

## CHAPTER 1

### INTRODUCTION

#### 1.1 Background

Sri Lanka is an island at the southern tip of India, having an area of 65,610 square kilometers. Like other countries in the Asian region, agriculture has traditionally been dominated and the agricultural sector plays an important role in the economy and social development of the country (CIA, 2010). The agriculture sector contributes 13 percent of Gross Domestic Product (GDP) in 2010 providing employment to about 33 percent of the labor force (CIA, 2012).

As agriculture is becoming widespread, coastal habitats are being badly degraded, wetlands are being filled and agriculture is shifting more towards single (mono) crop. Due to this soil erosion is severe in many parts of the wet zone. Unsustainable agricultural and forestry practices are causing biodiversity loss and severe soil erosion ([www.unescap.org/rural/doc/oa/Sri%20lanka.PDF](http://www.unescap.org/rural/doc/oa/Sri%20lanka.PDF)).

Coconut (*Cocos nucifera*) which is known as “Tree of life” among the important tree crops of the humid tropical regions. The global annual production of coconut is around 52 billion nuts (Asian–Pacific Coconut Community, 2003; Peiris *et al.*, 2003). Sri Lanka ranks fourth in terms of the contribution to the world coconut production (6 percent) and land extent under coconut after Indonesia, India and Philippines (Peiris *et al.*, 2008). Coconut is an important food crop in Sri Lankan economy and it provides about 22 percent of the per capita calorie intake in the diet,

being second only to rice, the staple food of Sri Lankans. Coconut is almost exclusively grown as a rain fed crop in Sri Lanka (Fernando *et al.*, 2007). It is cultivated in about 400,000 hectares or 25 percent of the total cultivated area in Sri Lanka. It is the most widely cultivated plantation crop of the island nation (Peiris *et al.*, 2003). In Sri Lanka, coconut can be grown in a wide range of climates and soil types since this is a highly adoptable tree species, compared with tea and rubber like other plantation crops in Sri Lanka. Being a perennial tree with about 60 years of economic life span, the growth and yield are directly influenced by weather pattern and characteristics of different soil types. The combined effect of climate and soil condition influences growth and nut yield (Liyanage, 1999). The other major plantation crops (tea and rubber) contribute to the cultivated area of 244,916 hectares and 222,311 hectares respectively (Liyanage, 1986).

Of the total extent of coconut, 82 percent is under smallholding sector (land area of less than 8 hectares) and 18 percent under estate sector (land area of more than 8 hectares) (Peiris and Kularathne, 2002). The national coconut production is decided by number of factors such as bearing extent of coconut, age of the plant, maintenance practices and other agronomic practices, pests and diseases incidents and distribution of rainfall (Peiris *et al.*, 2008). Coconuts are generally harvested at two months intervals giving six picks per year. The yield of six coconut picks shows considerable seasonal variation. This pattern of coconut fluctuation within a year is fairly regular and consistent. This can be used as a guide to determine the contribution of each individual pick to the total crop for the year (Liyanage, 1999).

Sri Lankans normally use coconut in cooking. Other than this after processing the parts of the nuts are used in different ways such as desiccated coconut, copra, oil

and activated carbon. The trunk of the palm has a timber value too. The inflorescence is used for celebrations and for religious activities. The coconut production contributes to considerable amount of export earnings in the country. The main exported categories of coconut products are kernel products, fiber products and shell products (Gunathilake, 2005).

Although the national production target is 3,000-3,500 million nuts, the total production of coconut was 2,386 million nuts in 2011 and that was 2,317, 2,762, 2,909 and 2,805 million nuts in 2010, 2009, 2008 and 2007 respectively (CBR, 2011).

Although Coconut is grown in all the districts of Sri Lanka, about 70 percent of the area under the crop is concentrated in the coconut triangle (Figure 1.1) formed by the three major growing districts consist of Kurunegala, Gampaha and Puttalam in the central west coast (Liyanage,1986).

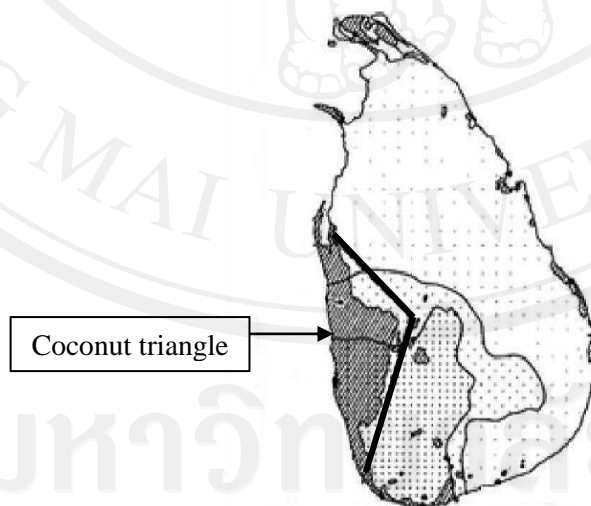


Figure 1.1 Coconut triangle of Sri Lanka

Source: Liyanage, 1986

The smallholder farmers have adopted several crop diversification technologies in their farming. Out of these main one is intercropping with annuals and perennials. It has been reported that livestock integration of coconut is another farming technology adopted by farmers to achieve higher income (FAO, 1983). Different soil moisture conservation and soil fertility improvement measures have been introduced by Coconut Research Institute (CRI) for the sustainability of farming system (Liyanage, 1986). The cost of production was fluctuating over the past years resulting unstable income for the growers.

Since the coconut production is becoming insufficient to meet the national demand (the annual demand is 3,500-4,000 million nuts and the production is 2,700-2,900 million nuts (CCB, 2010)), the price of the nut increases rapidly. It has been reported that the price of the nut in the retail market has showcased 94 percent increase from 17 rupees in 2005 to 43 rupees in 2011 (CRI, 2011; CBR, 2011). Despite a drastic price increase, coconut shortfall has brought number of coconut based industries to a standstill situation. The scarcity of coconuts and its eventual high price in the market made us realize how all Sri Lankans are dependent on this simple natural product. Undoubtedly it is the staple base of the Sri Lankan cuisine and does play a major part in the export economy too. Therefore coconut prices and coconut industry had been a crucial topic of talk among the public and media in the recent past (Purasinghe, 2008). Production instability, land fragmentation due to urbanization and industrialization, pests and disease incidences, poor soil fertility and low income are some of the problems faced by the coconut smallholder farmers. All these problems contribute for the yield reduction of Coconut plantations. It has been reported that although the nut yield should be around 60-80 nuts/palm/year under good

management, the nut yield in farmer field is around 40-50 nuts/palm/year (Liyanage, 1999; CCB, 2010).

The government of Sri Lanka has taken immediate measures to ensure availability of coconuts at a reasonable level to the existent and sustainability of the industry aiming at expands the coconut cultivation and production. These include encouraging younger generation on the importance of replanting coconut, banning of felling down coconut trees and portioning of coconut lands for property development, making the school children aware of the importance of coconut planting and protecting existing coconut trees (CCB, 2010). Beside that the government aims to promote technically sound, economically viable, environmentally friendly and socially acceptable programs to promote sustainability of existing coconut cultivation with efficient and effective utilization of resources. The major policy behind this is to increase the productivity of coconut lands by diversification of land introducing improved and modern land development technologies such as intercropping and livestock integration. Due to these diversified technologies coconut productivity can be increased by 20 percent while obtaining the income from other related sources (Trade Chakra, 2010; CRI, 2006).

CRI and Coconut Cultivation Board (CCB) in Sri Lanka play an important role by providing assistance and subsidies to the small holders (seedlings free for replanting and under planting, 10,000 rupees for intercropping, five seedlings are provided for 10 rupees each for home gardening, 25,000 rupees for livestock integration with cattle, 4.50 rupees per each cutting to plant *Gliricidia* for organic fertilization and 8,000 rupees per acre for rehabilitation adopting soil moisture conservation measures) (CRI, 2010).

Further the Government started giving fertilizer subsidy to coconut grower irrespective of the number of trees. According to the Government's decision even a person having one coconut tree is eligible to receive the subsidy. It has been implemented because the coconut growers are not properly fertilizing the trees and it is important to get the maximum out of the existing coconut cultivated lands. Beside that government is taking measures along with the related administration and research institutes to ensure the supply of high quality planting material.

Performance of the subsidy scheme during 2009 has been listed in Table 1.1. According to this new planting, under planting, rehabilitation, seedling and fertilizer subsidies were the popular subsidy types.

Table 1.1 Performance of the coconut subsidy scheme during 2009

Subsidy scheme	Progress	Amount paid (million rupees)
Replanting (hectares)	581	9.51
New planting (hectares)	4356	71.23
Under planting (hectares)	2488	40.69
Rehabilitation (hectares)	2772	25.95
Fertilizer subsidy (metric tons)	1811	24.68
Gliricidia subsidy (hectares)	58	0.54
Kapraka ayojana (hectares)	520	13.51
Intercrop (hectares)	41	0.28
Animal husbandry (units)	244	
Seedling subsidy (seedlings)	2415	21.49

Source: Coconut statistics, CDA (2009)



Out of the introduced sustainable systems intercropping is the main technology adopted by the smallholder coconut farmers with different crops. It has been reported that 50 percent of the farmers have been adopted this since this is the main practice enhances land use efficiency improving productivity and soil fertility. Although facilities are available to adopt this still 50 percent of the farmers continue the conventional practice of monocropping in their cultivation (Perera and Gunawardane, 2009). Although many facilities are available to improve the productivity of coconut smallholdings the constraints faced by smallholders have not been solved (CRI, 2010; CCB, 2010).

## **1.2 Rationale**

Gampaha district situated in wet zone wet lowland area of Sri Lanka contributes to the economy of agriculture providing diverse crops due to the favorable climatic conditions prevailed. It contributes about 12 percent land extent to the total area under coconut. Due to the location of this district close to the capital city Colombo and location of International Airport and two major Free Trade Zones within this district the value of land is increasing rapidly. Therefore much of the coconut land loss occurred (fragmentation) in the district mainly due to property development associated with rapid urbanization and industrialization. It has been estimated that within twenty years from 1982 to 2002 Gampaha district has lost 52,000 acres (25 percent) of coconut land. Due to this production losses occur by land fragmentation the market price of coconut has been increasing drastically (Jayakody, 2006).

Although it is necessary to maintain soil fertility in coconut cultivations since this is a perennial crop giving continuous production for over 40 years, soil fertility studies showed that coconut plantations of Gampaha districts are generally under fertilized or not fertilized at all (Jayakody *et al.*, 2007). One reason for this low fertility soil condition is receiving of high rainfall intensity to this area during some periods of the year results in washing off the surface soil layer within the coconut palms exposing solid carbook layer which is not suitable for cultivation. A study finding showed that smallholder farmers apply lower rates (less than 3 kg/palm/year) of fertilizer for their cultivations and some farmers do not fertilize at all (Gunathilake *et al.*, 2008).

The coconut land productivity and sustainability can be increased by intercropping with other type of crops (fruit crops, tuber crops, spice crops) and integration with livestock such as cattle since about 70 percent of the land area space in between coconut square is available for another use. Since the intercropping is mainly recommended to wet zone area of Sri Lanka, there is a potential to adopt this successfully since Gampaha district is the main coconut growing district belongs to wet zone. Although intercropping is the widely adopted sustainable practice in the study area with pineapple, banana, rambutan, cassava and pepper crops, a study revealed that about 50 percent of smallholder farmers in this district do not practice intercropping, although technological knowledge, subsidy and credit facilities are provided for them to improve the productivity and sustainability of the land by CCB and CRI with the help of the Government (Department of Census and Statistics, 2010; Perera and Gunawardane, 2009).



All these factors result in decreasing the coconut productivity in the region. Under these circumstances consumers are also affected by unstable coconut retail prices and shortage of supply. Some smallholder cultivations are sold for non agric uses to obtain short term economic benefit without considering the obtaining of sustainable production as recommended by the authority to get long term benefit. These constraints have further increased due to higher population growth of this area due to migration with rapid urbanization and industrialization (Jayakody, 2006).

Due to these conditions it is vital to investigate the smallholder coconut cultivations in this area concerning the factors influencing sustainable productivity improvement coconut-based farming systems mainly concerning the intercropping, livestock integration and also considering the conventional system of monocropping to understand the prevailing situation, problems faced by the smallholder farmers to improve the productivity for the sustainability of existing coconut cultivations and find out ways to enhance the sustainable productivity of the system. These findings are helpful to improve the sustainable coconut land management by improving the productivity and sustainability. Thereby the land fragmentation and low productivity problems can be minimized in coconut smallholding farms since smallholder farmers of coconut play the main role in economy of coconut in Sri Lanka.

### **1.3 Objectives**

1. To explore the coconut-based farming systems and problems faced by coconut smallholder farmers in Gampaha district, Sri Lanka
2. To determine the factors influencing on the sustainable coconut-based farming systems of smallholder farmers in the study area

#### 1.4 Usefulness of the study

This finding is useful to study the present situation of coconut small- holding farms in the study area regarding the sustainable coconut-based farming systems mainly emphasizing on the intercropping which improve the productivity of farm concerning smallholder farmer problems. The results gained from this study can be used to take measures to improve the productivity and sustainability of coconut smallholder cultivations.