

Chapter IV

Descriptions of the Study Site

This chapter present detail about the study site. At the beginning of this chapter, describe socio economic information on Sri Lanka. The end part of the chapter allocated to present specific socio economic information on Anuradhapura district.

4.1 Description of Sri Lankan socio-economic characteristics

4.1.1 Location and topography

Sri Lanka is an island lying east of the southern tip of the Indian subcontinent. It stretches between $50^{\circ} 55'$ and $90^{\circ} 50'$ of north latitude and between $79^{\circ} 42'$ and $81^{\circ} 53'$ of east longitude. The maximum north-south length of the island is 432 km and its greatest width is 224 km. the island cover a land area of 65,610 km². The highest elevation of the island is 2,524 meters. The Bay of Bengal lies to its north and east and the Arabian Sea to its west. The Gulf of Mannar and the Polk Strait (see Appendix 1) separate Sri Lanka from India.

Sri Lanka is divided into three elevation zones, Low country (LC) from 0 to 300 m above mean sea level (MSL), Mid country (MC) between 300 m- 1,000 m MSL, and UP country (UC) 1,000 m above MSL.

Also based on the rainfall the country is divided in to three major parts: dry zone (DZ) where the annual rainfall is less than 1,500 mm, intermediate zone (IZ) where the rainfall is between 1,500- 2,500 mm and wet zone (WZ) where the annual rainfall is more than 2,500 mm (Figurer 4.1).

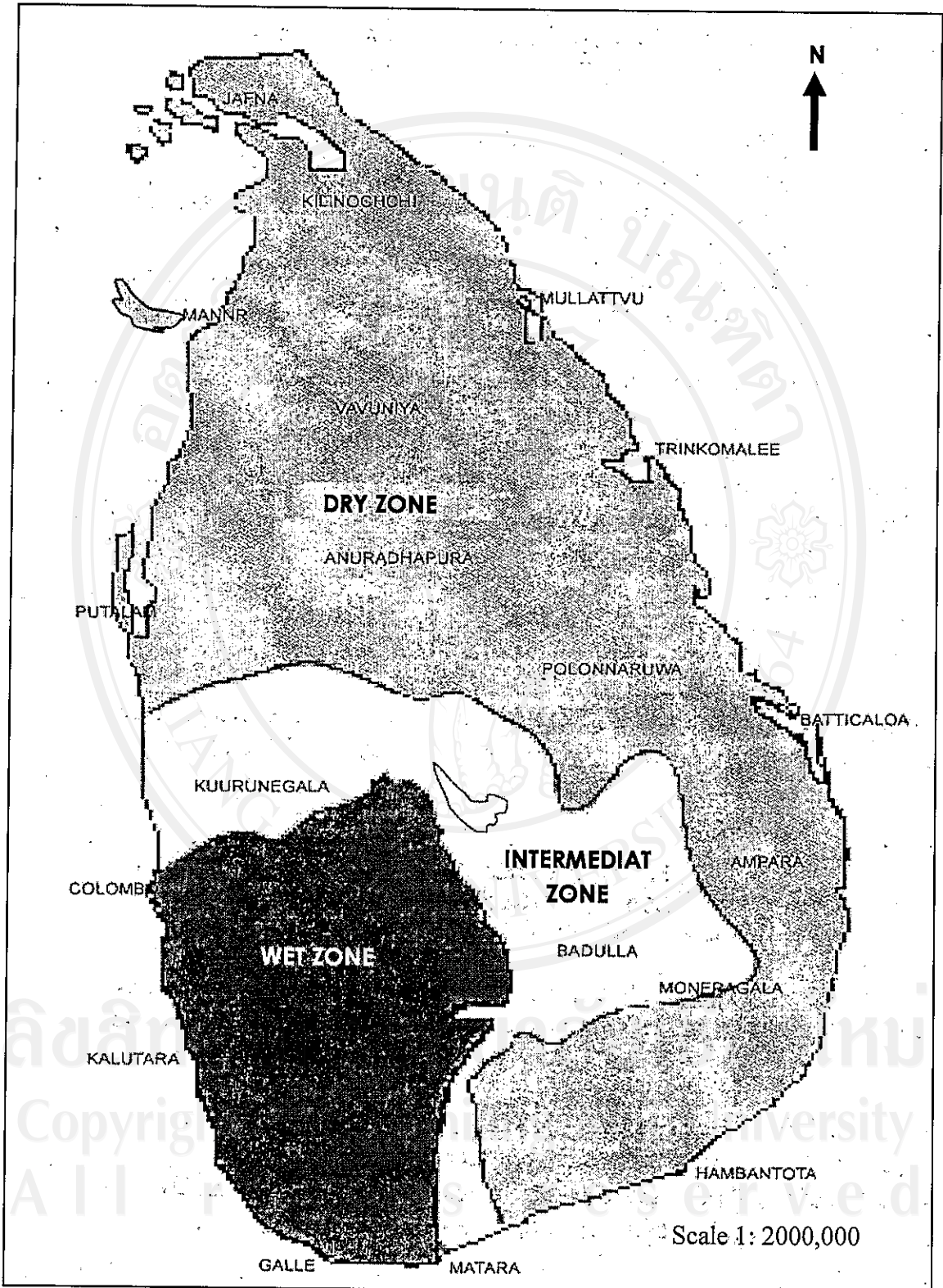


Figure 4.1 Three main climate zone in Sri Lanka

Source: DOA, 2003

By considering these two parameters (rainfall and altitude), seven major agro ecological zones have been identified: low country wet zone (LCWZ), low country dry zone (LCDZ), low country intermediate zone (LCIZ), mid country intermediate zone (MCIZ), mid country wet zone (MCWZ), up country intermediate zone (UCIZ) and up country wet zone (UCWZ). These agro ecological zones are further subdivided into 30 Agro Ecological Regions, considering the temperature, amount of rainfall receives and its distribution pattern, soil types and the landform pattern. According to that subdivision, dry zone low country has seven agro ecological regions named DL1 to DL 5 and DL2&4 and DL3&4. Intermediate low County is sub divided in to six agro ecological regions named IL1 to IL3 and IL1&2 and IL1&3 and IL2&3. Intermediate mid country have three agro ecological regions: IM1 to IM3. Intermediate up country is subdivided into three agro ecological regions named IU1 to IU3. Wet low country has four agro ecological regions: WL1 to WL4. Wet mid country is sub divided in to four subdivisions named WM1 to WM3 and WM1&2. Wet up country has three agro ecological regions named from WU1 to WU3. The map in Figure 4.2 demonstrated these agro ecological regions in Sri Lanka (DOA, 2003).

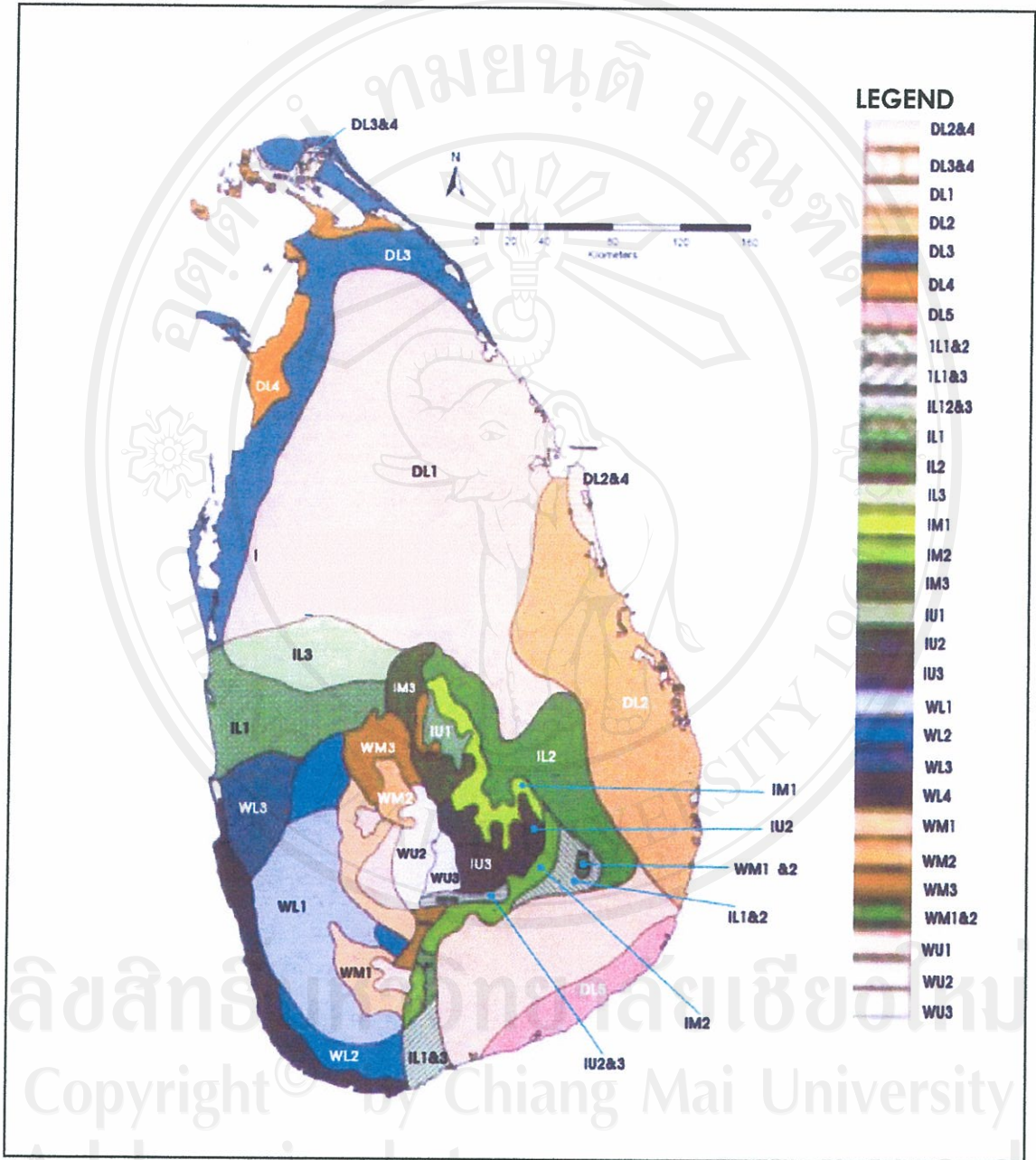


Figure 4.2 Agro ecological regions in Sri Lanka

Source: DOA, 2003

4.1.2 Climate of Sri Lanka

4.1.2.1 Rainfall

The rainfall of the country mainly governs by two monsoon systems; namely south-west and northeast. Most part of the country rainfall follows a bi-modal pattern. Main cropping season in dry zone called “Maha” (October to January) and minor cropping season in dry zone called “Yala” (February to September). Mean monthly rainfall pattern of wet zone and dry zone are displayed in Figure 4.3.

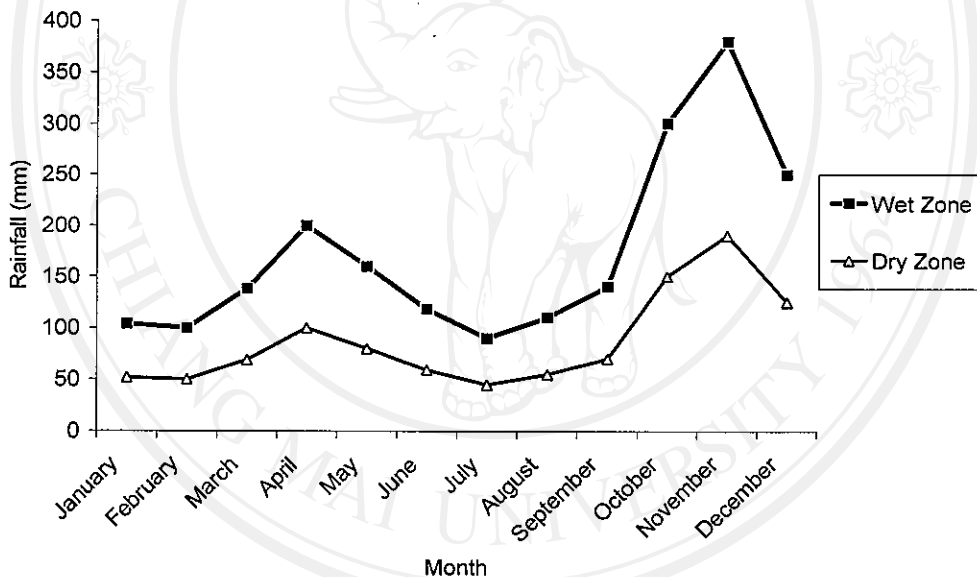


Figure 4.3 Mean monthly rainfall pattern of wet zone and dry zone (1961- 2002)

Source: DOCS, 2002

4.1.2.2 Temperature

Temperature is not significantly change through out the country. However, when elevation is increased temperature change within few degree. Country highest temperature is recoded in low country for every month. Maximum temperature for low country is 28.85 C° it is recorded in month of January. Low temperature is recoded in up country area. Minimum temperature for up country is 18.6 C° . It is recoded in month of January. Maximum temperature for mid country is 24.23 C° .

This temperature is recorded during May to June months. Thirty year temperature recode for different region of Sri Lanka are shown in Table 4.1.

Table 4.1 Thirty years average temperature throughout year for different regions in Sri Lanka

| Country region | January February | March April | May June | July August | September October | November December |
|----------------|---------------------|----------------|-------------|----------------|----------------------|----------------------|
| Low country | 28.85 | 28.84 | 28.71 | 28.25 | 27.94 | 26.60 |
| Mid country | 21.66 | 23.73 | 24.23 | 23.40 | 23.10 | 22.66 |
| UP country | 18.06 | 19.90 | 21.20 | 20.50 | 20.20 | 19.26 |

Source: Niggolseo *et al.*, 2005

4.1.3 Population

According to 2001 population survey, the country has 18,787,000 of population. Ratio between male and female are about one. Population growth rate is 1.4 per year and population density at 2001 is 299 people per Km² (Table 4.2).

Table 4.2 Detail on population in Sri Lanka year 2001

| Items | Amount |
|--------------------|------------|
| Total population | 18,797,000 |
| Male population | 9,359,000 |
| Female population | 9,438,000 |
| Population growth | 1.4 |
| Population density | 299* |

Note: * indicate unit is people per Km²

Sources: DOCS, 2005

4.1.4 Land use Pattern

The island covers a land area of 65,610 km². In this, inland water body covers 2500 km². Thirty one percent of the land area covers by forest and wildlife area, 34 percent of land covers permanent crop lands and pasture lands. At present, out of 6.5 million hectares of land in the country, only about 34 percent or 2.1 million hectares are considered arable with 19 million of country's population to feed (Table 4.3).

Table 4.3 Land use pattern of Sri Lanka year 1999

| Land use pattern | Land extent (Km ²) | Land extent as a % |
|------------------------------------|--------------------------------|--------------------|
| Arable | 2,1745 | 34.780 |
| Forest and wildlife protected area | 1,9753 | 31.420 |
| Permanent crop and grassland | 2,1224 | 33.790 |
| Other purpose | 378 | 0.006 |
| Total | 6,3110 | 100.000 |

Source: FAO, 1999

Greater parts of the lands are under dry zone, it is 63 percent from the total land cover. 23 percent and 14 percent are under Wet zone and Intermediate zone in respectively (see Table 4.4).

Table 4.4 Land extent under different climatic zone in Sri Lanka

| Climatic Zone | Land extent (Km ²) | Land extent as a % |
|-------------------|--------------------------------|--------------------|
| Dry Zone | 39,917 | 63.25 |
| Wet zone | 14,344 | 22.73 |
| Intermediate Zone | 8,849 | 14.02 |
| Total | 63,110 | 100.00 |

Source: DOCS, 2001

Only 34 percent lands from total cultivated area under irrigation. Rest of the part use rainfed farming. Majority of the irrigated land are in dry zone and intermediate zone. There are two main sources to supply irrigation water, namely major irrigation tanks, and minor irrigation tanks. Under these two types of irrigation sources farmers cultivate paddy in low land. Farmers, who lived under major irrigation tanks, enjoyed double cropping in the year. Nevertheless, most of the farmers who lived in minor irrigation area, cultivate only one crop.

During last two decades, ground water utilization has been popularized among dry zone farmers. At the present, ground water is one of important water sources for dry zone agriculture. At the present, thousand of shallow wells are used to cultivate upland of dry zone area. Before introducing ground water most of the dry zone upland cultivate only rainy season and some year they did not cultivation any crops due to water limitation. Nevertheless, after introducing ground water utilization using shallow wells, more than 6,000 hectors of dry zone area cultivate though out the year (Karunaratne, 2002).

4.1.5 Agriculture

4.1.5.1 Contribution of agriculture for Sri Lankan economy

Total population of the island is 18.7 million in mid 2001 and 72 percent of population lives in rural area. About 22 percent and six percent live in urban and estate sector respectively. During last few decades the share of agriculture sector in term of contribution of GDP (Gross domestic product) and employment declined, while those industry and services rose. In 2004 the industry sector was responsible for over one fourth of the GDP (26%) while more than half of GDP (56%) was generated by the services sector, agriculture sector contributes only about one fifth (18 %) of the GDP (Figure 4.4).

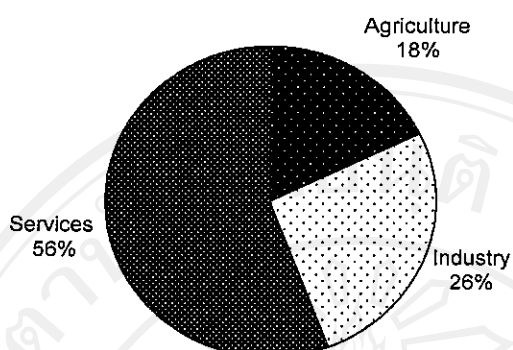


Figure 4.4 Composition of Sri Lankan GDP based on economic sectors in 2004.
Source: CBSL, 2005

In year 2004, service sector generate 45 percent of the total employment in the country. Agriculture sector provides about 31 percent of total employment. Industrial sector provide only 25 percent of the total employment in the country economy (Figure 4.5).

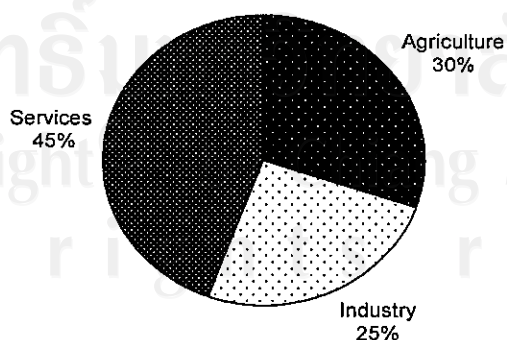


Figure 4.5 Composition of employment based on economic sectors in Sri Lank, 2004
Source: CBSL, 2005

Rice contributes 20 percent of the agriculture production and provide livelihood for a significant proportion of the population in the country who lived in rural area. Tea, coconut and rubber plantation contribute to agriculture in 17 percent, 13 percent, and four percent respectively. Other agriculture crops contribute 24 percent of total production (fruits, vegetables etc). While fisheries contribute 13 percent, livestock contribute nine percent of the total production (Figure 4.6).

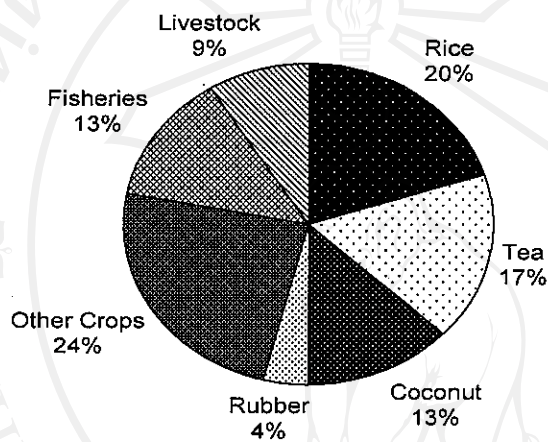


Figure 4.6 Value shares of major categories of Sri Lankan agriculture, 2004

Source: CBSL, 2005

4.1.5.2 Major crops land extent

According to statistic year 2005, paddy covers highest land area in the country. It is about 936,000 hectares. Second top land extent is covered by coconut cultivation. It is about 337,000 hectares. Tea and other field crops are in third and fourth place. It is about 222,000 hectares and 137,870 hectares respectively. Rubber is grown only 115,000 hectares in the island (Table 4.5).

Table 4.5 Cultivation land extent of some major crops in Sri Lanka- 2005

| Crops | Land extent (ha) |
|--------------------|--------------------------|
| Paddy* | 937,000 |
| Coconut | 394,000 |
| Tea | 222,000 |
| Other field crops* | 137,870 |
| Rubber | 115,000 |

Note: * Indicate this extend for both Maha and Yala seasons

Source: DOCS,2005

4.1.5.3 Major fruit cultivation land extent

Banana is major fruit crops in Sri Lanka. In year 2005, banana is grown in 55,997 hectares in the country. Second highest fruit crop mango. It is grown about 14,231 hectares in year 2005. Cropping area of pineapple and papaya are more or less similar, it is 4,504 hectares and 4,474 hectares respectively. Rabbutan is cultivated 3,240 hectares in the island (Table 4.6).

Table 4.6 Major fruit cultivation land extent in Sri Lanka

| Crop | Land extent (ha) |
|-------------|-------------------------|
| Banana | 55,997 |
| Mango | 14,231 |
| Pineapple | 4,504 |
| Papaya | 4,504 |
| Rabbutan | 3,240 |

Source: MAD,2005

4.2 Description of Anuradhapura district

4.2.1 Topography of the dry zone area

Sri Lanka consists in 25 districts. From that 14 district under dry zone, namely Anuradhapura, Polonnaruwa, Puttalam, Hambanthota, Monaragala, Ampara, Batticalo, Trincomalee, Vaunia, Mannar, Mulathu, Killinochci and Jafana district. These all district are situated in low country.

The study was conducted in Anuradhapura district in low country dry zone in Sri Lanka. It is situated in north central province. North central province consist two districts Anuradhapura and Polonnaruwa. Anuradhapura district is largest district in the island (Figure 4.7).

4.2.2 Soil and land form pattern

This area comes under DL₁ Agro Ecological Region (see Figure 4.2). The main great soil groups are Radish Brown Earth and (REB) Low Humic Glay (LHG). Drainage classes well drained to poorly drained. Slope range from 0-2 percent. Rice is mainly grown in moderately to poorly drained soils. During Maha season, all the rice lands are used for rice, but during Yala season imperfectly to poorly drained soils only can used for paddy cultivation under rainfed condition and moderately drain RBE soil needs fair amount of water as supplementary irrigation for a good rice crop. Therefore, these moderately drained lands are suited for other field crops during Yala season. Under good management conditions, 6-8 tons/ha paddy yield can be expected during both Maha and Yala seasons. The landform pattern of this region is mainly undulating. Rice growing LHG soils are confined to the valley bottoms of the undulating terrain.

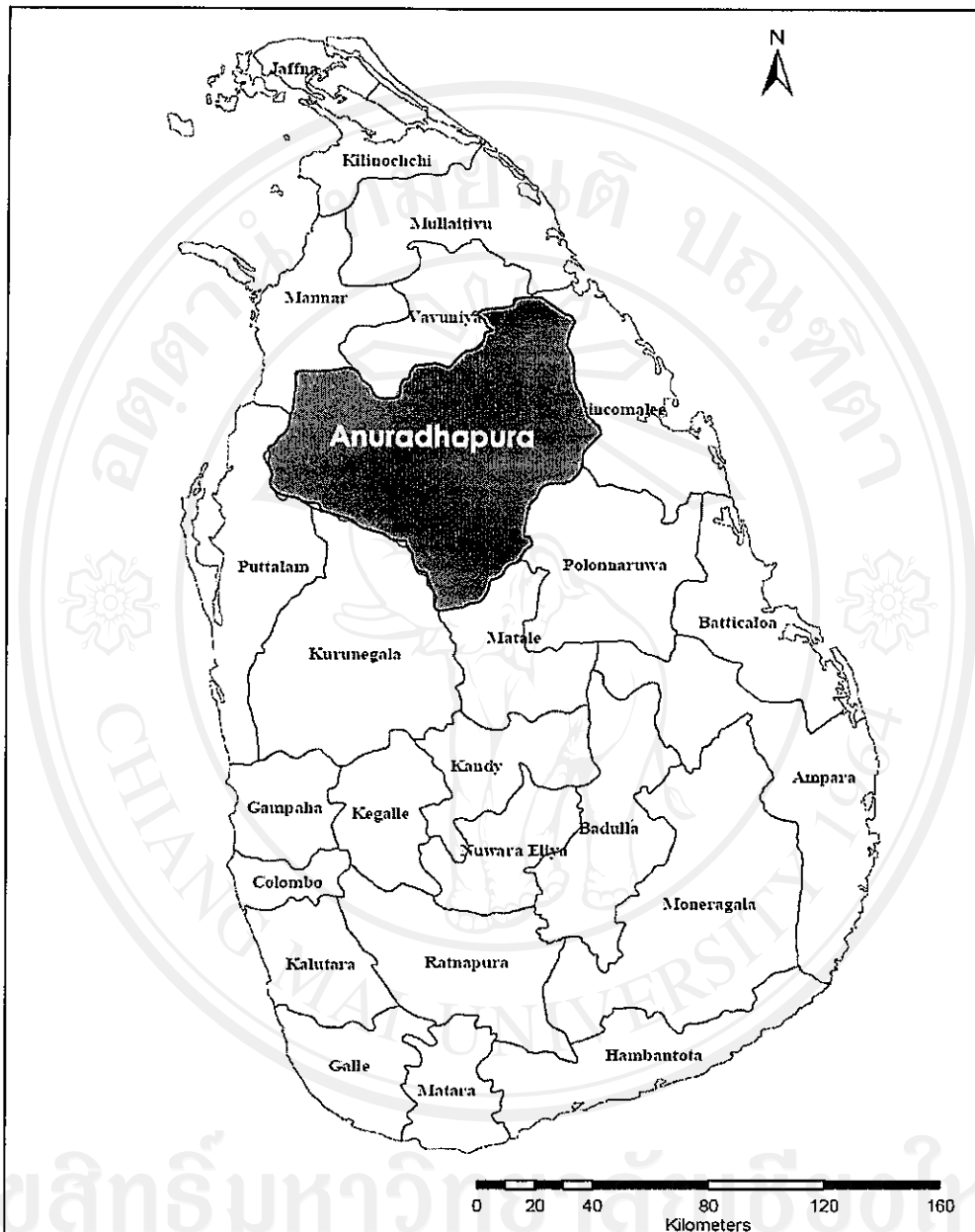


Figure 4.7 Geographical position of Anuradhapura district

Sources: DOCS, 2002

4.2.3 Rainfall

Main rain season is Maha season for this area. Maximum rainfall is gained during October to December and minimum rainfall is recorded during May to August in the district. Total average annual rainfall of the district is 1,045 mm (Figure 4.8).

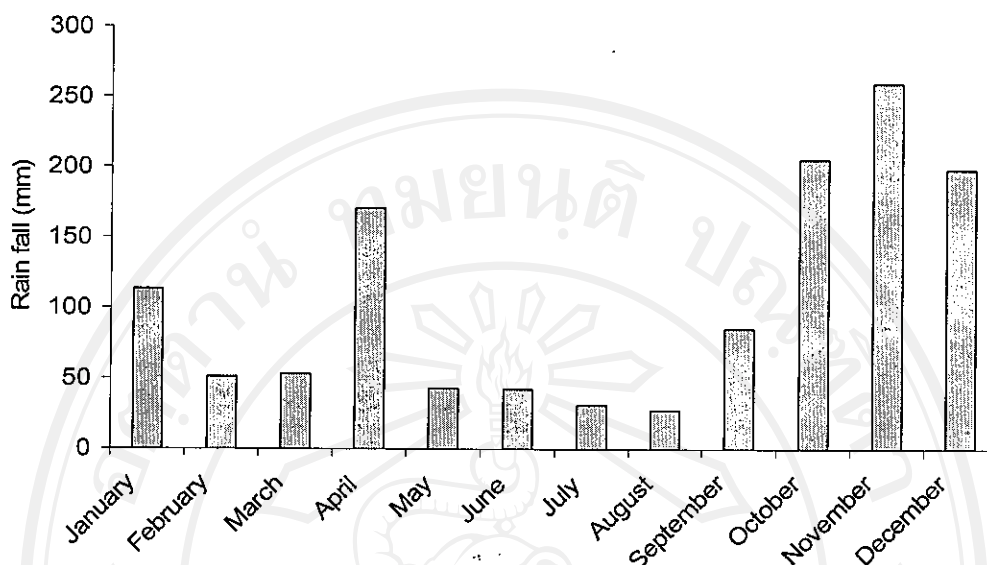


Figure 4.8 Monthly averages Rain fall 2002 to 2004 in Anuradhapura district

Source: DOCS, 2005

4.2.4 Land use

Total land area in Anuradhapura district is about 7,034 square kilometers. From this total agricultural land are approximately 172,200 hectares. The district comprises 40 agrarian divisions. Land availability for paddy cultivation (low land) is about 56 percent of total agricultural land and for other crop is about 44 percent in the district. While paddy is cultivated 96,982 hectares, 75,226 hectares are allocated to other crops (Table 4.7).

Table 4.7 Agricultural lands in Anuradhapura district

| Land use type | Land extent (ha) | Percentage |
|-------------------------|------------------|------------|
| Paddy cultivation | 96,980 | 56.32 |
| Land for other crops | 75,220 | 43.68 |
| Total agricultural land | 172,200 | 100.00 |

Sources: DOAS, 2005

4.2.5 Agriculture and cropping pattern

Paddy is the major crop in this area. There are main two types of irrigation systems for paddy cultivation, major irrigation systems and minor irrigation systems. If a reservoir commanding area is, more than 80 hectares, called major irrigation system, if it is less than 80 hectares, called minor irrigation system. Apart from those two irrigation systems, farmers cultivate paddy, using rainwater in “Maha” season. Farmers who lived in major irrigation area cultivate paddy in both “Maha” and “Yala” seasons. Most of the paddy lands in minor irrigation system in “Yala” season are not growing paddy due to limitation of water. However, these lands are cultivated crops that need less water than rice, like Chilies, Big onion, Maize, and gingerly.

Under major irrigation scheme, 50,920 hectares of paddy is grown. Usually these lands are utilized through out the year. Using minor irrigation tanks 40,028 hectares of paddy is cultivated. Some parts of the lands under minor irrigation tanks are not cultivated in Yala season. It is depend on the amount of rainfall, which gained during previous wet season. How ever, 6,032 hectares of lands are grown paddy in wet season only using rainwater (Table 4.8)

Table 4.8 Paddy land extent under different irrigation methods in Anuradhapura district

| Irrigation method | Land extent (ha) |
|--------------------------|-------------------------|
| Major irrigation area | 50,920 |
| Minor irrigation area | 40,028 |
| Rain fed area | 6,032 |
| Total paddy land | 96,980 |

Sources: DOAS, 2005

At major rain season most of the farmers utilize their upland field to cultivate other field crops. They cultivate some vegetable, pulses, maize, and chilies using rainwater. At minor rain season some low land are used to cultivate other crops (Table 4.9).

Table 4.9 Other crops land extent in Anuradhapur district, year 2003 /2004

| Crops | Land extent (ha) | |
|-------------------------|------------------|---------------|
| | 2003/2004 Maha | 2004 Yala |
| Kurakan (finger millet) | 79 | 1,721 |
| Maize | 270 | 5,480 |
| Sorghum | 6 | 35 |
| Green gram | 91 | 542 |
| Cowpea | 161 | 1,017 |
| Chili | 528 | 4,180 |
| Sesame | 1,651 | 429 |
| Ground nut | 41 | 405 |
| Red anion | 23 | 49 |
| Big anion | 723 | 60 |
| Manioc | 309 | 709 |
| Sweet potato | 72 | 200 |
| Total | 3,882 | 14,827 |

Source: DOCS, 2005

4.2.6 Fruit cultivation

Mango is common fruit in the district. Most of the people grow few mango plants in their home garden. Nevertheless, commercial level mango plantations are very hard to see in this area. Orange, lime, pineapple, passion fruit, banana, and papaya are other fruit crops, which are grown in the district. From these, banana and papaya have been grown as commercial level fruit crops using irrigation. Table 4.10 is given fruit cultivation extend in the district.

Table 4.10 Fruit cultivation extent in Anuradhapur district, 2005

| Crop | Land extend (ha) |
|---------------|-------------------------|
| Mango | 1,250 |
| Banana | 3,000 |
| Papaya | 470 |
| Pineapple | 19 |
| Passion fruit | 16 |

Source: MAD.2005

4.2.7 Ground water utilization

Shallow wells (Agro wells) are highly popularized among upland farmers in the district to harvest ground water during 20 years. At the introduction periods of agro wells to this area, some subsidies were provided to farmers for digging and construct the wells in their own lands by Agricultural Development Authority. After few years, other farmers experienced from their neighbors on benefits of agro wells, and then they construct agro wells in their own land bearing the cost. Now, Agro wells are mushrooming in the area. Thousands of agro wells were constructed through out the district during past years. Currently, more than 10,000 agro wells are used (see Table 4.11) to extract ground water for agricultural purpose.

Table 4.11 Number of shallow wells (agro wells) in agrarian divisions of Anuradhapur district

| Agrarian Division | Number of wells | Agrarian Division | Number of wells |
|--------------------------|------------------------|--------------------------|------------------------|
| Srawasthipura | 168 | Koonwewa | 209 |
| Anuradahpura | 305 | Parangiyawadi | 63 |
| Elayapathuwa | 168 | Thirappane | 836 |
| Nochiyagama | 280 | Muriyakadawal | 126 |
| Ranorawa | 78 | Maradankadaw | 89 |
| Gambirigaswewa | 275 | Mihinthale | 459 |
| Pemaduwa | 157 | Katiyawa | 135 |
| Rabewa | 306 | Negampaha | 310 |
| Punewa | 418 | Thalawa | 258 |
| Ethakada | 300 | Thabuthegama | 266 |
| Medawachiya | 230 | Rajanganaya | 192 |
| Kalanchiya | 248 | Eppawala | 54 |
| Kebithigollewa | 187 | Epologama | 583 |
| Rathmalgahawewa | 106 | Madatugama | 310 |
| Galenbidunuwewa | 860 | Adiyagala | 430 |
| Kahatagasdigiya | 205 | Palagala | 282 |
| Kapugollewa | 111 | Kekirawa | 317 |
| Yakalla | 182 | Palugaswewa | 160 |
| Horoupathana | 332 | Siwalakulama | 42 |
| Padawi- Parakramapura | 124 | Thanthirimal | 180 |
| | | Total | 10,338 |

Sources: DOAS, 2005

4.2.8 Banana cultivation using ground water

Upland farmers cultivate banana, using ground water. Majority of the farmers practice surface irrigation to deliver water from wells to banana plots. However, some

farmers use drip irrigation to cultivate banana with ground water. Both irrigation method use pumps to lift and convey the water to cultivated plots.

4.2.8.1 Banana cultivation with surface irrigation

Except irrigation activities, most of the agronomic practices in banana cultivation with surface irrigation and banana cultivation with drip irrigation are similar. Farmers invest money for ducked wells and pumps.

Land preparation and Planting

Before stabilize the crop, two times plowing have to done. After plowing field is divided to 10 m x 10 m basin. This basin will helps to proper distribution of irrigation water. When they construct basin in the field, also construct ditch to improve drainage condition in their field, because at the main rain season extra water will affect the drainage of the land. After preparing basing, planting hole are excavated with 3 m x 3 m space. The size of the hole is 60 cm x 60 cm x 60 cm. After preparing the planting hole, selected healthy banana suckers are planted in these holes.

Fertilizer application

When planting is done, basal fertilizer is not applying. Two months after planting fertilizer is applied. Surface irrigated banana farmers use fertilizer recommendation that was given by department of agriculture for dry zone area. According to recommendation, three times per year fertilizer should be applied. But some farmer use less frequency and some use more frequency. Three type of fertilizer are used to supply plant nutrients: urea, MOP, and TSP. In surface irrigated banana farmers use manual method to apply these three types of fertilizers. Detail of the fertilizer application is in Chapter V.

Weeding

Weeding is one of main agronomic practice in banana cultivation. Farmers use manual method or herbicide to control weed in their banana field. When they are doing annual method to control weed, some farmer use slashed knife to remove upper part of the weeds and some farmer use hoe to scrape weeds or uprooting weed.

Field sanitation

Other main practice is keeping field sanitation of banana field. Reason of keeping sanitation of the field, is preventing banana weevil attack and increase quality of the bunch. For that, farmers are doing main two things. One is maintain number of plants in the bush and second one is remove dried leaf. For maintain of number of plant in the bush, from planting until sucker become 4 months, every new suckers from planted sucker are removed. After 4 months, until flowering one extra sucker is allowed to growing. After flowering another sucker is kept. It does mean, well managed banana bush should have one plant with banana bunch and other two extra plants. Most of the surface irrigation farmers practice this method to manage the bush. However, some farmers do not much care about number of plant in the bush and some time they keep one or two extra plants apart from above mentioned numbers.

Normally, they remove dried leaf and other parts as their daily activity. This will help to reduce banana weevil attack.

Support supply for banana plants

Banana root system is very shallow. Therefore, banana plant has trend to falling down due to wind. Most of the farmer use props to prevent falling down of banana plant. For that, they use some wood as prop. Most of the farmers use their own labor to supply props.

Harvesting

With good management and good planting material, 11 months to 13 months after planting, farmers can harvest their first harvesting. Harvesting is done by manually. Most of the farmers use their own labor to harvesting.

Normally, farmers manage their cultivation seven years to eight years period. After that, they remove old banana and start new plantation.

Irrigation

When they supply the water, fill the entire basin by water and allow adsorbing. After filling one basin, they supply water to other basin like first one and water is supplied one by one.

Most of the farmers use flexible plastic pipes to convey water from pumps to the basin, but few use earth cannels. At the water supplying time the farmers totally engage with irrigation activities, because farmer should observe the water filling of the banana plots and water flow should change to new plot after filling one plot.

The farmers, who cultivate banana with surface irrigation, maintain 7 days as their minimum irrigation interval. However, most of the farmers do not pump water during rain season (October to January). When consider peak drought period (June to September) 44 percent of farmers in surface irrigated banana cultivation, maintain 15 days as their irrigation interval. Thirty-five percent farmers use 11 days as their irrigation interval. Thirteen percent of the farmers pump water after 20 days and only 7 percent farmers maintain one week as their irrigation interval (Table 4.12).

Maximum irrigation duration in surface irrigated land reported as 24 hours per hectare and minimum is 10 hours per hectare. Average irrigation duration in surface irrigated banana is 16 hours per hectare.

Table 4.12 Deferent irrigation interval at peak drought period in surface irrigated banana

| Irrigation interval(Days) | Number of farmers | Farmer Percentage |
|-----------------------------------|--------------------------|--------------------------|
| 7 | 4 | 7.40 |
| 11 | 19 | 35.18 |
| 15 | 24 | 44.44 |
| 20 | 7 | 12.98 |
| Total | 54 | 100.00 |

Sources: Computed from field survey during 2006

4.2.8.2 Banana cultivation with drip irrigation

Most of the agronomic practices in the drip irrigated banana cultivation are similar like surface irrigated banana but apart from investing money on well and pump farmers invest money for drip irrigation equipments. It is about 180,000 rupees per hectare.

Land preparation and planting

Land preparation is done it like surface irrigated banana cultivation. Plant space and size of the planting hole is same like surface irrigated banana cultivation. However, they do not make basin on banana field. Banana suckers are cultivated along with the drip irrigation lines. Usually, two to four drippers are used for one banana bush. Drip irrigated banana farmers also concern about drainage stature of the field, they construct drainage ditch same like surface irrigation banana farmers.

Fertilizer application

Drip irrigated banana farmers use same fertilizer to provide nutrient for banana plants. At the planting time, they do not apply fertilizer. After two month, they start to supply fertilizer. Difference between surface irrigated cultivation and drip-irrigated cultivation is method of the fertilizer application. Some drip irrigated farmer use fertigation to supply fertilizer to crop. They use urea and MOP to doing fertigation. However, TSP is applied by manually. Drip irrigated farmers also practice recommendation, which was given by department of agriculture. Nevertheless, they use more frequency than recommended frequency. But this study realized they use less fertilizer than surface irrigated banana farmers (see Chapter V).

Weeding

Drip irrigated banana farmers practice weed control like surface irrigated banana farmers. However, their field has less vulnerability to weed than surface irrigated banana field. Weed infestation of drip irrigated lands are lower than surface irrigated banana lands (see Chapter V).

Field sanitation

Activities under field sanitation are same like surface irrigated banana cultivation. However, drip irrigated banana farmers pay more attention to control number of plants in the bush, because that they need to maintain plant row correctly.

Support supply for banana plants

Drip irrigated banana farmers supply prop to prevent falling down of banana plant just like surface irrigated banana cultivation.

Harvesting

Drip irrigated banana farmers's use their own labor to harvesting of banana same like surface irrigated banana farmers.

Irrigation

Irrigation activity under drip irrigation, are different with irrigation activity under surface irrigated banana cultivation. After starting the pump automatically, water supply to the field. Most of the farmers irrigate one hour for one day. After irrigation only wet adjacent area of the banana bush. Their minimum irrigation interval is one day and maximum irrigation interval is three days. Some drip irrigated lands are not irrigated during month of October to January.

When consider peak drought, 85.5 percent of farmers maintain their irrigation interval at one day and 10.5 percent of the farmers use two days as their irrigation interval. Only 4 percent of the farmers practice three days as their irrigation interval (Table4.13).

Maximum irrigation duration in drip irrigated banana is 15 hours per hectare and minimum is 5 hours per hectare. Average irrigation duration for drip irrigated banana is 6.75 hours per hectare.

Table 4.13 Deferent irrigation interval at peak drought period in drip irrigated banana

| Irrigation interval (Days) | Number of farmers | Farmer Percentage |
|------------------------------------|--------------------------|--------------------------|
| 1 | 41 | 85.41 |
| 2 | 5 | 10.41 |
| 3 | 2 | 4.18 |
| Total | 48 | 100.00 |

Sources: Computed from field survey during 2006

4.2.8.3 Banana marketing

Including Anuradapura municipal area, there are several sub cities in the district. Anuradapura urban area and most of the sub cities conduct weekly markets. These markets provide day today home needs for people and market place for local produce agricultural commodities. Banana farmers use these nearest weekly market to sell their products and some sale to middlemen. They collect farm products and transport market place. Middlemen use tractors and trucks to transport banana. Some farmers do not sale their banana to middlemen but they use middlemen vehicles to transport their products in to market place. When farmers directly transport their products, they use bicycle and motor bicycle.

There are two wholesale markets that accessible for district agricultural products. One market is situated in side the district, place named Thabuthegama. Other one is situated out side the district but adjacent the southern boundary of the district, place called Dabulla. Most of the middlemen bring their collection in to these two places.

Among 102 surveyed banana farmers, three marketing methods were identified; selling banana in to nearest weekly market, selling banana at the fields or transport to their banana to wholesale markets and sell.

Largest part of the farmers' use weekly nearest markets to sell their banana. It is 57 percent of the total sample. Twenty seven percent grower's sale their production to middlemen. Sixteen percent of farmers bring their products to Dabulla or Thabuthegama wholesale markets (Figure 4.9).

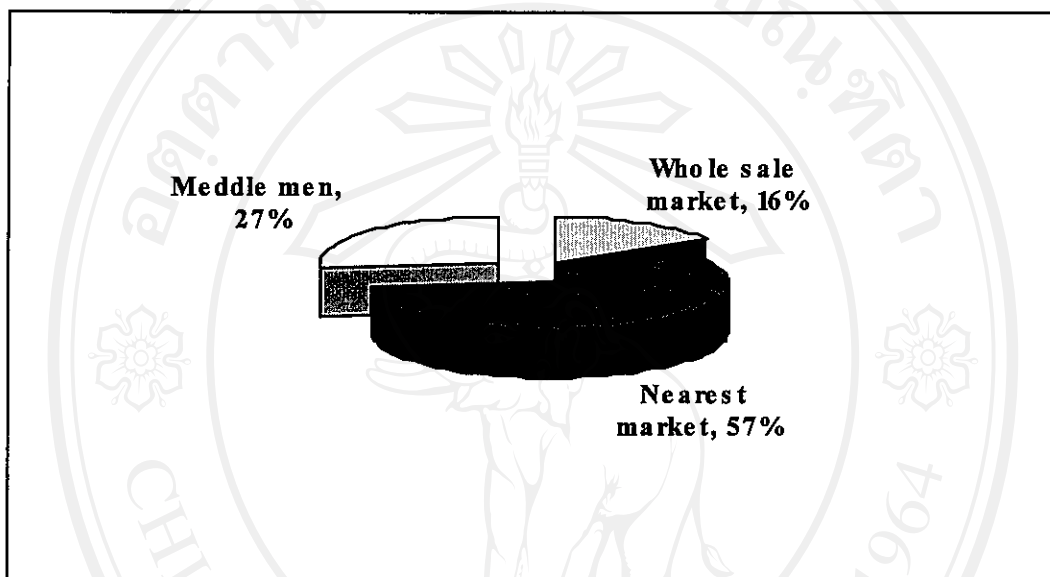


Figure 4.9 Banana marketing methods in Anuradapura district

Sources: Computed from field survey during 2006

The farmers who sale their products to nearest weekly market, they use two transport methods. One is farmers use their own vehicles, other use middlemen's vehicles. Ninety percent use their owned vehicles to convey banana to market place and other use middlemen vehicles.

When they use own vehicles to transport banana to market place 40 percent of farmers use bicycle and 55 percent use motor bicycle. Five percent of growers use other vehicles like truck and tractors (Figure 4.10).

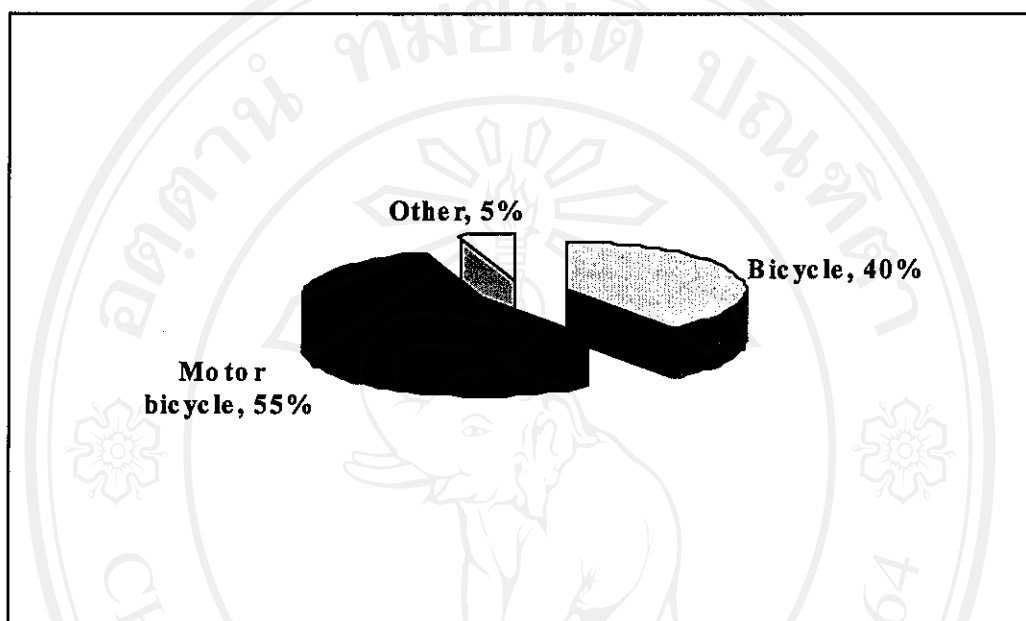


Figure 4.10 Types of own vehicles for banana transport in Anuradapura district

Sources: Computed from field survey during 2006

When concern about banana grower, those who like to transport banana to wholesale markets (Dabulla or Thabuthegama), they use three main methods; their own vehicles, haired vehicles and middlemen vehicles. When transport their collection to wholesale markets, middlemen provide their vehicle facility to small scale farmers. They keep transport margin from that production. Most of the small scale farmers like this method, because their production amount is not sufficient for truck load and not worth to hire vehicle. Majority of the banana farmers use this method to transport banana in to wholesale markets. 74 percent use middlemen vehicles 16 percent farmers use their owned vehicles and others use haired vehicles (Figure 4.11).

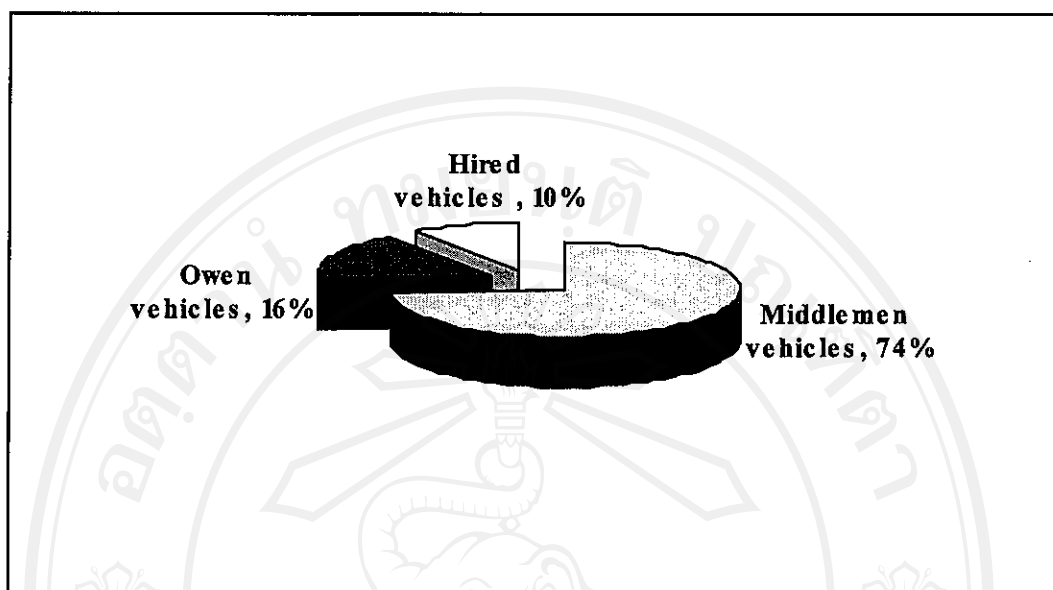


Figure 4.11 Banana transport methods to wholesale markets Anuradhapura district

Sources: Computed from field survey during 2006

4.2.9 Socio-economic conditions

4.2.9.1 Population

According to 2001, statistic total population of the district is 746,446 and its growth rate is 1.2 during year 2001. Population density in the district is 112 head per square kilometer. When comparing the country average, population density in the district shows somewhat low figures. This statistics are in Table 4.14.

Table 4.14 Demography characters in Anuradhapura district

| | Total population | Male | Female | Growth rate | Population density(head/km²) |
|-------------|-------------------------|-------------|---------------|--------------------|--|
| Anuradapura | 746,446 | 380,500 | 365,946 | 1.20 | 112 |
| Sri Lanka | 18,797,000 | 9,359,000 | 9,438,000 | 1.40 | 299 |

Sources: DOCS, 2005

Anuradhapura district is one of major agricultural district in the island. According to 2005 statistic, 181,342 of farm families are living throughout the district. Main nationality group in this area are Singhala, Thamil, and Muslim. Number of Singhala farm family is 166,358 (91%). Tamil and Muslim are 1845 (1%) and 12,296 (7%) respectively and other nationality is less than one percent (0.48%) (Figure 4.12).

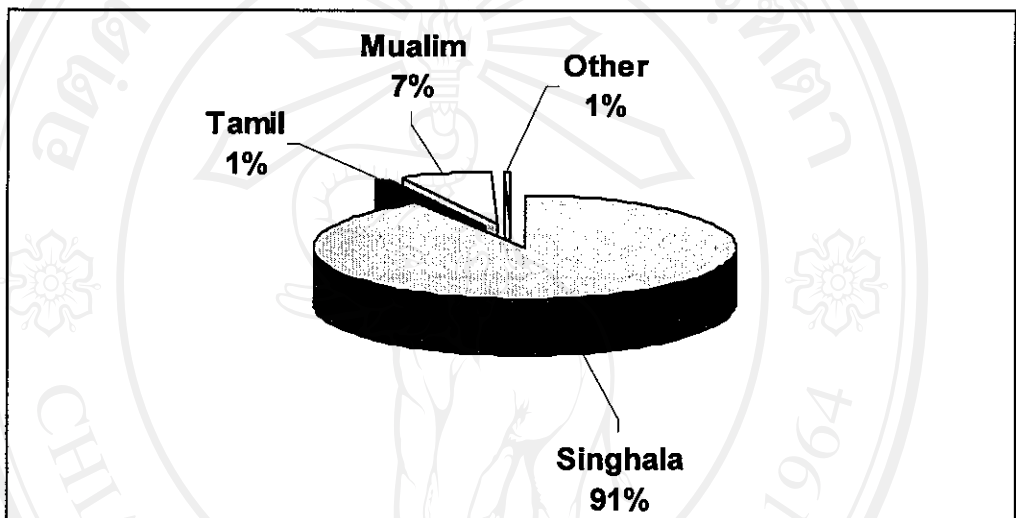


Figure 4.12 Percentages of farm families according to nationality in Anuradhapur district in 2005

Source: DOAS, 2005

4.5.9.2 Economic condition

Greater parts of the people in the district are association with agricultural activities. Mean monthly household income (agricultural and non-agricultural) is Rs. 10,496 and mean monthly per capita income is Rs. 2,602 in the district. In the meantime, monthly household expenditure of the area is Rs.10, 309 (Table 4.15).

Table 4.15 Some economic indicators of Anuradapura district in household level year 2001

| Economic Indicator | Value (Rs.) |
|--------------------------------|-------------|
| Mean monthly household income | 10,496 |
| Monthly per capita income | 2,602 |
| Monthly house hold expenditure | 10,309 |

Sources: DOCS, 2004

North central province of Sri Lanka consists of two districts: Anuradhapura and polonnaruwa. Anuradhapura district cover large part of the north central province. During past years, agriculture contribution has been observed increasing trend for Gross domestic product in the north central province (PGDP). In year 1998, it was 1,017 billion Rupees and in year 2001, it was 1,760 billion Rs. Greater part of the agriculture contribution, comes from paddy cultivation, and other field crops with fruits jointly add second large figure (See Figure 4.13)

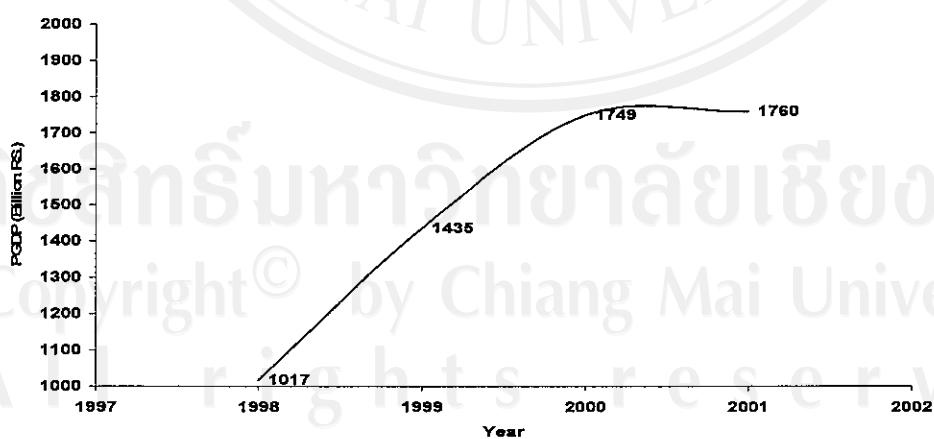


Figure 4.13 Contribution of agriculture for Province gross domestic products in north central province

Sources: NCPFC, 2001

While total fruits show, gradually decreasing trend on contribution of agricultural, banana has been demonstrated increasing pattern during past years. When the role of mango was demonstrating decreasing trend, other fruits are remaining at more or less steady position during year 1998 to 2001 (see Figure 4.14).

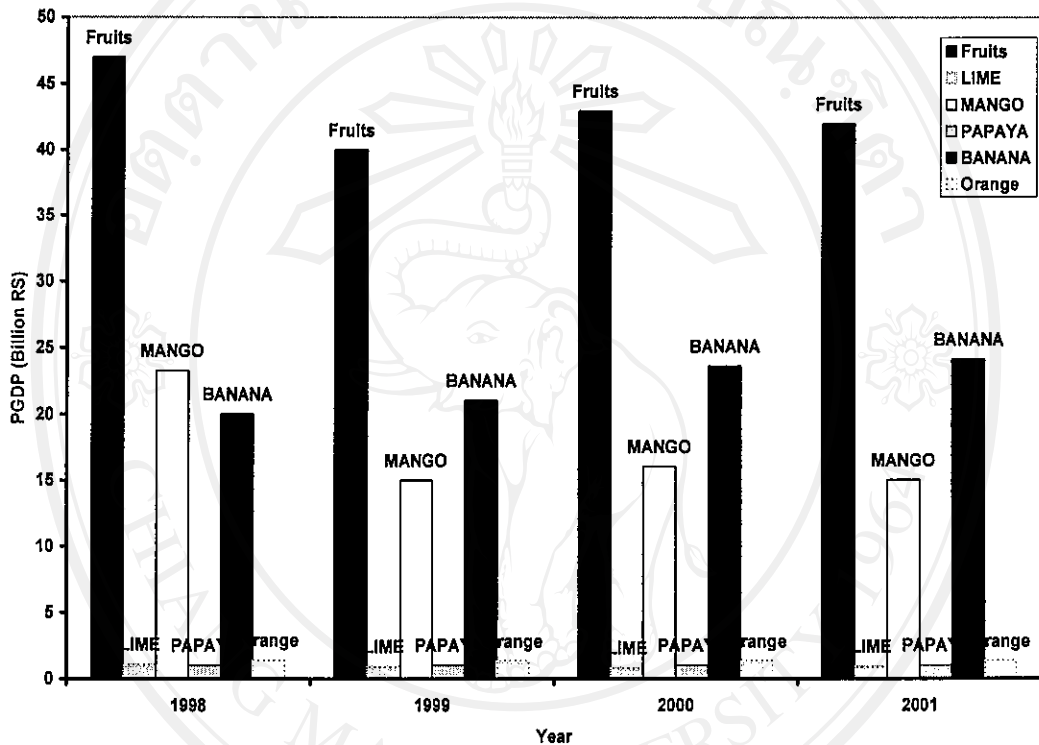


Figure 4.14 Contribution of fruit crops for Province gross domestic products in north central province during 1998 - 2001

Sources: NCPFC, 2001

4.2.9.3 Social organization and social activities

Social organization play important role in the district. Specially farmers organizations involve maintain and manage water in the lowland fields. Same time farmer organizations engage to enhance condition of upland area. Apart from farmers organization there are some prominent social organization in the district. Funeral welfare society, “Samurdi” society (a government poverty alleviation program), Temple council (“Dayaka sabawa” – Village organization which take care village

temple), “Sanasa” bank (micro credit program), and some NGO are the major social organization in the area. Survey sample are spread out 79 villages. From this 97 percent villages have funeral welfare societies. Farmers in 91 percent of villages are involved with farmer organization. Seventy one percent of villages have Samurdi societies. People in 40 percent of village are engage with temple council. Sanasa movement activates only 21 percent of villages. Ten percent of villages’ link with other social organization witch organized by nongovernmental organizations (NGO) (see Table 4.16).

Table 4.16 Prominent social organization in Anuradhapura district

| Name of the Social organization | Number of village | Percentage (%) |
|--|--------------------------|-----------------------|
| Funeral welfare | 77 | 97.00 |
| Farmer organization | 72 | 91.00 |
| “Samurdi” Society | 56 | 71.00 |
| “Dayaka sabawa” | 32 | 40.00 |
| “Sanasa” movement | 17 | 21.00 |
| Other | 8 | 10.00 |

Sources: Computed from field survey during 2006