# Volume II Forest management plan in the Model Area

## 1 Objectives of the model forest management plan

The principles and guidelines for forest management for the Kon Plong District are discussed in Volume I as a master plan. Volume II, discuss how to apply the principles presented in the master plan to manage the actual forests. The overall objective of this study is to formulate a management plan for the model area to realize sustainable forest management.

More precisely, this study presents a forest management plan that deals with such aspects as logging, reforestation, and support for local communities over the next ten years. To this end, the study assesses the latest forest conditions and the socioeconomic conditions in the model area taking into account its geographic features in as much detail as possible based on a larger scale topographic map. The study also took into account various requirements including: the maintenance of the functions of the model area in conserving soil, water, and ground surface; the conservation of the local ecosystems that depend on the forests; and the response to the needs of local residents. After formulating a forest management plan, the study checked for compliance with each item of ITTO's C&I to see whether the plan is in line with the concept of sustainable forest management. It is expected that the plan will make it possible to achieve sustainable forest management and even serve as a model for maintaining and managing forests throughout Vietnam.

**Selection of the model area**

The selection of model areas is based on an assessment of the following considerations and comparison between different areas.

a. The area of forest should be sufficient to allow sustainable forest management, *including future timber* production requirements, on the specified scale.
b. The presence of rare and/or endangered wildlife
c. The distribution of villages and communities
d. Beneficial conditions of topography and access, such as existing roads
e. The capability of the FE with regard to management/administration

When each FE is compared and evaluated based on the above considerations, the priority is given to the following enterprises for each item. Items b and c are regarded as negative since the model area is set up to assess the establishment of a forest production business with a view to sustainable forest management. Therefore, an FE with less or without rare and/or endangered wildlife within its jurisdiction takes priority for item b. In addition, an FE with a sparse distribution of villages and communities within its jurisdiction takes priority for item c. The order of the enterprises against each item has no significance.

a. Tan Lap FE, Mang Canh II FE, Mang La FE
b. Mang Canh I FE, Mang La FE
c. Tan Lap FE, Dak Ruong FE
d. Mang Canh I FE, Mang La FE
e. Tan Lap FE, Mang Canh II FE

Tan Lap FE and Mang La FE take priority for most items. However, part of the area of Tan Lap FE is included in an active WWF project. Consequently, Mang La FE was selected as the Model Area.

# 2 Selection of the Model area

The study is requested to formulate a model forest management plan on a model area. The model area was selected after discussions with the team and the Vietnamese authority taking various aspects for sustainable forest management into account as shown in the column on the right of the previous page, then after, both sides agreed that the area of Mang La forest enterprise is defined as the Model area.

# 3 Summary of the Model Area

## 3.1 Natural conditions

The Model Area managed by the Mang La Forest Enterprise is situated in the eastern part of Kon Plong District (Figure II-3.1.1) and characterized by the different natural conditions from the western lower region of the district. The summary of natural conditions is described below.

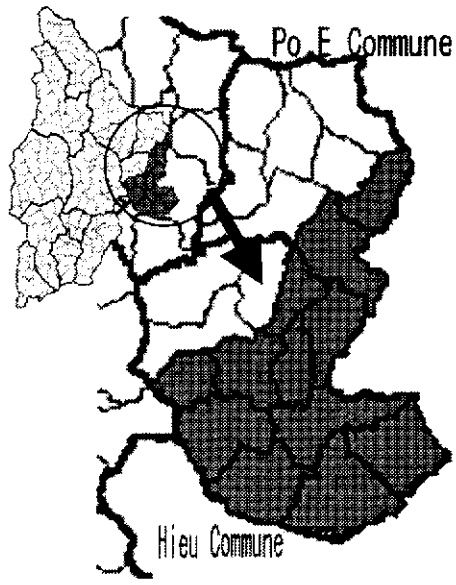


**Figure II-3.1.1 Location of the Model Area**

### 3.1.1 Topography

The general feature of the topography in the Model Area is described that the altitude gradually increases from the east towards the western region with the range of altitude between 400 m and 1,400 m. Particularly the lowest part distributes in the northeast and southeast.

### 3.1.2 Meteorology

Although detailed data on meteorology in the Model Area are not available as there is no climatic station, the climatic zone belongs to a different one from the western region of Kon Plong District, as shown in Figure I-2.1.2. The Model Area can be split into two climatic zones; e.g. II.1a and II.1b. According to Table I-2.1.3 indicating the climatic attribute, the area under II.1a falls into a higher temperature due to low altitude. The annual temperature and the annual rainfall can be estimated at 20 to 24℃ and 2,400 to 2,800 mm according to Figure I-2.1.3 and I-2.1.4 respectively. Regarding the rainy season, it is assumed to be June to December according to Table I-2.1.3, that is, the dry season falls from January to May. However, according to interviews with local farmers, it was found that they cannot clearly identify the dry season and fail to practice slash-and-burn farming in some years.

### 3.1.3 Hydrology

As indicated in Figure I-2.1.5, the Model Area belongs to the Son Tra Khuc Basin. Several rivers or streams are combined to the Son Tra Khuc River in the downstream outside the Model Area and flow into the South China Sea. The area can be split into five sub-watersheds by main rivers; e.g. Kon K Tao, Nuoc Vi, Dak Leng, Dak Re, Dak Xa Rak. Most of the southern region is included in the Dak Re sub-watershed.

### 3.1.4 Geology and soil

According to the observation conducted during the soil and agroforestry surveys, the major soil type appearing in the Model Area is characterised as brown or reddish brown humic gley soil on basalt stone in slope lands, and marshy diluvial gley soil on weathered basalt mixed with alluvial soil of rivers and streams in paddy fields. Other soil type identified particularly in low lands (below 1,000 m) is yellowish brown soil on acid magma stone and metamorphic rock in slope lands, and marshy diluvial sandy gley soil on weathered granite and gneiss stones mixed with alluvial soil of rivers and streams in paddy fields.

As for the attribute of the soils in the Model Area, it is depicted that the soil in forests is deep, less exploited and appropriate for tree growing but, in cultivation, it is seriously degraded particularly in brown or reddish brown basalt soil and the acidity is rather high.

## 3.2 Socio-economic conditions of the Model Area

### 3.2.1 Basic socio-economic conditions of the villages in Hieu and PoE commune

#### (1) Village administrative units

The jurisdiction of Mang La Forest Enterprise (FE) covers parts of two communes, Hieu and PoE. Out of the 11 villages in Hieu and 7 in PoE, 4 in Hieu and 3 in PoE have their main residential areas located within the jurisdiction of Mang La FE. In addition, there are 5 villages in Hieu and 1 village in PoE with some of their agricultural land located within the jurisdiction of Mang La FE.

#### *(2) Distribution of villages*

Among the 18 villages in the 2 communes, 8 villages are located by National Road 24 (R24), and 5 villages are located within 1 to 2 km from R24, having access by rural roads (Figure II-3.2.1). There are 5 villages that are relatively remote, located more than 4 km from R24. In both Hieu and PoE,

there are villages with clustered residential areas, and those that are scattered.

No village in the 2 communes has been established by the government policy of transmigration. Many villages have, however, been resettled within the commune. For example in Hieu, all villages except Kon Pling and Kon Pieng (Village 7 and 8[7]) have been resettled, supported by the government's Fixed Cultivation and Resettlement Program. These villages have moved closer to R24 and/or to their paddy fields from their original residential locations. Most of the households have settled in the new residential areas, while a small number of households have returned to their old residents[8]. Some villages in PoE have also resettled within the past several decades, although not under any specific government program. Resettlement was triggered by natural or human induced disasters, such as climate conditions and war[9].


**Figure II-3.2.1 Villages in PoE and Hieu communes**

There are also villages that were originally one village but have been divided into two villages. Another characteristic of local residential pattern is the existence of 'farm houses' nearby the paddy fields, in which they eat and rest during the farming season. People often use the houses in the old settlement as their farmhouse.

### (3) Ethnic composition of the villages

According to the outcomes of RRA and individual interviews, it was found that the local population of Hieu commune is mostly M'nam, while PoE commune mostly consists of H're. There are some Kinh

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[7] Each village is given a number (e.g., Hieu village 2) and a name (e.g., Vi G Long).

[8] For example, 5 households of Dak Lieu (village 4) and 2 households of Dak Lom (village 3) of Hieu commune have returned to the old residential areas. When one faces problems in cultivation, or when family members become ill in the new settlement, local people believe that the new location does not allow them to settle, or that the old location is not allowing them to leave.

[9] For example, Dak Xo (Hieu Village 6) was established as a new village separating from Vi Chiring (Village 5) during the war, at the time when they escaped into the forest. Vi O Lak (PoE Village 7) moved to the current location after they suffered a serious flood in the previous location.

households who have settled in the villages, although the number is very few. The Kinh households mostly engage in small businesses, such as roadside shops selling food and other commodities. They also often act as middlemen for livestock and other commodity exchange.

**(4) Population and migration**

Table II-3.2.1 presents the number of households, families, and total number of people in each of the villages. Total population of 18 villages is 3,581, with 2,038 in Hieu and 1,543 in PoE. The natural population growth rate is 2.6% in Hieu and 2.8% in PoE, and the population density is 9 persons/km$^2$ and 12 persons/km$^2$ respectively, according to the year 2000 statistics[10].

In the two communes, there are cases in which two or three families live under one roof. Normally they are the children's families living with their parents. Although the children are married and in some cases have their own agriculture land or forest protection contract, they still share most of their activities concerning livelihoods including production and consumption. The number of families in the 2 communes ranges from 21 to 59 per village, and households[11] from 16 to 57 per village. The average size of a household in the 2 communes is 6.1 persons, ranging from 4.6 persons to 7.6 persons. On average, the number of households in one village is larger in Po E than in Hieu, as is the size of a household. Average number of economically active persons at the age group between 15 and 60 years old is 3.3 persons per household, ranging from 2.3 persons to 4.5 persons. Among the sample households surveyed, 40% of the total population was below labor force age, out of which 15% was below 6 years old, 14% between 6 and 10, and 10% between 11 and 14. Six percent of the total population was above 60.

Movement of people in the 2 communes is relatively stable. Except for movement of local ethnic people from one village to another due to marriage, there were only 5 Kinh families (16 persons) who have moved into the 2 communes in 2001. Kinh migrants are from the neighboring Quang Ngai province, and from the provinces in the North.

[10] Population density and growth rate are cited from: Kon Tum Province People's Committee. (2000) *Planning for Construction of Infrastructure of Hieu Commune, Kon Plong District - Period 1999-2005* and Kon Tum Province People's Committee. (2000) *Planning for Construction of Infrastructure of PoE Commune, Kon Plong District - Period 1999-2005.*

[11] The term 'household' is defined hereafter in this report as the family (families) living under one roof, in view of the fact that household economy appeared to be mostly operating within this unit.

**Table II-3.2.1 Population and number of households in PoE and Hieu communes**

| Village No. and Name | Number of Households | Number of Families | Total No. of Persons | No. of Persons by Ethnicity | |
|---|---|---|---|---|---|
| **PoE** | **232** | **293** | **1,543** | **H're** | **Kinh** |
| | | | | **1,491** | **52** |
| 1. Kon Klang 1 | 31 | 43 | 234 | 229 | 5 |
| 2. Kon Klang 2 | 40 | 51 | 301 | 286 | 15 |
| 3. Kon K Tau | 39 | 46 | 231 | 208 | 23 |
| 4. PoE 1 | 35 | 49 | 270 | 265 | 5 |
| 5. PoE 2 | 16 | 25 | 105 | 105 | - |
| 6. Kon Roa | 32 | 35 | 182 | 182 | - |
| 7. Vi O Lak | 39 | 44 | 220 | 216 | 4 |
| **Hieu** | **366** | **428** | **2,038** | **M'nam** | **Kinh** |
| | | | | **2,009** | **29** |
| 1. Kon Plong | 44 | 49 | 233 | 233 | - |
| 2. Vi G Long | 50 | 59 | 270 | 270 | - |
| 3. Dak Lom | 32 | 41 | 219 | 215 | 4 |
| 4. Dak Lieu | 16 | 21 | 93 | 88 | 5 |
| 5. Vi Chiring | 17 | 21 | 93 | 89 | 4 |
| 6. Dak Xo | 40 | 47 | 193 | 193 | - |
| 7. Kon Pling | 26 | 31 | 162 | 157 | 5 |
| 8. Kon Pieng | 21 | 30 | 141 | 141 | - |
| 9. Tu Can | 38 | 42 | 208 | 208 | - |
| 10. Vi Chong | 25 | 28 | 143 | 139 | 4 |
| 11. Kon Klung | 57 | 59 | 283 | 276 | 7 |
| **OVERALL** | **598** | **721** | **3,581** | **M'nam** / **H're** | **Kinh** |
| | | | | **2,009** / **1,491** | **81** |

Source: Village Profile and Household Survey, Feb – March 2002

**Table II-3.2.2 Average sizes of households and number of main labor force per household by village**

| PoE | Average size of household | Ave. number of main labor force per household | Hieu | Average size of household | Ave. number of main labor force per household |
|---|---|---|---|---|---|
| 1. Kon Klang 1 | 7.1 | 3.6 | 1. Kon Plong | 6.0 | 2.9 |
| 2. Kon Klang 2 | 7.4 | 3.6 | 2. Vi G Long | 5.9 | 3.2 |
| 3. Kon K Tau | 5.5 | 3.3 | 3. Dak Lom | 7.4 | 4.2 |
| 4. PoE 1 | 7.6 | 4.5 | 4. Dak Lieu | 5.4 | 3.0 |
| 5. PoE 2 | 6.3 | 3.6 | 5. Vi Chiring | 6.5 | 3.6 |
| 6. Kon Roa | 6.1 | 3.1 | 6. Dak Xo | 4.6 | 2.3 |
| 7. Vi O Lak | 5.3 | 3.9 | 7. Kon Pling | 6.1 | 3.4 |
| **Total PoE** | **6.5** | **3.7** | 8. Kon Pieng | 6.3 | 3.0 |
| **Total Hieu** | **5.8** | **3.1** | 9. Tu Can | 4.9 | 2.5 |
| **Overall Total** | **6.1** | **3.3** | 10. Vi Chong | 5.4 | 2.9 |
| | | | 11. Kon Klung | 5.8 | 3.4 |

Source: Village Profile and Household Survey, Feb – March 2002

### (5) Education

The government has invested in educational infrastructure through various national programs. For example, 395 million VND for Hieu and 671 million VND for PoE has been allocated for the period 1999-2005, for constructing and upgrading primary schools and kindergartens through Program 135[12]. All villages in the 2 communes now have access to primary education either within the village or in the commune center, although some schools need further upgrading.

According to the household survey, the number of children not attending primary school accounted for 33% of the age group. Dropping out from school is also a concern in the 2 communes, although the dropout rate has reportedly been decreasing[13]. The number of students attending lower secondary school still remains at a low level. The results of the key informant interviews and RRA survey indicate that the main reasons for low attendance of lower secondary school are the constraints in transportation between the school and the villages (far distance, and difficulty in commuting during rainy season), and the cost of schooling[14].

Literacy rate is still low especially among the elderly. In most villages, literacy rate differs significantly between men and women. The average literacy rates of the 2 communes are 63% for men and 36% for women. Literacy rate of household heads also remains low, averaging at 43%. There is a significant difference of literacy rate among the villages, ranging from 18% to 79% for household heads, 46 to 86% for male population, and from 17 to 56% for female population.

**Table II-3.2.3 Literacy rate of household heads and household members**

| Village No. and Name | Household Heads (%) | Household members | | Village No. and Name | Household Heads (%) | Household members | |
|---|---|---|---|---|---|---|---|
| | | Male (%) | Female (%) | | | Male (% | Female (%) |
| *1. Kon Klang 1* | 21 | 58 | 17 | *1. Kon Plong* | 50 | 46 | 47 |
| *2. Kon Klang 2* | 18 | 49 | 23 | *2. Vi G Long* | 60 | 85 | 47 |
| 3. Kon K Tau | 44 | 58 | 43 | *3. Dak Lom* | 36 | 57 | 45 |
| 4. PoE 1 | 50 | 71 | 30 | *4. Dak Lieu* | 40 | 48 | 31 |
| 5. PoE 2 | 67 | 65 | 21 | 5. Vi Chiring | 79 | 83 | 48 |
| 6. Kon Roa | 77 | 72 | 55 | 6. Dak Xo | 19 | 55 | 23 |
| 7. Vi O Lak | 49 | 81 | 56 | 7. Kon Pling | 44 | 60 | 31 |
| **Total PoE** | **41** | **65** | **35** | 8. Kon Pieng | 29 | 59 | 36 |
| **Total Hieu** | **45** | **62** | **37** | 9. Tu Can | 47 | 58 | 30 |
| *Overall Total* | **43** | **63** | **36** | 10. Vi Chong | 57 | 76 | 44 |
| | | | | 11. Kon Klung | 32 | 50 | 21 |

Source: Village Profile and Household Survey, Feb – March 2002.
Note: Literacy rate is calculated by dividing the number of literate people by the number of household members whose age is above schooling age.

[12] Socio-economic development program for mountainous and remote most disadvantaged communes.
[13] Hieu People's Committee (2002). *Report on the socio-economic development, security, and defence of the 2nd half of year 2001 and 1st half of 2002.*
[14] While there is no school fee, cost for meals, clothes, notebooks etc. needs to be borne by the students who attend the lower secondary school located in the commune center. Children who attend boarding school at the district centre receive allowance for meals and clothes. However, allowance appears to be insufficient to cover the full expense.

**(6) Health and sanitation**

There is one health care station in each commune, with a doctor assistant and several nurses. Medical staff of the health care station visit villages periodically (2 to 3 days a week), and provide basic medicine to local people free of charge. At the village level, one nurse is appointed with the task to monitor the health situation of local people, and to report to the commune health care station for disease prevention and treatment. Healthcare service has reportedly improved, with epidemics occurring less frequently than in the past. However, RRA survey results indicate that the healthcare service is still not meeting the local people's demand. Poor medical equipment, limited number of medical staff, and shortage of medicine have been highlighted.

The government has been investing intensively in the rural water system. For example for the period 1999-2005, total amount of 1,107 million VND for Hieu and 960 million VND for PoE have been allocated through Program 135, with provisions of 60 dug wells each in the 2 communes, upgrading of gravity pipeline systems in 2 villages of PoE, and installation of gravity pipeline system in 4 villages of Hieu. At present, 9 out of 18 villages in the 2 communes have a gravity pipeline system, some with water purification filters and tanks[15]. The remaining villages are relying on water from the streams, springs, and water wells.

The hygiene situation is generally low. Free ranging of livestock is commonly practiced, and many villages have few if any latrines often in poor conditions. Unhygienic living conditions lead to high risks of diseases such as malaria, diarrhea, and eye infections, which are commonly observed in the villages. Skin diseases are also common in villages that do not have water-filtering facilities. Infant mortality and malnutrition are also reported as common phenomena.

### 3.2.2 Land Use

**(1) Current situation of land use**

Current land use situation based on the district statistics is shown in Table I-2.2.12. Most of the paddy fields are located along the streams or at a lower altitude, as the local irrigation system relies on gravity to channel water. Areas at higher altitude from water sources are often left untouched, even if the land was flat and otherwise suitable for cultivation. In Hieu Commune, areas suitable for lowland rice cultivation (i.e., areas where irrigation water is available) have mostly been reclaimed leaving little land for further expansion, according to the commune officers. Upland farms are normally located at the edge of the forest, also nearby paddy fields, whereas shifting cultivation fields are often

[15] Villages no. 1, no. 2, no. 5, no. 9, no. 10, and no. 11 of Hieu commune, and villages 3, 6, and 7 of PoE commune. The pipelines in villages 10 and 11 of Hieu commune are out of order and have not been repaired.

located in remote areas. In the villages newly resettled close to the national road, upland farms are also observed in the areas adjacent to the road. In addition to the above, most households have permanent cultivation plots and home gardens near their residential areas.

**(2) Key historical changes of land use**

1) Distribution of agricultural land and the impact of resettlement

Distribution of current residential areas and agricultural land is closely related to the resettlement history. For example, Vi O Lak (village no. 7 of PoE) has resettled twice since the 1980s. Their paddy fields are distributed in 3 main clusters: two near the old settlements and another close to the current residential area. In Dak Xo (village no. 6 of Hieu), they are cultivating the paddy fields that were opened in late 1950s when the village moved to settle in the forest escaping from American troops. Land is also cleared to establish new settlement areas and home gardens when villages are divided into new villages, as is the case in Vi Chong (village 10 of Hieu) and Kon Klang 2 (village 2 of PoE).

2) Condition of the forest

The impact of the war on forest resources appears to have been quite significant. The impact of dioxin sprayed by the Americans during 1965-66 was reportedly severe in the 2 communes, especially in the areas close to R24 and around paddy fields. Crops were lost and trees died, leaving the areas denuded for 2 to 5 years. Some areas are reported to have remained bare since then. Survey findings also revealed that in some villages, upland farming was introduced during the 1950s –1960s at the time of resistance to French and American regimes, to provide sufficient food for the Vietnamese soldiers.

**(3) Status of land use certificate issuance**

Land use right certificates (Red book certificates: RBCs) have been issued to farmers in Hieu and PoE in 1999 – 2000 (Table II-3.2.4). The RBCs can be issued for agricultural land, including paddy fields, upland farms and home gardens, and for residential areas. However, RBCs have only been issued for paddy fields in the 2 communes so far. There have been cases in which the location and size of the land were recorded inaccurately. The district cadastral office is making corrections as claims are brought in from the farmers.

**Table II-3.2.4 Land use right certificates issued in Hieu and PoE communes**

| | Area (ha) | | No of Certificates | |
|---|---|---|---|---|
| | Hieu | PoE | Hieu | PoE |
| Total Area | 345 | 208 | 341 | 283 |

Source: Cadastral Office, Kon Plong District People's Committee (2001). Report on the result of implementation of Land Use Right Certificate issuance of communes in Kon Plong District.

According to interview findings, land use certificates for upland farms can be issued if the land is categorized as 'existing upland farm,' which includes areas that have been used for cultivation for a long time period (both the areas currently being cultivated, and those areas in fallow). Slash and burn cultivation and shifting cultivation are also observed on land not categorized as 'existing upland farm.' While in some cases farmers obtain permission from village leaders to use such land, their legal status is not secure (refer section 3.2.5.(3)) . In the model area, Mang La FE is the entity that holds the rights to manage the forest. Therefore, forestland allocation to households has not been practiced in Hieu and PoE. However, FE entrusts households to look after some portions of forestland by issuing Forest Protection Contracts (FPC, refer to section 3.2.5 (3) 2) ). As FPCs are applied for protection forests, they have been issued to all villages in PoE and Hieu, except the 5 villages in Hieu that are surrounded by production forest.

### 3.2.3 Productive activities

#### (1) Agriculture

The basic agricultural statistics of the 2 communes are summarized in Table II-3.2.5. The situation of agriculture and forestry sector is summarized by village in Table II-3.2.6 (More details are available in Volume III of the Supplemental Data Book). There were no major differences observed between the two communes regarding the situation of agriculture. It largely remains at the subsistence level, and there were some cases in which households were not able to secure sufficient level of food and rely on natural resources to meet their needs.

The typical pattern of agricultural production in the 2 communes consists of lowland rice cultivation as their main staple crop, and cultivation of upland farms and home gardens for supplementary food and/or for cash income. Livestock husbandry and aquaculture is also practiced on a small scale. Slash and burn cultivation (or shifting cultivation) is still practiced in small areas. Applications of agroforestry were observed but very few.

Lowland rice is the by far the dominant crop, accounting for 90% of the total food output. Upland crops such as cassava are used mainly for jar wine production and livestock feeding. Vegetables are planted in small quantity mainly in home gardens, mostly for household consumption, with a few

exceptional cases such as in villages 1, 2, and 7 in Po E. In these villages, vegetables are grown in relatively large quantities, enabling the farmers to sell a portion of their harvest[16].

**Table II-3.2.5 Agricultural statistics of Hieu and Po E communes, 2001 (Food Output)**

| Item | District | Hieu | Po E |
|---|---|---|---|
| Population (Persons) | 33,027 | 1,952 | 1,520 |
| Total food output (ton) | 11,258.9 | 397.8 | 339.8 |
| Average food output per capita (kg/year/capita) | 340 | 200 | 220 |

| Planted Area (ha) | | | | Crop Yield (ton) | | | |
|---|---|---|---|---|---|---|---|
| Item | District | Hieu | Po E | Item | District | Hieu | Po E |
| *Lowland rice* | 3,168.8 | 180.0 | 153.8 | Lowland rice | 6,311.5 | 360.0 | 303.8 |
| Spring-winter | 368.6 | - | - | Spring-winter | 1,195.0 | - | - |
| Summer | 2,800.2 | 180.0 | 153.5 | Summer | 5,116.5 | 360.0 | 303.8 |
| Upland rice | 1,042.1 | - | 3.5 | Upland rice | 1,268.8 | - | 3.8 |
| Maize | 1,512.5 | 21.0 | 20.0 | Maize | 4,947.4 | 37.8 | 36.0 |
| Cassava | 857.6 | 30.0 | 30.0 | Cassava | 4,896.9 | 165.0 | 165.0 |
| Sweet potato | 31.2 | - | 4.9 | Sweet potato | 158.9 | 0.0 | 25.0 |
| Vegetables | 62.9 | 3.0 | 4.0 | Crop Productivity (t/ha) | | | |
| Beans | 42.4 | 3.0 | 3.0 | Lowland rice | 1.99 | 2.00 | 1.98 |
| Short-term industrial crop | 412.2 | 3.0 | 3.5 | Spring - winter | 3.24 | - | - |
| Tobacco | 29.0 | 3.0 | 3.5 | Summer | 1.83 | 2.00 | 1.98 |
| Perennial crops | 713.4 | | | Summer* | | 1.18 | 1.16 |
| Coffee | 282.2 | | 8.0 | Upland rice | 1.22 | - | 1.10 |
| *Boiloi* | 205.3 | 28.0 | 4.0 | Maize | 3.27 | 1.80 | 1.80 |
| Cinnamon | 54.9 | | 3.1 | Cassava | 5.71 | 5.50 | 5.50 |
| Fruit trees | 103.8 | 5.5 | 4.2 | Sweet potato | 5.09 | - | 5.09 |
| Tea | 11.0 | 8.0 | | | | | |

[16] For example, there was one family in Village 2 of PoE who harvested 105 kg of chayote last year, out of which they sold 27 kg at the price of 4,000 VND/kg. Likewise, one family harvested 100 pumpkins, out of which they sold 40 at the same price. Source: Extracted from Kon Plong District DARD (2001). *Report on Actual Implementation of the Plan for 2001.*

## Table II-3.2.6 Village profile on agriculture and forestry (1)

| | Commune | Hleu | | | | |
|---|---|---|---|---|---|---|
| | Village no. (name) | 1 (Kon Plong) | 2 (Vi K Long) | 3 (Dak Lom) | 4 (Dak Lieu) | 5 (Vi Chi Ring) |
| 1 | Overview | | | | | |
| 1.1 | Location | N: 14°37.91<br>E: 108°24.37; 1,217 m | N: 14°38.84<br>E: 108°23.93; 1,183 m | N: 14°39.30<br>E: 108°25.42; 1,214 m | N: 14°39.37<br>E: 108°25.78; 1,211 m | N: 14°39.26<br>E: 108°26.40; 1,279 m |
| 2 | Agriculture | | | | | |
| 2.1 | Paddy *1 | 1.2 ton/ha | 29.5 ha, 1.5-2.0 ton/ha | 20 ha, 1-2 ton/ha (depends on fertilizer) | 10 ha, 1-1.5 ton/ha | 4.9 ha, 1.5 ton/ha |
| 2.2 | Upland (including shifting cultivation) | Maize, cassava, sweet potato, taro | Maize, cassava, sweet potato, taro | Maize, sweet potato, taro (no cassava) | Maize, cassava, sweet potato, taro | Maize, cassava, sweet potato, taro |
| 2.3 | Horticulture | Chayote, eggplant, chilli, citronella, ginger, orange, jackfruit, grapefruit, guava, tea Shan, pineapple, cinnamon | Chayote, eggplant, chilli, citronella, ginger, orange, jackfruit, grapefruit, banana, pineapple, tea Shan, red and green boi loi, cinnamon | Chayote, mustard leaves, water morning glory, China squash, cucurbit, eggplant, chilli | Mustard leaves, eggplant, chilli, citronella, ginger, orange, jackfruit, guava, pineapple, tea Shan, coffee, red and green boi loi, cinnamon | Chayote, mustard leaves, orange, pineapple, banana, tea Shan, coffee, pepper, red and green boi loi |
| 2.4 | Suitable crop | Orange, tea Shan, pineapple, green boi loi | Orange, grapefruit, tea Shan, green boi loi | | Sweet potato, taro, maize, chayote, orange, tea Shan, pineapple, cinnamon, green boi loi | Orange, pineapple, tea Shan, green boi loi |
| 2.5 | Unsuitable crop | Jackfruit, mango, papaya, longan, coconut, red boi loi | Coffee, pepper, red boi loi, | Cinnamon, red boi loi | Coffee, banana | Banana, coffee, pepper |
| 2.6 | Livestock | 100 buffaloes, (no cows), few pigs and chickens | 50 buffaloes, (no cows), few pigs and chickens | 67 buffaloes, 3 cows, 57 pigs (no chickens) | 18 buffaloes, (no cows), few pigs and chickens | 23 buffaloes, 4 cows, 48 pigs, few chickens |
| 2.7 | Fisheries | 50 fishponds | No fishponds due to no water availability | 3 fishponds | 8 fishponds | 2-3 fishponds due to no water availability |
| 3 | Forestry | | | | | |
| 3.1 | Natural resources | Honey, mushroom, (no medicinal plants), (no hunting) | Honey, (no medicinal plants or hunting) | Honey, mushroom, (no hunting) | Honey, mushroom, (no medicinal plants or bamboo shoots), (no hunting) | Honey, mushroom, bamboo shoots, wild banana and vegetables, (no medicinal plants), (no hunting) |
| 3.2 | Plantation and others | Bamboo | | | | 500 Agalwood planted |

Note: *1: Area in village and productivity on average

**Table II-3.2.6 Village profile on agriculture and forestry (2)**

| | Commune | Hieu | | | | Po E |
|---|---|---|---|---|---|---|
| | Village | 8 (Dak Xo) | 9 (Tu Cen) | 10 (Vi Chong) | 11 (Vi Klung) | 1 (Kon Lang 1) |
| 1 | Overview | | | | | |
| 1.1 | Location | N: 14°37.61<br>E: 108°26.86; 1,228 m | N: 14°40.54<br>E: 108°27.20 | N: 14°40.50<br>E: 108°27.14; 1,160 m | N: 14°41.88<br>E: 108°27.55; 1,057 m | N: 14°43.02<br>E: 108°28.52; 1,196 m |
| 2 | Agriculture | | | | | |
| 2.1 | Paddy *1 | 14.5 ha | 14.3 ha, 1.5-2.0 ton/ha | 13 ha, 2 ton/ha | 17 ha, 2 ton/ha | 26 ha, 1.5-2.0 ton/ha |
| 2.2 | Upland (including shifting cultivation) | Maize, cassava, sweet potato, taro | Maize, cassava, taro | Sweet potato, cassava, taro | Maize, sweet potato, cassava | Maize and cassava, sweet potato, taro |
| 2.3 | Horticulture | Chayote, eggplant, tobacco, pineapple, guava, coffee, cinnamon, tea Shan | Orange, jackfruit, guava, banana, sugarcane, mango, pineapple, tea Shan, coffee Timo, red and green boi loi | Calabash (bitter cucumber), ginger, orange, mango, papaya, milk fruit, coconut, guava, pineapple, pepper, cinnamon, green boi loi, coffee | Orange, mango, papaya, longan | Chayote, mustard leaves, onion, tobacco, orange, pineapple, banana, cinnamon, tea, red boi loi, coffee Timo, lemongrass |
| 2.4 | Suitable crop | | Orange, tea Shan | Orange, cinnamon, green boi loi, guava | Cassava, sweet potato, green tea, taro, orange | Orange, cinnamon, red boi loi, jackfruit, pineapple, cocoa |
| 2.5 | Unsuitable crop | Coffee | red boi loi | Pepper, mango, papaya, red boi loi, | Maize, beans, tomato, mango, papaya, longan | Coffee, mango, papaya |
| 2.6 | Livestock | 43 buffaloes, 15 cows, 6-7 pigs | 50 buffaloes, 7 cows, 50 pigs, few chickens | 50 buffaloes, pig and chicken almost eradicated, few pigeons | 60 buffaloes, pig and chicken almost eradicated | 70 Buffaloes, 21 pigs, few chickens |
| 2.7 | Fisheries | No fishponds due to no water availability | Fishponds: 30 H/Hs | Fishponds: 10 H/Hs | No fishponds | No fishponds |
| 3 | Forestry | | | | | |
| 3.1 | Natural resources | Honey, mushroom, bamboo shoots, (no medicinal plants), (no hunting, only of small animals like rats) | Honey, (no medicinal plants), (no hunting) | Honey, orchid leaves | Timber, honey, orchid leaves, leaves for wine fermentation | Honey, (no medicinal plants), (no bamboo shoots), hunting only small animals |
| 3.2 | Plantation and others | | Agalwood (*Aquilaria crassna*) | Agalwood (*Aquilaria crassna*), Po Mu (*Fokienia hodginsii*), *Acacia mangium* and *A. auriculiformis* | Agalwood (*Aquilaria crassna*) from seeds | Boi loi leaves are believed to improve soils, *Erythrina indica* for live fences |

Note: *1: Area in village and productivity on average

**Table II-3.2.6 Village profile on agriculture and forestry (3)**

| | Commune | Po E | | | | |
|---|---|---|---|---|---|---|
| | Village | 2 (Kon Lang 2) | 3 (Kon K Tau) | 4 (Po E 1) | 6 (Kon Koa) | 7 (Vi O Lac) |
| 1 | Overview | | | | | |
| 1.1 | Location | N: 14°43.24<br>E: 108°28.61; 1,181 m | N: 14°44.20<br>E: 108°30.12 | N: 14°44.65<br>E: 108°28.29 | N: 14°45.49<br>E: 108°29.52; 912 m | N: 14°45.46<br>E: 108°30.26 |
| 2 | Agriculture | | | | | |
| 2.1 | Paddy *1 | 29.5 ha, 1.5-2.0 ton/ha | 27 ha, 1.5-2.0 ton/ha | 21 ha, 2.0 ton/ha | 24 ha, 2.0 ton/ha | 18 ha, 2.0 ton/ha |
| 2.2 | Upland (including shifting cultivation) | Maize, cassava, sweet potato, taro | Maize, cassava, sweet potato, taro, upland rice, tobacco | Maize, cassava, sweet potato, taro, upland rice | Upland rice, maize, cassava, sweet potato, taro | Maize, cassava, sweet potato, taro, upland rice, tobacco |
| 2.3 | Horticulture | Orange, grapefruit, jackfruit, banana, pineapple, pepper, coffee Timo, tea Shan, cinnamon, red & green boi loi | Orange, banana, persimmon (*Kaki*), pineapple, tea, cinnamon, green boi loi, coffee, coconut, jackfruit | Orange, grapefruit, jackfruit, banana, pineapple, pepper, coffee Timo, tea Shan, cinnamon, red & green boi loi | Orange, jackfruit, papaya, guava, banana, coffee Timo, tea Shan, cinnamon, red and green boi loi | Orange, mandarin, grapefruit, jackfruit, mango, guava, banana, pineapple, tea Shan, coffee Timo, cinnamon, red and green boi loi |
| 2.4 | Suitable crop | Orange, grapefruit, tea Shan | Orange, banana, guava, pineapple, green boi loi, tea | Cassava, orange, tea Shan, green boi loi | Cassava, orange, pineapple, jackfruit, tea Shan, red boi loi | Orange, mandarin, jackfruit, cinnamon, boi loi, tea Shan, pepper, taro |
| 2.5 | Unsuitable crop | Coffee Timo, red boi loi, pepper | Coffee, coconut, jackfruit | Coffee Timo, pepper | | Grapefruit, mango, banana, pineapple, coffee |
| 2.6 | Livestock | 50 buffaloes, (no cows), few pigs or chickens | 70 buffaloes, few pigs, chickens or duck | Buffalo, few pigs or chickens | 41 buffaloes, 8 cows, (no pig, chicken, duck) | 64 buffaloes, 18 cows, few pigs, chickens or ducks |
| 2.7 | Fisheries | No fishponds due to no water availability | Fishponds: 5 H/Hs | 1 fishpond | 6 fishponds | No fishponds |
| 3 | Forestry | | | | | |
| 3.1 | Natural resources | Honey, (no medicinal plants), (no hunting) | Honey, (no medicinal plants), (no hunting) | Mushroom, (no medicinal plants), (no hunting) | Medicinal plants, mushroom, hunting, (no honey) | Honey, medicinal plants, bamboo shoots, hunting, Agalwood, green boi loi |
| 3.2 | Plantation and others | | *Acacia mangium*; green boi loi improve soils, 3 species of bamboo, *Erythrina indica* for live fences | 3 species of bamboo | | Jackfruit keeps soil fertility and wild banana maintains water; 3 species of bamboo planted |

Note: *1: Area in village and productivity on average

1) Lowland rice

In the 2 communes, most of the paddy fields are cultivated only once a year. Productivity of lowland rice is stable but low at around 1.0 – 2.0 t/ha according to the village survey results. The typical cropping pattern of lowland rice cultivation in the 2 communes begins with renovation of ridges of the fields in January, plowing in February – March, followed by transplanting of seedlings from the nursery to the field in April – May. Crop is harvested from August to October. Plowing is done by two methods depending on the depth of the soil, either manually by using a hoe, or by having buffalo walk on paddy fields. The method of having a buffalo pull a plow was rarely observed in the 2 communes. Paddy fields largely rely on rainwater and small temporary water diversions from streams by gravity. Sophisticated irrigation systems are not commonly observed.

Aside from labor input, farmers' investment in agriculture is very low. On average, one household invests only 11,000 VND/sao[17]. Seeds of the local varieties are stored from the harvest of the previous year, except for a small amount of new variety rice that is either distributed by the government or purchased by the farmers. The majority of the farmers do not use chemical inputs such as fertilizers, insecticides or pesticides, neither do they use organic manure. The only exception observed was in the demonstration plots for the semiannual cropping system supported by the district Department of Agriculture and Rural Development (DARD)[18].

Average number of plots per household ranges from 2.8 to 6.1 plots (Table II-3.2.7). Total area of paddy field per household ranges from 4.6 sao to 9.4 sao, with the commune average of 7.2 sao per household in Hieu and 7.3 sao per household in PoE. Generally, villages that are located by the national road tend to have smaller areas, while the villages in the interior have larger areas. The size of the paddy field (plots) in the 2 communes is small, averaging below 2 sao except for the two villages located furthest from R24 (Kon Pling and Kon Pieng). Local people's perception is that more than 50% of their paddy field area is of low quality soil. Figure II-3.2.2 shows the proportion of households by landholdings. Analysis reveals that 47% of the total households surveyed have 6 sao or less, out of which 15% have 3 sao or less.

Calculating from the average crop productivity (1.17 t/ha), average land holding (7.2 sao) and averages household size (6.1 persons), the average rice productivity per capita in the 2 communes is 138 kg/capita/year. This indicates that the current level of lowland rice production alone is not sufficient to achieve self-sufficiency of food, without other sources of income or food production[19].

[17] 1 sao = 1,000 $m^2$.

[18] The district organizations have been restructured recently, and the DARD has been integrated into the Economic Division (ED). The department will be referred to as Economic Division ED – DARD hereafter.

[19] Households with an income equivalent of 13 kg rice/capita/month (i.e., 156 kg rice/capita/year) or below are considered as *most disadvantaged households* (households suffering from hunger), according to the definition used by the district in year 2000 (cited from FIPI, 2000).

**Table II-3.2.7 Average number and size of paddy fields per household**

| Village No. and Name | Average No. of plots | Total area (sao) | Ave. size of plot (sao) | Good land (%) | Moderate land (%) | Poor land (%) |
|---|---|---|---|---|---|---|
| **PoE** | **5.1** | **7.3** | **1.4** | **10%** | **37%** | **53%** |
| 1. Kon Klang 1 | 5.6 | 8.1 | 1.4 | 17% | 51% | 31% |
| 2. Kon Klang 2 | 6.1 | 7.9 | 1.3 | 13% | 56% | 32% |
| 3. Kon K Tau | 3.1 | 5.3 | 1.7 | 8% | 34% | 58% |
| 4. PoE 1 | 5.1 | 7.6 | 1.5 | 11% | 22% | 68% |
| 5. PoE 2 | 5.3 | 8.2 | 1.6 | 2% | 23% | 74% |
| 6. Kon Roa | 5.6 | 6.4 | 1.1 | 2% | 6% | 92% |
| 7. Vi O Lak | 4.7 | 7.8 | 1.7 | 17% | 59% | 24% |
| **Hieu** | **4.2** | **7.2** | **1.7** | **8%** | **36%** | **54%** |
| 1. Kon Plong | 4.5 | 8.1 | 1.8 | 12% | 32% | 56% |
| 2. Vi G Long | 3.9 | 6.0 | 1.5 | 8% | 30% | 62% |
| 3. Dak Lom | 4.3 | 5.8 | 1.4 | 9% | 22% | 71% |
| 4. Dak Lieu | 5.8 | 6.0 | 1.0 | 2% | 33% | 65% |
| 5. Vi Chiring | 2.8 | 4.6 | 1.6 | 17% | 41% | 41% |
| 6. Dak Xo | 3.4 | 5.9 | 1.7 | 2% | 46% | 53% |
| 7. Kon Pling | 2.8 | 9.0 | 3.3 | 3% | 32% | 64% |
| 8. Kon Pieng | 3.3 | 9.4 | 2.9 | 9% | 44% | 47% |
| 9. Tu Can | 4.1 | 6.1 | 1.5 | 3% | 59% | 36% |
| 10. Vi Chong | 5.4 | 7.8 | 1.5 | 12% | 10% | 78% |
| 11. Kon Klung | 5.9 | 9.4 | 1.6 | 12% | 48% | 41% |
| **OVERALL** | **4.5** | **7.2** | **1.6** | **8%** | **38%** | **54%** |

Source: Village Profile and Household Survey, Feb – March 2002.

A number of training courses are offered in the 2 communes every year, mainly by the district ED-DARD. Courses recently offered include training on new crop variety application, usage of fertilizer, and integrated pest management. The trainings are mostly held at the commune level, inviting village chiefs, deputy chief and a few farmers. While the participants are expected to disseminate the contents of the course to the villagers, it has been difficult for the participants to acquire skills and to transfer them effectively to the villagers. Another constraint is the limited technical knowledge and skills of the commune agricultural extension staff recruited locally from the commune by the district ED-DARD.

Demonstration plots for Spring/Winter crop (January-April) are being established by district ED-DARD in Kon K Tau village (village no.3 of Po E) and Vi Chong village (village no. 10 of Hieu). Semiannual cropping has also been tried out in several villages, but these attempts have not been successful.

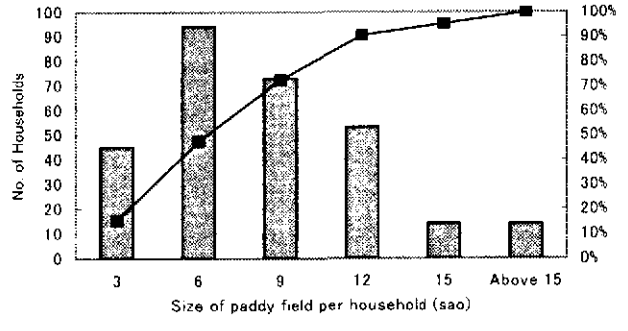



**Figure II-3.2.2 Size of paddy fields per household and distribution**

Local people's perceptions on the reasons of failure include lack of sufficient water, low soil fertility (lack of fertilizer), and climatic

condition (cold weather, prolonged rain, etc.). They feel that the variety introduced was not suitable to the local environment.

2) Upland farming

According to the survey, 69% of the households practice upland farming, and the average area of upland farm cultivated per household is 1,131 $m^2$ in Po E and 697 $m^2$ in Hieu (Table II-3.2.8). It is however difficult to clearly distinguish permanent plots from those used for shifting cultivation, as the farmers do not have a clear understanding on the definitions of shifting, slash and burn, and permanent upland cultivation. Also farmers tend to be reluctant to give clear explanation about their cultivation patterns, as they are aware that shifting cultivation is prohibited by law.

It is worth noting, however, that slash and burn cultivation has not been practiced on a large scale in the 2 communes traditionally. Lowland rice cultivation has always been the local people's major subsistence crop. In some villages, slash and burn cultivation was not introduced until the 1950s-1960s when there was a need to increase food productivity to cater for the Vietnamese soldiers fighting against French and Americans.

**Table II-3.2.8 Average number and size of upland fields per household**

| Village No. and Name | Average No. of plots | Total ($m^2$) | Good land (%) | Moderate land (%) | Poor land (%) |
|---|---|---|---|---|---|
| **PoE** | **1.1** | **1,131** | **5%** | **72%** | **23%** |
| 1. Kon Klang 1 | 1.0 | 1,214 | 18% | 77% | 6% |
| 2. Kon Klang 2 | 1.1 | 1,353 | 0% | 96% | 4% |
| 3. Kon K Tau | 0.6 | 444 | 14% | 68% | 18% |
| 4. PoE 1 | 0.9 | 531 | 0% | 35% | 65% |
| 5. PoE 2 | 1.0 | 953 | 0% | 52% | 48% |
| 6. Kon Roa | 1.5 | 1,441 | 8% | 47% | 45% |
| 7. Vi O Lak | 1.4 | 1,945 | 0% | 93% | 7% |
| **Hieu** | **0.7** | **697** | **5%** | **56%** | **39%** |
| 1. Kon Plong | 0.8 | 725 | 0% | 67% | 33% |
| 2. Vi G Long | 1.1 | 1,295 | 8% | 42% | 50% |
| 3. Dak Lom | 0.1 | 21 | 0% | 100% | 0% |
| 4. Dak Lieu | 0.5 | 493 | 0% | 41% | 59% |
| 5. Vi Chiring | 0.7 | 671 | 11% | 59% | 31% |
| 6. Dak Xo | 0.8 | 850 | 7% | 52% | 41% |
| 7. Kon Pling | 1.3 | 1,088 | 0% | 87% | 13% |
| 8. Kon Pieng | 0.8 | 786 | 0% | 82% | 18% |
| 9. Tu Can | 0.8 | 688 | 0% | 34% | 66% |
| 10. Vi Chong | 0.9 | 621 | 23% | 34% | 43% |
| 11. Kon Klung | 0.4 | 318 | 0% | 50% | 50% |
| **OVERALL** | **0.9** | **862** | **5%** | **64%** | **31%** |

Source: Village Profile and Household Survey, Feb - March 2002.

Generally, upland farms for shifting cultivation are located in remote areas, in some cases more than 2 hours walking distance from the residential areas. The existing practices of slash and burn

agriculture, in general, begin in January – February by cutting secondary forest grown on fallow land, followed by burning in March. Planting of maize and cassava begins during the rainy period of March – April. Weeding is practiced twice a year, one month and two and a half months after planting. Cultivation method is not highly sophisticated, and crops are often planted in between stumps that had just been burned down. Maize is harvested around July, whereas cassava is harvested when needed over a 2-year period after growing the crop for one year. When upland rice is included in the cultivation pattern, it is harvested only in the first year, followed by maize and cassava in the 2nd year. Cassava is the only crop grown in the 3rd year and beyond.

Normally, land is left to rest in fallow after 2 to 4 years of cultivation. Fallow period is 4 to 5 years, depending on the soil fertility that is assessed by the growth of specific tree species. In most villages, there is no strong sense of ownership over fallow land. Households, who are not necessarily the previous user, can open and burn fallow land as per their labor availability (Refer to 3.2.5 (3)).

Most of the households have permanent upland farms plots close by the residential areas where they mainly grow maize, cassava, and sweet potatoes. Productivity of these plots is assessed to be low, due to severe erosion resulting from long-term cultivation without the use of fertility improvement measures, and lack of soil erosion control measures.

3) Home garden

Home gardens are also common in the 2 communes. Eighty three percent of the households surveyed have home gardens, with an average size of 860 $m^2$. A wide variety of fruits and vegetables are grown, such as lemongrass, eggplant, taro, sweet potato, gourd, chayote, orange, jackfruit, banana, coffee, cinnamon, grapefruits, pineapples, tea, *boi loi* (*Machilus* spp., *Litsea.* spp.), tobacco, sugarcane etc., although in small quantity mainly for their own consumption. District ED-DARD has been actively introducing industrial trees and crops during the past 2 to 3 years. For example, oranges, mandarin, *boi loi*, cinnamon, and coffee have been introduced in several villages.

Farmers perceive that most of the crops and trees grown do not suit the local climate and soil conditions, with few exceptions such as orange and *boi loi*. In some villages, farmers are very pessimistic about growing these crops and trees due to past experiences. Contrastingly, the commune agriculture extension officer based in Hieu commune expressed that the local climate is suitable for most of the crops, and he is growing a wide range of vegetables himself. This gap of perception between local farmers and extension staff is one of the key factors that need to be considered in developing policies and programs of agricultural extension in the future.

The layout, fencing materials and structure, and maintenance of home gardens and permanent upland plots vary among villages and households. Well-maintained gardens are watered and have

firm fencing, with ditches to prevent animal intrusion. Poorly maintained gardens are full of stumps, and have insecure fencing.

**(2) Livestock and aquaculture**

Livestock is an important source of cash income in the 2 communes. Large animals are mostly sold to traders from Quang Ngai and Kon Plong who visit the villages, while chickens are sold to local villagers, teachers, construction workers, etc. Except for chicken, villagers consume their own livestock only on special occasions, such as funerals and at the occasion of new house construction.

During the lowland rice cultivation season (April to October), buffaloes are normally kept in cages at night to prevent damage to paddy fields (cages are normally without roofs). Free grazing in grassland and forestland is practiced during the off-farm season, from November to February.

**Table II-3.2.9 Percentage of households who own livestock**

| | Buffalo | Cow | Pig | Poultry |
|---|---|---|---|---|
| Hieu | 63% | 8% | 58% | 80% |
| PoE | 61% | 5% | 64% | 62% |
| **TOTAL** | 62% | 7% | 60% | 73% |

Source: Village Profile and Household Survey, Feb – March 2002.

Smaller livestock such as pigs and chickens are also often set free in the residential area. Improper caging and free grazing of animals are considered to be among the main reasons for frequent occurrence of animal epidemics. When epidemic outbreaks occur, a high percentage of the livestock population die, in some cases reaching 100%. For example, the most recent epidemic outbreak in 2000 resulted in serious losses of livestock in Kon Plong, Dak Lieu, and Vi Chong (villages 1, 4, and 10 of Hieu), according to the RRA Survey. Commune veterinary staff provide an immunization service for buffaloes, however it has not been highly effective as cases are often brought in too late.

In recent years, fish harvested from ponds have been serving as an important source of protein in the model area, since other livestock have suffered from frequent occurrence of epidemics. However, there is a significant gap in terms of awareness and application of fishponds by villages, depending on their technical knowledge and water supply capacity. Villages can be clearly categorized into two groups: those without any fishponds, and those having fishponds. Technical level also varies among the villages that have fishponds. Some have achieved stable productivity by establishing dams to circulate fresh water, while in other villages most of the fish die due to poor technical application.

**(3) Forest resources**

The main non-timber forest products (NTFPs) harvested by local people are shown in Table II-3.2.10. The types of NTFPs consumed and sold vary among the villages. The reasons behind the difference are the availability of the products, and the local people's knowledge. For example, villagers of Kon Pling and Kon Pieng (villages 7 and 8 of Hieu), the two most remote villages, were not aware of diamond leaf and its market value. In addition to these NTFPs, various kinds of natural vegetables and fruits are collected for household consumption. Small animals such as rats and birds are also hunted. Porcupine, wild pig, weasel, muntjac, deer, and monkey are also reportedly hunted in some villages.

**Table II-3.2.10 NTFP utilization in PoE and Hieu**

| Type | Main season of harvest | Quantity collected | Main purpose |
|---|---|---|---|
| Bamboo (stems) | Year round | 13,000 | Consumption |
| Mushroom (kg) | March-June | 730 | Consumption |
| Honey (liter) | May-July | 320 | Consumption & Sales |
| Diamond leaf (kg) | Year round | 140 | Sales |
| *Boi loi* (kg) | - | 1,330 | Sales |

Source: Village Profile and Household Survey, Feb – March 2002 (Note: The column on 'quantity collected' indicates the estimate of total quantity collected in the 2 communes in 2001)

Construction of one traditional house requires on average 8 to 12 $m^3$ of sawn timber. As the utilization ratio is low (estimated at around 30%), approximately 40 to 50 $m^3$ of round wood is needed. Local people must travel 5 to 8 km from their residential area to find quality timber for housing construction. From the VPHH survey, it is estimated that around 1,430 $m^3$ of timber was exploited in the 2 communes in 2001 for self-utilization, mainly for housing construction, fencing, and animal caging. In addition to the above, fuelwood is collected mainly from the forests and bush near residential areas and the farms, for cooking and heating. On average, one household utilizes 75 kg of firewood per week.

## 3.2.4 Economic conditions

**(1) Main sources of income / main means of supporting livelihoods**

In all villages, almost 100% of the households responded that the main source of income / means of sustaining livelihoods is lowland rice cultivation (Table II-3.2.11). Forest Protection Contract (FPC) was of the second highest importance in PoE, with 70% of households interviewed considering it as the main source of income. Contrastingly in Hieu, FPC is only granted in 6 villages, as the 5 other villages are surrounded by production forest. Livestock husbandry is another important means of sustaining livelihoods, it is considered as a main activity by 26% of households in PoE, and 22% in

Hieu.

While upland farming is a common practice in the central highlands in general, it is not a major livelihood activity in PoE and Hieu. Survey results indicate that only 5% of the households consider upland farming as their major livelihood activity. Comparing the ethnic groups, there is a difference on main livelihood activities between the local people (M'nam and H're) and the Kinh. The Kinh people support their lives mainly as small vendors or as government servants (e.g., teachers and nurses).

**Table II-3.2.11 Major sources of income / means of sustaining livelihoods**

| Village No. & Name | Agric.-1 Lowland Rice | Agric.-2 Other | Livestock | Shop/ Vendor | Wage Labour | Gov't Service | Forest Products | Forest Protection | Other |
|---|---|---|---|---|---|---|---|---|---|
| **PoE** | **100%** | **7%** | **26%** | **1%** | **14%** | **7%** | **0%** | **70%** | **1%** |
| 1. Kon Klang | 100% | 14% | 21% | 0% | 14% | 0% | 0% | 64% | 0% |
| 2. Kon Klang | 100% | 6% | 35% | 0% | 18% | 12% | 0% | 71% | 6% |
| 3. Kon K Tau | 100% | 6% | 31% | 6% | 19% | 0% | 0% | 56% | 0% |
| 4. PoE 1 | 100% | 0% | 25% | 0% | 6% | 6% | 0% | 88% | 0% |
| 5. PoE 2 | 100% | 0% | 13% | 0% | 13% | 7% | 0% | 73% | 0% |
| 6. Kon Roa | 100% | 0% | 24% | 0% | 18% | 6% | 0% | 47% | 0% |
| 7. Vi O Lak | 100% | 25% | 31% | 0% | 13% | 19% | 0% | 94% | 0% |
| **Hieu** | **98%** | **4%** | **22%** | **2%** | **11%** | **5%** | **2%** | **39%** | **7%** |
| 1. Kon Plong | 100% | 10% | 25% | 0% | 5% | 5% | 5% | 0% | 10% |
| 2. Vi G Long | 100% | 0% | 25% | 5% | 15% | 0% | 0% | 75% | 0% |
| 3. Dac Lom | 100% | 0% | 36% | 0% | 7% | 0% | 0% | 79% | 0% |
| 4. Dac Lieu | 93% | 0% | 13% | 7% | 7% | 0% | 0% | 80% | 0% |
| 5. Vi Chiring | 93% | 14% | 21% | 7% | 21% | 7% | 0% | 0% | 14% |
| 6. Dak Xo | 100% | 0% | 19% | 0% | 6% | 13% | 0% | 0% | 6% |
| 7. Kon Pling | 100% | 19% | 31% | 0% | 25% | 13% | 6% | 0% | 19% |
| 8. Kon Pieng | 100% | 0% | 0% | 0% | 7% | 7% | 0% | 0% | 0% |
| 9. Tu Can | 100% | 0% | 12% | 0% | 18% | 0% | 0% | 53% | 12% |
| 10. Vi Chong | 93% | 0% | 21% | 0% | 7% | 21% | 0% | 71% | 0% |
| 11. Kon Klung | 100% | 0% | 32% | 0% | 5% | 0% | 5% | 64% | 14% |
| **OVERALL** | **99%** | **5%** | **24%** | **1%** | **12%** | **6%** | **1%** | **51%** | **5%** |

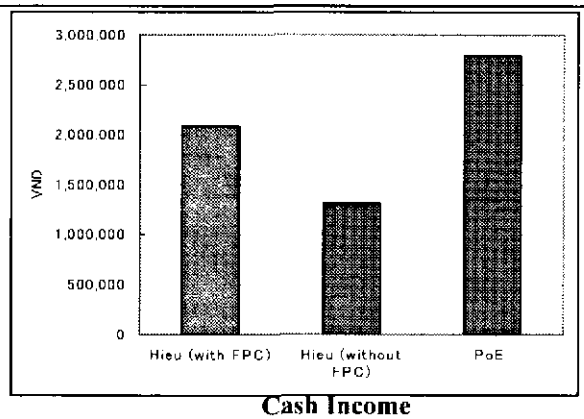
Source: Village Profile and Household Survey, Feb – March 2002.

### (2) Household income and expenditure

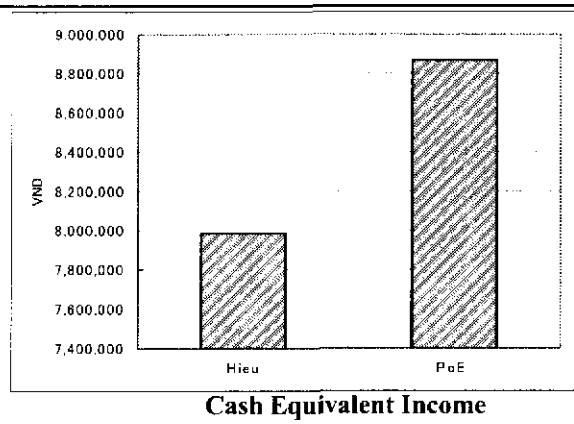
Figure II-3.2.3 shows the average income of households in PoE and Hieu commune. Economy in PoE and Hieu remains predominantly at subsistence level. Barter exchange is still common, as is the use of rice as a medium for exchange. Under such conditions, cash income alone does not fully reflect local people's level of wealth. Hence, the survey tried to capture cash income as well as the *cash equivalent* income, which was calculated by attaching monetary value to local people's agricultural and other production. Analysis reveals that cash income only accounts for 22% (Hieu) and 31% (PoE) of the total cash equivalent income. Overall, PoE has a higher average than Hieu, both in terms of cash and cash equivalent income. Forest Protection Contract (FPC) serves as the most important source of cash income for the local people in the 2 communes. Average cash income per household differs significantly between the villages that receive FPCs and those that do not.

The villages with the lowest average cash income are Dak Xo and Kon Pieng (villages 6 and 8) of Hieu commune, with approximately 740,000 and 710,000 VND per household per year respectively. The villages with the highest cash income were Vi Chong (village 10) of Hieu and Kon Klang 2, PoE 2, and Vi O Lak (villages 2, 5 and 7) of PoE, which exceed 3million VND per household per year. Villages with high levels of average cash income have a relatively large number of government employees, or there are households that own a large number of livestock. In terms of average cash equivalent income, the villages at the lowest level include Dak Lieu, Dak Xo and Tu Can of Hieu (villages 4, 6 and 9) and Kon K Tau of PoE (village 3), with below 7 million VND per household per year. One of the common characteristics of these villages was the relatively small average land holding per household (Table II-3.2.8), which indicates a low level of agricultural production.

Local people's income, both in terms of cash and cash equivalent terms, are unevenly distributed over the year. It is concentrated in the harvesting period (August, September and October), and the months of FPC payment (June and December). Expenditures are mainly on seasonings (salt and glutamate), and on clothes. Local people do not purchase meat and vegetables very often.




Cash Income




Cash Equivalent Income

**Figure II-3.2.3 Average household income (VND/HH/year)**

Source: Village Profile and Household Survey, Feb – March 2002.

### (3) Wealth distribution structure

Table II-3.2.12 summarizes the characteristics of households based on their economic status categorized into 3 groups: most disadvantaged, poor, and average and above[20]. The most notable characteristic of the most disadvantaged is the small landholdings of both paddy field and upland farms. Interview findings indicate that poor and most disadvantaged households tend to have inherited only a small area of land from their parents. They do not have enough family labor force, nor do they own buffalos to open or expand their paddy fields. Proportion of households suffering food shortage is higher among the poor and most disadvantaged, although close to 60% of the average and above

[20]The criteria used by the government for the most disadvantaged and poor households are as follows. Most disadvantaged households: Income level of equal or less than 55,000 VND/capita/month; Poor households: Income level between 55,000-70,000 VND/capita/month (Kon Tum Province Hunger Eradication and Poverty Alleviation Sub-Committee, 2000).

households also responded that they do not have enough food. The share of NTFPs within the total cash equivalent income is slightly higher among the most disadvantaged and poor households compared to the average and above households, although the absolute quantity of consumption is higher in the latter group.

**Table II-3.2.12 Characteristics of the households in the 2 communes based on welfare category**

| | Most Disadvantaged | Poor | Average and above |
|---|---|---|---|
| % of households | 15% | 13% | 72% |
| Average size of household (pers/HH) | 6.5 | 6.5 | 5.9 |
| Paddy fields | | | |
| Average size (sao) | 5.2 | 7.3 | 7.6 |
| Median (sao) | 4.8 | 6.4 | 7.0 |
| Upland fields | | | |
| Average size (sao) | 0.5 | 0.91 | 0.92 |
| Median (sao) | 0.2 | 1 | 1 |
| Livestock | | | |
| Households that do not own buffalo | 80% | 57% | 26% |
| Households that do not own pigs | 50% | 51% | 35% |
| Households that do not own chicken | 45% | 32% | 22% |
| Households with food shortage | 77% | 84% | 58% |
| Households with paddy field shortage | 32% | 32% | 24% |
| Average cash equivalent income from NTFPs (VND/year/household) | 961,000 | 1,095,000 | 1,309,000 |
| Share of NTFPs in total household cash equivalent income (VND/year/household) | 29% | 24% | 16% |

Source: Village Profile and Household Survey, Feb – March 2002

The quantitative data described above are supported by qualitative information obtained through the RRA Survey. In all villages, local people identified food shortage, land holding, and livestock ownership as the main criteria for identifying poor households. Lack of necessities such as housing and clothing were also highlighted, indicating the low level of income. Poverty ranking analysis by the local villagers, based on these criteria resulted in a slightly higher proportion of poor households at 43%, indicating that local people perceive more people are poor than what is implied by the statistical figures.

**Table II-3.2.13 Criteria identified by local people to identify poor households**

| Criteria | Characteristics of the Poor |
|---|---|
| Food shortage | • Lack of food for 2 to 3 months (Before harvest period) |
| Land holding | • 1-4 sao of paddy field |
| Livestock | • No buffalo<br>• Chicken and pig (some villages only) |
| Housing condition | • Wooden or bamboo wall with thatched roofing (iron roof where provided by gov't) |
| Household items | • No bed or not enough beds<br>• Not enough (or just enough) kitchen utensils |
| Clothing | • Not enough clothes to wear |

Source: RRA Survey, Feb – March 2002 (Consolidated data from 7 villages)