

## **CHAPTER IV**

### **AGRO-ECOSYSTEM OF THE STUDY AREA**

To have a general and covered view, characteristics such as geography and natural condition, population, surveyed households and labor characteristics, natural resources were studied in order to discover the general characteristics, problems, challenges and opportunities of the study area.

#### **4.1 General characteristics**

##### **4.1.1 History of development**

According to an archeological research, Haiduong is ancient land that has experience of administrative alterations. The province has changed the names and the shapes. In 1831, it was officially named Haiduong, embracing 3 sites covering 17 districts, located in the East of Hanoi and it is also called Thanhdong (Eastern Province). Since 1960, Haiduong has covered 11 districts and 1 town. In March 1968, Haiduong was integrated with Hungyen province into Haihung province, which embraced 20 districts and 2 towns, but provincial capital was in Haiduong town. This integration made management machinery more bulky and inefficient. Because of this, economy of whole province developed slowly, especially in agricultural sector. However in January 1997, Haiduong province was re-established; in August of the same year, Haiduong town was recognized as Haiduong city, so the province has kept 11 districts and 1 city since 1997. This made more condition to improve the economy of the province, especially in rural areas, and agricultural production (Haiduong Services of Investment and Planning, n.d.).

#### 4.1.2 Geographical condition

Haiduong is located in latitudes from 20°43' and 21°14'N and longitudes between 106°3' and 106°38' E between the Northern Vietnam Plains and Midlands - the second largest Red River delta of Vietnam (Haiduong Services of Investment and Planning, n.d.). It consists of 11 districts and one city with a total area of nearly 1.65 thousands km<sup>2</sup>, in which Chiling and Kinhmon are upland districts. The capital city is Haiduong and 55 km far from Hanoi Capital City of Vietnam. It is bordered by Haiphong province to the east, Hung Yen to the west, Bac Ninh and Bac Giang to the north, and Thai Binh to the south.

Table 4.1 Characteristics of the surveyed areas

District	Elevation	Ecosystem	Position	Water source	Profile
Thanhha	2.23 m	Plain lowland	East-southern Haiduong	Rainfall, surface water	Rice land and gardens
Chiling	33.58 m	Hilly upland	East-northern Haiduong	Rainfall, surface water, groundwater	Inefficient forest, idle hilly land, and gardens

Source: farmer interview, 2003

Haiduong has two litchi production systems, upland and lowland systems. Some characteristics of these systems are quite different from each other (Table 4.1). Thanhha is a plain lowland district with sea level elevation of 2.2 m and located in east-southern side of Haiduong. Its per km<sup>2</sup> average population density is more than one thousands people, and total area is around 158.9 km<sup>2</sup>, in which agricultural area occupies 70.9% and is irrigated by rainfall and surface water. The land, up to now, that has been growing the litchi originated from rice land and garden land. Chiling is a hilly upland district with sea level elevation of 33.6 m and located in east-northern side of Haiduong. Its average population density is more than 5 hundreds people/km<sup>2</sup> with a total area of 281.9 km<sup>2</sup>, in which agricultural area occupies 50.5% and is irrigated by rainfall, groundwater, and surface water. The land that has been cultivating the litchi

had origination of inefficient forestland, idle hilly land, and garden land (Haiduong Services of Investment and Planning, n.d.).

### **4.1.3 Climatic condition**

Haiduong is situated in the monsoon tropical area. The specific climate of tropical area consists of 4 different seasons (Spring, Summer, Autumn, and Winter). The annual rainfall average is between 1,300 and 1,700 mm. The annual average temperature is 23.3°C. Per annual total number of hours with the sun are 1,524. The relative humidity is between 85% and 87% (Haiduong Statistics Department, 2003). These are quite advantageous to agricultural production including the food crops and fruit trees, especially the winter vegetable crops and litchi trees.

### **4.1.4 Population and religion group**

Haiduong is one of central provinces of the paddy rice in the North Vietnam and home to nearly 1.7 millions people with average population density of more than 1.0 thousand people/km<sup>2</sup> (Table 4.2) that is 4 times higher than that of the average country, 242 people/km<sup>2</sup>. It consists of various ethnic groups (28 groups). The main ethnic groups living in the area are the Kinh, Hoa, Tay, and San Diu. Among these groups, Vietnamese (Kinh) ethnic group is majority with 1,000,000 people or 59.4%. The rests consist of Sandiu group with 1,300 people or 7.7%; Hoa (Chinese) group with 1,000 people or 6.0%; Muong and Nung groups with 200 people or 0.01%; and other ethnic groups with 681,473 people or 40.5%. Like other provinces in Vietnam, composition of religions is not various. Buddhism, Catholicism, and Protestantism are 3 main religions in Haiduong. Buddhism has about 100,000 believers; Catholicism consists of around 40,000 believers, and Protestantism - approximately 300 believers (Haiduong Statistics Department, 2003).

Among districts and city, Haiduong City is the center for socio-economic activities of the province and considered as a place that is narrow in area and dense in population with the highest population density of 3,637 people/km<sup>2</sup> over other districts. Chiling is mountainous upland district with the largest area of 281.9 km<sup>2</sup> that is

equivalent to 17.1% of total area of whole province and its population occupied 146,329 people that were equivalent to 519 people/km<sup>2</sup> or 8.7% of total population of whole province. On the contrary, Thanhha is a lowland plain district with an area nearly half that of Chilinh, 158.9 km<sup>2</sup> or 9.6% of total area of whole province. However Thanhha population was higher than that in Chilinh district, accounted for 161,260 people or 9.6% of total population of whole province (Table 4.2).

Table 4.2 Distribution of population in Haiduong province, 2002

District	Total area (km <sup>2</sup> )	Population (head)	Density (head/km <sup>2</sup> )
Haiduong city	36.2	131,669	3,637
Chilinh	281.9	146,329	519
Namsach	132.8	138,173	1,040
Thanhha	158.9	161,260	1,015
Kinhmon	163.5	163,988	1,003
Kimthanh	112.9	124,439	1,102
Gialoc	122.2	149,949	1,227
Tuky	168.1	166,066	988
Camgiang	109.3	120,007	1,098
Binhgiang	104.7	105,285	1,006
Thanhmien	122.3	129,907	1,062
Ninhgiang	135.4	146,901	1,085
Total	1,648.2	1,683,973	1,022

Source: Haiduong statistics department, 2003

#### 4.2 Natural resources

Natural resources are one of important and necessary factors to expand and develop economic as well as society. So reasonable utilization and exploitation of these

resources will make more condition to promote strongly socio-economic development. These can include land resources, water resources, and forestry resources.

#### 4.2.1 Land resources

Haiduong has a total area of 164,820 ha (Table 4.3) which comprises the plain areas and hilly areas. The plains account for 89% of the total area, which was built up with the Thaibinh River alluvium.

Table 4.3 Land use in Haiduong province, 2002

District	Area	Type of land use			Farm land/ head	Forest land/ head
		Farm land	Forest land	Others		
		ha.....				
Haiduong	3,620	1,648	n.a.	1,972	0.013	n.a.
Chilinh	28,190	14,228	7,617	6,345	0.097	0.052
Namsach	13,280	8,901	n.a.	4,379	0.064	n.a.
Thanhha	15,890	11,278	n.a.	4,612	0.070	n.a.
Kinhmon	16,350	8,864	1,430	6,056	0.054	0.009
Kimthanh	11,290	7,694	n.a.	3,596	0.062	n.a.
Gialoc	12,220	8,485	n.a.	3,735	0.057	n.a.
Tuky	16,810	11,527	n.a.	5,283	0.069	n.a.
Camgiang	10,930	7,365	n.a.	3,565	0.061	n.a.
Binhgiang	10,470	7,592	n.a.	2,878	0.072	n.a.
Thanhmien	12,230	8,499	n.a.	3,731	0.065	n.a.
Ninhgiang	13,540	8,965	n.a.	4,575	0.061	n.a.
Total	164,820	105,046	9,047	50,727	0.062	0.005

Source: Haiduong statistics department, 2003

The plain is very fertile and suitable to grow various plants such as food crops, fruit trees at different times. The hilly areas are situated at northeastern side of the province comprising of 13 communes of Chi Linh District and 18 communes of Kinh Mon District. Despite of infertile like the plain, these areas are relatively suitable to grow fruit trees, wood trees and shortly growing industrial trees. Regarding to per capita farmland area, Chiling is leading district with 0.097 ha/head, following by 0.072 ha and 0.070 ha/capita in Binhgiang and Thanhha districts respectively. Haiduong City is the unit with the lowest per capita farmland area of 0.013 ha. Meanwhile forestland exists in two districts only, Chiling and Kinhmon with 0.052 ha and 0.009 ha/capita, respectively. However with sound policies and orientations, Haiduong administrative board and people have made many efforts in agricultural production to provide not only sufficient agricultural products to inner and outer people, but also come to export to foreign market.

For the purposes of use, the land types share as follows: for farming - 63.7%, for forestation - 5.5%, for industries - 14.9%, for urban & rural residences - 6.4%, rivers and for other purposes - 9.5% (Haiduong Statistics Department, 2003). Most of the agricultural lands are in-depth clayer alluviums of the Thai Binh River, which are mechanized at light or average silkiness with the pH of 5-6.5 and can be watered mechanically. They are advantageous for both intensification and crop multiplication. The farmers grow mainly vegetable, fruit and industrial crops besides the rice. Several sites in the northeastern side of the Province are exceptional by the shallow layers of soil, the acid and infertile soil, which are usually watered by lakes, but suited to groundnuts and soybeans.

#### **4.2.2 Water resources**

Haiduong has a great potential of water resources. There are 16 river routes connected from the smaller rivers, including the 10 ones (281 km long) under the central administration, the 6 ones (119 km long) under the provincial administration. These routes are allocated evenly to most areas in the province, so the province's



agricultural production has many advantages by these allocation and potential (Haiduong Services of Investment and Planning, n.d.).

### **4.2.3 Human resource**

The province has a plentiful resource of workable force that attain up to 898,000 people or 54% of province's population in the 2000, in which 83% working in agricultural field. There are as many as 40% of workable force aging from 18 to 30 years old. The white-collar workers occupied about 10%. Half of common workers had a secondary education standard. Most of workers are industrious, diligent in all works and they can catch new technologies quickly (Haiduong Statistics Department, 2003).

## **4.3 Socio-economic situation**

### **4.3.1 Economic structure and growth**

After the 10 years (1990-2000) of renovation, Haiduong had achieved many successes in the cause of socio-economic development. The economy has been altered from the bureaucratic and subsidized mechanism to the market mechanism, mobilizing and exploiting the resources for the production and business. The multi-sector, dynamic, and effective economy had been raised in order to gain more important achievements. The province's GDP has been increased by around 9.5% yearly as 2.4 times as higher than that of 1990; per capita average income has grown up by 2.2 times. The economic structures have positively changed with the increases in industry, construction and service rate and the decrease in agricultural, forestry and aquatic production rate. The growth rates by 1990 were 22.4% for industry and construction sectors; 26.4% for service; and 51.2% for agricultural, forestry and aquatic productions. Those, by year 2000 were 37.2% for industry and construction sectors; 28.0% for service; and 34.8% for agricultural, forestry and aquatic productions (Table 4.4). The total value of agricultural, forestry and aquatic productions has increased by 6.7% yearly. The outputs of the foodstuff are more and more from 359 kg (1990) to 520 kg (2000) and have not only been enough for the demands throughout the province, but also reserved and sold in the domestic and world markets. The litchi outputs were 30,000 tons by 2000. The

litchi, vegetable and pig outputs were 6, 4 and 2.5 times higher than 1990, respectively (Haiduong Services of Investment and Planning, n.d.).

Table 4.4 Economic structure of Haiduong province, 2002

Sector	Unit	2000	2001	2002
GDP (at constant price in 1994)	Billion VND	5,036	5,450	6,110
Growth pace	%	9.5	8.2	12.1
GDP (at market price)	Billion VND	6,175	6,712	7,974
Agriculture (at market price)	Billion VND	2,148	2,243	2,576
Share of GDP	%	34.8	33.4	32.3
Industry (at market price)	Billion VND	2,297	2,539	3,126
Share of GDP	%	37.2	37.8	39.2
Services (at market price)	Billion VND	1,730	1,930	2,272
Share of GDP	%	28.0	28.8	28.5

Source: Haiduong statistics department, 2003

### 4.3.2 Agricultural production

Haiduong is a province of traditional paddy rice cultivation with rich land area lying at the Red River delta. So it has many advantageous conditions to develop and expand agricultural production. Its major crops are rice, vegetables, litchi and many other crops. Among the crops, the litchi namely “Thieu Thanhha” grown many hundred years ago is considered as the best quality over other varieties in the whole country (Vu, 1996).

By an agriculture-based province, so agricultural production occupies 32.3% in economic structure of Haiduong by year 2002 (Table 4.4). The province’s agricultural product was not only sufficient to meet demands of around 1.7 million Haiduong populations, but also for surrounding cities and provinces and event for export. In the



five-year period of 1996-2000 average value of agricultural products increased annually by 6.2%, in which cultivating area increased by 5.4%, and breeding domestic animal increased by 7.4%. Structure was shifting toward increasing density of breeding and services. Rate of cultivation - breeding - service in year 1995 changed from 73.9% - 24.1% - 2% into 71.2% - 25.5% - 3.3% in year 2000, respectively. By orientation of farm and family economic development, rural economic structure is also shifting step by step toward increasing density of industry - handicraft and service. Animal husbandry was occupying 25.5% total value of Haiduong's agricultural production. With 613,000 pigs, output of porker from the pigsty attained up to 45,000 tons; and 37,500 cows; 35,630 buffaloes; 7 million poultry. The aqua-cultural area was 6,500 ha with an output of 11,000 tons, in which output of special animals (frog, snake, etc.) was about 100 tons (Haiduong Services of Investment and Planning, n.d.).

### **4.3.3 Industry and others**

Haiduong has taken attention to develop industry sector for many years. Up to year 2000, industry production value accounted for VND 4,213 billions. So industry development, especially development of industrial, construction and service sectors contributed much in changes in the general economic structure of the province. Industry production value at period 1996 - 2000 increased annually on average of 15.3% and lead Haiduong become one of top ten provinces and cities in Vietnam in term of industrial development (Haiduong Services of Investment and Planning, n.d.).

## **4.4 Characteristics of the surveyed households**

### **4.4.1 Family size**

Generally, Vietnam is a country with narrow area and dense population. So most families have from 2 to 3 generations living together under one roof in rural area, sometimes that has 4 generations. In the surveyed area, the household's characteristics are different from each district (Table 4.5).

Members of the household varied from 2 to 7 people in Thanhha district and 2 to 6 people in Chilinh district, of which the household member numbers averaged 4.3 in Thanhha district and 4.4 in Chilinh district. However the household labor force was quite different over number of the household members. This was 2.5 workable people/household with variation from 1 to 5 workable people in Thanhha district and 2.6 workable people/household in Chilinh district, in which minimum workable people were 2 and maximum – 5 people. Regarding to workable age of members (equal or more than 18 years old), this varied from 18 to 92 years old with an average of 37.6 years old in Thanhha district. While this varied from 18 to 71 years old with an average of 35.9 years old in Chilinh district.

Table 4.5 Farm household's characteristics in the two systems

Item	Member		Farm labor		Age		Education		Experience	
	T.ha	C.linh	T.ha	C.linh	T.ha	C.linh	T.ha	C.linh	T.ha	C.linh
	.....person.....				.....year.....					
Average	4.3	4.4	2.5	2.6	37.6	35.9	8.5	7.4	18.0	14.5
Min	2.0	2.0	1.0	2.0	18.0	18.0	3.0	3.0	7.0	5.0
Max	7.0	6.0	5.0	5.0	92.0	71.0	16.0	12.0	41.0	27.0
SD	0.8	0.9	0.8	0.8	14.3	14.4	2.9	2.5	8.9	6.1

Source: farmer interview, 2003

Family size has many effects on agricultural production such as plough, harrowing, weeding, pruning, insect pest management, etc. Through these findings, it is clear that the farms in Chilinh upland district had more chances to invest in litchi production and insect pest management than that of Thanhha lowland district or these differences would influence directly or indirectly on practices of litchi cultivation in both districts.

#### 4.4.2 Litchi production experience

Regarding to litchi cultivation experience of the household head, number of experience years varied from 7 years to 41 years with an average of 18.0 experience

years in Thanhha district (Table 4.5). Meanwhile these were from 5 years to 27 years with an average of 14.5 experience years in Chilinh district. There were the differences of litchi cultivation experience between the districts by the following reason: Chilinh was a newly litchi cultivated district for around 15 years. Meanwhile the litchi has been grown some hundreds years in Thanhha. This fact is proved by formation and maintenance of cultivar “Thieu Thanhha” originated from the district has been considered as a major one for commerce in Vietnam nowadays. The litchi cultivation of Thanhha as well as experience spread out to Chilinh district and east-northern provinces and other areas of Vietnam (Vu, 1996).

#### **4.4.3 Education**

As known, education or knowledge level has many effects on socio-economic development, especially in agricultural production. When farmers with higher education level would help them to learn and apply new technologies easier as well as more efficient production. Regarding to education attainment in survey households, all of the heads of families were experienced at least primary school (Table 4.5). These levels were quite different over the households and the districts. They varied from primary school, class 3 (education systems of 12 years) up to higher education, university in Thanhha district with an average educational level of 8.5 years. Meanwhile these are from primary school, class 3 up to secondary school, class 12 in Chilinh district with an average level of education 7.4 school years. These can be explained by the difference of development level between two districts. Thanhha is a plain district with advantageous position that is next to the capital city of Haiduong province and a better infrastructure, living standard and level of knowledge. Meanwhile Chilinh is a hilly district with poor socio-economic conditions such as poor infrastructure, lower living standard, and poor level of knowledge as well as more far away from the center of the province.

#### **4.4.4 Agricultural land allocation**

Land is considered as farmers’ invaluable property and the most important means of production to produce foods and goods in order to maintain and improve their life. Structure of household income would be reflected by the structure of crops in their

land. Depending on size and total area, the farmers would decide which crop to be grown, and how many percent of land is for each crop. To understand land allocation in the farms of Thanhha and Chilinh districts and distributions among litchi and other crops, indicators such as total land per farm household and total land per capita were established (Table 4.6).

Table 4.6 Agricultural land allocation in the surveyed farms

Land type	Surveyed farm area						Country average area	
	% of total area		Per farm household		Per capita		Per farm household	Per capita
	T.ha	C.linh	T.ha	C.linh	T.ha	C.linh		
	.....ha.....							
Rice	4.84	19.90	0.035	0.194	0.008	0.045	0.312	0.047
Fruit tree	95.16	80.10	0.681	0.781	0.157	0.179	0.048	0.007
Total	100	100	0.715	0.975	0.165	0.224	0.610	0.108

Source: farmer interview, 2003

The findings shown that per farmland for rice in both districts was 0.035 ha in Thanhha district and 0.194 ha in Chilinh district. These were very much lower than that of country average, 0.312 ha (Ministry of Agriculture and Rural Development, 2002). Correspondingly per capita agricultural land holding and allocation area for rice were only 0.008 ha or 4.8% in Thanhha district and 0.045 or 19.9% ha in Chilinh district, lower than country average, 0.047 ha (Ministry of Agriculture and Rural Development, 2002). However rice cultivation area in Chilinh district was not very much lower than that of country average. This also elucidates that the rice still plays an important role in the Chilinh farmers' life. On the contrary with the rice, the land for fruit tree accounted for up to 95.2% in Thanhha district and 80.1% in Chilinh district. This was spelled out by the difference between per capita areas of fruit tree in both districts over the country average. Meanwhile these areas were 0.157 ha in Thanhha and 0.179 ha in Chilinh district, the country average was only 0.007 ha (Ministry of Agriculture and Rural

Development, 2002). By the differences in per farm household and per capita land holding for the rice and fruit tree in both districts, so the difference of total two crops in both districts over the country average was easy to understand.

The main reasons for this difference are that income from the litchi cultivation is generally higher from 4 to 8 times, even 20 times than annual food crops in the same area (Vu, 2001). Additional litchi production has brought economic effectiveness from 3 to 13 times higher than the 2-season rice cultivation in the same area in Thanhha district (Nguyen, 1999a). However as a matter of harsh fact of marketing rule, price of litchi always fluctuates negatively causing disadvantages for litchi farmers, when very low price many farmers abandoned their fruits without caring. This will affects directly on business efficiency of litchi orchards in coming years. Generally litchi cultivation brings about many benefits for the farmers. From these benefits, they did dare transfer cropping systems from rice and other crops into litchi tree especially in Thanhha district where rice area is curtailed by litchi area (Table 4.7), a work they did not dare do ever for food security.

Table 4.7 Transformation of rice land into litchi land in Thanhha district

District	Item	1999	2000	2001	2002
	Litchi planted area added (ha)	3,256	467	531	1,494
Thanhha	Rice land into litchi land (ha)	n.a.	305	358	1,327
	Contribution of rice land (%)	n.a.	65.31	67.42	88.82

Source: Thanhha plant protection station, 2003

The findings showed that the litchi farmers were aware of the benefits from the litchi cultivation but disagreement of law, they transferred rice land into litchi land automatically disregarding to law before year 2002. The main reason for the transformation ban was for food security guarantee issued by the government. Despite of illegal transformation, ratio between litchi area planted from transformation of rice land over total planted area was still very high that was 65.3% and 67.4% in year 2000 and 2001, respectively. However this was 88.8% in year 2002, because local



government has unraveled partly the law and allowed the farmers in area of litchi cultivation to transform rice cultivation area into litchi one.

#### 4.4.5 Structure of household income

Litchi development is a right orientation in change and transfer of cropping systems in Vietnam in order to improve the farmers' living standard. Litchi tree holds an important position in the farm households in Thanhha and Chilinh districts. This is expressed more clearly by structure of household income in both districts (Table 4.8).

Table 4.8 Source of the household income in surveyed farms

Index	District	Value of products (million VND)				
		Litchi	Rice	Pig	Others	Total
Per household	Thanhha (n=39)	20.52 (±8.51)	0.47 (±0.84)	3.33 (±2.04)	5.45 (±5.54)	29.75 (±10.98)
	Chilinh (n=40)	23.04 (±10.45)	3.23 (±1.71)	3.65 (±3.56)	3.70 (±4.79)	33.62 (±11.50)
Per capita	Thanhha (n=169)	4.73	0.11	0.77	1.26	6.87
	Chilinh (n=175)	5.30	0.74	0.84	0.85	7.73

Source: farmer interview, 2003

The Table speaks out one issue that litchi contributed a main part in household income. Income from litchi accounted for a great part in total income of each household with VND 20.5 millions or 68.9% and VND 23.0 millions 68.5% in Thanhha and Chilinh districts, respectively. The second source of income came from the others (not from rice and pig) with VND 5.5 millions or 18.3% and VND 3.7 millions or 11.0% in Thanhha and Chilinh districts, respectively. Other sources of income can mention such as salary, business, and supplementary work. Income from rice and pig accounted for a smaller proportion of total income in both districts. Income from rice was VND 0.5 millions or 1.6% in Thanhha district and VND 3.2 millions or 9.6% in Chilinh district.



Meanwhile income from pig accounted for a more remarkable proportion of total household income than that of the rice. This source was VND 3.3 millions or 11.2% in Thanhha district and VND 3.7 millions or 10.9% in Chilinh district. Per capita income was also quite different between two districts. Total per capita income was VND 6.9 millions and VND 7.7 millions in Thanhha and Chilinh districts, respectively, in which the income from litchi contributed VND 4.7 millions and VND 5.3 millions in Thanhha and Chilinh districts, respectively. Off-litchi income also shared a remarkable part over total income. These were quite difference between two districts. Meanwhile per capita off-litchi income was VND 2.1 millions or 31.2% of total income in Thanhha district and VND 2.4 millions or 31.4% of total income in Chilinh district. This means that off-litchi income in both districts contributed an important part in structure of household income. However in both per household income and per capita income, Chilinh growers' income was bigger than that of Thanhha district. These numbers were around per household VND 29.8 millions in Thanhha district and per household VND 33.6 millions in Chilinh district and per capita income was VND 6.9 millions and VND 7.7 millions in Thanhha and Chilinh districts, respectively. The main reason for these differences came from gross output of the litchi and the rice, the gross output of these crops in Chilinh district were higher than that in Thanhha district.

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
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