

Economic Conditions for Development of
Paddy Farm Sector in Sri Lanka

(スリランカにおける稲作経営発展の経済的要因に関する研究)

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Scope and Objectives

In recent years there have been several noteworthy surveys and research studies relating to various aspects of paddy cultivation in Sri Lanka. Nevertheless, there is a great deal of work that remains to be done on the social aspects of paddy cultivation in different parts of the island, therefore it is essential to initiate a worthy research regarding the paddy production in the country.

The main objective of this study is to identify the factors that effected the widening income disparities between small rice farmers and large rice farmers in Sri Lanka through the survey data, with a view of providing a more systematic understanding of rice farmers, income distribution and modern agricultural development.

The reason for undertaking this study, is that; in spite of its strong performances in the last four decades the rice sector faces difficult challenges in the coming future. The decreasing level of self sufficiency of rice since 1993, increasing the volume of importation of cheap rice, decreasing the rice producers' real rice price and continuous increasing the input cost are really affecting the rice producers' production environment and those factors ultimately widen the income inequality gap between small rice farmers and large rice farmers.

I have focussed only on paddy cultivation, because rice is the staple food of the nation and evidently paddy cultivation has taken prominence over all other food crops from the ancient times, and also more than 10% of the country's people depend on paddy cultivation. Further the area planted with paddy

(annually) far exceeds the area planted with other field crops, collectively. In aggregate terms, paddy is the largest employer of seasonal labor in domestic agricultural sector in Sri Lanka, as well it uses considerably less labor per unit of land than the other leading commercial crops. In addition it is estimated that self sufficiency level of paddy production in Sri Lanka, absorb the 55% of the rural labor force, it effects to reduce the country's unemployment into 6% (at Present 14%).

Methods of the Study

This study was done mainly collecting the the data through a direct survey in the Anuradapura district of Eppawela area in 1997 and 1998, and gathering secondary data sources.

For the purpose of identifying the rice farmers' production environment and income distribution, two sets of data were collected in Anuradapura district, Eppawela area. The first round of the survey was conducted in 1997 and was called the **extensive survey**, which provided a broad picture of the production environment. The second round of the survey was conducted in 1998 and was called the **intensive survey**, covering 75 out of the 82 farmers who were surveyed in 1997. A complete census was conducted to gather farmers' costs and income sources, taking 20 days.

The secondary data are collected by following ways

- a) Sending direct letters to main research institutions, and publishers,
- b) Referring Previous studies done by various researches in Sri Lanka and international level.
- c) In Sri Lankan accepted publications as well as international publications.

Limitations of the Study

Collection of the labor involvement data in paddy sub sector is extremely difficult. Due to lack of availability of reliable source to gather true data.

CHAPTER 1

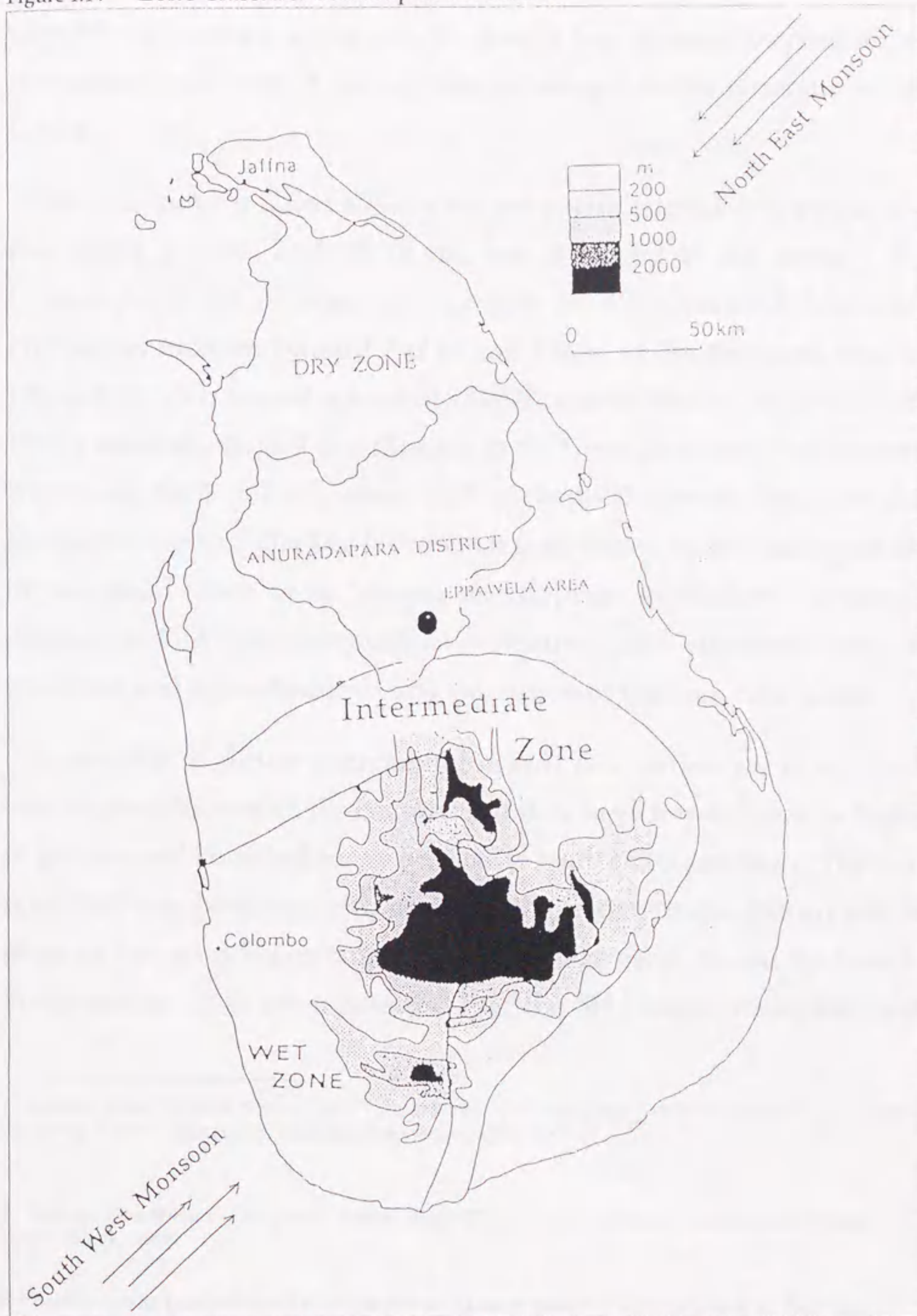
1) Historical Background and Present Situation of the Paddy Cultivation in Sri Lanka

1.1) Introduction

Rice is the most extensively cultivated crop and the largest employer of seasonal labor (more than 10% of the total population), in the domestic agricultural (subsistence) sector in Sri Lanka, it occupies 34% of the total cultivated land in the country. Rice is cultivated predominantly in small holdings. Within a small island of 65610 km², there are numerous niches where rice farming is practiced using different techniques. Paddy cultivation is strongly influenced by topography and climate factors that cause considerable regional variations. Rainfall in Sri Lanka follows a bi-model pattern: Northeast monsoons from October to February and Southwest monsoons from April to September. Based on rainfall, Sri Lanka is conventionally divided into three agro-climatic zones: the **Wet Zone**, the **Intermediate Zone**, and the **Dry Zone** and two paddy cultivation seasons **Maha season** from October to February and **Yala season** from April to September (see figure 1.1). Paddy is grown throughout the country except in higher elevations under three categories: **rainfed paddy**, **major irrigation paddy**, and **minor irrigation paddy**.

During the pre-independence era, great emphasis was placed upon plantation crops. Development of domestic agricultural sector received its due attention only after independence in 1948. Since independence successive governments have accorded high priority to the development

Figure 1.1: Zone Classification Map of Sri Lanka



Source : Social Studies Text book of Sri Lanka, Junior High school : Government Printing Press, 1984.

of paddy cultivation. Consequently, paddy has regained its position as a domestic food crop of the highest importance in the economy of Sri Lanka.

Rice accounts for about 40% of the per capita calories and 40% of the per capita protein, and 5% of the per capita fat in the average Sri Lankan diet¹. At present it is grown on 915 thousand hectares. Production increased from 1.7 t/ha and a total of 746 thousand tons in 1964/65 to 3.5 t/ha and a total of 2810 thousand tons in 1996/97. In 1995 it made the largest contribution to the Gross Domestic Production³ which was Rs. 7 billion, about 21% of the total contribution from the agricultural sector. The key factors that contributed to the rapid growth in rice production were known as adoption of modern varieties, expansion and improvement of irrigation, and increased use of fertilizers and agro-chemicals and expansion of the area cultivated.

Promotion of paddy cultivation towards self sufficiency in rice had been the ambition of all the country and they have formed various types of policies and launched many projects to realize this ambition. The rice price had long been regarded as one of the leading indicators on which price of the all other commodities and wage rates would be based. Furthermore, it is often asserted that the Sri Lankan mentality and

1. **Source** : Food Balance Sheet 1994 : *Department of Census and Statistics Ministry of Finance Planning, Ethnic Affairs and National Integration*, 1995, p.17.

2. **Source**: Central Bank of Sri Lanka: Annual Report Central Bank of Sri Lanka: *Central Bank Printing Press*. 1-119, 1998.

3. **Gross Domestic Production (GDP)** is the money value at current market prices of all final goods and services produced by nation's factors of production in a given year.

culture has been fostered through paddy rice farming which requires hard work in muddy fields and close co-operation among village inhabitants with respect to water control and labor sharing during the time of transplanting and harvest.

1.2) Geography of the Island

The distinct differences of rainfall distribution in Sri Lanka are expressed by the commonly accepted and widely used climatic divisions of Sri Lanka into a *Wet Zone* and *Dry Zone*. Although in principal the existence of both zones is agreed upon, for their definition different criteria have been applied by various authors. However, based on the ecological parameters such as rainfall, vegetation, soils, and present land use, Sri Lanka Meteorology department categorized Sri Lanka into three major agro-ecological zones, they are as follows;

(a) Wet Zone

Receiving a rainfall of over 2540 mm per annum. In the *Wet Zone* not long dry period pronounced. From June to September southwest monsoon rain, occasional rain occurs throughout the *Wet Zone*. The differentiation of the *Wet Zone* into its distinctive agro-ecological region is governed primarily by rainfall and elevation. *Wet Zone* again sub divided to up country, mid country, low country. Within the *Wet* and *Intermediate Zone* a sub division based on elevation takes into account the temperature limitation for the more important plantation and arable crops that are grown in the country. The low country is demarcated as land below 300 meters in elevation and the mid country as land of elevation between 300-900 meters and up country is land above 900 meters.

(b) Intermediate zone

Receiving a mean annual rainfall between 1900 mm to 2540 mm per annum. *Intermediate Zone* is identified as the either between *Wet Zone* and *Dry Zone*. Therefore bi-model pattern of rainfall distribution can be seen in this area. *Intermediate Zone* also sub divided into up country, mid country, low country. In this zone rainfall regime is significantly is different from that of the *Wet Zone*.

(c) Dry zone

Receiving a rainfall of 1200 mm to 1900 mm per annum North-East monsoonal period is the major rain occurrence season. In the *Dry Zone*, nature of the soil primarily determines the identity of *Wet zone*. *Dry Zone* located plain low country, hence this zone is not sub divided.

1.3) Climatic Conditions for Paddy Cultivation

Proximity to the equator dictates a tropical climate, and the island's location in relation to the monsoon winds largely determines its pattern of rainfall. The island enjoys an equitable climate. The day time temperature varies from 20-32 °C in the low country and in coastal areas, 10-23 °C in the hill country. The highest temperatures are generally experienced in the *Dry Zone*, especially in the northern part of the island. A succession of seasons is completely unknown. Except by the change of wind, the difference of a few degrees in temperature, and the transition from dry to rainy weather and vice versa, a perennial summer prevails.

The annual rainfall in Sri Lanka varies from 900 mm to 6000 mm. The island is influenced by two wind regimes: the **South West monsoon** and

Figure 1.2

Average Annual Rainfall of Sri Lanka in Each Districts



Source: Survey Department of Sri Lanka the National Atlas: Survey Department Press in Sri Lanka, 1988.

the North East monsoon. In figure 1.2 shows the Sri Lanka mean annual rainfall of each months in different districts. The rainfall during two inter monsoonal periods are mainly convectional and depressional.

According to the rainfall patterns in Sri Lanka two paddy cultivation are commonly distinguished: they are called *Yala season* and *Maha season*, these seasons are completely depend on the northeast monsoon rainfall and southwest monsoon rainfall.

In the figure 1.3, shows the variation of average annual rainfall of both *Maha* and *Yala* seasons in *Dry Zone*. In figure 1.4, and, figure 1.5 shows the mean annual rainfall variation in *Wet Zone* both *Maha* and *Yala seasons* respectively.

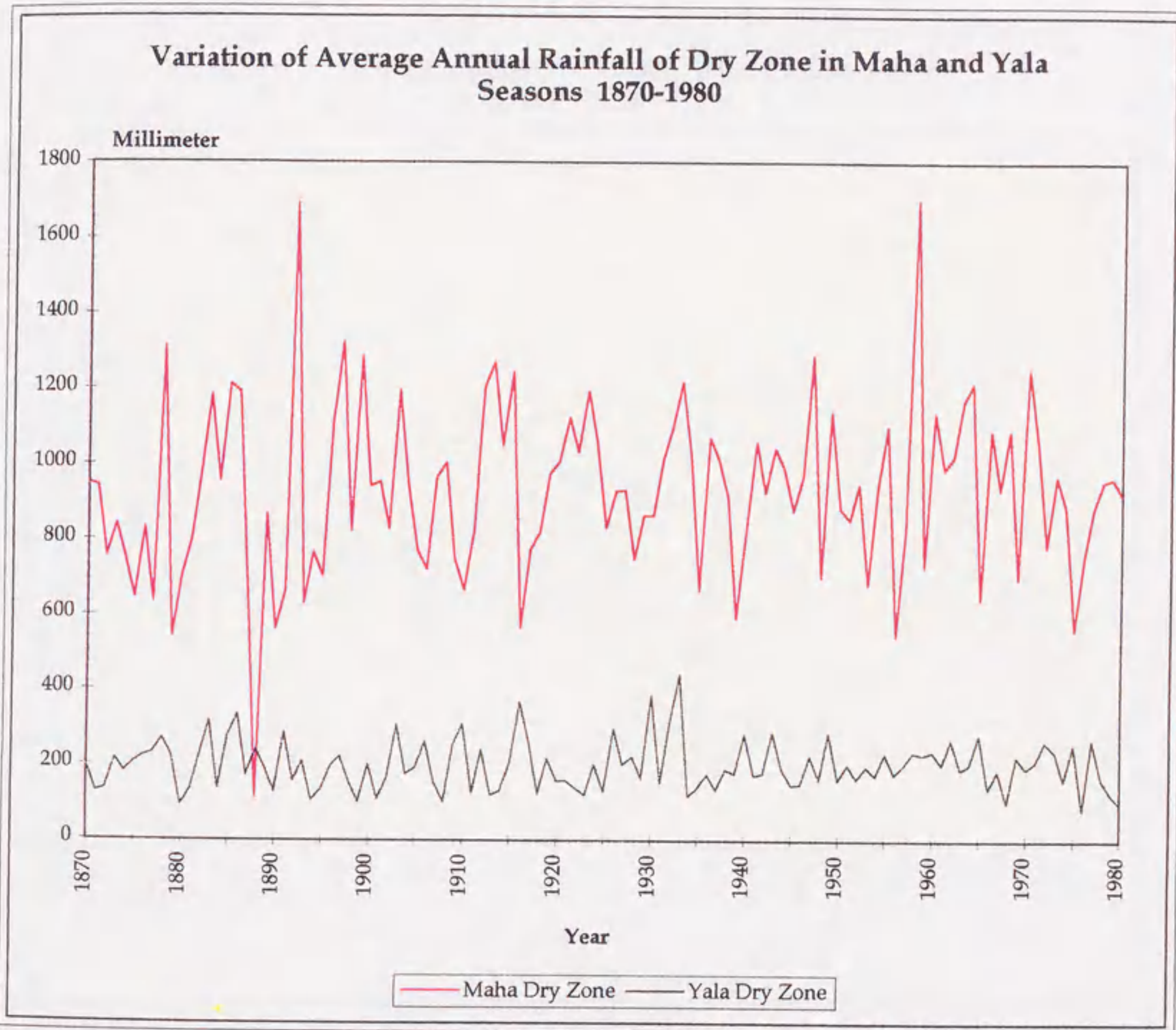
Climatologists divide Sri Lanka's climatic year into five seasons:

(a) The conventional-convergence period (*March to mid April*),

when the island comes under the influence of the Inter-Tropical Convergence Zone. This is a constant daily weather sequence with bright clear mornings that induce convectional activity leading to the formation of rain clouds by early afternoon and thunderstorms in the late afternoon. Convectional rains caused by the difference in temperatures between sea and land occur during the transitional periods between monsoons.

(b) The pre-monsoonal period (*mid April to late May*) This is a transitional weather pattern. During this time convectional weather is gradually suppressed by surges of the southwest monsoon.

Figure 1.3

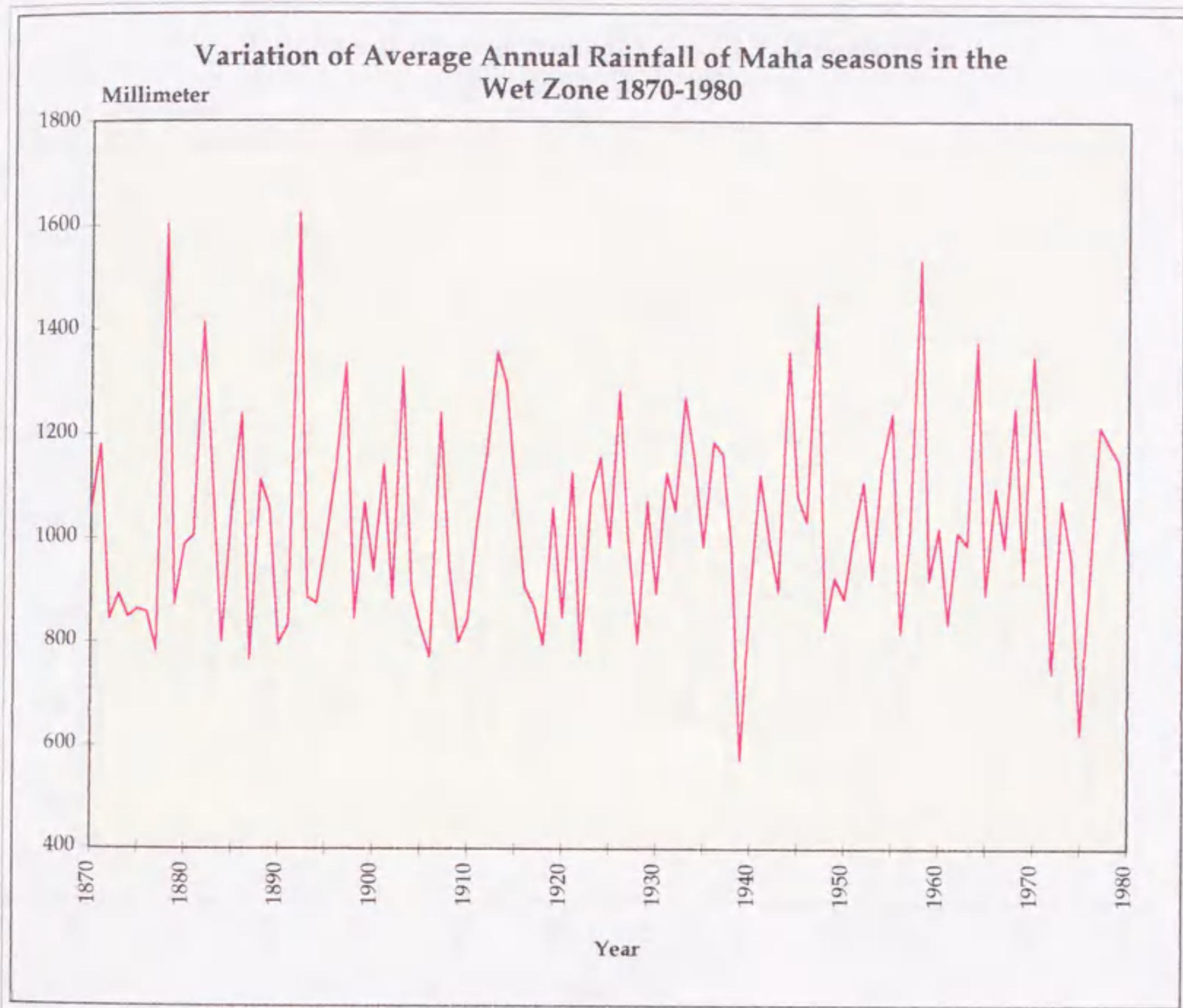


Source : Land Utilization Report 1962 : Sri Lanka Survey Department : 1963, p.46.

Economic and Social Statistics of Sri Lanka : Statistic Department Central Bank of Sri Lanka : 1994, p.8

Kurunegala Integrated Rural Development Project Ex-Post Evaluation : Agrarian Research and Training Institute , 1988, p.28.

Figure 1.4

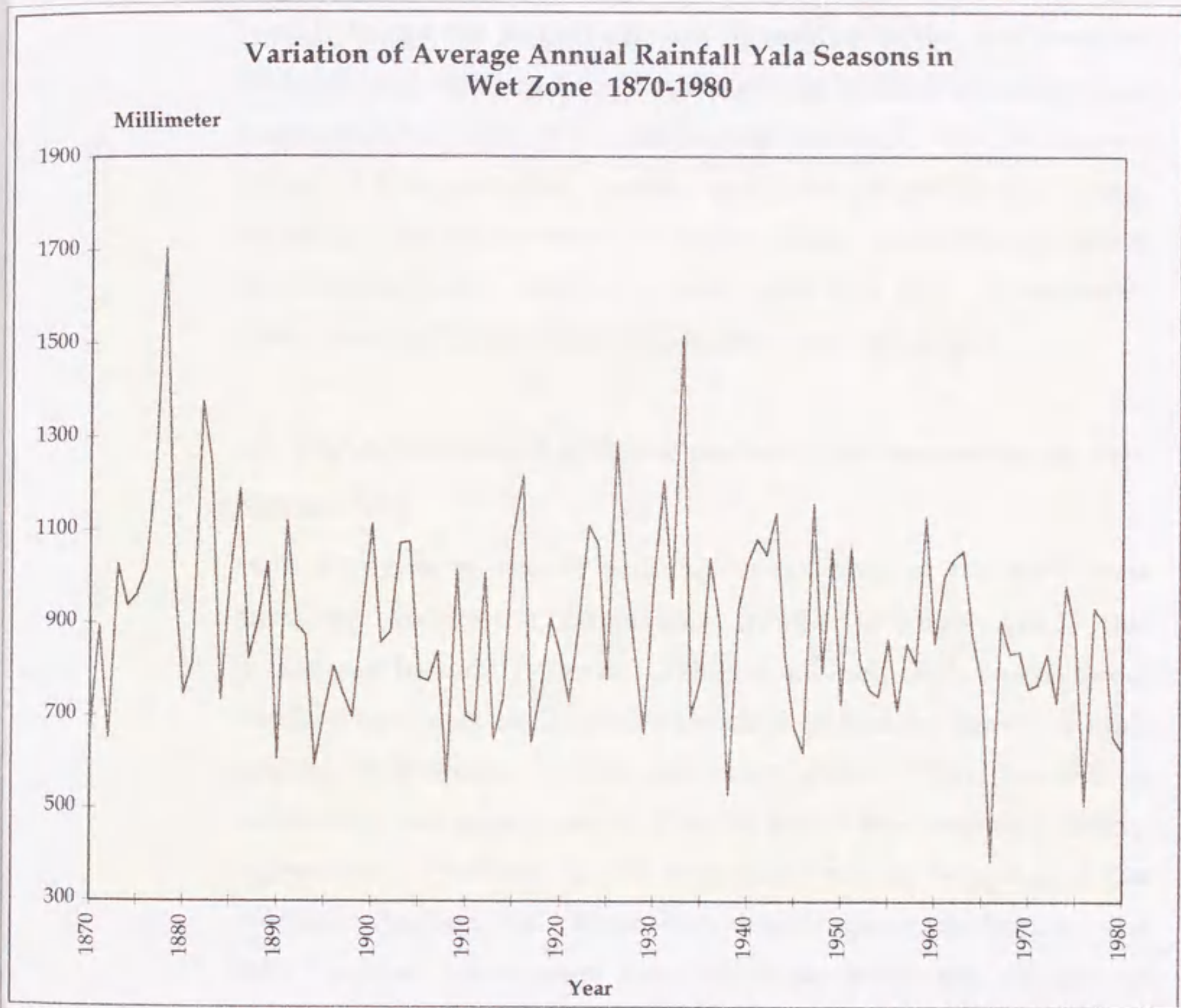


Source : Land Utilization Report 1962 : Sri Lanka Survey Department : 1963, p.46.

Economic and Social Statistics of Sri Lanka : Statistic Department Central Bank of Sri Lanka : 1994, p.8

Kurunegala Integrated Rural Development Project Ex-Post Evaluation : Agrarian Research and Training Institute , 1988, p.28.

Figure 1.5



Source : Land Utilization Report 1962 : *Sri Lanka Survey Department* : 1963, p.46.

Economic and Social Statistics of Sri Lanka : *Statistic Department Central Bank of Sri Lanka* : 1994, p.8

Kurunegala Integrated Rural Development Project Ex-Post Evaluation : *Agrarian Research and Training Institute* , 1988, p.28.

(c) The southwest monsoon period (*late May to late September*),

which brings the largest amount of rainfall to the southwestern lowlands and windward slopes of the central highlands, where some places receive over 5000 millimeters annually. The southwest monsoon is of unstable, moist, maritime air and thus is a wet monsoon. The southwestern monsoon blows across the northern, north central, and southeastern lowlands as a wet, moist wind. Yala season paddy crops are cultivated in this rain period.

(d) The depressional cyclonic period (*late September to late November*),

which begins to appear with the weakening of the southwest monsoon. Unlike the convectional weather in March-April, this period can include cyclones. When combined with convectional weather, cyclones occasionally produce period of heavy rainfall causing widespread floods and land slides. This rainfall is widespread and mainly due to disturbances of low pressure systems, depressions, cyclones in the southwest bay of Bengal and the southeast Arabian sea. These disturbances generally form on the Inter Tropical Convergence Zone which lies across the latitudes of Sri Lanka during the October and November.

(e) The North East monsoon (*December to February*)

This period has a weak, shallow, rather stable and therefore is a dry wind compared with that of the southwest monsoon. However the northeast monsoon brings agriculturally significant rainfall to the northern and eastern parts of the country. Maha season paddy crops are cultivated in this rain period.

1.4) Historical Background and Present Situation of Paddy Cultivation and Irrigation Systems in Sri Lanka

From history to at present paddy cultivation of Sri Lanka can be described in clearly identified three stages. They are as follows;

- (a) The kings period
- (b) Pre independence period (Colonial Era)
- (c) Post independence period
 - (i) Before the Green Revolution
 - (ii) The Green Revolution
 - (iii) The Open Economic Policy (After 1977 to now)

(a) The kings period

Large-scale irrigation net work began crisscrossing the parched land scape which started by early in the 1st century A.D. Sri Lanka's engineers utilized the water of the *Mahaweli river*⁴ and other rivers that flowed down to the plains from the mountains of the wet zone.

In the 1st century they introduced the reservoirs or *wewas*⁵ revealed a thorough grasp of hydraulic principles. Their dams had board bases able to withstand very heavy pressures. Outlets for the discharge of water were installed at suitable points in the embankment.

By the 3rd century B.C., Sri Lankan engineers had invented the *Bisokotuwa* (valve pit), the prototype of sluices regulating the flow of the water from contemporary reservoirs. Remarkable feature in the 3rd

4. Note : Mahaweli river is the longest river in Sri Lanka (335 km), and out of total land 16% Mahaweli river.

5. Note : *wewa* means Sri Lankan term for the very big water tank.

century was to build up the *Minnariya tank* (which covered 2100 ha) and (which covered 1850 ha, was fed by a dam 40 km long, and was contained by a dam 15 m.) by **king Mahasena (274 - 302)**. The increasing sophistication of irrigation technologies enabled Sri Lanka's early settlers to extent water net works throughout the dry zone.

Even more superior in technology was the *Kala wewa* constructed by **king Datusena (460 - 478)**. It encompassed 11 miles² and had a dam 5.6 km long and 11 m to 18 m high with a spill of hammered granite. A canal 88 km long and 13 m wide linked it to the city of **Anuradapura** and played an integral role in the development of the paddy cultivation of that ancient capital. The first 27 km of this canal is known as the *Yoda Ela* or *Giant's canal* had a gradient of only 9.5 cm slopes per 1 km.

Subsequent centuries saw even more remarkable developments in the irrigation of Sri Lanka. By the end of 8th century, irrigation systems enabled the islanders to open extensive tracts of land to cultivation.

Against this backdrop of technological and agricultural growth, two important cores of sinhalese civilization rose in the irrigated plains, and **Polonnaruwa**, further to the southeast near the *Mahaweli river*, in the time and in succession became the capital cities of the whole sinhalese kingdom.

Polonnaruwa boasted one of the largest and most spectacular of Sri Lanka's ancient tanks, the *Parakkarama Samudra*, it was built by **king Parakkaramabahu 1 (1153 - 1186)** one of the greatest of the Sinhalese rulers. The bound of the *Parakkarama Samudra* was nearly

14 km long and rose to an average height of 12 m. Nothing of this scale was built again until Sri Lanka regained her independence from the British in 1948.

The third core of Sinhalese civilization, **Ruhuna**, was located near modern **Magampattu**, in the far southeast of the dry zone where the climate is even more severe, and rainfall less reliable, than the kingdoms to the north. The region was settled by the ancient Sinhalese almost as early as **Anuradapura** and a well-developed irrigation system was established there at least 2,000 years ago.

Another significant facet of life in ancient Sri Lanka was Buddhism. It had an impact on the island and its people as important in social and political affairs as was the development of irrigation technology in the field of economic activity.

Sri Lanka's irrigation network formed the basis for a thriving economy with a large agricultural surplus that sustain a vibrant civilization. Buddhism gave that civilization dignity and elegance. It inspired the architectural and sculptural splendors of ancient Sri Lanka.

• Land Use Systems of Kings' Era

In theory, Sri Lanka's king exercised absolute rule. But custom and tradition put formidable constraints on his absolutism. He used part of his agriculture surplus to "pay" his officials and gave many of them grants of land from which they earned additional revenue. Buddhist monasteries also received land grants and eventually came to control extensive land holdings. The ruler maintained some rights over all lands in his kingdom, but private individuals mainly among the nobility,

merchants and institutions like monasteries were permitted to "buy" and "alienate" land. Land and rights to it, as well as the accompanying power, came to be shared by large numbers of individuals and institutions. It was held under a variety of **tenurial obligations**.

Thus ancient Sri Lanka became more feudal kingdom than an authoritarian state. The military aspects of feudalism were absent, as were contractual relationships between lord and vassal. But the two main attributes of feudal polity existed—the comparative weakness of central authority and the importance of land as a determinant of social and economic relationships. Like European **feudalism**, there was also an obligation of service as a condition of holding land. Relations between some agricultural workers and land holders could be judged feudal.

The vital difference was that the nature of that obligation was affected by a person's caste. Caste considerations eventually formed the basis for social stratification of Sri Lankan society. This practice was another transplant from India, but the caste system in Sri Lanka took on its own characteristics. As in India, the service or occupational role of an individual was the primary distinguishing function of caste. But the Sinhalese system, in contrast to India's, provided no religious justification for caste. The Buddha himself had condemned the system as iniquitous. So Sri Lanka's religious difference considerably softened the impact of the caste system.

Thereafter several times South Indians invaded Sri Lanka and damaged Sri Lanka irrigation civilization. Again political entity began when **Parakkaramabahu VI (1411 - 1467)** ruled the country. But

after the death of **Parakkaramabahu VI**, the country's internal disorder started.

The country's disorder gave a territorial appetite to the **European colonialists**.

(b) Pre independence period (Colonial Era)

Pre independence period can be discussed under three invasion periods. They are as follows;

(i) **Portuguese invasion**

(ii) **Dutch invasion**

(iii) **British invasion**

(i) Portuguese invasion (1505- 1658)

European ambitions arrived with the Portuguese during the early 16th century. In 1505 Portuguese arrived **Colombo**, and then ruled **Jaffna, Kotte, Kandy**. Portuguese held most of the western and southern lowlands of the country, because they were interested mainly in the control of commerce, especially the island's cinnamon trade, occupation of the *wet zone* lowland ensured that no rival interfered in this activity. It is also meant that the traditional subsistence agriculture in the region was not much affected. They succeeded in planting coconut in the low lands and developed it to large scale plantations. Then the country's subsistence agriculture area especially paddy cultivated area began to reduce.

(ii) Dutch invasion (1658 - 1796)

The Dutch invaded Sri Lanka 1658 and ruled until 1796 and reorganized the planting cinnamon and coconut for exporting. Dutch controlled the trading power and established the "*Roman-Dutch Law*" for the administration and also introduced several tropical plants, such as *cassava*, *breadfruit*, *tobacco*, *teak*.⁶ Dutch cultivated these crops in hill country and low country where it was successful .

(iii) British invasion (1815-1948)

Then British invaded Sri Lanka in 1815 and ruled until 1948. British rule brought a remarkable transformation of Sri Lankan economy, they cultivated coffee as a plantation scale 1830s. Cultivation of coffee on the scale of large plantations demanded a reliable and disciplined labor force, and this was supplied by Tamil immigrants from south India. Large scale Indian immigration began from early 1840s. This added the latest large scale components of people, to the already existing plural society of Sri Lanka. Sinhalese were not attracted by the wage incentives and the terms of employment that were offered by the planters, and also Sinhalese were used to traditional village life. However, a virulent leaf disease broke-out in coffee bushes and coffee industry came to standstill. Then early in 1860s British started tea plantation in Sri Lanka in the *wet zone*, where heavy rainfall well distributed throughout the year, together with the decrease in temperature with altitudes, provides the ideal environmental conditions needed for cultivation variety of plantation crops.

6. Note: *Cassava*, a kind of a yams (Tuber): *Breadfruit*, a kind of tree, the fruits of this tree used as kind of a vegetable. (In Sri Lanka term it is called Dell). *Tobacco*, a kind of a plant. *Teak* a kind of tree.

Thus the plantations largely utilized just one important and indigenous resource, extensive and fertile land. This affected the traditional agriculture sector in two very important ways.

Firstly, it took away land, to which the peasants felt they had traditional rights; land which was communally owned, such as grazing land and chena land⁷.

Secondly, with the growing dependence of plantation crops, scant attention was made to encourage traditional agriculture, with the result that its returns enabled its practitioners to only eke out a bare livelihood.

Furthermore, the most damaging blow to the development of this traditional sector, was that the surplus profit produced by the plantation sector, were either reinvested in the plantation sector or self-paid by the dividends to foreign investors (Sondgrass 1966).

It has been argued that it was the divergent economic policies and attitudes between **plantation agriculture** and **traditional agriculture**, that created two broad sectors, which came to be later known as **dual economy**. Thus arose a dichotomy in the economic and political structure of the country, creating a sense, two nations, which successive governments especially in the post independence period (1948 onwards) have been battling hard to eliminate.

During the British rule, Rubber was planted in *wet zone*, where

7. **Chena** is an anglicized rendition of the Sinhala term **hena**. *Chena cultivation* is described as a form of agriculture engaged in by people living in sparsely populated areas, thus having easy access to scrub land or forest land that could be used as venues for rainfed farming which may depending on circumstances, constitute their only main or supplementary source of livelihood. *Chena cultivation* also called *shifting cultivation* or *slash and burn* agriculture.

higher rainfall and higher temperature available especially in the **Kalutara, Kagalla, Rathnapura** districts. Other plantation crops such as Cocoa, Cardamom, were also introduced but not cultivated on a major scale. Till the 1850s little concern was paid to encouragement of traditional agriculture by British. But in 1855-1860 The **Govenor Ward** made an attempt to the restoration of irrigation works and rehabilitation of the *dry zone*. The result of this irregular cultivated land converts to regular cultivation land; rather than to new areas to peasant agriculture (De Silva 1977). This restoration of irrigation works did not touch the *wet zone*, where by the 1890s peasant agriculture and plantation activity were unequal competition. Plantation income earned more income than rice cultivation. But paddy cultivation was continued in spite of uneconomical prices in the *wet zone* where Gley soils available, because these soils could not be used to grow any plantation crops .

As the plantation economy prospered with increasing number of emigrant labors settling in plantations and the creation of an elite class among the native population. The self sufficiency of the internal economy collapsed, and rice had to be imported. Imported rice was also cheaper, as a result rice farmers made much discouragement. Little by little imbalance of the economy widened. Famine, starvation, and the rural poverty recorded many parts of the country in the last quarter of the 19th century and the first decade of the 20th century.

British ruler did not make any attention for the situation, instead they further developed the plantation sector. They hired many labors from South India, and this influx of new migrants brought about radical

change in occupancy and employment, and it adversely affected the economic condition of the up country. Plantation workers were provided the small apartments close to the working estates. While local and foreign capitalists took the freehold title of the land in the *wet zone*. Most of *wet zone* lowland title were given to the local capitalists. This brought about the landlessness of the peasant farmers. Before the Western influence most of *dry zone* lands were held and administrated by the village societies.

Absolute ownership of these lands were given to individuals by issuing the title deeds at the end of the 19th century (Leach 1971). Under this British administration country's sectorial balance gradually widened.

Sri Lanka economy faced the great economic depression in 1920s and the malaria spread throughout the country and needed upgrade the economic structure.

The breakthrough came in 1932 when **D.S.Senanayake** became the first Minister of Agriculture and Land under the British rule. Under his guidance, planned peasant colonization schemes in the *dry zone* and restored the abandon tanks, and established the peasant settlement, increased the infra-structure facilities.

Established the **Land Development Ordinance** in 1935, under this ordinance gave the allots in these restored schemes, tenure and perpetuity, with careful restrictions to prevent the sub division of the land. These implementations result the migrate Sinhalese from the *wet zone* back to *dry zone* to develop the unpopulated areas. With the

out break of war in Asia and the interruption of the supply of rice from South East Asia by 1942, Sri Lankan economy faced the very severe situation.

A greater range of free services was made available to colonists to improve the domestic agriculture. From 1942 a **guaranteed floor price was provided for rice**. Between 1928-48 some 11,000 ha or dry zone and, between 1939-48 alone 60,000 ha of land in the wet zone were **given to smallholders**. In 1948 Sri Lanka's paddy fields had one of the lowest yields per ha in Asia (C.R.De.Silva 1987).

(c) Post Independence Period

(i) Before the Green Revolution (1948-1965)

In 1948 Sri Lanka got the political independence from Great Britain. By the time of independence much of the *wet zone* had been opened for cultivation. The alluvial valleys and flood plains in this region were cultivated with rice, while upland surface were planted primarily by the three major perennial crops of tea, rubber, and coconut. A comparison of the land cultivated with tea, rubber, and coconut with the climatic potential lands for these crops, showed that the optimal climatic lands were already utilized (Domros 1974). After the independence various governments came to power and change the administrative policies in many ways, but none of the governments would not govern the country more than 5-7 years until 1977. In 1958 Paddy Lands Act No. 1 were introduced and implemented tenurial reforms.

(ii) The Green Revolution

In 1965-69 Green Revolution took place in Sri Lankan economy.

Result of the green revolution high yield rice varieties, and new biological chemical inputs were introduced, this brings to expansion of the new area for paddy cultivation. In these years cumulative efforts were made to develop the paddy production, and strengthening the institutions, and the infrastructure facilities. Again the image of the self sufficiency of rice came to Sri Lankan farmers.

In 1972 Land Reform Law No. 1 was introduced, under the act restricted the maximum ownership of a person to 25 acres (10.125 ha) of paddy land in case of estate owner 50 acres (20.25 ha) .

(iii) The Open Economic Policy (After 1977 to Now)

The year 1977 marked a watershed in Sri Lanka economic history. New political party came to power and introduced the out ward oriented economic policy (Liberalization economic policy). Number of economic reforms were done in that year floating exchange rate, foreign direct investments, large infra-structural development project etc.

For purpose of the expand the agricultural frontier, the government launched the diversion of the water of the *Mahaweli river* to irrigate, the *dry zone*. This plan was made 1960s, and this project was to be completed over a period of 30 years. But in 1977, ruling government decided to accelerate the development program and implement as much of it as possible of six years period. The program is called "*the Accelerated Mahaweli program*" (AMP). Under this project it is expected to provide irrigation facilities 265,000 ha of new land and improve the irrigation facilities to 100,000 ha. In 1980 ruling party

Figure 1.6



started another two major irrigation schemes they are known as "*The Gal Oya Project*", and "*The Udawalawe Reservoir Project*". Aim of these schemes are to be irrigated the dry zone and increase the country's paddy production as well as the paddy productivity (see figure 1.6).

The experience of last 15 years, the irrigation development has certainly brought about substantial increase in the extent of paddy land and paddy production.

1.5) Present Situation of the Paddy Cultivation in Sri Lanka

a) Open economy and agriculture sector

The Sri Lanka economy has undergone significant diversification since economic liberalization commenced in the late 1970's. The export structure is now less dependent on primary agricultural exports and less vulnerable to external and domestic shocks. New manufacturing and service activities have emerged and more employment opportunities generated, including increased opportunities for employment abroad. The industrial sector has been since then developed and expanded by the promotion of foreign investment via various economic incentives. The increase of production such as textile and garments exports which were export oriented became substantial. During last 10 years, industrial exports increased by annually 16 percent. Technology transfer and employment creation are the significant benefit from industrial promotion.

Sri Lanka agricultural sector organized is with traditional agricultural sector (subsistence peasant farm sector) and modern agricultural sector (export-oriented plantation sector). The share of

agricultural sector has been decreasing during 1980's and to now. Fluctuation of export prices and stagnation of farm productivity has made the situation of the agricultural sector even worse (See table 1.1).

Table 1.1

Sectoral composition of Gross Domestic Production in Sri Lanka (%)

Sources	1978	1987	1996
Agriculture, forestry and fishing	28.7	23.6	18.4
Mining and quarrying	2.5	2.7	2.5
Manufacturing	15.3	16.2	21.0
Construction	8.3	7.2	6.9
Services	45.3	50.3	51.2

Source: Central Bank of Sri Lanka: Annual Report Central Bank of Sri Lanka: *Central Bank Printing Press*. 1978 (27), 1987 (19-26), 1996 (23).

b) Composition and Direction of External Trade

The changing structure of exports and imports provides valuable insights to causes of external imbalance and the efficiency of adjustment policies. In so far as exports are concerned, a clear structural shift has occurred in the post 1977 period from conditions of heavy dependence on a few primary commodities to a diversified structure with manufactured exports contributing a significant proportion of exports (table 1.2).

In 1977, the share of plantation crops in exports was about 73 per cent with the contribution of manufactured exports at a mere 7 per cent. Since then manufactured exports have increased rapidly. During the 1978-94 period, manufactured exports grew at about 25 per cent

annually, while plantation crop exports virtually stagnated. In 1986, manufactured exports superseded plantation crops as the dominant category of merchandise export. The structural transformation in exports achieved by 1994 was dramatic as compared to 1977 as the contribution of plantation crop exports had declined to 17 per cent, with that of manufactured exports increasing to 72%.

Table 1.2

Composition of Exports in Sri Lanka: Selected Years, 1975-94 (%)

Sources	1975	1980	1985	1990	1991	1992	1993	1994
Plantation crops	75.6	54.6	46.8	31.1	27.1	19.0	18.0	17.0
Tea	49.1	35.1	33.2	24.9	21.7	13.8	14.4	13.2
Rubber	16.6	14.7	7.1	3.9	3.2	2.7	2.2	2.3
Coconut	9.9	4.3	6.6	2.3	2.2	2.5	1.3	1.6
Minor agricultural exports	2.9	5.0	3.8	4.0	4.1	4.6	4.2	4.0
Manufacturing	6.1	18.0	30.7	48.4	58.7	69.5	70.6	71.9
Textile & garments	0.6	10.4	22.0	31.7	40.5	49.3	19.3	48.3
Precious & semi-precious stones	4.6	3.8	1.5	3.7	2.9	2.3	2.5	2.5
Others	10.6	19.1	17.1	12.7	7.2	4.6	4.7	4.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

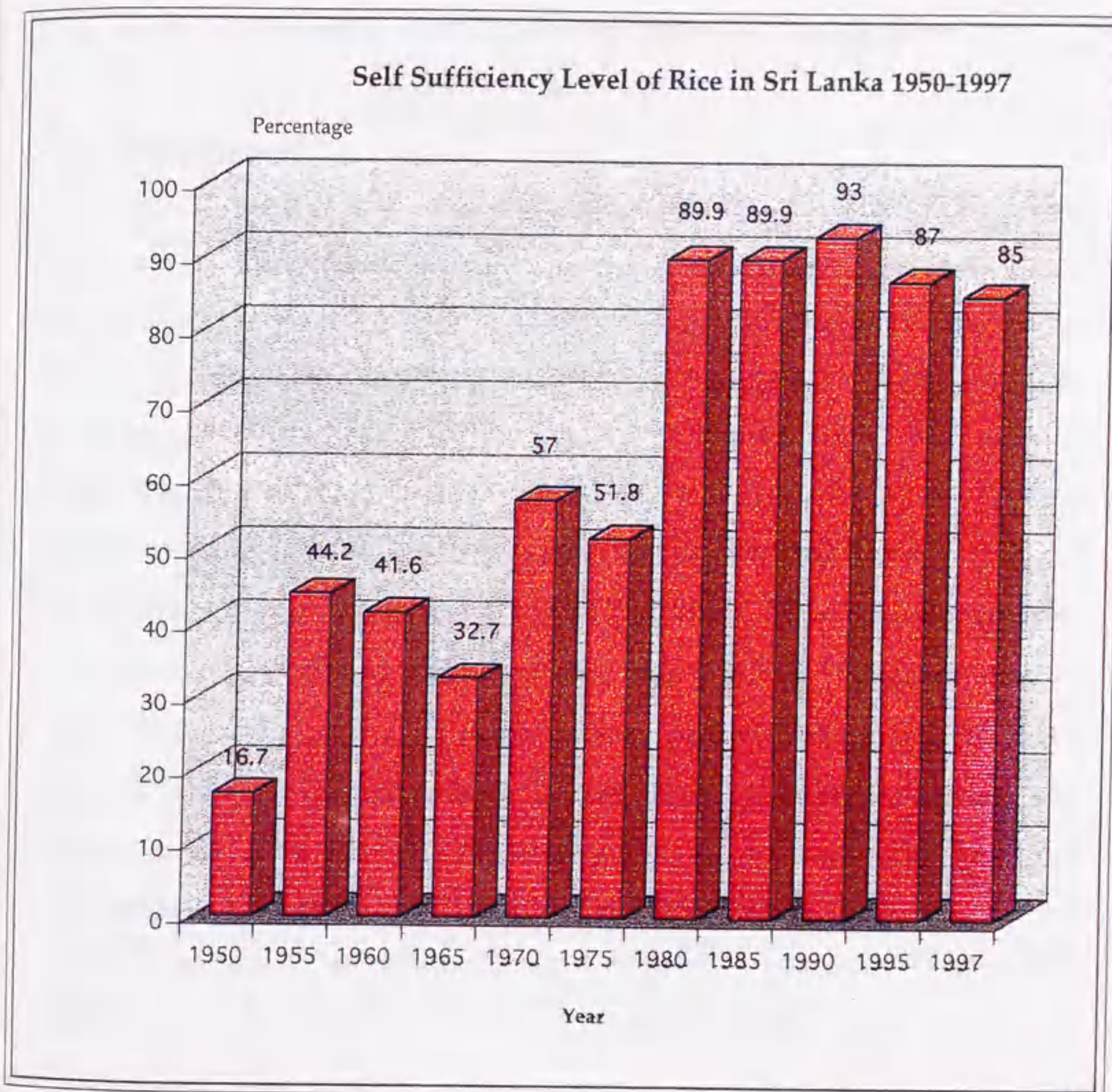
Source: Central Bank of Sri Lanka: Annual Report Central Bank of Sri Lanka: *Central Bank Printing Press*. 1975-1995.

1.6) Present Trends of the Paddy Cultivation

At present rice occupies 34% of the total cultivated land in the country with a production of 2.9 million tons. Production increased from 1.7 t/ha in 1964/65 to 3.5 t/ha in 1997/98. The area planted with modern varieties was 0.6 million hectares by late the 1990s, constituting 65% of the total rice growing area. The Green Revolution that occurred in late 1960s and open economic policies introduced in the late 1970s are key factors that contributed to the rapid growth in rice production. It is said that both of these stages created the necessary technical environment for Sri Lanka to enter the path of so called modern agriculture. In 1993, the country reached its maximum self-sufficiency level in rice (93%) achieved so far (past four decades rice self sufficiency level of the country was as follows: 1965 33%, 1975 52%, 1985 89%). But ever since, this level of self sufficiency has tended to decrease. In 1997 it was reduced to 85% (see figure 1.7).

Despite its strong performances in the last three decades the rice sector faces difficult challenges in the coming future. The decreasing level of self sufficiency of rice since 1993 and the widening degree of the income inequality gap between small farmers and large farmers are the present crises in the Sri Lankan rice sector.

Figure 1.7



Source Economic Review People's Bank of Sri Lanka, Human Resources Development : *People's Bank Publication* : 1994 March, p.31.

Annual Report Central Bank of Sri Lanka: *Central Bank Printing Press*, 1984 - 1997.

Paddy Statistics : *Department of Census and Statistics Ministry of Plan and implementation*, 1983-1987.

CHAPTER 2

2) Regional Diversity and Land Use Patterns of Paddy Farming Practices in Sri Lanka's Peasant Farm Sector

2.1) Introduction

Rice farming in Sri Lanka is characterized by a large regional diversity in adopted technologies as well as by complex systems of land tenancy and labor use patterns. Different types of adopted technologies can be observed by examining and district level data for the activities of land preparation, crop cultivation, and weeding operations. Land tenancy systems included; joint-ownership of land (*havul*), sharecropping (*ande*), tenancy rotation (*thattumaru*), benefit rotation (*kattumaru*), situation sharecropping (*bethma*), lease systems (*badu*), and mortgage systems (*ukas*). Labor use patterns included; family labor, exchange labor with responsibility (*attam labor*), shared labor (*kaiya labor*), informal (*ad-hoc labor*), formal (*contract labor*), and hired labor. The aim of this chapter is to examine the regional diversities in adopted technology in Sri Lanka paddy farming practices and the different methods of land tenancy practices (Labor use practices are discussed in chapter 3). This study reveals that;

- (1) The most significant determinants of regional diversity in adopted technology in Sri Lanka paddy farming are; (i) **farm size**, (ii) **wage rate**, (iii) **migrant farmers**, (iv) **irrigation conditions**.

- (2) The most severe problems in the Sri Lankan paddy farming sector due to rigid tenure structure and different labor practices are; (i) **landless peasants** (ii) **micro-holdings**, (iii) **exploitative tenure conditions**, (iv) **underutilization of resources**, (v) **low agricultural productivity**, (vi) **low income**, (vii) **unemployment**.

2.2) Regional diversity in rice technology

While traveling in the countryside, it is not rare to come across a rice village where land is prepared by manual labor alone using hoes, right after passing through another village where the same operation is performed by large four wheel tractors. Land preparation using water buffalo is also popular in some rice growing areas, while in others a plough or harrow is used and still others employ stepping or mudding by a swarm of animals without any implements at all. A long list of such varied techniques can be prepared for rice production operations from land preparation through harvesting and threshing.

As mentioned above, Sri Lanka is conventionally divided into two climatic zones; the wet and the dry. Besides their climatic differences, these two zones are characterized by sharply different development histories. The development of rice farming was accelerated in this century mainly through the development of a dry zone irrigation infrastructure, which always took the form of colonization projects with the farmer settlers migrating primarily from the densely populated wet zone to the dry zone. The dry zone is where the large-scale irrigated lowland projects are concentrated, resulting in rice farms of a relatively large size. In contrast, rice farming in the wet zone features

a concentration of rainfed and small-scale irrigated low land projects with small sized rice farms.

Sharply different rice growing environments are found even within each zone. In the wet zone for example mountainous districts called **high country** with small terraced rice fields found in valley bottoms with a high concentration of minor irrigation schemes. In the coastal districts of the southwestern corner of the wet zone, which is called **low country**, rice farming is practiced on flat low paddy fields which are predominantly rainfed.

Similarly, the dry zone could be divided into three sub-zones; the **inner dry zone**, **southern dry zone**, and **northern dry zone**. The inner dry zone is the region where ancient lowland agriculture prospered, and where efforts for restoring and developing major tank-irrigation schemes have been concentrated since the turn of this century. The southern coastal area of the dry zone is centered with major irrigation schemes. Situated far from the source of water in the mountainous part of the island, rice farming in the northern dry zone is most critical; there are many rainfed paddy fields, and even when tank irrigation is available, severe water shortages often makes one crop per year barely possible.

Table 2.1 illustrates the regional diversity of adopted technology in rice farming according to the zones described above. First it should be noted that regional variations in rice yield per ha are considerably large. The wet zone average in 1994/95 Maha was 3193kg per ha, while

Table 2.1

Regional Diversity of Rice Farmers in Sri Lanka

Kinds	Wet Zone		Dry Zone			
	Low Country	High Country	Inner	Anuradapura	North	South
Rice Yield (kg/ha) 1990-1995 Maha						
1990/91 Maha	3037	3552	4340	3824	2867	4245
1991/92 Maha	2736	3697	4437	4096	*N.A.	4240
1992/93 Maha	2902	3465	4319	3709	2778	4079
1993/94 Maha	3120	3458	3801	3836	2808	3752
1994/95 Maha	2959	3427	4437	4018	3289	3925
Land Preparation (1994/95 Maha)						
Tractors	35.0	13.0	81.0	85.5	79.0	71.0
Animal ploughing	17.8	50.7	16.2	6.9	17.1	11.7
Animal mudding	11.0	18.3	2.0	5.0	3.5	15.0
Manual hoeing	36.2	18.0	0.8	2.6	0.4	2.3
Crop Establishment (1994/95 Maha)						
Direct seeding	94.5	43.6	87.2	81.8	92.6	94.2
Transplanted in row	1.2	3.5	5.1	14.7	2.6	1.0
Transplanted at random	4.3	52.9	7.7	3.5	4.8	4.8
Weeding (1994/95 Maha)						
Weedicide	68.5	28.6	77.3	85.5	44.2	69.5
Hand weeding	10.8	54.7	12.1	5.8	50.2	27.7
No weeding	20.7	16.7	10.6	8.7	5.6	2.8
Wage rate (Rs/day) (1994/95 Maha)						
	49.0	34.0	38.4	41.0	45	69
Farm Size (ha/farm) (1984/85 Maha)						
	0.44	0.42	0.94	*N.A.	1.67	0.88
Major Irrigation (%)						
	6.8	20.3	63.4	*N.A.	41.6	74.5

Source: Paddy Statistics: Department of Census and Statistics Ministry of Planning and Implementation 1990-95 Maha⁸).

Cost of Cultivation of Agricultural Crops: Department of Agriculture University of Peradeniya, 1994/95 Maha⁹).

Yamada, Y., Sagimoto, Y., & Kikuchi, M.: Japanese Journal of Tropical Agriculture: 39 (4): 240-246, 1995.

Notes: i) The districts included in each zone are as follows: **Low country wet zone;** Colombo, Gampaha, Kalutara, Galle, Matara. **High country wet zone;** Kandy, Matale, Nuwara Eliya, Badulla, Ratnapura, Kegalla. **Inner dry zone;** Kurunegala, Anuradhapura, Polonnaruwa, Mahaweli H. **Northern dry zone;** Puttalam, Mannar, Jaffna, Vavuniya, Mullatiyu, Batticaloa, Trincomalee, Killinochichi. **Southern dry zone;** Hambantota, Ampara, Moneragala, Udawalawe.

ii) *N.A. = Not Available.

iii) Anuradapura is a district of an inner dry zone.

iv) Since farm size data in 1994/95 Maha is not available, we applied 1984/85 Maha season data.

the dry zone average was 3884kg per ha, the gap between the two zones being 691kg per ha. More over as the table explains, the recent year average yield kg/ha also fluctuated greatly between the wet and dry zones. The column Anuradapura refers to a district of the inner dry zone within which the district fluctuation gap is large.

It should be noted that remarkable regional diversity patterns are observed in the technologies used for land preparation, crop establishment, and weeding. For instance, for land preparation the tractor is adopted mainly in the dry zone, whereas farmers in the wet zone mainly rely on either manual hoeing or draft animals.

In the case of crop establishment, direct seeding by broadcasting is the adopted technology in both zones. However, nearly 53% of the farmers in the high country wet zone adopted the random transplanting method. For weeding, many farmers adopted the weedicide in wet zone low country and in the inner and southern sub zones of the dry zone, while hand weeding is popular in high country wet zone and northern dry zone. Low country data shows a considerable percentage (21%) using no weeding techniques.

All these factors revealed that it is very difficult to give a systematic overview of Sri Lankan regional diversity in technology adoption. However, the theory of induced technical change, which says that technology is adopted so as to save the factor, the prices of which is increasing relative to others. Is there any validity in applying this theory to Sri Lankan types of adaptation? For this analysis we took the wage differentials which exist between the wet and dry zones (Table 2.1).

The wage rate is some what high in the low country wet zone but the southern dry zone, and low in the high country wet zone and the inner dry zone. There is a positive relationship between some regionally adopted technologies and wage rates. For instance, in the case of crop establishment, labor-intensive transplanting is the popular method in low-wage regions of the wet zone high country, whereas labor-saving direct seeding is practiced mainly in the high-wage regions. In these regions, the theory of induced technical change is ideally suited to the regional diversity of adopted technologies.

In some cases, however wage rates and adopted technologies show a negative relationship. For instance, labor-intensive manual hoeing is the major land preparation method in low country wet zone, while a majority of farmers in the high country wet zone use weedicide. Further more, hand weeding which is highly labor intensive is practiced in the northern dry zone where wages are some what higher. These negative relationships militate against the theory of induced technical change.

It is clear that in some instances such a theory is applicable to the Sri Lanka regional diversity of adopted technologies, but not in others. This means that we have to think further about factors that account for the revealed pattern of regional diversity in technology adoption.

To construct a pattern of the adaptation of technology to rice farming, we have utilized farm size, irrigation conditions, migrant farmers, all of which are highly important factors in the rice farming environment.

Farm size reflects the degree of population pressure against the land, as shown in Table 2.1. Sri Lankan farm size is very small in the wet zone, and large in the dry zone, and the land preparation adoption rate of technology is labor intensive in the wet zone and capital intensive in the dry zone. Therefore, we can predict that on a small farm the adoption technology is labor intensive, and on a large farm is capital intensive. In any event, we can not come to a conclusion based only on farm size, because irrigation is also very important in deciding farming techniques.

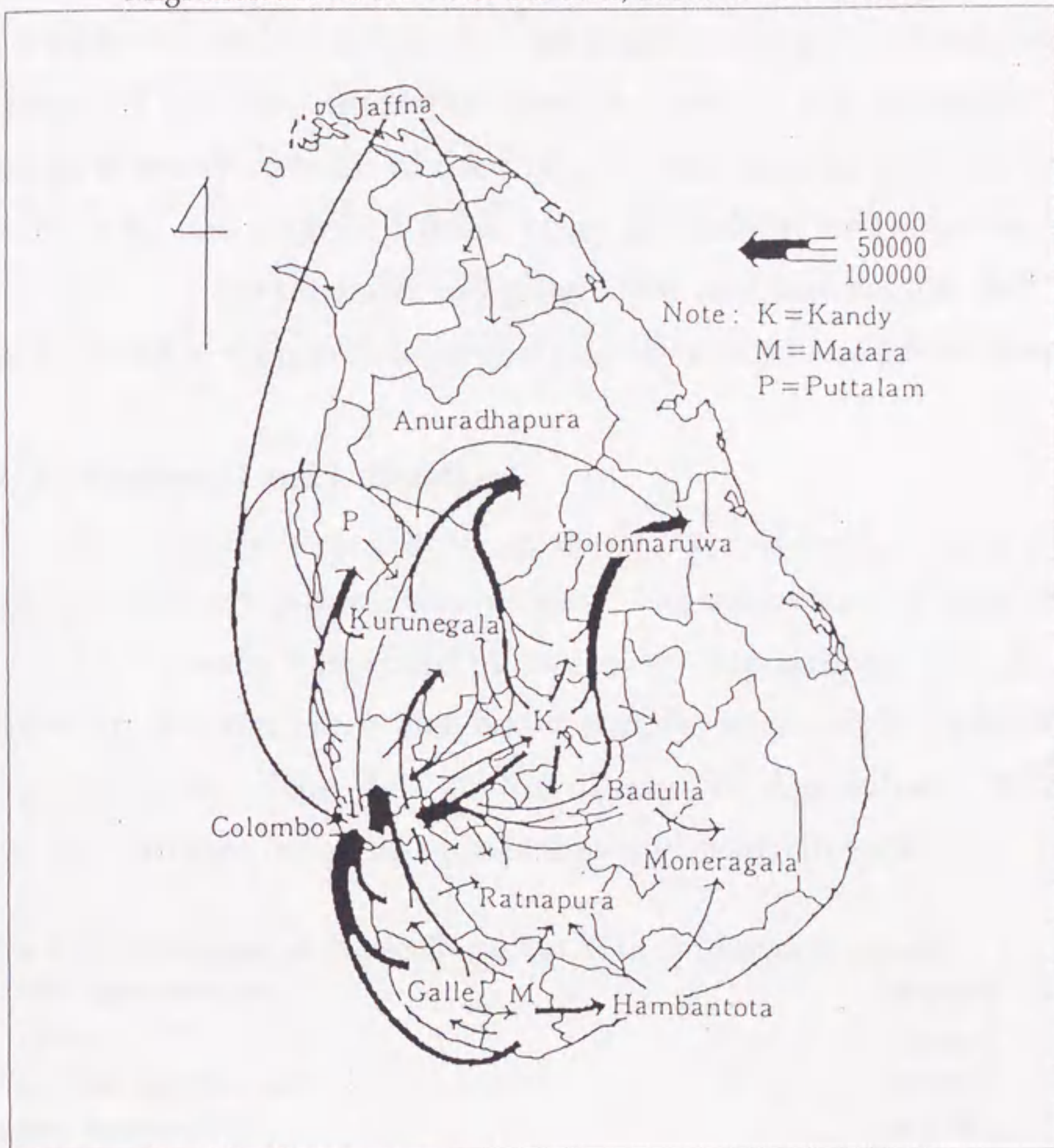
Table 2.1 summarized the major irrigation conditions in both the wet and dry zones. In the dry zone many farmers have to select machine-intensive techniques for land preparation in order to conserve irrigation water. Therefore, dry zone farmers naturally adopted the four-wheel tractor for land preparation. But in the case of weeding, dry zone farmers adopted labor intensive weeding technology. As for seeding, major irrigation farmers adopted direct seeding which requires more delicate water control than transplanting. We discuss migrant farmers as a separate topic because in the last two decades many of the farmers migrated to new settlement areas drawn by developing irrigation facilities and various land settlement program implemented by the government.

2.3) Technology transfer with migrant farmers

Rice farming in many districts of the dry zone has been carried out by the farmers who had migrated from other districts under the irrigation-cum-colonization projects. Such a migration is highly significant between the districts (figure 2.1)

Figure 2.1

Migration Flows Between Districts, Prior to 1981 Census



Source: Department of Census and Statistics.

Large irrigation networks began crisscrossing the parched land in the dry zone after 1977 fed by the Mahaweli and other rivers that flowed down to the plains from the mountains of the wet zone. Especially after the completion of the Mahaweli river irrigation project, considerable numbers of civilians migrated from the wet to the dry zone. Rice farming in many districts of the dry zone has been carried out by the farmers who had migrated from other districts in irrigation-oriented areas. These migrant farmers brought the rice technology that they used to adopt in their area of origin to newly settled rice growing areas.

2.4) Agricultural Land Utilization

Land Utilization data mainly gives the area of land in agricultural holdings which are put in different uses. The use of land in agricultural holdings are greatly influenced by its ecology, topography, climate, soil, population density, labor and water supply, variation in rainfall and temperature etc. The data of the Census of Agriculture 1982 are classified into nine broad categories they are shown in table 2.2.

Table 2.2 : Utilization of Agricultural Lands in Sri Lanka (hectares)

Total Agricultural Land	2,010,291
<i>Arable Land</i>	752,613
Asweddumized Paddy Land	557,414
Other Temporary Crops	195,199
<i>Permanent Crops</i>	975,360
Major Plantation	798,722
Other Permanent	176,638
Pasture Land	20,113
Forest Land	54,171
All Other Land	208,034

Source Sri Lanka Census of Agriculture General Report 1982 : *Department of Census and Statistics Ministry of Plan and Implementation, p.66.*

Other Temporary Crops are Potatoes, Onion, Chilies, Sugar Cane, Vegetables etc.

Major Plantation Crops are Tea, Rubber, Coconut.

Other Permanent Crops are Coffee, Cocoa, Cinnamon, etc.

The statistics reveals that out of total agriculture land 27.7% under paddy cultivation in Sri Lanka.

2.5) Changes in Agricultural Land Use in Sri Lanka from 1962 to 1982

The crop land consisted of arable land and land under permanent crops, which accounted 86% of the total land under agricultural holdings in 1982, where as it was about 84.6% in 1962. Table 2.3 shows the land use under crops land according to the Censuses of Agriculture 1962 and 1982. In figure 2.2 shows the present land use pattern of Sri Lanka.

Table 2.3

Changes in Agricultural Land Use Under Crop Lands in Sri Lanka 1962-1982

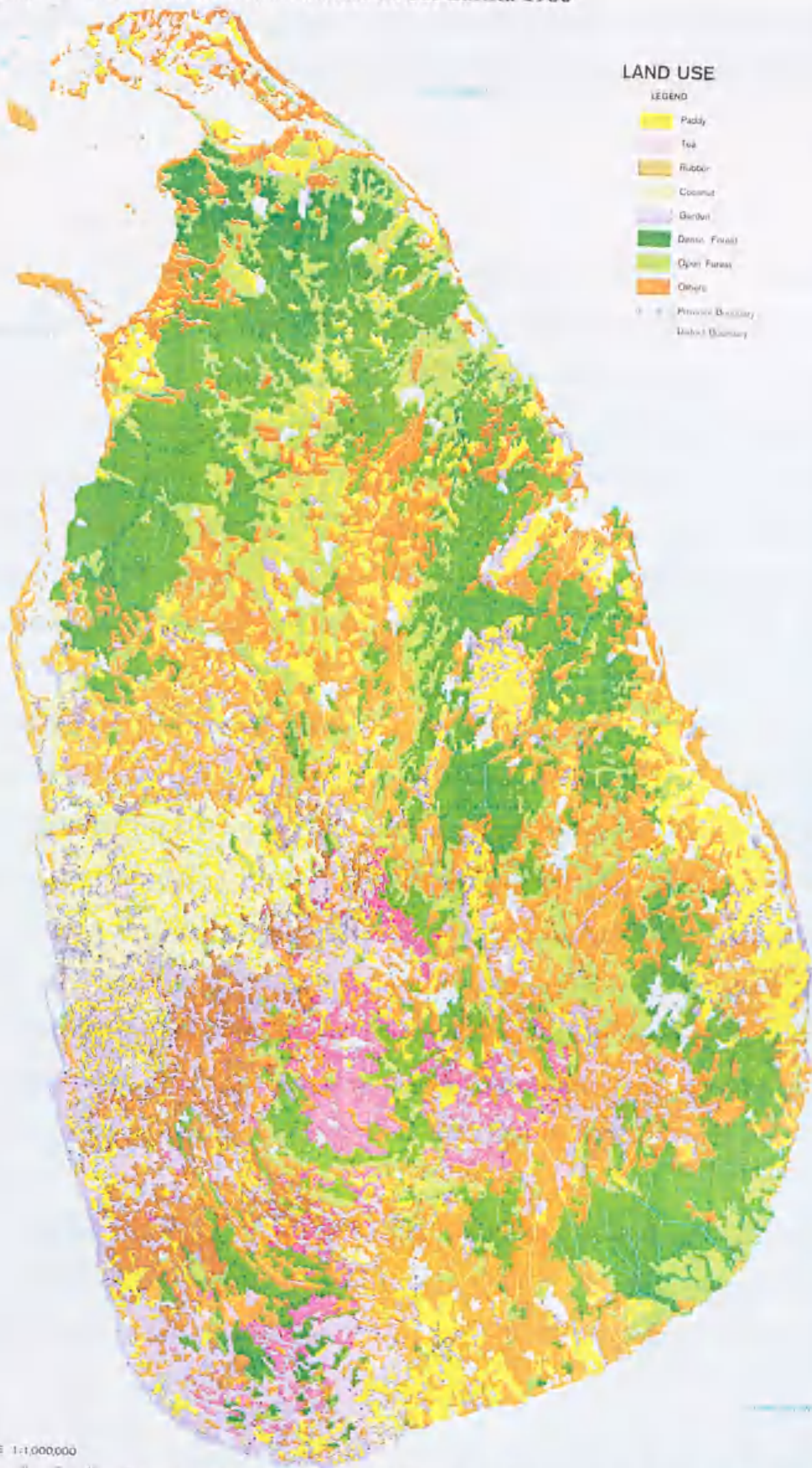
Crop Land	1962		1982	
	Extent (acres)	%	Extent (acres)	%
Crop Land	3,947,917	100.0	4,266,604	100.0
Arable Land	1,303,518	33.0	1,858,306	43.6
<i>Asweddumized paddy land</i>	1,135,188	28.7	1,376,331	32.3
<i>Land under other temporary crops</i>	168,330	4.3	481,975	11.3
Land under permanent crops	2,644,399	67.0	2,408,298	56.4
<i>Land under major plantation crops</i>	2,290,001	58.0	1,972,155	46.2
<i>Land under other permanent crops</i>	354,398	9.0	436,143	10.2

Source : Sri Lanka Census of Agriculture 1982 : Department of Census and Statistics Ministry of Plan and Implementation, 1986, p.68.

Note : 1 acre = 0.405 hectares
1 hectare = 2.471 acres

It can be seen table 2.3 that arable land has increased, but land under permanent crops has recorded decline in 1962 to 1982. There has been a shift from the major plantation crops to other permanent crops and temporary crops. It was mainly due to the efforts made by diversifying the exports of agricultural commodities by laying increasing importance of minor export crops with a view to reduce the undue independence of

Figure 2.2: Land Utilization Pattern in Sri Lanka 1986



SCALE 1:1,000,000

Source : Survey Department of Sri Lanka, the National Atlas: Survey Department Press in Sri Lanka, 1988.

major plantation crops, for foreign export earnings as well as due to highest priority given achieving self-sufficiency in rice and other food crops.

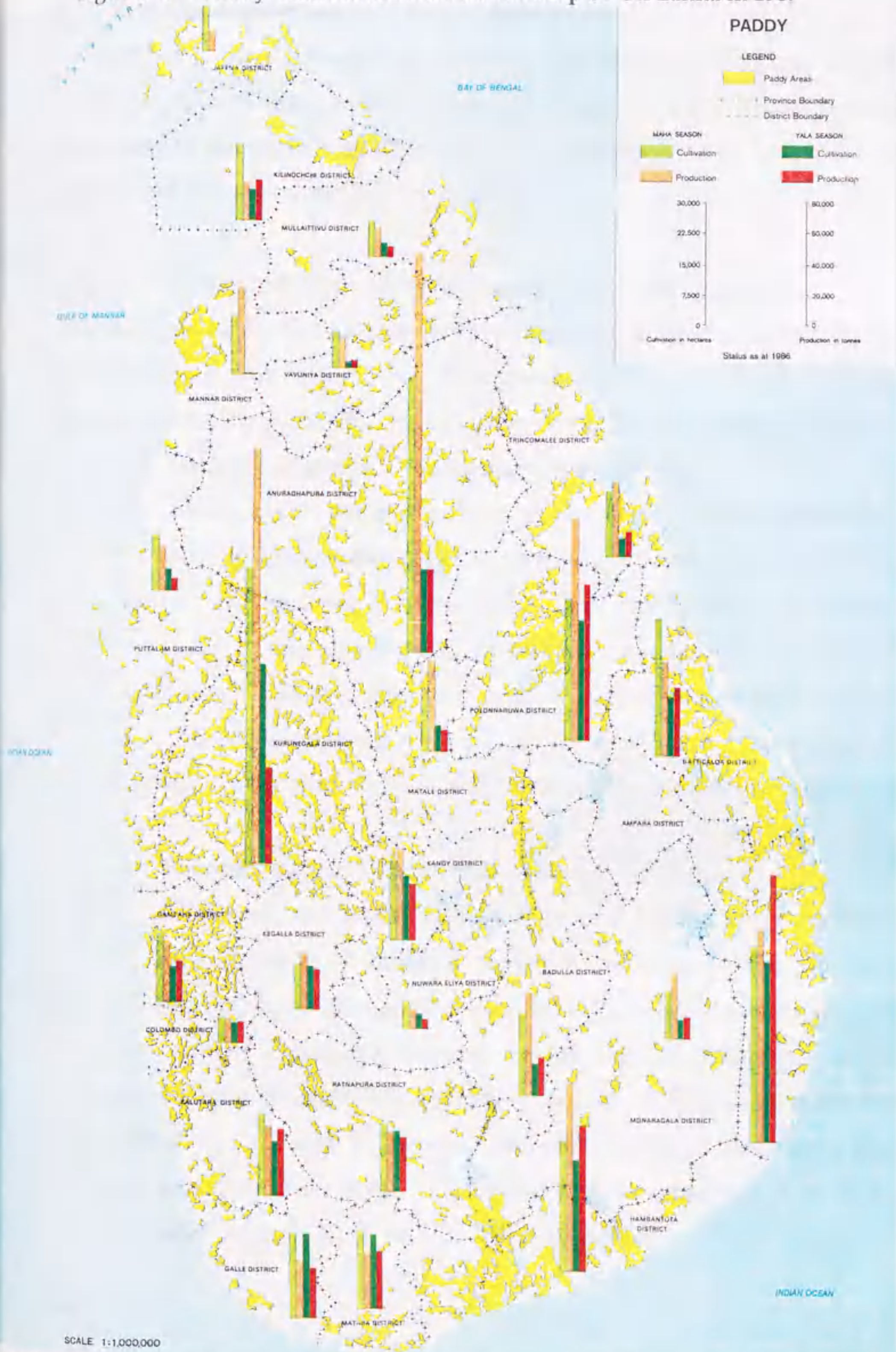
2.6) Paddy Growing area

Paddy cultivation in Sri Lanka is strongly influenced by topography and climatic factors that cause considerable regional variations. Sri Lanka is under the influences of both South-west monsoon from May to September and North-east monsoon from November to January. According to these rainfall pattern three agro-climatic zone are identified. They are: a *Wet Zone*, receiving a rainfall over 2500 mm per annum; an *Intermediate Zone* of 1900 to 2500 mm per annum; a *Dry Zone* receiving a rainfall of 1200 to 1900 mm per annum.

Two seasons of rice production, based on the pattern of rainfall distribution are also recognized in the country. The *Maha season* coincides with the North-west monsoon from October to February and in this season production is spread over the entire country. The *Yala season* coincides with South-west monsoon and production is mainly confined to the *wet zone* and major irrigation schemes in the *dry zone*. Paddy cultivation in each season commences only after receiving sufficient amount rainfall. Since each monsoon spreads over several months there is a large variations between districts in sowing and harvesting periods.

For the administrative purpose Sri Lanka is divided into 25 districts. Through out the country paddy is grown in both seasons. Paddy production in *Maha season* and *Yala season* are displayed in figure 2.3.

Figure 2.3 : Paddy Cultivation Distribution Map of Sri Lanka in 1987



Source : Survey Department of Sri Lanka, the National Atlas: Survey Department Press in Sri Lanka, 1988.

2.7) Systems of land use

The Sri Lankan peasant farm sector was characterized by complex systems of land tenure other than single ownership. These tenurial agreements are shown in figure 2.4, and descriptions of each tenurial agreement are summarized as follows:

2.8) Joint owned (Havul or partly owned and partly tenanted)

Under this category, no one has total ownership of the property, but everyone is a part owner. No individual can take any single decision which affects the property. Havul ownership can take various forms.

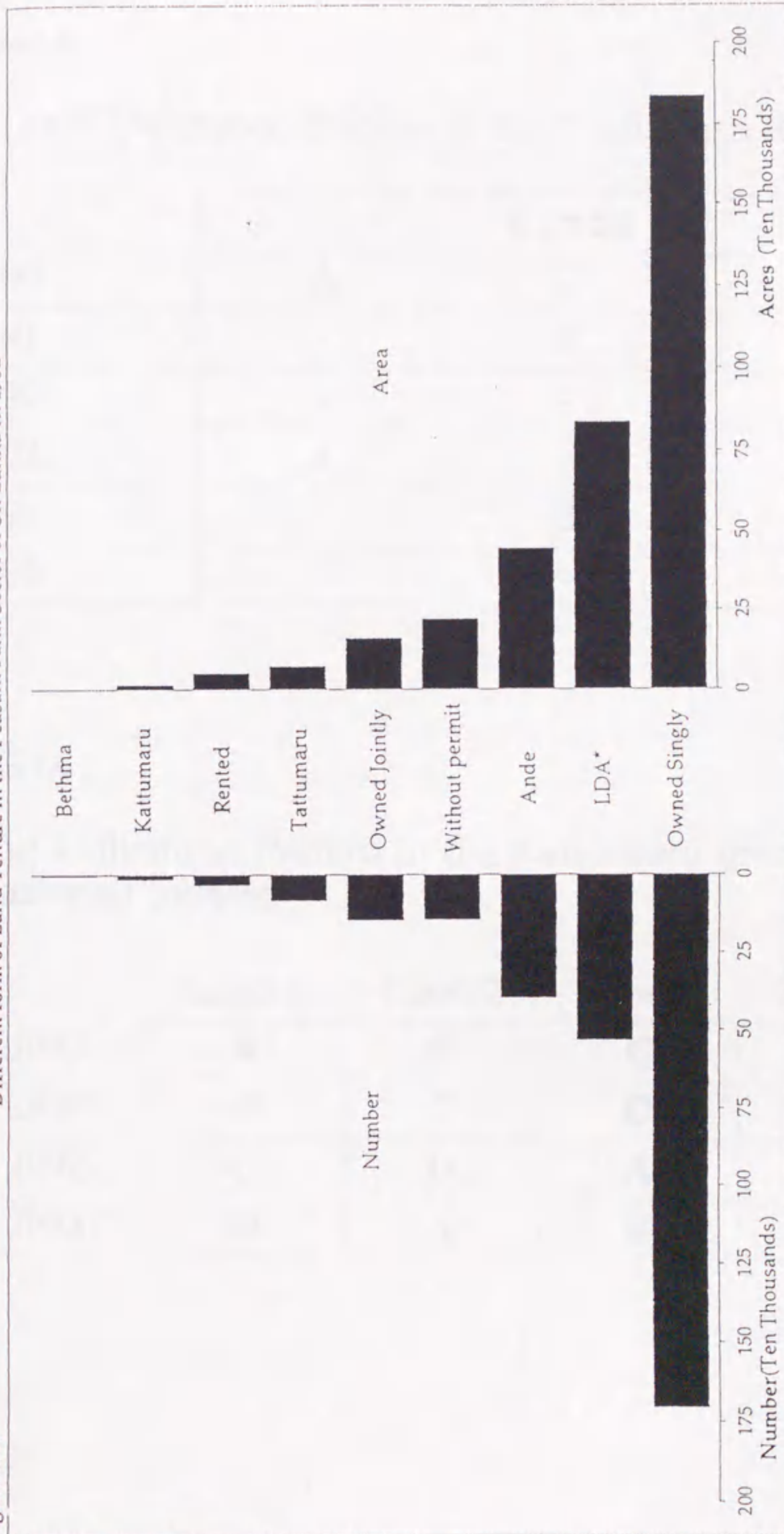
a) Tenancy rotation (Thattumaruru system)

Under the tattumaruru system, if one small holding belongs to a number of farmers, they rotate the land among them in different years. For example if a one paddy field owned to A, B, and C one year A take opportunity to cultivate paddy field and take the total harvest alone, then next year B cultivates and next rotate to C. All the conditions for rotating the land among each other are agreed to mutually or by a judgement of the court. (See figure 2.5)

b) Benefit rotation (Kattumaruru system)

Under the kattumaruru system, if several holders share ownership of several plots of land in different locations or in the same location under different facilities in such a situation those lands are rotated among the holders for an agreed period to equalize the benefits of lands. For example if the A, B, and C own the land called X, Y, and Z suppose utilization of these lands are agreed by yearly rotation basis. Three years in once each of A, B, and C operates the land X, Y, and Z. (See figure 2.6)

Figure 2.4 : Different form of Land Tenure in the Peasant Farm Sector of Sri Lanka in 1982



Source : Census of Agriculture in Sri Lanka 1982 : Department of Census & Statistics Ministry of Plan Implementation, 75, 1982(12).

Note : i). 1 acre = 0.405 hectares

ii). The number 2200 and area 2610 acres under *bethma* system is too small to be shown on this scale.

iii). * LDA means Land Development Authority of Sri Lanka

Figure 2.5

Land Utilization Pattern in the Tattumaruru System

	Lands		
1990	A	-	-
1991	-	B	-
1992	-	-	C
1993	A	-	-
1994	-	B	-
1995	-	-	C

Figure 2.6

Land Utilization Pattern in the Kattumaruru (benefit rotational) System

	Land 1	Land 2	Land 3	Land 4
1990	A	B	C	D
1991	B	C	D	A
1992	C	D	A	B
1993	D	A	B	C

c) **Situational sharecropping (Bethma system)**

This type of sharecropping prevails when water for a cultivation season normally using tank water proves insufficient for the farmers, they all gathered in a common place and take mutual agreement, at first thinking present available water in the irrigation source, then using that how many paddy fields to be cultivated are counted, then all the farmers cultivated decided paddy fields and finally, harvest is sharing each others. This type of practice is not common at present in Sri Lanka because of the new irrigation schemes.

d) **Land leasing system (Badu)**

Badu is Sri Lankan for "leasing". Under the badu system, a farmer can use the leased land for a defined period according to an initial agreement. For the usage of land beneficiary (farmer) has to pay leasing payment monthly or annually whether he gets profit or loss.

e) **Land mortgage system (Ukas)**

Ukas is the Sri Lankan term for mortgage. Under this system, the person to whom property is mortgaged can enjoy the benefit of the land until the mortgagor releases his land. If the mortgagor fails to release the land under the agreed person, title is transferred to the mortgagee.

2.9) Sharecropping (Ande)

Ownership is recognized as **ande** when the operator cultivates a holding owned by another party subject to the conditions agreed upon

mutually between the operator and the land owner. Agreed condition may be based either on a cash rental or on the basis of sharecropping rents. Before 1956, the law obliged a property owner to supply the tenants with seeds, fertilizer, half the labor cost etc. In exchange for half of the harvest. But in 1956, the Paddy Act changed the conditions. At present, the owner has a right to only 1/4 of the harvest, and the tenant has to bear all the expenses of cultivation.

Regional diversity of land tenancy among rice farmers is summarized in table 2.4. In the wet zone single ownership is less common than in the dry zone due to the population pressure on land in the wet zone. Though farms size are small in wet zone, the system of Ande is wide spread since owners prefer to engage in non-farm work and allow the land to be tended by farmers on a sharecropping basis. The joint ownership percentage in the wet zone, is higher than in the dry zone. In the Anuradapura district it is high due to many government land settlement schemes implemented in this area involving the development of new irrigation programs.

In the same table, land tenure in 1982 is depicted. It is interesting to note that in the dry zone the percentage of single ownership in 1982 was low, (below the 53%). But single ownership in 1995 had risen to more than 78%. After 1985, the government took the ownership of irrigated area land and retransferred it as new settlements, therefore we can predict the increasing gain as new settlements. In Anuradapura district also single owner ship increased with finishing of Mahaweli development program.

Table 2.4

Regional Diversity in Land Tenure of Rice Farmers in Sri Lanka

Kinds	Wet Zone		Dry Zone			
	Low Country	High Country	Inner	Anuradapura	North	South
Distribution of Land Tenure (%)						
Singly Owned (1994/95 Maha)	61.4	65.5	81.0	77.0	78.0	80.0
Jointly Owned (1994/95 Maha)	15.0	12.0	6.2	11.0	5.9	3.5
Ande (1994/95 Maha)	23.6	22.5	12.8	12.0	16.1	16.5
Distribution of Land Tenure (%) (1982)						
Singly Owned	62.0	54.6	44.0	42.4	52.4	37.9
Owned Jointly Tattumaruru	2.8	3.4	1.5	0.7	0.9	1.6
Owned Jointly Kattumaruru	0.5	0.7	0.3	0.3	0.7	1.4
Bethma	0.1	0.2	0.1	0.1	0.1	0.1
Owned Jointly Others	7.0	6.1	3.6	2.1	2.1	3.3
Land Permits Under LDA*	12.9	15.5	28.8	36.6	25.5	23.4
Rented from Private	0.8	2.0	0.6	0.5	2.2	1.8
Ande	12.0	13.4	13.2	10.8	9.2	16.9
Without permits	1.9	4.1	7.9	6.5	6.9	13.6

Source: Paddy Statistics: Department of Census and Statistics Ministry of Planning and Implementation 1994/95 Maha.

Census of Agriculture in Sri Lanka 1982: Department of Census & Statistics Ministry of Planning and Implementation, 82-84, 1982.

Notes: i) The districts included in each zone are as follows: **Low country wet zone**; Colombo, Gampaha, Kalutara, Galle, Matara. **High country wet zone**; Kandy, Matale, Nuwara Eliya, Badulla, Ratnapura, Kegalla. **Inner dry zone**; Kurunegala, Anuradhapura, Polonnaruwa, Mahaweli H. **Northern dry zone**; Puttalam, Mannar, Jaffna, Vavuniya, Mullaitivu, Batticaloa, Trincomalee, Killinochchi. **Southern dry zone**; Hambantota, Ampara, Moneragala, Udawalawe.

ii) *LDA = Land Development Authority.

iii) Anuradapura is a district of an inner dry zone.

2.10) Discussions of Regional Diversity in Rice Technology

Islandwide data reveal that there are significant differences in the adopted technology among Sri Lankan rice farmers (in both maha and yala seasons). This implies that technologies adopted by the rice farmers are a long-term phenomenon, and not subject to short term change. Therefore it is expected to take a long time to change the environment of adopted traditional technologies among farmers and to introduce new technologies.

As the wage rates, there are some regions where the selection of technology was systematically affected by the level of wages in as much as the higher the wage rate the less labor-intensive the technology adopted by the farmer (see table 2.1, high country wet zone and southern part of dry zone). But this is not true in the other regions where negative relationships prevails, i.e., though wage rates are lower, machine-oriented technologies are adopted by the farmers.

As for case of farm size, there is a positive relationship of the adopted technology in all regions to the function of land preparation, and in some regions to the weeding function. To the extent that farm size reflects the degree of population pressure against the land (as shown in the table 2.1), farm size in the wet zone is relatively small compared with the dry zone. If we observed the adopted technology with the farm size, it is clear that labor-intensive technologies are adopted for land preparation in the wet zone, while machine-oriented techniques are adopted for that same function in the dry zone. Therefore we can

come to the conclusion that when the farm size is small it is difficult to use machine-oriented techniques, as in the case in the high country wet zone area where there are many mountains and the farm size is very small. Moreover, population pressure in the wet zone indicates cheap wage rates in the area, which implies that highly disguised unemployment rates prevails there.

Regarding irrigation conditions, many parts of the dry zone have paddy cultivation based on major irrigation, whereas in the wet zone it is based on rainfed or minor irrigations. We can presume that the farmers were forced to use four-wheel tractors in order to shorten the time spent on land preparation with a view to saving irrigation water. Further more it appears that major irrigation schemes motivate farmers to adopt direct seeding which requires more delicate water control than transplanting.

The increase in the extent of paddy land in Sri Lanka during the past four decades was due largely to the development of irrigation in the drier parts of the country. Prior to the commencement of the Mahaweli Development program (early 1970s), this process mainly took the form of harnessing land and water resources within each locality or river basin for paddy cultivation. In the more recent past, however the emphasis in irrigation development has been on the large-scale diversion of river water from water surplus areas to deficit area.

The smallness of operational farm units is one of the most prominent features associated with the use of land for paddy cultivation in Sri Lanka (Table 2.5). What is of direct relevance in the present context is

that the ubiquity of small operational units implied the presence even within a small rice-growing locality of a large multitude of individual decision makers regarding the use of physical resources. This in itself does not constitute a problem in situations where the resource users act in mutual harmony and unison, as rural communities might have done in the past. Since that type of social ethos is no longer typical in the most parts of the country, considerable waste and misuse of resources has become common.

On smaller owner-cultivator farms, the incentives to capital-labor substitution are different and more complex. Many such farms face the dominant problem of accommodating the increase in the number of people as children grow up. This effort includes making the best use of family-owned resources, principally land, combined with increased utilization of outside opportunities of work on other farms, non-farm work, and various kinds of self employment. The net effects are likely to be further subdivision of the parental farm, increased off-farm work by family members resident on the farm, and the migration of some family members to other locations where employment can be found. These labor alternatives are dependent on the availability of outside employment opportunities. When such opportunities are scarce the net effect is to decrease the average size of farm and increase the ratio of days of human labor to the land.

The pressures of population growth, the risk of displacement from employment and income, and the dearth of non-farm employment make it desirable to consider more interventionist policies. When introducing interventionist policies, political obstacles, budget limitations, and

Table 2.5

Size Composition of the Operational Units of Paddy Land in Sri Lanka, 1982

Size Category	% of total	
	Number of Operational Units	Extent Areas
Less than 0.2 ha	19.1	2.8
0.2 to 0.4 ha	24.5	8.8
0.4 to 0.8 ha	23.8	17.2
0.8 to 2.0 ha	27.0	15.5
2.0 to 4.0 ha	4.3	44.2
4.0 to 8.0 ha	1.0	7.1
More than 8.0 ha	0.3	4.4

Source: Peris, G. M.: Development and change in Sri Lanka, Geographical Perspectives; *International Center of Ethnic Studies, Macmillan India Ltd.* 128.

considerable problems of implementation have to be considered. The following considerations seem important for the analysis of the desirability of tenancy and other interventionist reforms.

1) A desirable outcome of land reforms that widen ownership of cultivating families is precisely the enlargement of the number of rural families that gain autonomy in determining, for themselves, the path of agricultural development. This may include survival at low-income levels with existing production practices which, however, may be superior to alternative opportunities available to such families. Ownership and autonomy in decision making may be particularly important given the inability of government to implement its objectives and the limitation of budgets. However, it should be recognized that politically opportune occasions for carrying out land reforms are limited. New class distinctions and new vulnerabilities may appear after only one post reform generation.

2) Interventionist reforms may well be needed in improving delivery systems for small farmers, in providing credit, markets, technology and technical assistance, and in abolishing traditional arrangements.

CHAPTER 3

3) Labor Utilization of Paddy Cultivation and Chayanov Concept of Family labor

3.1) Systems of labor use

There are several traditional labor exchange systems native to the Sri Lankan subsistence agriculture sector. The proportion of such systems depends on the cost of other available techniques. These labor systems can be explained as follows;

3.2) Types of Labor in Sri Lankan Paddy Subsistence Sector

a) Attam Labor

Attam traditional term used for exchange labor. This labor is a kind of some special labor concept of Sri Lanka. In the village level when some work is to be done neighbors communicate, mutually agreed between each other and do the work. This is repeated among each other participated persons in the first day.

For example suppose A owns paddy land of 2 ha when he harvests the paddy land, neighbor paddy land owners come and help him providing the labor, suppose that 10 neighbors participated when A is harvesting paddy. Then one of among 10 neighbors harvesting day of paddy it is essential to participation of A. If A fails to participate he has to higher a labor and to be participated behalf of him. This custom is practicing in village level of Sri Lanka. All the people providing their labor as attam in a mutually agreed way.

b) Kaiya Labor

The *Kaiya* is also similar to *Attam labor*, the land owner invite his friends, to participate when he harvests his paddy lands. Persons who is free and willing work come to help the land owner in agreed date. All the participants are well treated that working day, and they all together eat specially prepared meal that day . This meal is also called *Kaiya*.

c) Ad-hoc Labor

Ad-hoc labor is informal type of labor in Sri Lanka. When some one expecting just meet a labor supplier, without having any pre arrangement suddenly agreed to provide labor necessary date is known as *Ad-hoc labor*.

d) Contract Labor

Under the contract labor informally organized labor supplier is there, and he meets the labor demander, and agreed to do specified work in specified price. Here the labor supplier is responsible for until finishing the specified work in agreed time. Labor supplier hired the labor in labor market and finished the work as agreed with a profit.

e) Hired Labor

Hired labor is open market labor. Supplier of labor come to a agreement with labor demanders and decide supply the labor in agreed wage. The wage is decided per hour basis or day basis or specified duration basis.

In subsistence agriculture not a well organized one in Sri Lanka it is known as informal labor market, therefore wage (price) of the labor is somewhat lower. Most of Sri Lanka subsistence sector labor is **Seasonal type hired labor**, this means labor hired only for the peak days of cultivation season. It is necessary to note some of the hired labors in informal labor market immigrate to urban sector in off seasons and provide their labor in agreed wage.

For example Suppose that A supplies his labor in subsistence sector in seasonal peak days, when no demand for his labor migrates to urban sector temporary and work urban sector until the next season.

f) Family Labor

It is widely agreed that reliance of family labor is a defining economic characteristic of Sri Lankan subsistence agriculture. Members of the peasant families, them selves provide the necessary labor for their own farm if the labor is not enough they hired outside labor or utilize the any kind of labor described above.

The family labor plays the vital role in subsistence agriculture in Sri Lanka. The predominance of family labor in production has an effect on the working of labor markets in peasant communities, since various subjective criteria peculiar to individual households are likely to influence both the supply and demand for wage labor in the wider market.

Table 3.1 explains the labor utilization of land preparation and harvesting functions in the Anuradapura district, Galnewa area.

Table 3.1

Labor Utility of Paddy Cultivation in Anuradapura District Selected Area (Galnewa)
1994 Maha Season

Labor category	Land Preparation			Harvesting		
	No. Households	% total Households	Area ha	No. Households	% total Households	Area ha
Family Labor	295	81.0	254	287	79	250
Attam Labor	43	11.8	33	96	19	81
Hired Labor						
Manual	134	36.8	114	189	51.9	167
Machine	111	30.4	100	8	2	6
Contract Labor	2	0.5	2	30	8.2	23
Kaiya Labor	104	28.5	97	94	25.8	69
Ad-hoc Labor	61	16.7	35	0	0	0
Others (Unspecified)	11	3.0	80	0	0	0

Source: Agricultural Crops and Livestock "Mahaweli System H": Department of Census and Statistics, Ministry of Finance Planning, Ethnic Affairs and National Integration, 26, 1994.

Note: In this Survey area the total number of households reported is 364 and Survey area is 300 ha.

Family labor is known to reach a high percentage during land preparation and harvesting. In the case of hired labor in land preparation, manual and mechanized labor are both very common. But during harvesting, mechanized hired labor is uncommon since Sri Lankan rice farmers are unaccustomed to using harvest machines. It is necessary to say that traditional labor exchange systems are still an important characteristic of Sri Lankan peasant communities.

In the microeconomic field there is well known theory about the peasant family labor, it is labelled as the *theory of peasant economy*. Following in this chapter detail description of the theory of peasant economy is given in Sri Lankan aspects.

3.3) Chayanov Concept Family Labor "the Theory of Peasant Economy"

" **The Theory of Peasant Economy**" put forward by the Russian economist A.V. Chayanov in the 1920s, which emphasizes the influence of family size and structure on household economic behavior, via subjective valuation of labor within the household. The peasant farm theory assumes that no labor market exists, hence farm household entirely reliant on family labor. Lack of labor market causes households to make two subjective decisions: (1) **work on farm**, (2) **work-avoidance on farm**. These two decisions conflict each other: work on farm is an income objective in order to satisfy consumption needs; work avoidance involves households to do separate activities than farm work which is against with income generation. The main factor influencing such household decisions is the **demographic structure** of the households.

Demographic structure means the formation of family unit. Formation of family unit can be categorized in two ways; **consumers** (non working people below 15 years and old people) **workers** (between 15 and 65 years). The demographic structure of the household is explained by the dependency or **consumer to workers ratio** (c/w ratio).

3.4) Relationship of the Chayanov Theory and the Sri Lankan Economy

The Sri Lankan economy, in the past has been concentrating on strategies for rural development through agricultural development. It was generally thought that such efforts would lead to economic growth and prosperity. This was based on the belief that the potential for growth lies in the development of the rural productive forces which include the technology of production, and the skills and productivity of labor. Seventy-four percent of the total population of Sri Lanka is classified as rural, most of whom are engaged in small-farm subsistence agriculture (traditional sector)^(a) or plantation agriculture (modern sector)^(b). Sri Lankan agriculture is a labor-oriented industry solely dependent on the rural labor force. Rural labor force represents the family labor in households and hired labor in rural labor market. The most common features of the Sri Lankan rural labor market are a fluctuation in the demand and supply of labor due to the seasonal nature of agriculture, a low absorption capacity of labor due to the lack of a diversified rural economy, and the absence of non-farm opportunities. All these facts lead to disguised unemployment, and finally to open unemployment in the rural sector. Unless a vigorous solution to this unemployment problem in rural sector, can be found the country's expected development cannot be achieved, because rural

development is a prime part of Sri Lankan economic development. The Chayanov "theory of peasant economy" is based on the rural family labor and their inheritance problems and some solutions. The aim of this study is to investigate to what extent the Chayanov model can be applied to the Sri Lankan-type dual characteristic economy.

The peasant household economy occupies the margins of the capitalistic economy. The main characteristic of the peasant household is that it has one foot in the market and the other in a subsistence mode, neither of which is fully integrated into that economy nor wholly insulated from its pressures. The economic study of farm families in the world has undergone formidable increases in its scope and complexity in recent decades. Many theories now exist to analyze peasant household behavior, e.g., the working of rural factor markets, the paths of technical change, the internal relations of farm households, and the prospects for peasants in a capitalist world economy. Among these approaches, the household decision making pattern constitutes **the theory of peasant economy**, which still makes valuable contributions as an analytical tool of a micro economy. The theory of peasant economy (put forward by the Russian economist A.V. Chayanov) emphasizes the influence of family size and the structure of the household economic behavior, via the subjective evaluation of labor within the household. In his theory Chayanov describes the peasant household decision making procedure through the labor availability of the family using both production and consumption functions, therefore this model is known as the theory of household utility maximization. Since the theory assumes the farm household is entirely reliant on family labor, the lack of a labor market causes time not working on the farm to enter the utility function as a goal separate from income. Hence

households are involved in two opposing objectives: work objectives and work-avoidance objective, therefore this theory is also known as the "drudgery-averse"^(c) of the rural peasant households. Further the theory explains the "demographic cycle"^(d) through family size and household structure.

(a) Labor intensive agriculture sector operating with small holdings.

(b) Capital intensive agriculture sector operating with large scale holdings.

(c) "Drudgery averse" choice between income and leisure.

(d) "Demographic cycle" family flow from one generation to another.

3.5) Definition of peasant households

Defining peasant households is not an easy task, because peasant life is based on social characteristics which differ from other social groups mainly with the field of social anthropology. *Chayanov* defined a family farm as "a farm normally run by a family without hired outside wage labor, sometimes in part engaging in non -agricultural crafts and trades." Since Chayanov's definition is very narrow and describes only labor and agricultural activity, we have to consider a broader definition. In recent decades the most acceptable definition is that introduced by *Frank Ellis*, i.e., "peasants are farm households, with access to their means of livelihood in land, utilizing mainly family labor in farm production, always located in a large economic system, but fundamentally characterized by partial engagement in markets which tend to function with a high degree of imperfection."

3.6) Assumptions of the Chayanov theory

For the purpose of model building, the Chayanov theory makes the following four main assumptions.

- (a) There is no market for labor, i.e., no hiring in or hiring out of labor by the household (absence of a labor market).
- (b) Farm output may be retained for home consumption or sold in the market, and is valued at the market price.
- (c) All peasant households have flexible access to land for cultivation.
- (d) Each peasant community has a social norm for the minimum acceptable per person, which implies that the household as a unit has a minimum acceptable consumption level.

3.7) Validity of the key assumption in the Chayanov theory

- a) **There is no market for labor, i.e., no hiring in or out of labor by the household (absence of a labor market).**

This is the key assumption of the Chayanov peasant economic theory, which implies that family farms depend solely on the work of their own family members without resort to outside wage labor. But this assumption does not exclude resort to outside labor on an ad-hoc basis in the peak harvesting period. However, this practice is negligible in the rural labor market. Chayanov stressed this assumption cannot be worked-out in capitalistic economy, because if absence of one factor in the factor market capitalistic economies market structure would not survive. In the rural labor market, the demand and supply of labor depend not on market forces but on the availability of family labor in the household. Therefore peasant family farms ordinarily have no hired labor and they pay no wages which are not relevant to family activities among rural peasants. Chayanov took the entire family household as

the single economic unit among peasants. Based on this, he introduced the labor/consumer balance between the satisfaction of family needs and the drudgery of labor, which means that, since there is no labor market, they work for the family's prime goals and spend the rest of the time in leisure (there being no demand for labor). In further developing his concept of the labor / consumer balance, he explained how to calculate the return to peasants. He began with the peasant family household's gross annual product minus expenses like seed, fodder, repairs, and the replacement of expired livestock and worn out equipment. After deducting household expenses he arrived at their net income, including the return for their labor during that agriculture year. The net income was to provide the family budget for consumption and for capital formation to raise the farm's potential level of production. Chayanov insisted that there is no valid way of estimating the monetary value of their work because all they can see before them is the net product of that work. The nature of Chayanov's theory defines their return as something unique and indivisible.

b) Farm output may be retained for home consumption or sold in the market, and is valued at the market price.

As Chayanov assumed that total family production is retained for their consumption, any surplus is sold in the prevailing market and valued at the market price. This assumption depends heavily on the main assumption that 'there is no market for labor'. Non-existence of the labor market means that peasant households have a choice in consumption needs for survival purposes (work for consumption) and spending the rest of the time work-avoidance (spending time leisure or other activities). Therefore, the utility function includes the alternatives of income earning and leisure. Income here implies the output retained

for home consumption and the monetary value of surpluses in the market. Goods retained for consumption and surplus sold in the market depend on family size and composition. If the family is large, consumption need are correspondingly great, and vice versa. Chayanov strongly assumed that output should be sold at the market price; otherwise the net profit of the peasants might be miscalculated.

c) All peasant households have flexible access to land for cultivation.

Peasant farms that have a considerable amount of land are therefore able to utilize the family's whole labor force at an optimum degree of cultivation rather than to lease or buy land. This assumption was based on the socialist system prevailing at that time in Russia. The impact of flexible access to land is to defer one set of diminishing returns as labor use increases, since extra labor is combined with additional rather than fixed land. In other words, production function may have a constant marginal return before diminishing marginal returns.

d) Each peasant community has a social norm for the minimum acceptable income per person, implying that the household as a unit has a minimum acceptable consumption level.

Farm households must meet a minimum acceptable standard of living according to their family structure. If that level is reduced, they cannot survive. This minimum level according to Chayanov depends solely on size of the family.

3.8) The Labor - Consumer Balance

Chayanov's central concept for analyzing family economics was the labor / consumer balance between the satisfaction of family needs and

the drudgery of labor. In developing this concept, he stressed that peasant households have experience in agriculture over many generations. Therefore, peasant families are in a position either to work more hours or to work more intensively, and sometimes even both. The capacity for work of peasant families in such a situation he called "the degree of the self-exploitation of family labor." The peasant would put greater effort into increasing output if it could be devoted to greater family consumption or to enhancing the investment in the family, or to both. The mechanism Chayanov used to explain how peasant families achieved their labor/consumer balance is that each family would work to adequately meet their basic needs; anything more than that involves drudgery. Peasant families do not work beyond the point where the possible increase in output is outweighed by the irksomeness of the extra work involved. Each family strikes a rough balance between the degree of satisfaction of family needs and the level of drudgery required. Chayanov showed that the balance between consumer satisfaction and the degree of the drudgery is affected by the size of the family and the ratio of working members to non-working members. In his analysis, Chayanov examined the effects on the labor/consumer balance of a wide range of factors such as size of holdings, qualities of soil, crops grown, livestock, manure, location, market prices, land prices, interest rates on capital loans, feasibility of particular crafts and trades, availability of alternative work, the relative density of population, etc. In weighing the influence of these several elements on the delicate balance between family needs and the drudgery of labor, he employed the technique of a marginal utility analysis through the demand satisfaction and marginal expenditure of the work force.

3.9) Consumers to workers ratio

As mentioned above, households made a subjective decision as to the drudgery of the farm work to meet consumption needs. The most influential factor in these decisions is the demographic structure of the household; in other words, composition of the household influence the above two conflicting decisions. In every peasant household, the family composition includes both working and nonworking members. Taking the demographic structure into account, Chayanov introduced the ratio of consumers to workers in the household, known as the c/w ratio. For example, if a household consists of just two adults and children, its c/w ratio (consumers 2, workers 2) $2/2 = 1$; but for an adult with elderly parents and two children (each contributing half of an adult's work contribution) the c/w ratio is (consumers 5, workers 2) $5/2 = 2.5$. The c/w ratio gives some predictive advantage. If the number of dependents rises, the c/w ratio would rise, meaning that the work days of the working people in the family have to increase to achieve their consumption needs. If the number of the family working members increases, the c/w ratio would fall.

3.10) Peasant family cycle pattern

The peasant family organization has no recourse to hired labor. The labor force and its composition and degree of labor activity are entirely determined by the family composition and size. Family composition means the number and variety of family membership. In any family labor-based organization, workers and consumers are determined by the number and age of family members. If the number of children in a family is high, consumers in the family increase; and if there are many

young children in the family, the number of workers increases. The composition of consumers and workers in the family determines the lower and upper limits of their living standard or the volume of economic activity required for their support. Hence, family makeup is one of the chief factors in peasant farm organization. Family size and composition influence farm organization quantitatively, and qualitatively determine the level of their activity. Therefore, it is necessary to analyze formation of peasant family size and the family's generational flow.

If a surviving child is born every third year to a young family, their future family composition and development can be shown by the rough scheme in table 3.2.

(For analytical purposes, the death rates of grown children and any exceptionally higher birth rates were ignored). In this example of a birth every three years, the consumption level of the total family increases gradually. In the early stage, parents have to increase their working contribution to feed the family. As the children grow, they would join their parents at work, (normally a child of 15 years works as an adult). Theoretically, we only count each child's contribution when he or she attains 15 years of age. Table 1 shows the first child starting work at 15, which is also true of the second and third children. When the father is 50 years old and the mother is 45, four children can contribute as farm workers, but gradually they will leave to start families of their own on their own farm. If, when the last child joins the family work force, the father is 64 years old and mother is 59, half of the family will already have married and left the household to raise children of their own. If we expand our analysis further we can include consumer/workers contributions in the same example (table 3.3).

Table 3.2

Family Members' Ages in Different Years in the Chayanov's Concept

Years of Family Existence	Husband	Wife	Age of children									Number of Persons
			1st	2nd	3rd	4th	5th	6th	7th	8th	9th	
1	25	20	-	-	-	-	-	-	-	-	-	2
2	26	21	1	-	-	-	-	-	-	-	-	3
3	27	22	2	-	-	-	-	-	-	-	-	3
4	28	23	3	-	-	-	-	-	-	-	-	3
5	29	24	4	1	-	-	-	-	-	-	-	4
6	30	25	5	2	-	-	-	-	-	-	-	4
7	31	26	6	3	-	-	-	-	-	-	-	4
8	32	27	7	4	1	-	-	-	-	-	-	5
9	33	28	8	5	2	-	-	-	-	-	-	5
10	34	29	9	6	3	-	-	-	-	-	-	5
11	35	30	10	7	4	1	-	-	-	-	-	6
12	36	31	11	8	5	2	-	-	-	-	-	6
13	37	32	12	9	6	3	-	-	-	-	-	6
14	38	33	13	10	7	4	1	-	-	-	-	7
15	39	34	14	11	8	5	2	-	-	-	-	7
16	40	35	15	12	9	6	3	-	-	-	-	7
17	41	36	16	13	10	7	4	1	-	-	-	8
18	42	37	17	14	11	8	5	2	-	-	-	8
19	43	38	18	15	12	9	6	3	-	-	-	8
20	44	39	19	16	13	10	7	4	1	-	-	9
21	45	40	20	17	14	11	8	5	2	-	-	9
22	46	41	21	18	15	12	9	6	3	-	-	9
23	47	42	22	19	16	13	10	7	4	1	-	10
24	48	43	23	20	17	14	11	8	5	2	-	10
25	49	44	24	21	18	15	12	9	6	3	-	10
26	50	45	25	22	19	16	13	10	7	4	1	11

Source : Vologda statistics : The Theory of Peasant Economy, A.V. Chayanov, p. 57.

Table 3.3

Consumers to workers ratio in the Chayanov's Concept

Years of Family Existence	Married Couple	Children									Consumers	Workers	C/W
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th			
1	1.8	-	-	-	-	-	-	-	-	-	1.8	1.8	1.00
2	1.8	0.1	-	-	-	-	-	-	-	-	1.9	1.8	1.06
3	1.8	0.3	-	-	-	-	-	-	-	-	2.1	1.8	1.17
4	1.8	0.3	-	-	-	-	-	-	-	-	2.1	1.8	1.17
5	1.8	0.3	0.1	-	-	-	-	-	-	-	2.2	1.8	1.22
6	1.8	0.3	0.3	-	-	-	-	-	-	-	2.4	1.8	1.33
7	1.8	0.3	0.3	-	-	-	-	-	-	-	2.4	1.8	1.33
8	1.8	0.3	0.3	0.1	-	-	-	-	-	-	2.5	1.8	1.39
9	1.8	0.5	0.3	0.3	-	-	-	-	-	-	2.9	1.8	1.61
10	1.8	0.5	0.3	0.3	-	-	-	-	-	-	2.9	1.8	1.61
11	1.8	0.5	0.3	0.3	0.1	-	-	-	-	-	3.0	1.8	1.66
12	1.8	0.5	0.5	0.3	0.3	-	-	-	-	-	3.4	1.8	1.88
13	1.8	0.5	0.5	0.3	0.3	-	-	-	-	-	3.4	1.8	1.88
14	1.8	0.5	0.5	0.3	0.3	0.1	-	-	-	-	3.5	1.8	1.94
15	1.8	0.7	0.5	0.5	0.3	0.3	-	-	-	-	4.1	2.5	1.64
16	1.8	0.7	0.5	0.5	0.3	0.3	-	-	-	-	4.1	2.5	1.64
17	1.8	0.7	0.5	0.5	0.3	0.3	0.1	-	-	-	4.2	2.5	1.68
18	1.8	0.7	0.7	0.5	0.5	0.3	0.3	-	-	-	4.8	3.2	1.50
19	1.8	0.7	0.7	0.5	0.5	0.3	0.3	-	-	-	4.8	3.2	1.50
20	1.8	0.9	0.7	0.5	0.5	0.3	0.3	0.1	-	-	5.1	3.4	1.50
21	1.8	0.9	0.7	0.7	0.5	0.5	0.3	0.3	-	-	5.7	4.1	1.39
22	1.8	0.9	0.7	0.7	0.5	0.5	0.3	0.3	-	-	5.7	4.1	1.39
23	1.8	0.9	0.9	0.7	0.5	0.5	0.3	0.3	0.1	-	6.0	4.3	1.39
24	1.8	0.9	0.9	0.7	0.7	0.5	0.5	0.3	0.3	-	6.6	5.0	1.32
25	1.8	0.9	0.9	0.7	0.7	0.5	0.5	0.3	0.3	-	6.6	5.0	1.32
26	1.8	0.9	0.9	0.9	0.7	0.5	0.5	0.3	0.3	0.1	6.9	5.2	1.32

Source : Vologda statistics: The Theory of Peasant Economy, A.V. Chayanov, p. 58.

In the first stage when young children are unable to work, they become more of a burden to the head of the family, and contribute to a rapid increase in the proportion of consumers to workers. In the fourteenth year of the family's existence, the c/w ratio reaches its highest point, 1.94. But in the fifteenth year, as the first child reaches semi-working age, the c/w ratio immediately falls to 1.64. In the twenty-sixth year of the family, the ratio falls to 1.32. In reality, no such sudden leaps occur, since the transition from a child unable to work to that of a half-time to full worker is a gradual one. Basically, the burden of the head of the family becomes lighter each year the children take a greater part in the work. This demographic cycle is a common feature of peasant societies in rural areas, as Chayanov noted.

3.11) Economic activity of a peasant family

In every peasant farm organization, family composition primarily defines the upper and lower limits of the volume of its economic activity. The labor force of households is entirely determined by the availability of able-bodied family members. The highest possible limit for volume of activity depends on the amount of work a labor force can give working at its maximum. On the other hand, the lowest activity level is determined by the sum of material benefits absolutely essential for the family's mere existence. The volume of economic activity considered here includes all forms of economic activity, both agricultural and in the form of crafts and trades. In adopting the volume of economic activity as an economic concept, we have to take into account all the elements of the household's economy in order to

measure it quantitatively. Many empirical investigations have made use of production factors such as sown area, number of livestock, size of arable land, etc. that can serve to measure the volume of economic activity quantitatively. Among them sown area is often taken as a measure to arrive at many conclusions as to economic activity since land area is a material security of the peasants. Family size and the number of family members determine their sown area, and thus their level of economic activity. For example, in Novorod Guberniya (according to recorded budgets), the percentage of young families consisting of a married couple and children below working age in categories sowing different areas amounts to the following.

Sown area (Desyatinas)	0 - 2	2 - 4	>4
Percentage of young families	42.9	20.8	0.0

Source: The Theory of Peasant Economy, A.V. Chayanov p. 66

The increased percentage of young children in groups that sown a small area and the family size depend on the farm size. In other words a small sown area consists of young families with a large number of young children, whereas larger areas consist of older families in which small children do not play a great part. Another detailed analysis of sown areas in fifteen years time will help us to reach a conclusion; cf. Russian Kushchenko's data (table 3.4) which compares the 1882 and 1911 census data for Surazh Uezd, Chernigov Guberniya. Table 3.4 shows that farms cultivating small area will, in the course of 15 years, continue to cultivate the same small areas, and that farms well endowed will, as before, cultivate large areas and raise large families. We can see from the table that many of the farms that

Table 3.4

1911 sown area by 1882 sown area groups (%)

Desyatinas Sown in 1882	Desyatinas Sown in 1911					Total
	0-3	3-6	6-9	9-12	>12	
0-3	28.2	47.0	20.0	2.4	2.4	100.0
3-6	21.8	47.5	22.3 ^a	6.0 ^b	2.4	100.0
6-9	16.2	39.0 ^c	26.8	11.3	6.7 ^d	100.0
9-12	9.6	35.8	26.1	12.4	16.1	100.0
>12	3.5	30.5	28.5	15.6	21.9	100.0

Source: The Theory of Peasant Economy A.V. Chayanov, p. 67.

Note: Since table figures do not match total, I have altered them as follows:

- a) 24.4 - 22.3
- b) 8.2 - 6.0
- c) 37.0 - 39.0
- d) 2.4 - 6.7

cultivated very small areas gradually acquired a labor force as family age and size increased and, by expanding the total cultivated area, passed onto a higher level and increased their economic activity. Conversely, former large farms passed into lower groups corresponding to the small families created after division. This tells us that the demographic processes of growth and family distribution by size also determine to a considerable extent the distribution of farms by size of cultivated area and numbers of livestock.

3.12) Measure of self-exploitation of the peasant labor force

As a peasant farm develops, the number of family working hands into farm size, the income has to be determined additionally. Thus, to what extent these hands are utilized, and what part of potential working time is actually expended, the intensity of their labor or degree of self exploitation must also necessarily be analyzed.

The gross production of peasants consists of all income the family receives in the course of a year both in agriculture and other applications of its labor in farming, crafts and trades. After calculating the gross product, we deduct all annual overhead connected with capital renewal and annual expenditures on the farm. Net production means the annual payment to the farm family for labor expended on all economic activities.

The many factors influencing the size of agricultural production include the degree of its labor and capital intensity, size of the family, the market, natural condition, technological factors, and the availability

of resources. Since the peasant theory is based on family labor, here we are going to analyze the economic activity involved in family labor and farm productivity. A family farm worker's annual labor depends on two factors which determine his annual productivity, i.e., the degree of intensity of his annual work (the quantity of labor energy the peasant worker wants to expend in one year) and the labor productivity of each labor unit expended (economic and technical conditions that assure his labor of a particular productive effect). Most intensive daily labor gives significant annual income if rise in the market price and fertile soil. Conversely, an unfavorable market situation and poor soil discourage labor intensity. On the other hand, the level of productivity depends not so much on farm factors as on general economic factors like soil fertility, advantageous location of the farm in relation to the market, current market situation, and local land relations. Here we deal only with labor intensity or the measure of self-exploitation of peasant labor because the factors determining the labor productivity depend more on management aspects than on economic aspects.

The particular feature of labor organization in agriculture is its seasonal nature, demanding particularly favorable weather conditions. Therefore, the labor intensity curve in agriculture always reflects realities such as uneven cultivation, mowing, harvesting, and amount of work on specialized crops which sometimes demands an exceptionally large number of workers. For example, the Tver farm in Russia recorded the following monthly average length of a working day in actual hours worked.

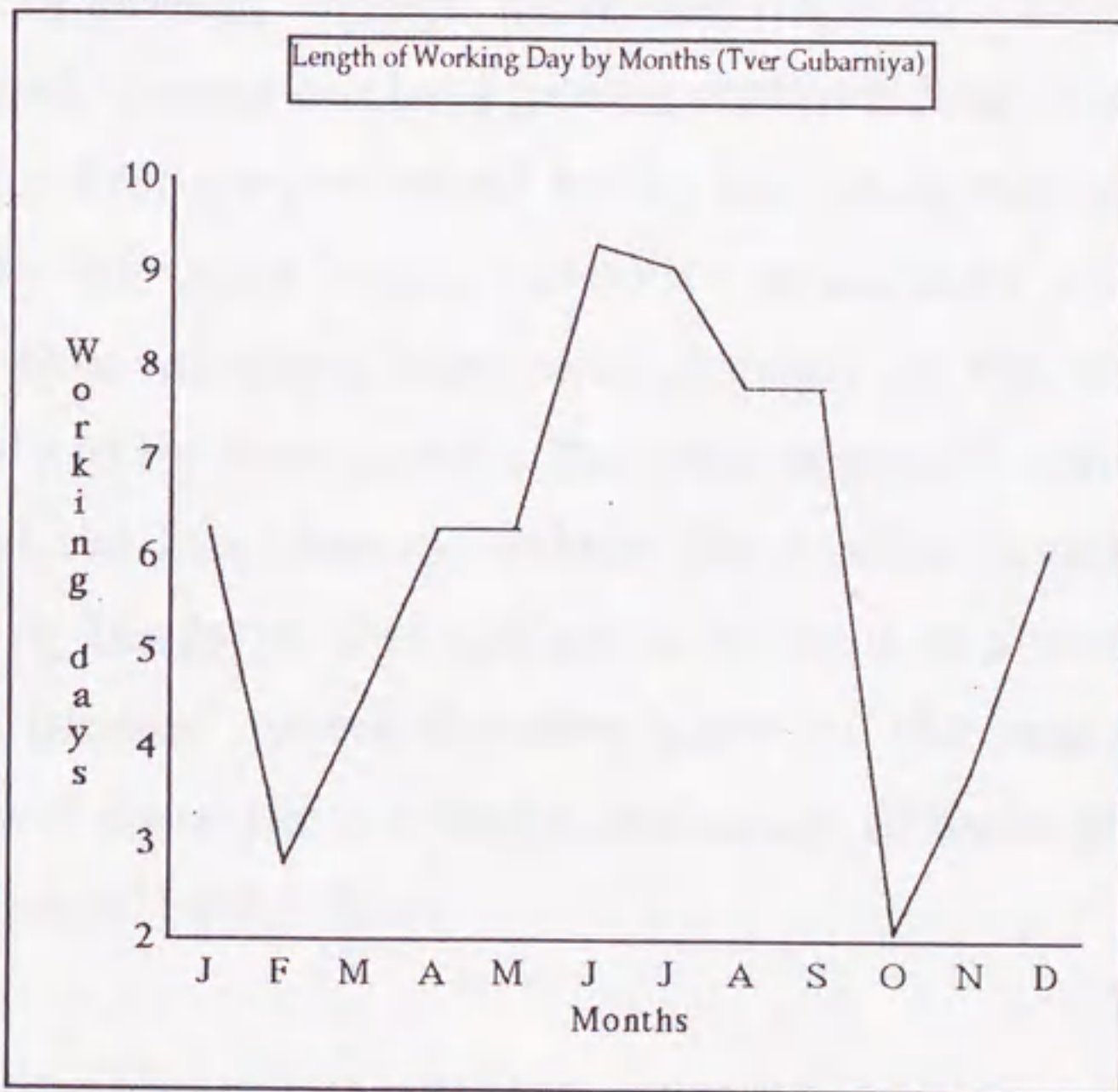
January	6.3	July	9.1
February	2.8	August	7.8
March	4.5	September	7.8
April	6.3	October	2.1
May	6.3	November	3.8
June	9.3	December	6.1

Source : The Theory of Peasant Economy, A.V. Chayanov p. 75.

(These data are the basis of the labor intensity curve in figure 3.1).

Figure 3.1

Average Monthly Working Days in Actual Hours Tver Farm in Russia



Source : The Theory of Peasant Economy, A.V. Chayanov, P. 75

The measure of self-exploitation depends mostly on how heavily the worker is burdened by the consumer demands of his family. The number of consumers depends on the structure of the family. The larger the number of consumers the faster the consumer demand grows. Therefore, the volume of economic activity depends on the number of consumers and not the number of workers. As we know, the economic activity of labor differs from any other activity in that the quantity of values that become available to the person running the farm corresponds to the quantity of physical labor expended. But the expenditure of physical energy is not limited by the human organism. A small expenditure is accompanied by little satisfaction, and further expenditure of energy brings more satisfaction. The greater the quantity of work carried out by a person within a definite time period, the greater the drudgery involved in the last (marginal) unit of labor expended. On the other hand, subjective evaluation of the values obtained by this marginal labor will depend on the extent of its marginal utility to the farm family. But since marginal utility falls with the growth of the total sum of values that become available to the subject running the farm, there comes a moment at a certain level of rising labor income when the drudgery of the marginal labor expenditure will equal the subjective evaluation of the marginal utility of the sum obtained by this labor.

3.13) Basic principles of peasant farm organization

Any agricultural organization or undertaking is a combination of land, labor, and capital. Normally, a peasant farm means any family economic unit in which work is connected with the expenditure of physical effort, and where earnings are proportional to this

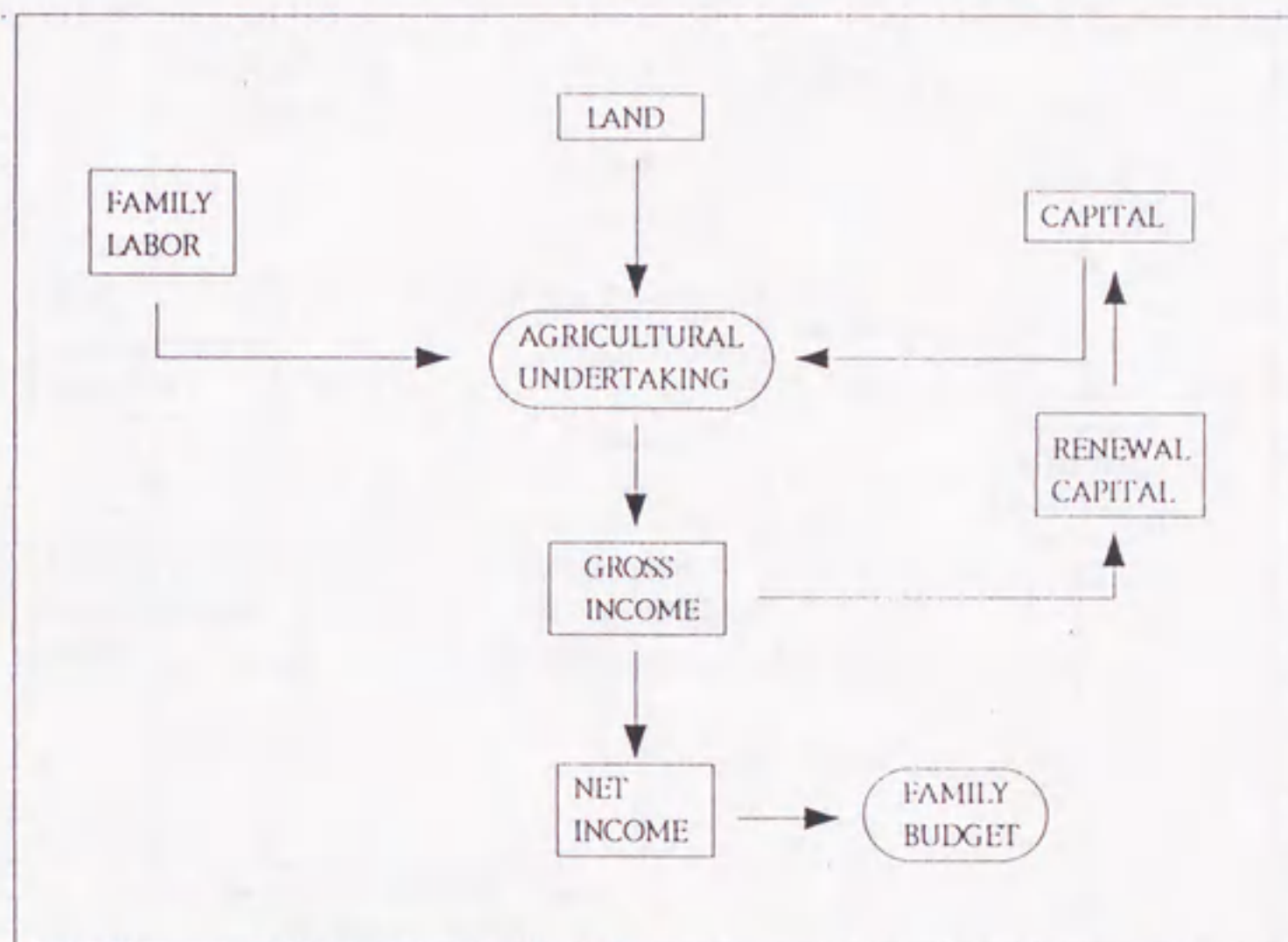
expenditure, whether the economic unit be an artisan, a cottage, or simply any economic activity involving family labor. When the organization is based on the principles of the family labor farm, the peculiar feature the labor force is fixed by being present in the composition of the family. The labor force cannot be increased or decreased at will in the short run. Therefore, this type of organization is necessary to keep the factor of production in an optimal relationship to this fixed element. This confines the total volume of economic activity to quite narrow limits. Family labor based on an agricultural organizational structure is depicted in figure 3.2.

If the agricultural organization consist of both agricultural and non-agricultural activities, the basic structure is somewhat more complex (figure 3.3).

Family labor based on agriculture undertaking, the labor force of the family is something given, and the farm's production are fixed accordance with it in the technical harmony usual among them. Given the freedom to acquire the necessary area of land for use and the possibility of having available the necessary means of production, peasant farms are structured to conform to the optimal degree of self-exploitation of the family labor force and in a technical optimal system of production factors as regards their size and the relationship of their parts. Any excess of production means that available labor or land above the technical optimum level will be an excessive burden on the undertaking. It will not lead to an increased volume of activity, since increasing the intensity of labor beyond the level established for the family's self-exploitation is unacceptable. Family productivity due to an

Figure 3.2

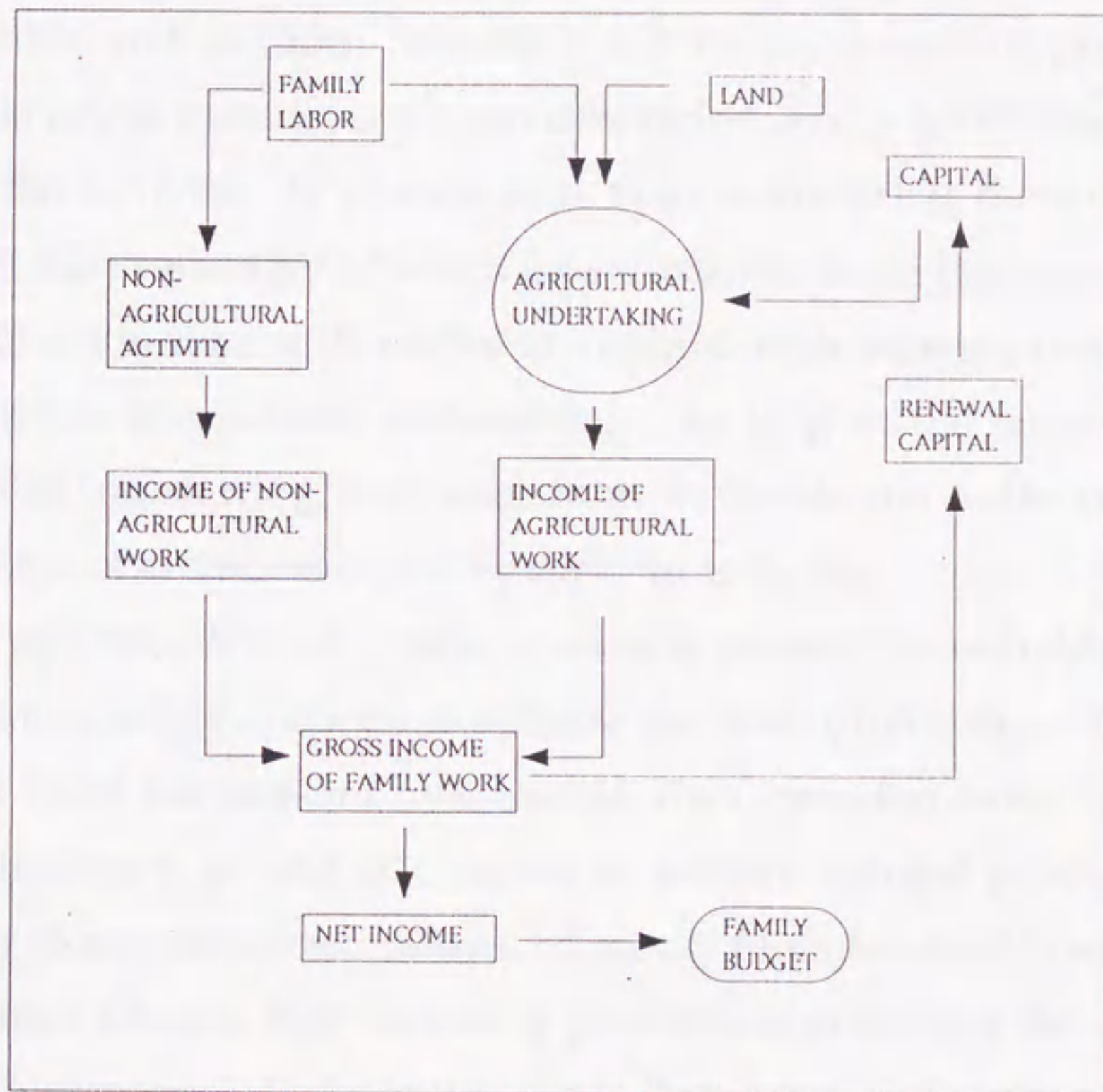
STRUCTURE OF THE PEASANT FAMILY ORGANIZATION



Source: The Theory of Peasant Economy, A.V. Chayanov.

Figure 3.3

STRUCTURE OF THE COMPLEX PEASANT FAMILY ORGANIZATION



Source: The Theory of Peasant Economy, A.V. Chayanov.

increase in capital intensity naturally cannot be raised once the achieved rate of provision is itself optimal.

Apart from this, it is essential to note that very frequently, due to both predictable and random causes, land or the means of production available is less than the optimum demanded, and is insufficient for full use of the farm family's labor. It is then natural that the production element, the availability of which is less than the norm demanded by the technical environment, becomes to a considerable extent a determining factor in the agricultural undertaking. As long as the farm does not succeed in transferring this factor from the minimum to the optimum, the volume of activity will closely conform to its size.

The optimum level depends upon how peasant households allocate their factors of production to achieve the total production. Although labor is fixed for peasant households, they can alter other factors of production such as land and capital to achieve optimal production. If we refer to sample investigations, it is easy to understand how peasant households allocate their factors of production to achieve the optimum level. Novgorod Guberniya and Tambov Guberniya budget investigations are shown in table 3.5.

In the table, it is explained that fixed capital varies with the number of persons in the family. The capital intensity of labor falls sharply with an increase in the number of workers given the same amount of capital. Conversely, with an increase in capital, given unchanged family size, there will be an increase in capital intensification. The influence of capital intensification with constant family size does not allow us to trace the influence of family activity on the farm, given the same rate of

capital intensity. Therefore, we have to compare using a somewhat altered form of analysis. Table 3.6 compares the influence of family size, the amount of capital, and the cultivated area.

It shows that when the family increases its capital, it naturally generates a greater volume of agricultural activity. On the other hand, it also shows that, as the peasant family's work force increases, it succeeds in raising the level of agricultural activity with the same amount of capital, compensating for its lack of additional capital by its labor intensity.

Since the amount of capital remains the same as the family increases, its workers are in a worsening situation as regards the availability of fixed capital. Naturally, the equilibrium of basic economic factors is attained at a lower level of worker activity (table 3.7).

As we see, the worker, encountering ever worse conditions, starts to reduce his output. This reduction in production influences the volume of activity, and this then affects the basic economic equilibrium, causing the worker to reduce his output due to the increasing drudgery of his work, thus leading to a reduction in the family's well-being, i.e., less satisfaction of demands, despite the possibility of making use of earnings from crafts and trades.

Suppose that, in a particular year, the farm does not have the land or capital needed to develop an agricultural undertaking optimal as to the relationship between the farm and the family size. In such a situation the farm has to reduce the volume of agricultural activity, and this

Table 3.5

Fixed capital (rubles) per worker

No. of workers in family	Novgored Guberniya family fixed capital				Tambov Guberniya family fixed capital			
	0 - 500	500 - 1000	1000 - 1500	1500 - ∞	0 - 500	500 - 1000	1000 - 1500	1500 - ∞
0 - 2	187	349	-	-	154	360	-	-
2 - 4	122	202	355	692	120	243	385	747
4 - ∞	71	146	213	309	86	139	208	368

Source : The Theory of Peasant Economy, A.V.Chayanov, p. 95.

Table 3.6.

Influence of capital and family size on cultivated area

No. of workers in family	Novgored Guberniya family fixed capital				Tambov Guberniya family fixed capital			
	0 - 500	500 - 1000	1000 - 1500	1500 - ∞	0 - 500	500 - 1000	1000 - 1500	1500 - ∞
0 - 2	1.7	2.1	-	-	3.4	3.6	-	-
2 - 4	2.3	3.3	4.5	5.1	3.1	4.6	7.7	8.1
4 - ∞	2.9	3.7	5.1	6.9	4.6	6.1	8.6	14.1

Source : The Theory of Peasant Economy, A.V. Chayanov, p. 96.

Table 3.7

Influence of family size and fixed capital on cultivated area (Desyatins) *per worker

No. of workers in family	Novgored Guberniya family fixed capital				Tambov Guberniya family fixed capital			
	0 - 500	500 - 1000	1000 - 1500	1500 - ∞	0 - 500	500 - 1000	1000 - 1500	1500 - ∞
0 - 2	1.01	1.17	-	-	1.91	2.02	-	-
2 - 4	0.83	1.01	1.35	1.66	1.01	1.48	2.49	2.53
4 - ∞	0.56	0.75	0.89	0.98	0.94	1.23	1.56	2.38

Source : The Theory of Peasant Economy, A.V. Chayanov, p. 96.

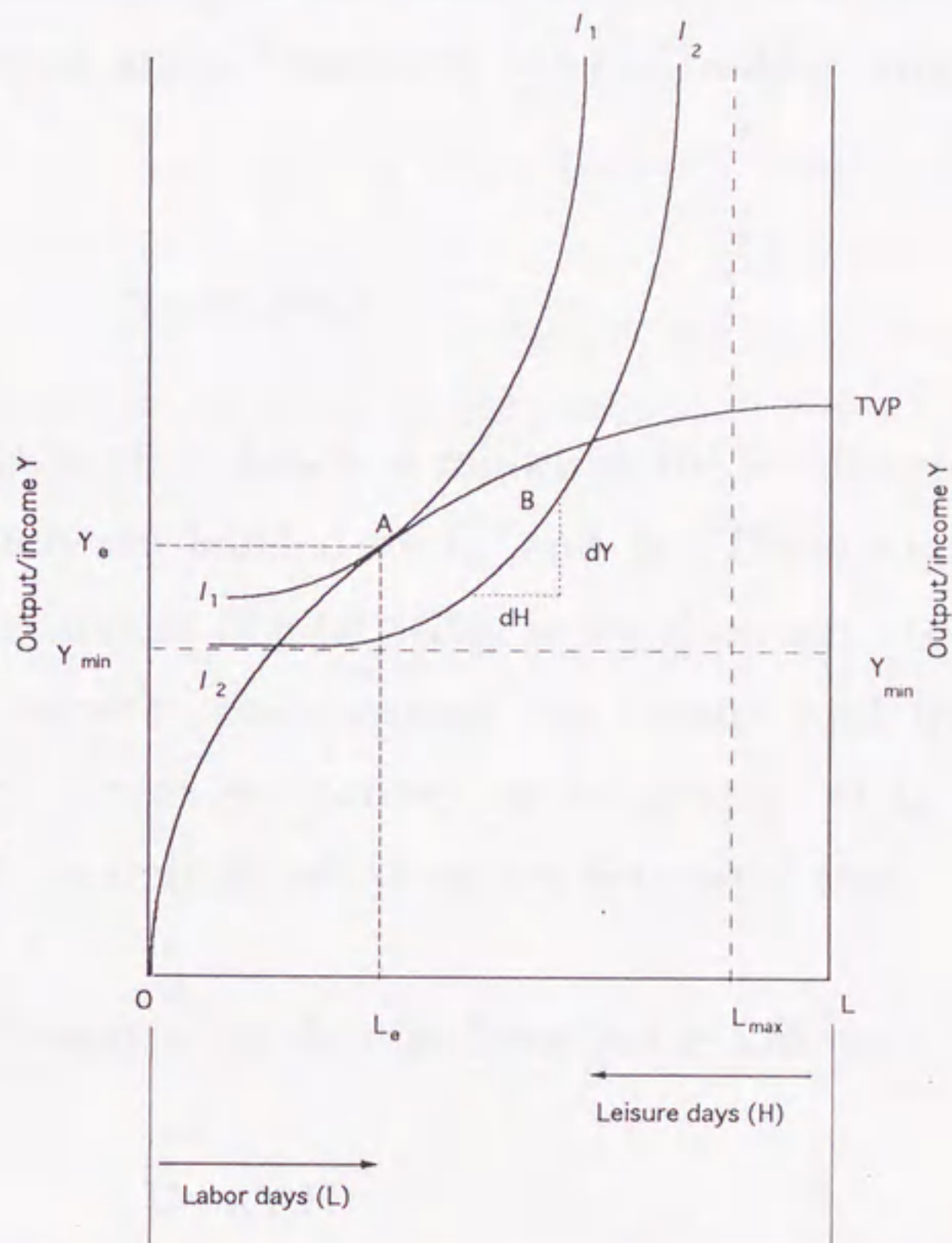
*Note: Desyatina is a Russian unit of area measure; 1.1 hectares = 1 Desyatina.

minimizes the supply. How far to reduce the volume is a complex process involving the influence of deteriorating conditions for agricultural production on the basic equilibrium the economic factors. In such a situation, the farm inevitably transfers its unutilized labor into crafts, trades, and other extra-agricultural livelihoods. The whole of its income from agriculture, crafts and trades is in conflict with its demands, and the drudgery of acquiring leads to an equilibrium with the degree of satisfaction of these personal demands. Therefore, all forms of the influence of family composition and size on the family worker's output, and the other consequences income are added to derive the family income.

3.14) Graphic Illustration of Chayanov Theory

The central elements of the Chayanov theory of peasant household behavior are depicted in figure 3.4. The gross output of the peasant farm, which equals gross farm income, is measured on the vertical axis. Here income is measured in money terms. The horizontal axis measures the total labor time available to the household, which is determined by the number of its workers. **Since there is no labor market, the total time can be allocated either to farm work or other activities (leisure).** In the graph, the number of working days on the farm is measured from left to right, **OL**, and the number of days engaged in other activities is measured in the opposite direction, from right to left, **LO**.

Figure 3.4



Chayanov model of farm household

Source: Peasant Economics: Farm Household and Agrarian Development, Frank Ellis, p. 107.

The graph depicts both the production and consumption aspects of household decision making. The production function describes how the output responds to varying level of labor input. The total variable production (**TVP**) represents the production function. The **TVP** curve displays diminishing marginal returns of labor in various stages. Since output and income are the same, the **TVP** curve can be labeled as a family income curve. Therefore, we can build a production function notation.

$$Y = P_y \cdot F(L)$$

The consumption function represent the indifference curves in the graph, which are labeled as I_1 , and I_2 . These indifference curves describe the amount of total utility in the alternative combination of the consumer, where combinations are leisure and income. All the indifference curves are convex to the origin at L , since leisure is measured from right to left along the horizontal axis.

The utility function can thus be described as follows:

$$U = f(Y, H)$$

The slope of the indifference curves explains the marginal rate of substitution of one thing for another (in this case income for leisure hours), and point **B** explains the amount of income, dY , which the household needs to obtain, has to compensate for the loss of one unit of leisure, dH . In other words, from the loss of one unit of leisure the household gains some income (subjective wage level) since output and

income represent the vertical axis, L . In the graph the I_1 indifference curve combination is higher than the indifference curve I_2 . The relative wage level of different combinations indicates the slope and position of the indifference curve.

In the graph, Y_{\min} indicates the minimum acceptable standard of living for the household. In other words, the household must earn Y_{\min} level of income for survival. Therefore, any indifference curve hitting the minimum consumption curve (Y_{\min}) at the bottom left will become horizontal at that level; and the marginal utility of leisure becomes zero (no amount of leisure could compensate for a fall in income below the minimum survival level).

On the other hand, L_{\max} line shows the maximum number of full working days feasible for the household, meaning that the marginal utility of income becomes zero (no more income could compensate for a fall in leisure above the maximum income level).

Therefore, any indifference curve hitting the maximum working days (L_{\max}) at the top right will become completely vertical at that level.

Both these maximum and minimum levels are determined by the demographic structure of the household family size and the number of workers in the family.

The equilibrium position is seen at point A , where TVP touches the highest possible indifference curve. At equilibrium point A , the combination of the labor input is labeled as L_e , and the combination of

income is labeled as Y_e . At point A the marginal product of labor (MVP_L) equals the family labor time (dY/dH) i.e., the amount of income required to compensate for the loss of one unit of leisure. Thus, at the equilibrium point of the graph, it can be listed as follows.

$$MU_H MU_Y = dY/dH = MVP_L$$

Finally, it is easy to summarize the microeconomic behavior of the peasant household formulated in the Chayanov model as maximizing the utility subject to three main constraints.

- (a) the production function;
- (b) the minimum acceptable income level;
- (c) the maximum number of working days available.

The following notation can be used to summarize it.

$$\max U = f(Y, H)$$

subject to: $Y = P_Y \cdot f(L); Y \geq Y_{\min}; L \leq L_{\max}$

This Chayanov model is in stark contrast to profit maximization in capitalistic enterprises, in that its marginal labor product is essentially synonymous with the market wage. Furthermore, Chayanov considered the microeconomic equilibrium of the household as a unique economic calculus of the peasant household which is quite different from capitalist enterprises.

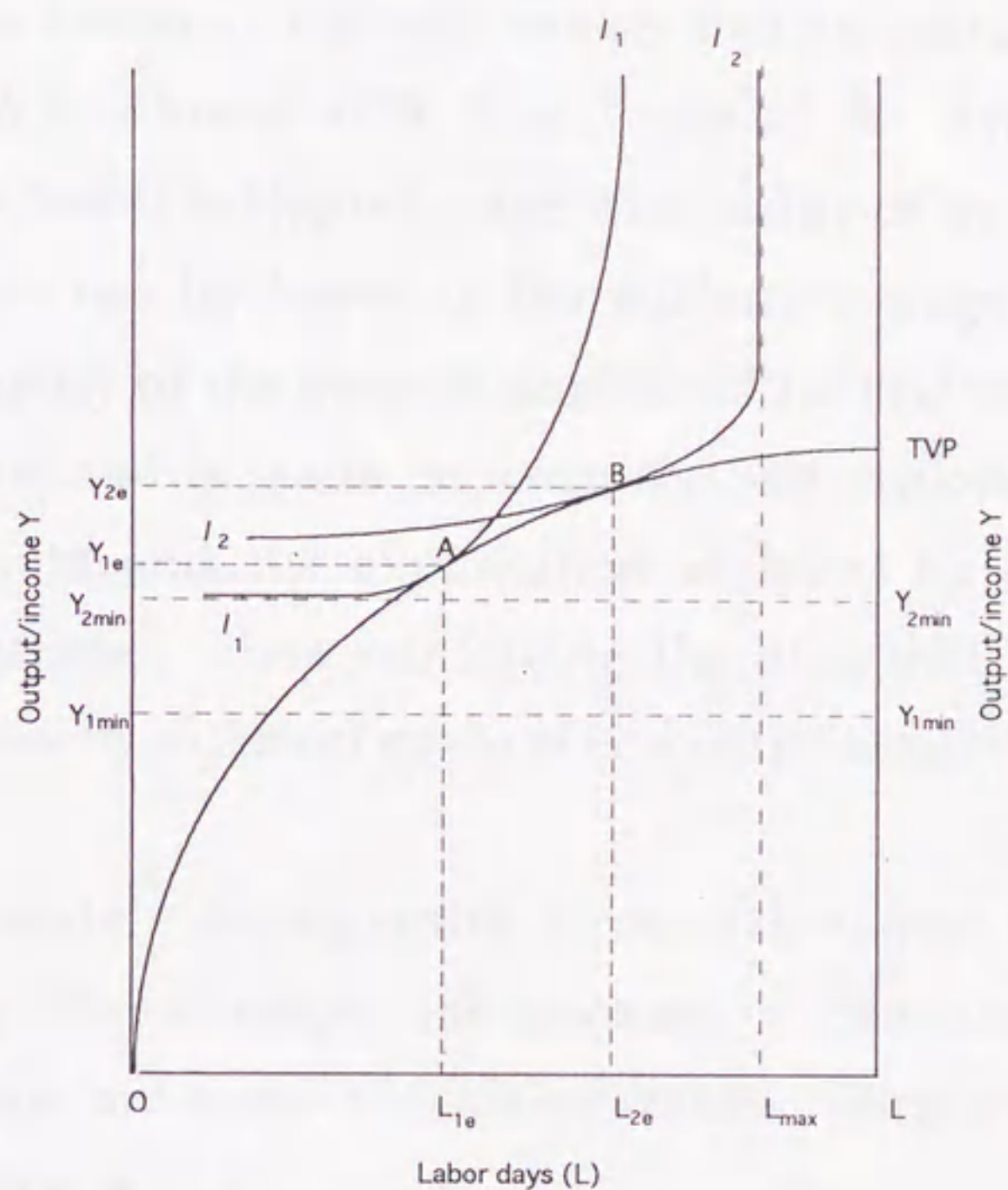
The most important part of the theory family size and family composition is relevant to peasant decision making. **Maximum and**

minimum levels of output depend on family size and the family work force. In addition, peasant communities as a whole and their average levels determine the lower and upper limits of economic activity. Family size and composition are also determinant of leisure hours and income in the household utility function.

By analyzing this model further, it is easy to understand, that the proportion of farm output which is kept for household consumption has no influence on either the slope of the income leisure or on the equilibrium position. See figure 3.5.

Like Figure 3.4, gross output or gross farm income is here measured on the vertical axis. Total labor time available to the household is measured on the horizontal axis (available time depends on family size and composition). The total time can be allocated to either farm work or other activities (**drudgery**). The number of work days on the farm is measured from left to right, **OL**, and the number of days engaged in other activities is measured in the opposite direction, **LO**. The **TVP** curve explains the production function of the household. Since the output and income are (according to the assumption of the Chayanov model) synonymous, the **TVP** curve also represents the family income curve. The **I₁** and **I₂** curves represent the indifference curve of the households. As the family size and structure increases, the c/w ratio will rise the minimum consumption constrain is risen from Y_{1min} to Y_{2min} , reflecting the increased consumption needs of a larger family. Thus, the shape of the position of the income-leisure indifference curve changes. The curve will assume a shallower slope because the marginal utility of income

Figure 3.5



Impact of higher consumer worker ratio

Source: Peasant Economics: Farm Household and Agrarian Development, Frank Ellis, p. 110.

has increased and the marginal utility of leisure has decreased at all points of the curve. In other words, the preferences of the household change due to the need to feed a larger family. This means that the household is prepared to accept a smaller rise in income (dY) in order to compensate for the loss of one unit of leisure (dH) than before, at all points of the curve.

The new equilibrium is established at a higher output, Y_{2e} , and a higher labor input, L_{2e} , than the former equilibrium Figure 6. On the given production function, this also implies that the marginal product of labor, (MVP_L), is lower at **B** than it was at **A**, consistent with optimization at a lower subjective wage. This ability of the farm family to intensify labor use by lowering the subjective wage Chayanov termed "**the capacity of the peasant household for self-exploitation.**" Here again a contrast is made between the self-exploitation of the peasant household and the exploitation of labor by capital in a capitalistic enterprise, thus reinforcing the idea that the peasant household operates by a distinct mode of economic calculation.

Chayanov model demographic structural change in the farm household on equilibrium output and labor use in change in production function. But there are many alternative factors which may alter the production function, such as:

- (a) a change in the technology of production
- (b) a change in the market price of output
- (c) a change in other resources which combine with labor to produce output.

Consider that any of the changes will tend to shift the family income curve upward, it puts households on a higher indifference curve than before. However, since their impact on labor use is neglected by the Chayanov model, a further positive substitution effect and a negative income effect cannot be predicted by this type of model.

Further the Chayanov theory does not predict the factors which affect the production function relative to the infrastructure of the household. The main factor influencing the production function is the demographic structure of the household (composition of working and nonworking members in the family). Chayanov called this the ratio of consumers to workers in the household, or the c/w ratio.

In brief, Chayanov constructs a model theory of the peasant household that includes both consumption and production components. The key elements are the size of the peasant family, the absolute number of workers in the family, the social norms for a minimum acceptable standard of living, and the c/w ratio. These elements lead to a change in the production function of the household. The size of the area cultivated varies directly with family size. According to the model, family size will lead to a larger area to be cultivated, but land being scarce in a peasant economy, the size of the farm imposes limits on family size.

3.15) Validity of the Chayanov Peasant Farm theory in Sri Lankan

Family Labors Aspect

The Chayanov model sets up a theory of the peasant household which integrates both the consumption and production decisions of the peasant family. The key elements of the theory are the size of the peasant family, its demographic structure, its consumer/worker ratio, the absolute number of workers in the family, and the social norm for a minimum acceptable standard of living. These elements lead to a distinctive type of economic calculation for peasant households.

There are advantages and disadvantages of Chayanov model and some vague points which are somewhat questionable.

(a) According to the theory, the marginal and average products of labor should vary significantly between household composition in relation to their demographic structure. This emphasis varies with labor efficiency in each society.

(b) The number of days or hours devoted to farm work per family should vary directly with the consumer/worker ratio. As the c/w ratio rises, the amount of time devoted to farm labor by each worker should increase.

(c) According to Chayanov, increasing family size causes a larger area to be cultivated, meaning that the size of the area should vary directly with family size. But in the actual world of a land scarce peasant economy, the size of the farm might impose limits on family size.

(d) The lower the c/w ratio, the higher the average income per person in the household, because a low c/w ratio means a higher subjective wage, placing the family in a position on the production function with a high marginal returns for labor.

(e) This type of model has not generally been found very useful in formulating policy due to factors affecting households decision patterns and, subsequently, the production function. Some thought has been given by policy analysts to a way of influencing the income-leisure trade off so as to raise the marginal utility of income and then decrease the level of utility. This causes peasant households to operate at a higher output and for a lower wage on their production function. For example, crop taxes reduce cash income, consequently reducing the subjective wage, resulting in higher labor input at a lower wage.

(f) There is an implicit assumption in the theory that both males and females are equally interchangeable for farm work. However, in reality a woman's allocation of time is mainly for reproductive activities (child bearing and rearing), productive activities (animal husbandry, cultivating food crops), leisure activities (meals, personal hygiene). Therefore, women have a role distinct from men, and illusions of interchangeability are misleading when calculating the c/w ratio and the economic activities of peasants.

(g) The uniqueness of household decision making in the model is solely attributable to the lack of a labor market, but it disappears when a labor market is introduced.

There are wider issues arising from the Chayanov theory of peasant economy concerns theoretical merits, that the theory concerning separate peasant mode of production which is distinct from the capitalistic mode. In the peasant household, buying and selling does not occur independently as in the capitalistic model. Peasant transactions are limited to family survival. In such a situation the Chayanov model is ideal because it is a theory based on family labor and family structure. In modern societies, the rural economy is organized around either simple farms, extended families, landless laborers, sharecroppers, or around plantations and estates. The Chayanov concept is ideal for simple peasant farms run by family based labor.

Though the above arguments reduce the validity of the Chayanov model, it remains still important for labor-intensive agriculture-based countries with a small industrial sector due to the theory to concentrate on the utility maximization type and the household decision making relative to family size and composition.

In Sri Lanka, subsistence economy is formed with different types labor, family, hired, Attam etc. Out of them Chayanov concept applicable in relation with family labor. In Sri Lanka subsistence family labor features and Chayanov introduced family labor are similar in many aspects, e.g., family based labor, a labor consumer balance, a peasant

family cycle pattern, economic activity and optimum level of labor, dependency ratio. But though the basic characteristics are matched the Chayanov model, carries less weight for the following reasons.

(1) In Sri Lanka, rural hired labor and other kind of labor (Attam, Kaiya, etc.) plays an important role, rendering the main assumption of the Chayanov model less important.

(ii) The Chayanov model of labor consumer balance cannot be applied to Sri Lankan peasant families as is because those peasant households have not only basic needs but also a wide range of complex needs. Thus they are not in a position to balance labor and consumption by using leisure. Instead, they will look for work either on or off the farm. Because they are living in mixed type economy. Which is complex than Chayanov thought.

(iii) As Chayanov mentioned, the peasant family cycle pattern is not common because most of subsistence family laborers search for employment in industrial sector due to ongoing problems in the agricultural sector and faced the competition in the prevailing society.

(iv) Allocation of the optimum level of labor cannot be applied to Sri Lankan society due to a labor surplus in the rural labor market which caused for open and disguised unemployment.

(v) In Chayanov theory main assumption "there is no labor market" can not be applied Sri Lankan type because, actually (though it is unorganized) labor market exists.

To what extent this theory is applicable to the Sri Lankan economy depends on the importance of family labor in the rural labor force and the availability of work in the agricultural sector. If, in the rural labor

force the proportion of family labor is reduced, or if labor intensive agriculture is transformed into capital intensive agriculture, the model become less applicable. In present day Sri Lankan society, family labor is still an important factor in the rural labor force, and the proportion of labor intensive agriculture is high. Until changes, occur in the above two factors, this Chayanov type of model can be used, but only with the necessary adjustments whenever it seems inapplicable.

CHAPTER 4

4) Comparative study of Paddy Cultivation Practices in the Anuradapura District, Eppawela Area

4.1) Objective of the Survey

The main objective of this study is to identify the factors that effected the widening income disparities between small rice farmers and large rice farmers in Sri Lanka through the survey data, with a view of providing a more systematic understanding of rice farmers, income distribution and modern agricultural development.

4.2) Methods of the Survey

For the purpose of identifying the rice farmers' production environment and income distribution, two sets of data were collected in Anuradapura district, Eppawela area. The first round of the survey was conducted in 1997 and was called the **extensive survey**, which provided a broad picture of the production environment. In this survey, 110 rice farmers were covered in three areas.

- i) **Traditional village** (82 sample farmers).
- ii) **Non-traditional area** (13 sample farmers).
- iii) **Mahaweli H area** (15 sample farmers).

A basic questionnaire was distributed and each farm family was interviewed for about 2-3 hours by the survey team. It took 15 days for the team to finish this survey as they gathered data relating to demographic factors, production environments, cropping patterns, technology adoption, rice yield and land tenancy characteristics. The second round of the survey was conducted in 1998 and was called the

intensive survey, covering 75 out of the 82 farmers who were surveyed in 1997 in the traditional area. A complete census was conducted to gather farmers' costs and income sources, taking 20 days.

In the total survey, farms are classified according to operational holdings. The characteristics of each category is as follows:

Small farmers : Those who operate less than 2 acres, and experience difficulties in getting enough income for family livelihood.
(< 2 ac)

Medium size farmers: Those who operate more than 2 acres and less than 4 acres, and can manage farm maintenance mainly with family labor. They are also labelled as standard farmers.
(2-4 ac)

Large farmers : Those who operate more than 4 acres and less than 8 acres), and both family labor and employees are the main labor for farm operations. Most of this category of farmers engage in different kinds of non farm activities to earn more money.
(4-8 ac)

Super large farmers: Those who operate more than 8 acres, the largest farms in the area, and also highly depend on employees for farm work. They own agriculture machineries, and do side business throughout the year.
(> 8 ac)

4.3) Introduction of the Survey area

Anuradapura is the largest district in the country, located in the dry zone lowlands of the North Central part of Sri Lanka, and covers an area of 7129 km², with a population of 0.6 million (See figure 4.1). The district is characterized by a 2000 year history of development. The development of rice farming since the turn of this century has been brought about mainly through the development of a dry zone irrigation infrastructure, which always took the form of colonization projects with farmer settlers migrating primarily from the densely populated wet zone to the dry zone. At present the Anuradapura district accounts for 9% of Sri Lanka's total rice production; about 95% of the district's rice area is planted with modern rice varieties.

Figure 4.1: The Anuradapura District Map

Anuradhapura District



Source : Based map 1:25000, Survey Dept.

The surveyed area Eppawela is located in the Southeastern part of the Anuradapura district, and is supported by two small rivers, constructed canals, water tanks, and a small part of the area is fed by the major irrigated Mahaweli water (Mahaweli is the longest river in Sri Lanka) (see figure 4.2).

4.4) Categories of the survey area

i) **Traditional area** called Mawathawewa

Mawathawewa area is located Eastern part of the Eppawela area. There are 143 families living in Mawathawewa area out of them 82 families were surveyed. Main occupation of the people is agriculture. There are 6 water tanks located in the area. The main water tank in this area is called 'Mawathawewa tank' which is more than 50 ha large. Jayaganga is the main river near to project area. Mawathawewa tank is fed by the Jayaganga's water.

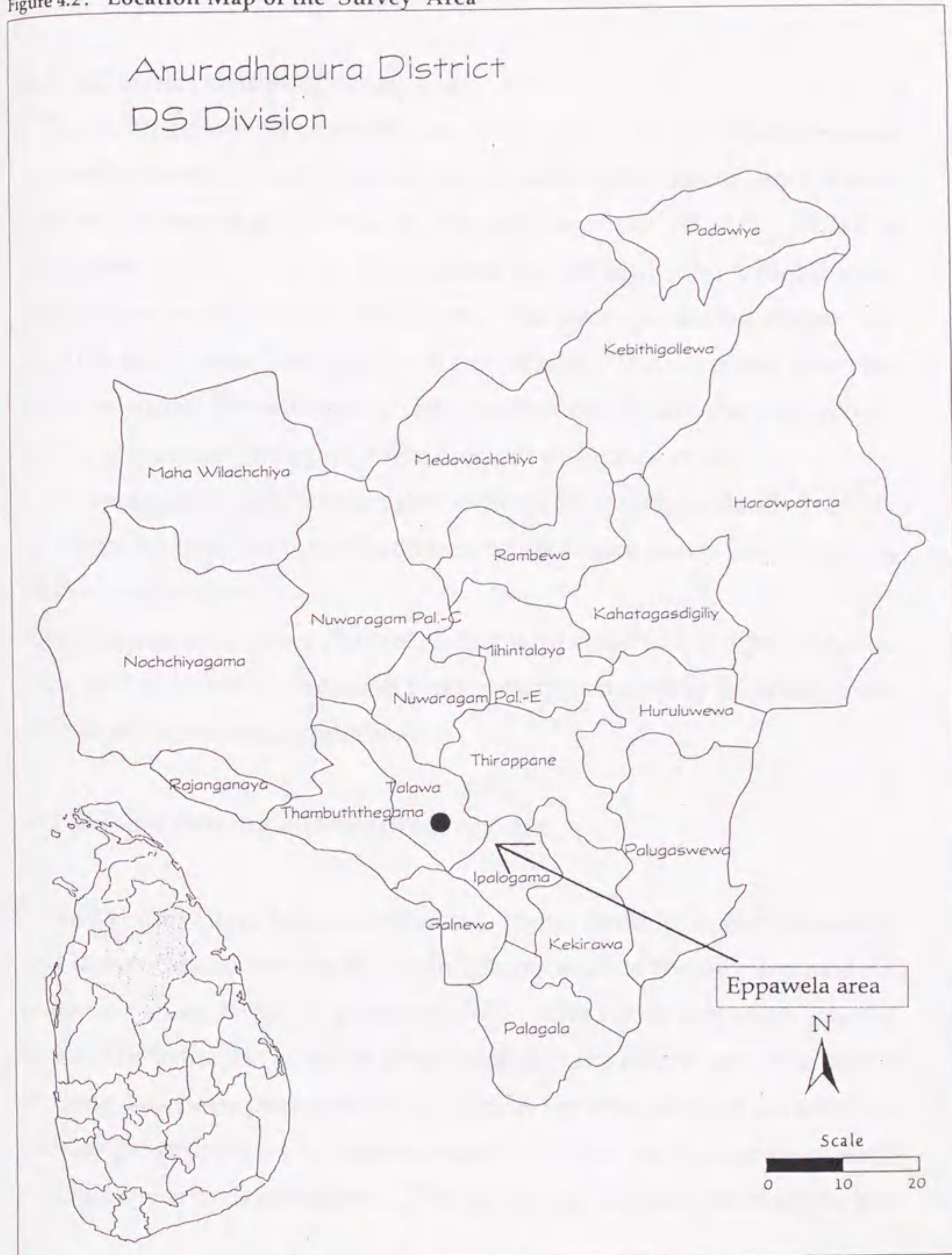
ii) **Mahaweli H area** called New town area

Mahaweli H area is a very large area, one of it's part belongs to Southwest side of Eppawela. This area were populated after 1982. Mahaweli river water is provided to Jaya river, then across Jaya river there are many division channels (D1, D2, etc.). Eppawela area is fed by the D6 channel. In this area there are 62 families are living and out of them 15 families were surveyed.

iii) **Non-traditional area** called old town area (13 sample population).

Non traditional area is located in the Northwest part of Eppawela. In this area there are 3 water tanks. These tanks are fed by rainwater. More than 200 families are living in this area and out of them 13 families were surveyed.

Figure 4.2: Location Map of the Survey Area



Source: Anuradapura Urban Council Atlas "Main Cities in the Anuradapura District, 1997"

Location and irrigation condition of the each area is drawn in the figure 4.3.

4.5) Climatic features of survey area

The average annual precipitation in the project area is characterized by well defined bi-model rainfall pattern. During the major rainy season (Maha) the average rainfall in the area is about 900mm. There is adequate rainfall during this season for lowland and upland crop production under rainfed conditions. The average rainfall during the minor rainy season (Yala) is only about 550mm. The uncertain Yala rain is not adequate for satisfactory crop production. Hence the crop grown in this season are limited to a few drought resistance crops.

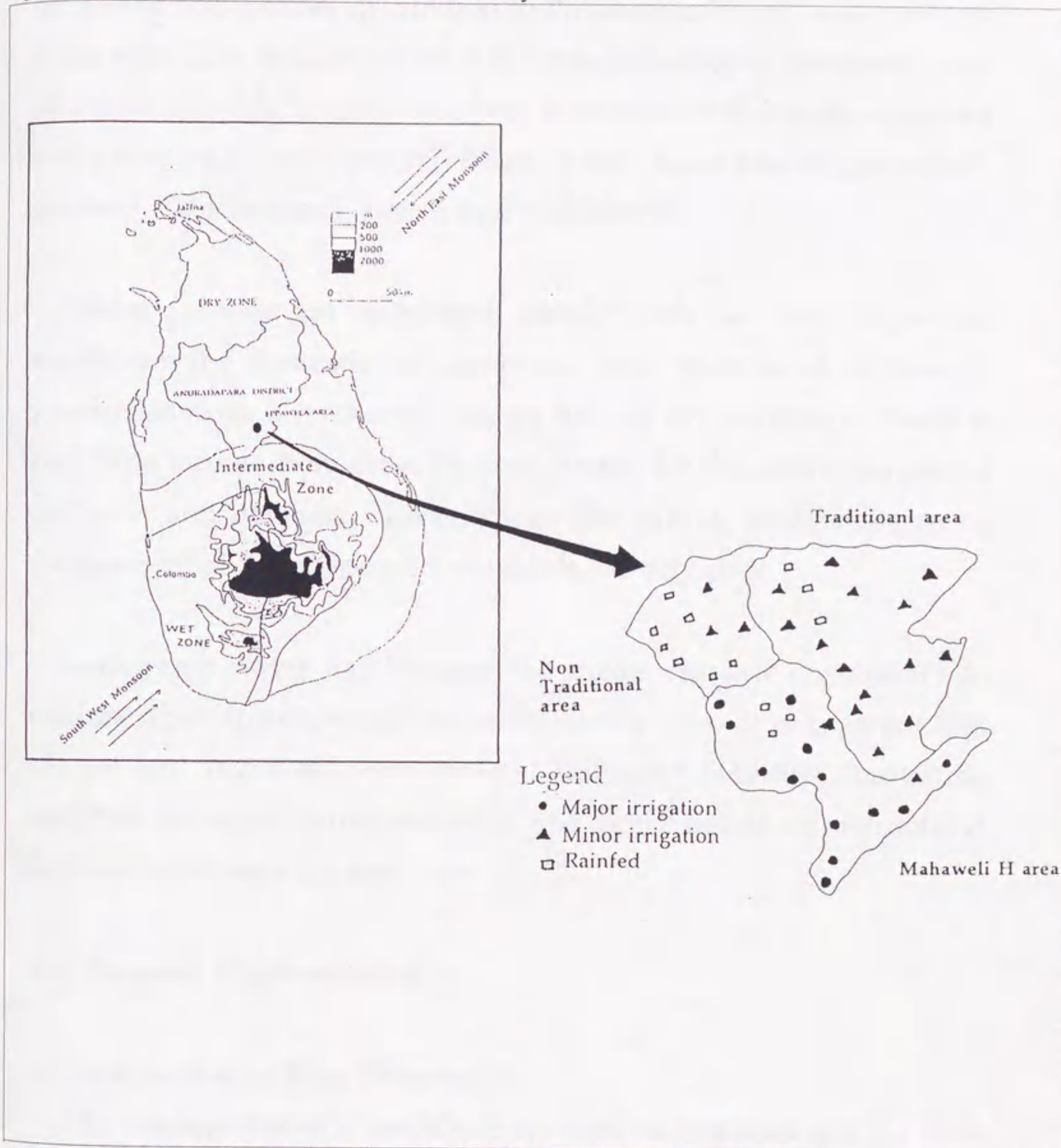
The mean maximum temperature varies from 32.0°C in March to 28.4°C in December and the mean minimum temperature varies from 20.6°C in June to September.

The topography is generally undulating with slope of 2 to 4 percent. The principal soil group is reddish brown earth comprising of sandy loam with weak structural properties.

4.6) Present farming systems of survey area

Paddy cultivation, highland farming, chena farming, home gardening and livestock farming are the main components of the farming system of survey area. Paddy is grown mainly under major irrigation scheme and minor irrigation schemes rehabilitated in the recent past. The chena farming has been practiced in the region for over several decades by substantial proportion of farmers mainly on state lands, legally as well as illegally for their subsistence. This system of cultivation, however has

Figure 4.3: Irrigation Conditions of the Survey Area



Source : Paddy Cultivation Survey in the Anuradapura District, Eppawela area in 1997.

resulted in reducing soil fertility, depletion of vegetative growth and increasing soil erosion, in addition to the destruction of forest reserves in the area. The chena cultivation is characterized by a system of mixed cropping. The Maha and Yala chena is planted with a wide variety of crops such as up land paddy, chilies, maize, Kurakkan (finger millet), mustard, Tala (sesame), ginger, and vegetables.

Home gardens are cultivated mainly with the root crops and vegetables for domestic consumption. Also permanent and semi-permanent crops like coconut, mango, banana etc. are grown. There is very little income from these gardens, except for the occasional sale of mangoes and bananas. Livestock in the survey area seems to be unorganized and management standards are very poor.

Inadequate water has become the major climatic constraints to increase agricultural production in the survey area. It is apparent that the present input delivery system, transport facilities, marketing facilities for agricultural products and other social infrastructural facilities in the area are also poor.

4.7) Farmers' Characteristics

(a) Composition of Farm Households

The average size of a household for total survey area is 4.2, a little below than the Anuradapura district average of 4.8. However, in traditional area where family sizes are ranged between 4-7. The availability of family labor seems to be an acute problem in the settlements where small family sizes are reported.

(b) Age of Household heads

In the total survey area the age structure of household heads are listed in table 4.1. The analysis of age structure indicates that 23.7% of household heads are young farmers belong to the age group of 19-30. Further data shows that 71.8% of household heads belong to mature age group of 30-59. Only 5.4% of the household heads account for the age category of over 60 years.

Table 4.1

Age of Household heads in the Eppawela area in 1997

(unit = number of household heads)

Age of Household heads	Traditional area	Mahaweli H area	Non-traditional area	Total
19-29	21	2	2	25
30-39	24	5	3	32
40-49	20	1	4	25
50-59	13	4	5	22
60-69	2	1	1	4
70-79	1	0	1	2

Source : Paddy Cultivation Survey Anuradapura District, Eppawela area in 1997.

(c) Occupational pattern

We have gathered the information pertaining to main occupations and sub-occupations. The main occupation category is further divided into agriculture and other(a). Other(a) represents the information of permanent salary workers. The sub-occupation is also sub-divided into agriculture and other(b). Other(b) is defined as casual labor in any level and self employment in various sources. In the survey area majority of employed population belonging to the settler families worked as agricultural laborers mainly in the major and minor colonization schemes located in area. Substantial number of people employed as casual laborers for their day-today living under private contractors and departments such as Irrigation, Agrarian services, Roads and Highways, involves in local level constructions, rehabilitation or development activities, occupied in self-employments (making arrack, conducting boutique, making handcrafts etc..), government and private sector employments.

Survey data reveals that 100% of household heads in the traditional area occupied in agriculture, and 70% of household heads engaged sub occupation in the same area. In the non-traditional area and the Mahaweli area also 100% of household heads do agriculture as a main occupation, while 31% and 26% of household heads engaged in sub occupations respectively (See table 4.2).

Further survey data reveals that 38% of other family members in traditional area occupied in main occupation as agriculture, 4% of them work in main occupation as other work. In the same area under the

category of sub occupation 8% are doing agriculture and 51% are doing other jobs.

Table 4.2

Main Occupation and Sub Occupation of Household Heads in the Eppawela area 1997

(unit = number of household heads, other family members)

Classification of Family	Survey area	Main Occupation		Sub Occupation	
		Agriculture	Others (a)	Agriculture	Others (b)
Household Heads	Traditional area	82	0	0	57
	Mahaweli H area	15	0	0	4
	Non-traditional area	13	0	0	4
Other family members	Traditional area	68	7	14	92
	Mahaweli H area	12	8	2	2
	Non-traditional area	17	6	4	1

Source: Paddy Cultivation Survey Anuradapura District, *Eppawela area* in 1997.

Note : Others (a) mean Government workers or Private company workers.
Others (b) mean casual laborers, occupied in Agrarian services, roads and highways, involves in local level constructions, rehabilitation or development activities, self-employments.

Non-traditional area and Mahaweli area 74% and 60% of other family members engage main occupation as agriculture, while 26%, and 40% of them do main work as other jobs respectively. In both areas category of sub occupations aspect 80% and 50% of other family members engage sub occupation as agriculture. These figures implies that newly developed Mahaweli area's people reduce the dependency of agriculture, and also various self employment opportunities have been increasing in past few years.

4.8) Land Ownership and Tenure

The agricultural land tenure structure of the total survey area is of a complex nature. There are seven categories of land tenure in Eppawela area are listed in table (4.3). Data shows that 72.7% of total area is single operators, and 10% operators are under the category of single own and sharecroppers. Further considerable number of operators are categorized single own, sharecropping, Ukas, and government own. According to their classification sharing percentages are also listed in same table.

In **new town area** (Mahaweli H area) and **old town area** (non-traditional area) the variety of land tenancy is small, because most of operators of these area new settlers. Specially in Mahaweli area new settlements began after 1982 and in non-traditional area also with the process of development new irrigation schemes in which new settlers gathered at the end of 1980's.

Table 4.3

Land Ownership of the Survey area in 1997

(unit = number of households)

Land Ownership type	Traditional area	Mahaweli H area	Non-traditional area	Total	%
Single own	57	13	10	80	72.7
Ande(a)	1	0	0	1	0.9
Single own & Ande	8	2	1	11	10.0
Single own & Ukas(b)	3	0	2	5	4.6
Single own & Government own(c)	7	0	0	7	6.4
Single own & Ande & Government own	3	0	0	3	2.7
Single own & Ukas & Government own	3	0	0	3	2.7
Total	82	15	13	110	100.0

Source : Paddy Cultivation Survey Anuradapura District, *Eppawela area* in 1997.

- Note : (a). Ande means Share cropping.
 (b). Ukas means pawn.
 (c) Government own means both legal lands & illegal lands.

4.9) Land Category of the Survey Area

Land categories are classified into three main types in survey area such as: **low land** (paddy), **high land**, and **Chena** (shifting cultivation). They are listed in table 4.4 according to each area.

In traditional area 55.5% of lands are utilized for paddy cultivation and 29.8% are utilized for Chena cultivation. In newly settled Mahaweli area where water is available for both Maha and Yala season 83.3% of lands are used for paddy cultivation. Result of that Chena cultivation is very low. In non-traditional area land utilization pattern is between traditional and new town area.

Third row of the table represents average cultivated acres per household. In Mahaweli area when new settlements occurred in 1982 government distributed 2.5 acres per household head. Therefore average acres per household is around to that (2.6ac in survey). But in traditional area it is 2.1ac due to large number of small farmers, and in non-traditional area it is 2.8ac due to number of large farmers.

4.10) Ownership of the Agricultural Implements and Machinery

In total survey area ownership of agricultural implements and machinery are listed in table 4.5. Mammoties are the commonest agricultural implements owned by the households. The next importance is the sprayers and dusters. Excepting mammoties most of the implements and machines are owned by large holding farmers.

The availability of four wheel tractors are limited to traditional area. The table's second half represents the agricultural implements and machinery ownership per 100 households. 30 (per 100 persons) two wheel tractors are available to total survey area. New and old town area's there is no ownership of four wheel tractors. But when they

Table 4.4

Land Category of Eppawela area in 1997

(unit = acres, %)

Source	Land Category	Traditional area	Mahaweli H area	Non-traditional area	Total
Total (acres)	Cultivated area	305	48	55	408
	Paddy	169	40	36	245
	High Land	45	7	12	64
	Chena	91	1	7	99
Percentage (%)	Cultivated area	100.0	100.0	100.0	100.0
	Paddy	55.5	83.3	65.1	60.0
	High Land	14.7	14.6	21.8	15.0
	Chena	29.8	2.1	13.1	25.0
Average acres Per household	Cultivated area	3.7	3.2	4.3	3.7
	Paddy	2.1	2.6	2.8	2.2
	High Land	0.5	0.5	0.8	0.8
	Chena	1.1	0.1	0.6	1.0

Source : Paddy Cultivation Survey Anuradapura District, *Eppawela area* in 1997.

- Note : i). Chena is a Sri Lanka word for shifting cultivation
 ii). 1 acre = 0.405 hectare

Table 4.5

Ownership of Agricultural Implements and Machinery in Eppawela area 1997
number of units

Type		Traditional area	Mahaweli H area	Non-traditional area	Total
Total numbers of Implements & Machinery	Tractors 4 wheeled	3	0	0	3
	Tractors 2 wheeled	24	5	4	33
	Mammoties	207	59	47	313
	Ploughs	3	2	7	12
	Sprayers and Dusters	60	11	11	82
	Threshers	13	1	5	19
	Irrigation pumps	20	5	10	35
	Winnowing fans	16	3	3	22
	Weeders	1	0	2	3
	Others	4	7	0	11
Ownership per 100 farmers	Tractors 4 wheeled	4	0	0	3
	Tractors 2 wheeled	29	33	31	30
	Mammoties	252	393	362	285
	Ploughs	4	13	54	11
	Sprayers and Dusters	73	73	85	75
	Threshers	16	7	39	17
	Irrigation pumps	24	33	77	32
	Winnowing fans	20	20	23	20
	Weeders	1	0	15	3
	Others	5	47	0	10

Source : Paddy Cultivation Survey Anuradapura District, Eppawela area in 1997.

need, rent out it from outsiders. Rent out is highly depend on with financial availability of farmers. Two wheel tractors are common in total survey area due to less cost than four wheelers. Ploughs are not commonly in use. Even when land preparation is done with the aid of draft animals, mudding is practiced a form of non-inversion tillage by the repeated driving of animals over the land.

4.11) Land Preparation Activities in the Survey Area

Land preparation consists of an assortment of work: turning the soil, clearing of an buns and channels, plastering bunds and manual levelling. The time of commencement and completion of land preparation activities in these settlements for the Maha and Yala paddy crops mainly depend on factors such as reliability of rainfall and the availability of tank water. The availability of farm power also seems to be an important factor in this respect, as the farmers depend mainly on outside farm power for the preparation of land. Most of the farmers (89%) who reported cultivation of paddy in Maha season had commenced land preparation only after the first few Maha rains. These farmers usually delay their land preparation until the onset of Maha rain to avoid risk of crop failure. About 11% of the farmers, however, are reported to be utilizing tank water for land preparation. In Maha season land preparation farm power in traditional area and Mahaweli H area are summarized in table 4.6.

Majority of farmers in both area used tractors for land preparation; 58% in traditional area and 75% in Mahaweli area respectively. As mentioned above the ownership of tractors in total survey area is very low. In Mahaweli area there is no four wheel tractors and total survey

Table 4.6

Land Preparation Sources of Maha Season in Traditional and Mahaweli area, 1997

(unit = number of households)

Farm Power Source	Traditional area				Mahaweli H area
	< 2 ac	2 -4 ac	> 4 ac	Total	Total
By Tractors*	5	23	30	58	18
Buffalo Ploughed & Muddied	3	5	4	12	0
Mammotied** (hoe)	8	13	9	30	6
Total	16	41	43	100	24
By Tractors	31.3	56.0	69.8	58	75.0
Buffalo Ploughed & Muddied	18.7	12.2	9.3	12	0.0
Mammotied	50.0	31.8	20.9	30	25.0
Total	100.0	100.0	100.0	100.0	100.0

Source : Paddy Cultivation Survey Anuradapura District, *Eppawela area* in 1997.

- Note : i). * By tractors and Mammotied.
 ii). ** By Mammotied only

area 3 four wheel tractors, and 30 two wheel tractors (per 100 persons) are available. Therefore most of the farmers depend highly on outside rental sources. In traditional area 50% of the small holders used their farm power as mammoties to the purpose of maximum utilization of family labor and exchange labor and also to reduce the cost. But on the other hand large holders utilize 70% of tractors in traditional area to minimize the cost, because seasonal peak times hired labor is much expensive than tractors. The use of buffaloes in land preparation is limited to 12% in traditional area Maha season. In this area there are some traditional farmers who have already used to utilize farm power as buffalo draught power. Therefore such farmers are not willing to adhere alternative farm power sources. In total survey area 10 farmers reported in such a traditional type.

4.12) Crops Cultivation Pattern

Crops cultivation pattern in each survey area is summarized in table 4.7. Paddy is cultivated both in Maha and Yala season in wet low lands. Substantial extent of forest lands were being utilized extensively for chena cultivation by the farmers who are living in adjoining villages. Land rotation, non use of soil conservation measures, non-adoption of improved crop husbandry practices or management practices, low-land productivity were the main features of these chena system although it provides substantial economy to the farmers involved in it. Various crops such as cereals (Kurakkan, Cowpi, Green gram, etc.) pulses and oil crops (sesame, mustered) and some vegetables were grown in chena mainly to satisfy their food needs. The distribution of high land allotment among beneficiary families and the creation of human

Table 4.7

Crops Cultivation Pattern Maha and Yala Seasons in Eppawela area 1997

(unit = acres, %)

Name of crops		Maha Season 1996/97				Yala Season 1997			
		Traditional area	Mahaweli H area	Non-traditional area	Total	Traditional area	Mahaweli H area	Non-traditional area	Total
Total Acres	Paddy	160.00	38.00	30.00	228.00	114.80	31.75	25.00	171.55
	Chilies	12.25	4.75	2.25	19.25	35.25	4.25	4.00	43.50
	Maize	38.75	0.50	0.25	39.50	2.00	0.50	0	2.5
	Kurakkan	31.10	0	0.25	31.35	0.75	0	0	0.75
	Cowpi	8.25	0.25	0.25	8.75	0.25	0.25	0.50	1.00
	Green gram	1.40	0.50	0.25	2.15	0	0.50	0	0.50
	Tala	2.25	0	0	2.25	2.25	0	0	2.25
	Mastered	1.00	0	0	1.00	0.25	0	0	0.25
	Undu	2.20	0	0	2.20	1.00	0	0	1.00
	Ginger	2.10	1.50	0	3.60	1.25	1.50	0	2.75
	Banana	1.50	1.50	1.00	4.00	1.00	1.50	1.00	3.50
	Brinjals	0	0.25	0	0.25	0	0.25	0	0.25
	Ladies fingers	0	0.25	0	0.25	0	0.25	0	0.25
	Papow	0	0	8.00	8.00	0	0	6.00	6.00
	Total	260.80	47.50	42.50	350.80	158.80	40.75	36.50	236.50
Percent (%)	Paddy	61.3	80.0	70.6	65.1	72.3	77.9	68.5	72.5
	Chilies	4.7	10.0	5.3	5.5	22.2	10.4	11.0	18.5
	Maize	14.9	1.0	0.6	11.3	1.3	1.2	0	1.1
	Kurakkan	11.9	0	0.6	9.0	0.5	0	0	0.3
	Cowpi	3.2	0.5	0.6	2.5	0.2	0.6	1.4	0.4
	Green gram	0.5	1.0	0.6	0.6	0	1.2	0	0.2
	Tala	0.9	0	0	0.5	1.4	0	0	1.0
	Mastered	0.4	0	0	0.3	0.2	0	0	0.1
	Undu	0.8	0	0	0.6	0.6	0	0	0.4
	Ginger	0.8	3.1	0	1.0	0.8	3.7	0	1.2
	Banana	0.6	3.1	2.4	1.1	0.6	3.7	2.7	1.5
	Brinjals	0	0.5	0	0.1	0	0.6	0	0.1
	Ladies fingers	0	0.5	0	0.1	0	0.6	0	0.1
	Papow	0	0	18.8	2.2	0	0	16.4	2.6
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source : Paddy Cultivation Survey Anuradapura District, Eppawela area in 1997.

settlements are mainly in eliminating land rotation based traditional chena system from the area. Continuous utilization of land resources for the crop production becomes the main feature of high land use pattern. Wide variety of crops were reported to be grown in the highland allotments during the Maha season. Chilies, maize, various kind of vegetables, ginger were among those crops grown by majority of farmers.

As shown in the table paddy were cultivated in 65% and 73% of total survey area both Maha and Yala season respectively. Comparatively paddy cultivation area in Yala season (172ac) is lower than Maha season (228ac). Inadequate rainfall and limited availability of irrigation facilities (especially Yala season) were the main constraints to increase the paddy production and low land cropping intensity in the survey area.

In chena cultivation area also there were large gap between Maha and Yala season, for example Kurakkan, Cowpi, and Green gram (31.10ac+8.25ac+1.40ac) 40.75ac were cultivated in Maha season. For the same crops in Yala season area were limited to (0.75ac+1.00ac+0.50ac) 2.25ac, due to unavailability of water. In highland crop chilies were cultivated more in Yala season (44ac) than in Maha season (19ac) by using the available water economically.

Using the data table 4.4 and table 4.7 extent area of total crops and paddy in seasonal basis were calculated in total survey area (See table 4.8).

Table 4.8

Extent Acres of Crops in the Total Survey Area 1997

Season	Total Crops extent (%)	Paddy extent (%)
Maha 1996/97	86	93
Yala 1997	58	70

Source : Paddy Cultivation Survey Anuradapura District, *Eppawela area* in 1997.

In Maha paddy is cultivated 93% and in Yala it is limited to 70% due to unavailability of water. Even in total crops, same reduction pattern can be seen 86% extent in Maha and 58% extent in Yala.

4.13) Labor Cost of Paddy Production

In the total survey area four types of farm household labor were identified; family labor, exchange labor (Attam, exchange labor with responsibility and Kaiya, shared labor), hired labor, and contract labor. According to the extensive survey labor utilization pattern in each area is given in figure 4.4 .

Each of the areas one sample farmer was interviewed deeply and gathered the total details of the labor cost. Collected labor cost details of sample farmers are listed in table 4.9 in each area.

The family labor contributes highest proportion (47%) in both traditional and Mahaweli H area. Hired labor utilization is relatively higher in non-traditional area. Survey information revealed that, this is mainly due to availability of employment opportunities in non-traditional area. As mentioned earlier non-traditional area is located in

the old town area in the Eppawela. Further nearer to this area Eppawela Rock Phosphate is situated, therefore many house wives and household heads are working in there, such a situation promote the requirement of cheap hired labor during peak days.

The cheap alternative source of hired labor is known as Attam and Kaiya labor in survey area. In traditional area exchange labor is recorded 21% and in Mahaweli area it is 27% (Attam and Kaiya) and non-traditional area 11% (Attam) recorded the lowest in the area.

Figure 4.4

Labor Utilized Charts in Paddy Process in Maha Season in the Survey area 1996/97

Functions	Land Preparation				Seeding				Fertilizer/Weeding/ Agro che.				Harvesting/Winninging								
Months	Oct				Nov.				Dec.				Jun.				Feb.				
Weeks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Traditional area																					
Family labor				•	•	•	•	•					•	•					•	•	•
Attam labor				•															•	•	•
Hired labor				•				•											•		
Mahaweli H area																					
Family labor		•	•	•	•	•	•					•	•					•	•	•	
Kaiya labor			•	•																	
Attam labor												•					•	•			
Hired labor												•	•	•					•	•	
Non-traditional area																					
Family labor				•	•			•					•	•					•	•	•
Attam labor				•															•		•
Hired labor				•	•	•			•					•					•	•	•

Source : Paddy Cultivation Survey Anuradapura District, *Eppawela area* in 1997.

Note: Attam traditional term used for exchange labor. This labor is a kind of some special labor concept of Sri Lanka. In the village level when some work is to be done neighbors communicate, mutually agreed between each other and do the work.

The Kaiya is also similar to Attam labor, the land owner invite his friends, to participate when he harvests his paddy lands. Persons who is free and willing work come to help the land owner in agreed date. All the participants are well treated that working day, and they all together eat specially prepared meal that day. This meal is also called Kaiya.

Table 4.9

Value of Utilized labor for Paddy Process in Maha Season in the Survey area 1996/97
(Rupees, %)

Kind of Labor	Land Preparation	Seed-ing	Fertilizer	Weeding	Agro-chemical	Harvesting	Winnowing	Others	Total
Traditional area									
Family labor	250	375	425	350	200	500	450	150	2700
Attam labor	300	0	0	0	0	500	400	0	1200
Hired labor	200	0	0	0	150	1000	0	450	1800
Total	750	375	425	350	350	2000	850	600	5700
(%) Family labor	33	100	100	100	57	25	53	25	47
(%) Attam labor	40	0	0	0	0	25	47	0	21
(%) Hired labor	27	0	0	0	43	50	0	75	32
Total	100	100	100	100	100	100	100	100	100
Mahaweli H area									
Family labor	700	450	425	250	200	800	450	50	3325
Attam labor	0	0	0	450	0	600	0	0	1050
Kaiya labor	500	0	0	0	0	0	200	80	780
Hired labor	0	0	200	0	300	1250	0	100	1850
Total	1200	450	625	700	500	2650	650	230	7005
(%) Family labor	58	100	68	36	40	30	69	22	47
(%) Attam labor	0	0	0	64	0	23	0	0	15
(%) Kaiya	42	0	0	0	0	0	31	35	12
(%) Hired labor	0	0	32	0	60	47	0	43	26
Total	100	100	100	100	100	100	100	100	100
Non-Traditional area									
Family labor	400	375	100	250	550	500	400	500	3075
Attam labor	300	0	0	0	0	500	0	100	900
Hired labor	800	125	500	150	150	2000	600	300	4625
Total	1500	500	600	400	700	3000	1000	900	8600
(%) Family labor	27	75	17	63	78	17	40	56	36
(%) Attam labor	20	0	0	0	0	17	0	11	11
(%) Hired labor	53	25	83	37	22	66	60	33	53
Total	100	100	100	100	100	100	100	100	100

Source : Paddy Cultivation Survey Anuradapura District, *Eppawela area* in 1997.

Note: Attam traditional term used for exchange labor. This labor is a kind of some special labor concept of Sri Lanka. In the village level when some work is to be done neighbors communicate, mutually agreed between each other and do the work.

The Kaiya is also similar to Attam labor, the land owner invite his friends, to participate when he harvests his paddy lands. Persons who is free and willing work come to help the land owner in agreed date. All the participants are well treated that working day, and they all together eat specially prepared meal that day. This meal is also called Kaiya.

In Maha season labor utilization in each stages of paddy production process is summarized in table 4.10 for traditional, Mahaweli area and non-traditional area respectively.

It is clear that, for harvesting process around 36% (average of total area) of total labor cost was consumed. In Mahaweli area and non-traditional area 17% of total labor cost was absorbed for land preparation process. While in traditional area 13% was absorbed.

Table 4.10

Percentages of labor utilization for Paddy Process in Maha Season Surveyed area 1996/97

(%)

Kind of Labor	Land Preparation	Seed-ing	Fertiliz-er	Weeding	Agro-chemical	Harvesting	Winnowing	Others	Total
Traditional area	13	7	8	6	6	35	15	10	100
Mahaweli area	17	6	9	10	7	38	9	4	100
Non-traditional area	17	6	7	5	8	35	12	10	100

Source : Paddy Cultivation Survey Anuradapura District, *Eppawela area* in 1997.

4.14) Cost and Returns of Paddy Production

The cost components of paddy production has two major categories namely variable and fixed cost. The variable cost involves the cost of material inputs, labor and other items which varies with the scale of farming operations. The fixed cost denote those which are independent of the scale of farming operations such as land, rent, capital cost of tractors etc. For this analysis, only the operation costs of paddy production were taken into account. The cost of various inputs were obtained from respective farmers who utilized those inputs. The cost family and exchange labor were calculated using the market price

prevailing in the survey area according to the used mandays and hours in each stages. In the following table (see table 4.11) Maha season paddy production cost and returns were calculated on three sample farmers in each survey area.

Table 4.11

Cost and Returns of Maha Season Paddy Production in Eppawela area 1996/97

Input	Traditional area (Rs.)	Per cent-age (%)	Mahaweli area (Rs.)	Per cent-age (%)	Non-traditional area (Rs.)	Per cent-age (%)
Land (Ande)	1330	11	0	0	850	5
Tractors	750	6	1600	11	1000	6
Seeds	625	5	650	5	720	5
Fertilizer	1100	9	1480	10	1430	9
Agro-chemical	1250	10	1160	8	1200	8
Sprayers	250	2	250	2	200	1
Threshers	550	5	1200	9	1300	8
Labor	5700	47	7005	49	8600	53
Transport	450	4	400	3	200	1
Others	190	1	350	3	600	4
Total cost	12195	100	14195	100	16100	100
Return						
Total Production (kg)	2000		2200		2000	
Personal Consumption (kg)	(200)		(400)		(240)	
Others (kg)	(60)		(75)		(75)	
Selling Price per kg (Rs.)	10		10		10	
Amount of Sold (kg)	1740		1725		1685	
Total income (Rs.)	17400		17250		16850	
Total cost (Rs.)	(12195)		(14195)		(16100)	
Net return (Rs.) in Maha	5205		3055		750	
Paddy cultivation average return per month (Rs.) per acre	867.50		509.16		125.00	
Paddy Cultivated total land (ac)	7.5		2.5		4	
Average total income per month (Rs.)	6506.25		1272.90		500.00	
Ownership of tractors	Own		Not own		Own	

Source : Paddy Cultivation Survey Anuradapura District, *Eppawela area* in 1997.

- Note: i) Ande is share cropping
 ii) Rs. Stands for Rupees, (Sri Lanka money)
 iii) 1 acre = 0.405 hectare

It is evident that cost of labor which comprises of 50% (average of total survey area) of the total cost become the single largest cost item in paddy production. Farm power is the second important cost item in surveyed Mahaweli area due to unavailability of tractor. In traditional area second important cost items are rent for land(Ande), fertilizer, and chemical respectively. The cost of fertilizer seem to be low compared to the actual cost of recommended dosage. This indicates the poor fertilizer application for paddy cultivation surveyed area.

The latter part of same table shows the net income of each farmer. It shows that average total income per month (total paddy cultivated area) traditional area farmer (large holder) is relatively higher than in the Mahaweli area farmer (middle class holder). It reveals that the situation of small hold farmer is very worse in Sri Lanka. In non-traditional area though small return derived in paddy cultivation, farmers engage in money earn other employment opportunities.

CHAPTER 5

5) Income Distribution Patterns, According to the Paddy Farmers' Scales in the Traditional area

5.1) Introduction

Rice in Sri Lanka at present is grown on 915 thousand hectares. Production increased from 1.7 t/ha and a total of 746 thousand tons in 1964/65 to 3.5 t/ha and a total of 2810 thousand tons in 1996/97. The key factors that contributed to the rapid growth in rice production were adoption of modern varieties, expansion and improvement of irrigation, and increased use of fertilizers and agro-chemicals. There were two prominent development stages in Sri Lanka's paddy cultivation concern.

i) **The Green Revolution** that took place in the late 1960s.

The green revolution introduced high yielding varieties, specialized fertilizer mixtures, and specific recommendations for the control of major pests.

ii) **Open economic policies** that were introduced in late 1977.

Under the open economic policies and the help of foreign investments and various economic incentives, a number of major irrigation projects were initiated. In particular, in the dry zone a massive irrigation project called the Mahaweli *scheme* was

started, which caused more than 80,000 families to move into new farm settlements.

Both of these developmental stages paved the way for modern agriculture in Sri Lanka. The open economic policies helped to improve paddy productivity considerably, due to an inflow of machines and the technology transition during the 1980s. In 1993, the country reached 93% sufficiency level in rice, but ever since this level has decreased and in 1997 it was 85%. Local producers' real rice price also increased slightly up to the year 1990 and ever since the local real rice price tended to be decreased (table 5.1).

Despite its strong performance in the 1990s, the rice sector faces difficult challenges in the coming decades. There has been an increase in the volume of imported cheap rice, a decrease in the price of the locally produced rice, and an increase in the cost of paddy cultivation. The main purpose of this paper is to examine the economic conditions that have affected the micro economic conditions for rice farmers in Sri Lanka, through the survey data with a view to providing a more systematic understanding of rice farming, economic conditions, and modern agricultural development.

5.2) Occupational Pattern in the Traditional area

We have gathered the information pertaining to main occupations and sub-occupations. The main occupation category is further divided into agriculture and other(a). Other(a) represents the information of permanent salary workers. The sub-occupation is also sub-divided into

Table 5.1

Wholesale Price index and Producers' Rice Price in Sri Lanka 1985-1998

Year	Wholesale Price index 1974=100	Wholesale Price index 1985=100	Nominal Guaranteed Rice Price (Rs./kg)	Real Guaranteed Rice Price (Rs./Kg)	Nominal Open Market Producers' Rice Price (Rs./kg)	Real Open Market Producers' Rice Price (Rs./kg)
1985	377.1	100.0	3.3	3.3	3.8	3.8
1986	366.0	103.0	3.3	3.2	4.0	3.9
1987	414.9	110.0	3.3	3.0	4.2	3.8
1988	488.7	129.6	3.8	2.9	4.4	3.4
1989	532.9	141.3	3.8	2.7	6.1	4.3
1990	651.1	172.7	5.3	3.1	7.8	4.5
1991	710.8	188.5	6.5	3.4	8.0	4.2
1992	773.0	205.0	6.5	3.2	8.6	4.2
1993	831.8	220.6	7.0	3.2	8.7	3.9
1994	873.4	231.6	7.4	3.2	8.0	3.5
1995	950.3	252.0	7.4	2.9	7.8	3.1
1996	1145.1	303.7	7.4	2.4	10.2	3.4
1997	1224.3	324.7	7.4	2.3	10.5	3.2
1998	1298.7	344.4	7.4	2.1	10.7	3.1

Source: Economic and Social Statistics of Sri Lanka: Statistics Department Central Bank of Sri Lanka: Central Bank Printing Press, 1994-1998.

agriculture and other^(b). Other^(b) is defined as casual labor in any level and self employment in various sources.

Extensive survey data reveals that all household heads make their livelihood in agriculture as their main occupation. There are 57 household heads working in the available sub occupation category (see table 5.2). The infrastructure of the survey data reveals that all large farmers categorized in other^(b) employed in high profit earning sources such as self employment, lending money, buying and selling crops, private contractors, renting agricultural equipment, providing transport facilities etc.

But on the other hand, all small and medium size farmers engage in sub-occupational sources such as casual labor, local level construction and development activities. Many small farmers in the survey area work under large farmers as hired labor in different farm and non-farm activities. Among other family members of small and medium farmers, 76% work in agriculture as their main occupation and 74% work under the category of sub occupation other^(b). Only 7 members of total area have permanent employment, all of which are small and medium farm members.

Table 5.2

Classification of Family Occupation in Anuradapura District,
Eppawela area 1997

(unit = number of household heads, other family members)

Occupation Type	Source	<2ac	2-4ac	4-8ac	>8ac	Total
Main Occupation	<u>Agriculture</u>					
	Household Heads	42	20	15	5	82
	Other family members	28	24	16	0	68
	<u>Others (a)</u>					
Main Occupation	Household Heads	0	0	0	0	0
	Other family members	5	2	0	0	7
Sub Occupation	<u>Agriculture</u>					
	Household Heads	0	0	0	0	0
	Other family members	11	0	0	3	14
	<u>Others (b)</u>					
Sub Occupation	Household Heads	36	14	2	5	57
	Other family members	60	8	6	18	92

Source: Paddy Cultivation Survey in Anuradapura District, *Eppawela area* in 1997.

Note : Others (a) means Government workers or Private company workers.
Others (b) means casual laborers, occupied in Agrarian services, roads and highways, involve in local level construction, rehabilitation or development activities, self-employment.

5.3) Land Ownership and Utilization in the Traditional area

The evolution of land tenure in Sri Lanka's subsistence sector can be traced through the following historical phases:

- (a) Land holding system under the Sri Lankan Monarchy.
- (b) Land tenure under colonial rule particularly under the British.
- (c) Tenurial transformations during the period following the First Land Commission in 1927.
- (d) Land tenure changes during the last four decades under land reforms and Land Acts.

In 1958, **The Paddy Land Act** was implemented to give new legal rights to secure tenancy contract. In the Smallholders sector, **the land reform implemented in 1972**, placed a limit of 50 acres per farmer. This greatly reduced the traditional farming system in which tenant farmers lease land from large land holders.

Due to a mix of these four phrases, the infrastructure of land tenure in the survey area is complicated beyond single ownership. Seven categories of land tenure in the Eppawela area are listed in table 5,3. Data shows that 52% of the total area is comprised of single operators. All super large farmers (> 8 ac) are complex owners as well as 54% of large farmers (4-8 ac). Among small farmers (< 2ac), 60% are single owners and others are single and government owners. Many small farmers use government land for cultivation, either legally or illegally, for their subsistence. Common feature in total survey area is among small and medium farmers 58% represented single ownership and among large and super large farmers 65% represented complex

Table 5.3

Land Ownership Classification in Anuradapura District, Eppawela area in 1997

(unit = number of households)

Ownership Type	< 2 ac	2-4 ac	4-8 ac	> 8 ac	Total
Single own	25	11	7	0	43
Ande(a)	0	1	0	0	1
Single own & Ande	0	4	2	0	6
Single own & Ukas(b)	0	0	2	4	6
Single own & Government own(c)	17	4	0	0	21
Single own & Ande & Government own	0	0	3	0	3
Single own & Ukas & Government own	0	0	1	1	3
Total	42	20	15	5	82

Source : Paddy Cultivation Survey in Anuradapura District, Eppawela area in 1997.

- Note :
- i). a Ande is the Sri Lankan word for Share cropping.
 - ii). b Ukas is Sri Lankan word for pawn.
 - iii). c Government own means both legal lands & illegal lands.
 - iv). 1 acre = 0.405 hectares

owners. This is mainly due to large farmers expand their farm scales in different agreements. It is identified that in recently most large farmers in Sri Lanka assembled land under Ukas agreement. *Ukas means Sri Lankan term for mortgage; under Ukas system mortgagee (person to whom property is mortgaged) can take the benefit of land until the mortgagor release the land. If mortgagor fails to release the land under the agreed period the title of land transfer to mortgagee.* In 1998, the intensive survey revealed that complex ownership was increased in large farmers category 6 cases all of them were Ukas agreements.

5.4) Land Category in the Traditional Area

Land categories are classified into three main types in the survey area such as: paddy (low land), high land, and Chena (shifting cultivation) (see table 5.4). In the survey area 61.3% of the land is utilized for paddy cultivation and 22.0% is utilized for Chena cultivation. Data reveals that paddy cultivation and chena farming is a common practice among small farmers, this is mainly due to lower cost involvement and accessibility of chena land. Highland farming is popular among super large farmers; though it involves high cost for fertilizer and chemical applications, it is a profitable and reliable income source for them.

The third main row of the table represents average cultivated acres per household. In the small farmers category (<2 ac), paddy farm size is too small (0.5 ac), therefore to make a living they practiced chena cultivation in government lands with permission (legally) or without permission (illegally).

Table 5.4

Land Category of Anuradapura District, Eppawela area in 1997

(unit = acres, %)

Source	Category	< 2 ac	2 -4 ac	4-8 ac	>8 ac	Total
	Number of Households	42	20	15	5	82
Total (acres)	Cultivated area	45.35	65.20	78.00	72.25	260.80
	Paddy	21.00	40.00	53.00	46.00	160.00
	High Land	5.35	8.00	9.25	20.75	43.35
	Chena	19.00	17.20	15.75	5.50	57.45
Percentage (%)	Cultivated area	100.00	100.00	100.00	100.00	100.00
	Paddy	46.30	61.30	67.90	63.70	61.35
	High Land	11.80	12.30	11.90	28.70	16.60
	Chena	41.90	26.40	20.20	7.60	22.05
Average acres Per household	Cultivated area	1.00	3.26	5.20	14.45	3.18
	Paddy	0.50	2.00	3.50	9.20	1.95
	High Land	0.10	0.40	0.70	4.15	0.53
	Chena	0.40	0.86	1.00	1.10	0.70

Source : Paddy Cultivation Survey in Anuradapura District, *Eppawela area* in 1997.

- Note : i). Chena is a Sri Lankan word for shifting cultivation
 ii). 1 acre = 0.405 hectare

On the other hand, in the super large farmer category (>8 ac), among 63.7% of households who practiced paddy cultivation, their farm size is too large when compared with small farmers (9.2 ac). For the purpose of spreading their farm size further and further, they borrow lands under tenancy agreements and continue chena and highland practices.

5.5) Factors Affecting to the Paddy Production

(1) Agricultural Implements and Machinery

In the total survey area ownership of agricultural implements and machinery are listed in table 5.5. Mammoties (hoes) are the most common agricultural implements owned by the households. The next in order of importance are the sprayers and dusters. Except for the mammoties, most of the implements and machines are owned by large and super large farmers.

The table's second half represents agricultural implements and machinery ownership per 100 households. Four wheel tractors are owned only by super scale farmers, 60 per 100 persons. Two wheel tractors are available to those in other farm categories except for small farmers. But ownership of two wheel tractors is rare among medium scale farmers. Our survey revealed that small and medium scale farmers rent out tractors from large and super large farmers under various payment agreements. For example in one case a small farmer agreed to pay tractor rent by working 14 days for the tractor owner. Ploughs are not commonly in use in our survey area. Even when land

Table 5.5

Ownership of Agricultural Implements and Machinery in Anuradapura District, Eppawela area 1997

Type		number of units				Total
		< 2 ac	2-4 ac	4-8 ac	> 8 ac	
Number of	Households	42	20	15	5	82
Total numbers of Implements & Machinery	Tractors 4 wheeled	0	0	0	3	3
	Tractors 2 wheeled	0	6	10	8	24
	Mammoties(hoes)	82	59	46	20	207
	Ploughs	3	0	0	0	3
	Sprayers and Dusters	9	23	20	8	60
	Threshers	0	2	5	6	13
	Irrigation pumps	1	3	10	6	20
	Winnowing fans	0	4	7	5	16
	Weeders	0	0	0	1	1
	Others	4	7	16	11	38
Ownership per 100 farmers	Tractors 4 wheeled	0	0	0	60	4
	Tractors 2 wheeled	0	30	67	53	29
	Mammoties(hoes)	195	295	307	400	252
	Ploughs	7	0	0	0	4
	Sprayers and Dusters	21	115	133	160	73
	Threshers	0	10	33	120	16
	Irrigation pumps	2	15	67	120	24
	Winnowing fans	0	20	47	100	20
	Weeders	0	0	0	20	1
	Others	10	35	107	220	46

Source : Paddy Cultivation Survey in Anuradapura District, Eppawela area in 1997.

preparation is done with the aid of draft animals, muddying is practiced as a form of non-inversion tillage by the repeated driving of animals over the land.

(2) Crop Cultivation Pattern

The crop cultivation pattern in the survey area is summarized in table 5.6. Paddy is cultivated both in the Maha and Yala seasons in the wet lowlands. Highland farming is common among super scale farmers, while chena farming is common for small scale farmers. A substantial extent of forest lands were being utilized extensively for chena cultivation by small and medium farmers who were living in adjoining villages. Land rotation, non-use of soil conservation measures, non-adoption of improved crop husbandry practices or management practices, lowland productivity were the main features of the chena system, although it provides substantial economy to the farmers involved in it. Various crops such as cereals (Cowpi, Green gram, Kurakkan), pulses, oil crops (sesame, mustered) and some vegetables were grown in chena mainly to satisfy their food needs. In table 5.6, Kurakkan and other categories stand for chena cultivation, while chilies and maize stand for highland cultivation.

The distribution of highland allotment among beneficiary families and the creation of human settlements serve mainly to eliminate land rotation based on the traditional chena system from the area. Continuous utilization of land resources for crop production becomes the main feature of the highland use pattern. A wide variety of crops

Table 5.6

Crop Cultivation Patterns Maha and Yala Seasons in Anuradapura District, Eppawela area 1997

Maha					acres
Item	< 2 ac	2-4 ac	4-8 ac	> 8 ac	Total
Paddy	21.00	40.00	53.00	46.00	160.00
Chilles	0.25	4.50	3.75	3.75	12.25
Kurakkan	17.00	9.50	10.75	1.50	38.75
Maize	5.10	3.50	5.50	17.00	31.10
Others	2.00	7.70	5.00	4.00	18.70
Total	45.35	65.20	78.00	72.25	260.80
Yala					
Item	< 2 ac	2-4 ac	4-8 ac	> 8 ac	Total
Paddy	22.80	33.00	25.00	34.00	114.80
Chilles	0	9.25	12.00	14.00	35.25
Kurakkan	0	0	2.00	0	2.00
Maize	0.75	0	0	0	0.75
Others	0	0	2.00	4.00	6.00
Total	23.55	42.25	41.00	52.00	158.80

Source : Paddy Cultivation Survey in Anuradapura District, *Eppawela area* in 1997

were reported to be grown in the highland allotments during the Maha season. Chilies, maize, various kinds of vegetables, ginger were among the crops grown by the majority of farmers.

Comparatively, the paddy cultivation area in the Yala season (114.8 ac) is lower than the Maha season (160.0 ac). Inadequate rainfall and limited availability of irrigation facilities (especially during the Yala season) were the main constraints to increasing paddy production and lowland cropping intensity in the survey area.

There was a large gap between the Maha and Yala seasons in the chena cultivation. For example, 57.45 ac chena acres were cultivated in the Maha season, but in the Yala season, it was limited to 8 ac due to unavailability of water. Among highland crops chilies were cultivated more in the Yala season (35.25 ac) than in Maha season (12.25 ac) mainly because lesser rain conditions are much more favorable for chilies.

(3) Land Preparation

Land preparation consists of an assortment of work: turning the soil, clearing of bunds and channels, plastering bunds and manual leveling. The time of commencement and completion of land preparation activities in these settlements for the Maha and Yala paddy crops mainly depend on factors such as reliability of rainfall and the availability of tank water. The availability of farm power also seems to be an important factor in this respect, as the farmers depend mainly on outside farm power for the preparation of land. Most of the farmers

(89%) who reported cultivation of paddy in the Maha season had commenced land preparation only after the first few Maha rains. These farmers usually delay their land preparation until the onset of Maha rain to avoid risk of crop failure. About 11% of the farmers, however, are reported to be utilizing tank water for land preparation. The Maha season land preparation farm power in the survey area for 1997 is summarized in table 5.7.

The majority of farmers (51%) used tractors for land preparation. Tractors are not available among small farmers, therefore the tractor utilization rate for land preparation recorded at only 33.3% among small farmers. Most medium scale farmers depend highly on outside tractor rental sources. Further small holders used their farm power as manual hoeing in order to maximize utilization of family labor and exchange labor as well as to reduce the cost. But on the other hand, large holders utilize 83.3% of tractors for land preparation. The use of buffaloes in land preparation is limited to 16.7% and 12.5% in small and medium scale farmers respectively.

Table 5.7

Land Preparation Sources of Maha Season in Anuradapura District, Eppawela area 1997

(unit = number of households, %)

Farm Power Source	< 2 ac	2 -4 ac	4-8 ac	> 8 ac	Total
By Tractors*	14	18	15	5	52
Buffaloa Ploughed & Muddied	7	4	0	0	11
Manual hoeing**	21	10	7	1	39
Total	42	32	22	6	102
By Tractors	33.3	56.2	68.2	83.3	51.0
Buffaloa Ploughed & Muddied	16.7	12.5	0	0	10.8
Manual hoeing	50.0	31.3	31.8	16.7	38.2
Total	100.0	100.0	100.0	100.0	100.0

Source : Paddy Cultivation Survey in Anuradapura District, *Eppawela area* 1997.

- Note : i). * By tractors and Manual hoeing.
 ii). ** By Manual hoeing only

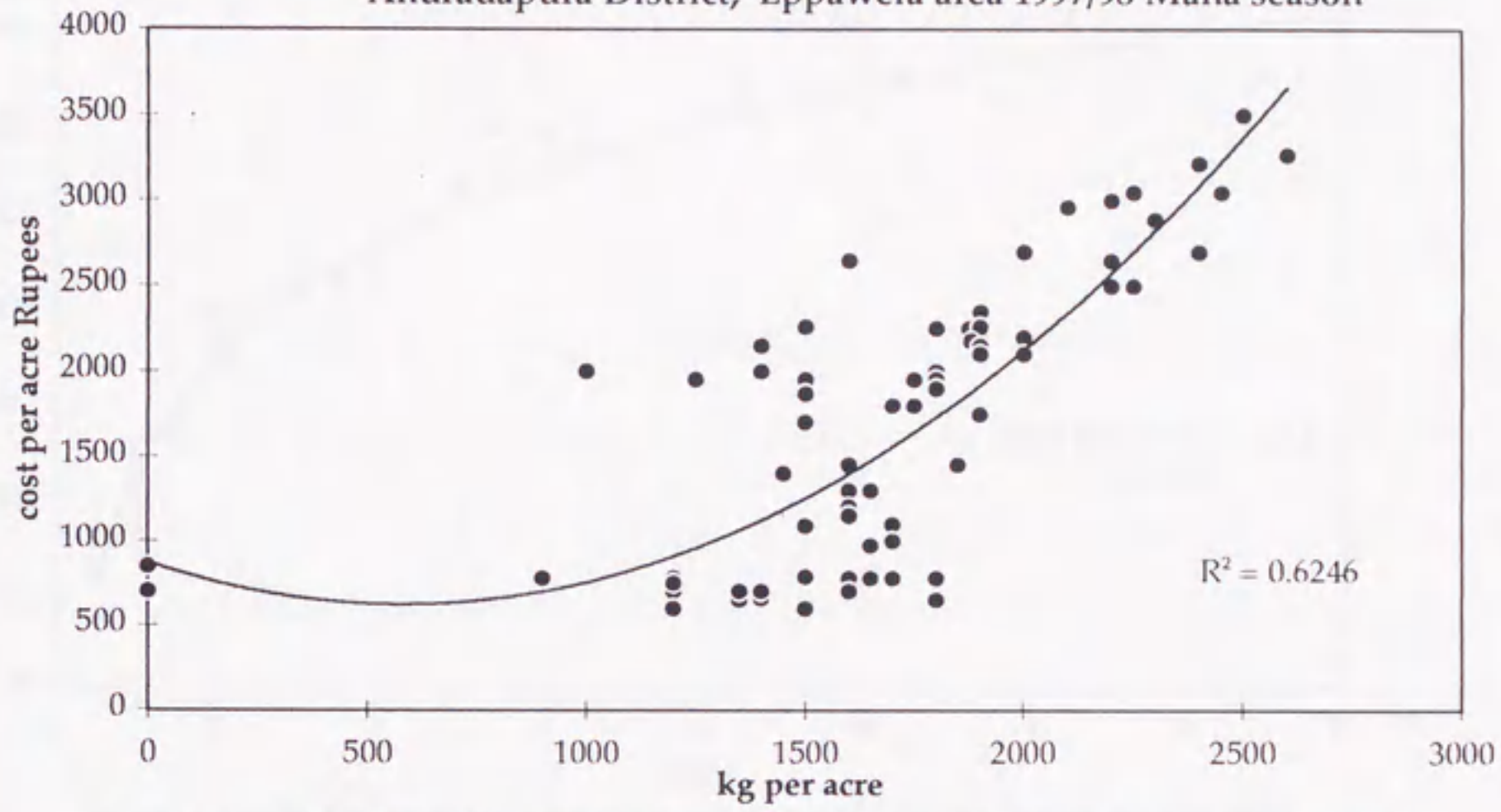
5.6) Modern Rice Varieties and Productivity

Productivity of modern rice varieties highly depend upon the usage of fertilizers, agro-chemicals and irrigation conditions of production environment. In the survey area, responsiveness of fertilizer/agro-chemical to the paddy productivity is highly positive. For example, the relationship between fertilizer and productivity is given in figure 5.1. It is clear that in the survey area any proportion of fertilizer usage is highly responsive for increasing the paddy productivity. The regression result R^2 in fertilizer is 0.62 and in chemical is 0.73. That explains the combination of either fertilizer or chemical usage would tend to increase the paddy productivity in the survey area.

5.7) Proportion of Fertilizer Usage per Acre

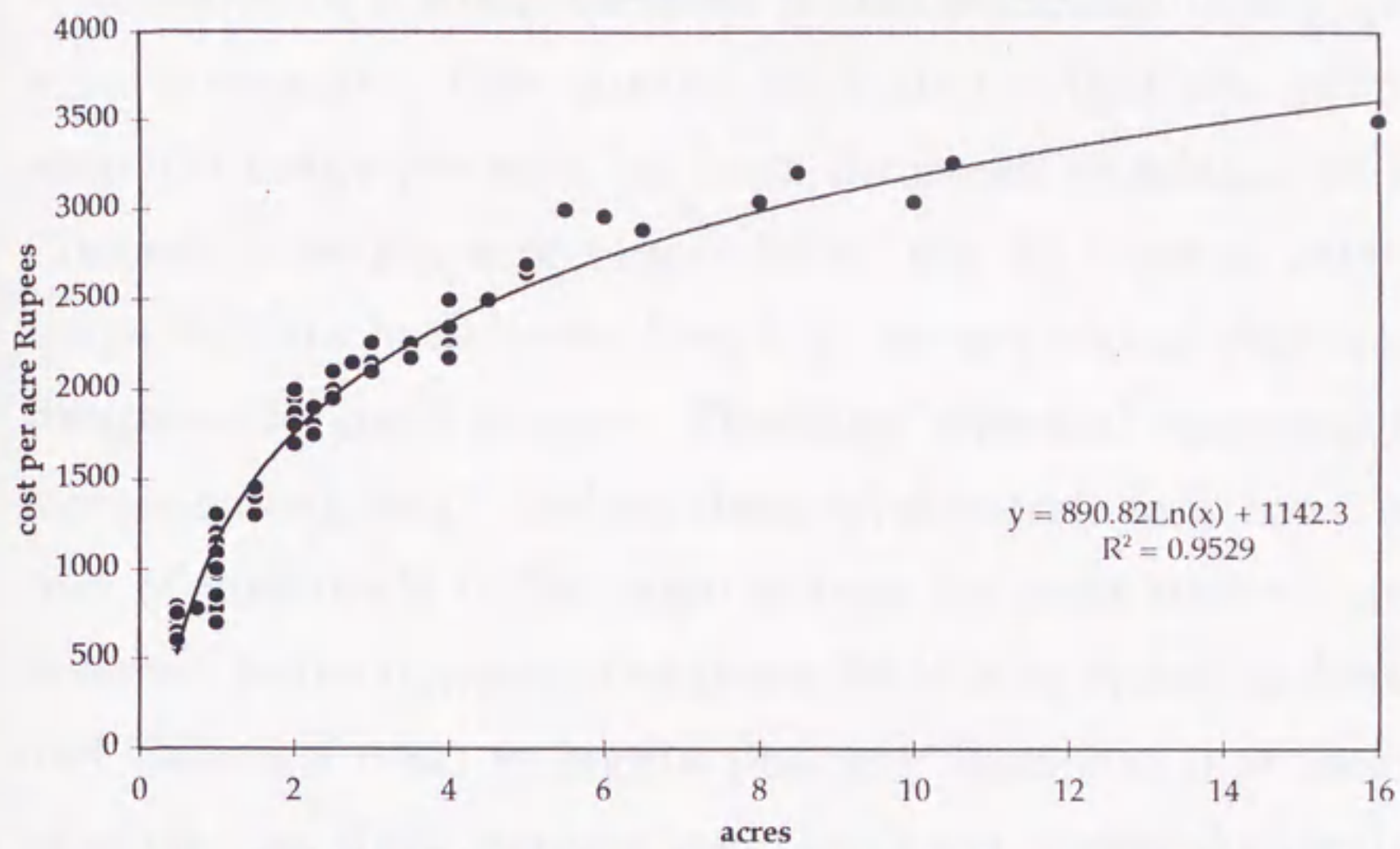
Fertilizer use per acre is significantly different in the survey area ranging from 600 Rs./acre to 3500 Rs./acre. When farm size is large, the proportion of fertilizer usage per acre increases (see figure 5.2). When farm size is small the proportion of fertilizer usage per acre decreases. For those who operate less than 5 acres, a higher fertilizer usage gap can be seen. In the gap ranging from 600 Rs./acre to 2700 Rs./acre, the high cost of fertilizer was attributed as the major reason for poor use of fertilizer in small holders. Shortage of water was also cited as a major constraint to the timely application of fertilizer.

Figure 5.1: Proportion of Fertilizer usage to Rice Productivity acre in Anuradapura District, Eppawela area 1997/98 Maha season



Source: Paddy Cultivation Survey in Anuradapura District, Eppawela area 1998

Figure 5.2: Proportion of Fertilizer usage per acre in Anuradapura District, Eppawela area, 1997/98 Maha Season



Source: Paddy Cultivation Survey in Anuradapura District, Eppawela area 1998

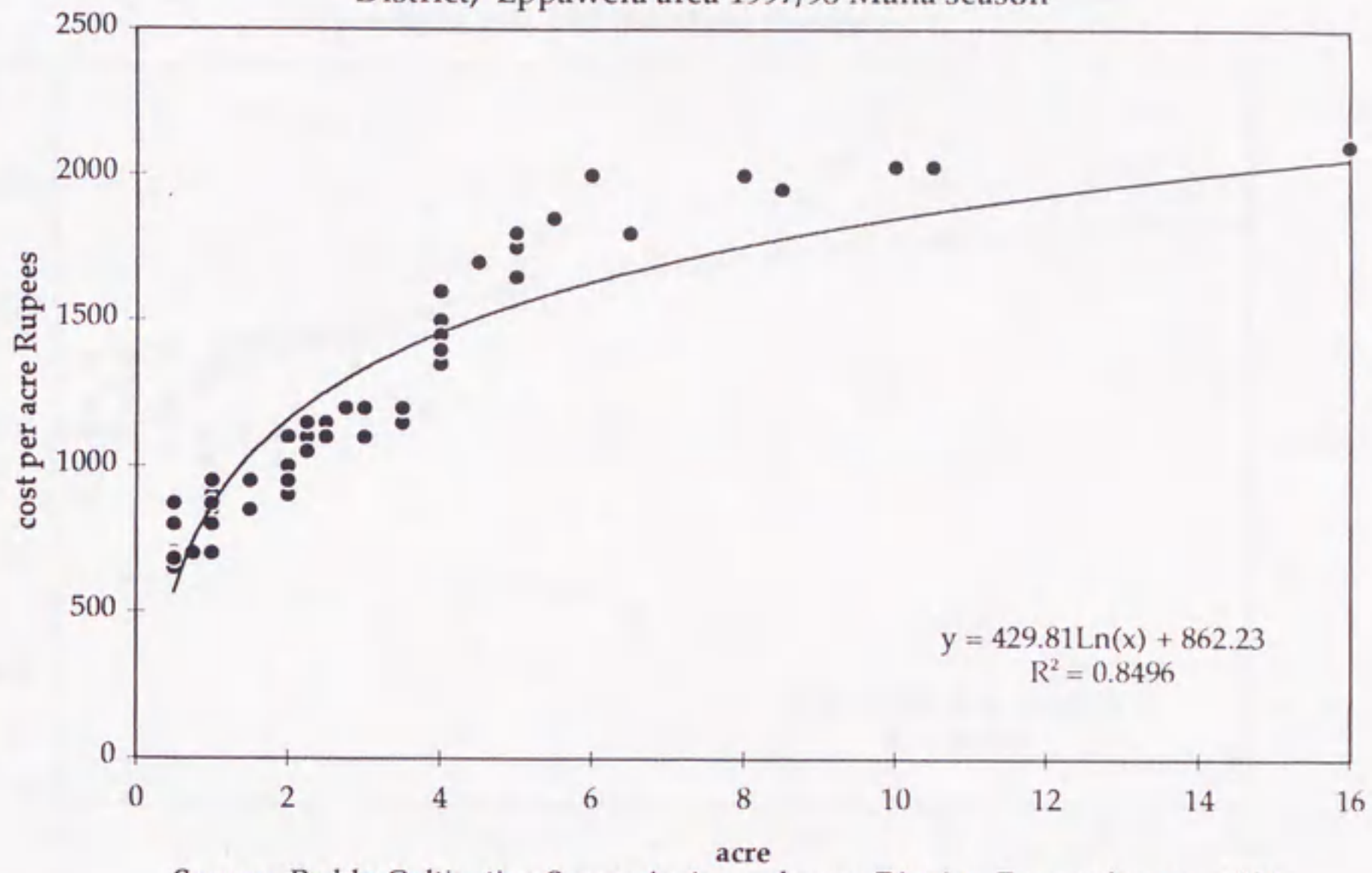
5.8) Proportion of Agro-Chemical Usage per Acre

Adoption of modern varieties is also associated with greater use of agro-chemicals. Our survey data shows that the proportion of chemical usage per acre has been increased in relation to farm size. Chemical cost per acre ranges from 680 Rs./acre to 2100 Rs./acre. Large farmers have been using high proportion of chemical per acre compared to small farmers. Therefore chemical usage gap is a classic feature among small holders, those who operate less than 5 acres. The cost of chemicals is the main reason for poor usage among small holders. In the regression equation R^2 in both occasions (fertilizer 0.95 and chemical 0.84) is highly positive; therefore it is interesting to examine how these modern input react to increase the productivity of rice farmers(see figure 5.3).

5.9) Productivity per Acre

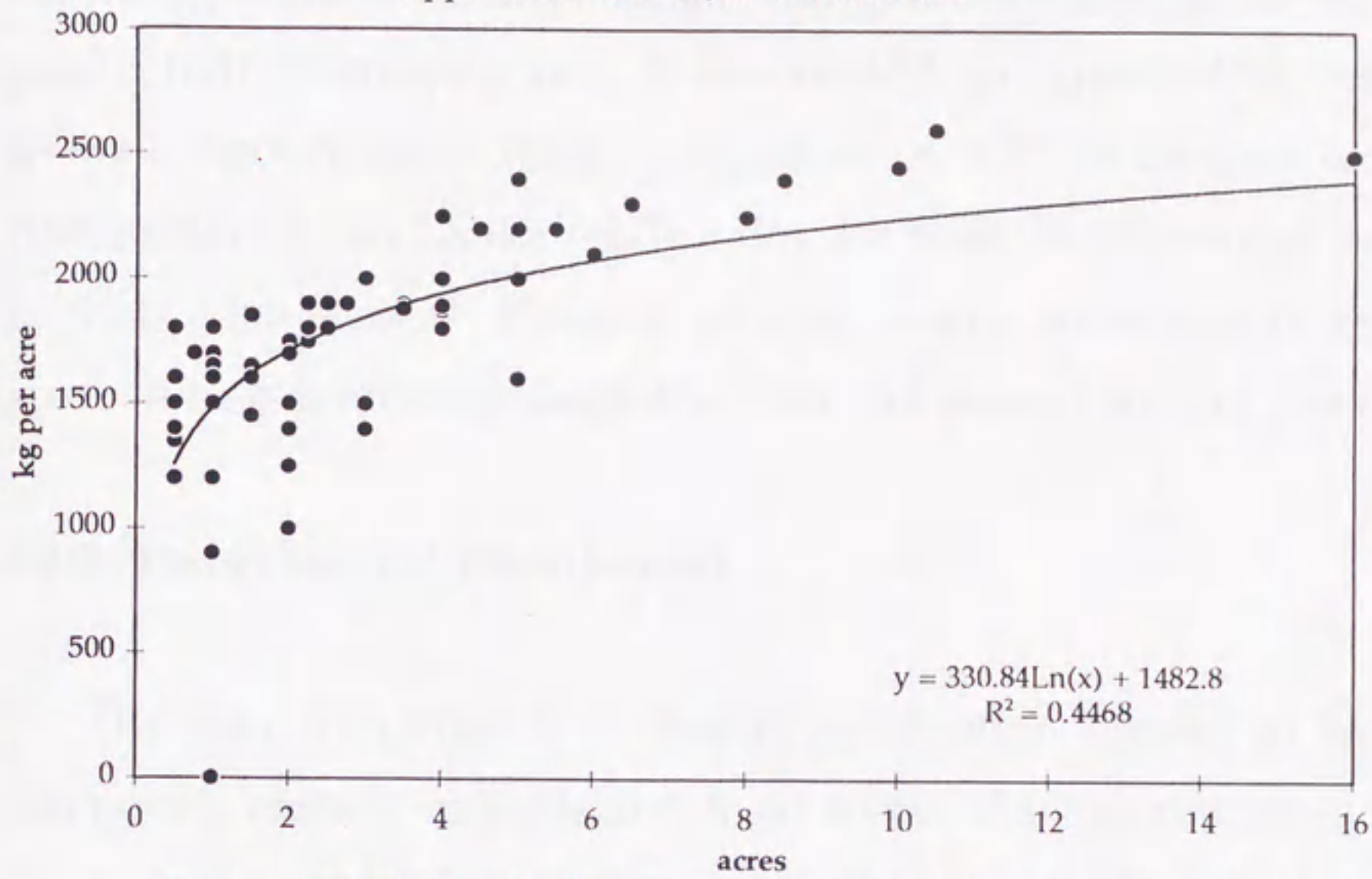
High yield varieties, irrigation conditions, and modern input ratios are the most important variables in explaining the productivity gap between small scale farmers and large scale farmers. More than 90% of farmers in the survey area used to practice modern varieties in recent past. Productivity per acre according to farm scales are plotted in figure 5.4. A wider productivity fluctuation can be seen among small scale farmers, those who operate less than 2.5 acre ranging 1200 kg per acre to 1900 kg per acre. Fluctuation of productivity is somewhat less in medium scale farmers (between 2.5 to 7.5 acre), and among those who operate more than 7.5 acres, such a fluctuation cannot be seen. Differential usage of modern inputs has widened disparities in yields

Figure 5.3: Proportion of Agro-chemical usage per acre in Anuradapura District, Eppawela area 1997/98 Maha season



Source: Paddy Cultivation Survey in Anuradapura District, Eppawela area 1998

Figure 5.4: Paddy Production per acre in Anuradapure District, Eppawela area 1997/98 Maha Season



Source: Paddy Cultivation Survey in Anuradapura District, Eppawela area 1998

between large scale and small scale farmers in survey areas. It is evident that productivity would increase with the use of modern inputs according to different farm scales, but questions arise as to whether the productivity increasing rate, is economical for large holders compared to their modern input usage proportion or not? In another words, do rice farmers in Sri Lanka really enjoy for scale merits or not according to their farm scales? Position of scale merits according to their farm size can be examined through the cost and income data of rice farmers.

5.10) Paddy Income Distribution

The cost components of paddy production consist of two major categories, namely variable and fixed costs. The variable costs involves the cost of material inputs, labor and other items which varies with the scale of farming operations. The fixed cost denotes those which are independent of the scale of farming operations such as land, rent, capital cost of tractors etc. For this analysis, only the operation costs of paddy production were taken into account. The cost of various inputs were obtained from respective farmers who utilized those inputs. The cost of exchange labor was calculated using the market price prevailing in the survey area according to the used mandays and hours in each of the stage. To identify the impact of modern rice technology on rice farmers, we classified the average income distribution per season according to farm size (see table 5.8).

Table 5.8

Cost and income of Paddy cultivation per acre in Anuradapura District, Eppawela area 1998 Maha Season

(Rupees)

Item	< 2 ac	2-4 ac	4-8 ac	> 8 ac	Average
Number of households	35	20	15	5	75
Labor	1641.43	2672.50	4833.33	7240.00	2932.00
Tractor	1557.14	1980.00	1746.67	1680.00	1717.73
Seed	844.29	977.50	1753.33	1030.00	926.67
Fertilizer	891.63	1990.95	2530.93	3217.00	1667.67
Chemical	782.00	1077.50	1643.33	2022.00	1139.73
Sprayers	18.18	40.00	33.33	0	25.33
Threshers	401.43	635.00	472.00	200.00	457.73
Transportation	976.00	1130.00	1033.33	680.00	1008.80
Others	2044.99	2570.00	3160.00	3860.00	2523.33
Total cost	8852.49	13073.45	16632.27	19829.00	12265.80
Gross Income	14970.00	17393.25	21507.17	25620.00	17633.63
Net Income	6117.51	4119.80	4874.90	5791.00	5367.83
Production per acre kg	1425.70	1656.50	2041.00	2440.00	1677.93
Price per kg (Rs.)	9.30	10.50	10.50	10.50	9.95
Self Consumption (kg)	434.80	772.50	913.30	1500.00	691.60

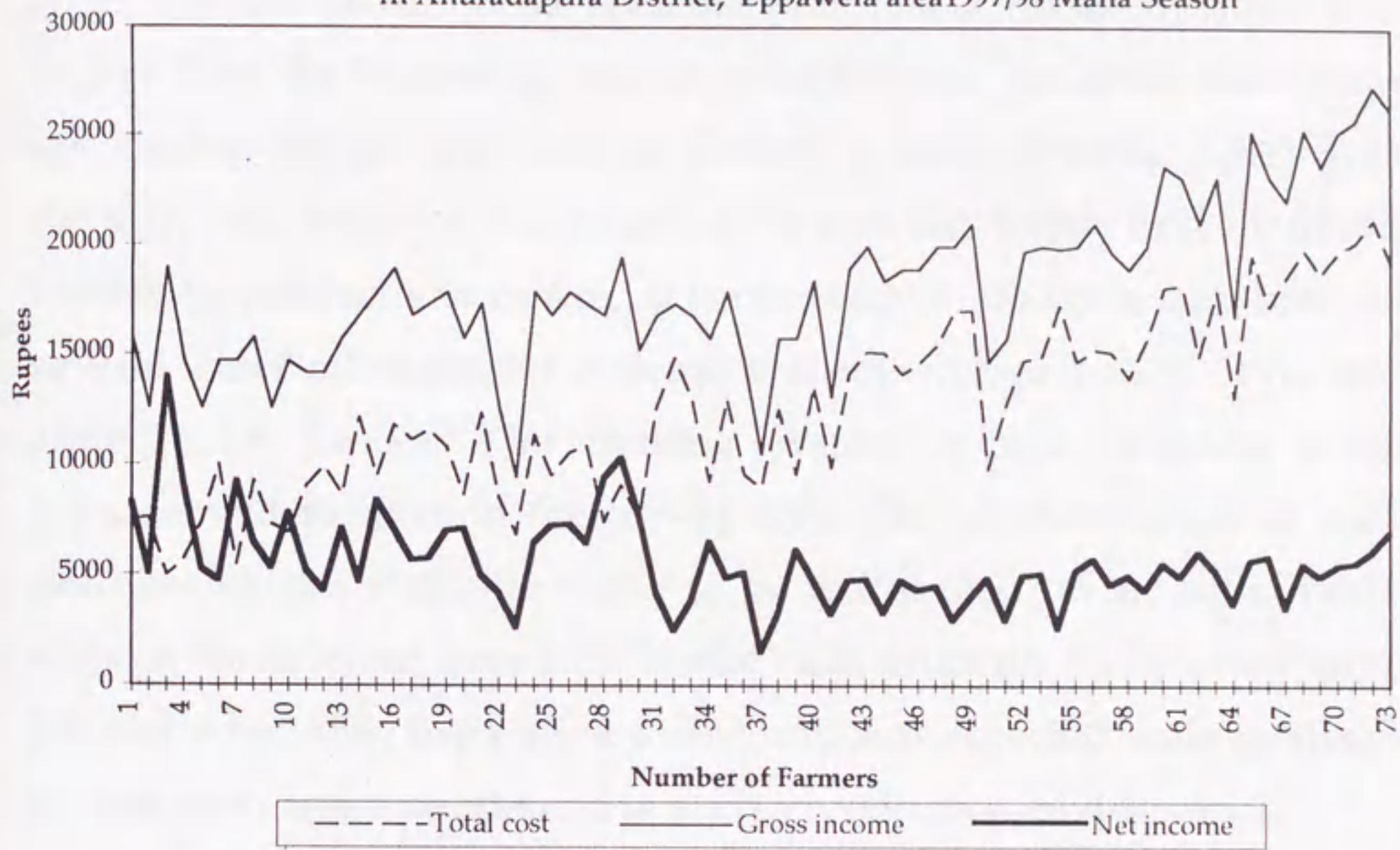
Source : Paddy Cultivation Survey in Anuradapura District, Eppawela area 1998.

Note : Others cost is included tobacco, meals, alcohol and other miscellaneous cost.

- i) If we take into consideration labor costs among small farmers (1641.43 Rs.) and super large farmers (7240.00 Rs.), labor cost is 4.4 times higher in super large farmers. This is due to high the utilization of hired labor during peak days. In Sri Lanka paddy cultivation is highly dependent on rain conditions. Land preparation and transplanting especially have to be done within a very limited period of time after rain fall. Though irrigation is available, it is not an assured source. Because most irrigation canals are not filled with concrete half of the water is absorbed in the soil.
- ii) Productivity of modern rice varieties highly depends upon the usage of fertilizer and agro chemicals in the recommended dosage. The proportion of fertilizer and chemical usage per acre differs according to farm size in our survey area. Large farmers use 3.6 times more fertilizer and 3.0 times more chemicals compared to small farmers. It is identified that most small scale paddy farmers in Sri Lanka opted to use smaller proportions of fertilizer and chemicals due to the unbearable cost.
- iii) Paddy productivity per acre is higher according to farm size. Large farmers' productivity per acre is 1.6 times bigger compared to small farmers. But comparative usage proportions of fertilizer and chemicals concerning the increasing rate of productivity per acre is lower. Insufficiency of irrigation water, the high cost of hired labor are considered to be the main factors for this situation.
- iv) The total cost is varied according to operating farm scales. Specially super large farmers' total costs are 2.2 times larger in comparison to small farmers. Gross income also varied with farm scales but the gross income gap is smaller; only 1.7 times difference compared to the total cost between super large farmers and small farmers.
- v) Net income differences cannot be seen according to farm size. The average net income of the area is 5367.8 Rs per acre. The net income index of small farmers is 1.13 and super large farmers is 1.07. (self-consumption of rice is also included in our calculation, therefore visibly small farmers' net income is exceeding that of large farmers'). There is no considerable net income difference in paddy cultivation between small and large farmers.

According to the survey data, each farmer's cost and income of rice is calculated and converted into a graph (figure 5.5). The size of the farm holding is represented in the x axis in small farmers to large farmers. At a glance, we can see that there is no income gap between small scale

Figure 5.5: Paddy Production Cost, Gross income and Net income per acre in Anuradapura District, Eppawela area 1997/98 Maha Season



Source: Paddy Cultivation Survey in Anuradapura District, Eppawela area 1998

farmers and large scale farmers. When the farm size is small, both cost and gross income of the farm are also small, but when the farm size is large, cost and gross income both increase. The increasing rate of cost is higher than the increasing rate of gross income, therefore finally low net income margin is a common feature in large farmers. Apart from the high cost, irrigation conditions of the area also highly influenced the increasing productivity of rice. It is necessary to mention that there are several water management systems available in many parts of the dry zone in Sri Lanka. The **Bethma system** is one common water management practice in the survey area. The ultimate result of such practices causes available water to be distributed on an equal basis, without considering farm size. Hence such practices really affect large farmers when they expanding their farm, and expected scale merits as to farm size cannot be attained in such a production environment.

5.11) Alternative Investment Opportunities in Large Scale Farmers

Household income includes sources other than rice production i.e., income from non rice crops, livestock, off farm and non farm activities. Recent development of the industrial sector and micro economic policies of the country created favorable investment opportunities for many large scale farmers in rural areas. In the survey area two main investment opportunity streams were identified.

(1) Side Business Opportunities

Number of large scale farmers in the survey area earned money utilizing various investment opportunities available, for example

lending money to farmers, **renting out agricultural equipments** such as tractors, fans, pumps etc., **self employment opportunities** such as buying and selling paddies, making bricks or blocks, making cement flower vases, making illicit brews (arracks), animal husbandry (broiler chicken farm), **private contractors** for road and highway construction, or rehabilitation of irrigation tanks and **providing people transport facilities**.

All the incidents mentioned above are true examples in the survey area). It is interesting to note there was a large scale farmer, who lent money to a small scale farmer 25000 Rs. (16250 yen) at the interest rate of 10% per month, which means the annual interest rate would become 120%.

(2) Ukas Agreements (Land Assemble System)

Land reforms and various legal acts reduced many tenurial exploitations in Sri Lanka. But our survey revealed that informal sectors in Sri Lanka have been still practicing tenurial agreements which are really advantages to large scale farmers. Large scale farmers assembling land by negotiating Ukas agreements are a special feature in the survey area. Changes of land ownership classifications in the traditional area within one year (1997 to 1998) are listed in table 5.9. Single ownership has changed five incidence in 1998 (46 households) compared to 1997 (51 households) and single ownership & Ukas increased 5 incidence within one year. Further complexity of land tenancy increased in 1998 compared to 1997; there were 7 ownership type categories in 1997 and in 1998 it was changed to 9 ownership type

Table 5.9

Land Ownership Classification of Traditional area in Anuradapura District,
Eppawela area 1997-1998

(unit = number of households) 1997

Ownership Type	2ac <	3-4ac	4-5ac	5-10ac	10ac >	Total
Single own	29	4	11	7	0	51
Ande(a)	0	1	0	0	0	1
Single own & Ande	4	2	0	2	1	9
Single own & Ukas(b)	0	0	0	0	3	3
Single own & Government own(c)	1	2	0	2	0	5
Single own & Ande & Government own	0	1	0	1	2	4
Single own & Ukas & Government own	0	0	0	2	0	2
Total	34	10	11	14	6	7
1998						
Ownership Type	2ac <	3-4ac	4-5ac	5-10ac	10ac >	Total
Single own	29	4	8	5	0	46
Ande(a)	0	1	0	0	0	1
Single own & Ande	4	2	0	1	1	8
Single own & Ukas(b)	0	0	2	3	3	8
Single own & Government own(c)	1	2	0	2	0	5
Single own & Ande & Government own	0	1	0	1	1	3
Single own & Ukas & Government own	0	0	0	2	0	2
Single own & Ande & Ukas	0	0	0	1	0	1
Single own & Ande & Ukas & Government own	0	0	0	0	1	1
Total	34	10	10	15	6	75

Source : Paddy Cultivation Survey in Anuradapura District, Eppawela area 1997, 1998.

categories. Survey data reveals that all the new ownership titles are in the Ukas category. All these agreements take place between medium scale farmers and large scale farmers.

5.12) Total Income Distribution

The total income of rice farmers coming from sources other than rice production include several sources, such as income earning from non-rice crops, livestock, off-farm activities, and non-farm activities. According to our intensive survey information, the total income distribution of four sample farmers in each scale is listed in table 5.10.

- i) Income from employment is the highest income source for small and medium scale farmers. Small farmers earn 72% of their total net income by working on farm activities and non-farm activities, while medium farmers earn 57% of their total net income by working on farm activities and non-farm activities.
- ii) A wide net income gap can be seen between small and super large farmers in total income distribution. Super large farmers' total net income (27930 Rs.) is 16 times larger compared to small farmers' (1784 Rs.). Although paddy net income difference is very small, total net income shows very large gap according to farm size. Main reason for such a wide gap is identified as side business opportunities in the area.

The main side business sources in the survey area is as follows: lending money to farmers, renting out agricultural equipments such as tractors, fans, pumps etc., self employment opportunities such as buying and selling paddy, making bricks or blocks, making cement flower vase, making illicit brew (arracks), animal husbandry (broiler chicken farm), private contractors for road and highway construction, or rehabilitation of irrigation tanks and provide transport facilities.

Table 5.10

**Total Cost and Net Income in Anuradapura District, Eppawela area
1998 Maha Season**

(unit = Rupees)

Source	A	B	C	D
Farm Size				
Total	1.0 ac	3.0 ac	7.5 ac	17.5 ac
Paddy	0.5 ac	2.5 ac	6.0 ac	14.0 ac
Others	0.5 ac	0.5 ac	1.5 ac	3.0 ac
Family members				
All	6	7	4	4
Labor force	4	4	3	2
i Total Gross income	16125	61512	226350	492700
Total cost [(a) + (b) + (c)]	(5415)	(28300)	(134500)	(325000)
ii Total net income per season	10710	33212	91850	167700
Net income per month	1785	5535	15308	27930
iii Gross income of Paddy	4725	32812	141750	367500
Cost of paddy (a)	(3415)	(24750)	(108600)	(270200)
iv Gross income from other crops	2400	3700	36000	54000
Cost of other crops (b)	(800)	(1950)	(16800)	(24900)
v Income from employment				
Farm activities	3000	8600	0	0
Non farm activities	6000	14400	12000	0
vi Side business income				
Income from lending money	0	0	6000	16400
Renting Agricultural equipments	0	0	5000	8200
Income from without agriculture	0	6000	21000	18600
Construction (Private contract)	0	0	0	10000
Transport activities	0	0	0	12000
Animal husbandry	0	0	3600	6000
vii Uncategorized cost (c)	(1200)	(1600)	(9100)	(29900)
viii Gross income of Paddy per acre	9450	13125	23625	26250
Cost of paddy per acre	(6830)	(9900)	(18100)	(19300)
ix Gross income from other crops per acre	4800	7400	24000	22700
Cost of other crops per acre	(1600)	(3900)	(11200)	(8300)

Source : Paddy Cultivation Survey in Anuradapura District, Eppawela area 1998.

Note: i) All the value are in Sri Lankan Rupees, current exchange rate is 100 Yen = 60 Rupees

ii) All income received from highland and Chena farming were included to other crops income.

iii) Income from without agriculture means self employments included making hand crafts, boutiques activities, making bricks, plucking coconuts, and making illicit brew

iv) Family labor cost was not calculated, but exchange labor were calculated according to marker rate. Used market rates are as follows;

Land preparation	Male = 175 Rs. Per day
Transplanting	Male = 160 Rs. Per day Female = 130 Rs. Per day
Harvesting	Male = 150 Rs. Per day Female = 125 Rs. Per day
Other different farm activities	Male = 125 Rs. Per day Female = 100 Rs. Per day

- iii) Side business opportunities contribute a considerable amount of total net income in large and super large farmers. It is identified that side business income earnings represent more than 40% the total net income of both large and super large farmers.

For example the largest farmer in the survey manages 17.5 acres. His favorite side business is lending money to farmers. Details of one of his transaction is as follows: lent money to a small scale farmer 25000 Rs. (16250 yen) as the interest rate per month 10%, which means annual interest rate would become 120%. (In 1998 survey revealed that one farmers (who was surveyed in 1997) was committed suicide in 08/02/1998 for the reason unpayable debts)

- iv) Income from other crops source also one of a profitable income source for large and super large farmers. Our intensive data revealed that around 30% the total net income is other crops income by large farmers.

For example large farmers utilize hired labor maximum way under the condition of daily payment basis. One record of our intensive survey is as follows: A small farmers (male) worked under the condition of 150 Rs. daily payment basis. He harvested paddy in morning session (from 8 a.m. to 12 a.m.) and picked chilies in the afternoon (from 1 p.m. to 6 p.m.).

NOTES

- a) The first round of the survey was conducted in 1997 and was called the *extensive survey*, which provided a broad picture of the production environment. The survey was covered in three areas:
- (i) Traditional village (82 families were surveyed).
 - (ii) Mahaweli H area (new town or Newly settled area) (15 families were surveyed).
 - (iii) Non-traditional area (old town area or Oldly settled area) (13 families were surveyed).

The second round of the survey was conducted in 1998 and was called the *intensive survey*, covering 75 out of the 82 farmers who were surveyed in 1997 in the traditional area. A complete census was conducted to gather farmers' costs and income sources, taking 20 days.

Traditional village is called Mawathawewa and located in the Eastern part of Eppawela area. Land utilization for paddy cultivation in the Mawathawewa area has a long history more than 1000 years. Therefore all the farmers in this area is inherited paddy farmers. A big lake is available in the area and also called "Mawathawewa lake" which was built in kings era.

Non-traditional areas' lands were converted to paddy cultivation in the last century with the development of minor and major irrigation schemes. Mahaweli H area is recently irrigated area after 1982. Therefore rice farming in both non-traditional and Mahaweli H area have been carried out by the farmers who had migrated from other districts under the irrigation-cum-colonization projects.

In the chapter 5 we used only the traditional area data, therefore the word "survey area" stands for traditional area.

- b) *Ande* means sharecroppers
- c) *Ukas* means Sri Lankan term for mortgage; under *Ukas* system mortgagee (person to whom property is mortgaged) can take the benefit of land until the mortgagor release the land. If mortgagor fails to release the land under the agreed period the title of land transfer to mortgagee.
- d) In survey area Government own means both legal lands and illegal lands
- e) Farmers net income calculated by omitting self consumption kg of every level farmers. Many small farmers cultivated paddy only for consumption purpose, therefore small farmers portion (2.5<) in figure 8 penetrates little high net income of small farmers. Small farmers average consumption is 560 kg, and average price per kg is 10 Rs. Large farmers average consumption is 1600 kg, and average price is 10.5 Rs.
- f) *Bethma System* is known as a type of sharecropping, prevails when a cultivation season normally use water tank's water is not enough for the farmers, they all gathered in a common place and take mutual agreement, at first thinking present available water in the irrigation source, then using that how many paddy fields to be cultivated are counted, then all the farmers cultivated decided paddy fields and finally, harvest is sharing each others. Percentage of this type of practices are not important at present in Sri Lanka, because of the new irrigation schemes.
- g) There were five large scale farmers (8>ac) in the survey area, all of them engaged in side business. Number of cases of side business among 5 farmers are as follows;
 - i). Lending money 5 cases
 - ii). Renting out agricultural equipments 5 cases
 - iii). Self employment opportunities 5 cases
 - iv). Private contractors 3 cases
 - v). Providing people transport facilities 1 case

- h) *Government guaranteed local producers' real rice price, 1985=3.3 Rs./kg and 1998=2.1 Rs./kg.*
- i) *Local producers' real open market rice price, 1985=3.8 Rs./kg and 1998=3.1 Rs./kg.*
- j) *Inflation of the country, 1998 was 18%.*
- k) *Our survey data in 1998 shows that two farmers have stopped paddy cultivation due to unbearable cost. One of them (who is surveyed in 1997) is committed suicide in 08/02/1998 for the reason of unpayable debts)*

CHAPTER 6

6) Findings of the Survey, Concluding remarks and Discussion

6.1) Findings of the Survey

It is said that green revolution and open economic policies opened the way for modern agricultural process in the Sri Lanka paddy farming sector, despite prevailing low adoption rates of machineries and insufficient irrigation conditions. Our survey revealed that prevailing economic conditions of rice farmers would not help to expand farm scales more due to unfavorable production environments.

The key indicators which affected rice farmers' economic conditions are identified by our survey. They are listed in table 6.1, and an index of each item is calculated by taking each item's average of total survey area separately.

Table 6.1. Main indicators of Paddy Cultivation Process in
Anuradapura District, Eppawela area 1997/98 Maha season
per acre

Category	Average of total survey area	Index	
		operate 3< acres	operate 8> acres
Fertilizer	(Rs.) 1667.67	0.75	1.99
Agro-chemical	(Rs.) 1115.73	0.79	1.93
Productivity	(Kg) 1677.93	0.89	1.45
Cost	(Rs.) 12265.80	0.87	1.61
Gross income	(Rs.) 17633.60	0.93	1.45
Net income	(Rs.) 5367.80	1.05	1.07

Source : Paddy Cultivation Survey in Anuradapura District, *Eppawela area* in 1997/98.

Note: Index was calculated by taking each source average total survey area

- i) The proportion of fertilizer usage per acre is higher according to farm size. We can examine how the proportion of fertilizer usage affects the scale merits, in different farm sizes. The average proportion of fertilizer usage cost per acre of total survey is 1667.6 Rs., using this as a base, we calculated the index of proportion fertilizer usage per acre. Those who operate 3< acres is 0.75 and those who operate 8> acres is 1.93, which indicates the large farmers' proportion of fertilizer usage is 2.6 times more than the small farmers.
- ii) The proportion of chemical usage per acre is higher according to farm size. The chemical index of small farmers is 0.79, and large farmers is 1.99, means the large farmer's proportion of chemical usage is 2.5 times higher as compared to small farmer's.
- iii) Paddy productivity per acre is higher according to farm size. Large farmer's productivity per acre is 1.6 times bigger compared with small farmer's. But the comparative proportion of fertilizer usage and chemical concern increasing rate of productivity per acre is lower. Insufficient irrigation water and high cost of hired labor are considered be the main factors for this situation.
- iv) Farm cost per acre is increasing according to farm scale. In the survey area, total average cost is 12265.8 Rs per acre. Cost index of small farmers is 0.87 and large farmers is 1.61. That indicates large farmer's paddy cost per acre is 1.8 times higher compared to small farmers.
- v) Gross income in the farm per acre is increasing according to farm scales. Average gross income of the area is 17633.6 Rs per acre. Gross income index of small farmers is 0.93 and large farmers is 1.45, larger farmer's gross income is only 1.5 times higher compared to small farmer's.

- vi) Net income difference cannot be seen according to farm size. Average net income of the area is 5367.8 Rs per acre. Net income index of small farmers is 1.05 and large farmers is 1.07. There is no considerable net income difference between small and large farmers.
- vii) In spite of paddy productivity increases according to farm size, hired labor cost, modern input cost and unfavorable irrigation conditions are highly affected to reduce the net income of large scale farmers.

Our survey revealed the income distribution pattern of the rice farmers as follows;

1) In the process of paddy cultivation there is no considerable net income difference according to farm size.

Although large scale farmers take advantage of high productivity by utilizing machine and modern inputs, they cannot enjoy the maximum technical advantages due to unfavorable irrigation conditions in the dry zone agricultural areas. Further unavoidable high labor costs and modern input prices are highly affected to reduce large farmers' net profit per acre.

For example, for each scale average net income, average productivity, percentage of average labor cost and modern input cost into total cost per acre in paddy cultivation are listed as follows;

	small	medium scale	large scale	super large
Paddy net income*	6118 Rs.	4120 Rs.	4875 Rs.	5791 Rs.
Productivity	1426 kg	1657 kg	2041 kg	2440 kg
(Labor + Modern input)/ Total cost	37%	44%	54%	63%

* Self consumption of rice is included for calculation, therefore small farmers' average net income slightly exceeds other farmers.'

- 2) Concerning the total income distribution of rice farmers, a wide net income gap can be identified according to farm size.

For example, in our survey area the total net income per month to a household unit in each scale are as follows;

	small	medium scale	large scale	super large
Total net income	1785 Rs.	6202 Rs.	15308 Rs.	27930 Rs.

It is identified that large scale farmers' side business opportunities and maximum utilization of available resources are the main factors which widen income disparities among paddy farmers.

Further, it is also revealed that, those side business sources are highly interrelated to small and medium farmers and their agricultural activities.

The survey reveals the present situation of rice farmers in Sri Lanka as:

- a) **Small farmers continue rice farming as their subsistence.**

Among small farmers 60% (2.5 < acres) work as hired labor of large farmers in different activities.

- b) **Most medium scale farmers (between 2.5-7.5 acres) engage in rice farming with an ambiguous mind, either expanding farm size further or investing in side business opportunities if available.**

Survey data reveals that Ukas agreements would activate among medium scale farmers and large scale farmers.

- c) **Large scale farmers invest their money into side business sources due to unattainable scale merits in the production environment.**

All large farmers in the survey area engage in various side businesses available to them.

6.2) Concluding Remarks

It is said that macro economic policies, pursued by Sri Lanka's government from the 1980s onward tended to increase the degree of income inequality between rice farmers.

The importation of cheap rice and wheat especially effected the economically and mentality of local rice farmers.

Further, prevailing inflation of the country made the situation worse by soaring input cost in the survey area; out of the total cost 51% absorbs the labor cost.

Present macro economic policy in the country does not allow a fair price for rice producers', mainly imported cheap rice created an environment to decrease producers' real rice price instead of increasing.

Continuous increasing costs made the environment to reduce many scale farmers' net income, which really discourages further investment money into the paddy sector.

It is true that open economic policy helped many large scale farmers to replace manual labor with machines but finally, unfavorable production environments discourage large scale farmers; recent data shows that the demand of agricultural machinery in the subsistence sector is stagnant.

Therefore, agricultural policy makers of the country have to rethink before implementing various policies which are hazardous to rice farmers. If protection to producers' rice price is not given, number of rice farmers in the country will decrease. **In our 1998 survey data, shows that two farmers have stopped cultivation due to unbearable costs.**

This survey suggests that, at least for small farmers, subsidiaries or any other supportive system need to be introduced. Otherwise, a considerable number of rice cultivators will stop farming, adding to the unemployed crowd, finally it effecting to decrease the self-sufficiency ratio more.

This survey also found that many farmers face severe water management problems in the Yala season. Therefore irrigation assurance has to be given to farmers, truly not an easy task, but at least reconstruction of abandoned water tanks would help some percentage.

Under this present situation, various economic conditions of rice farmers must be taken into account, and increased technical assistance and improvement of water management distribution are needed in order to further encouragement of modern agricultural development. Since rapid economic growth sometimes hinders agricultural development in the subsistence sector, it is critical that steps, such as the implementation of effective protection policies of rice farmers, be taken to reduce the unfavorable production environment of rice farmers.

6.3) Discussion

Policies and measures to be implemented which aim at raising agricultural production need to take account of the linkages between agriculture and other sectors of the economy. The link with the industrial sector is especially important since industry is a source of farm inputs and of consumer goods among the rural population as well as a source of demand for agricultural products. Agro-industries and processing industries located in the rural areas can provide both a stimulus to agriculture and a means of employment for underutilized labor.

Success in realizing the potential for greater agriculture productivity requires a farming population aware of the incentives and the means required for this purpose. Improving the knowledge and skill of farmers calls for the diffusion of technology relating to agriculture practices and the use of improved plant varieties as well as for the continued development and adaptation of technology through research. This presumes both an effective extension efforts and services to enhance the capabilities of agricultural research institutions.

The successful adoption of better methods and technologies is significantly dependent on incentives which link the use of superior methods to prospects for an improved standard of living.

Price incentives are also really important, particularly in the context of the transition from subsistence farming to modern agriculture. Policies which depress the price of farm product in order to protect or subsidize living costs for the population at large are often counterproductive. A policy framework that permits more realistic prices more reflective of market institutions often yields better results. Such a framework must also remove the shortcomings in marketing and distribution, as well as shortages that lead to an excessive gap between retail and farm prices.

Economic units of land under a secure system of tenure are often prerequisites for agricultural process. Facilities for irrigation and a strong infrastructure of transport, communications and power as well as of other services that the remoteness of rural areas are among the

others. A strong network of rural banking and cooperatives is also vital to help farmers procure inputs and make the investments needed for raising production. Schemes for rural self-help and for the mobilization of labor for community development and for the upgrading and maintenance of the rural infrastructure can also play an important part in the drive for agricultural progress.

A number of steps are also needed at the international level. Investment in the agricultural sector and technical assistance should form part of the programs for the development cooperation, both bilateral and multilateral. The removal of existing distortions in international trade in agriculture is also essential.

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Appendix

Extensive Survey of Anuradapura district, Eppawela Area 1997 (Questionnaire)

Date	Name	Address

Information of the house

Own	Rent	Others ()
-----	------	------------

Condition of the house

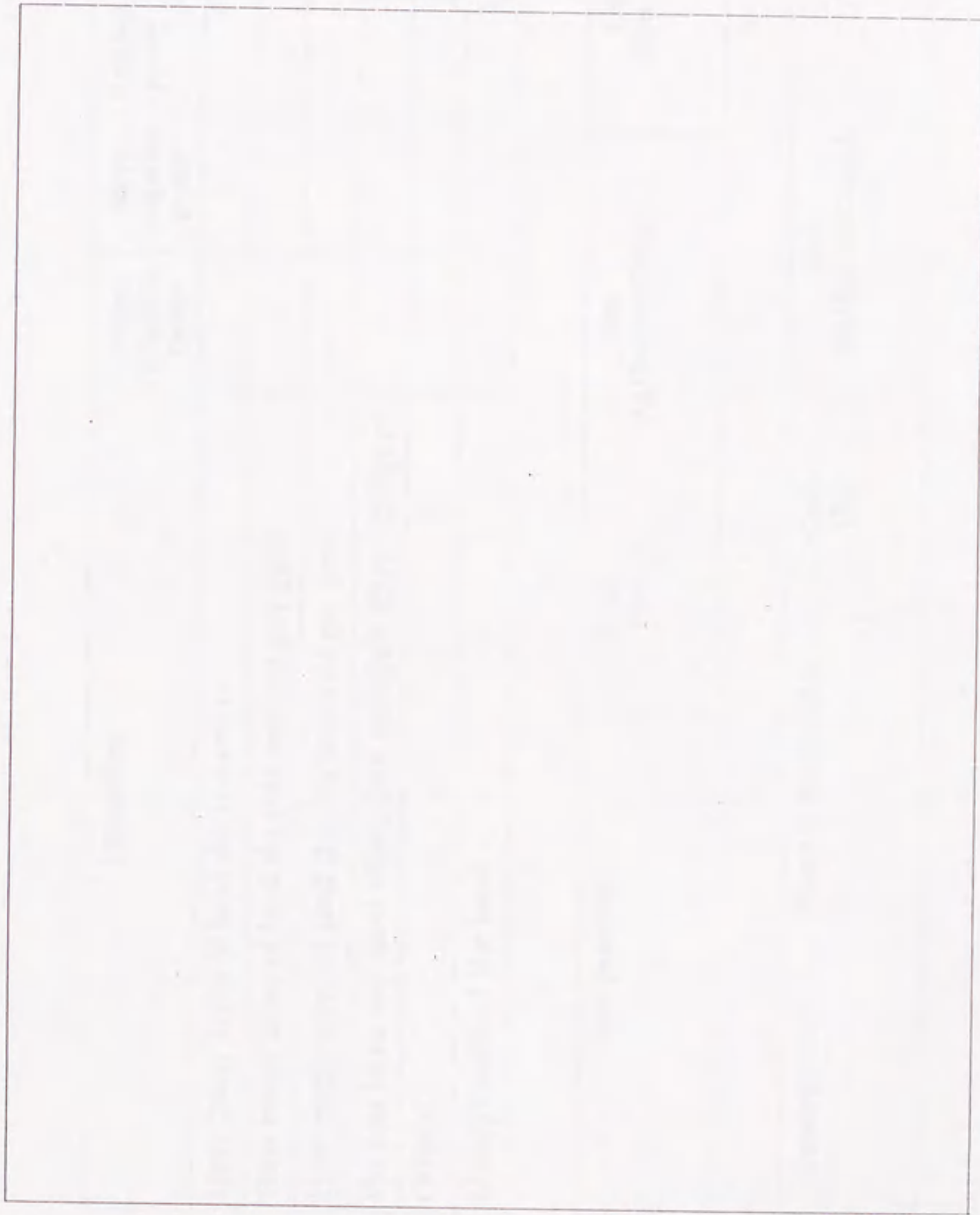
Permanent	Temporary	Others ()
-----------	-----------	------------

Electricity Have/Have not

Family members

No.	Name	Sex	Age	Relationship	Main Occupation	Working days per year	Sub Occupation	Working days per year	Stay
1		M/F							
2		M/F							
3		M/F							
4		M/F							
5		M/F							
6		M/F							
7		M/F							
8		M/F							
9		M/F							
10		M/F							

Land map



Land Ownership

Description	Major Irrigation Paddy	Minor Irrigation paddy	Rainfed paddy	High land	Others	Total
How many acres of land do you own						
How many acres of land do you rent out per year						
How many acres of land do you lend out per year						
Do you have any land other than mention above category						
Others						
Management of the land						

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Rent payment	Cash (Rs.)	Rice (Kg/Bushel/Gunny)	Labor (Man days)	Others

Lending Income	Name & Relationship	Cash (Rs.)	Rice (Kg/Bushel/Gunny)	Labor (Man days)	Others

Agricultural impliments and mechninery

Numbers

Tractors 4 wheeled	
Tractors 2 wheeled	
Mammoties	
Ploughs	
Sprayers & Dusters	
Threshers	
Irrigation pumps	
Winnowing Fans	
Weeders	
Others	

Live stock information

Numbers

Cattle	
Buffalo	
Poultry	
Pig	
Goat	
Others	

Method of sowing

Method	Maha	Yala
Broadcasted		
Transplanted in Rows		
Non Transplanted in Rows		
Row Seeded		

Use of fertilizer

Kind	Maha	Yala
Inorganic fertilizer		
Organic fertilizer		
Both organic and inorganic		
No fertilizer		

Names of Inorganic fertilizer used			
------------------------------------	--	--	--

Names of organic fertilizer used			
----------------------------------	--	--	--

Reason for no fertilizer	
--------------------------	--

Method of weeding

Kind	Maha	Yala
By hand		
Weedicide		
Water		
None		

Use of insecticide

Kind	Maha	Yala
Use of insecticides		
No use of insecticide		

Use of fungicide

Kind	Maha	Yala
Use of fungicide		
No use of fungicide		

Labor usage of harvest

Category	Maha	Yala
Family labor		
Hired labor		
Others		

Method of yield

Kind	Maha	Yala
Using threshers		
Using buffaloes		
Any other method		

Labor Utilization of paddy Activities (Maha)

Kind	Land Preparation	Seeding	Fertilizer	Weeding	Agro Chemical	Harvesting	Winnowing
Family							
Hired							
Attam							
Kaiya							
Ad-hoc							
Contract							
Others							

Labor Utilization of paddy Activities (Yala)

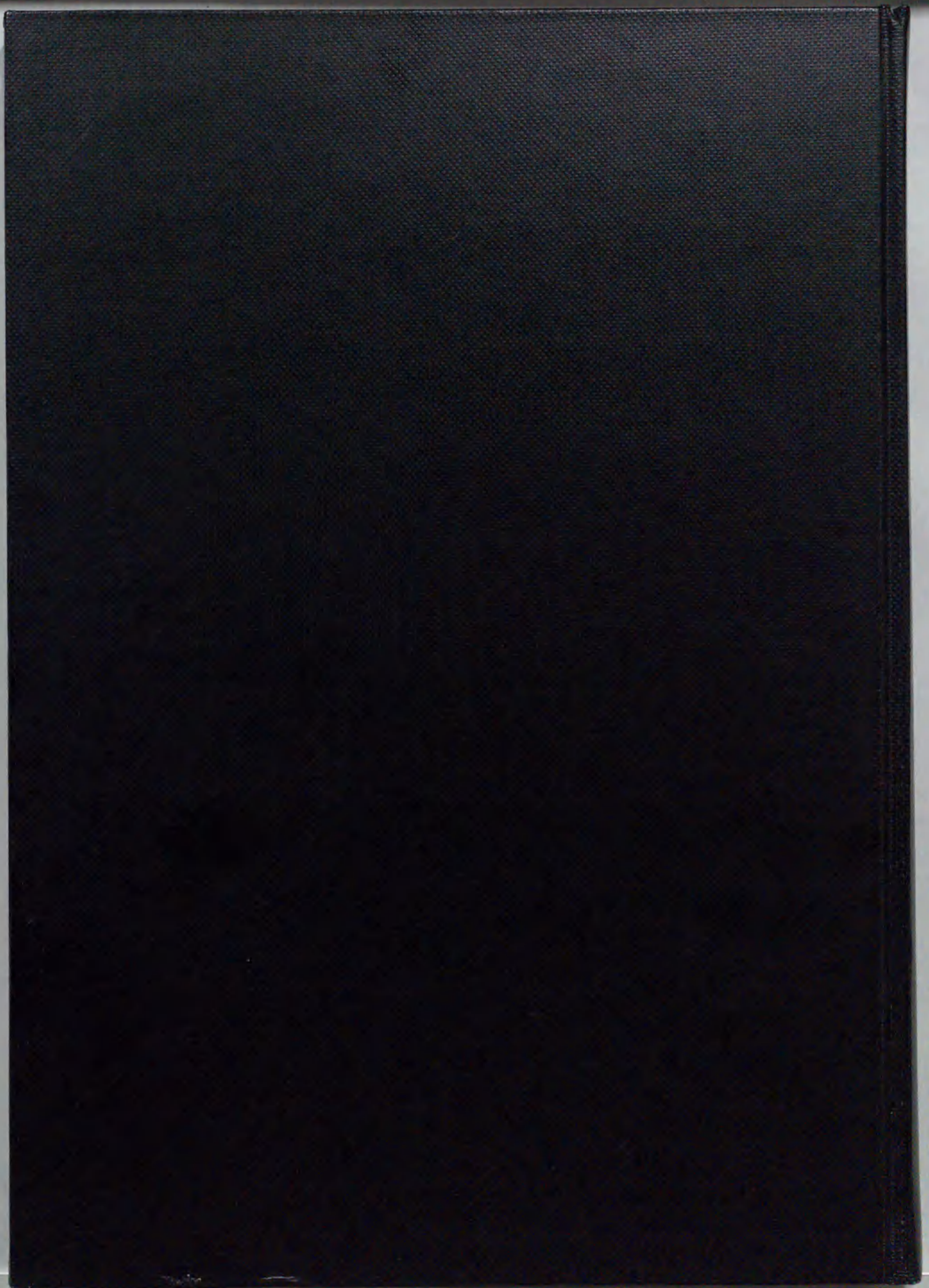
Kind	Land Preparation	Seeding	Fertilizer	Weeding	Agro Chemical	Harvesting	Winnowing
Family							
Hired							
Attam							
Kaiya							
Ad-hoc							
Contract							
Others							

Production income
Income earned from agriculture (paddy)

Kind	Measure unit	Maha				Yala						
		Amount Produce	Personal consumption	Selling Price per unit	Amount of sold	Measure unit	Amount Produce	Personal consumption	Selling Price per unit	Amount of sold		
Paddy												
Highland crops												
(i)												
(ii)												
(iii)												
(iv)												
(v)												
(vi)												
Chena												
(i)												
(ii)												
(iii)												
(iv)												
(v)												
Animal husbandry												
(i)												
(ii)												
(iii)												
Others												
(i)												
(ii)												
(iii)												

Income earned from non agriculture

Kind	Monthly income
By working	
Other method	
(i)	
(ii)	
Selfemployment	



Inches 1 2 3 4 5 6 7 8
cm 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

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Kodak Gray Scale



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A 1 2 3 4 5 6 M 8 9 10 11 12 13 14 15 B 17 18 19

