65	26.35
Timber forest products	7.31	10.87	9.87
Non-farm activities	5.13	3.85	11.21

Source: Survey, 2002

sources of cash income in the mountainous areas. The obtained sources of income, however, are different among household economic groups. The poor, who did not have enough land or less capital, usually work as wage laborers, while the better-off usually obtained their income from working for the government and dealing as middlemen in the commune. This is indicated by the portion of income for the better-off, which is 11%, while for the poor it is only 5%. The medium, however, has lowest portion of income from these sources. This can be explained by their less reliance on non-farm income while seeking their income in the form of other activities such as cultivating swidden crops. None of the respondents have income from remittent sources.

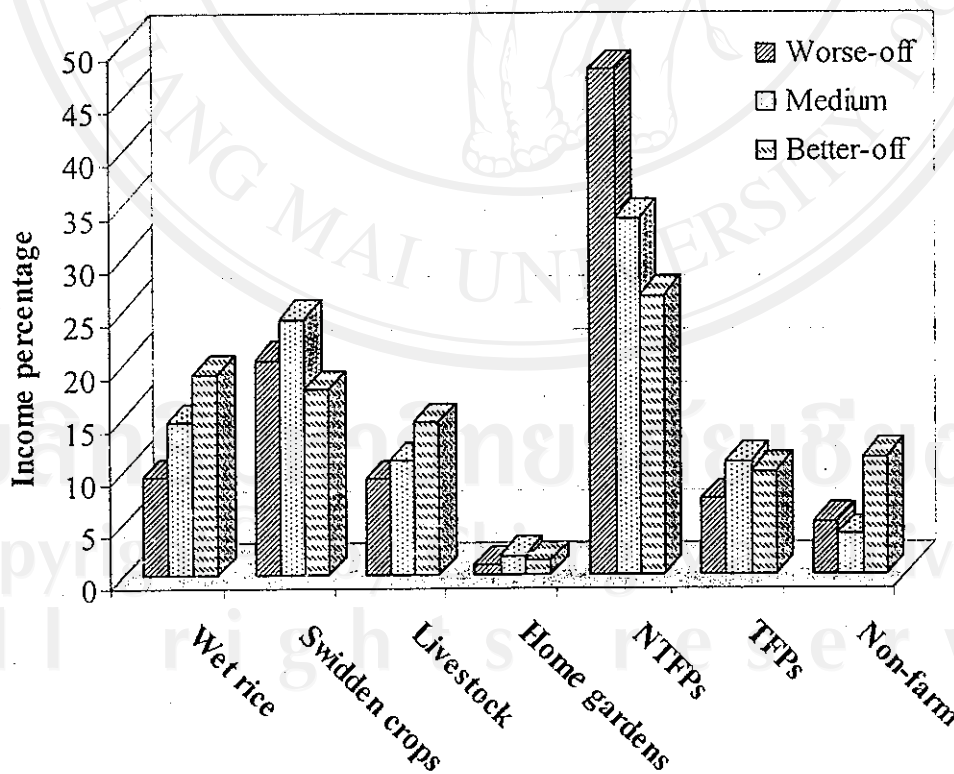


Figure 9: Percentage of income from different sources by household economic status

Source: Survey, 2002