

CHAPTER III

STUDY AREA

3.1 Geographical Location and Administrative Setting

The Nam Dong district is located in the south of Thua Thien Hue Province in Central Vietnam. The headquarters of the district is about 53 km south-west of Hue city. The approximate co-ordinates of Nam Dong district are 16°00' - 16°15' latitude North and 107°27' - 107°53' longitude East. It is bounded by Huong Thuy and Phu Loc district on the North, by Quang Nam Province on the South, by A Luoi district on the West, and by Da Nang city on the East (Figure 3.1).

The natural area of Nam Dong is 65,052 ha. And 65.6% of the area is covered by forest. A large area of Nam Dong is unused land (25.8%), which is extensively used by farmers as swidden agricultural land. Only 6.2% of Nam Dong's area is used for permanent agriculture.

Nam Dong district has 11 communes (Table 3.1). One of these communes is Khe Tre, which is the most important trading centre of the district. The second important is Nam Dong market, which are located in the southwest of the district. Thuong Quang is a commune that has the biggest area (15,630 ha or about 24.4% of total land of the district), followed by Thuong Nhat (11,410 ha), Thuong Lo (10,640 ha), Huong Phu (7,948 ha), Huong Loc (6,634 ha), Thuong Long (5,125 ha), Huong Son (4,377 ha), Huong Huu (990 ha), Huong Giang (771.8 ha), and the smallest area was khe tre town (418 ha or 0.6% of total area of the district), respectively (Table 3.1).

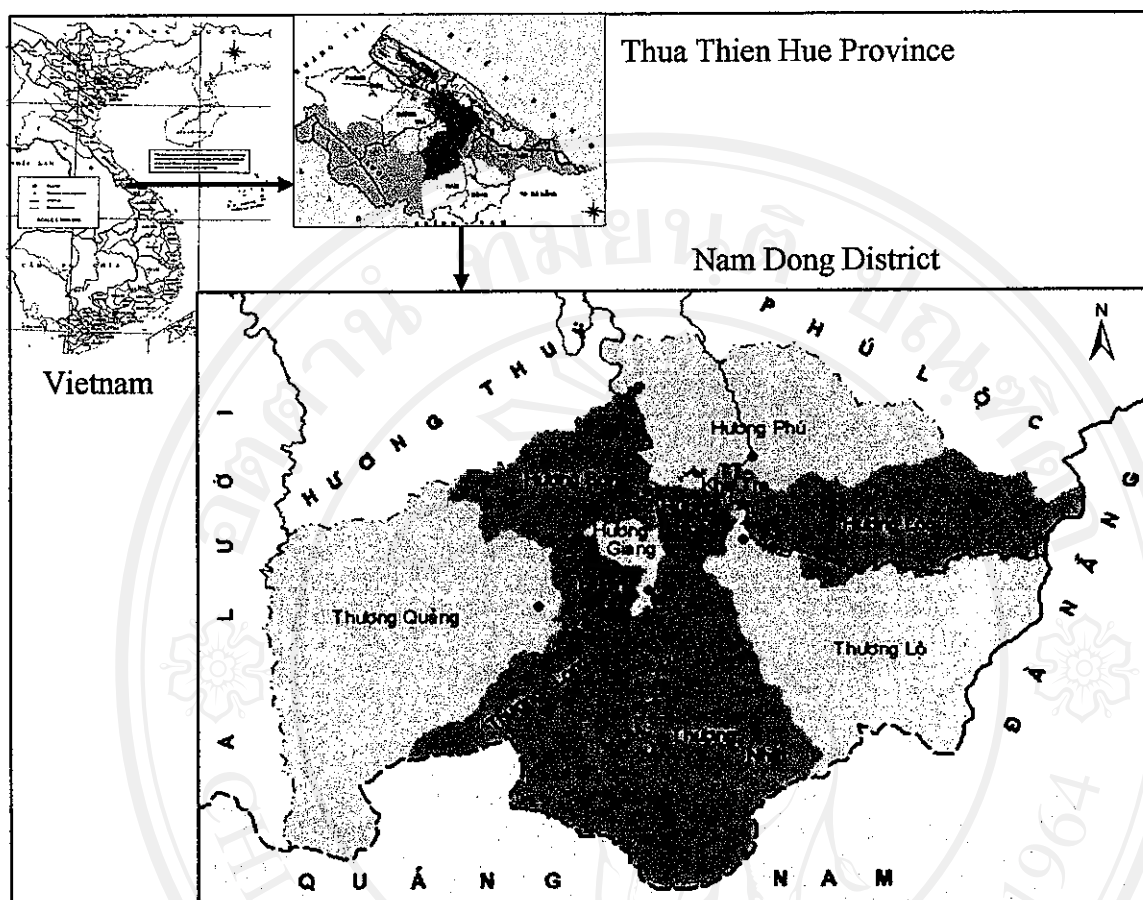


Figure 3.1 The location of Nam Dong district, Thua Thien Hue province, Vietnam.

Table 3.1 Distribution of land in administrative boundary.

Ordinal	Name of communes	Area (ha)	Proportion (%)
1	Huong Giang	772	1.2
2	Huong Hoa	1,109	1.7
3	Huong Huu	990	1.5
4	Huong Loc	6,634	10.2
5	Huong Phu	7,948	12.2
6	Huong Son	4,376	6.7
7	Khe Tre	418	0.6
8	Thuong Lo	10,640	16.4
9	Thuong Long	5,125	7.9
10	Thuong Nhat	11,410	17.5
11	Thuong Quang	15,630	24.0
Total area		65,052	100.0

Source: Nam Dong Statistical Department, 2006.

3.2 Topography

Nam Dong is a mountainous district. In general, topography of the district can be divided into three sections composed of mound zone mixed Khe Tre valley with basin shape stretch on the Southnorth direction, low hill zone, and medium hill zone. Its area is dissected by many streams, which are tributaries of Ta Trach River, forming a complex topography with many micro - catchment - areas. The Ta Trach River is one of the main arms of the Huong River. At the centre of Nam Dong there is a valley, which is enclosed by high mountains such as Truoi, Bach Ma, Mang. The altitude in the area ranges from 40.0 to 2,035.6 meter above sea level (Figure 3.2).

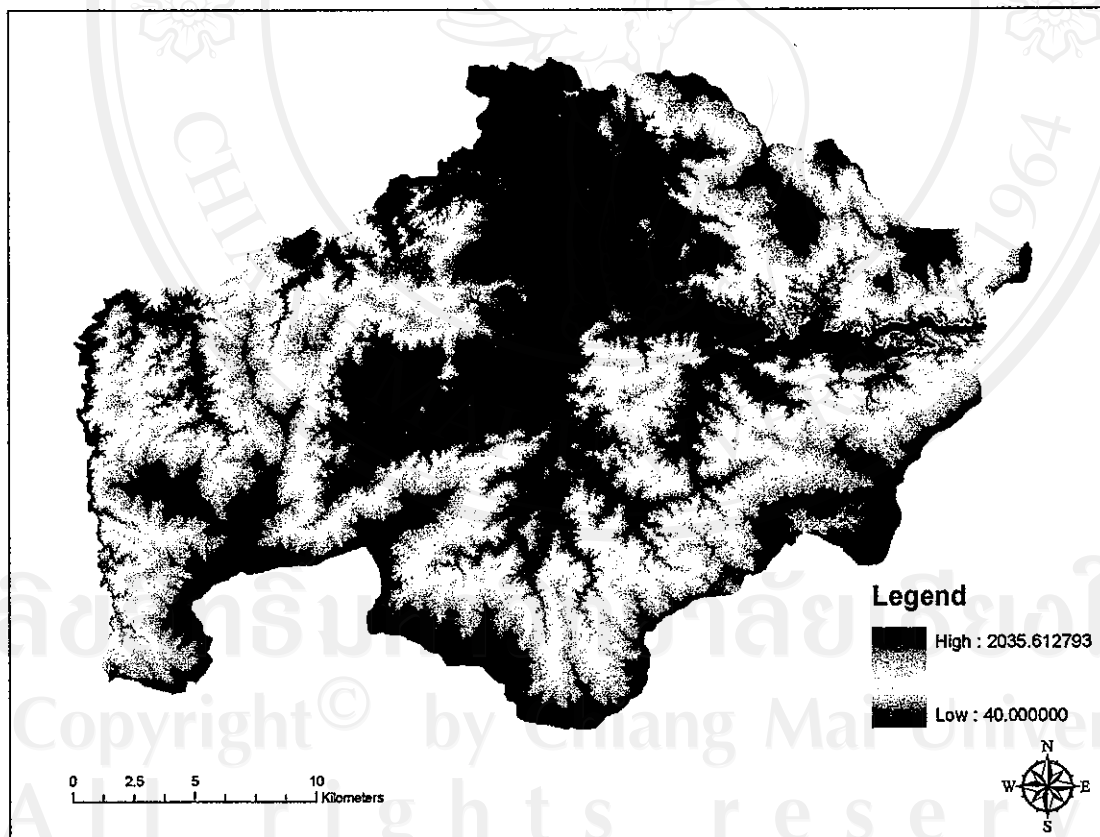


Figure 3.2 The Elevation map in Nam Dong district.

Source: Nam Dong Cadastral Department, 2005.

3.3 Climate

Nam Dong is located in a monsoon tropical climate. There are two main windy seasons in the year and North-West wind in summer (dry and hot) from April to September and South-East wind in winter (wet and cold) from October to March.

The mean annual temperature is approximately 24.8°C with a mean monthly maximum of 38.4°C in April and mean monthly minimum of 14.5°C in January. The annual precipitation is approximately 3,446 mm (averaged for the period 2001 to 2005). The rainfall in Nam Dong has strong differentiation and diversification. Light rain period is from January to July amount of rainfall makes up 20-30% of total annual rainfall. The heavy rain period is from September to December with amount of rainfall makes up 70-80% of total annual rainfall that is cause of frequently floods and soil erosion. The maximum and minimum monthly rainfall recorded is 810.8 mm in October and 42.3 mm in February, and the average number of rainy days is 182 days per year (for the period 2001 to 2005). The mean of monthly sunshine is 148.8 hours (averaged for the period 2001 to 2005) with the highest and lowest monthly sunshine is 214.8 hours in July, and 55.6 hours in December. The dynamic of temperature and annual rainfall and sunshine in term of five years recorded from 2001 to 2005 in the study area is represented in the Figure 3.3 and 3.4.

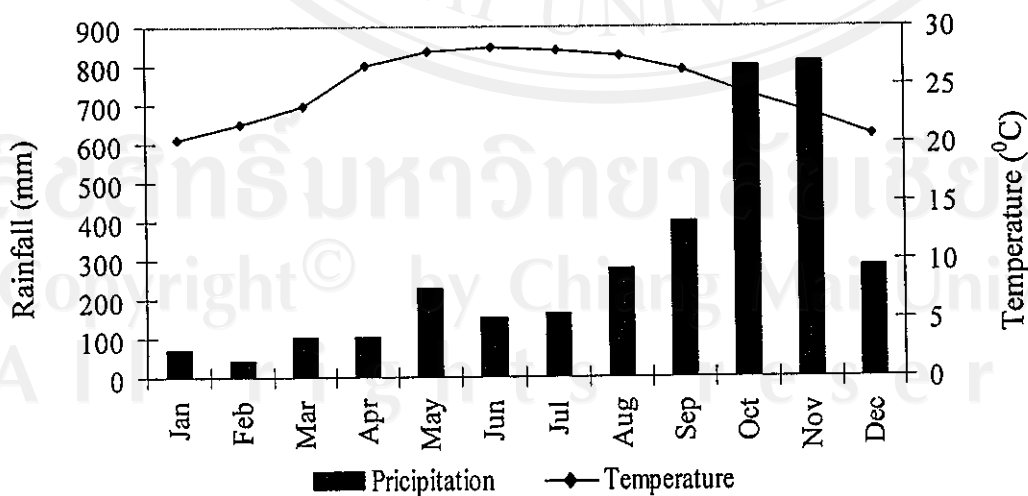


Figure 3.3 The monthly rainfall and temperature in the study area (2001-2005).

Source: Nam Dong Statistical Department, 2006.

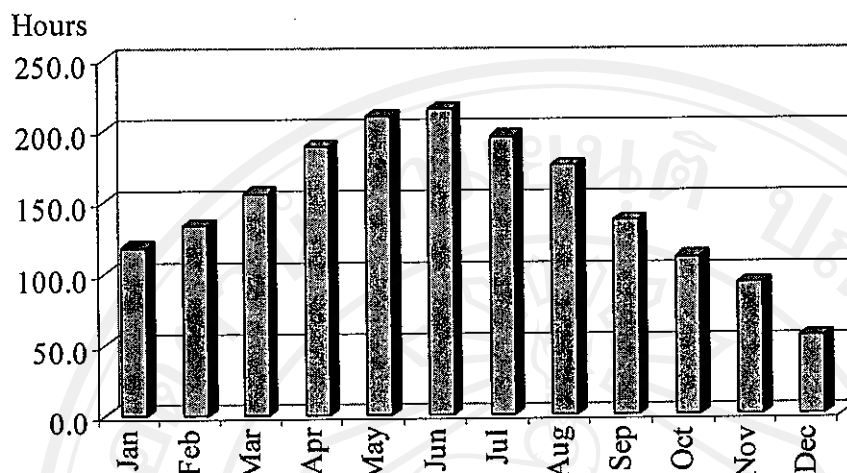


Figure 3.4 The average monthly sunshine in the study area from 2001 to 2005.

Source: Nam Dong Statistical Department, 2006.

3.4 Hydrographic Conditions

Nam Dong domain belongs to upstream zone of Huong river with rather dense watershed and drainage network forms rivers and streams with its average is about 0.65-0.67 km/km². The Huong river originates from Nam Dong mountain area includes two main branches which are Ta Trach and Huu Trach. The Ta Trach river has 70 km in length and including some main estuaries such as Aro stream, La Van stream, and Bara river. Those estuaries flow almost communes in the district therefore they can supply water for irrigation and living of people. The Huu Trach is located in the West of the district with total length is 80 km includes some main estuaries such as Dang stream, Mu Nu stream, etc (Figure 3.5). Moreover, locating in monsoon tropical zone the rivers and streams in Nam Dong have abundant water source and differentiating evidently following rainy and dry season. The annual flood season coincide with rainy season, and its discharge makes up about 80% of total in a year. Meanwhile, the discharge just makes up from 10% to 30% of total in dry season and critical time is in March, April, July, and August.

The lake in Nam Dong mainly is small size and concentrating at Khe Tre-Nam Dong valley zone. The biggest lake is Ka Tu lake that located in Huong Phu commune. Besides, in Nam Dong district still has an irrigative dam network such as Khe Bo, Khe

Choi, Laoai, Bara, etc. They had effects in terms of supplying the water for agricultural production and living in that area. In addition, due to water balance is positive so underground water is abundant in Nam Dong district. In general, source of underground water in Khe Tre-Nam Dong valley is more abundant than others such high terrain areas around the district. The underground water level ranges from 1 to 20 m.

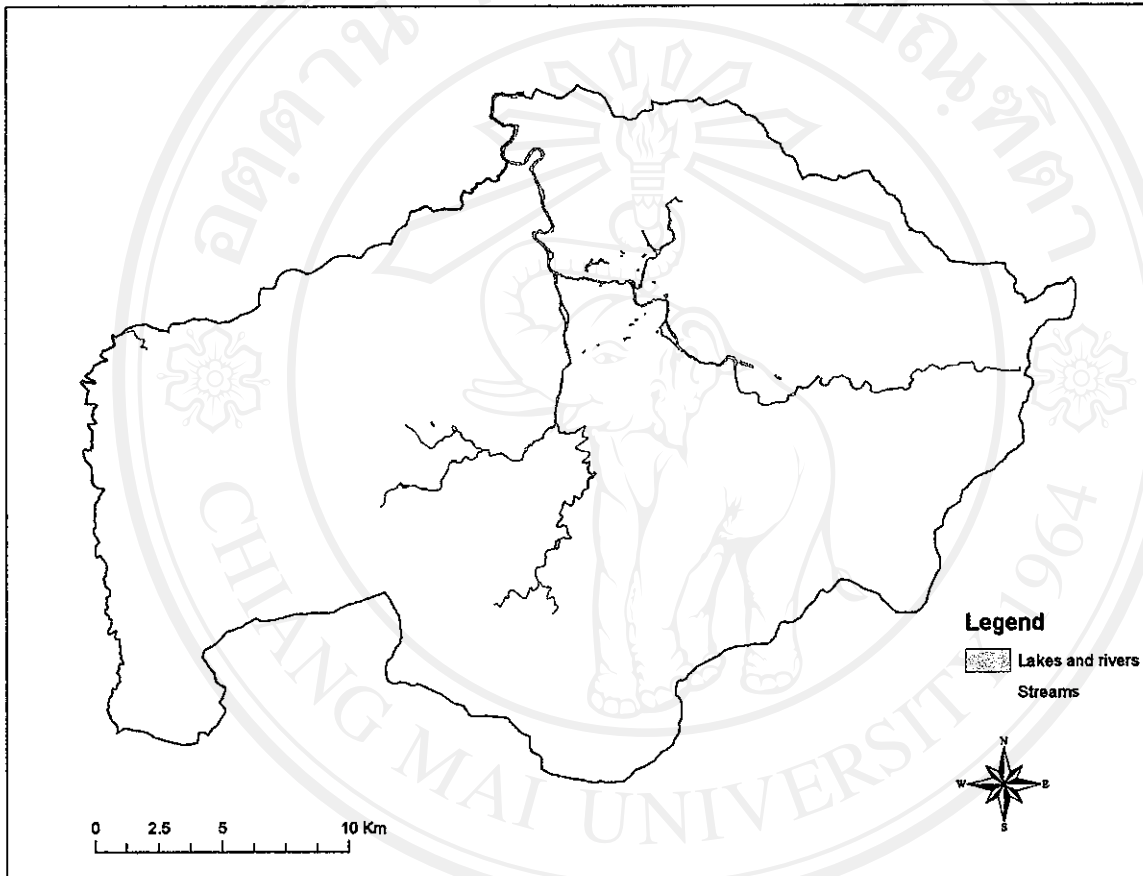


Figure 3.5 The lakes, rivers and streams network in Nam Dong district.

Source: Nam Dong Cadastral Department, 2005.

3.4 Soil Characteristics

Soils is one of the components reflecting entirely interaction between natural geographical components of landscape. In addition, with complex of topography and different mother rocks has formed into different soil types in Nam Dong district. Soil characteristic is very important not only for crop suitability assessment, but also relate to both soil detachment and transport when rainfall occur for detemining soil erosion.

In the study area with soil map scale 1:25,000 were published in 2005 following the FAO/UNESCO classification method. There are four types of main soil groups which are Acrisols, Fluvisols, Ferrasols, and Leptosols, in each group include several unit. The first soil types occupies a largest area is Acrisols group appropriate about 55,426.89 ha and its proportion of 85.2%. The second rank one is Fluvisols group that cover area about 3,280.57 ha with proportion is 5.04%. The Leptosols group and Ferrasols group are ranked as the third and the last ones, which cover areas about 2,986.82 ha, and 1,328.16 ha, with their proportion is 4.59% and 2.04%, respectively (Figure 3.6 and Table 3.2). Generally, in Nam Dong, the terrain medium sloping with heavy rainfall, and it is also impacted by improper exploitation of people so the soil in hill zone was degraded.

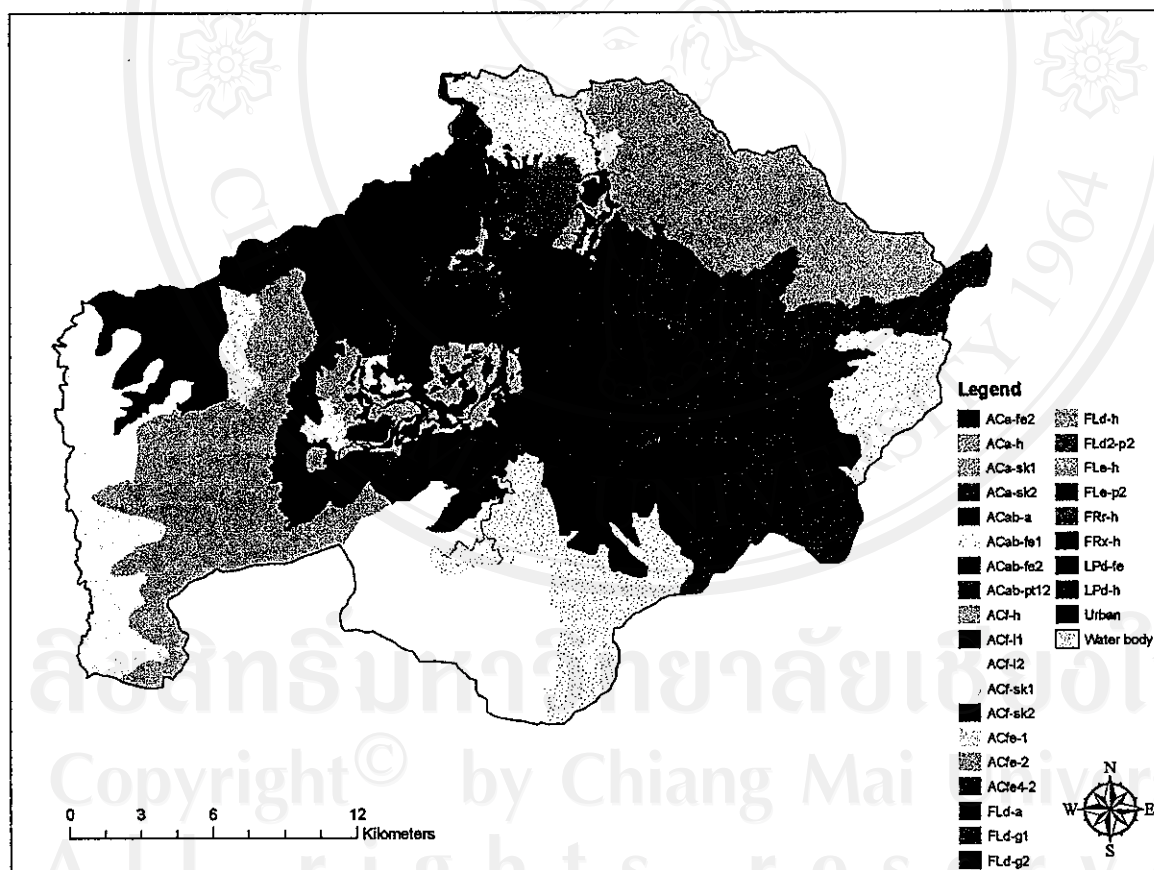


Figure 3.6 The soil map of Nam Dong district.

Source: Nam Dong Cadastral Department, 2005.

All most soil in the district with thick of layer is 30-70 cm. The content of nutrient is poor. The content of organic matter fluctuates from 0.2 % to 3.16 %, nitrogen (N) is from 0.018% to 0.246%, phosphorous (P_2O_5) is from 0.12% to 0.75%, and the content of potassium (K_2O) is from 0.42% to 1.8%, cation exchange capacity range from 1.15 meq/100g to 10.14 meq/100g.

Table 3.2 Soil types of Nam Dong district.

Ordinal	FAO name	Notation	Area (ha)	Proportion (%)
I	Acrisols		55,426.89	85.20
1	Areni Albic Acrisols	ACab-a	5,252.75	8.07
2	Epi Ferri Albic Acrisols	ACab-fe1	7,607.80	11.69
3	Albic Acrisols	ACab-fe2	2,733.27	4.20
4	Endo Plinthi Albic Acrisols	ACab-pt12	5,662.44	8.70
5	Endo Ferric Arenic Acrisols	ACa-fe2	1,052.43	1.62
6	Hapli Arenic Acrisols	ACa-h	4,238.45	6.52
7	Epi Skeleti Arenic Acrisols	ACa-sk1	2,335.64	3.59
8	Endo Skeleti Arenic Acrisols	ACa-sk2	3,703.34	5.69
9	Epi Ferric Acrisols	ACfe-1	809.55	1.24
10	Endo Ferric Acrisols	ACfe-2	1,625.05	2.50
11	Endo Hypo Ferric Acrisols	ACfe4-2	1,890.17	2.91
12	Epi Lithi Ferralic Acrisols	ACf-h	2,263.86	3.48
13	Hapli Ferralic Acrisols	ACf-h	5,990.35	9.21
14	Endo Lithi Ferralic Acrisols	ACf-l2	6,751.61	10.38
15	Epi Skeleti Ferralic Acrisols	ACf-sk1	2,330.49	3.58
16	Endo Skeleti Ferralic Acrisols	ACf-sk2	1,179.70	1.81
II	Fluvisols		3,280.57	5.04
1	Endo Plithi Dystric Fluvisols	FLd2-p2	196.55	0.30
2	Areni Dystric Fluvisols	FLd-a	916.91	1.41
3	Epi glayi Dystric Fluvisols	FLd-g1	34.38	0.05

Source: Nam Dong Cadastral Department, 2005.

Table 3.2 Soil types of Nam Dong district (cont.).

Ordinal	FAO name	Notation	Area (ha)	Proportion (%)
II	Fluvisols			
4	Endo glayi Dystric Fluvisols	FLd-g2	586.81	0.90
5	Hapli Dystric Fluvisols	FLd-h	997.48	1.53
6	Hapli Eutric Fluvisols	FLe-h	151.42	0.23
7	Endo Plinthi Eutric Fluvisols	FLe-p2	397.02	0.61
III	Ferrasols		1,328.16	2.04
1	Hapli Rhodic Ferrasols	FRr-h	732.02	1.13
2	Hapli Xanthic Ferrasols	FRx-h	596.14	0.92
IV	Leptosols		2,986.82	4.59
1	Ferri Dystric Leptosols	LPd-fe	2,273.72	3.50
2	Hapli Dystric Leptosols	LPd-h	713.10	1.10
V	Uninvestigation		2,029.30	3.12
1	Urban, industry, mineral land	urban	1,536.67	2.36
2	Water body	waterbody	492.64	0.76
Total			65,051.75	100.00

Source: Nam Dong Cadastral Department, 2005.

3.5 Existing Land Use Types

The total area of Nam Dong district is 65,051.8 ha (Figure 3.7, Table 3.3). Of which, 65.6% of the area is covered by forest. These forest areas especially protective forest areas in the upstream zone of Huong river are very important in the protection of ecological environment for this district. The land used for special purpose just occupied 1.39% but it has an important role in developing socio-economic infrastructures and cultural community. About 4,011.2 ha (6.17%) of land are used for agricultural purpose with the majority of land area in permanent crops. Besides the growth of replanted forest areas, the land for agricultural purpose has also increased during few recent years through the conversion of fallow land. A large area of Nam Dong was fallow land (25.75%),

which is extensively used by farmers as swidden agricultural land and to collect products such as fertilizer or the broom making plant. Besides swidden fields, farmers have paddy fields for wet rice, cash crop fields that are planted with beans, maize, sweet-potato, fields with perennial crops, home gardens and fish ponds. The main agricultural system is cash crop fields, fields with perennial crops such as citrus, pineapple, banana, and swidden fields that are planted with sugarcane, cassava or upland-rice.

Table 3.3 Land use types of Nam Dong district.

Ordinal	Land use types	Area (ha)	Proportion(%)
I	Agricultural lands	4,011.20	6.17
1	Banana	30.00	0.05
2	Banana-Sweet potato	133.00	0.20
3	Cassava-Bean	50.00	0.08
4	Cassava	425.00	0.65
5	Citrus-Sweet potato	6.00	0.01
6	Citrus	91.00	0.14
7	Pineapple	87.00	0.13
8	Rice-Maize-Bean	86.50	0.13
9	Rice-Rice	203.70	0.31
10	Rice-Maize	66.00	0.10
11	Rubber	2,726.00	4.19
12	Sugarcane	60.00	0.09
13	Upland rice-Maize	21.50	0.03
14	Upland rice	12.50	0.02
15	Upland rice-Bean	13.00	0.02
II	Forest	42,691.40	65.63
III	Residential and special land	901.15	1.39
IV	Unused land	16,747.60	25.75
V	Water body	700.40	1.08
Total		65,051.75	100.00

Source: Nam Dong Cadastral Department, 2005.

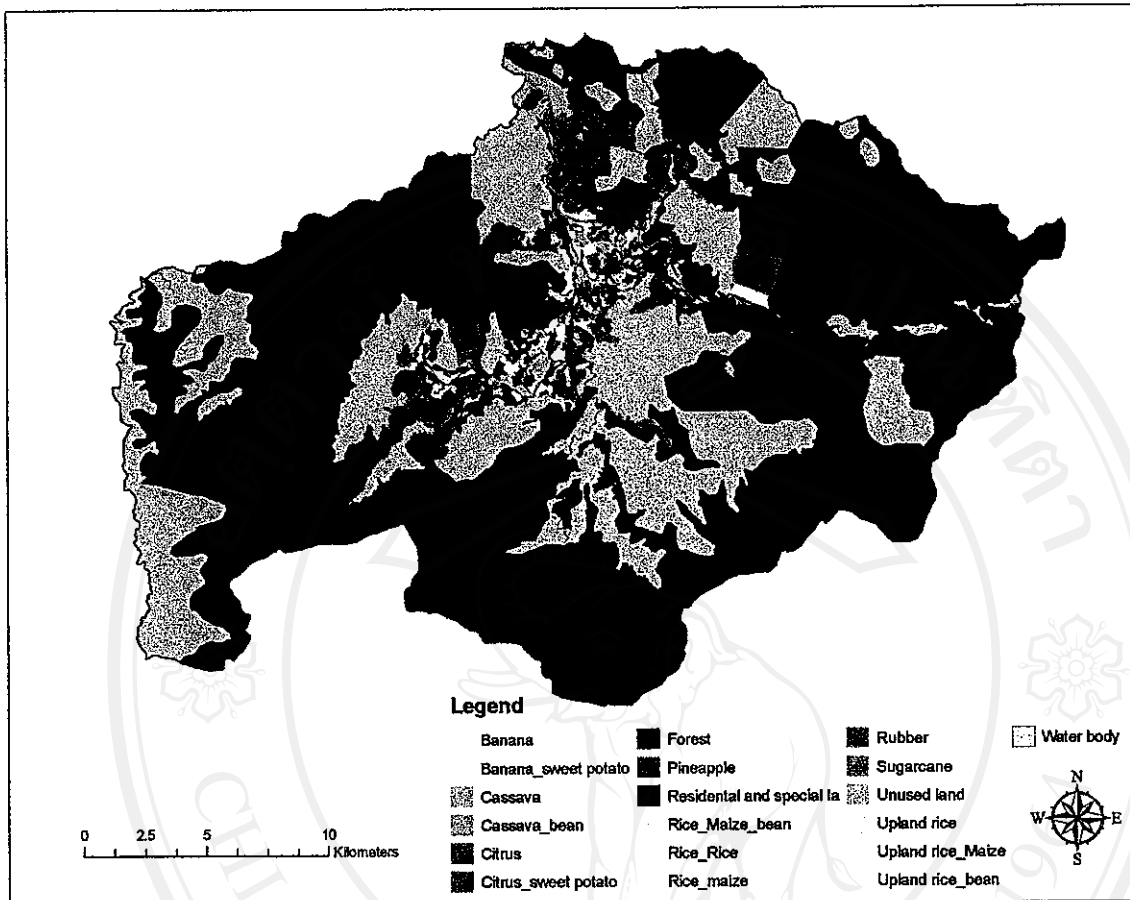


Figure 3.7 The land use map of Nam Dong district.

Source: Nam Dong Cadastral Department, 2005.

3.5 Social Conditions

3.5.1 Communes and Infrastructure

Nam Dong district has 11 communes, which contains 66 villages. One of these communes is Khe Tre, which is the most important trading center of the district. Transportation roads connect all communes. The roads connecting the communes are mostly asphalted. In addition, there are smaller roads, which are graveled connecting the villages to the main road. At the moment, a lot of roads are presently under construction and old gravel roads are being transformed into asphalted roads, which can take the loads of trucks and reach the villages during the rainy season. There are two markets in the district. The most important market is the market that located in Khe Tre town. Next to

this important trading center, there is a small market located in Thuong Nhat commune is called Nam Dong market.

3.5.2 Demographic and Labor

According to statistic of Nam Dong district, population in 2005 was 22,948 people consisting of 4,470 households. There are two main ethnic groups in the district, Kinh and Cotu group. The population size and their distribution are shown in Table 3.4.

Table 3.4 Population density by commune in Nam Dong district.

No.	Commune	Area (km ²)	Population		Density (People/km ²)
			No. of households	No. of people	
	Total	650.52	4,470	22,948	35.28
1	Huong Giang	7.72	319	1,377	178.41
2	Huong Hoa	11.09	450	2,178	196.39
3	Huong Huu	9.90	433	2,385	240.91
4	Huong Loc	66.34	428	2,340	35.27
5	Huong Phu	79.48	613	2,998	37.72
6	Huong Son	43.76	217	1,335	30.51
7	Khe Tre	4.18	702	3,464	828.71
8	Thuong Lo	106.40	213	1,094	10.28
9	Thuong Long	51.25	409	2,273	44.35
10	Thuong Nhat	114.10	379	1,823	15.98
11	Thuong Quang	156.30	307	1,681	10.75

Source: Nam Dong Statistical Department, 2006.

The population has difference in terms of distributing to communes. In the communes located in center of the district had more population such as Khe Tre town, Huong Phu, Huong Huu, Huong Loc, and Huong Hoa commune. Conversely, the less population presented rather evidently in Thuong Lo, Huong Son, Thuong Nhat, Huong Giang, and Thuong Quang commune. Their population was around 1,200 people. Hence, corresponding with total area caused critical level in density of each commune, it also has

different particular features. The highest density was in Khe Tre town where reaches to 828.71 people/km², followed by Huong Huu, Huong Hoa, and Huong Giang commune with density was around 200 people/km². The commune has the lowest density was Thuong Lo commune (about 10.28 people/km²). The average household size in this district was 5.13 people with density about 35.28 people/km².

In 2005, available labor was 11,126 people distributed into 15 economic domains and occupying 48.48% of total population in the district. The majority of labor was in agriculture and forestry production (8,617 people, its proportion is 77.45% total labor), followed by education (483 people), repair business (411 people), processing industry (365 people), etc. The lowest labor force was in culture and sport domain, they just only 13 people, occupied 0.12% of total labor (Nam Dong Statistical Department, 2006).

3.6 Economic Conditions

The economic situation of Nam Dong district in some recent years already has changed positive in all economic domains. Some fields have increased suddenly therefore leading to the economic growth of the district was over plan that is illustrated in Table 3.5.

Table 3.5 Growth of total product value by economic domains.

Category	Year				
	2001	2002	2003	2004	2005
	%				
Total	7.5	8.2	10.2	11.6	9.9
1. Agriculture - Forestry - Aquaculture	4.9	6.9	12.7	12.3	7.0
- Agriculture	4.1	5.7	11.6	12.6	12.8
- Forestry	7.4	10.3	18.8	17.8	-2.4
- Aquaculture	9.3	9.9	3.2	6.4	10.5
2. Industry - Construction	19.4	13.6	11.1	14.4	14.6
3. Business - Service	5.6	7.4	6.0	7.0	14.0

Source: Nam Dong Statistical Department, 2006.

The growth of total product of most economic domains was increasing year by year (Table 3.5). In 2005, the general growth was 9.9%, of which the Industry-Construction was highest growth as 14.6%, followed by Business-Service domain (14%). Finally, the lowest growth was Agriculture-Forestry-Aquaculture domain (7.0%). The main reason of the lowest growth was Agriculture-Forestry-Aquaculture domain that is forest production was negative (-2.4%). In general, the Agriculture-Forestry-Aquaculture domain made up high proportion is 50,505 million VND, its proportion is 43% compared with others, followed by Industry-Construction is 41.963 million VND, occupying 35.8%, and in Business-Service is 24.834 million VND with its proportion is 21.2% (People Committee of Nam Dong, 2005).



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