

Primary Economic Activities in the Islands between Ngawun and Thetkethaung Rivers, Ngaputaw Township

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Abstract

The study area is located at the southernmost part of Ngaputaw Township in Ayeyarwady Region. The location of the study area is a Central Island between Thetkethaung and Pathein (Ngawun) rivers. It is composed of 22 villages. As a rural area of Ayeyarwady Region, the main economic activities are primary activities. This study focuses on spatial distribution of primary economic activities in the study area, although the areas have statistical recorded data, the main data in this study are obtained from the field survey. In the study 4 types of the primary economic activities are recognized as agriculture, fishing, shrimp farming, and salt farming. Spatial distribution and the development of economic activities are depending mainly on the relief and drainage.

Keywords: primary economic activities, agriculture, Island, spatial variation

Introduction

Economy of the country depends on primary economic activities. Ngaputaw Township is one of less developed areas in Ayeyarwady Region. Township economy depends on primary economic activities. The study area is located between Ngawun and Thetkethaung rivers, close to the Andaman sea and (mouth of river) riches in water resources such as fish, prawn, salty sea water. It favors fishing, prawn farming and salt farming. The southern and northern tips of the study area (rocky) favors quarrying. However, quarrying is carried on in only one Village tract. Agriculture is the main economy of the study area, especially monsoon paddy. Therefore, the economy of the study area depends on agriculture, fishing, shrimp farming, salt farming. Usually, lowland area flooded by sea water, especially the rainy season. In 2008, Nargis Cycloe hit the study area, the whole region of the study area flooded by sea water except the northern tip. It affects the primary economic activities. In addition, the sea level rises more recently. Therefore, sea water flooding affects upon the primary economic activities in the study area. Total population of the study area was 84815 in 2018, 26% of the township population. The number of houses are 20605 houses, 29% of the township and 22248 household, 29% of the township. According to interview, people who engaged in primary economy activity are 31% of the total household. In the study area, monsoon paddy is cultivated in 55025 acres (27% of the township). Summer paddy is not cultivated due to the rich salty sea water. However, salty sea water favors salt farming. The area of salt farm occupies 94.7% of the township and 52.3% of the Ayeyarwady Region in 2018. In addition, shrimp farming is carrying on 12 village tracts in the study area. The number of shrimp farm in the study area was 73.7% of the township in 2000. Fishing is being carried out along the river, streams as well as Andaman Sea. There are two kinds of fishing: inland fishing and marine fishing. Inland fishing is found in all village tracts, but marine fishing is found in the southern part of the study area, close to the sea. Therefore the study area is the important area for the development of Township's economy.

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Study Area

Study area lies between North Latitudes 15° 49' 00" and 16° 16' 00" and between East Longitudes 94° 22' 00" and 94° 41' 00". It is bordered by Andaman Sea on the south, Thetkethaug River on the east and Patheingyi or Ngawun River on the west. The area of study area has 527 square kilometres (130225 acres). The study area receives the tropical monsoon climate. The whole region is flat plain except the northern and southern tip of the study area. The study area has saline swampy and meadow gley soils. In the study area, the northern tip is Tumyaung Formation and the southern tip is Hainggyi Formation.

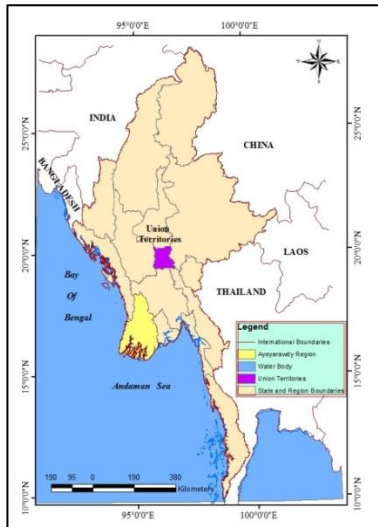


Figure (1)(b). Location of Ayeyarwady Region in Myanmar, (Source: Survey department, Yangon)

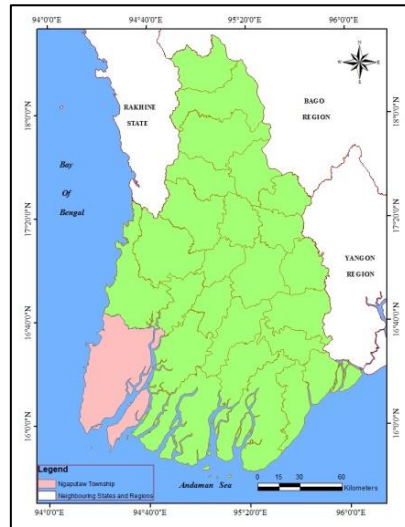


Figure (1)(b). Location of Ngaputaw Township in Ayeyarwady Region, (Source: Survey department, Yangon)

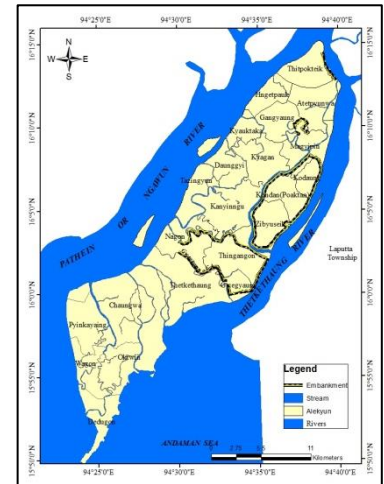


Figure (1)(c). Location of Study Area, (Source: Land Records Department, Ngaputaw)

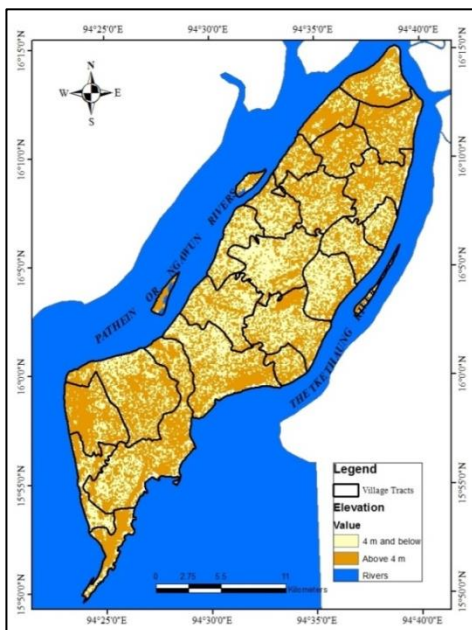


Figure (2). Elevation of Study Area, Source: DEM (90 Metres Resolution)

The relief of the study is flat plain. According to the figure (2), the highest elevation of the study area is (34) metres, they are found at the northern tip and southern part of the study area due to Tumyaung formation at the northern tip and Hainggyi formation at the southern tip. Elevation is classed into two; (4) metres and below (4) metres, and above (4) metres. The middle and southern parts of the area has (4) m and below 4m, saline intrusion is the highest. Shrimp farming and salt farming are the favour in this area.

The main drainage is Ngawun River in the west, Thetkethaung River in the east, and Andaman Sea in the south. In addition, many streams drain in this area. Therefore, the study area is endowed seawater resources, favour inland fishing and marine fishing.

Climate

Climate is one of the main factors in physical features. It plays a vital role in agriculture and some economic activities. Climate directly influences on the types of soil and vegetation. According to Koppen's classification, study area experiences tropical monsoon climate (Am). Mean temperature is 27.50°C (81.5°F) and total rainfall is 3030.80 mm (119.32 inches). Table 1 and figure3 show the average monthly rainfall and temperature at Pathein (2008-2017).

Temperature

According to the temperature records during 10 years period from 2008 to 2017, the average maximum temperature is 32.90°C (91.22°F) and the average minimum temperature is 21.90° (71.42°F). Thus, the mean temperature is 27.50°C (81.5°F).

Temperature condition of study area is changed by season. It increases in summer but decreases in the rainy season by the influence of south and southwest monsoon wind. By the invading of north and northeast monsoon wind, the temperature again decreases in winter.

Rainfall

The larger proportion of rainfall between May and October from the southwest monsoon. Rain comes also from the storms of the Bay of Bengal and the Andaman Sea. The total rainfall of study area was 3030.80 mm (119.32 inches) and the rainy days were 132 days, as recorded at Pathein Weather Station (2008-2017). The heaviest rainfall was in July with average rainfall of 724.60 mm (28.53 inches) and the least rainfall in February 2.60 mm (0.10 inches). This result is flooding in the lowland and poor drainage area in the rainy season. Flooding usually causes damages to the planted crops. Moreover, the monthly rainfall is also important for salt farming and marine fishing.

Table (2). Average Monthly Rainfall and temperature at Pathein(2008-2017)

Months	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Avg:/ Total Rainfall
Maxi Temp (°C)	32.2	34.3	35.7	36.9	34.6	31.2	30.6	30.5	31.1	32.6	33.4	34.2	32.9
Average Mini Temp (°C)	17.6	18.9	21.6	23.9	24.9	23.9	23.5	23.2	22.7	22.7	21.3	19.1	21.9
Average Mean Temp (°C)	24.9	26.6	28.7	30.4	29.8	27.6	27.1	26.9	26.9	27.7	27.4	25.7	27.5
Rainfall (mm)	6.2	2.6	11.5	45.8	295.2	587.8	724.6	630.5	445.2	221.4	52.5	7.5	3030.8
Rainy day	0.4	0.1	0.5	1.9	12.0	24.1	26.7	24.6	22.3	15.3	3.2	0.6	131.7

Source: Hydrology and Meterology Department, Pathein

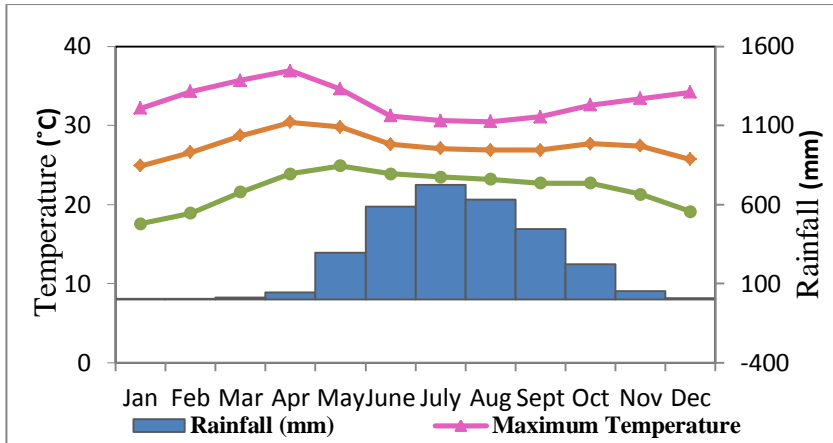


Figure (3). Climograph of Study Area (2008-2017), (Source: Based on Table)

Table (3). Number of House, Household and Population in the Study Area in 2017

Village Tracts	Houses	Households	Population	Area(sq.km)	Population density per sq.km
Tit Poke Hteik	441	455	1750	15.36	114
Ah Htet Pyun	1035	1137	5009	25.21	199
Hnget Pauk	478	516	2138	13.02	164
Kyauk Ta Gar	170	200	793	12.73	62
Gan Chaung	586	643	2507	18.14	138
Ma Gyee Pin	1540	1623	6770	25.05	270
Koe Htaung	152	191	706	8.54	83
Daunt Gyi	321	340	1263	24.19	52
Kyar Kan	755	849	3025	25.42	119
Kone Tan	362	373	1363	21.53	63
Ka Nyin Ngu	810	970	3096	36.27	85
Zee Hpyu Seik	491	549	2046	23.37	88
Thin Gan Kone	1582	1873	6114	30.95	198
Gwe Chaung	298	303	1240	14.63	85
Ta Zin Kyun	422	447	1797	19.69	91
Na Gone	915	1008	3971	28.09	141
Pyin Kha Yaing	2296	2418	9280	25.74	361
Chaung Wa	1416	1488	5837	28.42	205
War Kone	896	936	3115	17.91	174
Dee Du Kone	2503	2560	9474	16.43	577
Oke Twin	1314	1420	5334	47.46	112
Thet Kei Thaung	1822	1937	8187	40.57	202
Total	20605	22236	84815	518.72	164

Source: General Administrative Department, Ngaputaw, 2018

Table (3) shows the number of houses and household, the total population and the population density in the study area in 2018. The number of houses were 20605, household 22236 and total population 84815. The average population density was 164 person per sq.km. The average population density of the Township was 90 per square kilometres. This said that the population density of the study area was larger than the township density.

Research questions

- ❖ How many types of primary economic activities in the study area?
- ❖ Which types of primary economic activities are currently dominant in that area?

Aim

- ❖ The main aim of the research is to present the spatial distribution of primary economic activities

Objective

- ❖ To investigate the types of primary economic activities in the study area
- ❖ To examine the dominant activities in the study area
- ❖ To present spatial distribution of primary economic activities

Data and Methods

Both primary and secondary data are used in this research. Most primary data are derived from field surveys, interview with authorized person, and local people of the study area. Secondary data concerned with salt are acquired from Myanmar Salt and Marine Chemical Enterprise, Ministry of Mines; Land Records Department; and soil map from Agricultural Atlas of the Union of Myanmar. Literatures concerning salt industry and some definitions needed in this study are received from libraries and online sources. Digital Elevation Model (ASTER DEM) (90 Meters Resolution) is used for elevation. Satellite Images Landsat 7ETM+ are used to present the land use.

Methods

Primary data are acquired from field surveys and open talks with authorized person, people who work in primary economic activities. The data related to primary economic activities are obtained through Structured Open-ended Interview method with farmers, fishermen, shrimp farm owners and salt farm owners of the study area. Spatial distributions of primary economic activities are shown by map. The locations of salt farm, le land, forest land, settlement area are identified by GPS. Satellite images are used for the distribution of area related to salt farm, le land and shrimp farm by Supervised Classification Method. Spatial distribution of primary economic activities is presented by map using GIS.

Previous Investigation and Literature Review

In 2003, Cho Cho Myint submitted M.A Thesis, Department of Geography, Patheingyi University, on "A Geographical Analysis on Fishing Industry of Ngaputaw Township". It presented the importance of geographical factors for the development of fishing industry.

"A Geographical Analysis of Salt Industry in Ayeyarwady Region" was presented by Cho Cho Myint in 2015 as a PhD Thesis, Department of Geography, University of Yangon. Which focuses on salt farm area changes, suitable salt farm area, strength, weakness, opportunities and threat of salt industry.

In 2016, Khin Kay Khaing and San San Aye, presented in the University Research Journal, Patheingyi University, "Spatial Distribution of Primary Economic Activities in

Kangyidaung Township”. It presented the distribution of primary economic activities from the geographic point of view.

Definitions

Primary Economic Activity: Activity of an economy making direct use of natural resources. Such as agriculture, fishing, miningetc

Farm: an area of land and buildings used for growing crops and rearing animal

Results and Discussion

Types of Economic Activities

According to the field survey, there are 4-type of primary economic activity in the study area. They are agriculture, fishing, shrimp farming, and salt farming. Table (4) and figure (4) show the village tracts and their primary economic activity. According to the table, four types of primary economic activity are practised in 10 village tracts. They are Ah Htet Pyun, Ma Gyee Pin, Kyar Kan, Daunt Gyi, Ka Nyin Ngu, Ta Zin Kyun, Na Gone, Thet Kei Thaug, Oke Twin, and Chaung Wa and Chaung Wa Village tracts. Hnget Pauk, Pyin Kha Yaing, Dee Du Kone and War Kone and War Kone Village tracts are engaged in the three types of primary economic activity. They are found in the southern part and northern part of the study area. Two types of primary economic activity are found at Tit Poke Hteik, Gan Chaung, Kyauk Ta Gar, Koe Htaung, Kone Tan, Zee Hpyu Seik, Thin Gan Kone, Gwe Chaung, village tracts. They are in the northern and eastern part of the study area. In this area, embankments are built to prevent the intrusion of saline water. Therefore, it is not suitable for salt farming and shrimp farming in this area.

4 Types: Agriculture, Fishing, Shrimp Farming and Salt Farming

3 types: Agriculture, Fishing, and Shrimp Farming

2 types: Agriculture and Fishing

Table (4). Types of Primary Economic Activities in the Study Area (2017-18)

Types of Primary Economic Activities	Village Tracts
4	Ah Htet Pyun, Ma Gyee Pin, Kyar Kan, Daunt Gyi, Ka Nyin Ngu, Ta Zin Kyun, Na Gone, Thet Kei Thaug, Oke Twin, and Chaung Wa
3	Hnget Pauk, Pyin Kha Yaing, Dee Du Kone and War Kone
2	Tit Poke Hteik, Gan Chaung, Kyauk Ta Gar, Koe Htaung, Kone Tan, Zee Hpyu Seik, Thin Gan Kone, Gwe Chaung

Source: Field Survey, 2018

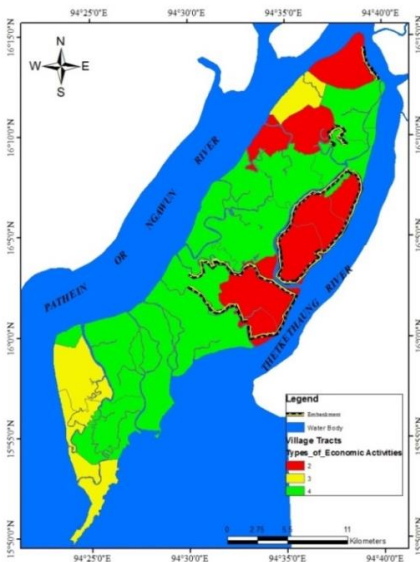


Figure (4). Village Tracts by types of Primary Economic Activity in Study Area (2018), (Source: Based on table. 4)

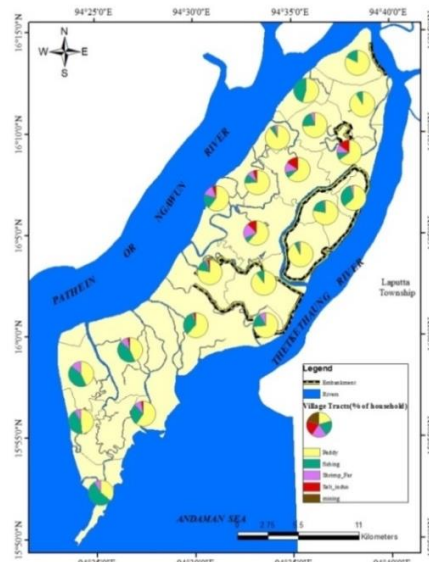


Figure (5). Household engaged in Primary Economic Activity of Study Area (2018), (Source: Based on Field Survey, 2018)

Figure (5) presents the percentage of household engaged in primary economic activities of the study area in 2018. They occupy 30.5% of the total household of the study area. In which agriculture is the dominant activity of the study area, farmers occupy 20.2% of the total household. Fishing is the second important activity in the study area, which is 7% of the total household. Shrimp farming is 1.2% of the total household.

In the primary sector, agriculture occupies 68.8% of the total primary economic activity, the largest activity in the study area. Fishing is the second largest with the percentage of 23.7, and shrimp farming occupies 23.6% respectively.

Agriculture

In the study area, agriculture is the leading primary economic activity. Monsoon paddy, dhani and garden are grown in this area. Monsoon paddy is the dominant agriculture. They are grown in all villages of the study area. According to Land Records Department, total monsoon cultivated area was 22659 ha (acres) in 2017, occupies 21% of the township monsoon paddy cultivated lands. Production varies depending on paddy varieties and saline water. To prevent saline water intrusion in the paddy field, embankments are built at the western part of Thetkethaung River, eastern part of the study area. Zee Hpyu Seik, Koe Htaung, Kone Tan, Thin Gan Kone, Gwe Chaung village tracts were partially free from saline water intrusion. Total salt water intruded area for paddy cultivation is 24425 ha in Ngaputaw Township because it is located in the coastal area. Although salt water intruded area give low paddy yield, farmers cultivated in the area due to staple crop of the local people. In summer, paddy is not cultivated in these areas because the land is salty. In the study area, average yield per hectare of monsoon paddy was 110 basket, township-wise average yield per hectare was 170 baskets. Figure (6) shows the paddy cultivated area and salt farming in the study area in 2018. According to the figure, paddy is cultivated in all village tracts, but salt farm is not found in the southern and eastern and northern part of the study area due to low saline water intrusion. Dhani is cultivated in some villages. In Dhani cultivation, the cost of production is limited to grow, especially bamboo and labour wages. In addition, the substitute of zinc for building's roof. Garden is less significant due to the richness of salinity.

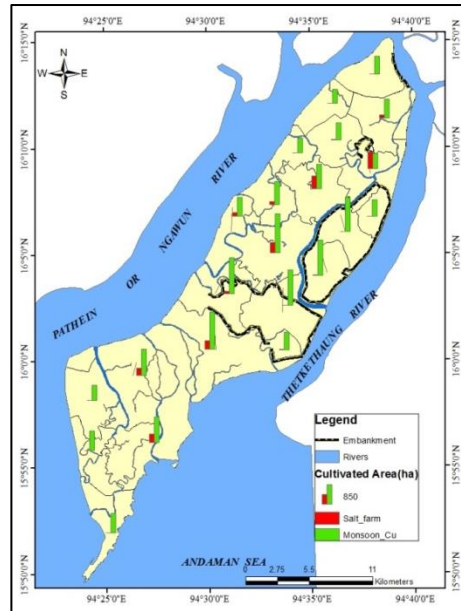


Figure (6). Monsoon Paddy Cultivated Area and Salt Farming Area in Study Area (2018),
(Source: Based on Land Records Department and, MSMCE, Patheingyi)

Fishing

In the study area, fishing is the second largest economic activity. Inland fishing and marine fishing are found in that area because the study area is close to the Andaman Sea and lies between Ngawuna and Thetkethaung rivers, consisting of many streams. Figure (7) shows village tract that working at inland and marine fishing in the study area. Inland fishing is found at the northern part of the study area. Inland fishing is found at 16 village tracts along the Ngawun and Thetkethaung rivers and many streams. Marine fishing is found at the southern part of the study area. Fishing areas are Taing Htaung Kya, Myawpaik, Three layer net, Marine fishing is found at 6 village tracts; Thet Kei Thaug, Pyin Kha Yaing, Chung Wa, War Kone, Dee Du Kone, and Oke Twin village tracts.

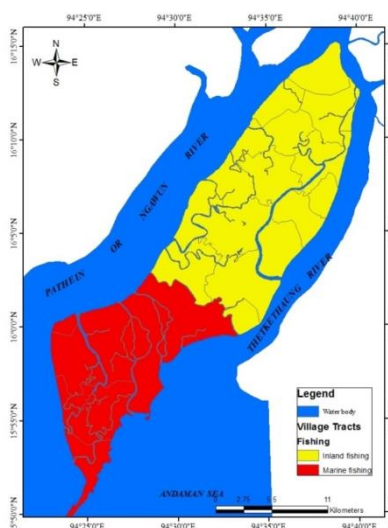


Figure (7). Inland and Marine Fishing Village Tracts in Study Area (2018),
(Source: Field Survey, 2018)



Plate (1). Marine Fishing (MyawPaik) in Andaman Sea, Dee Du Kone Village Tract,
(Source: Field observation, 2018)

Shrimp Farming

In the study area, small embankments are constructed in the upper part of streams to prevent saline water for cultivation. In addition; these small reservoirs are used not only paddy cultivation but also fishing. They open the slice gate during the high tide to enter the water resource like fish and prawn larvae into the reservoir. After that, they close the slice gate during the low tide. In this way they survive agriculture and fishing in this area. However, tidal forest depleted in this area, hence water resources like fish and prawn larvae are scarce. According to the interview, about 2000, larvae of prawn are caught in the mouth of river and near the coast. They sell prawn larvae to farmers to cultivate in their farm. In this way, shrimp farming changed from traditional way to prawn larvae's are bought to cultivate in their farm. At present, larvae of prawn are scarce in the mouth of river and near the coast. They bought prawn larvae from Magyi and Chaungthar shrimp breeding. However, shrimp larvae are not sufficient to cultivate in their farm. Therefore, they bought prawn larvae from Thailand. Table (5) shows Village Tracts, Number of Prawn Farms and Area in 2000. According to the Township's fishery department, total shrimp farm was 760 in 2000-01. According to field survey, shrimp farms are 485 of the study area in 2017-18.

Table (5). Village Tracts, Number of Prawn Farms and Area in 2000

No	Village Tracts	Prawn Farms	Area	
			acres	ha
1	Ka Nyin Ngu	80	1200.16	485.7
2	Thet Kei Thaug	70	1022.31	413.7
3	Na Gone	54	800.58	324.0
4	Ta Zin Kyun	84	1014.12	410.4
5	Ma Gye Pin	78	1100.14	445.2
6	Ah Htet Pyun	22	594.09	240.4
7	Oke Twin	87	1202.47	486.6
8	Kyauk Ta Gar	18	412.34	166.9
9	Dee Du Kone	21	524.3	212.2
10	Chaung Wa	102	1700.66	688.2
11	Pyin Kha Yaing	105	1524.21	616.8
12	Kyar Kan	39	640	259.0
Total		760	11735.4	4749.1

Source: Fishery Department, Ngaputaw



Plate (2). Catch the Gaiant Taiger Shrimp larvae in Andaman Sea, Dee Du Kone Village Tract, (Source: Field observation, 2018)



Plate (3). Gaiant Taiger Shrimp Farm in Ka Nyin Ngu Village Tract, (Source: Field observation, 2018)

Salt Farming

Salt is one of the basic essentials for the survival of human beings. Ayeyarwady Region produces over 95% of the total solar salt production in Myanmar. Solar salt is produced in Ngaputaw, Laputta and Pyapon townships in Ayeyarwady Region. Among these three townships, Ngaputaw Township is the leading producer of salt. In 2018, the study area produced 94.7% of salt in Ngaputaw Township. So, the study area occupies the largest share of Township. However, Salt production is decreasing due to climate, capital, labour, technique, and imported salt. In 2017-18, total salt farms were 259 in the study area. Salt farming industry is capital intensive farming. Unusual climatic condition effects on salt production. Figures (8) and (9) show the spatial distribution of the salt farm in the study area in 2000 and 2013. This show that the salt farm is declining in the study area. Most of the Salt farms are found in the study area. Salt farmers cultivate their farm by traditional method until recently. Some farmers introduced a new technique to produce salt. Plates show salt is produced by using the old technique and new technique. This shows that systematic management is also necessary in salt production.



Plate (4). Salt is Produced by Old Technique in Ka Nyin Ngu Village Tract, (Source: Field Observation, 2018)



Plate (5). Salt is Produced by New technique in Kyar Kan Village Tract(not success), (Source: Field Observation, 2018)



Plate (6). Salt is Produced New technique) in Oke Twin Village Tract(Success), (Source: Photo, 2018)

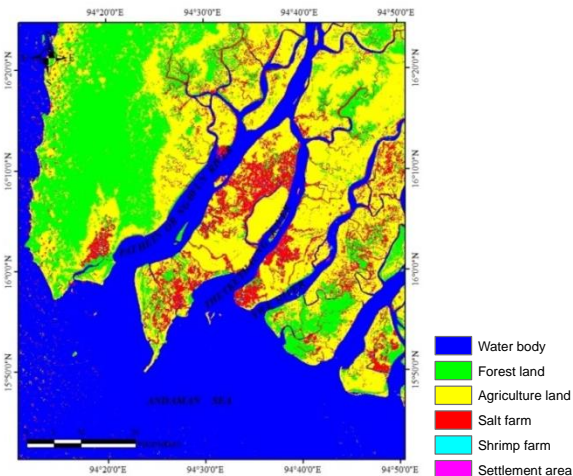


Figure (8). Land use and land cover in the study area and it's environ (2000), (Source:Landsat7+ETM, 30 metre Resolution)

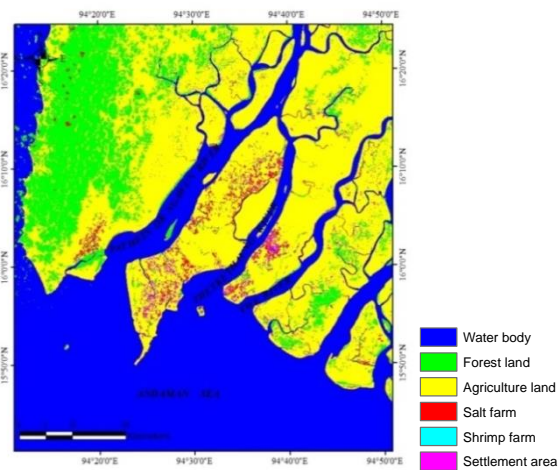


Figure (9). Land use and land over in the study area and its environ (2013), (Source:Landsat7+ETM, 30 metre Resolution)

Conclusion

The study area is located in between Ngawun and Thetkethaung rivers and Andaman sea in the south. It endowed saline water resources, favor salt farming, fishing, and shrimp farming in this area. In addition agriculture is practised in this area, especially for monsoon paddy; an embankment is constructed to prevent saline water in some village tracts. In the study area four types of primary economic activities are found. Among them agriculture is the dominant activity, especially monsoon paddy. However, paddy production and varieties vary depending on salt water intrusion. Their distribution is depending on relief and drainage of the study area.

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