

3.2 NATURAL FEATURES

3.2.1 Topography

There are several mountains and hills with an altitude ranging from 100 m to 500 m.a.s.l at the northern and western boundary of the Study Area. Most of the slopes of these hills are moderate at the mountain foot. Around 20,000 ha of plain areas can be found at altitude 4 to 6 m.a.s.l. in the Study Area.

The Study Area is divided into two zones; northeastern and southwestern parts, by the Lam river, which is one of the main rivers in Nghe An Province, flowing down through Nam Dan District from the center of western part to southern part.

3.2.2 Meteorology and Hydrology

(1) Meteorology

Based on the meteorological parameters recorded for a period of 34 years at the meteorological station at Vinh, Nghe An Province, which is the nearest station to the Study Area, the climate conditions are summarized below:

- Annual rainfall 2,133mm
- Mean temperature 24°C
- Average maximum temperature 33°C
- Average minimum temperature 17°C
- Relative humidity 85%
- Wind velocity 1.9m/s
- Sunshine 4.7hr/day
- Evaporation 940mm/year

(3) Hydrology

Considering data availability and locations, Nam Dan and Nam Phúc stations are selected for the rainfall analysis for the Study Area. Rainfall pattern recorded at the stations are shown below:

Analyzed Rainfall Pattern

(unit :mm)

Name of Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Nam Phúc	40	32	42	71	202	115	171	199	502	364	193	49	1,980
Nam Dan	26	28	36	65	136	149	125	230	431	409	130	45	1,811

More than 85% of the annual rainfall occur during the period from June to November, and the rainfall at the southern part of the District is higher than at the northern part.

The probable rainfall is analyzed as shown below:

Probable Rainfall

Return Period	Station Nam Dan			Station Nam Phuc		
	Annual Rainfall (mm)	Maximum 24 hr Rainfall (mm)	Consecutive Days without Rainfall (less than 5.0 mm)	Annual Rainfall (mm)	Maximum 24 hr Rainfall (mm)	Consecutive Days without Rainfall (less than 5.0 mm)
1/100	1,075.8	446.1	88	1,226.1	569.0	92
1/50	1,143.9	406.7	82	1,263.6	494.5	81
1/10	1,360.7	311.5	67	1,410.8	338.7	59
1/5	1,502.2	266.5	59	1,531.8	277.0	50
1/2	1,815.2	195.7	47	1,877.7	195.6	40

River specific discharges at 12 stations which have discharge record were analyzed and their runoff pattern are summarized below:

Analyzed Runoff Pattern

(l/s/km²)

Name of Station	River	Catchment Area (km ²)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
COC NA	LAM	417	20	15	15	14	19	26	31	40	90	82	54	28	435
CUA RAO	LAM	12,800	7	6	5	5	8	19	29	45	47	26	15	9	222
DUA	LAM	20,800	8	7	6	6	10	18	24	39	53	45	20	11	246
YEN THUONG	LAM	22,300	9	7	6	6	11	18	25	41	57	54	25	12	273
HUONG DAI	NGAN TRUOI	408	52	37	33	29	33	45	50	67	140	191	149	76	901
HOA DUYET	NGAN SAU	1,880	38	28	26	24	36	34	36	49	162	195	102	54	785
KHE LA	KHE THIEM	28	8	8	6	7	6	11	16	26	75	78	21	10	272
MUONG XEN	NAM MO	2,620	10	8	7	7	13	27	48	63	55	33	18	12	304
NGHIA DAN	HIEU	3,970	11	9	8	8	14	27	35	41	75	73	32	17	349
NGHIA KHANH	HIEU	4,000	16	13	12	12	20	28	29	49	84	84	33	19	400
QUY CHAU	HIEU	1,500	28	24	20	20	34	52	57	79	116	109	57	37	632
SON DIEM	NGAN PHO	790	39	30	28	28	39	42	41	55	171	149	97	53	771

At Lam River, the amount of river discharge is rising up from July and the maximum discharge is observed in October. The low flow season starts in January and lasts until May. Comparing it with the rainfall pattern at Nam Dan District, the high and the low flow seasons occur with one (1) month delay from the rainy and the dry seasons, respectively. About 75% of annual runoff occurs during from July to November period, and 50% during the September to November period. Discharge during March and April is considered to be the lowest.

The relationship between catchment area and annual, minimum and maximum runoff was analyzed and the following equation shows the relation between catchment area and annual runoff:

$$\text{Runoff (mm/year)} = 10773 * [\text{Catchment Area (km}^2\text{)}]^{0.285}$$

$$\text{Minimum Specific Discharge (l/s/km}^2\text{)} = 117.6 * [\text{Catchment Area (km}^2\text{)}]^{0.241}$$

$$\text{Maximum Specific Discharge (l/s/km}^2\text{)} = 3435 * [\text{Catchment Area (km}^2\text{)}]^{0.411}$$

Based on discharge records of 23 years at the Yen Thuong station which is the nearest station to Nam Dan District at Lam river, the mean, low and high flows were analyzed and the results are summarized below:

Probable Discharge at Station Yen Thuong

Return Period	Mean Discharge (m ³ /s)	Maximum Discharge (m ³ /s)	Minimum Discharge (m ³ /s)
1/100	235.9	9,785.0	46.6
1/50	255.8	8,696.5	49.8
1/10	323.3	6,241.3	61.0
1/5	370.4	5,173.4	69.1
1/2	482.5	3,626.9	89.2

There are several tributaries in the Study Area and the direct runoff from the rainfall is drained through these tributaries. The amount of the peak runoff varies depending on the scale of the catchment area. Here, the peak runoff discharge was analyzed applying the Rational Formula.

Based on the discharge and suspended sediment record at the Yen Thuong, suspended sediment runoff was analyzed and results are summarized below:

Probable Suspended Sediment Runoff (ton/km²)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	1.1	0.7	0.8	0.9	3.8	6.7	17.2	33.1	45.1	31.3	6.3	1.8	148.8
Max	7.5	5.0	2.9	3.2	26.8	25.2	70.6	109.6	184.3	81.6	28.3	6.9	365.4
Min.	0.2	0.1	0.1	0.1	0.5	0.6	0.4	2.4	2.3	1.0	0.1	0.0	51.6

3.2.3 Hydrogeology

Two types of aquifers are distinguished in the Study Area based on geological formations, namely aquifer in clastic sediments of Quaternary period, and aquifer in bedrocks of Triassic period. Groundwater is mainly used for domestic water supply. Most of the abstraction is from the aquifer in clastic sediment of Quaternary period by shallow wells. Water from the aquifer in bedrocks has not been utilized. The groundwater investigation was conducted in some parts of the Study Area in 1983 by Geological Survey of Vietnam. The test boring was carried out at 6 sites in the Study Area during this study period.

(1) Aquifer in Quaternary Sediments

The aquifer in quaternary sediments is widely found in the plain area along the hilly area on the EW direction. Sediments in this aquifer are mainly sand, sandy clay, and pebble. Underneath the aquifer is siltstone, sandstone of Triassic period. This aquifer has high water content however, water yield depends on thickness and composition the aquifer. Wells where the thickness of the aquifer is thick and composition is mainly with pebble, gravel, sand give high discharge. Wells in thin aquifer with composition mainly with fine sand, sand mixed with clay, grit forming in thin water content layers, give low yield. It is found that aquifer are located at different depths and their thickness varies widely. The thickness of aquifer is 80 m in maximum and 50 - 60 m in average, however it is estimated below 30 m on the north side of the hilly area. From the results of two test borings, the discharges rates were 8.5 liters/sec and 12.48 liters/sec thick layer aquifer. It is estimated 1 liter/sec in thin layer aquifers from the results of previous investigation.

(2) Aquifer in Bedrocks

The aquifer in bedrocks is found along the hilly areas on the east-west direction. The rock formation of this aquifer are of Triassic period, overlaid by quaternary sediments. Rocks in this formation are mainly siliceous mixed with weather products, sandstone, siltstone and claystone. Rocks in this aquifer are found to have strong cracks that contain water. Water from aquifer sometimes exposes to ground surface to form springs along cracks. The aquifer consists of two fractured limestone formations, namely Long Dai formation (O3-S1) and Dong Trau formation (T2adt). From the results of two test borings, the discharge rates were 4.65 liters/sec in Long Dai formation and 2.3, 1.2, 0.04 liters/sec in Dong Trau formation. The discharge rates of aquifer differs with respect to their location. Even though the discharge rates are high in the crack areas, there are also places where there is no water.

3.2.4 Soil and Land Classifications

(1) Soil Classification

The Study Area for soil classification covers an area of approximately 19,000 ha representing 64.5% of the Nam Dan District. The soils classification does not cover the area of the South Nghe An Province Irrigation Project implemented by the World Bank and the hillside areas.

Based on the FAO-UNESCO Soil Map of the World (FAO, 1990) and the Guidelines for Soil Description (FAO, 1990), a soil classification map of the Study Area at an scale of 1/25,000 has been elaborated.

Based on the field survey and analysis results, soils of the Study Area can be classified into 5 major soil groups, 10 soil units and 29 soil sub-units.

The major soil groups are as follows:

- Fluvisols group (FL) :	3,400 ha (22.0%)	1 unit	7 sub-units
- Gleysols group (GL) :	2,210 ha (14.8%)	2 units	7 sub-units
- Acrisols group (AC) :	3,510 ha (23.6%)	4 units	7 sub-units
- Plinthosols group (PT) :	1,480 ha (9.9%)	2 units	6 sub-units
- Leptosols group (LP) :	4,290 ha (28.8%)	1 unit	2 sub-units
Sub-total :	14,890 ha		
Other areas :	4,200 ha		
Total :	19,090 ha		

Fluvisols group occurs mainly at riverside of Lam River in southern communes of the Study Area. This group was formed by the deposits of Lam River alluvium. The acidity is light acidic or neutral. This soil is highly suitable for growth of rice at irrigable areas and upland crops at non-irrigable area.

Gleysols group often occurs neighboring Fluvisols area at the opposite side of the River. This soil is formed from low relief, flat plain, poorly drained field which is usually water saturated for more than 6 months per year using rice double cropping. This soil is suitable to grow rice.

Acrisols group can be found at almost all communes in the Study Area. This soil is suitable for upland crops and annual crops, and some soil units are suitable to grow fruit trees. This soil group is divided into 4 soil units: Gleyic Acrisols is formed on medium relief soil which is used for upland crops and single rice cropping; Ferric Acrisols is formed on gently undulating topography and major land form is upland, well drained, which is used for single rice or upland crops; Haplic Acrisols is formed on below foot of hill, undulating topography, very well drained. This soil is used for upland crops and fruit trees; Ferralic Acrisols is formed on hilly topography or steeply dissected topography of granite, rhyolite rock. This soil disposes at mountainous communes.

Plinthosols group is formed from the old degraded alluvial deposits which have been under dry conditions for a long time; as a consequence, iron oxide is strongly concentrated. This soil group is divided into 2 soil units: Eutric Plinthosols is formed on plat or high relief, well drained, which is suitable for double rice and single upland crops or single rice and single upland crops. Distric Plinthosols is formed on high relief. This soil is suitable to grow upland crops or alternation of crops.

Leptosols group can be found at places with hilly and mountainous topography with a slope of more than 15 degree. There are many rocks found on the surface. This soil is not suitable to grow annual crops but can be used for garden agriculture as fruit trees and forestry.

Outline of soil classification (including the characteristics of each soil unit), area of each soil unit and soil map are shown in Table 3.2.1 and Fig. 3.2.1, respectively.

(2) Land Classification

Land classification is carried out applying the Guideline for Land Classification of FAO-UNESCO. The results are shown in Fig. 3.2.2. The area of each utilization type and suitability class is summarized as follows:

Land Type and Suitability

Utilization Types	Area of each suitability class (ha)				Total
	S1	S2	S3	N	
Land for Rice	867.2	2,399.6	256.3		3,523.1
Land for Rice and Upland Crops		2,257.8	311.3		2,569.1
Land for Upland Crops	659.8	960.6	1,901.8	5,275.6	8,797.8
Total of Agricultural Land	1,527.0	5,618.0	2,469.4	5,275.6	14,890.0
Habitation and Special Land				3,071.0	3,071.0
Rivers, Streams, Ponds, Lakes				1,095.0	1,095.0
Grand Total	1,527.0	5,618.0	2,469.4	9,441.6	19,056.0

S1: Highly suitable, S2: Moderately suitable, S3: Marginally suitable, N: Non suitable.

3.3 AGRICULTURE

3.3.1 Land Use

The main uses of agricultural land in Nam Dan District are as shown below. Agricultural land, forest land and water surface for aquaculture covered about 11,530 ha, about 4,400 ha and about 200 ha respectively in 1995. These lands occupy about 40 %, 15 % and 0.5 % of total district area, respectively.

Actual Land Use in Nam Dan District (1995)

Category	Area (ha)
Residential	2,300
of which : Garden land	1,450
Agricultural land	11,530
a. Annual crop	11,510
- Single rice crop	2,200
- Double rice crop	4,000
- Double rice crop + single upland crop	1,600
- Single rice crop + single upland crop	660
- Double upland crop + single rice crop	1,050
- Upland crop	2,000
b. Perennial crop	20
Forest land	4,400
Water surface for Aquaculture	200
Special using land	3,000
Non-use land	8,000
Total	29,430

(Source) Calculated from the Land Use Map (1995)

The land of Nam Dan is classified into three categories according to the topography; Hilly land, Middle land and Plain land. Hilly land is located at the northern part and western part along the district border and occupies about 25% of total district area. Although the Hilly land is considered to be suitable for forest, about 40 % of this land is actually bare land. Middle land is situated along Hilly land with a width of 300 to 400 meters. Most of this land is a resident area and the inhabitants use their gardens mainly as orchards and sometimes grow cassava. Other areas are plain lands and mainly used as rice and upland crops fields.

Agricultural land comprises 11,510 ha of annual crops land (including sugarcane and mulberry according to the statistics of Nam Dan District) and 20 ha for perennial crops land. Annual crops land is classified into six categories.

Rice is cultivated on about 80 % of annual crop land. In addition, about 80 % of annual crops land is carried out double (about 50 %) or triple (about 30 %) cropping with rice and/or upland crops. Only less than 20 % is rice single cropping field because of mainly flood.

3.3.2 Agricultural Production

The sown area, production and yield of the main crops in Nam Dan District are as shown below:

Sown Area of Main Crops in Nam Dan District (ha)

Crop	1992	1993	1994	1995
W-Sp Rice	6,726	6,846	6,877	6,794
Su-Au Rice	5,358	5,399	5,930	5,924
Sum Rice	1,599	1,544	957	839
Rice Total	13,683	13,789	13,764	13,557
Maize	805	1,226	1,450	2,167
Sweet Potato	1,141	857	2,112	2,198
Peanut	1,538	1,613	1,878	2,032
Vegetables	649	755	934	1,127
Sugarcane	168	112	118	202
Cassava	184	117	144	173
Mulberry	162	342	202	205

(Source) People's Committee of Nam Dan

Production of Main Crops in Nam Dan District (tons)

Crop	1992	1993	1994	1995
W-Sp Rice	25,160	25,559	27,767	29,246
Su-Au Rice	14,136	15,039	18,931	19,410
Sum Rice	2,068	1,475	2,385	1,864
Rice Total	41,364	42,073	49,083	50,520
Maize	746	1,325	3,111	5,117
Sweet Potato	3,840	4,946	12,869	8,675
Peanut	1,238	2,555	1,941	3,234
Vegetables	4,410	5,481	5,654	6,751
Sugarcane	7,301	5,368	6,076	10,594
Cassava	736	700	432	865
Mulberry	679	2,064	1,279	1,358

(Source) People's Committee of Nam Dan

Yield of Main Crops in Nam Dan District (tons/ha)

Crop	1992	1993	1994	1995
W-Sp Rice	3.74	3.73	4.04	4.30
Su-Au Rice	2.64	2.79	3.19	3.27
Sum Rice	1.29	0.95	2.49	2.22
Rice Total	3.02	3.05	3.57	3.93
Maize	0.93	1.08	2.15	2.36
Sweet Potato	3.37	5.77	6.09	3.95
Peanut	0.80	1.58	1.03	1.59
Vegetables	6.80	7.26	6.05	5.99
Sugarcane	43.46	47.80	51.66	52.45
Cassava	4.00	5.98	3.00	5.00
Mulberry	4.12	5.98	6.39	6.67

(Source) People's Committee of Nam Dan

Rice is the most important crop and occupies more than 60% of the total crop planted area. Production of paddy amounts to 50,520 tons, that is equivalent to 320 kg per capita. Peanuts, maize and sweet potatoes are planted in more than 2,000 ha each; it is estimated that about twice the amount obtained during 10 years ago. Peanuts is an important cash crop which is sold through intermediate to an agro-export company as a raw material for oil production. Most of maize and sweet potato are used as feedstuff for livestock; there is scarcely any grassland in the District. Vegetables such as water spinach, field radish, lettuce, chili and onion are planted in 1,100 ha. The products are sold at the markets in communes, in Nam Dan town and even in Vinh city through middlemen or by the farmers themselves. Although it was not possible to get statistical data, a lot of fruits such as orange, grapefruit, lemon, persimmon etc. are produced and sold at the markets as vegetables. In addition, in a small area, of less than 200 ha located at the riverside, sugarcane, mulberry are planted; cassava is planted mainly at midlands and soybean or green bean at rice fields as the secondary crop of rice. There is scarcely a surplus of major food crops and industrial crops which are expected as cash crops of farmers in Nam Dan District. It is necessary to increase the production of these crops.

3.3.3 Livestock and Aquaculture

The number of main livestock in Nam Dan District is as shown below:

Number of Livestock in Nam Dan District				(head)
Livestock	1992	1993	1994	1995
Buffalo (1)	8,815	8,285	8,839	10,110
Cattle (1)	16,381	18,086	20,890	20,487
Pig (2)	34,396	37,751	39,906	41,945
Poultry (1)			116,100	115,700

(source)

(1) People's Committee of Nam Dan

(2) Statistic Data of Nghe An Province

Buffalo is the major draft animal found in the area and serves for land preparation in both paddy and upland fields. Although some of the cattle are also used as draft animals (mainly used in upland field), many of them are raised for meat. The average number of cattle, pig and poultry per farm household is 0.7, 1.4 and 3.4 heads, respectively. These livestock are major sources of cash income. It is necessary to introduce high productive strains, to improve technology of feeding and management of livestock.

It is reported that there are about 200 ha of water surface for aquaculture in Nam Dan district. However, actually much more than this area may be used as fish ponds. In addition, there are about 500 ha of Lam river and about 100 ha of reservoirs; it seems that potential of inland water fishery in the district is high. There is the Inland Fishery Center, under the Fishery Department of the Nghe An Province, at Nam Giang Commune. Although the Center supplies 60 million of fry per year to the farmers, the demand for fry far exceeds the supply. Inland fishery is also one of the major sources for cash income.

3.3.4 Farming Practices

(1) Cropping System

There are six cropping systems on annual crop land, which are classified into six categories according to the cropping system as mentioned above (see 3.3.1 Land Use). The typical rotation model is as shown below. Details of cropping system are shown in Fig. 3.3.1

Present Cropping Systems

Mark	Category	Rotation Model
CP1	Single rice crop	Winter-Spring Rice [W-Sp] or Summer Rice [Su]
CP2	Double rice crop	W-Sp Rice + Summer-Autumn Rice [Su-Au] or W-Sp Rice + Su Rice
CP3	Double rice crop + Single upland crop	W-Sp Rice + Su-Au Rice + Winter Upland Crop (Maize, Sweet Potato or Vegetable) [W U.C]
CP4	Single rice crop + Single upland crop	Su Rice + Spring U.C (Maize or Sweet potato) [Sp U.C] Su Rice + Winter-Spring U.C (Maize or Sweet potato) [W-SpU.C]
CP5	Double upland crop + single rice crop	W-Sp U.C (Maize, Sweet potato or Peanut) + Su-Au Rice + W U.C (Maize, Sweet Potato or Vegetable), W-Sp U.C + Su Rice + W U.C
CP6	Upland crop (Single, Double, Triple)	Spring U.C (Maize, Sweet potato or Peanut) [Sp U.C] + W U.C (Maize, Sweet Potato or Vegetable), Sp U.C + Summer U.C (Soybean or Green Bean) [Su U.C] + W U.C

(2) Rice Cultivation

There are three seasons of rice cropping; winter-spring rice cropping (W-Sp), summer-autumn rice cropping (Su-Au) and summer rice cropping (Su). Paddy yield of W-Sp cropping which is sown from December to January and harvested in May is the highest among three croppings, followed by Su-Au cropping which is sown at May and harvested in September and Su cropping which is sown in July and harvested in November is the lowest.

Usually after W-Sp cropping, Su-Au cropping is done. Sometimes Su cropping has to be carried out because of lacking water in the field. If water is available in June, the farmers choose Su-Au cropping. Su cropping may suffer from flooding from middle of the September to the first half of November.

Growing period of rice strictly depends on cropping season. Thus, suitable varieties are limited in each cropping season. Growing period and yield of main varieties are as shown below:

Growing Period and Rice Yield by Variety

Variety	Growing Period (days)			Yield (without (o) and with (w) Irrigation) (t/ha)					
	W-Sp	Su-Au	Su	(o) W - Sp (w)	(o) Su - Au (w)	(o) Su	(w)		
IR 1820	170-180			3.5-3.8	4.5-5.0				
IR 17494	160-170			3.2-3.5	4.0-4.5				
CR 203	120-125	110-115		2.5-3.0	3.0-3.5	2.5-2.8	3.0-3.5		
BAO THAI			140-150					1.8-2.0	-

These varieties do not satisfy the farmers' demand. Main demands of the farmers concerning rice varieties are higher yields, disease tolerance and resistance to insects. Farmers want to harvest more than 6 t/ha in W-Sp rice. The tolerance to blast and sheath blight is especially demanded and the resistance to brown planthopper is also requested by farmers.

Rice is generally transplanted after 25 days seeding on nursery bed. However, some varieties need about 50 days of growing period on nursery bed in W-Sp rice because of low temperature. Land preparation of rice field is carried out with local plow and harrow driven by buffalo. This work needs about 20 days per ha (1 day=8 hours). A few farmers have exceptionally a power tiller and they carry out the contracted land preparation for neighboring farmer's fields after completed the work of theirs. Land preparation work for 1 ha of field is completed only 2 days with the power tiller. Service fee for land preparation of 1 ha of field is from 400,000 to 700,000 VND. According to the results of the socio-economic survey about 40 % of answerers expressed the need of farm mechanization in order to be free from heavy labor. On the other hand, direct seeding of rice is carried out a little in W-Sp cropping to avoid a heavy labor of rice transplanting. However, direct seeding in summer-autumn cropping is impossible because of shortage of fallow field as a result of intensive land use.

Application amount of fertilizer is generally 150-200 kg/ha of urea, 150-200 kg/ha of superphosphate and 60-80 kg/ha of potassium chloride and 6-7 tons per hectare of manure. Application amount in Nam Dan is less than level of the general standard of Viet Nam (200-230 kg/ha of urea, 300-400 kg/ha of superphosphate and 100-110 kg/ha of potassium chloride and 10-12 tons per hectare of manure).

Major insect pests are Yellow rice borer (*Tryporyza incertulas*), Brown planthopper (*Nilaparvata lugens*) and Leaf fold (*Cnaphalocrosis medinalis*). Padam 95SP and Bassa 40EC etc. are sprayed for insect control by instruction from the Agricultural Protection Station. Major diseases are Blast (*Pericularia oryzae*) for W-Sp rice and Sheath blight (*Pellicularia sasakii*) for Su-Au rice. Fujione 40EC and Validacin 3A are also sprayed for control of Blast and Sheath blight, respectively by instruction from the same Station. Weeding is carried out generally by manual labor and herbicide such as Sofit 40ND is also applied sometimes.

Rice seed is supplied by cooperatives or private stores. Although some seeds are produced at the limited seed production farmer's fields under contract with the Seed Station located at Hung Tien Commune, quantity of its produced seeds is 40-50 tons in each cropping season and this quantity covers only less than 10 % of total cropping area of Nam Dan district. There were no seed inspection nor certification system in the Nghe An Province to say nothing in Nam Dan District. Fortunately, Nghe An Provincial Seed Test & Inspection Center was established at June 1997 and a seed inspection system is providing.

(3) Upland Crops

Main upland crops are grown in rice field with intensive cultivation such as double cropping and triple cropping with rice. Cassava is cultivated a little on the middle land. Application amounts of fertilizers for main upland crops are shown below:

Amount of Fertilizer Presently Used in Nam Dan

Crop	Chemical Fertilizer kg/ha			Manure t/ha
	Urea	Sup. Phos.	K. Cl.	
Maize	100 - 120			6 - 8
Sweet potato	40 - 60		50 - 70	6 - 8
Peanut	40 - 60	200 - 300	80 - 100	6 - 8
Green bean	60 - 80			6 - 8
Sesame	70 - 80			6 - 8
Chili	40 - 50	150 - 250	40 - 60	6 - 8
Sugar cane	350 - 450	400 - 600	50 - 70	6 - 8

(Source) JICA Study Team

Land preparation is carried out with local plow and harrow driven by buffalo or ox. Most management works are carried out by using manual labor.

3.3.5 Land Tenure

(1) General

According to the Constitution of Viet Nam, land ownership is in the hand of the State. However, a new Land Law enacted in 1993 states that land ownership still belongs to the State but land use rights are given to the farmers on a stable and long term basis. In this new Land Law, the land use rights are extended to five rights: right to exchange, transfer, rent, inherit and mortgage. The right to use land allocated by the State is also given to the farmers. Nevertheless, the District's People's Committee has the power to rule on those activities.

The law says that a household can receive a maximum of 3 ha of agricultural land and, in the case of forest lands, the decision of how much land is to be given is made by the local governmental bodies. It also states that organizations, households or individuals who are allocated with land for use in agriculture, forestry, aquaculture and salt production do not need to pay rent for that land. However, if a farmer rents his such land to somebody, the farmer must pay rent for that land.

(2) Land Management

Concerning agricultural and forest land management, there are some differences explained below:

1) Agricultural Land

a. Types of Agricultural Land

Agricultural land is defined by the Land Law as any land identified as being intended primarily for use in agricultural production, such as cultivation, animal husbandry and agriculture including research and experimentation in agriculture.

At present there are three types of agricultural land available in Nam Dan District.

i) First Agricultural Land Stock

This type of land accounts for 90 to 95% of total agricultural land. Land use rights for this land are given to the farmers completely for a period of 20 years.

ii) Second Agricultural Land Stock

It accounts for 5 to 8% of total agricultural land. This land is allocated to a Commune's People's Committee and serves two purposes:

- a) To compensate those farmers who have lost their land due to utilization of that land by the State for public purposes such as construction of roads, irrigation canals and installation of electric power lines.
- b) The commune's People's Committee can put this land into bidding in order to obtain funds for the Committee.

iii) Third Agricultural Land Stock

This type of land usually consists of forest land and land of very poor quality. This land is allocated to the Commune's People's Committee and can also be put into bidding to increase funds for the Committee. It is commonly known as "Public Land".

b. Farmers' Rights

- Farmers who have been allocated with use rights can use the land for agricultural purposes as long as they are agreeable with the State's Agricultural Master Plan.
- Farmers can lease the land originally allocated to them. However, the State requires that the farmer who rents the land must use the land in a proper way following the guidelines of the State's Agricultural Master Plan.
- Land use rights can be inherited.
- Land use rights can be mortgaged as collateral to obtain loans from banks or credit organizations.
- Farmers can sell or buy land use rights but they have to make sure that the land will be used for the same agricultural purposes as before.

c. Farmers' Obligations

- To follow the guidelines established by the State's Agricultural Master Plan concerning the use of the agricultural land.

- Land improvement and protection measures must be applied during the cultivation process.
- Farmers have to obey the guidelines of the law of environmental protection trying to avoid any activity which may have adverse effects on any surrounding land.
- In case of selling land use rights, the farmers must pay a tax of 20% of the sale's value in the case that the buyer intends to use the land for cultivation; it is 50%, if the land is used for other purposes different from cultivation.
- Farmers must be ready to relinquish their land, if the State finds it necessary for the public purpose.

2) Forest Land (Hilly Land)

a. Types of Forest Land (Hilly Land)

Forest land is any land identified as being intended primarily for production activity in forestry such as natural forest land, afforestation, timber reduction, and land used for forest nurseries, improvement and transformation of forests, and research on and experimentation in forestry. The chairman of the District's People Committee is in charge of issuing hilly land certificates for use to the farmers for a period of 50 years.

There are 14 communes out of 23 having hilly land areas. These hilly land areas are classified as follows:

- Hilly land with natural forest	:	28 ha
- Planting forest	:	4,900 ha
- Barren hilly land	:	3,150 ha
- Other hilly land	:	281 ha

In the planting forest, pine and eucalyptus trees are most common. Small areas are planted with acacia trees.

Nam Dan District has a total of 8,359 ha of hilly land area, 50% of which is under the management of a State-owned farm (Dai Hue State-owned enterprise). The rest is managed by the People's Committees of 14 communes.

b. Farmers' Rights

- Farmers have the right to use forest or hilly land on a stable and long-term basis so long as they comply with the guidelines of the State's Agricultural Master Plan.
- Farmers have the right to exploit, sell and inherit forest products under the State regulations.
- Farmers have the right of receiving free technological and financial assistance from the State.
- In case the State decides to expropriate the forest land for public purposes, the affected farmer is entitled for a compensation.

c. Farmers' Obligation

- Farmers must follow the forest land management guidelines set up by the State in its Forestry Master Plan.
- Farmers must pay a tax of 12% of the forest products value when they sell their products.

(3) Land Certification

The table below provides information on certified land rights and number of households in Nam Dan District who have such certification.

Total Certifiable Area	Actually Certified Area	Total Households	Households with Land Certificate
13,543 ha	10,429 ha	31,800 households	30,000 households

Source: People's Committee of Nam Dan District, 1996

(4) Tax on Land Use

For tax calculation purposes, the following elements are taken into consideration:

- Soil quality
- Land location
- Topographical conditions
- Weather conditions prevailing in the area
- Irrigation and drainage conditions

Based on the above five elements, land in Nam Dan District has been graded into five classes (from Grade 2 to Grade 6, there is no Grade 1).

The annual tax payment per hectare, which represents an equivalent of 10% of paddy production depending on land productivity, is as follows:

a) Tax for annual crops:

Land Grade	Amount of Payment (Equivalent to Kg of Paddy)
Grade 2	460
Grade 3	370
Grade 4	280
Grade 5	180
Grade 6	50

b) Tax for perennial crops or fruit trees:

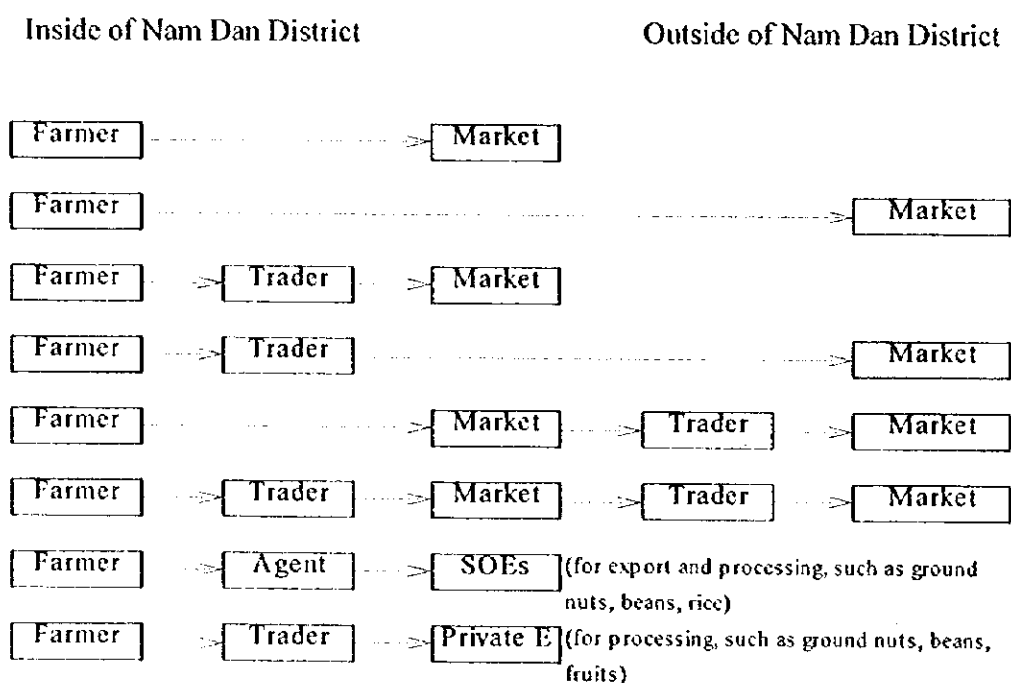
Land Grade	Amount of Payment (Equivalent to Kg of Paddy)
Grade 2	650
Grade 3	550
Grade 4	400
Grade 5	200
Grade 6	80

3.3.6 Marketing System

Generally, price controls in all stages of trading agricultural commodities were eliminated in 1989 (with the exception of a few products). Agriculture producers can set and negotiate their own prices and trade them with anybody they choose. This free price mechanism is basically essential to the market economy.

The marketing channels of agricultural products produced in Nam Dan District and transported to the markets in Nam Dan District are shown in Fig. 3.3.2. It also includes the channels in Vinh City which is the most important market for the products of Nam Dan District as most of the consumers of them can be found there.

The present marketing system is still passing through a transitional period from a former central controlled mechanism to a free market mechanism, and the farmers seem to be intended to start producing more profitable crops departing from the farming practice based on self-sufficiency (mainly producing staple crops). In this reflection, there are many different channels used by traders who are mainly small-scale middlemen using bicycles as their main means of transport. Principal marketing channels for agricultural products in this area focusing on Nam Dan District are categorized as shown below:



Remark: SOE (State-owned Enterprise), E (Enterprise)

Principal Marketing Channels for Agricultural Products

The Study Team investigated markets, agencies and persons concerned in Nam Dan District including Vinh City which is the biggest consuming market for agricultural products coming from Nam Dan District. The linkage to Vinh market must be discussed when the marketing aspects for Nam Dan District's agricultural products are considered.

The main observation made during the survey on the marketing system in this area are summarized below:

- a) Small-scale middlemen are almost traders among all 26,634 registered private traders in Nghe An Province, and use bicycles for transportation. The rest use motor bicycles and small trucks (Cong Nong). It is officially reported that there are many non-registered traders in addition to the above.
- b) The number of State-owned trading enterprises have been decreased to only 28 in Nghe An Province after the policy change which are still having leading role in several activities such as export and import, providing essential materials (cement, steel, fuel etc.) and distributing complementary goods to remote areas. However their activities are mainly concentrated in urban areas; rural areas are covered by the private traders.
- c) There are very limited number of traders using ordinary trucks, who can cover wider areas even out of Province, sometimes going as far as Hanoi.
- d) Major flow of agricultural products mainly vegetables is to/from Vinh City. Middlemen (mainly women in farm household who have excess time) buy and collect products from farmers and/or the nearest market, pack them in baskets, hang them on the back of their bicycles, and transport them to Vinh markets early morning on the following day. On the other hand, some middlemen come and buy commodities at Vinh markets and sell them at markets in Nam Dan District.
- e) There are many agricultural commodities sold in markets in Nam Dan District excepting some products such as rice, ground nuts, meat, pork and chicken, which come from other areas mainly through Vinh Market.
- f) Trading prices are decided by negotiation as their practice but without reasonable and sufficient data because of limited information which is mainly based on oral transmission. According to the result of interview to sellers in some markets in Nam Dan District, less than one forth of them only know the broadcasting program of market information by TV and radio but most of sellers do not use them for their trading because of low reliability and limited kinds of commodities.
- g) Trading prices are decided without a reasonable negotiation process because of limited information which is mainly based on oral transmission. Middlemen as a majority can cover a very limited area for their trading due to their limited mobility by bicycles and they do not change destination markets to seek more profitable ones according to market information.
- h) The private traders' activities have been sharply expanded and become a major force in the retail market.
- i) In Nghe An Province, only Vinh Market and Station Market in Vinh City out of 19 markets in total have wholesaling functions in addition to retailing functions.

- j) Markets having more than 500 registered traders belong to the People's Committee of Province. These markets are Vinh Market (3,000 registered traders) and Station Market in Nghe An Province. The rest of the markets belong to the District or City's People's Committee.
- k) The authorities who manage the all the markets in Nam Dan District and Vinh City do not collect daily trading information such as quantities and prices by commodities.
- l) Market prices do not seem to widely fluctuate much to the balance between supply and demand of commodities in those markets. On the other hand, it is known that some enterprises are very worried about fluctuations of purchase prices due to changes in available quantity of commodities in the market. For example, the purchase price of ground nuts fluctuated from 3,500 to 7,000 VND/kg during last one year, according to an exporting enterprise. As almost all the commodities are traded in small quantities due to the limitation set by the transportation means, their prices may not be to reflect the whole market conditions in the area. On the other hand, in case of big-volume trading, i.e, the ground nut case mentioned above, it might be affected directly by the whole market conditions in this area.
- m) Although market information is limited and disseminated mainly by traders through an oral transmission system, there are many commodities in the markets distributed from/to out of Nghe An Province as follows:

From other Provinces/Countries

- Apple: China
- Carrot: Hanoi, Da Lat
- Orange, Maize: Hanoi, Southern Provinces
- Rice: Southern Provinces
- Bean: Buon Me Thuot Prov., Dak Lak Prov.
- Cabbage, Potatoes, Tomatoes, Onion, Garlic: Hanoi
- Kohlrabi, Tomatoes, Garlic, Cabbage, Ginger: Thanh Hoa Province
- Radish: Thai Bin, Hai Hung
- Potatoes, Onion: Ha Tay Province.

To other Provinces/Countries

- Ground nuts: Export
- Squid (dried/frozen): Export
- Shrimp(frozen): Export
- Frozen pork: Hanoi
- Lemon: Hanoi
- Orange: Hanoi
- Dry chilly (mainly produced in Nam Dan): Other Provinces

- n) There are many agricultural commodities sold in Nam Dan District coming from out of District which have been identified in the survey period as follows:

Apple (from China), Orange (from China), Orange (from other Provinces), Black sesame, Cabbage, Cauliflower, Garlic, Green bean (String bean), Green onion, Kohlrabi, Mustard green, Onion, Potatoes, Salad green, Small tuber onion (fresh and dried), Tomato, White radish

Since the introduction of a free market mechanism, market opportunities for farmers to be involved in commercial farming have increased as a change from self-sufficiency farming system. However, there are many crucial constraints remained in the current marketing system in the area. Such constraints to be solved and improved are summarized as follows:

a) Lack of accessibility to credit

In rural areas of Nghe An Province, almost all the traders are women of farm household and their major role is agricultural products trading. Their trading scale are too small to generate more dynamic commodity flows reflected markets needs among markets. It is difficult to expect that trading companies with bigger activities using trucks would appear and generate dynamic commodity flow in markets. Because entrepreneurs hardly receive financial assistance such as credit especially in rural areas.

b) Lack of reliable market information

Additionally, as the areas of their activities are small and limited due to the limitation of transportation means such as bicycle and motorbike, they can obtain only limited information. As a result, it would be difficult for them to have more profitable opportunities in other areas. At the same time it is difficult for farmers to acquire market information for improving and adopting their farming system to market needs in order to achieve more profitable operation. As farmers are mainly relying on traders for market information, they do not have enough bargaining power to set appropriate price for their products.

c) Lack of institutional market information system

There are no institutional ordinance concerning set up of market information system to producers, traders and consumers in the area. This fact is crucially augmenting the problems mentioned in f) of page 43 - 44.

d) Deficient supply of products

There are many kinds of agricultural commodities coming from out of Nam Dan District and it seems that they do not satisfy markets demand excepting some products such as rice and meat.

e) Bad road condition

The conditions of roads connecting communes located in Nam Dan District are inadequate especially in rainy season, and impede trading activities as well as access to information.

f) Insufficient wholesaling function

Wholesaling function in Vinh Market and Station Market are not well operated and it seems only to pay the role of an intermediate step in a continuous stream of

commodities from producers to consumers. It is affected by the trading condition mentioned above.

3.3.7 Agro-industry

(1) Current Condition of Agro-industry

While employment for agro-industries in Nghe An Province is still small, this sector could have a strong growth potential and could serve as a sustainable income source, if the appropriate circumstances are found. Then, this Development Plan for Nam Dan District should involve agricultural sector initiatives such as introduction of commercial crops which are linked to agro-processing industries.

With this background in mind, the Study Team collected information and visited agro-processing factories in Nam Dan District and surrounding areas including Vinh City. Although official statistic data on enterprises especially non-State enterprises are unavailable, the current conditions of the agro-industry in the Area are summarized below. The findings are based on the information that the Study Team could get by visiting the factories and interviews with people involved in those activities:

a) Poor machinery and equipment

Almost all the factories use antiquated and/or simple machinery and equipment with the exception of the State-owned beer factory and knitting factory. The factories in Nam Dan District are characterized by being too conventional and having a small capacity. The capacity of them is insufficient and are mostly used for the side-job of the farmers.

b) Small-scale production

The production scale of the factories are relatively small. Market scale for products as beer, edible oil and frozen marine products production growth of which is expected is much beyond their production capability.

c) Lack of adequate marketing activities

All State-owned enterprises have not established any sales and/or marketing section in their organizations and do not implement enough sales or marketing promotions for their products. They tend to rely on State-owned trading enterprises which are close-linked to them historically for selecting raw material suppliers at lower prices, finding out new clients and expanding their markets.

On the other hand, the private enterprises do not have any trading enterprises to rely on. They are doing marketing activities aggressively even though the marketing information is limited and the market to be covered is limited to the near-by areas.

d) Lack of investment resources

Almost all the persons who are in charge of managing the factories have their plans for expanding their activities, and are looking for ways to access

investment funds and technology. Their biggest problems in executing the plans are those related with credit access and required information on technology needed to be introduced for the execution of their development plans.

e) Lack of market information

Although most of the factories have not international marketing experience and it is evident that they require international marketing information, official services do not provide such information. Thus, to access necessary information is blocked. Many factories especially in export-related factories desire external sources of marketing support including the joint venture partnerships. However, in case of some private enterprises, they are trying to expand activities and improve products in order to get higher profits within such limited circumstances.

(2) Present Problems

As a result of the survey, the following problems are recognized:

a) Lack of accessibility to credit

Difficulties to access investment credit for establishing enterprises as well as expanding activities in existing enterprises are one of the most critical constraints which impede proper development of agro-industry sector in this Area. It seems that development would be self-generated, if sufficient amount of credits could be timely available for such suitable enterprises and persons.

b) Lack of services including market information

The development of agro-industry in the Area require services of support, marketing activities, acquisition of machinery and workers training. It also require services that help old-style enterprises to adjust themselves to changing business conditions under a free market mechanism.

c) Inadequate transportation network in Nam Dan District

Small enterprises in Nam Dan District have limited access to capital, technology, marketing information and technical assistance. Additionally, they all dispersed and hampered by inadequate transportation network. Thus they are suffering from disadvantages in terms of gaining access to official assistance and obtaining and sharing with information compared to other enterprises of similar activities.

d) Difficulties of processing factories of industrial crops

The state-owned sugar mill located adjacent to the Study Area operates only four months a year. It has very old plant and seems to be unprofitable. Due to the fact that farmers in the surrounding area are having favor on rice cultivation over sugarcane production, it seems difficult that the mill could be provided with enough amount of sugarcane on continuous base and keep a longer operation period to become profitable. The situation will not change unless the

farmers change their self-sufficiency farming practice into commercial-oriented farming practice.

c) Disadvantage of the export/import factory

Currently many export commodities such as frozen marine products and garments produced in the Area are once transported to Hai Phong Port and then exported. It is disadvantage for the same kinds of factories located in neighboring areas of international ports in view of transportation costs to exporting ports. To the contrary the same condition can be applied for the factories procuring commodities with imported raw materials.

3.3.8 Agricultural Supporting System

(1) Agricultural Extension

1) General

The Nam Dan Agricultural Extension Station started giving services in October, 1996. Previously, these services were provided by the Agricultural Department. The Station is under the guidance and supervision of the Provincial Agricultural Extension Center. The Station, in its turn, depends on the Department of Agricultural Extension of the MARD.

2) Extension Purposes

The main purposes of the extension services are related to the introduction of new agricultural technologies, new crop and animal breed varieties, and the establishment of "Extension Model Plots" where new agricultural technologies are taught to the farmers. The system is so called the "Training and Visiting System" (T&V). In this system extension workers provide training to farmers at their farm and visit them from time to time for monitoring.

At the provincial level, the Extension Center provides training courses for both staff and farmers.

3) Budget

The available budget for the Station is VND77,000,000. The provincial budget provides VND60,000,000 and the district budget, VND17,000,000. The budget is too small to cover the requirements for an adequate provision of extension services.

4) Staff and Services' Coverage

At present, there are only 4 people working at the Station. This number is evidently insufficient to cover the 31,800 households in the District. The Station's services plan considers to cover one commune at every visiting due to the small number of extension workers. So far, seven communes have been benefited with extension services. It is estimated that under the present conditions, one staff can cover only two communes per year.

The Station has only three motorcycles and 1 bicycle, which makes it very difficult to visit the farms during the rainy season when most of the rural roads become muddy.

5) Materials

The materials used for extension services are:

- Magazines
- Leaflets specially prepared by the Station
- Educational material provided by the Provincial Extension Center

As most of these materials are available in small quantities, the extension workers give some materials to the head of a commune and he is in charge of circulating the materials among the farmers in the commune.

6) Extension Model Plots

The Station rents 1 - 2 hectares of land from some households in a commune. The land plot is divided into two equal sections. On one of them, a new variety of, for example, rice is cultivated using new techniques, while on the other land, a traditional variety is cultivated using old techniques. Once the crops are harvested, the farmers can directly see the advantages of adopting a new and improved variety and of using new technology.

Land preparation is made under the supervision of the extension worker and the machinery to be used for that purpose is rented from nearby farmers. The model plots are expected to be set up at each commune within the District.

7) Present and Future Activities

At present, the Station is concentrating on the introduction of a Chinese rice variety, Shan Wi 63, to the communes. Also, it puts emphasis on the new project of introducing a new breed of pig which will provides more kilograms of meat per animal. This project has been executed with the cooperation of the Agricultural University No.2 of Hue. To introduce this new breed, 10 households will be selected at each commune and they will be guided in the breeding process of this pig. They will help to disseminate the required technology to raise the pig within their own communes.

8) Main Problems

At present, the following problems can be detected in connection with the extension services.

- The budget is too small to operate an efficient extension services.
- The number of extension workers is not enough for the effective transfer to the farmers of the know how to improve productivity, farming management, new Technology, etc. The training of the communes' extension workers is also not enough.
- Transportation means are not enough to carry out the extension activities.

- Number of training facilities and materials for both extension workers and farmers is not enough.
- Model Extension Plots show only respective farming technology. The establishment of comprehensive model farm with model management directly connected with the increase of farmers' income is required.

(2) Rural Finance

1) General

According to the Viet Nam Living Standard Survey conducted in 1993 by the UNDP, which sampled 4,800 households, about 59% of responding households answered that they had taken loans, and that 70% of credit is obtained from informal sources (relatives, friends, moneylenders, traders, etc.) and the remaining 30% from the formal financial system. Interest rates were higher in the informal market compared to the formal market. Loans in the informal market adopts many forms: cash or payment in kind from relatives, moneylenders and traders; or through participation in rotating savings and credit Unions.

The present formal banking system is not capable to cover this demand. Based on 1994 Viet Nam Bank for Agriculture (VBA)'s lending volume to rural households of about US\$1.1 billion, the Asian Development Bank has estimated that total credit needs for the sector is at least US\$3.5 billion, meaning that there is a deficit of US\$2.4 billion. It is also estimated that the credit gap in the rural sector particularly for financing of medium- and long-term investments is even larger.

Concerning the formal financial system, the main regulations covering banking activities are based on Decisions 37 and 38 - LTC/HDNN of May 24, 1990, which cover the operations of the State Bank of Viet Nam (SBV) and other banks and financial companies. These regulations have been supplemented by Decision 260/TTG of June 2, 1993 which covers the establishment of credit unions and Decision 525/TTG of August 31, 1995 which established the Bank for the Poor. There are also other governmental programs which provide credit resources for poverty alleviation. The main programs are the "Fund for Hunger Eradication and Poverty Reduction (HEPR)", and "Decisions 327 and 4304 for Re-greening of Barren Hills".

2) Main Rural Financial Institutions

a. Viet Nam Bank for Agriculture (VBA)

This bank accounts for more than 90% of total credit extended by formal financial institutions to rural households. VBA was created from the Agricultural Credit Department of SBVN. At the beginning, its operations concentrated on granting loans to the SOE sector, but due to the transformation process of the Vietnamese economy, now it has a commercial orientation focusing on granting loans to farm households. VBA has the largest network of branches in the country with 500 branches and 1,500 smaller

outlets. The branch network covers the district level and the sub-district level as well, where population density is greater. VBA also provides capital for other sectors than agriculture such as local industry, side-businesses, commerce, services, etc.

Organizational Structure:

At a provincial level, VBA has a main office in Vinh City and at a district level, one at Nam Dan town. At each of the 23 communes of the Nam Dan District, it has 1 to 2 bank representatives depending on the population of the communes, who is(are) in charge of preparing loans applications for any member of the commune.

The bank is run by a Management Board of 3 persons: 1 director and 2 vice-directors. One of the vice-directors acts as the director of the Bank for the Poor.

It has a total staff of 59.

Capital Resources:

The bank has the following funds resources:

- a) Funds mobilized from the population under the form of deposits. The terms and interest rates applied to those deposits are as follows:

1-month deposit	:	0.4% per month
3-months deposit	:	0.5% per month
6-month deposit	:	0.6% per month

- b) Funds provided by the higher levels of VBA in case of liquidity constraints. These higher levels can also, in turn, obtain funds from the State Bank of Viet Nam through the discounting process.
- c) Borrowing from other economic organizations which have surplus capital. The interest rate is decided on a mutual agreement.
- d) Temporary use of funds from other organizations which have liquidation accounts at the bank.

Borrowers:

Any individual or firm (private or state-run) from any sector can borrow from the bank.

Active Interest Rates (Loan):

The active rate can fluctuate and is set up by the headquarters. The following active rates are in force at present:

- i) Urban Area
- 1.45% per month for short-term loans (less than 12 months)
 - 1.50% per month for mid-term loans (less than 36 months)

ii) Rural Area

- 1.20% per month for short-term loans (less than 12 months)
- 1.35% per month for mid-term loans (less than 36 months)

At present, the bank does not provide long-term loans.

Lending Procedures:

In general, the borrower gets a "Borrowing Passbook" issued by VBA governor. When the need for a loan arises, the borrower must make an application for capital and present a Mortgage Certificate issued by the local authorities which will be used as a collateral. The bank verifies the documentation and sends a personnel to the applicant's village to verify if the information and documentation presented are true. Then the bank decides to loan or not. The largest amount which the bank can loan is less than 70% of the value of the mortgage.

For loans less than VND1 million, mortgage is not necessary. In case that the loan is less than VND10 million, the guarantee of a communal organization is only required.

Information on Operations:

At the level of the Nam Dan District's VBA, short-term loans absorb most of the available funds for loans. Within the loans for agricultural purposes, they are used evenly for cultivation (60%) and animal raising (40%) purposes. For non-agricultural-purposes loans, most are used to finance trading activities.

b. Viet Nam Bank for the Poor (VBP)

This bank started its operations in 1996. It uses the facilities and staff of VBA. The Director of this bank is also one of the Vice-director of VBA. The objectives of this non-profit bank are to alleviate poverty by the provision of credit through the improved credit system. Financial resources are provided by the State budget.

Borrowers must be classified as poor according to a poverty line equivalent to less than 25 kg of paddy per month. Each village leader prepares a list of commune members who fall into the category of "poor" and sends it to the respective commune's leader for his approval. Only if his name is recorded into this list, a farmer can borrow from the bank. The active interest rate is 1.0% per month. The maximum amount that can be borrowed is VND1.5 million.

Short-term loans for agricultural purposes absorb most of the available funds for loans. Within the loans for agricultural purposes, they are used evenly for cultivation and animal raising purposes. For non-agricultural-purposes loans, most are used to finance sideline occupations.

c. Credit Cooperatives

At present only 5 communes out of 23 communes in Nam Dan District have Credit Cooperatives. They are part of SBV system which operates at the provincial level. It means their operations are regulated and supervised by SBV. The Credit Cooperatives mobilize capital from its stock holders and grant loans to both farmers and non-farmers. The management board usually includes 1 president and 2 vice-presidents, one of which is usually the head of the Farmers' Union of the commune.

The Credit Cooperatives have a more flexible mechanism than the bank system, mainly being more flexible about the collateral. This flexibility allowed them to mobilize an estimated VND 1 billion in 1996. They do not mobilize a long-term loans.

d. Main Problems Related to Regional Credit

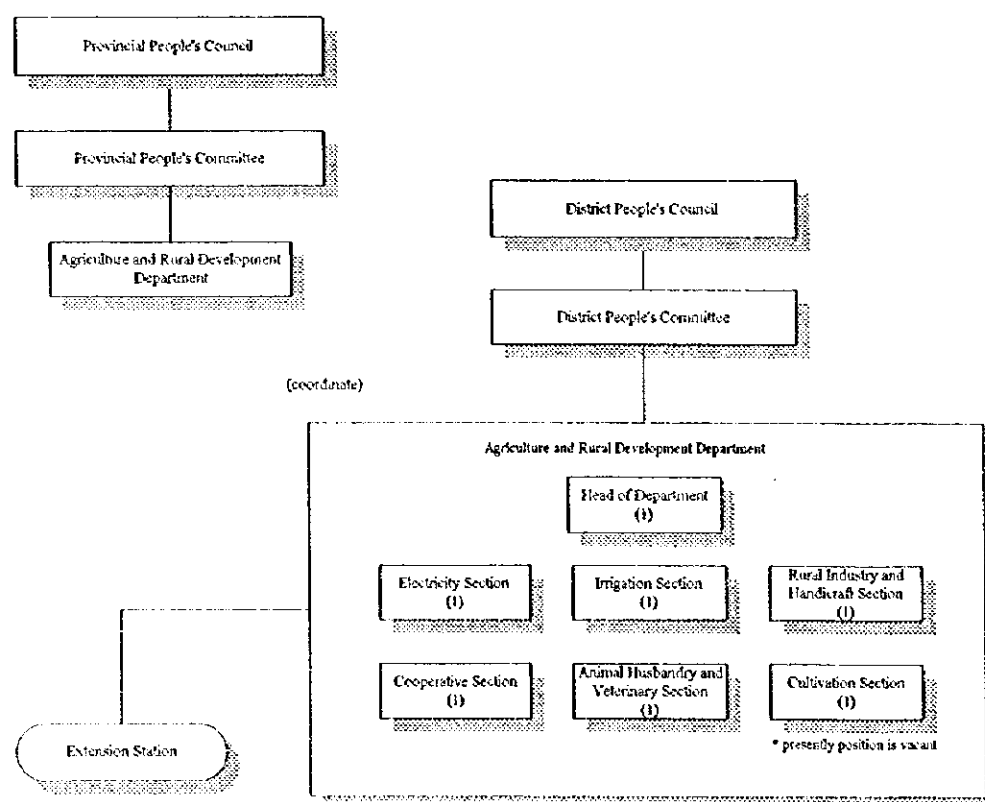
- a) Nam Dan District branch of VBA is unable to cover all the credit demand due to lack of adequate funds and leaves unattended a big sector which represents 75% of total credit demand. In other words, most of the farmers must seek for loans from informal financial sources (relatives, moneylenders, traders, etc.) with a correspondingly heavier financial burden in the case of sources other than relatives who usually do not charge interest or a very low one. In the case of moneylenders, the interest rate charged by them is two to three times the one charged by formal financial sources.
- b) Most of the loans provided by formal financial sources, i.e., VBA are for short-term loans (with a maximum of 6 months). Long-term loans are not available at present.
- c) The loan officers of VBA are not enough in number; creating bottleneck against the expansion of loans. It is estimated that each loan officer has to take care of around 700 clients, which is a too high client/staff ratio. This leads to a situation in which potential clients are unattended due to lack of personnel. In the case of the Credit Cooperatives, the number of the staff is too much small and usually their technical training and experience is quite limited. This creates obstacles for both expansion of activities and monitoring and supervision of the loans.
- d) The interest rate is set by SBV and it does not necessarily reflect the demand and supply conditions for capital in the districts. In the case of VBA and the Credit Cooperatives, they have to set their passive rate according to the rate set by SBV. Credit Cooperatives have a ceiling imposed on their active rate (2.1%); at present, they are granting loans at a rate lower than the ceiling (between 1.8 - 1.9%) but higher than the one offered by VBA but their passive rate is the same one. This situation means a disadvantage for the Credit Cooperatives which have to rely on their more relaxed loan requirements (mostly by not requiring mortgaged property as collateral) to attract clients and keep competitive.

- c) Lack of land rights certificates for some of the farmers makes it impossible for them to mortgage lands, that in fact may be theirs according to ancestral custom in some cases. Without being able to mortgage lands, some farmers cannot put them up as collateral, failing to have access to credit which would be available to them otherwise. Thus, the unfinished process of land certification has become a constraint for farmers in the district.

3.3.9 Organizations related with Agriculture

(1) Governmental Organizations related with Agriculture

In Nghe An Province, Department of Agriculture and Rural Development has been established as the agriculture related organization at the Province level and is controlling Agriculture Extension Center, Forestry Extension Center, Plant Protection Station and Animal Husbandry Station. In Nam Dan District, Department of Agriculture and Rural Development has been established to function on agriculture related subjects and is controlling Extension Station in the District.



Agriculture-related Organizational Structure in Nam Dan District

(2) Organizations in Viet Nam

Originally, Viet Nam had two types of farmer's organizations. "Cooperative" was engaged directly in agricultural production while "Union" or "Association" was the organization representing the interest of particular group of people such as farmers,

youth and women. Major organizations existing in the country which are closely related with agriculture and/or farmers 1)Agricultural Cooperative, 2)Farmers' Union, 3)Women's Union, 4) Unions of Vietnamese Gardeners) are summarized as follow:

(3) Agricultural Cooperative

1) Agricultural Cooperatives in the Past

Before the unification of the North and the South, agricultural production of Viet Nam had been managed by Agricultural Cooperatives. In the North, formation of these cooperatives started in 1958. Then, by 1975, more than 90% of farmers had been registered as the members of such cooperatives.

In the management system of these cooperatives, production units (troops) contracted for agricultural production based on its land fertility, labor availability and conditions of the production system which were assessed by the cooperative committee. In this contract, achievement of the production target was measured by 3 factors: 1) production volume 2) production cost and 3) labor points. If one unit exceeded the set level of achievement, they receive bonus, and if not, they were penalized.

However, the management system of these cooperatives generated inefficiencies and difficulties due to lack of an incentive system for each worker to achieve his target. Moreover, achievement bonus was collected by the production unit, not by the individual, so that a sense of inequality was created among hard - working laborers. Additionally, the management section of the cooperatives grew to large to function properly due to the difficulties of assessing the overall achievements and adequate recording of the labor points.

2) Recent Movement

The recent transition to a market economy has involved a major change in these organizations. Resolution No. 10 of the Communist Party and later the Land Law have meant the dismantling of the old cooperative system and transformed these entities from the sole instance of farmer's organization for productive/economic purposes into one of several alternatives of securing services for farmers. As a result of cooperatives losing their legal monopoly over organized farmers and having to shift to service provision instead of production activities, the sector as such has fallen into disarray.

A recent study by the Agricultural and Rural Development Policy of MARD reveals that of the 16,000 cooperatives existing throughout the country, only 10% are operating effectively under their new form. On the other hand, 42% are offering a few services to farmers and 50% exist without any activities. From that study, it becomes also quite clear that the cooperative movement is only important in the North and in some part of the Center, but not so in the Mekong Delta and its surrounding. A relatively few number of cooperatives are found in the Mekong Delta and a few of them are productive cooperatives.

Under these circumstances of diminishing trends, on the other hand, demands for establishing a functional cooperative had been rising in order to cover the services which were necessary for farming operations. So, it was of great urgency to have a proper legislative framework to regulate the operation of agricultural cooperatives. As a response to the above-mentioned demands, the Law on Cooperatives was approved by the 9th Legislature of the National Assembly of the Socialist Republic of Viet Nam on March 20th 1996. The Law was established aiming at the following purposes set in the socialist-oriented multi-sector economy driven by the state-regulated market mechanisms:

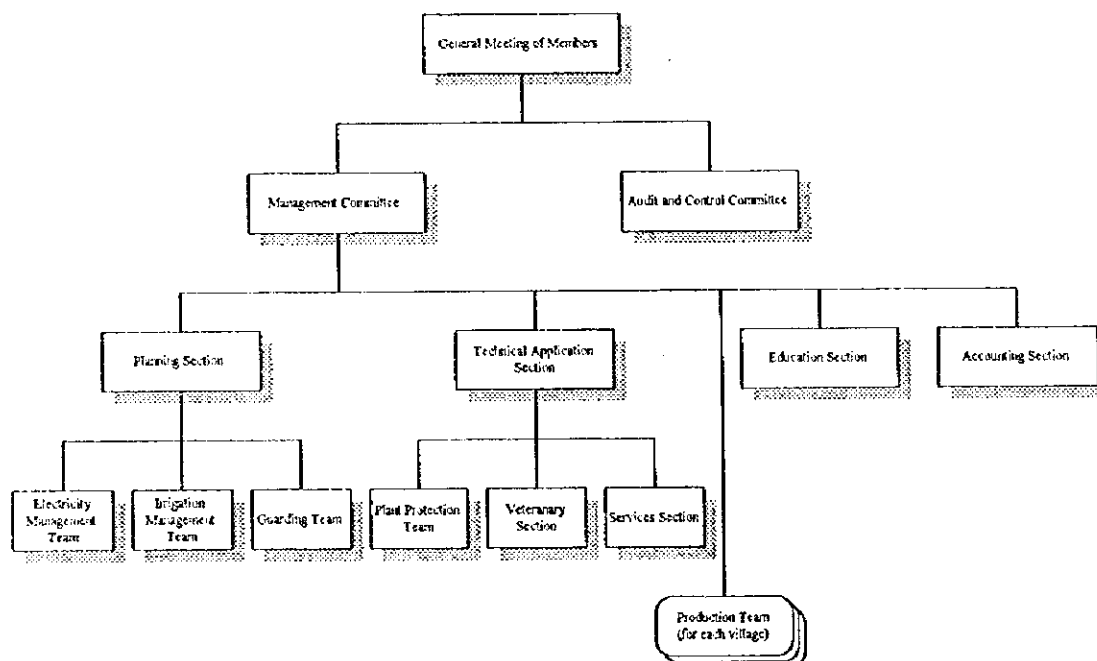
- a. to promote the important role of the cooperative economy
- b. to create legal basis for organization and operation of cooperatives

3) Agricultural Cooperative in Nam Dan District

Presently, 36 agricultural cooperatives can be found in the Study Area. The main functions of these cooperation are described as follows:

- a. Supply of seeds
- b. Supply of agricultural inputs (fertilizer, chemical etc.)
- c. Providing necessary information for farming
- d. Construction and management of irrigation facility

Agricultural Cooperative is typically established with 6 personnel of management staffs and representatives of farmers. A typical organizational structure is displayed as follow:



Organizational Structure of Agricultural Cooperative

In Nam Dan District, 3 communes (Nam Cat, Xuan Lam and Nam Hung) are classified as the model cooperative areas and the formation and/or re-structuring of the cooperatives are under process. Details of their activities are still under the discussion at the local level as well as at the district level. Under the Law of Cooperatives, financial self-sufficiency is the key factor of forming a new cooperative. For this process of formation, the following points should be carefully considered:

- a. Impartiality and characteristics of each rural community
- b. Awareness and judgment capability of the farmers
- c. Relationship with local government

(4) Farmers' Union (or Union of Peasants)

1) Characteristics of Organization

Farmers' Unions are one of active official organizations in Viet Nam and are considered as social and political organizations. The organization was originally established in October, 1930 at the initial period of the liberalization from the French domination. Because the movement of this liberalization started together with the formation of the organization in Nghe An Province at that time, pride and strong unification still exist in the Farmers' Unions in the Province.

2) Purpose

The organization was established to support the farmers in their producing activities and in other social aspects. The purposes of the organization activities are summarized as follows:

- a. to announce and to spread information on policies and regulations set by the government
- b. to guide farmers in their farming operation and to protect their rights
- c. to improve services for agricultural production

3) Organizational Structure

Farmers' Unions presently hold a membership of approximately 9 million people, covering 45% of total farmers in the nation. They have their offices at national, provincial, district and communal levels throughout the country. In Nghe An Province, the total number of members is 570,000 covering 57% of the total farmers population in the province. There are 19 district level offices located in Nghe An Province covering all districts in the province. In Nam Dan District, 24 communal offices are established covering all communes in the district. Under the control of a communal office, 4 to 5 members' groups are formed in each commune as the smallest organizational unit. Each group is lead by 2 to 3 leaders and holds approximately 50 to 100 members.

In the Study Area, 100% of farm households belong to Farmers' Unions which hold a membership of 30,000 farmers. Each member has to pay VND 10,000 as a registration fee and approximately VND 600 (VND 200 for official membership fee and communal fee) per month paid at once. These monthly dues are used to finance the Unions' activities at communal and district levels.

4) Activities

a. Dissemination of Information

One of their main activities is to organize meetings when a new policy or regulation is issued by the government and it is considered to be necessary to spread the information to all the members. Usually, those meetings are organized at the national level first and, later, at provincial, district level, commune and group unit level. Necessary information is spread by applying the top-down system through these meetings.

b. Extension

Other activities include the extension of techniques regarding agricultural production. Farmers are provided with technical information to improve farming practices and maximize their production. By providing technical information to the farmers, the Union plays the role as a technical extension agent.

Even though the Agriculture and Rural Development Department in the Provincial Government is responsible for agricultural extension services, the Farmer's Union also helps in the introduction process of new techniques and crop varieties. Farmers' Unions is the organization for farmers to operate and expand their farming activities. At the same time, the organization is set to protect farmers' right in any cases.

c. Services

Services provided by the Farmers' Union include supplying agricultural inputs such as fertilizers and agrochemical, and providing seeds. Another activity is organizing aid for farmers who can not work due to physical problems or aged farmers. As part of a program to improve farmers' living conditions, the Union finances farmers' activities for poverty alleviation and improvement of production activities.

5) Comparison with Agricultural Cooperatives

The activities of the Farmers' Union are considered to be public oriented. As a governmental organization, they cover the whole nation with an organizational network. The main focus of their activities are on maintaining and improving farmers' living conditions by supporting their agricultural activities. On the other hand, Agricultural Cooperative is more commercial oriented. Presently, its major activities are to support farmers by supplying agricultural inputs and materials and are focused on economic considerations. Also, all the cooperatives in the nation are regulated according to the Law of Cooperatives; formation and operation of a cooperative depend upon the local conditions of each area. Unlike the Farmers' Union, operation of the Cooperative is considered to be independent for each Cooperative.

(5) Women's Union

1) Purpose of Organization

Women's Union is an organization established in October, 1930 to support women in diverse aspects. The aims of the organization include the following:

- a. Protect women's health
- b. Protect women's and children's rights
- c. Contribute to the formation of happy families
- d. Improve living conditions of women and children
- e. Formation of a participatory development plan based on the view of women

2) Organizational Structure

All the women whose ages are above 16 years old are eligible to join the organization. However, most of the members are women whose age are above 18 years. The organization is presently holding 11 million members which is equivalent to 80% of the total women's population in the nation who have admission right.

The organization has established their offices at national, provincial, district and communal levels throughout the country. In Nghe An Province, the total number of members is 450,000 and in Nam Dan District is 22,800. Within this total number, 6,840 members keep their membership but are not active due to old age problems and financial constraints. Active members pay a membership fee of 200 VND per month to cover the cost of activities.

The wages of officials in the organization at the provincial and district levels are covered by the government's national budget. On the other hand, 50% of the wages at the communal level are covered by the national budget and the rest are covered by communal budget. Presently, joining fee is not collected when a new member is joined in the organization.

3) Activities

The action plan and development strategies are normally formulated at the national level. Lower level's activities are set according to the plan made at the upper level. Also each office implements activities which are originally planned for their members. In some occasions, People's Committee covering the region presents guidance for their activities.

One of the main activities of the organization is to provide their members with the necessary information and to train them in using the information for improvement of their living conditions. For this purpose, the organization sets several training courses and supplies documents utilizing approximately VND 45 million from the annual budget at the provincial, district and communal levels. Opportunities to participate in such training courses and meetings are provided for each member of the organization living in rural area 4 to 5 times each year as an average. Recent training courses planned by the organization include the following topics:

- | | |
|---------------------------------|-------------------------------------|
| a. Family planning | b. Birth control |
| c. Criminal activity prevention | d. Malnutrition prevention |
| e. Pregnancy scheduling | f. Protection of health after birth |
| g. AIDS prevention | h. Sanitation |
| i. Malaria prevention | |

Also, there are legal advisers available in the organization for solving problems such as domestic abuse and divorce processes. To improve the living conditions of each member, the organization provides services to introduce new job opportunities for them. The organization provides information regarding available jobs for women so that they can contribute to their society as labor force in the commune and obtain an additional income at the same time.

The organization provides information regarding new agricultural techniques aiming at women is initiative and responsibilities for its implementation. For the example in Nam Dan District, the organization is providing members with information on how to raise fresh water fish at their homes and in an economic way. The organization sets 9 communes as the potential area for the activities and encourages the members in the area to participate in the programs. By providing these activities, the organization is helping its members to increase and diversify their agricultural activities.

(6) Union of Vietnamese Gardeners (VACVINA)

1) Purpose of Organization

One of the successful voluntary organizations is the Union of Vietnamese Gardeners, better known by its acronym VACVINA ; Vuon (garden), Ao (pond), Chuong (livestock), Viet Nam. VACVINA is an organization of small farmers which have united voluntarily for economic, technical and professional objectives. The objectives are set to guide the transfer of technology of VAC system in promoting gardening, pond and livestock operations. The organization is implementing the technology and management progress into VAC system for producing the best nutritious food, improving family diets and providing the goods for the market in the country and abroad. The purposes of organization are summarized as follows:

- | | |
|---------------------------------------|---------------------------------|
| a. to realize household food security | b. to increase rural employment |
| c. to increase family income | d. to eliminate famine |
| e. to reduce poverty | |

2) Organizational Structure

The organization was established in 1986 as a NGO with 200 membership and was headed nationally by a former Minister of Agriculture and former Deputy Prime Minister. It has grown to cover 53 provinces in the country and almost all the districts and communes in those provinces. The organization has established its offices at the national, provincial, district and communal levels

throughout the country. Currently, its membership reaches 285,000, up from 250,000 in 1995.

In Nghe An Province, the total number of members is 18,600 covering 18 out of 19 Districts in the Province, and in Nam Dan District, the total numbers of member is 1,400 covering 10 out of 24 communes in the District. VACVINA operates two enterprises and several small companies that sell to the members agricultural inputs including fruit tree seedlings, seeds, livestock breeds, tools and etc. The profit from these commercial activities together with the membership fee of 200 VND/month are to finance the expenses of the organization. In addition, several international organizations are providing support to VACVINA.

3) Activities

The basic elements of VACVINA are to promote fruit and vegetable production in garden, fresh water fish raising in pond and livestock husbandry mainly for pig. In the activities of technical transfer, the organic agriculture is in with their environmental concern. Also, VACVINA is the organization which has firstly introduced "Permaculture" concept in the country aiming establishment of sustainable agriculture in the farming system. With the introduction of this new concept, VACVINA contributes to farm household economy of members to diversify their production and to achieve market oriented activities, while it contributes to environmental protection.

(7) Summary of Farmers' Organizations

1) Over View

As described above, the Farmers' Organizations operate effectively respective development activities under the national trait of mutual aid and assistance to support needed people. However, from the farmers' point of view, it is observed that some of their activities are overlapped among the several organizations. In order to maximize the effectiveness of their activities, it is necessary to eliminate their overlapping.

On the other hand, reforms under the Doi Moi policy to transfer agricultural production units from cooperatives to farm households have proved to be effective in increasing agricultural production. However, functions that were previously assigned to agricultural cooperatives such as irrigation, land improvement and collective disease and pest control are being lost. Under these circumstances, it is expected that agricultural organizations with functional activities including extension, marketing, group production and credit be formed voluntarily by farmers.

Under the present conditions, farmers are organizing themselves if definite economic benefits can be clearly defined. In Viet Nam, people historically have experienced organizational activities at farmers level and human resources trained through these experiences are available. Throughout the observation of agricultural organizations existing in Viet Nam, no serious problems for

compiling an agricultural development plan are found. At present the main problem is lack of financial resources and information that are necessary for farmers to initiate new activities. In the future, such activities as providing programs of agricultural credit with a low interest rate based upon farmers' organization formed voluntarily and forming "joint liability groups" to help each other against liabilities will be effective.

As a system of market economy in farm areas prevails, farmers' spatial differences and financial inequality will be more increased. Also, it is necessary to solve the problem of large debts owed by cooperatives. Under these circumstances, it is expected that voluntary organization of farmers will operate functionally as promoter in the area and contribute to needed people in their local societies.

2) Problems and Potential

In order to enhance the development, several problems related with organizations should be solved. Firstly, overlapping activities of existing organizations and lack of communication between the organizations are pointed out. As the result under these circumstances, effects of activities are scattered and utilization of human/equipment/material input is not efficiently realized. Also, each organization is established through the central level to commune/village level, so that many organizations at the end level exist and available personnel at the end functions as many important positions at the same time. Consequently, abilities of personnel are not utilized efficiently in management. Additionally, confusions at the end occur in some cases due to lack of coordination between organizations. On the other hand, the following potential of development in existing organizations in the area are recognized based on the historical background of lively organizational activities:

- a. New Type of Agricultural Organization
- b. Marketing Organization
- c. Organization for Agricultural Mechanization
- d. Improvement of Management Method

3.3.10 Irrigation and Drainage Facilities

(1) Conditions of Existing Irrigation Facilities

Until now 33 pumping stations have been built in the Study Area excluding those of the South Nghe An Irrigation Project with a total installed capacity of 66,820 m³/hr and 21 reservoirs and ponds have been constructed. Conditions of those facilities are shown in Table 3.3.1. Due to deterioration of the facilities, the ratios of actual irrigated areas by those facilities are very low as shown below;

Existing Irrigation System

Type of System	Number of Systems	Command Area (ha)	
		Designed Irrigated Area	Actual Irrigated Area
Pumping System	33	5,535	2,575 (47%)
Reservoir System	21	1,716	724 (42%)

The whole designed command area of these structures is about 7,300 ha. So far, actual irrigated area is 3,300 ha and accounts for 90 % of rice growing area and 54.6 % of cultivated area. Among them, only one pumping station (Nam Dong) and 5 reservoirs (Ho Thanh, Trang Den, Cua Ong, Thanh Thuy and Hao Hao) are managed by South Nghe An Irrigation Enterprise. As for the remaining structures, they are owned and managed by agricultural cooperatives. There is a big under-construction reservoir named Da Han; the first phase of construction has been nearly completed, and after completing the second phase, it will irrigate 220 ha of cultivated land and will be managed by the South Nghe An Irrigation Enterprise.

(2) Conditions of Existing Drainage Facilities

Conditions of existing drainage facilities in the Study Area excluding those of the South Nghe An Irrigation Project are summarized in Table 3.3.2. Water level of the Lam river in dry season (winter-spring and early stage of summer-autumn crop seasons) is always lower than field level in the Study Area. Flooding caused by rising up of the water level of the Lam river always occurs in the Study Area in rainy season with a rather short duration (about 7 - 10 days); in average, the annual flood frequency is 1.6.

The Study Area is defined to be mainly drained by gravity through drainage canal and some sluices constructed under the dike. In Nghe An Province in general and in Nam Dan District in particular, usually there is no heavy rain in winter-spring and early stage of summer - autumn crop seasons. Rainy season starts at the end of September or early October when the rice crop is already harvested. Due to topographical characteristics, the gravity drainage of both sides of the Lam river is easy excluding some far and low lying areas.

With the above reasons, the drainage system so far has not been reasonably considered. On-farm drainage system mainly consists of natural streams and rivers excluding in some low lying areas along Bau Non, Bau Lang and Lam Tra canals (on the left) and Thien Nhan canal (on the right) which have some artificial drainage systems. The Thien Nhan canal is used to separate rainwater coming from Thien Nhan mountainous range out of the plain area covering 5 communes at the right side of the Lam river.

Whole area on the left side of the Lam river is drained through Thap and Lam Tra canals and then to Ben Thuy sluice and Hung Chau pumping station. This station was built in Hung Nguyen District to drain water when the water level of the Lam river rose up and Ben Thuy sluice was closed.

Whole area on the right side of Lam river, excluding Nam Loc, Nam Thuong and Nam Tan communes areas and about 100 ha of Nam Trung commune, is drained directly to the Lam river. In this area there are 10 sluices under the dike, 5 were newly built and the other 5 were built about 50 years ago and have operation problems due to their deterioration. These drainage facilities were constructed independently and have no relationship with the irrigation facilities. No periodic maintenance of these drainage facilities is carried out. Furthermore, the capacity of them is not enough due to no hydraulic consideration on drainage conditions in respective areas.

(3) South Nghe An Irrigation Project

The South Nghe An Irrigation Project was commenced from July, 1997 financed and supported by World Bank covering totally 24,275 ha of cultivated land extended in three districts at the southern part of the Nghe An Province. The water for industrial and domestic uses in Vinh and Cua Lo cities where located north-eastern part of Vinh will be supplied by this project. This project covers 12 communes at eastern part of the Nam Dan district with a cultivated land of 4,130 ha and its population is approximately 60,500 persons.

Nam Dan sluice which is main water source for this project was built in period 1936 - 1941 and the mean discharge is $26.1 \text{ m}^3/\text{s}$ (max. $33.67 \text{ m}^3/\text{s}$, min. $10 \text{ m}^3/\text{s}$) to irrigate 18,945 ha of cultivated land in the Southern part of Nghe An province.

The main works of this project are to renovate main canal, pumping stations, to newly install some pumping stations for 5,330 ha of additional area and to repair Nam Dan and Ben Thuy sluices (for salt water presentation and storing fresh water) with a total cost estimated of 248 billion VND.

In this amount, the total investment capital to Nam Dan District is 44 billion VND and the irrigation area at the Project area is planed to be increased from around 2,500 ha at present to 3,750 ha.

3.4 RURAL SOCIETY AND FARM HOUSEHOLD ECONOMY

In order to clarify the conditions of rural society and farm household economy, the Socio-Economic Survey covering the whole area in Nam Dan District was conducted by adopting the method of Rapid Rural Appraisal. The results of the survey and the information collected through the survey are summarized as follow:

3.4.1 Grouping of Communes in Study Area

For the purpose of displaying clearly the conditions of the Study Area, the communes located in the area are arranged into 6 groups as described below, basing upon the data for each commune regarding average income of farm household, food sufficiency and etc.

Since the Study Area is divided by the Lam River, 24 communes located in the Study Area are firstly divided into 2 groups separated by the river. There are 8 communes located in the area at the right side of the river. Among these communes, 5 communes denominated "Nam Nam Region" and located at the south edge of the area are grouped together as "Nam Nam Area" due to the similar characteristics of the communes such as relatively low income level, agricultural activities and far distance from the Nam Dan ferry. Other communes in the area located closer to the ferry are grouped together as "Right Plain Area" due to their similarity of topographical conditions as plain field and their similarity of the survey results.

On the other hand, 16 communes are located at the left side of the Lam River including Nam Dan Town, activities of which are mainly commercial. In comparison with other communes, the town is drastically transforming itself into a metropolis to play the role of a central town in the district. Based on these conditions, Nam Dan Town alone is considered as one area group and is denominated as "Nam Dan Town". Four communes located in the northwest area on the left side of the river are grouped together as "Northwest Area" due to the similar characteristics of the communes such as the high poverty rate, low agricultural productivity and low food sufficiency rate as confirmed by the results of the survey.

In the northeast area on the left side of the river, there are mountainous ranges ranging from 400m to 500m. Four communes located in this area, which are characterized by their unique agriculture practice utilizing slopes of the mountains and relatively high farmers' income, are grouped together as "Mountainous Area". Seven communes in the area on the left side of the river are grouped together as "Plain Area" due to the characteristics of the relatively similar conditions such as agricultural activities of rice cultivation in the plain area, average income level and food sufficiency rate.

The grouping of the communes in the Study Area which are mentioned above is listed in the next table and the location of each area is shown in Fig. 3.4.1.

Grouping of Communes of Nam Dan District

Area	Commune	Population	Total Area(km ²)	Cultivated Area(km ²)
Northwest	Nam Hung, Nam Ghia Nam Thai, Nam Thanh	18,906(12%)	67.97(23%)	27.79(18%)
Mountainous	Nam An, Nam Xuan Nam Linh, Nam Giang	25,004(16%)	51.07(17%)	31.66(21%)
Plain	Van Dien, Xuan Hoa Hung Tien, Kim Lien Hong Long, Xuan Lam Nam Cat	57,033(36%)	67.31(23%)	46.09(30%)
Nam Dan	Nam Dan	6,398(4%)	1.74(1%)	1.00(1%)
Right Plain	Nam Thuong, Nam Tan Nam Loc,	12,332(8%)	28.30(10%)	13.20(9%)
Nam Nam	Khanh Son, Nam Trung Nam Phuc, Nam Cuong Nam Kim	38,284(24%)	77.92(26%)	33.25(15%)
(Total)		157,957(100%)	294.31(100%)	153.03(100%)

The conditions of the rural society and farm household economy for each area of communal grouping are summarized in the following sections:

3.4.2 Social Aspects

(1) General Condition

People

The ancestors of the Vietnamese people are believed to be the race which inhabited the lower reaches of the Red River and formed the highly developed Bronze Age. They were under the control of China for more than 1,000 years between 2 B.C. and 10 B.C. Even after gaining their independence, Vietnamese were still influenced by China due to their historical and geographical relationship with the country. It is believed that the people who actively accepted Chinese culture became the Kin race which is the major race in Viet Nam; the people who were not influenced by the Chinese culture became the Muong race which is one of the minority races.

There are 54 races co-existing in Viet Nam; the Kin race being the majority while the other 53 races minorities. Among the minorities, the related races of Khmer and Thai from neighboring countries are most common; other minorities include the people from Polynesia or China Tibet. Most of the minorities generally inhabit in the mountains or highlands. The Study Area of Nam Dan is located in an area largely inhabited by the Kin race and any other minorities are not easily found. In the District, no minorities inhabit the mountains and problems such as friction between races and territorial dispute do not exist.

Religion

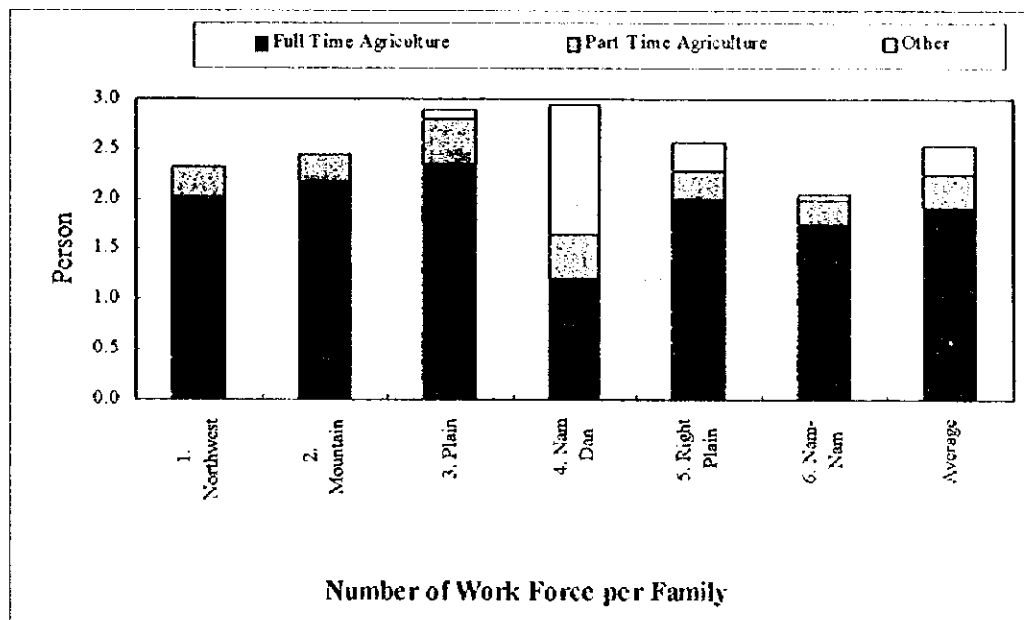
The popular religion of the people in Nam Dan District is Buddhism and the farmers believing in Buddhism enshrine their ancestors in Buddhist altars at their homes. Some farmers have a small pagoda in their front yards where they pray for the safety of their family, successful harvest of agricultural produce, etc. according to the lunar calendar. However, there are not many temples found in the villages and the custom of visiting temples is not popular. In Nam Dan Town, there is a temple where the body of a past regional king is enshrined and a permanent caretaker is living there.

Beside Buddhism, Christian people are living in communes including Nam Linh, Van Dien, Hong Long and Nam Loc. In these communes, there are churches which the followers living near by belong to. Among these communes, there are large-scale churches in Van Dien and Nam Loc communes and religious activities are lively. The relationship of people with different religions are fine and any religion-related troubles are not observed.

(2) Family

Average number of family members is 5.3 persons ranging from the lowest of 5.0 persons for Mountainous Area to the highest of 5.5 persons for Plain Area. The ratio of male and female for the family members is approximately 50:50.

The results show that an average of 1.9 persons in farm household is working full time in agriculture and only 0.3 person is working part time in agricultural activities and other occupations. Average of persons working in other than agriculture is 1.3 persons in Nam Dan Town and this is remarkably high compared with other communes especially Northwest Area and Mountainous Area where almost no persons are working in other than agriculture.



(3) Living Conditions

The average electrification ratio is 95% and the figures range from the lowest of 90% for Nam Nam Area to the highest of 100% for Nam Dan Town. According to the results of the survey, the water source for daily life is mainly well for 87% of families in the District. Notably, 20% of families in Nam Dan Town are utilizing river water for their living. Equipment used for collecting water is mainly a well bucket and only a few families are using hand pumps. On the other hand, a few families in the communes except Northwest Area and Right Plain Area are using power pumps at their homes. The property of water source is mainly private (85%). However, the water source for 33% of families in Nam Nam Area is classified as of common use with other families.

The quantity of water is "enough" for 66% of the families in the area as an average. The highest figure of 84% is recorded for Plain Area and the lowest figure of 42% for Northwest Area. An average of 64% of the families consider that the water they use is of good quality. The figures of this category for each area correspond to the figures for water amount. However, only 55% of the families in the Plain Area which shows the highest figure for water amount (84%) consider that the water is of good quality.

For cooking purposes, an average of 85% of the families use wood/charcoal which are the major fuel materials available in the area. Additionally, husk and straw which are by-products of paddy are commonly used as fuel. The survey results show that a few people in Mountainous Area (3%) and Plain Area (2%) use electricity for cooking. Most of the electricity for cooking is utilized to operate small electric fans in order to supply extra oxygen for burning fuel to obtain more heat. The power source for lighting is mainly electricity for 92% of the families in the area and 37% of the families use kerosene for lighting.

Regarding type of house, an average of 14% of the families live in permanent type houses and 62% live in semi-permanent-type houses. A high percentage of the families live in permanent type houses in Mountainous Area (24%) and Nam Dan Town (30%). On the other hand, a high-percentage of the families live in temporary-type houses in Nam Nam Area (28%) and Right Plain Area (30%).

Among the family assets, 'bicycle' is the item which has the highest percentage of possession (86%), followed by 'wind fan' (66%) and 'clock' (57%). For other goods, 'television' has a response percentage of 47% and 'radio & cassette' has 46%. On the other hand, 'refrigerator' has only 1% in average. Regarding the source of information, the results show that the people receive information mainly from 'radio' (53%) and 'television' (45%). Also, the results show that 'Extension Worker' (42%) and 'Farmers' Union' (41%) are important sources of information for the people in the area.

Regarding the food sufficiency, approximately 30% of the people in Northwest, Right Plain and Nam Nam Areas answer that they are sometimes short of rice. Approximately 10% of the people in Mountainous, Nam Dan and Nam Nam Areas answer that they are always short of rice. For the people facing rice insufficiency, the

major counter measure is to borrow some rice from relatives or neighbors. Only 3% of the people in the area are under some subsidiary program in order to solve their problems of food insufficiency. 'Rice'(99%) and 'vegetable' (98%) are the two major daily food items for the people, followed by 'soybean' (17%). The people occasionally consume some other food items such as 'meat' (66%) and 'fish' (64%).

The toilet in farm house is of type of "hole with ceramic stool" (50%) and "hole in the ground" (26%). The typical toilet observed in the area consists of a stool made of ceramic or concrete located in a hut or at the corner of a hut for animals. Stools are simply designed to catch excreta. 17% of the people do not have any type of toilet. The percentage of the people whose family member getting sick last year is 52% and average medical expenditure is VND556,489 which is equal to 7% of the average annual income. 90% of the child birth take place at a Communal Health Center and only 5% of cases take place at home.

(4) Gender Conditions

In general, women's status in rural society is relatively high. in Viet Nam, the space for women's social activities is enlarged due to the fact that historically women took care of their family after men went to the war. Like the similar situation found in Japan, the concept of male chauvinism exists in Viet Nam as a result of the influence of Confucianism. On the other hand, it is generally considered that women control the accounts and activities in their family and also they handle most of heavy works. The proportion of the work which is under women's responsibility is larger than that of men because women are responsible for much work including household work, farming and animal husbandry. On important financial matters, men usually take responsibility for making a final decision.

The proportion of women being a head of household (or holding land use right) is 27% and the proportion of women who have utilized any financial support system in the past is only 17%. In farming operations, men are generally responsible for making decision, on the other hand, women take responsibility for selecting kind of animals to raise in many cases (73%). Also, women take responsibility of decision making on caring their children and elders, and on education for their children (56%). In 60% of the surveyed households, women make decision on selling their produce.

Among those developing countries, Viet Nam is characterized with relatively less gender inequality. Especially, there is almost no gender inequality on educational opportunities of primary and secondary school, literacy and medical opportunities. The most advanced condition is that importance of education for women is generally recognized in the society. However, gender inequality is observed mainly on daily household works of women. Comparing time schedule of men and women in a typical farm household, men spend much more time for resting or for leisure than women and women spend more time for child education and household work without much leisure time. In the case that women have established position in a family of making decisions or of financial independence, leisure time for the women is severely limited. However, under the condition that the regional differences of

poverty is larger than the differences of gender inequality, the priority should be given to solving the poverty problems in the region.

3.4.3 Economic Aspects

(1) Agriculture

The average area of paddy field is 2,511m² varying from 1,559m² (Nam Dan) to 3,509m² (Plain). The average number of plots is 6.7. Orchard and/or other perennial crop fields are found mainly in Northwest Area (2,258m²) and Mountainous Area (2,285m²). The results show that 58% of the farmers in the area have an access road to all or some of their cropping fields. At the same time, 31% of the farmers do not have any access road to their fields. Regarding irrigation water, an average of 76% of the farmers answer that they have enough water during the dry and/or rainy season. The highest response percentage to the question 'lack of water' appears in Northwest Area (29%). The agricultural equipment commonly used by the farmers in the area are 'Cart, Cattle-Drawn Wagon' (69%), 'Manual Hand Sprayer' (52%) and 'Thresher' (49%). Use and possession of equipment tend to be more popular in Plain and Right Plain Areas.

Concerning agricultural facilities, an average of 82% of the farmers have a shed for livestock. However, separate-type feed storage facilities are not found in the area. Facilities are mainly used to shelter 'Egg-laying chicken' (69%), 'Cattle' (54%) and 'Goat and Sheep' (46%). Notably, a relatively high percentage of farmers use facilities for 'Egg-laying chicken' in Northwest (82%) and in Mountainous (78%) Areas. Also, facilities are used for 'Milk Cattle' in Right Plain (77%) Area. Use of waged labor for agricultural production is rare in the area and only 6% of farmers use such labor. Purposes of using such labor are 'Tilling', 'Weeding' and 'Transporting'. Main draft animals are cattle and buffalo. In Nam Dan District, 57% of farmer have cattle and 26% of them have buffalo. About 90% of these cattle and buffalo are used for drafting.

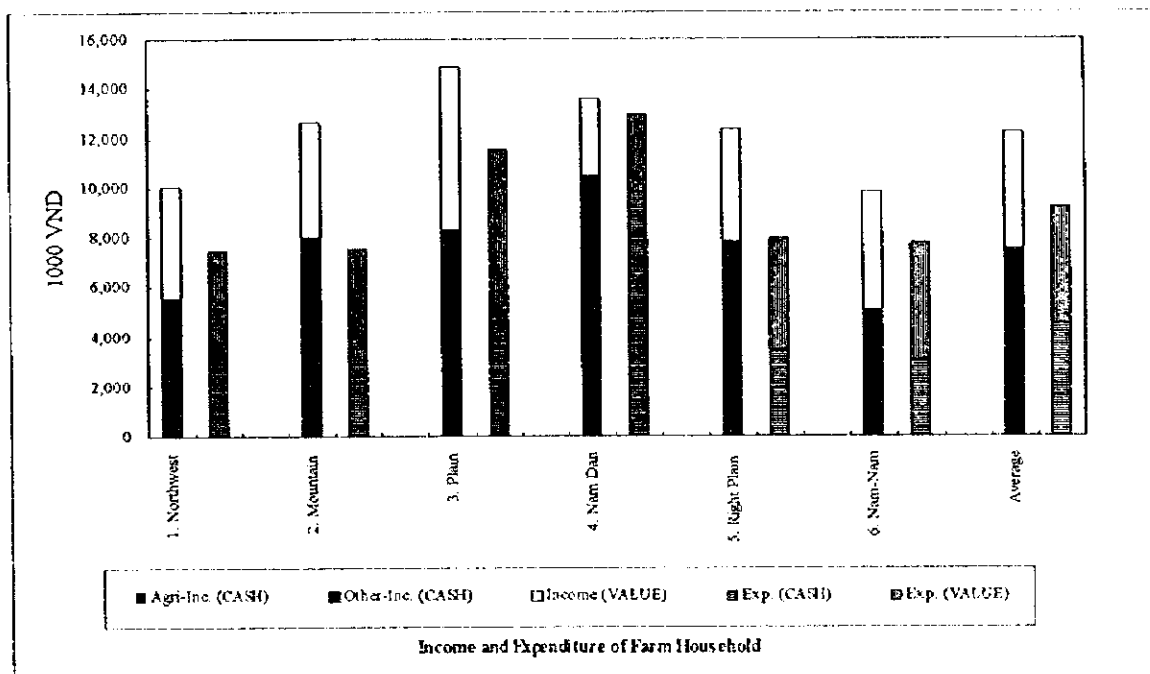
(2) Economic Conditions

The average of cash income per farm household is VND7.5 million. As a typical model of rural household management, each household consumes a part of its own production as self consumption. Including the self-consumption portion of value income, the average of total annual income per farm household is VND12.2 million and the portion of value income is 39% in average. This value income portion is high in Northwest (45%) and Nam Nam (49%) Areas, while it is low in Nam Dan Area (23%). The proportion of agricultural cash income to the total annual income is 33% in average and lower for Nam Dan Area (18%).

An average annual income per person of VND2.3 million is obtained by dividing the average income with the average number of family members (5.3 persons) to obtain an average of annual income per person of VND2.3 million. Compared with the poverty line of VND1.1 million which was set in the World Bank Study in 1995, the average annual income is more than double of the poverty level. However, the income level of each family differs greatly and the proportion of the families whose

income levels are under the poverty level is calculated as 21%. In general, the average income of Plain Area is high, and that of Northwest and Nam Nam Areas are low.

The average annual expenditure of Nam Dan Area is the highest (VND12.9 million) and the proportion of cash expenditure is 76% which is higher than that of other areas. The annual expenditure second to the level of Nam Dan Area is the one of Plain Area (VND11.5 million) and the expenditure levels of other areas are approximately equal to a level of VND7.7 million. This VND7.7 million may indicate a minimum living cost level for the families living in the Study Area. Notably, the difference between income and expenditure is the smallest for Nam Dan Area (VND0.7 million) and relatively high for Mountain Area (VND5.1 million) and Right Plain Area (VND4.4 million). The income and expenditure for each area are summarized in the following figure:



The economic condition of each area is characterized as follows:

- Northwest/Nam Nam : low income level and low expenditure level
- Mountain/Right Plain : medium income level and low expenditure level
relatively high level of income/expenditure difference
- Plain : high income level and high expenditure level and
large proportion of value expenditure
- Nam Dan : relatively high income level and high expenditure level,
large proportion of income by other than agriculture, and large proportion of cash expenditure

3.4.4 Farmers' Intention

The farmers living in the Study Area recognize that issues related to "irrigation water" (31%) and "production cost" (26%) are the two major problems for their agricultural production. Other issues are "poor soil fertility" (19%) and "damage caused by insect, disease, etc." (14%). The problems they recognize for marketing farm products are "low selling price"(31%), "transportation to markets"(20%) and "seasonal fluctuation of selling prices"(19%).

The farmers' ideas for increasing their income are "to introduce new crops" (45%), "to expand farming scale" (28%), "to add value to produce by processing" (13%) and "to change marketing method" (12%). Regarding the ideas for enlarging their farm scale, 28% of the farmers consider "purchasing land use rights" and 10% of the farmers consider "cooperate with other farmers". Kind of crops and/or livestock that the farmers intend to introduce are "rice"(41%), "fish"(27%) and "poultry"(10%). Fifty five percent of the farmers recognize "capital" as the most common problem for production expansion, followed by "skill and technique" (33%) and "marketing" (11%).

The farmers have ideas of improving their marketing channels by "selling directly to consumers" (38%), "selling directly to processors" (25%), "selling directly to whole sellers/retailers" (17%), and "selling to intermediates at farm" (16%). For improving condition of farming field, the farmers intend "to improve/provide access roads" (34%) and "to rehabilitate irrigation canals" (30%). The survey results show that the farmers consider agricultural machinery as necessary for "tilling"(42%) and "transportation"(33%). On the other hand, their interest for machinery for post-harvest practices is low. Under present conditions, it takes about 25 days for tilling work; working hours for farmers for this work is estimated to be more than 10 hours per day. It is considered that the farmers' needs for the mitigation of such heavy work load is high.

Regarding official credit services, 98% of the farmers know about the services and 90% of them have experience in receiving loans through the services. The farmers request the credit services institutions to "raise limitation of debt amount" (36%), "lower interest" (34%) and "extend terms" (21%). The survey results show that the farmers request to extension services authorities to "intensify door to door technical services" (42%), "supply information an cropping" (22%) and "increase demonstration plots" (20%).

CHAPTER 3 : TABLES

Table 3.1.1 Area, Population and Administrative Units for Nghe An Province

(Up to Dec. 31, 1994)

	Natural Area (km ²)	Population (thousand person)	Population Density (person/km ²)	Administrative Units			
				District Towns	Urban Communes	Rural Communes	Number of Households
Whole Province	16,370.60	2,768.38	169	23	16	419	489,030
1) Low land district	2,734.70	1,752.91	641	6	16	230	324,558
Dien Chau	304.80	271.34	890	1		38	54,648
Yen Thanh	562.00	246.62	439	1		33	51,487
Quynh Luu	585.10	324.85	555	1		41	61,174
Nghi Loc	399.00	202.22	507	1		32	47,145
Hung Nguyen	147.80	121.99	825			23	24,689
Nam Dan	295.20	158.72	538	1		23	31,684
Do Luong	356.10	188.93	531	1		31	38,511
Thanh Vinh	61.70	197.62	3,203		11	7	15,220
Cua Lo	23.00	40.62	1,766		5	2	**
2) Midland district	1,166.40	231.64	199	1	0	36	43,726
Thanh Chuong	1,166.40	231.64	199	1		36	43,726
3) Mountainous District	12,469.50	783.83	63	16	0	153	120,746
Anh Son	606.00	106.21	175	1		19	20,451
Nghia Dan	727.70	171.14	235	6		23	23,665
Tan Ky	708.50	121.36	171	2		17	19,633
Quy Chau	1,075.10	48.03	45	1		11	8,535
Quy Hop	988.00	108.48	110	2		19	15,738
Que Phong	1,857.00	53.92	29	1		12	7,653
Con Cuong	1,662.80	60.83	37	1		12	8,919
Tuong Duong	2,952.70	63.47	21	1		20	9,804
Ky Son	1,891.70	50.39	27	1		20	6,348

(Note) **: Before 1995, Cua Lo town belonged to Nghi Loc district

Table 3.1.2 Criteria For Evaluation of Existing Road Condition

CLASSIFICATION	ROAD CONDITIONS		
	SPEED LIMITATION	MOBILITY	FLOOD INTERRUPTION
GOOD	Vehicle speed is mainly limited by geometry and safety factors. Width at least 4.5 m	No restriction.	No traffic interruption in rainy season.
FAIR	Vehicle speed is partially restricted due to unevenness or slipperiness of riding surface. Width at least 3.0 m	Sometimes difficult for heavy vehicles (trucks) to move due to muddy surface or narrow width.	Sometimes suffered by partial traffic interruption by flooding/inundation in short terms. Interruption less than 3 times per year and less than 3 days per flood.
POOR	Vehicle speed is severely restricted by surface condition and road width. Width at least 2.0 m	Difficult for even small vehicles (cars, congnongs) to move due to muddy surface or narrow width.	Suffered by traffic interruption by flooding frequently with more than 7 days. Total day of interruption more than 30 days.
VERY POOR	Inadequate for vehicle moving. Only for motorbike or bicycle.		

Table 3.1.3 Criteria For Evaluation of Existing Bridge Condition

Items	Road Classification			
	National Roads Provincial Roads	District Roads	Commune Roads Inter-commune Roads Main Commune Roads	Minor Roads
Bridge Width				
4.5 m ~	A	A	A	A
3.5 m ~	C	B	B	A
2.5 m ~	C	C	C	B or C
Less than 2.5m	C	C	C	C
Loading Capacity				
13 ton	A	A	A	A
10 ton	C	B	B	A
8 ton	C	C	C	B
2.5 ton	C	C	C	B or C
Less than 2.5 ton	C	C	C	C

Notes A : To be used as it is
 B : To be used for the time being with minor rehabilitation
 C : To be replaced by new bridge

Table 3.1.4 Existing Water Supply Systems in Nam Dan District

Name of the Commune	Area (km2)	Population in 1996 (no. of persons)	Density (p/km2)	Tubewell			Dugwell			Gravity Flow System (number)	Filtration Tank (number)
				Number	Average Depth	Covered Population	Number	Average Depth	Covered Population		
Semi-Mountainous Area											
1. Nam Hung	31.6	3,757	118.9	0	-	0	701	6.5	3,556	0	0
2. Nam Nghia	12.2	4,086	334.9	0	-	0	911	7.2	4,086	0	0
3. Nam Thai	11.7	2,797	239.1	0	-	0	607	9.0	2,976	0	0
4. Nam Thanh	25.9	7,560	291.9	0	-	0	1,506	7.2	8,639	2	1,322
5. Nam Anh	12.6	2,651	210.4	0	-	0	1,426	5.7	6,807	0	0
6. Van Dien	12.8	10,990	858.6	0	-	0	2,082	9.8	11,432	0	0
7. Xuan Hoa	6.5	5,831	897.1	5	14.0	24	1,227	4.7	5,889	0	1,001
8. Nam Xuan	11.7	5,968	510.1	0	-	0	1,109	4.8	5,759	0	0
Sub-total	125	43,640	349.1	5	14.0	24	9,569	6.9	49,144	2	2,323
Plain Area											
9. Nam Dan Town	16.6	5,910	356.0	11	25.5	52	936	5.3	3,663	0	928
10. Nam Linh	8.9	5,964	670.1	4	9.0	19	1,232	7.0	5,991	0	2
11. Hung Tien	8.8	8,360	950.0	51	13.0	249	1,284	4.7	8,924	0	351
12. Kim Lien	13.5	11,056	819.0	154	15.2	722	1,926	5.2	5,664	0	2,071
13. Nam Giang	12.7	5,108	402.2	49	14.0	175	959	4.8	5,683	0	362
14. Nam Cat	6.5	5,818	895.1	75	17.5	361	766	5.1	3,910	0	412
15. Hong Long	7.0	5,116	730.9	771	5.9	5,116	785	6.0	5,116	0	357
16. Xuan Lam	9.1	9,035	992.9	10	12.8	55	1,210	5.1	8,963	0	190
Sub-total	83.1	56,367	678.3	1,125	14.1	6,749	9,098	5.4	47,914	0	4,673
Right side of Lam river Area											
17. Nam Thuong	7.3	2,320	317.8	0	-	0	91	8.0	1,561	0	65
18. Nam Tan	11.9	4,313	362.4	0	-	0	826	7.4	4,140	0	0
19. Nam Loc	11.0	5,505	500.5	0	-	0	589	8.1	5,505	0	0
20. Khanh Son	37.7	12,051	319.7	19	11.6	74	1,926	6.8	12,826	0	375
21. Nam Trung	6.5	7,295	1122.3	147	14.8	691	1,218	4.9	5,766	0	382
22. Nam Cuong	5.8	5,705	983.6	31	9.0	155	790	6.6	5,705	0	131
23. Nam Kim	17.3	9,471	547.5	22	30.1	97	1,788	7.1	9,476	0	309
24. Nam Phuc	5.4	3,248	601.5	55	13.9	499	519	6.9	3,978	0	18
Sub-total	102.9	49,908	485.0	274	15.9	1,516	7,747	7.0	48,957	0	1,280
TOTAL	311.0	149,915	482.0	1,404	14.7	8,289	26,414	6.4	146,015	2	8,276

Note: The source for the population data is the Statistical Data of Nghe An Province

The source for the number of wells and population served by them is the Field Survey

Table 3.2.1 List of Soil Classification

Soil name	Symbols	Area (ha)	Area (%)	Texture	pH _{H2O}	CEC (c mol/kg)	Base Saturation (%)	Organic Carbon (%)	Available P ₂ O ₅ (mg/100g)	Available K ₂ O (mg/100g)
1. Fluvisols	FL	3,396.0	17.8							
Eutric Fluvisols	FLe	3,396.0	17.8	FSL-SL-L-CL	5.8-7.2	4.0-10.0	50-85	0.3-1.2	4.0-12.0	5.0-9.0
2. Gleysols	GL	2,211.0	11.6							
Eutric Gleysols	GLE	679.4	3.6	CL-SL	5.0-7.2	4.5-10.0	55-85	0.6-1.4	4.0-10.0	3.0-7.0
Dystic Gleysols	GLd	1,531.6	8.0	SL-L-SL-CL	4.5-6.0	5.0-10.0	20-50	0.6-1.4	4.0-10.0	2.0-7.0
3. Acrisols	AC	3,513.6	18.4							
Gleyic Acrisols	ACg	678.5	3.6	SL	5.0-6.0	4.0-8.0	20-45	0.8-1.1	4.0-8.0	3.0-7.0
Ferric Acrisols	ACfe	497.8	2.6	FSL-CoSL	5.0-6.0	3.0-5.0	less 50	less 0.8	very poor	very poor
Haplic Acrisols	ACH	35.0	0.2	CoSL	5.5-6.5	5.0-8.0	less 40	very poor	very poor	very poor
Ferralic Acrisols	ACf	2,302.3	12.1	SL	4.5-6.0	5.0-10.0	less 30	1.0-1.8	1.5-3.0	2.5-5.0
4. Plinthosols	PT	1,478.0	7.8							
Eutric Plinthosols	PTe	675.0	3.5	SL-FSL	5.0-6.0	4.0-6.0	more 50	less 1.0	5.0-10.0	4.0-8.0
Dystic Plinthosols	PTd	803.0	4.2	SL-CoSL	4.5-6.0	5.0-10.0	less 40	less 1.0	4.0-8.0	5.0-8.0
5. Leptosols	LP	4,291.4	22.5							
Dystic Leptosols	LPd	4,291.4	22.5	L-CL		4.0-6.0	less 40	more 1.0	4.0-8.0	3.0-6.0

Area (%) : Percentage of soil areas for the Study Area (total 19,056 ha, including 3,071 ha of habitation land & special land, and 1,095 ha of water surface).

Source: Report of soil map and land classification map by NIAPP, 1997

Table 3.3.1 List of Irrigation Schemes in the Study Area (1/2)

(1) Existing pumping stations												
Code No.	Name of stations	Location (commune)	Year of construction	Dimensions		Total Capacity (m ³ /h)	Style of Pump house	Main canal		Command Area (ha)		Problems
				Machine number	Machine style / Q of machine			Length (km)	Dimension (b.h.m)	Designed	Actual	
P1	Duong dap	Nam kim	1985	1	1000	1000	Class IV	1.5	0.8x1x1.5	100	90	Water source is insufficient, Canals are much damaged
P2	Mu ba	Nam kim	1985	1	540	540	Class IV	2	0.6x0.8x1.5	40	40	Water source is insufficient, Canals are much damaged
P3	Gech	Nam kim	1985	1	540	540	Class IV	2	0.6x0.8x1.5	40	29	Water source is insufficient, Canals are much damaged
P4	Vac	Nam kim	1985	1	800	800	Class IV	2.5	0.7x0.8x1.5	70	55	Water source is insufficient, Canals are much damaged
P5	Nam kim 2	Nam kim	1985	2	1000	2000	Class IV	6	0.8x1x1	140	100	Old pump set, insufficient water source, bad canal
P6	Nam kim 3	Nam kim	1990	1	1000	1000	Class IV	4	0.6x1x1.5	80	50	Insufficient water source, badly damaged canal
P7	Nam cuong	Nam cuong	1982	2	1000	2000	Class IV	2.7	1x1.2x1	140	96	Deposited canal, Insufficient water source
P8	Nam phuc	Nam phuc	1986	1	1000	1000	Class IV	1.5	0.7x0.9x1.5	70	43	Broken pump house, Old pumping machine, Badly damaged canal
P9	Nam trung	Nam trung	1961-1982	6	1000	6000	Class IV	5	1x1.2x1.5	1350	450	Sucking basin of old station is deposited, New station is flooded
P10	Du DU	Khanh son	1989	2	1000	2000	Class IV	2.5	1x1.2x1	60	40	Insufficient water source
P11	Station 1 : Khanh son 1	Khanh son	1984	1	1000	1000	Class IV	1	0.8x1x1	25	20	Insufficient water source
P12	Station 3: Khanh son 1	Khanh son	1994	1	540	540	Class IV	1	0.6x0.8x1	20	14	Low power line is far (2200m)
P13	Station1 : Khanh son 2	Khanh son	1983	2	1000	2000	Class IV	2.5	0.8x1x1	70	60	Station house is flooded
P14	Station 2 : Khanh son 2	Khanh son	1985	1	1000	1000	Class IV	3	0.6x0.8x1	25	20	Insufficient water source
P15	Station 3: Khanh son 2	Khanh son	1987	1	1000	1000	Class IV	0.7	0.6x0.8x1	20	15	Badly damaged canal system
P16	Nam dong	Khanh son	1965	8	1000	8000	2 floor	8	1.2x1.5x1	1200	253	Badly damaged canal system
P17	Station 1 : Nam loc	Nam loc	1984	3	1000	3000	Class IV	1	1x1.2x1.5	130	100	Reversed canal slope, Insufficient water source, New canal is
P18	Station 2: Nam loc	Nam loc	1985	1	1000	1000	2 floor	0.6	0.8x1x1.5	60	30	Insufficient water source
P19	Station1 : Nam tan	Nam tan	1970	4	1000	4000	2 floor	4	0.8x1x1.5	150	120	New reconstruction, new machine, the 1st canal needs upgrading
P20	Station 1 : Dai dong	Nam thuong	1985	2	820	820	Flat roof	2	0.8x1x1.5	100	60	Old machine
P21	Station 2: Dai dong	Nam thuong	1986	1	960	960	Flat roof	0.5	0.6x0.8x1	50	20	Insufficient water source
P22	Hong son station	Nam thuong	1986	1	480	480	Flat roof	1.2	0.6x0.8x1	50	30	Small scale, canal is incomplete
P23	Ru dun station	Van dien	1987	2	800	1600	Flat roof	2.5	1x1.2x1	100	70	The head work is small
P24	Station 2: Nam thanh 1	Nam thanh	1986	1	540	540	Class IV	2.5	0.6x0.8x1	100	90	Deposited canal, insufficient water source, new machine is needed water source
P25	Station 2 : nam thanh 2	Nam thanh	1990	1	1000	1000	Class IV	1	0.6x0.8x1	60	40	Insufficient water source
P26	Nam thai	Nam thai	1983	2	1000	2000	Class IV	2	0.8x1x1.5	140	80	Insufficient water source
P27	Sen doi	Nam xuan	1991	1	1000	1000	Class IV	1.2	0.6x0.8x1.5	50	30	Temporary pump house, canal is not in good condition
P28	Ghenh station	Hung tu	1986	4	1000	4000	2 floor	3	1x1.2x1.5	320	Newly reconstructed, canal is incomplete	
P29	Hong long 1	Hong long	1984	2	800	1600	Class IV	2.5	0.8x1.0x1.5	110	80	Pump house is flooded, canal is badly damaged
P30	Hong long 2	Hong long	1988	3	800	2400	Class IV	8.5	1x1.2x1.5	180	150	Pump house is flooded, canal is badly damaged
P31	Xuan lam	Xuan lam	1984	4	1000	4000	Class IV	5	1x1.2x1	235	200	Pump house is flooded, Sucking basin is deposited
P32	Bau non	Nam anh	1982	2	1000	2000	Class IV	2	0.8x1x1.5	200	80	Canal is badly damaged
P33	Doi	Nam giang	1983	1	1000	1000	Class IV	1	0.6x0.8x1	50	20	Temporary house and canal are badly damaged
Total				67		61820		86.4		5535	2575	

Table 3.3.1 List of Irrigation Schemes in the Study Area (2/2)

(2) Existing Reservoirs

No	Name of works	Location (commune)	Year of construction	Catchment Area (km ²)	Storage Capacity		Dimensions		Main Canal		Command Area (ha)		Problems and reasons
					Total (10 ⁶ m ³)	Effective (10 ⁶ m ³)	main dam (b, h, l.)	Outlet (b, h, d.)	Length (km)	Dimension (b, h, m)	Designed Area	Actual Irrigated Area	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
R1	Vung huyen	Nam kim	1965	2.20	0.20	0.16	3x4x300	0.4	0.8	0.6x0.8x1	20	10	Licked outlet, small dams, need enlarging and Heightening
R2	Ho thanh	Nam kim	1972	2.70	1.00	0.90	3x10x160	0.8	2	0.8x1x1	120	45	Broken outlet need restructuring. Broken
R3	Kim Khanh	Khanh son	1962	2.60	0.15	0.12	3x4x150	0.4	0.3	0.6x0.8x1	30	15	Small lakes are in good condition, unable to enlarge
R4	Vuc mau	Khanh son	1972	2.70	0.25	0.21	5x10x80	0.6	1.2	0.8x1x1	50	20	Licked dams and broken outlet need
R5	Hao Hao	Khanh son	1957	6.00	0.70	0.50	3x16x200	0.8	2	1.5x1.5x1	200	15	Broken canals, a lot of deposit on lake -bed
R6	Trang Den	Nam hung	1975	8.00	2.70	2.20	3x10x300	0.8	3.7	0.8x1x1	200	45	Low and broken subdam, bad canal and
R7	Thung Phco	Nam hung	1968	2.00	0.15	0.12	3x4x50	0.4	2	0.6x0.8x1	30	10	Low dams, bad canals
R8	10 small lakes	Nam hung		5.00				0	0			56	All in damaged conditions
R9	Cua ong	Nam nghia	1967	4.00	1.35	1.20	3x10x760	0.8	2.5	0.8x1x1.5	180	100	Bad canals and slidede/eroded dams
R10	Thanh thuy	Van dien	1936	1.83	1.24		3x8x500	0.6	2	0.8x1x1	280	70	A lot of deposit on lake -bed, steep slope on both dam sides, bad canal
R11	Rao bang	Nam thanh	1966	7.00	2.40	2.00	3x5x500	0.6	3.5	0.8x1x1	120	100	Main dam and spill way are in bad condition licked outlet
R12	Hung coc	Nam thanh	1974	1.40	0.69	0.60	5x7x200	0.6	1	0.6x0.8x1	180	60	Licked outlet
R13	Thung vuon	Nam anh	1980	0.60			2.5x4x100	0.4	0.3	0.4x0.5x1	5	5	Small lakes with low effect
R14	Khe dau	Nam anh	1972	0.80			2.5x6x100	0.4	0.5	0.4x0.5x1	10	10	Small lakes with low effect
R15	Khe be	Nam xuan	1970	0.70	0.15		3x6x150	0.6	0.4	0.6x0.8x1.5	50	20	Normal works
R16	Khe cav	Nam xuan	1982	0.50	0.10		3x6x150	0.6	0.5	0.5x0x1.5	20	10	Normal works
R17	Khe dinh	Nam xuan	1970	1.20	0.74		4x7x300	0.6	1	0.6x0.8x1.5	100	40	Absorbent and bad dams need heightening
R18	Khe che	Nam xuan	1982	0.65	0.10		3x6x100	0.6	0.8	0.5x0x1.5	20	15	Settling works
R19	Khe bo	Nam linh	1976	1.80	0.12	0.10	3x6x500	0.6	2	0.6x0.8x1	31	15	Low and bad dams, Absorbent drain, bad
R20	O O	Nam linh	1976	1.00	0.10	0.08	3x5x200	0.6	2	0.6x0.8x1	20	15	Low dam, bad canal
R21	Ru doi	Nam giang	1962	1.10	0.18	0.15	3x4x800	0.8	1.5	0.6x0.5x1	50	55	A lot of deposit on lake -bed, licked drain, bad canal
	Total			58.78							1716	724	

Table 3.3.2 List of Prevention Flood Structures in the Study Area (1/2)

(1) Drain works (Canal , Drainage Sluices and Sluices under the Dike)

No	Name of works	Location Commune	Year of construction	Dimensions (m) (b , h , l)	Crest Level (m. a.s.l)	Darin Area (ha)	Problems
PF1	Thien nhan canal	Vung Nam Nam	1987	5 x 2.5 x 9,700m	(+3) to (0.0)	2400	Canal is insufficient to supply water
PF2	Bau lang canal	Nam tan	1956	2 x 2.5 x 2000	+ 1.0	25	Canal is deposited
PF3	Bau non canal	Nam anh	1977	5 x 3 x 1,500	- 0.5	690	
PF4	Canal Tra 1	Namlien & Namcat	1967	4.5 x 4 x 10,700	- 0.2	1800	Some sections are deposited by sand (outside project area)
PF5	Canal Tra 2	Namcat	1968	3 x 3.5 x 1,700	- 0.2		
PF6	Tinhly canal	Kim lien	1988	3.5 x 2 x 500	+ 0.4	400	Outside project area
PF7	Drainage Sluices : 3 gates	Nam kim	1989	2 x 4.5 x 10	+ 1.5		Reconstructed recently
PF8	Drainage Sluices : 4 gates	Nam kim	1992	2 x 4.5 x 10	+ 1.5	1735	Reconstructed recently
PF9	Drainage Sluices : 2 gates	Nam cuong	1992	2 x 4.5 x 10	+ 1.0		Reconstructed recently
PF10	Drainage Sluices : 4 gates	Nam cuong	1993	2 x 4.5 x 10	+ 1.0		Reconstructed recently
PF11	Sluices under the Dike	Nam trung	1995	1.2 x 1.2 x 2.0	+ 1.0	65	Reconstructed recently
PF12	Drainage Canal	Nam trung	1975	2 x 2 x 3,600	+ 1.0	65	Reconstructed recently
PF13	Hongson drain (2 gates)	Nam thuong	1947	1.3 x 2 x 8	+ 5.5	50	Badly damaged , untight doors
PF14	Hongson -Cayda Drainage Sluice	Nam thuong	1947	1.3 x 1.5 x 8	+ 5.5	50	Badly damaged , untight doors
PF15	Drainage Canal	Nam loc	1976	6 x 4 x 5,000	+ 1.0	170	Deposited canal caused difficult draining
PF16	Daidong -Trodanh Drainage Sluice	Nam thuong	1947	2 x 1.5 x 8	+ 2.5	50	Badly damaged
PF17	Baudai Drainage Sluice	Nam thuong	1947	1.5 x 1.5 x 8	+ 2.5	10	Badly damaged
PF18	Duongcho Drainage Sluice	Nam thuong	1947	1.5 x 1.0 x 8	+ 2.5	15	Badly damaged

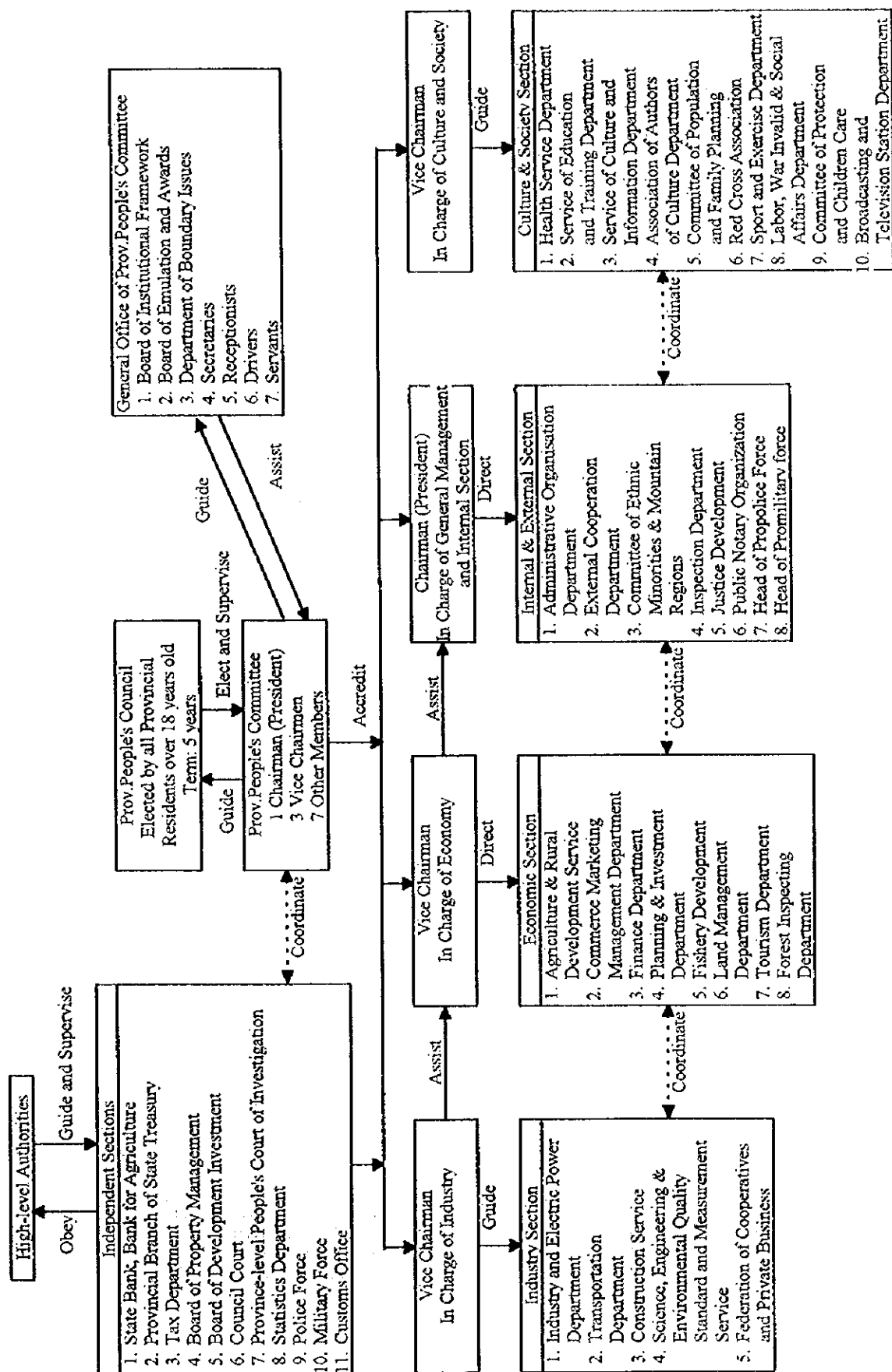
Table 3.3.2 List of Prevention Flood Structures in the Study Area (2/2)

(2) Existing Dikes

No	Name of dike	Location	Dike class	Dimensions (m) (b, h, l)	Protected area (ha)	Problems
1	Dike 42	Left of Lam river	2	10,050 m	78000	Rather good quality but still need strengthening every year
2	Van dien dike	Van dien	2	2000m	78000	Rather good quality but still need strengthening every year
3	Nam trung dike	Right of Lam river	4	3 x 2.2 x 8,860	3900	Cross section is small, dike body is incomplete
4	Dike 5 - nam	Right of Lam river	4	3 x 2.5 x 11,000	1800	Low dike so its quality is not good
5	Quai rac dike	Khanh son	4	3 x 1.7 x 963	640	Small cross section
6	Dike 3/2	Khanh son	4	3 x 4 x 1,600	120	Low dike that is affected by collapsed river bank
7	Hung son dike	Nam thuong	4	2.5 x 2 x 1,500	50	Small dike
8	Dai dong dike	Nam thuong	4	2 x 2.5 x 2,500	110	Low dike that is much broken
9	Nam thai dike	Nam thai	4	3 x 3 x 2,050	350	Small dike
10	Phuong hoang dike	Nam thai	4	3 x 3 x 270	350	Small dike

CHAPTER 3 : FIGURES





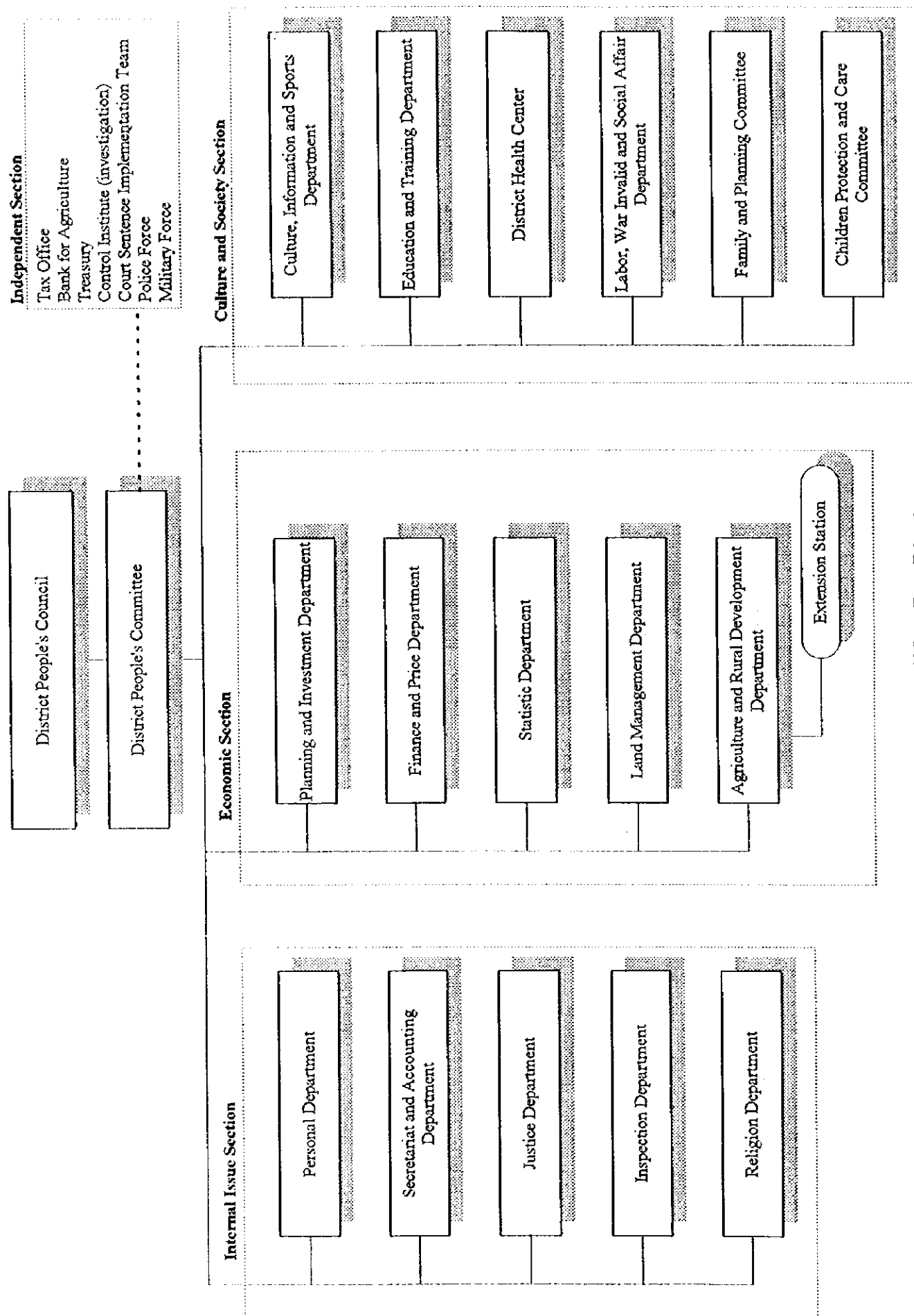


Fig. 3.1.2 Organizational Structure of Nam Dan District

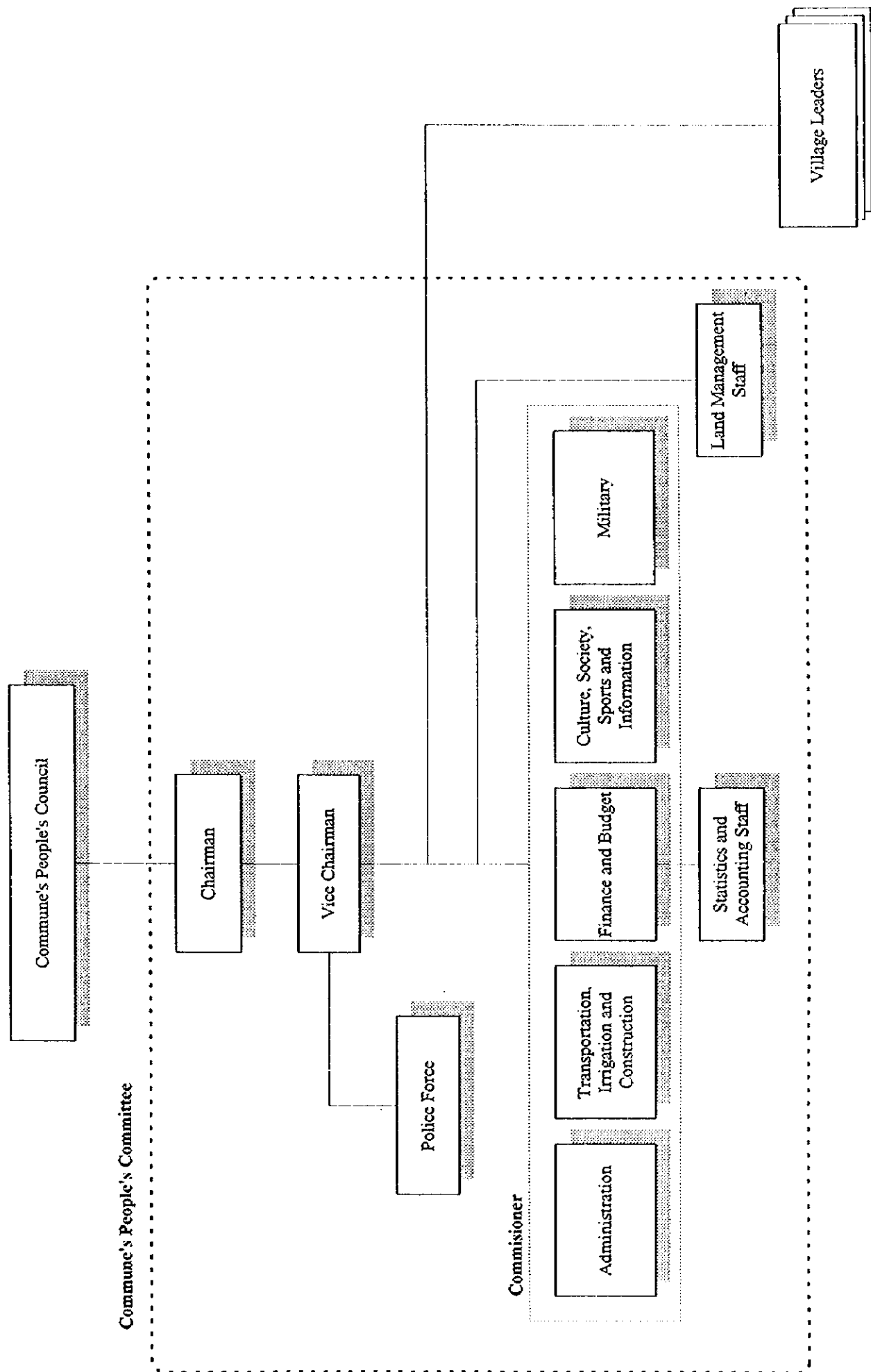
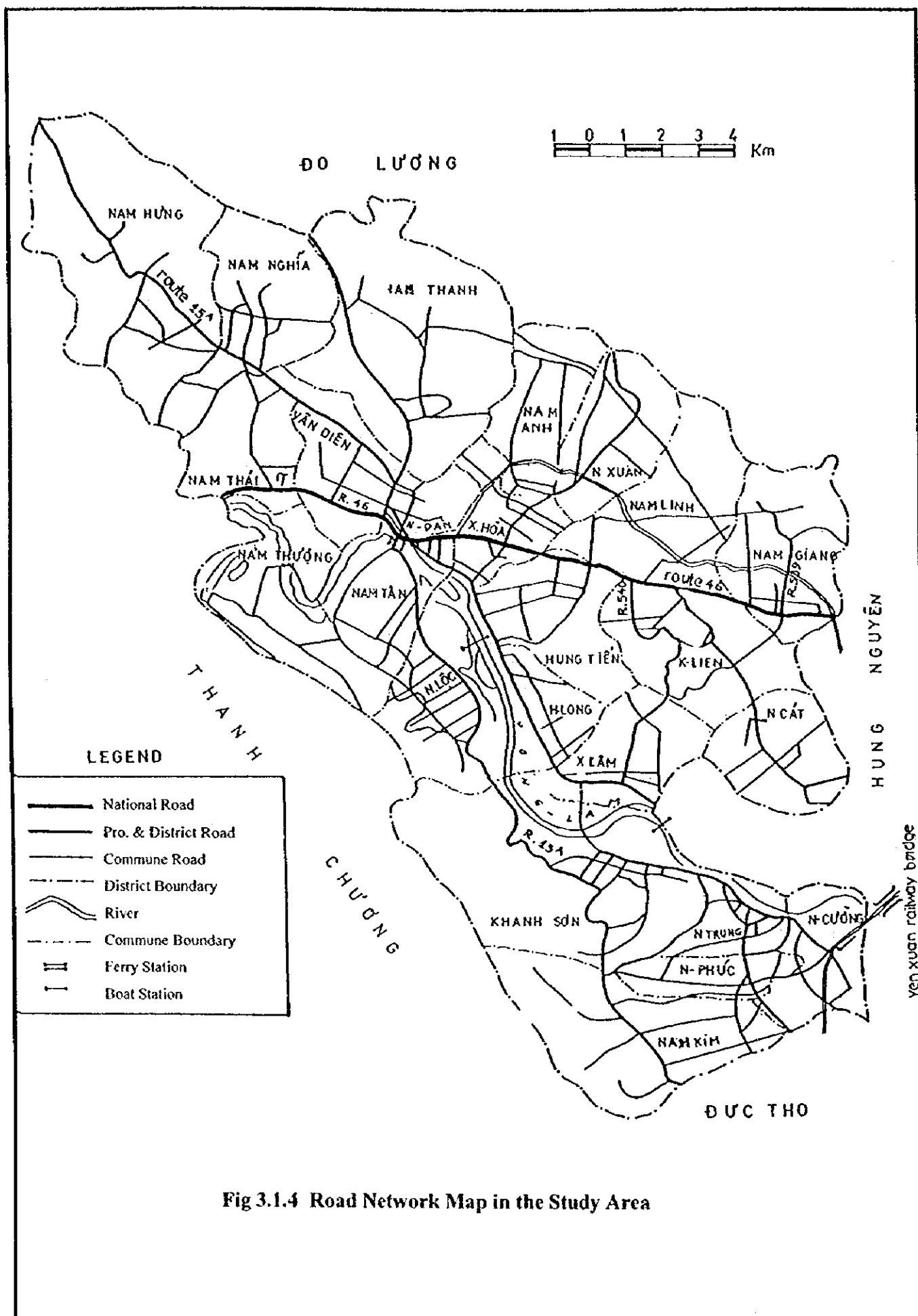


Fig. 3.1.3 Organizational Structure at Commune Level



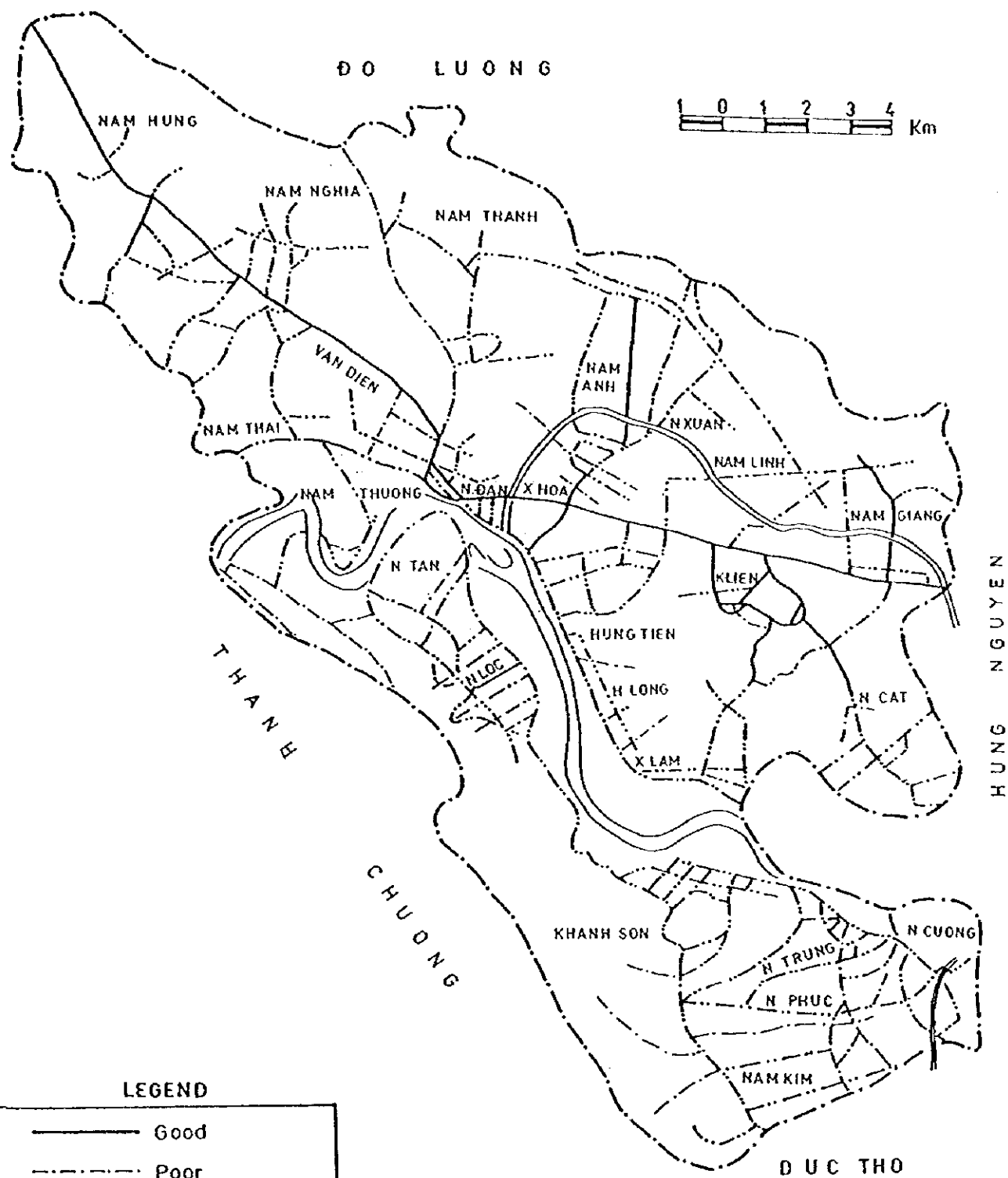


Fig 3.1.5 Present Road Condition in Dry Season

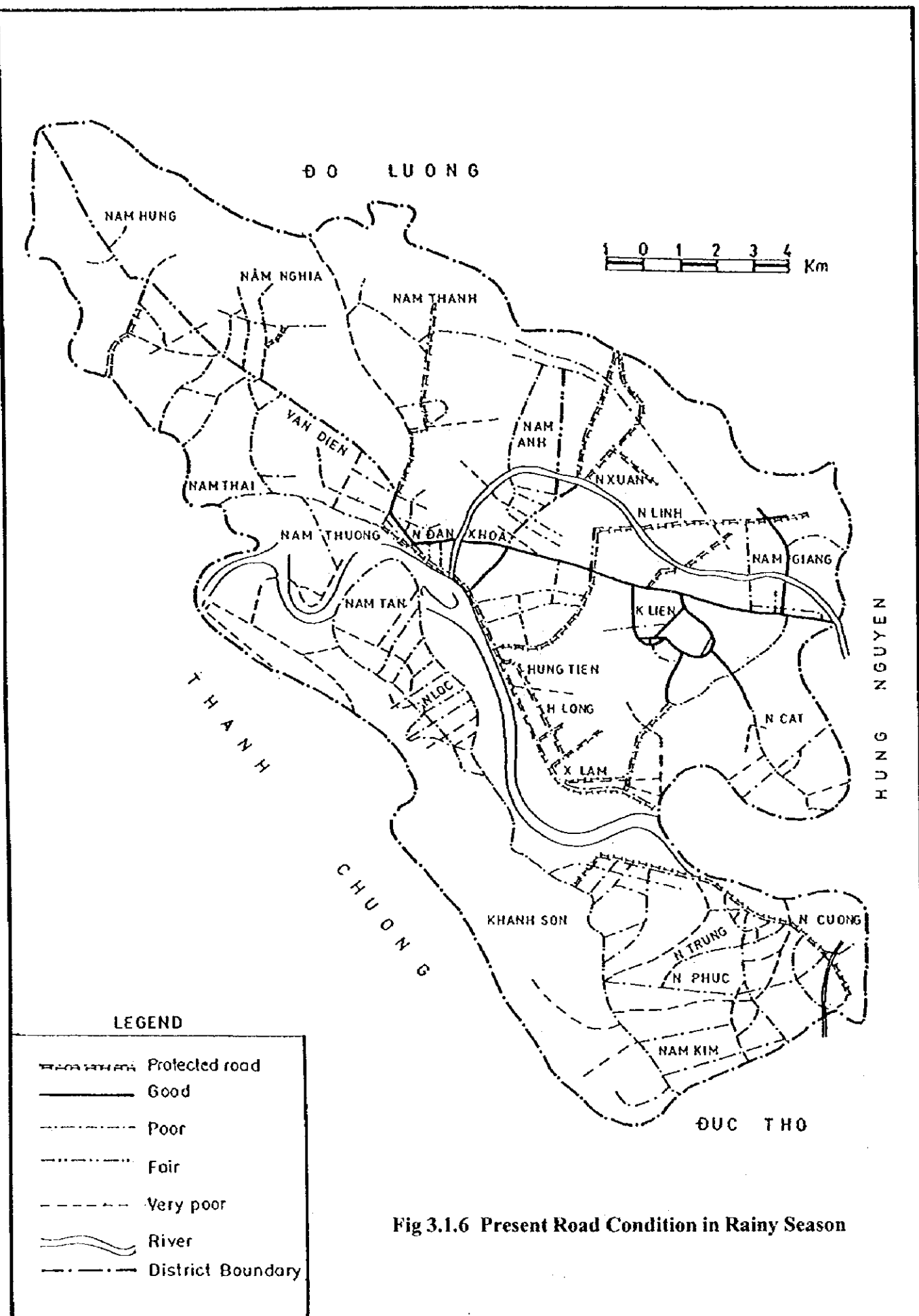


Fig 3.1.6 Present Road Condition in Rainy Season

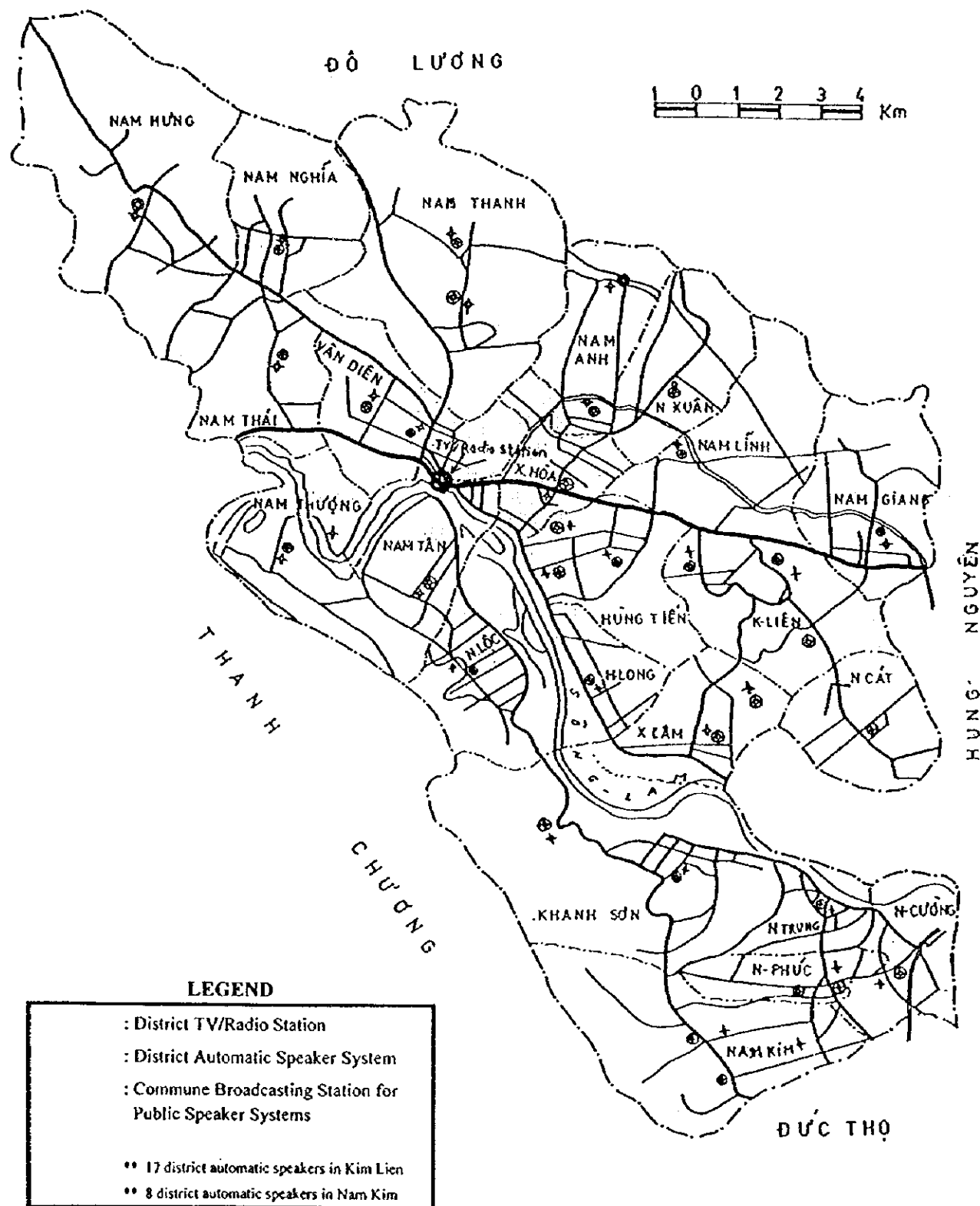


Fig 3.1.7 Location of Local Broadcasting System

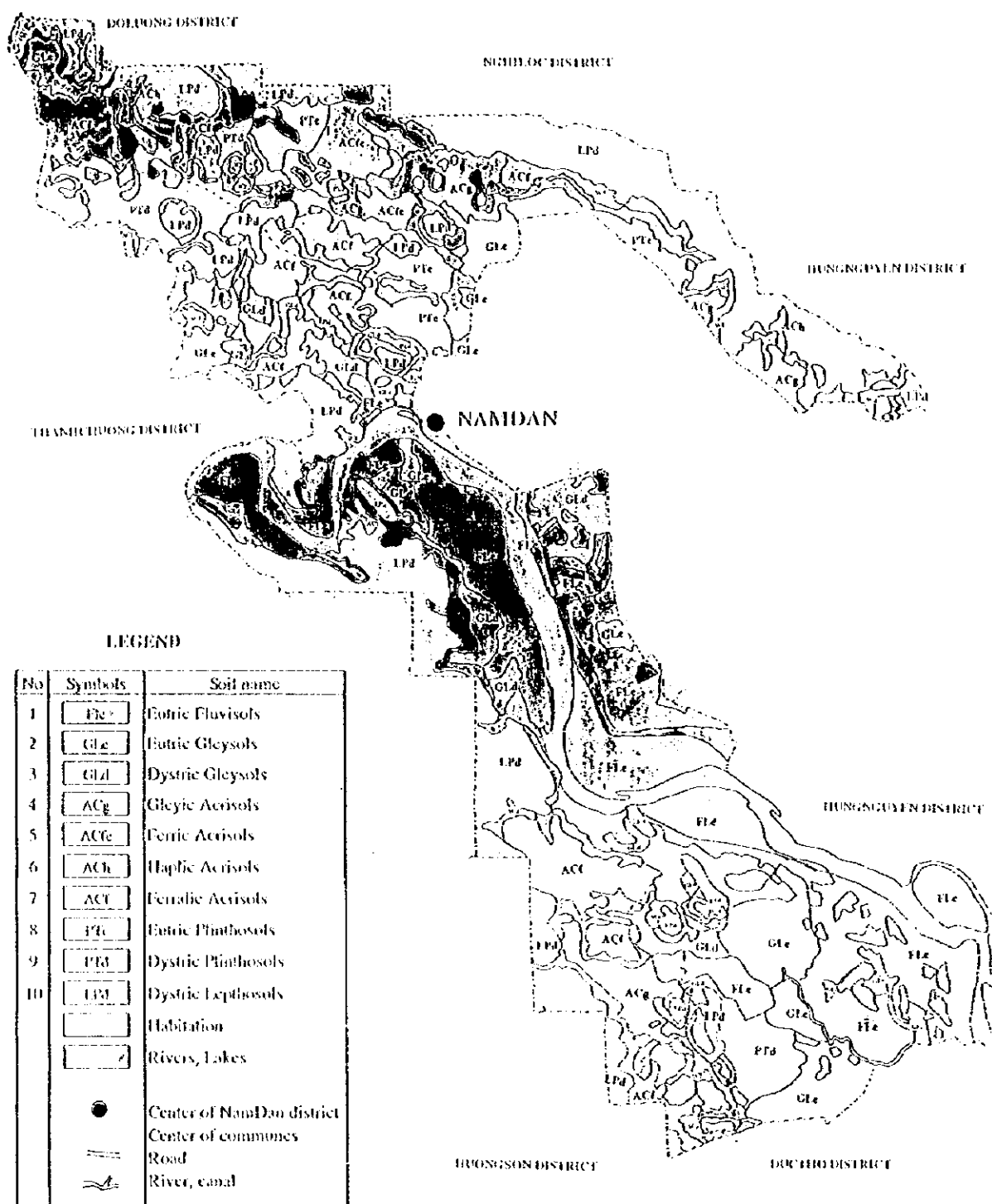


Fig. 3.2.1 Soil Map
NAMDAN PROJECT AREA-NGHEAN PROVINCE

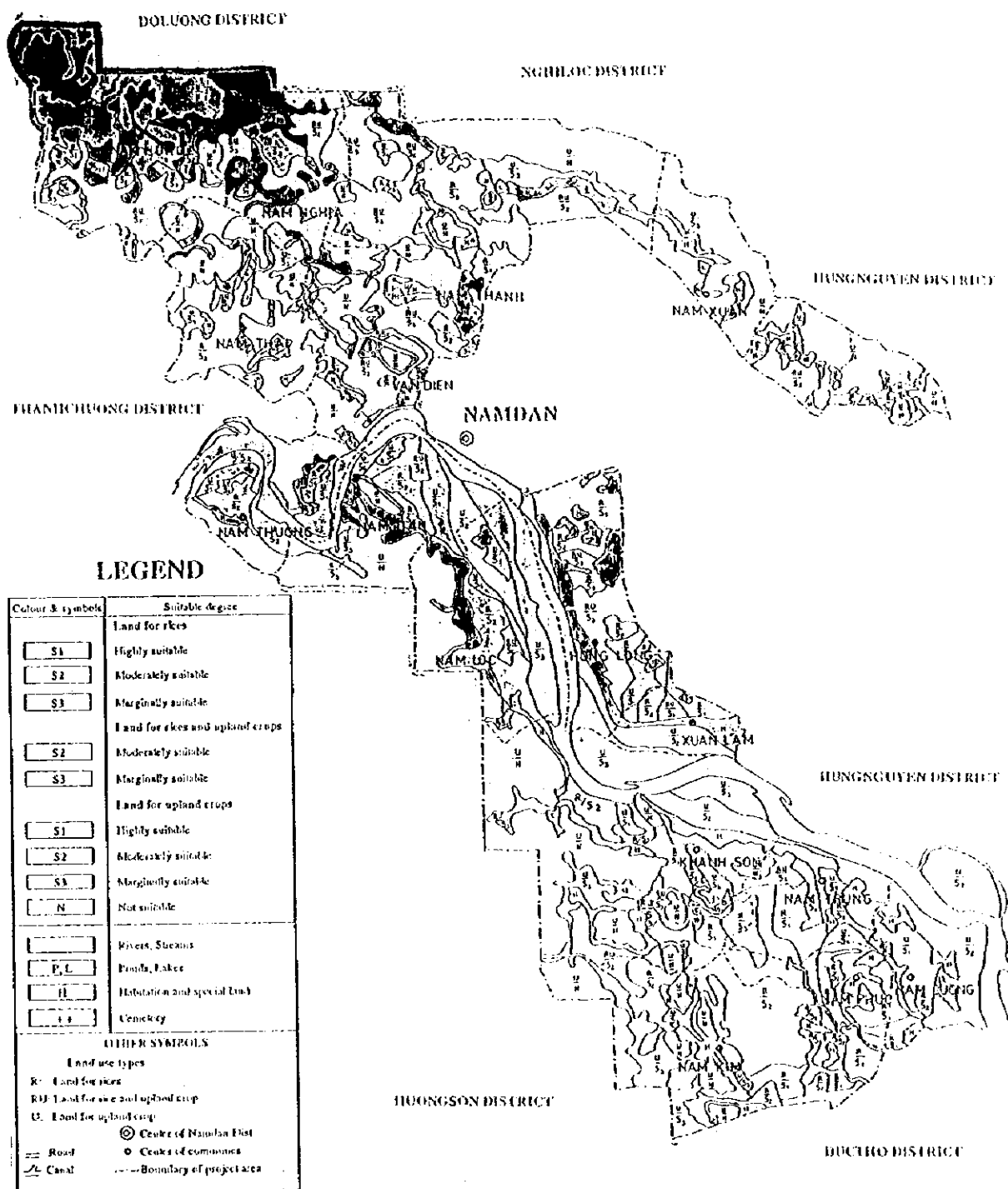


Fig. 3.2.2 Land Classification Map
NAMDAN PROJECT AREA - NGHEAN PROVINCE



REGEND





Fig.	Categories	Sub-categories
	Rice Crop Area	Double Rice Land, Single Rice Land
	Upland Crop Area	Seedling Land, Upland and Industrial Crop Land, Other Annual Crop Land, Fruit Tree Land
	Forest Area	Planting Forest, Protection Forest, Special Forest
	Other Area	Water Surface for Aquaculture, Reservoir, Land for Special Use, Residential Land, Unused Land, Others

Fig. 3.2.3 Present Land Use Condition

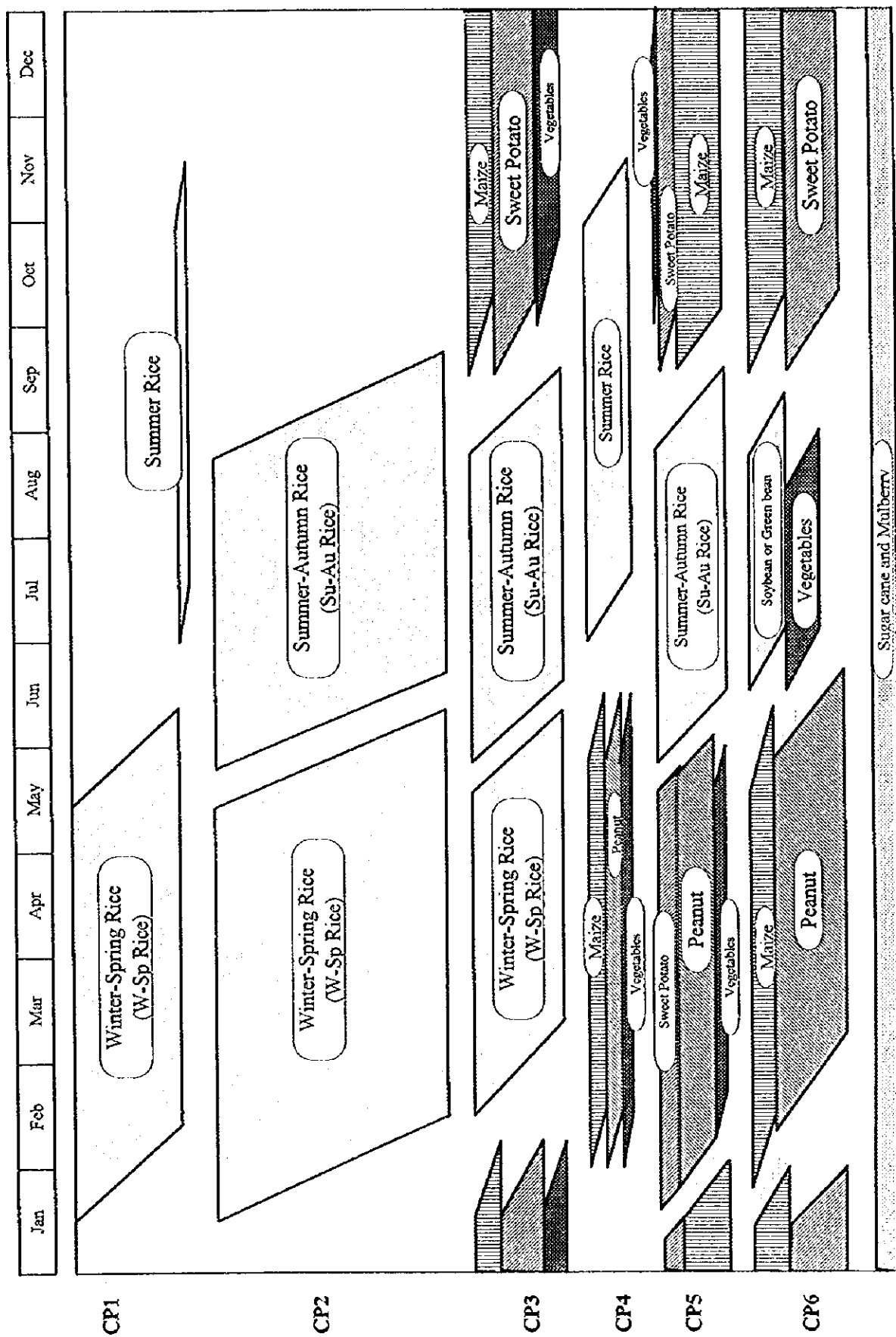


Fig. 3.3.1 Cropping Pattern in Nam Dan District

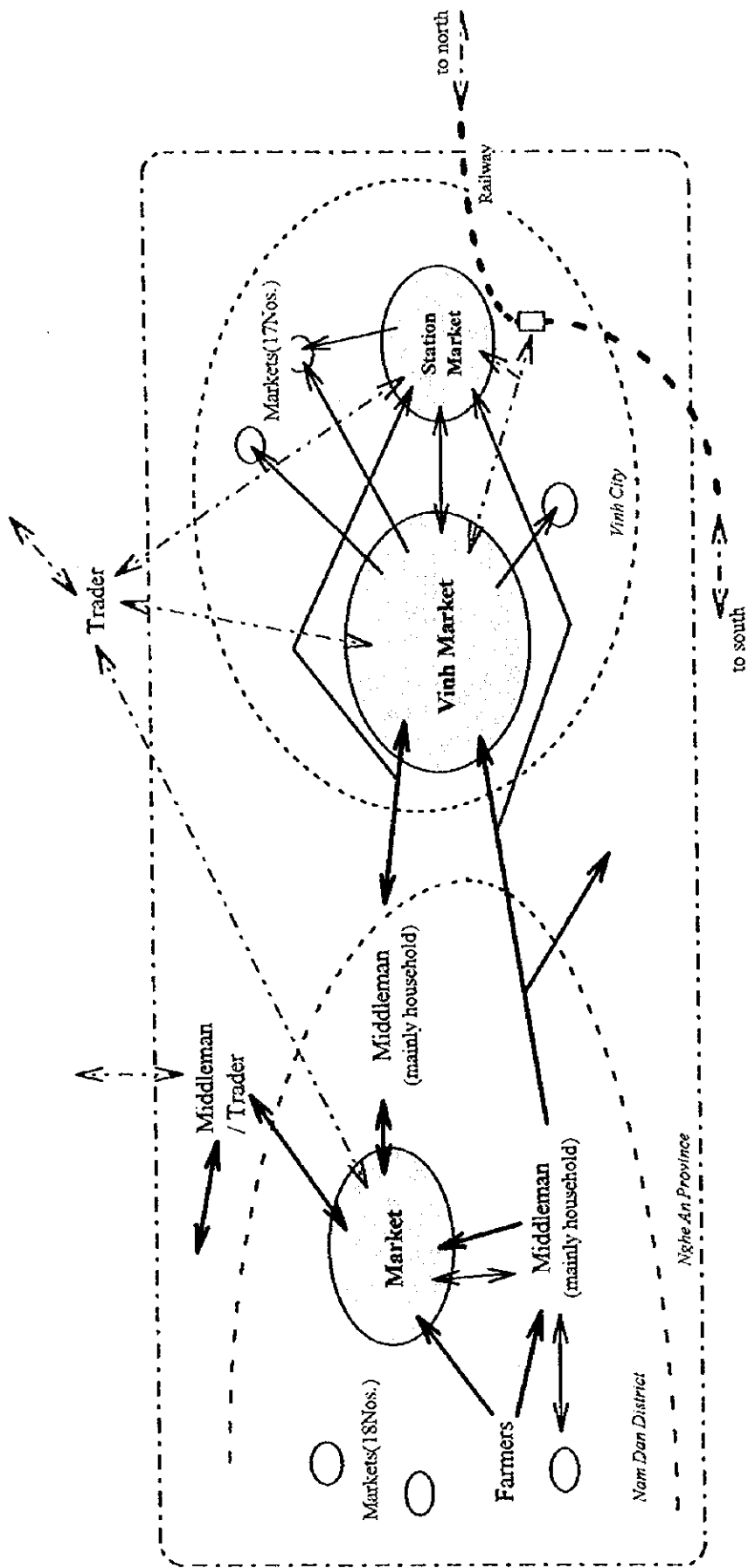


Fig. 3.3.2 Marketing Channels of Agricultural Products

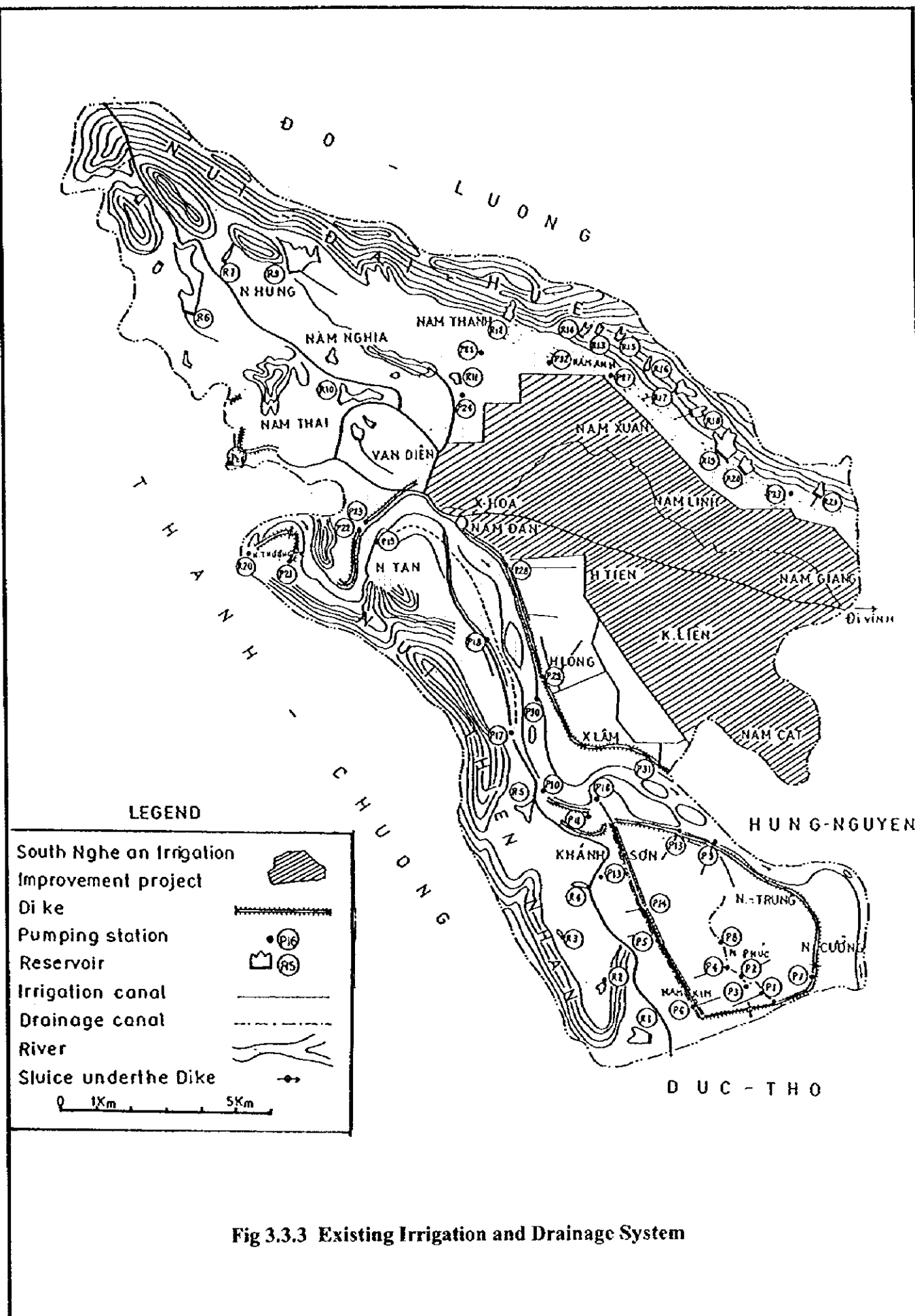


Fig 3.3.3 Existing Irrigation and Drainage System



Fig. 3.4.1 Areal Grouping as a Result of Rural Socio-Economic Survey