Chapter 3

Preliminary Data Analysis

This chapter was to investigate land use patterns and its change around Na Thap River where located at Na Thap Sub-district of Chana district in Songkhla province in 1982 and 2000. The frequency distributions of variables were shown, and then associations between variables were presented.

3.1 Description of the variables

The variables were classified as determinant and outcome. These variables and their role and data type were shown as a list in table 3.1.

Variable	Role	Data type
Location	Determinant	Nominal (3)
Land use change	Outcome	Nominal (4)

Table 3.1 Determinant and outcome variables

Table 3.1 shows, determinant and outcome were location and land use change respectively which both were nominal data type.

Determinant variable

Determinant variable in varios type of location. We categorized types of location into three groups as follows:

River : location around Na Thap River (R)

North : location over Na Thap River (N)

South : location lower Na Thap River (S)

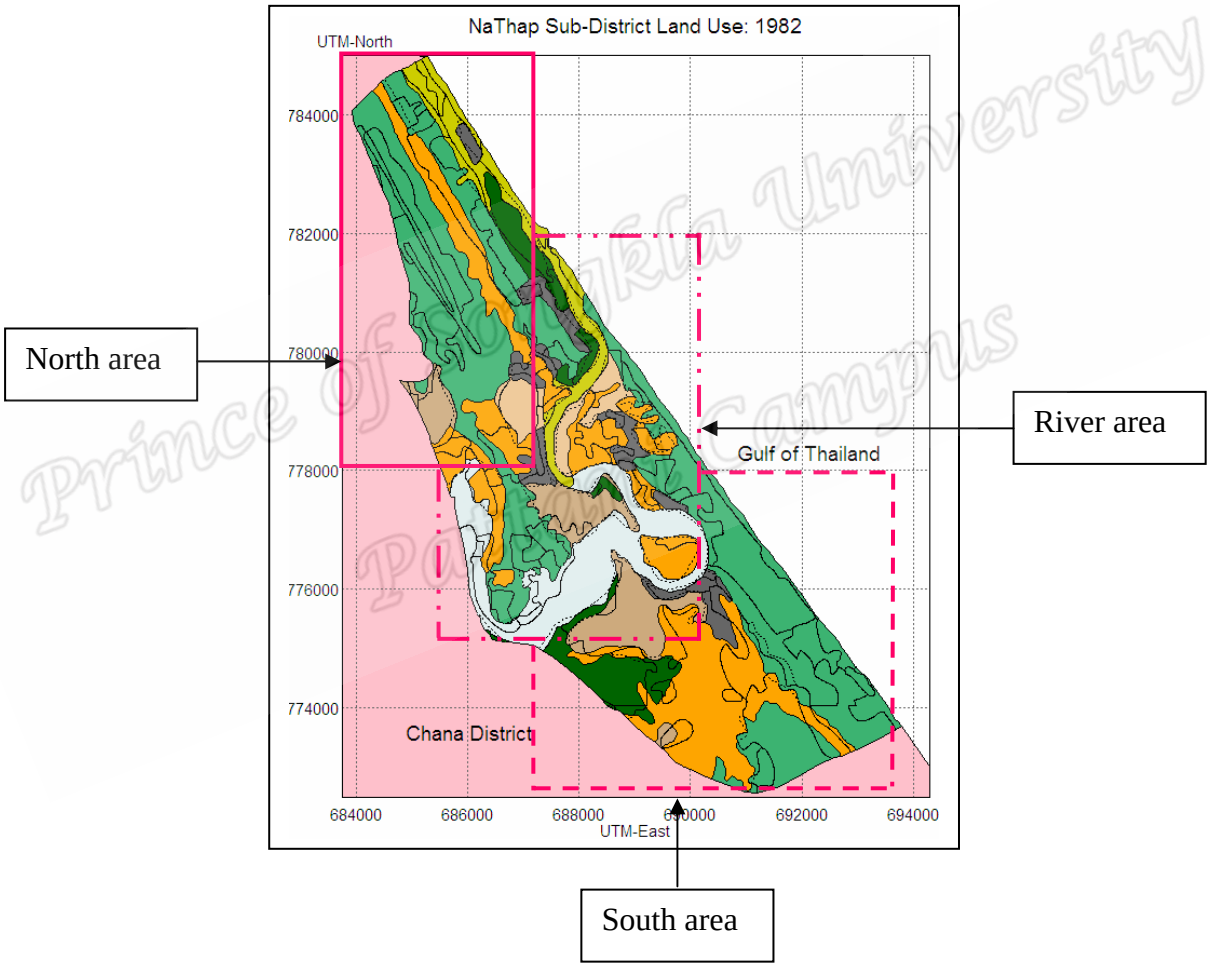

Figure 3.1: Location in Na Thap

We constructed a map of land use showing locations and general areas for specific land uses. We determined these locations with line: ——— for north area, —·—·— for river area and — — — for south area.

Location	Region (174)	%
North	67	38.5
River	56	32.2
South	51	29.3
Total	174	100.0

Table 3.2: The determinant variable

Table 3.2 shown regions of area in each location 38.5% of region was in the north, 32.2% was in the river and 29.3% was in the south location.

Outcome variable

Outcome variable is land use change of land use from 1982 to 2000. Map of land use showed locations and general areas for specific land uses. The sub-groups of land use was described with difinited colors for example: orange for paddy field, light green for swamp forest, gray for allocated project etc.

Land use in 1982

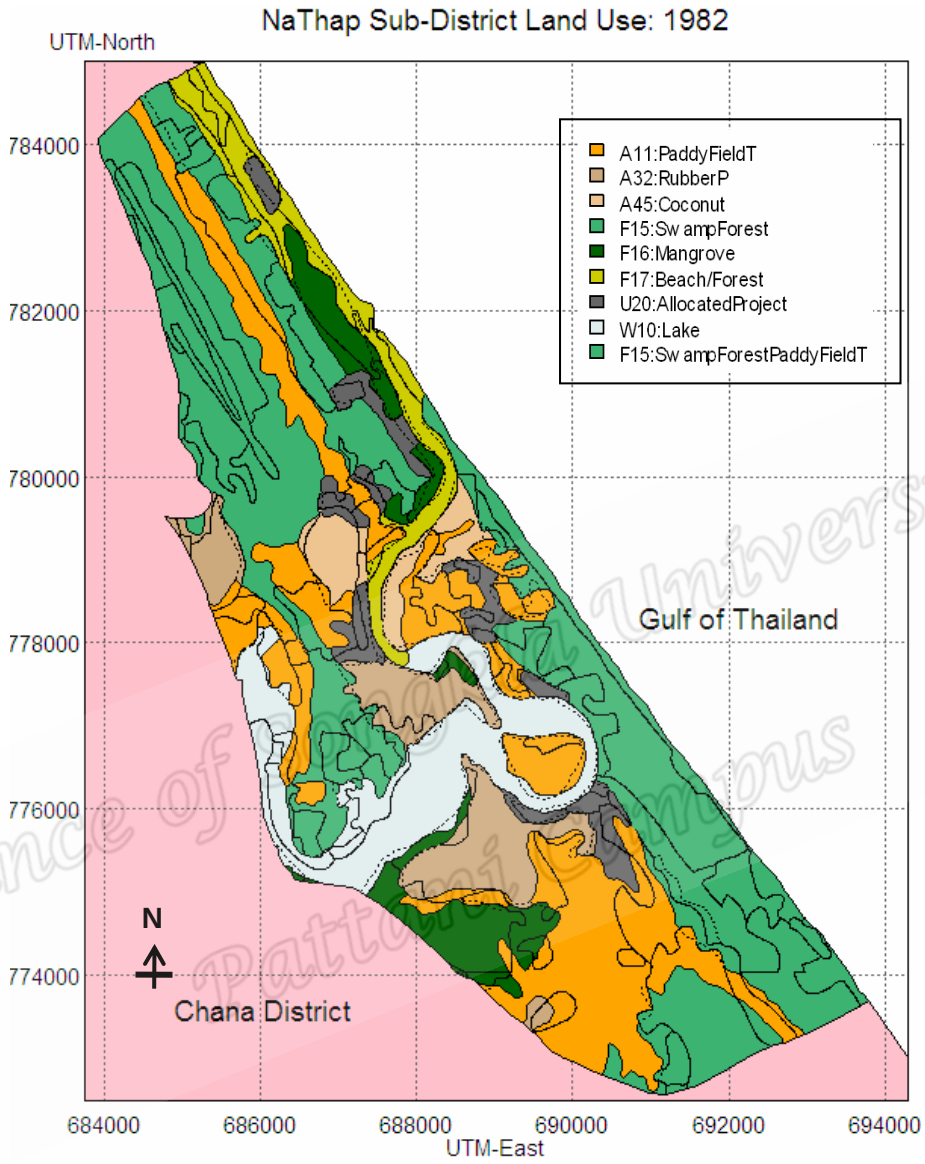

Figure 3.2: Land use in 1982

In 1982 half of this area was still natural and that land use area had not been greatly affected by humans (Figure 3.2). The Na Thap River was categorized as lake. The majority of land was used for paddy field.

Land use in 2000

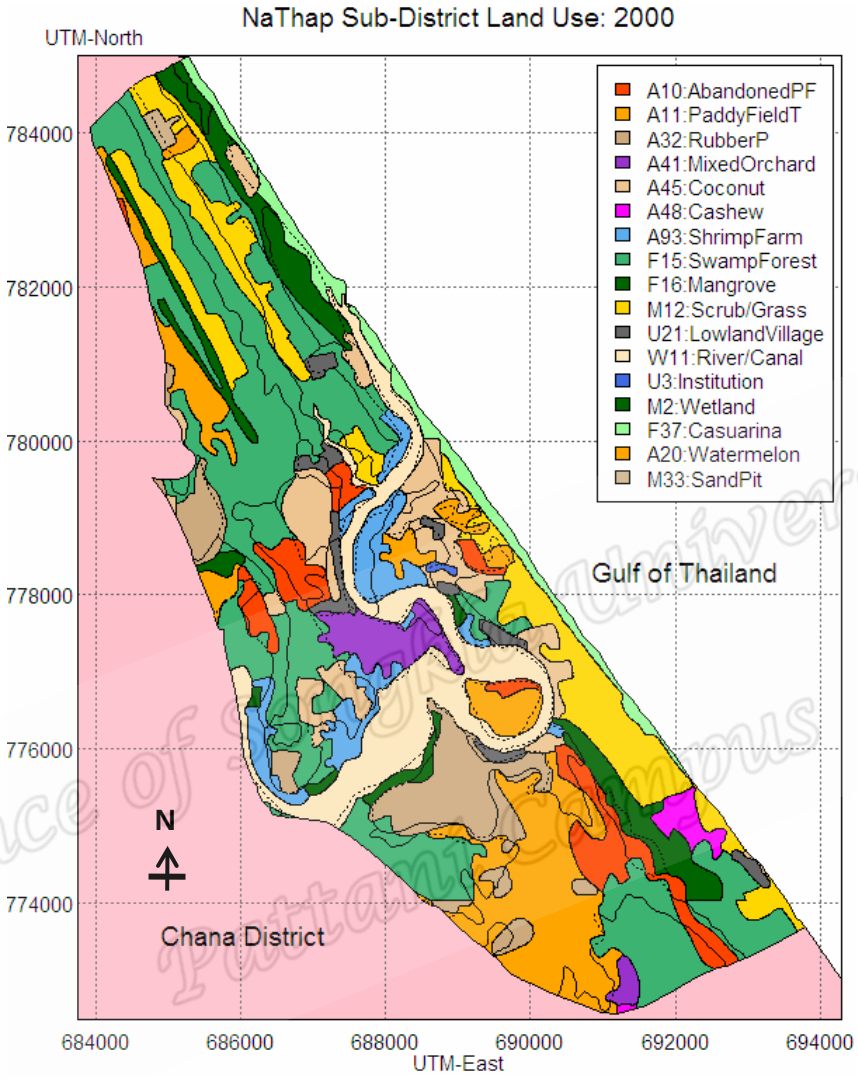

Figure 3.3: Land use in 2000

In 2000, the lake was categorized as river. Most of the areas around the river were changed to shrimp farms land use types in 2000 increased substantially

Land use	In 1982			In 2000		
	Region	%	Location	Region	%	Location
Natural						
Swamp forest	41	23.6	N, R and S	34	19.5	N and S
Mangrove forest	16	9.2	R	9	5.2	N and S
Lake	11	6.3	R	-	-	-
Beach-forest	9	5.2	N	-	-	-
Swamp forest Paddy field	6	3.4	N	-	-	-
Scrub / Grass	-	-	-	11	6.3	S
Wetland	-	-	-	5	2.9	R
Casuarinas	-	-	-	4	2.3	N and S
River / Canal	-	-	-	4	2.3	N and S
Farm						
Paddy field	47	27.0	N and S	16	9.2	N
Rubber plant	12	7.0	N and S	15	8.6	S
Coconut tree	6	3.4	N	24	13.8	N and S
Shrimp farm	-	-	-	16	9.2	R
Mixed orchard	-	-	-	3	1.7	R
Cashew	-	-	-	1	0.6	R
Watermelon	-	-	-	2	1.1	N and R
Developed						
Allocate project	26	14.9	R	-	-	-
Abandoned paddy field	-	-	-	17	9.8	R and S
Instauration land	-	-	-	1	0.6	R
Sandpit	-	-	-	1	0.6	N
Low land village	-	-	-	11	6.3	R
Total	174	100.0		174	100.0	

Table 3.3: Land use and the locations in 1982 and 2000

In 1982, there were 9 categories of land use (Table 3.3). Paddy field had the most area (27.0% of all) in north and south. Swamp forest had the second most (23.6%) and allocate project third most (14.9%). The number of land use increased from 1982 to 2000. In 2000, there was an increase in abandoned land (from 0 to 9.8%) in the north and south and 9.2%, of total area, increase in shrimp farming in the river location. The most change was found in the area of Paddy field, which showed 17.8% of total area decrease; coconut land use showed the second biggest change (10.4% of total area increase).

Type of land use	**In 1982**		**In 2000**	
	Region	%	**Region**	%
Farm	83	47.7	77	44.3
Natural	65	37.4	67	38.5
Developed	26	14.9	30	17.2
Total	174	100.0	174	100.0

Table 3.4: Type of land use in 1982 and 2000

Table 3.4 in 1982 were Swamp forest, Mangrove forest, Lake, Beach-forest and Swamp forest Paddy field group into natural. Paddy field, Rubber plant, Coconut tree were group in to farm and Allocate project was group into Developed. Farm was the most area 47.7% of all. Land use in 2000 were Swamp forest, Mangrove forest, Scrub/Grass, Wetland, Casuarinas, River/Canal were group into Natural. Paddy field, Rubber plant, Coconut tree, Shrimp farm, Mixed orchard, Cashew, Watermelon were group into farm and Abandoned paddy field, Instauration land, Sandpit, Low land village were group into develop . Only 44.3% was farm, 38.5% was natural area and 17.2% was developed.

Land use change (outcome)

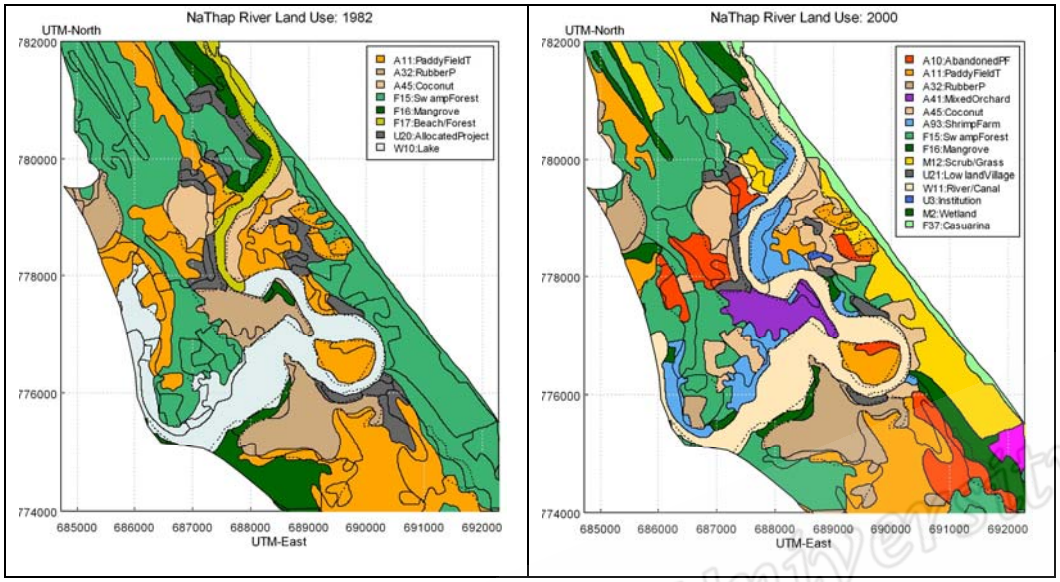

Figure 3.4: Land use change in 1982 to 2000

Figure 3.4 shows land use change in the Na Thap River area in 1982 to 2000. It can be seen that between 1982 and 2000 land use area had decreased for natural and residential and increased for agriculture. There was an increase in abandoned land in the north and south from 0 to 9.8% and increase in shrimp farming in the river location from 0 to 9.2% of total area. The increase in abandoned land and shrimp farming was mostly converting from swamp forest and paddy field. We group type of land use change into nine group (Natural remaining natural, Natural to Farm, Natural to Developed, Farm to Natural, Farm remaining farm, Farm to Developed, Developed to Natural, Developed to Farm and Developed remaining developed).

Type of land use change	Region	%
Natural remaining natural	43	24.7
Natural to Farm	34	19.5
Natural to Developed	6	3.4
Farm to Natural	19	10.9
Farm remaining farm	34	19.5
Farm to Developed	12	6.9
Developed to Natural	6	3.4
Developed to Farm	9	5.2
Developed remaining developed	11	6.3
Total	174	100.0

Table 3.5: Distribution types of land use change

The most common was natural remaining natural (24.7%), followed by natural changing to farm and farm remaining farm (19.5%), then farm changing to natural (10.9%). The least of the changes identified were of farm to developed (6.9%), developed remaining developed (6.3%), developed to farm(5.2%), natural to developed (3.4%), and developed to natural (3.4%).

3.2 Tabulation of change in types of land use for each location

Type of land use change (9 groups)	Location (Region)							
	River	(%)	South	(%)	North	(%)	Total	(%)
Natural remaining natural	7	12.5	20	39.3	16	23.9	43	24.7
Natural to farm	13	23.2	5	9.8	16	23.9	34	19.5
Natural to developed	3	5.4	2	3.9	1	1.5	6	3.5
Farm to natural	8	14.2	7	13.7	4	6.0	19	10.9
Farm remaining farm	15	26.7	7	13.7	12	17.8	34	19.5
Farm to developed	3	5.4	2	3.9	7	10.4	12	6.9
Developed to natural	1	1.8	1	2.0	4	6.0	6	3.5
Developed to farm	3	5.4	3	5.9	3	4.5	9	5.2
Developed remaining developed	3	5.4	4	7.8	4	6.0	11	6.3
Total	56	100.0	51	100.0	67	100.0	174	100.0

Table 3.6: Distribution of change in 9 types of land use for each location

Table 3.6, the river location farm remaining farm was the most common type of land use (15 areas of all). In the south natural remaining natural was the most common type of land use (20 areas of all). Both natural changed to farms and natural remaining natural in the north was the most common type of land use (16 areas of all) the chi-square test is 22.0264, with 16 degrees of freedom and p-value = 0.1423. The assumption of the chi-square test expected value for each cell is greater than 5. In this study is not follow in assumption, so we combine type of land use change which is similar. We combine Natural to Farm and Natural to Developed into Natural to Farm/Developed, Farm to Natural and Developed to natural into Farm/Developed to Natural and the last one Farm to Developed and Developed to Farm into Farm/Developed to Farm/Developed. After this we have 4 groups land use change, as shown in Table 3.7.

This table shows observe value of land use change after combine the developed to natural and developed to develop with developed to farm.

Type of land use change (4 groups)	**Location (Region)**							
	River	**(%)**	**South**	**(%)**	**North**	**(%)**	**Total**	**(%)**
Natural remaining Natural	7	12.5	20	39.2	16	23.9	43	24.7
Natural to Farm/Developed	16	28.6	7	13.7	17	25.4	40	23.0
Farm/Developed to Natural	9	16.1	8	15.7	8	11.9	25	14.4
Farm/Developed to Farm/Developed	24	42.9	16	31.4	26	38.8	66	37.9
Total	56	100.0	51	100.0	67	100.0	174	100.0

Table 3.7: Distribution of change in 4 types of land use for each location

Table 3.7, the data between land use change (outcome) with 4 categories and location (determinant) with 3 categories. Chi-square test is 11.96, with 6 degrees of freedom and p-value = 0.0627.

Odds ratios were used to assess the effect of location on land use change in each case we defined the odds ratio as the ratio.

Location	Type of land use change	OR	95% CI OR	
1:North	1:Natural remaining Natural	0.93	0.46	1.89
	2:Natural to Farm/Developed	1.24	0.61	2.55
	3:Farm/Developed to Natural	0.72	0.29	1.77
	4:Farm/Developed to Farm/Developed	1.06	0.57	1.99
2:South	1:Natural remaining Natural	2.81	1.36	5.77
	2:Natural to Farm/Developed	0.43	0.18	1.06
	3:Farm/Developed to Natural	1.16	0.47	2.89
	4:Farm/Developed to Farm/Developed	0.67	0.33	1.33
3:River	1:Natural/remaining/Natural	0.33	0.13	0.79
	2:Natural to Farm/Developed	1.57	0.75	3.26
	3:Farm/Developed to Natural	1.22	0.50	2.96
	4:Farm/Developed to /Farm/Developed	1.36	0.71	2.60

Table 3.8: Odds Ratio and 95% CI Odds Ratio

The data between land use change (outcome) with 4 categories and location (determinant) with 3 categories in table 3.8 are going to fit a model in next chapter.