

CHAPTER 2

BACKGROUND OF NORTHERN REGION

2.1 General Information and Characteristics of the Zones

2.1.1 General information of Northern Region in Thailand

At present, the northern region can be administratively divided into 17 provinces. These provinces are Kamphaeng Phet, Chiang Rai, Chiang Mai, Tak, Nakhon Sawan, Nan, Phichit, Phitsanulok, Phrae, Mae Hong Son, Lampang, Lamphun, Sukhothai, Uttaradit, Uthai Thani and Phayao. Comparing with other regions, the area of this region is the largest, with the area approximately 169,644 square kilometers, just about 33.06% of the total area of the country. Commonly, the northern region is divided into the upper and lower parts (see Figure 2.1).

The land area of the upper part of the northern region, which is approximately 102,258.91 square kilometers, includes the areas of Chiang Mai, Chiang Rai, Phayao, Mae Hong Son, Lampang, Lamphun, Phrae, Nan and Tak provinces. The topographical feature of the upper part is composed of mountainous lands and plain areas among the mountains. The main important mountains are Daen Laos, Khun Tan, Phi Pan Nam, Luang Phra Bang and Thanon Thongchai. These mountains give birth to many important rivers such as, Ping, Wang, Yom and Nan, which join together to form the original beginning of the Chao Phraya River at Pak Nam Pho in Amphoe Muang Nakhon Sawan (see Figure 2.2). The annual average number of rainy days is around 110, while the total quantity of rainfalls is around 1,203.9 millimeters. The average temperature is 25.9 °C.

Land area of the lower part of the northern region of approximately 67,385.38 square kilometers includes the areas of provinces Kamphaeng Phet, Sukhothai, Phitsanulok, Phichit, Phetchabun, Nakhon Sawan and Uthai Thani. It extends to

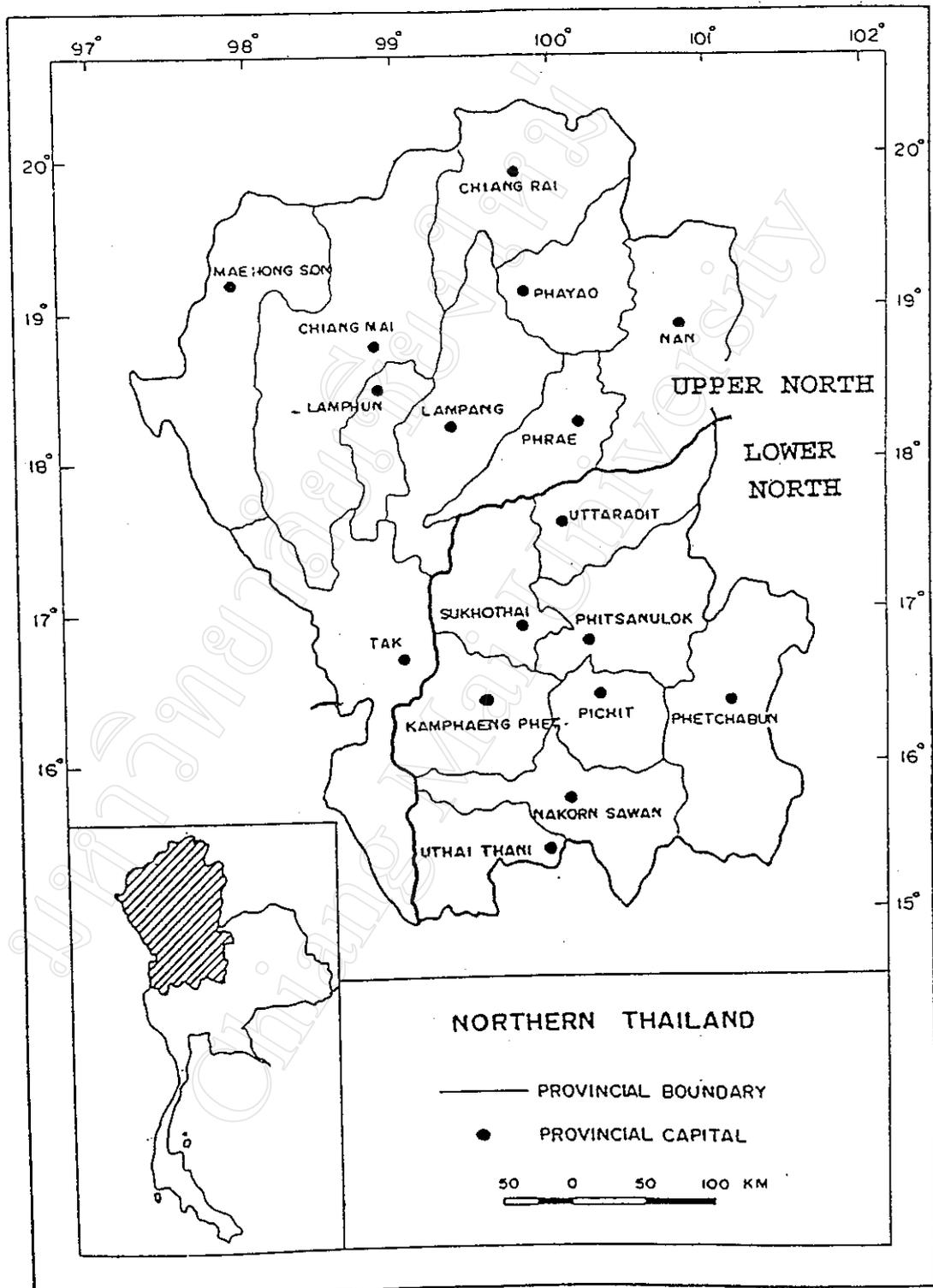


Figure 2.1 Map showing northern Thailand

Source: Adapted from Rerkasem (1994).

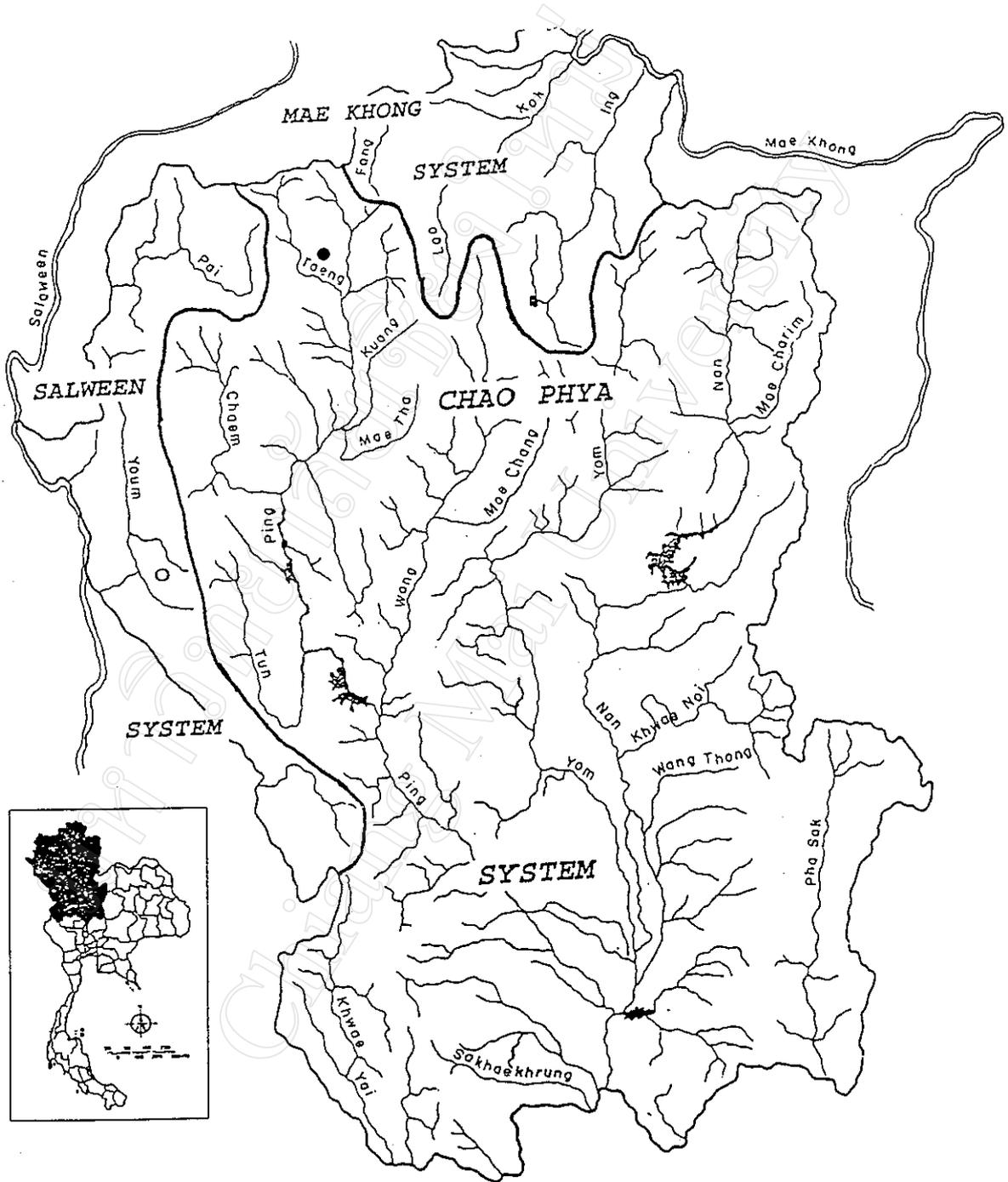


Figure 2.2 Rivers and tributaries in northern Thailand

Source: Adapted from Rerkasem (1994).

connect with the Central Region and the Northeastern Region of the country. Its main feature is composed of flat plains on both banks of the rivers which are most suitable for cropping. There are important rivers such as Ping, Wang, Yom and Nan. The annual average number of rainy days is 92, while the total quantity of rainfalls is around 1,209.9 millimeters. The average temperature is 27.6° C.

Agriculture is the main occupation of the population of this region. They are engaged in rice-growing, i.e. glutinous, non-glutinous and upland rice, maize, peanut, garlic, tobacco, sugarcane, strawberry, pineapple, litchi, longan, livestock raising and inland-water fishery. The other important occupations are earthen-ware production, wood product, weaving and mining. Some other occupations are tourism, cottage industry, trade and services and forestry.

2.1.2 Characteristics of the Zones in Northern Region

In an attempt to identify the areas that have a relatively similar agricultural pattern, the Division of Agricultural Economics (DAE, 1972) adopted the agro-economic zone concept. These zones were developed as aggregations of adjacent provinces with similar agricultural and resource uses and potential. The northern region contains 4 agro-economic zones (see Figure 2.3). The characteristics of the zones are as follows:

Zone 10, in this study is defined as zone A, includes Chiang Mai, Chiang Rai, Mae Hong Son, and Lamphun provinces. The terrain is mountainous with agricultural production in the valleys. The Ping River basin forms the major lowland area for agriculture. The agricultural soils are mostly alluvial with a clay or loam to sandy loam texture and relatively low levels of fertility. The major crops are rice, tobacco, groundnuts, corn, soybeans, and sesame. Cattle and buffalo populations used to be high.

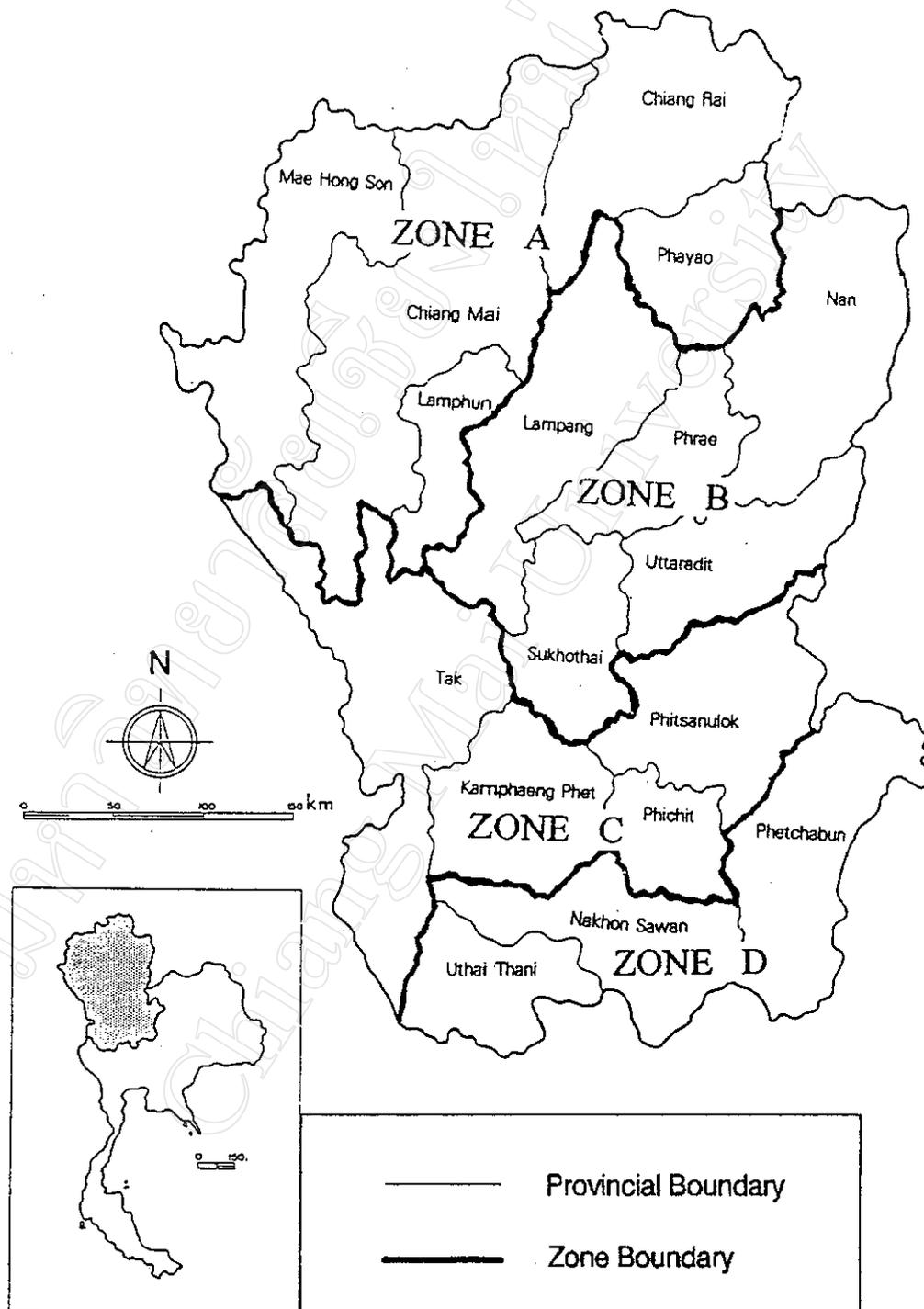


Figure 2.3 Agroeconomic zones in northern region

Source: Adapted from the Office of Agricultural Economics (OAE)

Zone 9, in this study is defined as zone B, contains Nan, Lampang, Phrae, Sukhothai, and Uttaradit provinces. These provinces are mountainous, with the southern end of the zone having an alluvial plain where the Yom and Nan rivers merge. The major crops are rice, corn, cotton, soybeans, mung beans, groundnuts, and tobacco. Cattle and buffalo production is high.

Zone 8, in this study is zone C, consists of Tak, Phitsanulok, Kamphaeng Phet, and Phichit provinces. Most of the zone is mountainous with agricultural production in the valleys between the mountains. The soils are mostly alluvial and of a level to gently undulating topography with moderate to good fertility. The major crops are rice, corn, mung beans, soybean, sesame, groundnuts, jute, and sugarcane. The great variety of suitable crops maintains a broad-based agricultural sector in this zone.

Zone 6, in this study is defined as zone D, includes Phetchabun, Nakhon Sawan, and Uthai Thani provinces. The eastern and western edges of this zone are mountainous, while the central part (Nakhon Sawan province) is a basin formed by the merging of several rivers. The soils vary from clay of high fertility to loam and sandy loam of lower fertility. The major crops are rice, corn, mung beans, cotton, kenaf, groundnuts, and specialty oil crops. Cattle and buffalo production is low in this zone.

2.2 Economic Structure and Composition of Agricultural Production

Agriculture used to account for almost all production in the regional economy. However, in 1991 it contributed only 25.9% of the gross regional product (see Table 2.1). Of crucial importance in recent development, especially in the Upper North, is the role of tourism (included in services) and its associated handicraft trades (Rerkasem, *et al.*, 1994). In general, agriculture is still the major income earner.

Within agricultural sector, crops occupy the predominant position; livestock ranked the second; fishery has a very small share; forestry used to own about 5% of

total agricultural production, but since the government set the national regulation of forestry conservation, the total production of forestry products sharply decreased in the northern region as well as in the whole country (see Table 2.2 and Table 2.3). Table 2.2 shows that from 1981 to 1991, forestry production decreased by 9.02% per year versus 6.04% of that at national level. In terms of annual growth rate, the agricultural production growth was 2.41% in northern region during 1981-1991, and it was lower than the national level 4.33%. At the same period, only livestock and agricultural services have higher growth rate than that of the national level.

Table 2.1 Regional Economic Structure, 1981 and 1991 (at current prices)

SOURCES	National (%)		NORTH (%)	
	1981	1991	1981	1991
Agriculture	21.4	12.8	40.4	25.9
Mining/quarrying	1.5	1.6	1.1	4.5
Industry	22.7	28.2	7.5	7.8
Construction	4.6	6.8	4.8	7.1
Retail/wholesale trade	18.2	17.0	17.0	16.5
Services	14.1	12.9	11.0	16.8
others*	17.5	20.7	18.2	21.4
GDP/GRP (Million Baht)	760,356	2,509,427	96,156	254,763
Per capita GDP/GRP (Baht)	15,934	44,085	10,042	23,328
Population (1,000 Persons)	47,718	56,923	9,575	10,921

* Include public sector and defense spending

Source: Northern Development Center, National Economic and Social Development Board (NESDB).

Table 2.2 Gross Agricultural Products in 1981, 1991 (at 1988 prices)

Unit: Million Baht

Sources	National (I)		NORTH (II)		Growth rate %	
	1981	1991	1981	1991	(I)	(II)
Agriculture	194,023	278,063	43,789	54,363	4.33	2.41
Crops	120,954	172,260	32,522	40,931	4.24	2.59
Livestock	18,331	29,352	3,429	6,003	6.01	7.51
Fisheries	19,275	31,273	639	635	6.22	0.06
Forestry	11,992	4,752	2,135	171	-6.04	-9.20
Agricultural services	8,505	9,797	2,664	3,403	1.52	2.77
Simp. agr. proc. products	14,966	30,629	2,399	3,220	10.47	3.42

Source: Northern Development Center, NESDB.

Table 2.3 Agricultural Production Composition of Northern Region (%)

Sources	1975	1981	1991
Agriculture	100	100	100
Crops	81.5	74.3	75.3
Livestock	10.8	7.8	11.0
Fisheries	2.9	1.5	1.2
Forestry	4.8	4.9	0.3
Agricultural services	-	6.1	6.3
Simple agri. processing products	-	5.4	5.9

Note: - data not available

Source: Calculated from NESDB.

2.3 The Government Policy

In the past, plans and directions for agricultural development were laid down in line with the economic changes and the national development guidelines as follows:

During the period of the First and Second National Economic and Social Development Plans (1961 - 1966, and 1967 - 1971) emphasis was placed on the improvement of the country's basic infrastructure. This included the construction of large scale dams for irrigation and electricity, road, the support and development of researches, agricultural promotion and experiments.

In the second Plan (1967 - 1971), one of the main development policies stated was to spread development efforts to reach the rural population in various regions, particular efforts being made in remote rural areas. Two important measures had been taken to implement this policy:

- **The Allocation of the Development Budget:** The Government has increased the development budget for the basic infra-structural programs in the rural areas, e.g. accelerated rural development programs and community development programs.
- **Regional Development Planning:** Apart from the allocation of development budget for rural development during the Second Plan period, the Government has initiated regional planning for the north and northeast as a tool to accelerate regional development during the Third Plan period....."

—*The Third National Economic and Social Development Plan (1972 - 1976), NESDB.*

In the third Plan (1972 - 1976), the summary of the Northern Development Plan (1972-1976) indicated that, to respond fully to the imperatives of demographic growth while complying with the national target of increasing farm income, the

expansion of the agricultural sector in the Northern region should proceed at an average rate of at least 6.5 percent per annum. The target of 6.5 percent in the agriculture sector for the period 1972-76 would call for more effective use of all available resources in the region. There was evidence that some of these resources by that time had remained partly idle. It also stated that it was necessary to accelerate agricultural development in the North by gradual shifting from predominantly paddy land use to diversified cropping patterns. Emphasis would be placed on foreign currency earners such as maize, soy bean, groundnut, cotton and tobacco. (*The Third National Economic and Social Development Plan* (1972 - 1976), NESDB).

Agricultural development was assigned the highest priority in the Third Plan. Farming is the main source of income for the Thai people, and the degree of prosperity in agriculture strongly influences the rate of growth in other sectors. In order to raise incomes and the standard of living of the farming community, the plan stated that: "it will be necessary to accelerate agricultural production and improve the quality of products, for both domestic and export markets". In the Third Plan, measures had also been adapted for: (1) the acceleration of diversification and improvement of agricultural production, and (2) improving the efficiency of existing irrigation and drainage systems and their use in agriculture.

The Fourth Plan (1977 - 1981) stressed the agricultural productivity. During the Third Plan period, there was a great number of forest encroachment to expand farm land. Hence, the importance of providing land ownership was taken into account by the promotion of land reform program. The Fifth (1982 - 1986) and the Sixth Plan (1987 - 1991) advocated the agriculture restructuring and improvement in efficiency of natural resources and marketing improvement. From the Fifth Plan period, importance was given to increase in production efficiency rather than expansion of planted areas.

To confirm with the Sixth Plan (1987-1991), Ministry of Agriculture and Cooperatives had set up a program for plants and animals production development.

The purpose of this aimed to distribute the family income of the people in the rural areas and to distribute an agricultural production including genetic improvement of about 71 varieties of crops and animals (*Statistical Year Book of Thailand*, 1994).

2.4 Characteristics of Agricultural Resources

2.4.1 Land

The total farm holding land in northern region is about 27.6 million rais in 1982, and reached the top about 34.0 million rais in 1988. Since 1989, the government put the ban on the encroachment of forest area, and regulated the reforestation law, the cultivated area was decreasing. In 1991, the total farm holding land was about 29.4 million rais, within which paddy land and the land under field crops were 15.2 and 10.5 million rais respectively. On the other hand, the harvested areas of paddy and field crops were 12.8 and 9.4 million rais respectively. Taking account of that planted but damaged areas of various crops, there were about 2.5 - 3.0 million rais of arable land in fallow.

Of the total harvested area, Table 2.4 shows the amount and percentage of zones, where zone D owned the largest and zone A the smallest share of total harvested areas in northern region. Figure 2.3 shows the situation of harvested area of the four zones from 1975 to 1991.

2.4.2 Labor

The Office of Agricultural Economics (OAE) defines the labor force as the female and male population, aged from 15 to 64, who engaged in agricultural production activities. According to this definition, about 70.4% of the total labor force worked in agricultural in 1991. This figure was higher than that of the national level

59.7% at the same time. Table 2.5 and Figure 2.4 present the agricultural labor force

Table 2.4 Harvested Area in Northern Region

Unit: 1,000 rais

Year	Zone A	Zone B	Zone C	Zone D	Regional
1975	3,597.8 (16.9)	4,376.1 (20.6)	5,303.7 (25.0)	7,956.7 (37.5)	21,233.9 (100)
1981	3,741.0 (14.5)	5,003.0 (19.4)	7,397.6 (28.6)	9,595.7 (37.3)	25,737.2 (100)
1991	4,387.1 (17.9)	5,046.0 (20.5)	6,715.0 (27.4)	8,401.9 (34.2)	24,550.0 (100)
Annual Growth Rate	1.3%	1.0%	1.6%	.4%	.97%

Note: The figures in the parenthesis are percentage share in regional harvested area.

Source: Calculated from statistical report data.

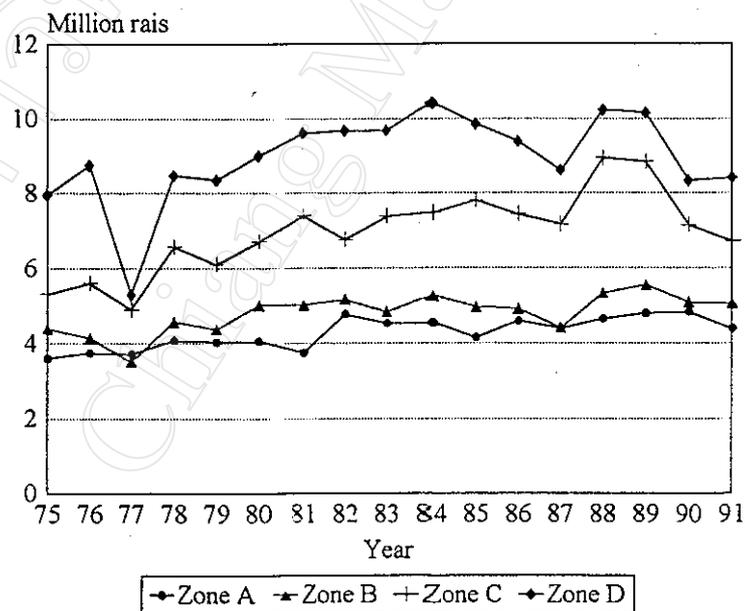


Figure 2.4 Harvested area in northern Thailand

Source: Drawn from statistical data as shown in Table 2.4.

situation among zones in northern region. In terms of agricultural labor force distribution, zone A had the largest share and zone D the smallest, which showed the averse situation of harvested areas. The annual growth rate in northern region from 1975 - 1991 was 1.4% per year, of which zone was 2.26%, ranked first, and zone D was 0.28%, the last.

Table 2.5 Agricultural Labor in Northern Region

(unit : 1,000 persons)

Year	Zone A	Zone B	Zone C	Zone D	Regional
1975	1,316 (35.0)	963 (25.6)	747 (19.8)	736 (19.6)	3762 (100)
1981	1,798 (39.6)	1,035 (22.8)	899 (19.8)	810 (17.8)	4,543 (100)
1991	1,793 (38.9)	1,007 (21.9)	1,000 (21.7)	804 (17.5)	4,604 (100)
Annual Growth Rate	2.3%	.3%	2.1%	.6%	1.4%

Note: Figures shown in the parenthesis are percentage share in regional agr. labor.

Source: Calculated from OAE data.

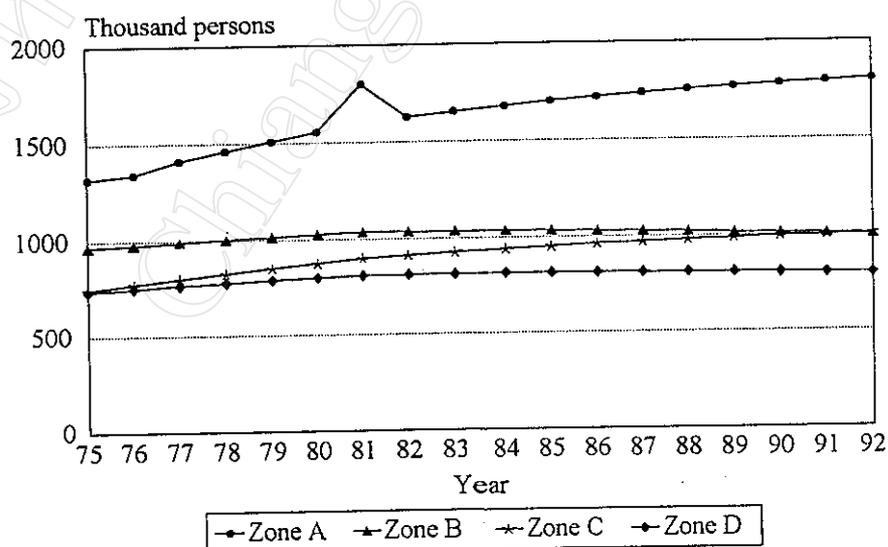


Figure 2.5 Agricultural labor in northern Thailand

Source: Drawn from OAE data.

2.4.3 Machinery

Table 2.6 listed the main agricultural machinery. The spread of the use of tractors in the mid-1960s and mid-1970s gave impetus to the desire for more land, making animal power obsolescent. The rise in crop prices also played a role in this process (Vichya, 1995). In 1975, there were 11,275 two-wheel walking tractors and 8,828 big tractors in northern region, and in 1991, these statistic reached 367,110 and 18,833 units respectively. Water pump, which played essential role in the irrigated area, increased by four times from 1975 to 1991. The increase of prayers was very common.

Table 2.6 Agricultural Machinery in Northern Region, 1975 and 1991

Items	Unit: units		
	1975	1991	Annual Growth Rate(%)
Two-wheel waking tractors	11,275	367,110	197.25
Big tractors	8,828	18,833	7.08
Water pump	59,469	317,962	434.67
Sprayers	37,322	1,632,056	267.06

Source: Agricultural Economic Research Division

2.4.4 Infrastructure

Road: In northern region, most of the roads through the villages are unpaved (Rerkasem *et al.*, 1994), but even these seasonal roads have been instrumental in commercializing many farmer subsistence activities, i.e., cash cropping, and broom grass for cash. The network of surfaced roads linking major towns and districts in the region, e.g. Chiang Mai, Fang, Chiang Rai, Nan, and Mae Sarong, Pai and Mae Hong Son, etc. together with the link to Bangkok, has also been built up from 1970s and 1980s (see Figure 2.6)

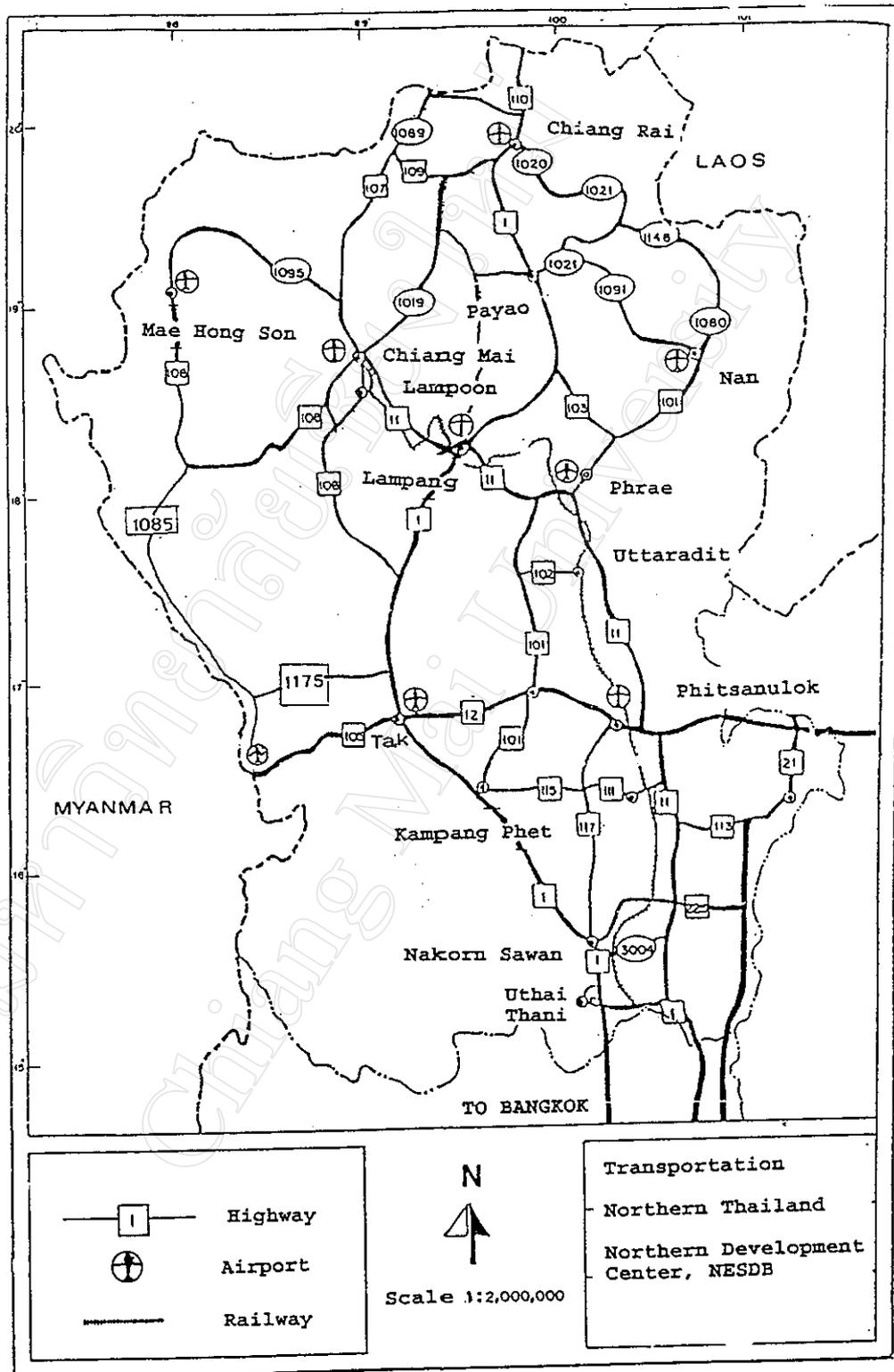


Figure 2.6 Network of major roads in Northern Thailand

Source: Adapted from Rerkasem, 1994.

Irrigation: The growth of Thai agriculture has primarily been due to increase in cultivated area, not increase in yield especially the case with rice production (Vichya, 1995). Expansion of irrigated area has been a primary factor contributing to the increase of output. Table 2.7 showed the accumulated irrigation area in northern region. Since the Royal Irrigation Project established early in the zone A area, in 1975, the accumulated irrigation area in zone A accounted for half of that in the whole northern region. On the contrary, zone D only accounted for 9%. The annual growth rate in the whole region was 13.7 percent per year from 1975 to 1991, where zone D had the highest growth rate about 46.1 percent per year because its base year (1975) data base compared was very small, only 198,500 rais.

Table 2.7 Accumulated Irrigation Area in Northern Region

unit: 1,000 rais					
Year	Zone A	Zone B	Zone C	Zone D	Regional
1975	1,108	504	404	199	2,215
	(50.0)	(22.8)	(18.2)	(9.0)	(100)
1981	1,322	837	966	724	3,849
	(34.4)	(21.7)	(25.1)	(18.8)	(100)
1991	2,105	1,287	1,886	1,644	6,922
	(30.4)	(18.6)	(27.2)	(23.8)	(100)
Annual Growth Rate	5.9%	10.3%	23.5%	46.1%	13.7%

Note: Figures shown in the parenthesis are percentage share in regional irrigation area.

Source: Calculated from OAE data.

2.5 Fertilizer Use and Technology Adoption

The earlier literature observed that Thai farmers in general were not used to making use of "organic fertilizers" (manure, compost, green manure). Fuhs *et al.*

(1972) stated that chemical fertilizers as the only means of fertilization have been used by about one third of the farmers in all project areas surveyed. The average fertilizer application in about 100 sample farms was in 1969/70 3.4 kg per rai. This figures indicate that the application of chemical fertilizers is worth mentioning only in areas where non-rice crops are being grown, e.g. Chiang Mai. Farmers might have experimented with fertilizers or may apply small amounts in their vegetable gardens but most of them are far from regular and intensive usage, especially in the paddies. The low expenditure on fertilizers as well as available general statistics, make very clear that the use of fertilizers is still in its infancy in Thailand and that the large production potential which has been tapped in other countries by the green revolution, is still a dormant potential in this country.

Fuhs *et al.* also pointed out that chemical fertilizers per se, in many cases do not have a positive effect upon crop production and that they become effective only when they are combined with other modern inputs such as improved seeds, improved crop rotations, improved cultivation methods and, in many cases, controlled irrigation. As long as the knowledge about such "package" is not made available to Thai farmers, these farmers act very rationally, indeed, when refraining from using fertilizers. Using fertilizers is not an objective in itself but only a means to increase yields and profit.

Rahman (1993) estimated that in Chiang Mai province the fertilizer rate for Khao Dauk Mali and glutinous varieties were at 17.12 kg and 16.32 kg of material per rai, respectively. About 21 percent farms used manure in addition to low dose of chemical fertilizers.

Regards of technology, in the early era increasing the area planted to rice has been the main approach taken to increase rice production. The fact that average yield levels were maintained while new lands of lower quality were added indicates that some yield increases were realized. However, yield increases much larger than those

realized are possible. Under experimental conditions rice department (RD) variety rice yields averaging 750 kg / rai have been achieved (Nicol *et al.*, 1982).

Most of the land suited to agricultural use is now employed. Further clearing of virgin land could destroy essential watersheds and deplete forest reserves and still not provide suitable agricultural land. Therefore, further production increases should come mainly from more intensive use of the land currently in agriculture or from carefully planned expansion of the land base. More double-cropping through the use of irrigation; increased use of pesticides, fertilizers, and new varieties; and more effective use of improved technology must all be considered as means to increase output per rai.

With a full understanding of the current situations and its background relating to the development issues in the northern region of Thailand, the analyst can proceed with searching for methodology and identifying policy instruments that can be used to influence the direction of growth in the agricultural sector. Subsequently, data need to be organized and analyzed systematically. Once this has been accomplished, the work to evaluate alternative development strategies can follow.