

**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED  
NATIONS**

**In collaboration with the World Bank**

**Sri Lanka Tea and Rubber Study**

**Sri Lanka Improving Rubber Productivity and Competitiveness**

**The rubber report (production sector)**

**Prepared by Dr. Eric Penot, Abt Associates as part of an industry report for the Food and Agriculture Organization of the United Nation and the World Bank.**

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## Sri Lanka Tea and Rubber Study

### Sri Lanka Improving Rubber Productivity and Competitiveness

#### The rubber report (production sector)

By E Penot

#### 1 Introduction

Despite the declining contribution of agriculture to Sri Lanka's gross domestic product, the agricultural sector is still an important pillar of the country's economy. The sector's share of the GDP declined from 28 percent in the early 1980s to 19 percent in 2003. However in 2002, the agricultural sector still accounted for 33 percent of the total labor employed. Within the sector, plantation treecrops – including tea, rubber, and coconut – play a central role.

*As stated by IFAD: The performance of Sri Lanka's agriculture sector has been influenced in recent years by adverse weather, trade liberalisation, depreciation of the rupee, privatisation of estate management, improved cultural practices and more efficient distribution systems. The relative contributions of other export agriculture crops<sup>1</sup> (EACs) and field crops<sup>2</sup> (OFCs) and vegetables have increased and the value of their combined production exceeds that of the plantation crops, tea, rubber and coconut.*

Estate crops, mainly tea, rubber and coconut, are grown on 0.8 million ha or 12% of the country's land with rubber on 129,000 ha. Tea and rubber are grown mainly in the wet zone on both large estates and smallholdings, while coconut is grown predominantly by smallholders in the wet and intermediate zones. Estate crops contribute about 4 % of the GDP.

Plantation agriculture still provides employment for a large number of people. Latest estimations indicate that tea-related employment absorbs one million laborers (according to IFAD, 2002, but 1.5 million according to the Ministry of Plantations, 2005), and that rubber-related employment represents about 230,000 people (according to IFAD, 2002, but 500 000 according to the Ministry of Plantations).

Rubber is both a crop opportunity for smallholders and a labor opportunity for landless workers who are employed by estates, either government Estates

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<sup>1</sup> EACs include spice crops (pepper, cloves, cinnamon, cardamom, nutmeg), minor beverage crops (cocoa) and miscellaneous crops like citronella, arecanut and betel.

<sup>2</sup> Field crops other than rice are referred to as "Other Field Crops" or OFCs

(called RPCs) or private estates. The rubber sector provides employment for about 200,000 people counting all plantations and for another 30,000 in the manufacture of rubber products (IFAD, 2002), from the tapping of latex to the manufacture of semi finished or semi processed rubber and manufactured products (primary products), the manufacturing of value added products and others involved in trading.

It is clear that labor is thus a very important issue in the rubber sector, which also has certain political implications. In addition to the State, trade unions have played a significant role in the past during nationalization in the 1950s, privatization in the 1990s and as fully-fledged actors in the remaining RPC governmental sector. At present exact the number of rubber farmers with under 5 hectares is not known but is estimated to be around 100 000 to 120 000 (a smallholder is considered to have less than 5 hectares). The sector including farmers with less than 8 hectares represents 42 % of total land under rubber. Ministry of Plantations statistics show that there are 155 000 rubber smallholders with less than 20 hectares (however, farmers with an area under rubber of between 8 and 20 ha are considered as small estates). Smallholder and small estates represent 63 % of the total area under rubber. These small estates are run either by rich farmers or by local stakeholders involved in other activities (or retired) who have invested locally in rubber.

Thus the total number of people who depend on the rubber economy is at least 385 000.

The rubber-producing sector contributes about 2% to the agricultural GDP and about 3% (or 29 million US dollars) of rubber from agricultural exports. Total rubber industry turnover in 2003 was around 300 million US dollars, whereas the contribution of the rubber growing sector was about 62 million US dollars. 62 % of natural rubber is used by local manufacturers for rubber related products. This sector triggers a strong demand for local rubber. Total earnings from rubber exports was 26.4 million Rp in 2004 (close to US\$ 264 000). Exported rubber products earned 32.2 million Rp in 2004.

The rubber sector in Sri Lanka is critical both to sustaining growth and to reducing poverty. As many smallholders are relatively poor farmers who have other part-time activities, addressing rubber is a key issue in poverty alleviation. Rubber is also a potentially good crop opportunity for poor farmers in eastern regions.

With the recovery in rubber prices since 2003 (more than 1 US \$/kg for NYC, TSR 20), "*rubber claims the maximum potential in value addition/future prospects among the main plantation crops*", as started by the Ministry of Plantations in 2004.

It is possible to build a typology of sectors and stakeholders. Today, the rubber industry consists of three closely interdependent sub-sectors:

- the plantation sector comprising private and government estates and smallholders (3 separate categories of stakeholders), who grow rubber trees and harvest latex that is converted into stable concentrates (liquid latex) and different forms of raw rubber (crepes, crump rubber, RSS). This sector covers a wide range of rubber products that are either used by local industry or sold on the international market. Smallholders and estates provide raw rubber that is processed into marketable rubber by factories operated by estates (producing liquid latex or various types of crepes or crump rubber) or by small smoking houses in the case of smallholders (producing RSS types of rubber). The output of plantations is therefore dry rubber in crepes, sheets or blocks.
- the rubber product manufacturing industry, which converts dry rubber into value-added finished rubber goods.
- The rubber wood industry. Harvested rubber trees are used in the manufacture of wood-based value-added products through a relatively new and small scale enterprise in Sri Lanka (Rubber Industry Cluster, 2002). Some rubber wood has always been used as fuel wood for tea plantations, in particular during the rubber price crisis (1997-2002). Attractive prices for rubber logs were triggered by high demand (in particular for firewood).

## **2 A brief overview of the rubber production sector**

### ***Actors in the rubber sector***

This sector comprises 3 main categories of actors: the smallholder sector, the corporate sector (private estates) and the government sector (government estates called RPCs). These 3 actors clearly have different degrees of motivation and different access to resources and strategies and thus should not be considered in the same category. However, it is possible to talk about the 'estate sector' comprising both private and government estates. Privatized RPCs are considered to belong to the private estate sector.

The estate sector in rubber accounts for 58% of land under rubber and about 37% of production. Rubber is still a major source of income in rural areas, but many smallholders have diversified and today most rubber farmers probably no longer rely on rubber alone for their income.

*“The rubber sector performed relatively well in the 1990s, growing at an annual average of around 4 % per year”* this statement is in fact questionable as we will see that the rubber sector has been in constant decline since 1985. Rubber plantations have an average lifespan of 35 years, therefore the replanting rate to maintain production capability should represent 3 %, i.e. 6 150 ha need to be replanted every year to maintain the rubber growing area at its level in 1981 (or 7 000 ha/year if the area under rubber in 1975 area is considered to be 230 000 ha). New planting and replanting represented between 6 and 9 000 ha/year up to 1993 and then decreased considerably to around 4 000 ha/year up to 2002 when there was a further serious decline to 1000 ha/year. Replanting has clearly been insufficient since 1980 and even new planting has not been sufficient to maintain the level of rubber production since 1993. These figures justify the statement that the rubber sector is living on its past and has not even maintained its production capability since at least 1980.

These figures also clearly show that the area of land under rubber is decreasing along with rubber production. The main decrease concerns private plantations in which some land is obviously now being used for other crops (such as oil palm with 3 000 ha in the last 5 years) or part of the rubber plantations are no longer tapped. Parts of these plantations have been cut down and the timber sold. The decrease in land under rubber between 1982 and 2002 represents 18 % for smallholders and 41 % for estate (33 % for the whole sector).

Sustaining a strong growth over the longer term is therefore an important priority of both the government and the private manufacturing sector.

The figures cited above also explain why there has not been a more rapid reduction in poverty among rubber dependent households. Recent estimates showed that poverty rates in the estate sector (both rubber and tea) rose from 26% in 1990/91 to 38.4% in 1995/96, declined to 30% in 2002 but today are still higher than in the early 1990s. The challenge for the future is how to make the desired growth process benefit the poor more.

Sri Lanka's rubber products exports have grown steadily from approx. US\$ 135 000 in 1995 to US\$ 200 000 in 2000 and then to US\$ 264 00 in 2004. Dry raw rubber exports comprise around 37 % of this total.

As stated by RRIC in their 2004 annual report, the total production of all grades was 97 000 tons in 2004, which is 5% higher than production in the previous year (2003).

Low world market prices combined with low yields has discouraged investment in the rubber plantation sector since at least 1997. Some rubber plantations have started uprooting the rubber trees and replacing them with other crops.

### ***The rubber challenge***

The global challenge for Sri Lanka is to address the following issues: the lack of firm policies to encourage stability, the lack of adequate credit facilities, unsatisfactory dissemination of information to smallholders, the lack of sufficient funds for Research and Extension institutions (as well as insufficient education and training capacity) and also the need to change the present mentality of the labor force with respect to rubber tapping in the estate sector.

The private sector could play a leading role in modernizing production as well as in boosting replanting to meet industry requirements.

The challenge facing the smallholder sector is to boost replanting and productivity, and to increase rubber income among other sources of income for all farmers, in particular for poor farmers with a limited area under rubber (below 1 hectare).

### ***Projection in the near future***

According to the Ministry of Plantations, to meet demand will require the following: an increase in the area under rubber of 40 000 ha in the eastern region in marginal conditions, maintaining or increasing the subsidy to boost replanting in both the estate and smallholder sectors and promoting appropriate agronomic practices to improve productivity (and among these rain guards and fertilization although the two last factors may be not priorities right now, as we will see later on).

### **3 Objectives of the study**

The aim of the study is to provide a comprehensive analysis of the rubber sector today, and to describe the main trends that can be observed as well as the constraints. Key development challenges and reform options for the rubber sector in Sri Lanka are discussed.

The main objectives of this consultancy are to review the production performance of the rubber estate and smallholder sectors, to identify the problems preventing an increase in their productivity, increasing the returns to rubber production; and finally to propose options for policy and institutional reforms.

The main task components are the following:

*1) A detailed review of the status and performance of the rubber sector and identify the main constraints to more rapid growth of the rubber sector.*

Provide a description of current agronomic practices in both the rubber smallholder and estate sectors, and assess their impact on current productivity levels. Identify constraints to increased productivity and competitiveness and propose options to address them, drawing on international experience

### *Institutions*

#### Rubber Research

Describe the agencies involved in rubber research (including the Rubber Research Institute, private sector, etc.) review its organizational structure/staffing, functions and responsibilities, infrastructure and facilities, level and sources of funding over the last 5 years and allocation of these resources across programs, level of coordination among agencies, arrangements for impact assessment, issues requiring priority attention.

Assess the shortcomings of program execution and their effectiveness to produce appropriate technologies and practices to meet the needs of the smallholder and estate sector. Compare the performance of the rubber research system in Sri Lanka with other countries.

Propose options drawing on international experience for improving the effectiveness of the rubber research system to achieve increased productivity and competitiveness at the farm level (e.g. improving research capacity, making it more demand driven, public-private partnerships, international alliances, etc).

#### Rubber Extension

Describe the agencies involved in rubber extension (including government agencies, private sector, etc.) review its organizational structure/staffing, functions and responsibilities, infrastructure and facilities, level and sources of funding over the last 5 years and allocation of these resources across programs, level of coordination among agencies, arrangements for impact assessment, issues requiring priority attention. Assess the shortcomings of program execution and their effectiveness in transferring appropriate technologies and practices to meet the needs of the smallholder and estate sector. Review related services in linking farmers to markets including farmer organizations and post-harvest technologies and practices. Compare the performance of the rubber extension system in Sri Lanka with other countries. Propose options drawing on international experience for improving the effectiveness of the rubber extension system to achieve increased productivity and competitiveness at the farm level (e.g. improving public and private capacity, making it more demand driven, strengthening research-extension linkages, public-private partnerships, use of innovative communication technologies,

*2) analyze poverty trends, other social issues pertaining to rubber producers and how to improve the livelihoods and welfare of rubber-dependent households*

*3) explore options (policy, institutional and technical) for reform drawing on international experience.*

## **Sri Lanka at a glance.**

**Economic summary: GDP/PPP** (2004 est.): \$80.58 billion; per capita \$4,000.

**Real growth rate:** 5.2%.

**Inflation:** 5.8%.

**Unemployment:** 7.8%.

**Arable land:** 14%.

**Agriculture:** rice, sugarcane, grains, pulses, oilseed, spices, tea, rubber, coconuts; milk, eggs, hides, beef.

**Labor force:** 7.26 million; services 45%, agriculture 38%, industry 17% (1998 est.).

**Industries:** rubber processing, tea, coconuts, and other agricultural commodities; telecommunications, insurance, and banking; clothing, cement, petroleum refining, textiles, tobacco.

**Natural resources:** limestone, graphite, mineral sands, gems, phosphates, clay, hydropower.

**Exports:** \$5.306 billion (f.o.b., 2004 est.): textiles and apparel; tea and spices; diamonds, emeralds, rubies; coconut products; rubber manufactures, fish.

**Imports:** \$7.265 billion (f.o.b., 2004 est.): textile fabrics, mineral products, petroleum, foodstuffs, machinery and transportation equipment.

**Major trading partners:** U.S., UK, Belgium, Germany, India, Hong Kong, Singapore, China, Taiwan, South Korea, Japan, Iran.

## 4 A review of the status and performance of the rubber production sector: the main constraints to a rapid increase in rubber production.

### 4.1 Historical evolution

Rubber is the second export crop after tea.

Land under rubber has increased regularly since the introduction of rubber at the beginning of the 20th century: from 72 500 ha in 1910 to 265 000 ha in 1952, with a peak of 270.000 ha in 1970. Subsequently land under rubber decreased to 162 000 ha in 1995 and only 129 000 ha in 2003.

The smallholder sector is almost as old as the estate sector but the area under rubber only decreased slightly: 18 % since 1982 (82 600 hectares today) which represents 64 % of the total area under rubber and 56 % of total rubber production (Ministry of Plantations, Pocket book, 2004).

Yields in general are relatively low compared to other countries, however almost all plantations are planted with clones. Sri Lanka is the only country where smallholders have an average yield above that of estates but this would be different if RPCs and private plantations were considered separately. The average yield is around 900 kg/ha/year. 70% of smallholder plantations were planted with clonal planting material in 1985. The proportion of still existing seedling plantations in the estate sector is not known. It should be less than that of smallholders but some old plantations from the 1960s still exist that were probably abandoned during the rubber crisis (1997-2002).

Table 1 provides the key indicators (IFAD updated 2002) that show that trends continue to be negative.

**Table 1: Rubber – Key Indicators of Performance**

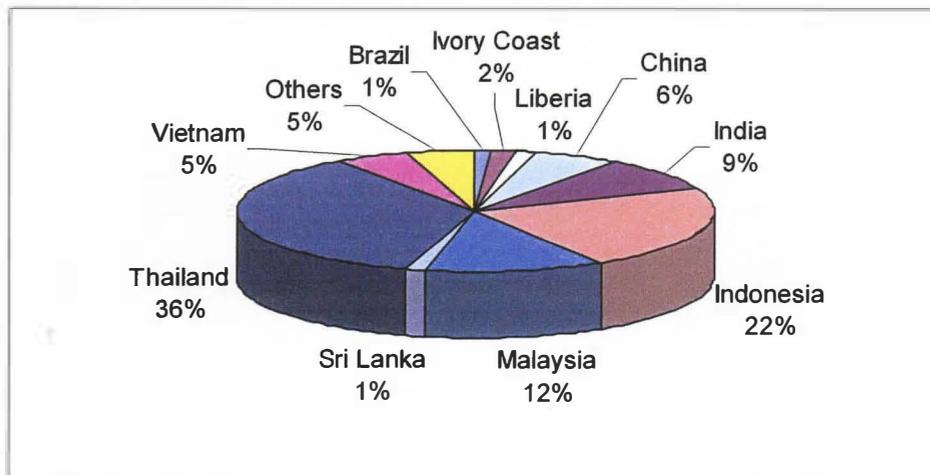
Year	Extent ('000 ha)	Prodn (mn kg)	Av. Yield (kg/ha)	Re/new planted (ha)	Fertiliser ('000 MT)	C O P (Rs/kg)	Auction Price RSS 1 (Rs/kg)
1991	198.1	103.9	706	7,165	13.7	22.92	23.58
1992	194.6	106.1	708	4,831	13.1	24.50	29.28
1993	161.5	104.2	873	6,278	17.8	30.22	35.66
1994	160.9	105.3	870	4,468	17.1	30.85	50.34
1995	161.6	105.7	853	3,935	14.9	33.37	72.45
1996	162.0	112.5	926	4,443	16.5	36.70	67.88
1997	158.2	105.8	822	4,031	12.3	40.37	56.71
1998	158.1	95.7	768	4,248	15.6	44.41	49.83
1999	158.0	96.6	755	4,802	9.9	43.50	45.35
2000	156.9	87.6	794	1,044	13.8	44.50	54.91
2001-2002							
2003	128.9	92	713	1014	8;4	60	102,6

Source: Plantation Sector Statistical Pocket Book – 2001 & Economic Research Department, Central Bank of Sri Lanka

#### 4.2 Importance and contribution of Sri Lanka to world production

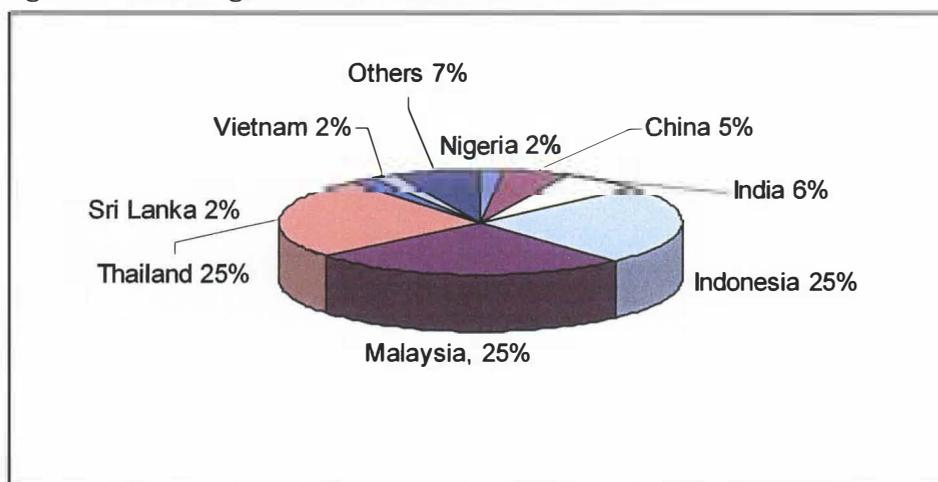
Sri Lanka is not one of the “big 3” (Thailand, Indonesia and Malaysia with 5.4 million ha who together contribute 71 % of total world production) or even one of the big 5 (the same countries + India and China with 6.6 million ha and almost 89 % of total world production). Sri Lanka represents only 1 % of total world rubber production (2 % in 1990) (see Figures 1 & 2 & 5). So whatever development policy the Sri Lankan government intends to develop may have a major effect on the SL sector but will not significantly affect world production. However Sri Lanka can obtain significant shares in “niche” markets in particular for rubber of high quality and well as finished or semi finished industrial rubber based products (see table 2).

**Figure 1: Percentage Share of World Production in 2003**



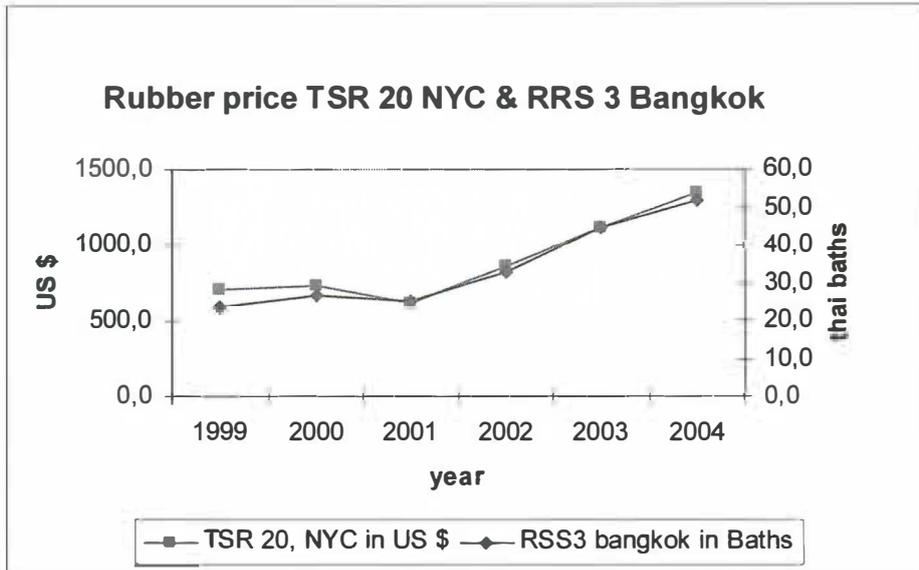
Source: International Rubber Study Group, 2005.

**Figure 2: Percentage Share of World Production in 1990**



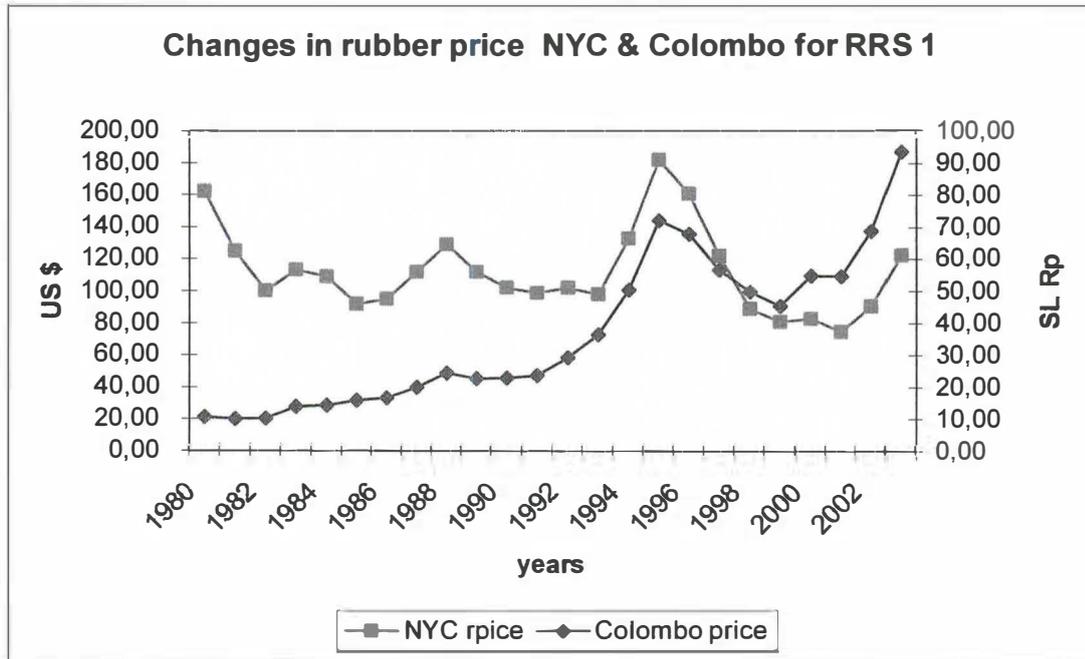
Source: International Rubber Study Group, 2005.

**Figure 3: Changes in rubber prices since 1998**



Globally speaking, Rubber has recovered from the 1997-2002 crisis with an average price close to US \$1.4 per kg TSR 20, NYC market, beginning of 2005 (see Figures 3 and 4).

**Figure 4**



**Table 2**  
**KEY INDICATORS: RUBBER In Sri Lanka**

Item	Unit	2000	2001	2002(a)	2003 (b)
1. Production	Mn. Kgs	88	86	91	92
2. Area (c)					
2.1 Under cultivation	'000 hectares	157	157	114	115
2.2 Under tapping	„	128	132	83	86
3. Yield	Kgs/ha	683	653	1088	1068
4. Fertilizer Issues	'000 MT	13	9	7	8
5. Replanting (d)	Hectares	793	557	712	564
6. New Planting (d)	Hectares	251	141	141	450
7. Prices					
7.1 Exports f.o.b.	Rs/kg	66.95	66.35	69.53	103,79
7.2 Colombo RSS 1	„	54.78	54.70	68.76	102,50
8. Cost of Production (e)	„	44.50	48.00	54.00	63,30
9. Exports	Mnkgs	33	32	37	35
10. Domestic consumption	„	55	54	54	56,8
11. Export earnings	Rs Mn	2 179	2 129	2 552	3 705
	(US\$ Mn.)	29	24	27	39
12. Value added as					
% of GDP (f)		0.4	0.4	0.5	0,5

(a) Revised

(b) Provisional

(c) Extent under rubber has been revised based on the Census of Agriculture conducted by the Department of Census and Statistics in 2002.

(d) Extents covered by cultivation assistance scheme of the Rubber Development Department

(e) COP revised in 2002 based on a survey conducted by the Rubber Development Department in 2003.

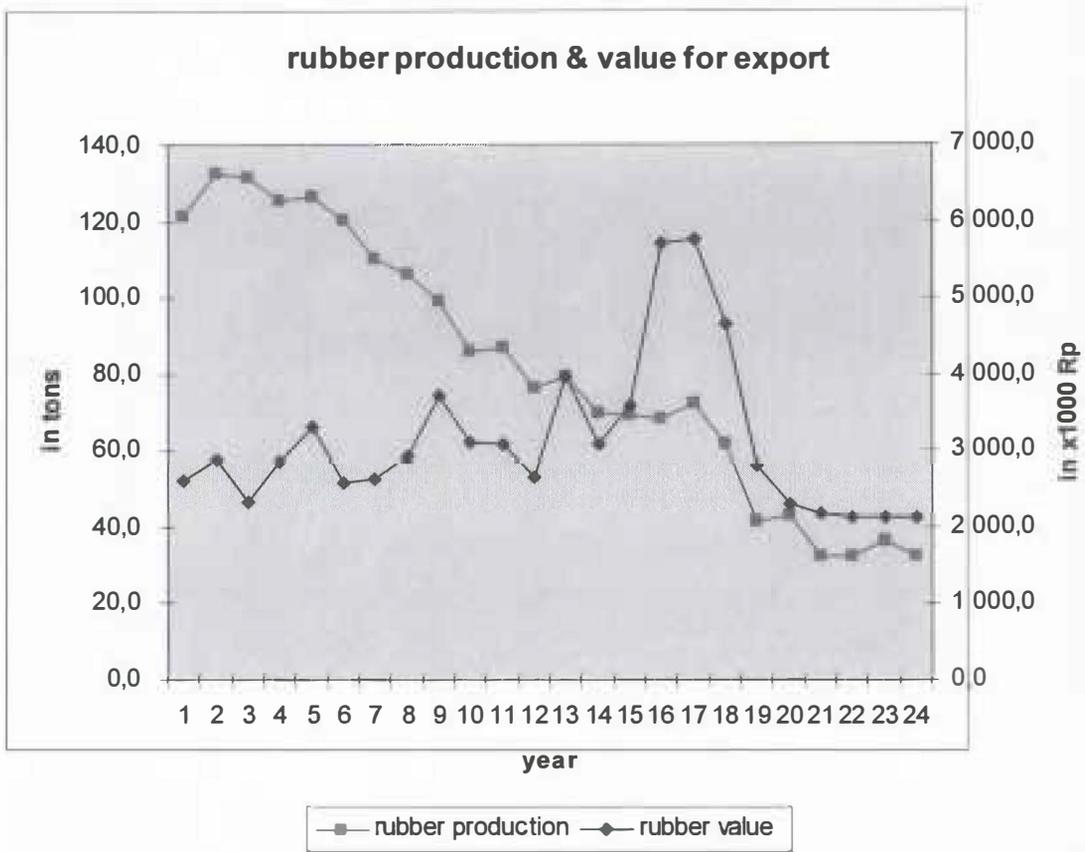
(f) In growing & Processing only.

Source: Central Bank Annual Report

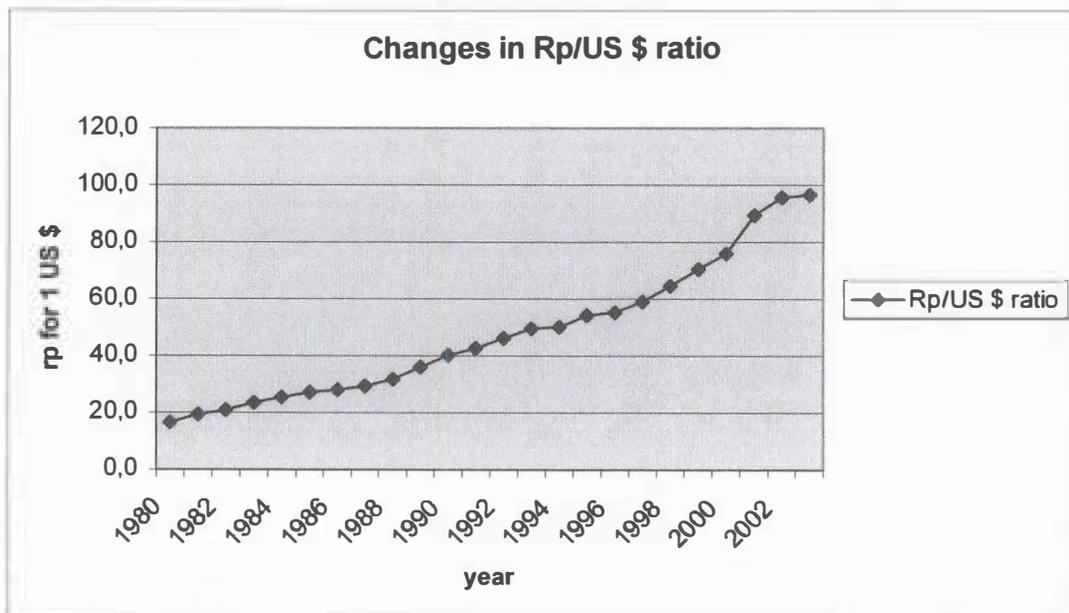
Source: Rubber Development Department

Refer Table No. 3.1

**Figure 5 Rubber production and value for export.**



**Figure 6: Inflation and changes in Rp/US \$ ratio**

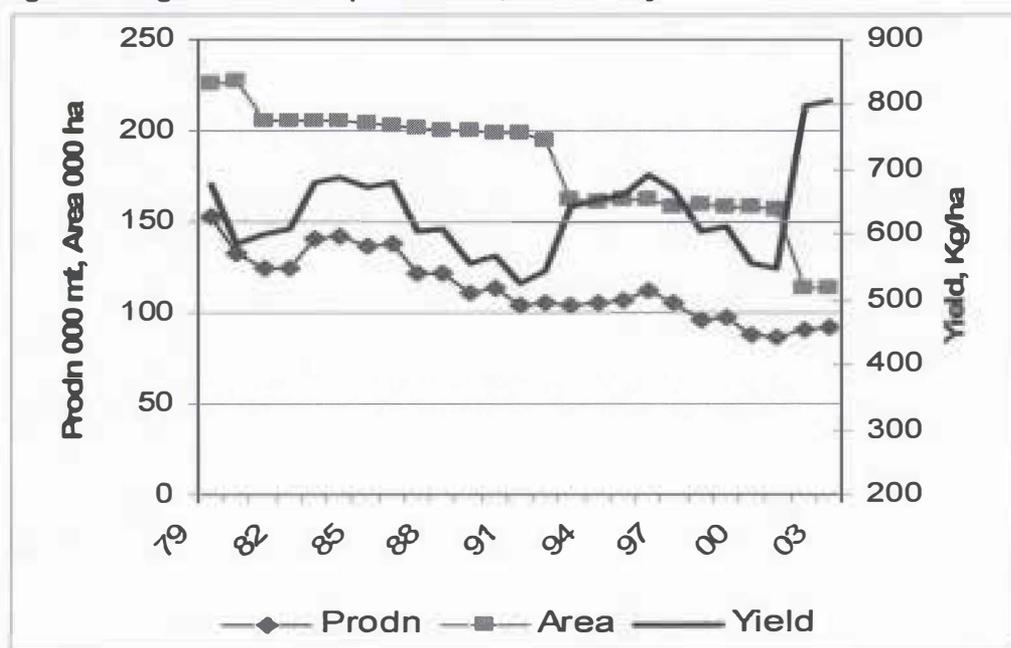


### 4.3 A constant decrease in rubber area and production since 1975.

Figure 6 shows the long-term downward trend in the extent of the rubber production area in Sri Lanka. In 1975, rubber was cultivated on 230,000 ha and by 2003 the area had decreased to 115,000 ha. This means that over this period the production area of rubber was reduced by 50 percent. It is also interesting to note that the area decreased significantly within the last 10 years, from about 200,000 ha in 1992 to 115,000 ha in 2002.

The area under rubber has been decreasing regularly since the 1970s due to ageing plantations, insufficient replanting, poor management in some estates, losses due to rainfall and, in general, poor agronomic practices that resulted in poor yield and consequently to poor productivity. However, all the necessary conditions exist for an important and productive rubber sector.

Fig 6: Changes in rubber production, area and yield.



According to the IFAD report, 2002 "The decline in rubber area, production and yields is mainly due to low prices and the low rates of replanting in the sixties and seventies". In fact, the factors that play a significant role in rubber decline are far more complex than suggested above and will be described in a later section. Prices were low only between 1997 and 2002, which is quite a long period, but the decline had already been underway since the mid 1970s. Consequently it was not low prices that triggered the decline. However low prices did increase the trend and seriously jeopardized the sector for 6 years. Price is thus an important factor but far from sufficient to explain the decline.

Replanting of rubber, which is supported by a cess, had reached satisfactory levels at about 6,000 ha per annum by 1993 but subsequently there was a serious decline in both planting and replanting and since that date, only 1,000 to 2,000 ha have been planted per year inadequate to maintain production capacity. Replanting and planting have in fact been directly affected by low prices since 1997 but the trend started in 1993 and continued even between 1994 and 1996 when prices were high. Other factors are required to explain this trend.

There is a shortage of clonal planting material of high quality. Budwood gardens have not been maintained and nursery capacity decreased significantly during the years when prices were low. As a consequence today it is impossible for the nursery sector to fulfill the considerable demand triggered by good prices since 2003.

It takes 2 years to replant budwood gardens and to create the nurseries required to produce sufficient planting material. Added to the 6 years of the immature period of rubber, the first kg of rubber from replanting could be expected in 8 years. In other words, all the efforts invested today will only be effective in the next decade.

According to the IFAD, *“Major issues in the rubber sector are the prolonged depression in world prices, lack of land for new planting, high cost of production and poor quality”*. Again, the factors that triggered the current situation are more complex.

The estate sector is probably undergoing an even greater crisis than the smallholder sector because of its higher cost base. We definitely agree with the statement that smallholders are generally capable of more resilience, in particular in the context of Sri Lanka as estates have higher costs of production which means they do not have a sufficient margin to cope properly with the crisis.

Estates are compelled to provide employment to plantation workers with productivity levels that do not compete with those of the smallholder sector in Sri Lanka or with any other country in the region. Sri Lanka is therefore a relatively high cost producer and is unable to compete with other producers particularly when prices are too low. Estate plantations need to implement flexible work arrangements to drive up productivity and reduce costs. But such a suggestion implies political arrangements with trade-unions and could thus be very sensitive.

*Unattractive returns to the grower due to poor farm-gate prices often result in poor agro-management through non-adoption of soil conservation, weeding and fertiliser applications. Abandoning of tapping or even over-exploitation of trees to enhance yields cannot be ruled out under these circumstances. Adoption of such strategies when faced with low prices could lead to poor productivity levels later (IFAD, 2002).* This statement from the IFAD is true but conditions have now changed and prices are back to “normal”. However it does sound strange to

economists to talk about “normal prices”, the rubber world agrees that the average price of rubber around US\$ 1 per kg is considered “normal” and “socially acceptable” by all actors.

However, poor tapping practices, over or under-exploitation of the tree’s potential, poor maintenance and lack of any necessary fertilization and treatment as well as poor overall agronomic practices are also key factors in the decline of rubber.

Table 3 displays production as a function of different sub sectors.

**Table 3: Production Area under the Estate and Smallholder Sector (in Hectares)**

	<b>1982</b>	<b>2002</b>
<b>Estates</b>	111,689 (65%)	66,026 (58%)
<b>Smallholders</b>	59,437 (35%)	48,655 (42%)
<b>Total</b>	171,126	114,681

Source: Ministry of Plantation Industries, 2004.

The above statistics are not precise enough as the estate sector should be divided into 2 sub sectors – the private and government sector - that have completely different means and strategies.

Average yields have been low and have varied between 600 and 900 kg/ha/year with a sudden increase in 2004 that brought them up to an average of 1000 kg/ha/year. It appears that in official statistics the yield is calculated for the total rubber area whereas it should only be for the production area not including immature plantations. In this case, average yield has probably been around 1000 kg/ha/year.

Current land distribution is shown in Table 4.

**Table 4: Rubber Land Area According to Administrative Districts**

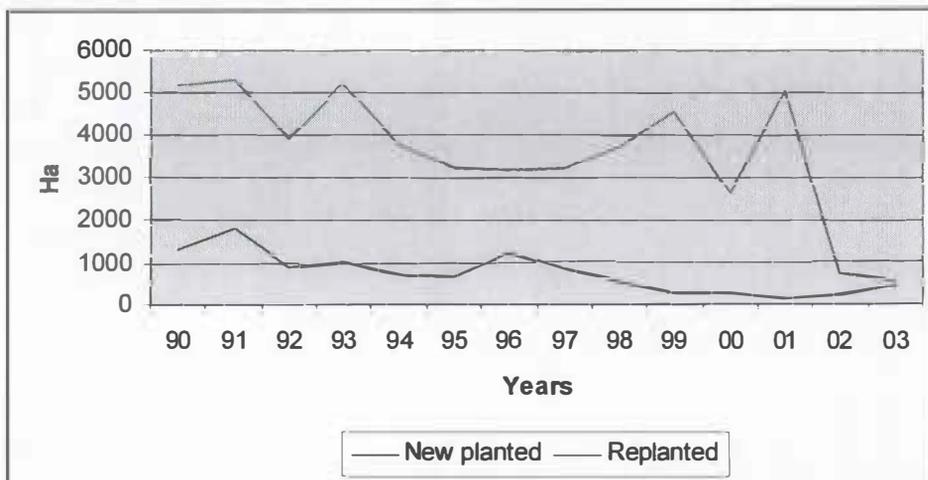
<b>District</b>	<b>2002</b>
Kalutara	29,922 ha (26.1%)
Kegalle	34,754 ha (30.3%)
Ratnapura	21,669 ha (18.9%)
Colombo	7,064 ha (6.2%)
Gampaha	3,055 ha (2.7%)
Monaragala	1,830 ha (1.6%)
Galle	6,518 ha (5.7%)
Matara	3,614 ha (3.2%)
Matale	1,861 ha (1.6%)
Kandy	1,166 ha (1.0%)
Kurunegala	2,753 ha (2.4%)
Others	475 ha (0.4%)
<b>Total</b>	114,681 ha (100%)

Source: Ministry of Plantation Industries, 2004.

#### 4.4 Planting and replanting

We stated earlier that new planting and replanting are extraordinarily insufficient as shown in Figure 7.

Figure 7: Area Replanted and Newly Planted Per Year 1990-2003 (in Hectares)



Source: Ministry of Plantation Industries, 2004

Burger and Smith (2004) project that the production of natural rubber in Sri Lanka will further decline and reach about 40 thousand MT in 2020 if nothing is done while the rubber market could face a shortage and prices will at least be maintained at their present level.

To reverse this declining trend in the rubber production area, the Government provided generous incentives in the 1980s and 1990s, including the Smallholder Rubber Rehabilitation Projects 1 and 2 (SRRP-1 and SRRP-2), which provided funds to replant in the Districts of Kalutara, Kegalle, and Ratnapura. The incentive was doubled in December 2004 and now stands at 100 000 Rp/ha (around US\$ 1000). This incentive should be very cost effective if it is properly managed. Today it is too early to assess the impact of this measure and to determine whether it has actually triggered a replanting trend. Assessment should be included in the farming systems survey suggested earlier.

The cost of setting up one hectare of rubber is estimated at 293 000 Rp of which 90 000 Rp for inputs and 203 000 Rp for labor (RDD, 2003). As smallholders use family labor, the real cost for farmers is that of inputs. In this case, we can consider that the subsidy of 100 00 Rp covers 100 % of the cost of inputs.

The Medium Term Investment Program (MTIP), financed jointly by the World Bank and the Asian Development Bank (ADB), is also directed towards rehabilitation of the state plantations through large scale planting and replanting of 12,000 hectares.

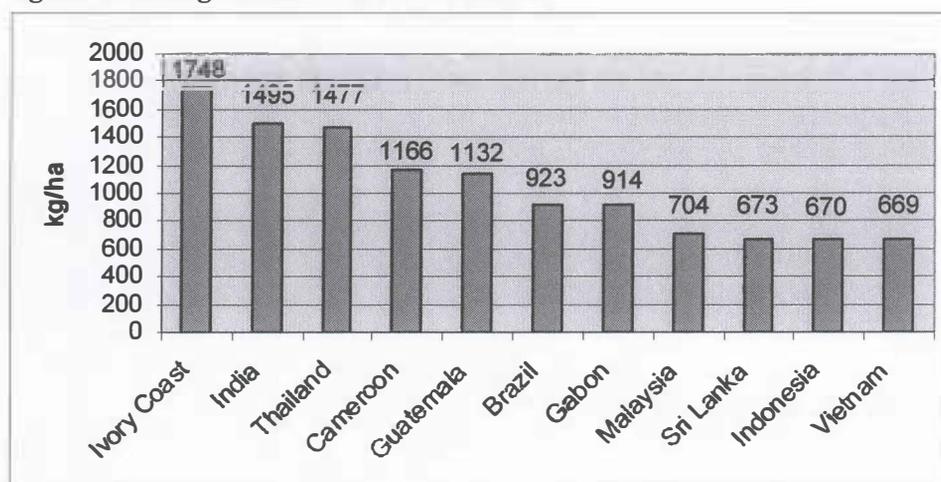
#### 4.5 Low yields in existing plantations impedes productivity in the near future

At the international scale, Sri Lanka's rubber yields are very low. Between 1994 and 2004, the average yield amounted to only 670 kg/ha.<sup>3</sup> Most major competitors, such as India and Thailand reached significantly higher levels with an average of 1495 kg/ha and 1477 kg/ha respectively. Ivory Coast, which managed to significantly increase total production and consequently its share in total global production, achieved the highest yields with an average of 1748 kg/ha.

The Rubber Research Institute has estimated the potential productivity of rubber in Sri Lanka at 2,584 kg/ha at the farm level, but the real actual average yield in the year 2000 was 794 kg/ha.

However, Sri Lanka recently managed to increase its yields from 555 kg/ha in 2000 to 802 kg/ha in 2004 (an increase of 45%). Nevertheless, Sri Lanka still has to increase its yields dramatically to become more competitive on the international market. Tan (1991) suggested that the reasons for low rubber yields in Sri Lanka include: (i) rugged and hilly land making planting and tapping difficult; (ii) sub-optimal tapping and low tapping intensity; (iii) poor agronomic practices; (iv) high output losses in the rainy season; (v) use of stimulants during slaughter tapping; and low use of fertilizers.

Figure 8: Average Rubber Yields 1994-2004



Source: FAOSTAT.

<sup>3</sup> According to FAOSTAT, rubber yields in Sri Lanka amounted to 789 kg/ha and 802 kg/ha in 2002 and 2003. However, yields reported by the Ministry of Plantation Industries (2004) increased significantly in these years and reached 1088 kg/ha and 1068 kg/ha respectively.

Indonesia is not representative of rubber producing countries as 2/3 of its production comes from smallholder jungle rubber, an extensive agroforestry system based on the use of unselected seedlings with an average production of 500/600 kg/ha/year. Smallholders who have access to clonal plantations (through NES or SRDP/TCSDP or TCSSP projects) have yields of between 1300 and 1800 kg/ha/year. Sri Lanka's real yield is around 900-1000 kg/ha (not including immature rubber areas).

In any case, low rubber yields do seriously limit potential productivity and as a consequence the potential income of both farmers and estates. There is no technical or serious agro-ecological problem (beside rainfall) that limits rubber production. In Sri Lanka, rubber could be as productive as in other countries: i.e. around 1500 kg/ha (DRC 100) in Thailand, In SRDP/TCSDP Indonesia, Ivory Coast, Malaysia, etc.

The factors that explain the current situation and low rubber yields are the following (not ranked according to priority as low yield results from complex and sometimes inter-related factors):

- Low number of tapping days due to rainfall and rain losses: in some areas, the number of tapping days drops below 150. 250 tapping days per year seems to be the objective but this is clearly too high as D2 implies 180/year and D2 D6/7 160 tapping days/year. Tapping frequency can be reduced with the use of stimulation, providing a reservoir of productivity and a challenge for the labor shortage. However, this technique has to be properly introduced and sufficient technical information provided.
- The number of tapable trees per hectare is too low, around 300 trees/ha, when it should be at least 500 or 550/ha at 6 years of age with a limited decline over time, in order to maintain more than 400 productive trees/ha. This low density is the result of poor agronomic practices - a fact that is well known by all actors and of the age of the plantations.
- The quality of planting: as is true in many rubber producing countries, the quality of the planting material at the national scale may be unsatisfactory and even poor in some areas in particular if private nurseries do not control the quality of their planting material.
- The clonal diversification in plantations is not sufficient. Only RRIC clones and remaining PB 86 constitute the clonal basis of the plantations. More clones should be introduced or at least existing clones should be better disseminated in order to extend the distribution of clones.
- Given that this is often the third generation of rubber, soils may be depleted and degraded. Suitable fertilization at plantation and during the immature period should be adopted to maintain soil fertility and guarantee satisfactory growth of the rubber trees which is the precondition for future production. Preliminary soil surveys should be carried out to confirm this hypothesis. Rubber is far less erosive than tea but poor practices during the

immature period and large gaps in plantations may have increased erosion in some places. Fertilization during the immature stage is more open to discussion. RRIC indicates that proper fertilization increases yields by 15 %. This needs to be confirmed because it depends to a great extent on the agro-ecological situation and not only on soil fertility. It appears that a small amount of fertilizer during the production period increases regeneration of the canopy after wintering and also improves bark regeneration.

In conclusion, according to the IFAD (2002), the Sri Lankan Rubber Research Institute has estimated that the potential productivity of rubber in Sri Lanka is 2,584 kg/ha at farm. In reality, yields of between 1400 and 1800 kg/ha/year are more realistic.

## **4.6 The 3 main actors in the rubber production sector**

### **4.6.1 The smallholder sector**

About 42 percent of the rubber production area is provided by smallholders (see Tables 2 & 4). Smallholder rubber area decreased by 18 % from 59,437 ha in 1982 to 48,655 ha in 2002. However as farmers suffered from the general trend in rubber decline, it is important to understand why the smallholder sector, traditionally more resilient than the estate sector, also suffered from such a decline. This seems to be a long term trend independent of the 1997-2003 rubber price crisis, although that period probably worsened the situation. 60 % of smallholders have less than 0.8 hectare.

Smallholders probably developed strategies based on diversification in order to reduce risks involved in depending on only one commodity. As a consequence, they are very susceptible to return to labor. They may even have a part-time off-farm activity if their agricultural activity provides a return to labor below that of the opportunity cost (considered as that of a tapper at 250 rp/day<sup>4</sup>, around 2,5 US \$).

Diversification is the key strategy to reduce risk and not to depend on only one commodity. Diversification has resulted in the introduction of tea, cinnamon and other crops. It is clear that we lack sufficient knowledge about their farming strategies with respect to recent changes, as well as about their ability to adapt to changes and cope with crisis. In other words a detailed characterization of farming systems needs to be implemented in different areas to enable us to build an operational typology of situations and acquire relevant knowledge on constraints and opportunities.

To understand farmers' technical choices, choice of crops and of global strategies, it is necessary to identify all on-farm and off-farm activities that

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<sup>4</sup> The official wage for a tapper in estates is 170 Rp/day + all benefits.

provide income and the contribution of rubber in generating income. Income structure and return to labor for each activity will help us to understand farmers' decisions and choices. It will also enable us to assess the potential benefit for farmers of adopting new technologies, of replanting rubber or of doing something else. Such research activity should be on the RRISL agenda.

We need to know in detail which factors can limit or encourage rubber production at the farming system level, and not only from a sectorial perspective limited to rubber. In practice, among many opportunities (that we definitely need to identify), farmers will allocate their production factors according to different criteria among which gross margin per hectare and return to labor may not be the most important. We need to contextualize farmers' decision-making processes, and in particular the factors that lead a farmer to adopt, replant or develop rubber as one of several activities. In other words, we need to understand the livelihood perspective if we are to be in a position to promote the right technology at the right place to the right farmers. As most farmers now have diversified cropping systems (and sometimes also part time off-farm activities), characterization of farming systems should provide the information needed to understand farmers' decision-making processes and strategies and the role of rubber within these strategies. A livelihood (non sectorial) perspective thus is highly recommended.

A complete farming system survey should be implemented, with the definition of an appropriate operational typology in order to up-date our knowledge on local initially rubber based farming systems' strategies and their future.

Agroforestry systems with cinnamon and tea intercropped with rubber for instance have already been adopted and promoted providing an excellent opportunity for small scale farmers to rely on two sources of income, profiting from the complementarity of the two crops.

It would also be interesting to see if the December 2004 Tsunami had an impact on the hinterland economy and/or agricultural activities in particular in terms of labour availability and transfert from coastal areas to hinterland.

### ***Rubber areas per actor and evolution***

**Table 5: Production Levels by Type of Management**

	<b>1982</b>	<b>1992</b>	<b>2003</b>
<b>Private Sector*</b>	83.7 (67%)	69.5 (66%)	58.0 (63%)
<b>RPCs</b>	--	24.5 (23%)	33.6 (36%)
<b>JEDB and SLSPC</b>	41.9 (33%)	11.9 (11%)	0.4 (1%)
<b>Total</b>	125.6	106.1	92

Source: Ministry of Plantation Industries, 2004

Note: In this table 5 the private sector includes smallholders and privately managed estates which do not belong to the RPCs. I disagree with this definition as smallholders really have almost nothing in common with the private (corporate) sector. I suggest we use the typology proposed at the beginning of this report with 3 categories of actors: private estates, government estates and smallholders. The statistics should be revised and the contribution of each actor will then be far clearer.

And although it may be relevant to compare the estate sector with smallholders even though they are fundamentally different, there is certainly no sense in comparing the “private sector including smallholder vs government”.

In conclusion, all farmers have access to the government subsidy of 100 000 Rp/hectare of rubber replanting, covering almost 100 % of inputs costs. This is a very powerful economic incentive for replanting and should be promoted through farmers' organizations or representatives.

### ***Comparison of Sri Lanka with other major producing countries***

Sri Lanka is not really well placed to compete on rubber export markets worldwide. Although we do not know the return to labor of rubber production activity at the smallholder level, we assume that it is above that of opportunity cost (250 Rp/day for a tapper, 2.5 US dollars).

Indonesia is probably the best placed to capture other market shares as it has tremendous reservoirs of productivity (i.e. 3 million ha of jungle rubber to convert into clonal plantations, 3 to 5 million hectares of land suitable for rubber and a cost opportunity of two US dollars per day). Thailand has probably reached its peak in terms of production potential, land is becoming scarce and a move to oil palm is already taking place (with a cost of opportunity between 4 and 6 US dollars). Malaysia has long since adopted a strategy based on rubber product manufacturing rather than producing rubber which has been in constant decline for the last 20 years (with a cost of opportunity between 6 and 8 US dollars). In terms of rubber production the new “small dragoons” are India and China, with around 700 000 tonnes per year each and a flourishing sector in both production and manufacturing.

Sri Lanka is in a regional position comparable to that of Cambodia, with a relatively small level of production but with the advantage of a very dynamic rubber product manufacturing sector that does not exist in Cambodia, however opportunity cost is around 1 US dollar in Cambodia. The dynamic Sri Lankan manufacturing sector is boosting demand for locally produced rubber that should trigger replanting and revive interest in rubber production.

#### 4.6.2 The Estate sector

During the same period the estate sector experienced an even more significant decrease of 40 % from 111,689 ha in 1982 to 66,026 ha in 2002. The rubber decline was far greater for estates than for smallholders.

The districts where smallholder rubber seriously decreased are Kalutara, Kurunagala, Monaragala, Matara, Matale, and Galle.

#### *Historical Changes*<sup>5</sup>

Plantation Agriculture in Sri Lanka has a history of over 200 years; the plantation sector began with coffee, cinnamon, cocoa, and cinchona, and later tea. Tea and rubber have in fact replaced coffee as the main plantation crops for export at this time.

At Sri Lanka's independence in 1948, the estate sector played a dominant role in the economy, but the plantation sector has undergone many changes in management since independence. Structural changes in the ownership and tenure of the plantations began gradually with dwindling profits and conditions of ownership that made the plantations less attractive to foreigners who had invested in them. The changes in ownership were hastened by the "Ceylonisation" policy of the government, which was accompanied by increased direct and indirect taxation of the plantations and the placing of restrictions on the repatriation of profits by foreign owners.

After 1956 there was also a concerted campaign to nationalize the estates, which resulted in companies reducing spending to maintain the plantations. Most of them stopped long-term investment in replanting. Many foreign managers also withdrew in anticipation of a take-over of the estates by the government.

Finally, in 1972, the government introduced the Land Reform Law No. 1, which imposed a ceiling of 20 ha on individual land holdings in general and 10 ha on paddy land holdings. A Land Reform Commission was established and given the powers to acquire and redistribute private land in excess of these ceilings. In 1975, the land reform was extended to public companies in agriculture through the Land Reform (Amendment) Law No. 39, under which land and all related capital assets held by public companies in agriculture were nationalized. 419,101 ha of land were nationalized comprising 74,494 ha of rubber land that has been the backbone of the estate sector. By 1976, nearly 62% of the plantations area was vested in public agencies, about 28% was leased to government assisted co-operative farms and the remaining 10% was distributed as small (0.05 to 0.4 ha) plots among peasants;

The estates were handed over to state-controlled bodies: the Sri Lanka State Plantations Corporation (SLSPC, 1958), the Up-Country Cooperative Estates

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<sup>5</sup> This section has been partly written including IFAD reports sections, up-dated.

Development Board (USAWASAMA, created in 1976 but disappeared in 1997), and the Janatha Estates Development Board (JEDB, 1976).

Some problems have been observed in the estates under state controlled management. Decision-making was inflexible and centralized with priority given to political factors. Wage increases were unrelated to productivity and labor was politicized and unproductive. Increased costs resulted in heavy financial losses. No new investment was provided and routine maintenance was neglected. Eventually, management efficiency of the SLSPC and JEDB deteriorated due to political interference.

As we can see in this interesting history of rubber in SL, the political factors are very important, explaining on one hand the trend of rubber decline that started as early as 1975 with a drop in motivation, incompetence, no incentive to foresee the future and virtually no interest in developing the sector due to instability and political risks. These factors seem to have been far more important for the estate sectors than the prices themselves.

### **Towards privatization and efficiency**

During the 1970s and 1980s the estate sector in Sri Lanka suffered major structural imbalances including external factors such as declining international prices and internal factors such as the lack of investment during the 1960s, the inefficient, bureaucratic management of the sector after nationalization, and the failure of exchange rate adjustments to keep pace with inflation. The state-owned plantation companies continued to make huge annual losses that were eventually covered by the government.

The first stage of structural and management changes included the nationalization of the sector in 1975 and the creation of two state corporations - the Sri Lanka State Plantation Corporation (SLPC) and the Janatha Estates Development Board (JEDB).

In 1992, the government decided to restructure the estate sector by creating 23 Regional Plantation Companies (RPCs) grouping 404 of the tea, rubber and coconut estates controlled by JEDB and the SLSPC, through a process of partial privatization

In 2005, JEDB and SLSPC, referred to in this report as the government sector (or RPCs) still manage 32 estates, which focus mainly on tea production.

The management of these companies was contracted to private management companies on a profit-sharing basis. The management contracts were initially for a five-year period only and the private companies did not have any stake in the ownership of the RPCs. As a further measure of support to the estate sector, all duties on exports from this sector were cancelled in 1992. By 1995, 13 of these companies were turning out profits.

A major structural change in the plantation industry took place in 1995 when the government sold RPCs' shares to the private sector with the land leased for a period of 50 years. At the end of 2000, the privatization of 8 companies had been completed and all the shares taken up. In another 8 companies 19% of the stock remains with the government, while in 4 companies, 39% of the stock is still with the government.

#### **4.6.3 The situation in 2005**

The decrease in rubber area comes mainly from the estate sector. Around 12 % of estate rubber area was not tapped in 2002/2003 (Rodrigo, 2003). This represented 20 % in 2000 when international rubber prices were at their lowest.

Yields in estates vary from 530 to 1 314 kg/ha/year with an average of 900. The average yield in 2004 was around 1000 kg/ha. D/2 is widely used. Only 10 % of estates use low frequency tapping, i.e. only 2 % of the total rubber area in 2002.

#### **RPC sector**

The RPC (government) sector is probably now paying the price of 2 errors: poor management, including poor agronomic practices leading to low yields, in addition to neglect during the crisis years (1997-2003). The remaining RPC sector is made up of "non viable" estates, their non-viability being clear from their capacity. Very few produced rubber.

The sector may be also lack motivation due to years of uncertainty since the 1970-1980s caused by the privatization process. Their history does not favor serious investment in quality or production or the capacity to foresee the near future. Their resilience is obviously lower than that of the private sector. They suffer from labor shortages and from the serious health problems of their employees. These health problems are also widely politicized (powerful trade-unions) providing only a limited margin of action for RPCs and resulting in a cost of production that is too high and obviously difficult to reduce. The current trend involving better prices seems to have revived the sector but structural problems remain.

Meanwhile, re-investment of profits in the estates by the RPCs has been very limited. In other words, the bulk of investment has been made by the private sector. Some of these privatized RPCs, managed entirely by the private sector, should no longer be considered as belong to the RPC or government sector. as this confusion in the names of plantations also results in confusion in interpreting statistics. Estates should be separated from the government sector and smallholders should be separated from the private estate sector. These 3 actors have nothing in common as they have different structures and strategies. Some RPCs have started programs of diversification by replanting the oldest rubber trees with oil palm. The old and unproductive rubber trees are used as fuel wood.

The future of rubber is probably not to be found in this sub-sector.

## **The private sector**

Privatization has resulted in improved routine management and maintenance of the estates. Investment in the estates has been forthcoming mainly from ADB project funds.

The main benefit of privatization has been the introduction of more flexibility and probably a higher level of competence and motivation in the estate sector.

Meanwhile, the rate of replanting for instance is only marginally higher than before privatization (which acquired its current form only in 2000). So 5 years later of which only 2 saw the return of good rubber prices might be a little too early to draw conclusions. However, it is clear that the current replanting rate is inadequate to maintain the tree stock in viable condition. The decline in replanting increased with the reduction in the replanted area from 5,029 ha in 2001 to only 712 ha in 2002.

The management costs in these companies also appear to be questionable. Recently, the Minister of Plantation Industry also drew attention to the failure of estate companies to introduce new technologies and to diversify their cropping systems in order to minimize excessive dependence on a single crop.

In 2005 a relatively active and dynamic sector exists that is capable of introducing as pilot projects agroforestry practices such as rubber and tea intercropping and trying to seriously improve agronomic practices in order to improve productivity and in particular yields. The demand for quality planting material for replanting is high. Currently the rubber development department (RDD) is focusing on the production of planting material for smallholders only. Its capacity to provide clonal planting material was originally created by RRISL. Eventually, the government decided to move these nurseries from RRISL to the RDD. Such changes are counter productive as all the efforts implemented by RRIC now benefit another actor.

Meanwhile, RRIC is not in a position to fulfill the demand from the private sector. RRISL being the key technical advisors for all rubber partners (at least in the domain of production), it seems urgent to provide funds to enable Research to recover its capacity to produce quality clonal planting material whatever the actors or the demand. The actors are the private sector, the RPCs, private nurseries at least for budwood, projects and perhaps smallholders or farmers' organizations. As the institution able to guarantee the clonal purity of planting material, it is crucial to enhance its capacity for the production of planting material. The key issue of the quality of clonal planting material is discussed in a later paragraph.

In traditional areas, part of the land suitable for rubber has already been exploited for other purposes and land is increasingly being diverted to other uses, e.g. oil palm, tea, urbanization or development of industries along the roads.

Cultivation of oil palm is most attractive in the south of Sri Lanka, where heavy rainfall restricts rubber tapping for many months of the year and adversely affects the incomes of the estates and the workers. This problem would not affect oil palm plantation, which have lower labor requirements in terms of days and skills. 3 000 ha of oil palm have been already established.

Estates have thus also developed strategies of diversification mainly concerning tea (with a growing demand for strong tea like that cropped in the low country) and oil palm. So far this is only a partial substitution that can be interpreted as complementarity rather than a true substitution inevitably leading to the abandonment of rubber in the near future. The latter scenario is highly unlikely.

#### ***Private sector, the cess and partnership***

In the private sector, rubber producing RPSs and exporters pay a cess on rubber of 4 Rp/kg. If a cess of 5 Rp/kg is applied on CIF value of imported goods, this should prevent importation of rubber and favor local rubber production. (or have I changed the meaning here?)

This means that the private sector is already funding replanting including that by smallholders. In the long term, the private sector will profit from an increase in production by smallholders to fill factories to capacity and ensure a global rubber offer compatible with industry's needs. With this cess, the private sector contributes to the economic health of the rest of the commodity system.

This is also the first time in over 15 years that cess funds have been allocated to replant estates in the corporate sector. Moreover, a fair amount of this money is to be used to improve rubber factories so that they are able to produce quality premium grades of raw rubber (RRISL, annual report, 2004).

This implies that the different actors involved in the commodity system should not only consider their own position but should contribute to solving the global structural problems of the commodity system through common actions. Partnership is clearly required if rubber production is to be boosted. The private sector is already developing a joint partnership with farmers in the "Monaragala scheme" in the eastern province in a marginal situation (see annex 9).

#### **Labor shortage and the social status of rubber workers**

One of the main problem estates face nowadays is the labor shortage both for maintenance and for skilled tappers. Several factors appear to be responsible for this situation. The social status of rubber workers, even tappers who have the highest rank, has always been lower than that of other estate workers, especially in comparison with tea. This important social factor linked with a relatively strong politization though powerful trade-unions, has created a situation where no current rubber worker wants his son to do the same work. This situation might be

very difficult to reverse and constitute a major problem for estates in the near future. In other words, working in a rubber plantation has no social status. The second factor is low wages, ranging from 150 Rp/day for daily workers employed locally by a private (absentee owner or local entrepreneur) to 250 Rp/day which appears to be the standard wage for tappers. Wages vary depending on local advantages (access to a health facility, accommodation, education, etc.) and incentives linked with production.

Rodrigo estimated that in 2002 38 % of tappers were unskilled. Most estates do not have enough permanent tappers (71 % were permanent in 2002). They employ occasional unskilled tappers that results in poor tapping and has consequences for future production. In 2000 labor for tapping represented 30 % of the total cost of production.

The dilemma facing estates who already suffer from high costs of production is to offer a high enough wage to attract workers while maintaining an acceptable margin. It is clear that if any other work opportunities arise for rubber workers, they will quit the sector to earn better wages in urban areas, in services, or in industry, at the same time improving their social status. The status problem itself could probably be overcome with better wages and social advantages. Whether the labor shortage continues depends on what estates are ready to pay to attract labor.

The key issue for estates is to rapidly adopt the low frequency tapping method using stimulation and thereby increase their return to labor and the productivity of the tappers dramatically. D/3 can result in an increase of 50 % and d/4 can double labor productivity. This technique will enable estates to tackle the labor shortage by both reducing the number of tappers required and increasing their margin. Results released by RRISL showed that d/4 is a feasible alternative as the saving on labor is significant.

In conclusion, several major constraints (technical factors, management problems, economic and social constraints and some policy issues) need to be overcome if productivity, profitability and longer term competitiveness is to be improved. But high rubber prices, high subsidies for replanting and capital investment from the private sector should enable private estates to meet their objectives, i.e. the profitability of rubber production.

Meanwhile, it seems that the search for immediate profitability led some estates to over production and over tapping thereby jeopardizing their short-term production potential as suggested by the RRISL directorate in its general statement in the RRISL annual report of 2004.

#### **Diversification: an alternative for estates.**

A possible solution to overcome low rubber productivity in ageing rubber plantations is to diversify to other crops or to forestry in areas with poor productivity. Most rubber growers, estates as well as smallholders, wish to

diversify to other crops. Oil palm is becoming popular among private estates and those with larger holdings in some areas in the south-western part of the country. Still 90 % of oil palm is imported and could be potentially locally produced. Land earmarked for diversification could also be planted to tea, cinnamon and forestry, particularly latex forest (700 trees/ha on a 10 year cycle). About half the replanting cost of rubber or other crops can be met from the value of timber from rubber trees. This explains why some estates cut down old plantations that were no longer exploitable or profitable. Cutting rubber has also been triggered by the demand for firewood by tea estates. As most estates have both tea and rubber, cutting rubber stands enables them to partially overcome the firewood shortage. In order to limit replacement of rubber with other crops and to also limit rubber cutting in periods of crisis, the estate sector could be recommended to implement forestry plantations in unused areas or in very degraded areas (*Acacia mangium* may be an excellent alternative in low-country and mid-country plantations).

By diversifying crops in uneconomic areas and in mid-country plantations, it will be possible to reply to the continually rising demand for energy through the use of fuelwood. The tea industry is the largest consumer of fuelwood in the entire industrial sector, (approximately 657,000 metric tons per annum) accounting for 43% of the total. Since many plantations do not have their own fuelwood plantations, they purchase fuelwood from contractors who haul rubber firewood from low-country rubber plantations to up-country tea plantations.

A decade ago, rubber wood represented a reliable supply of fuelwood, and was also used for manufacturing plywood furniture and toys.

There are a number of constraints that make diversification in the plantation context difficult. The modalities of allocating land for diversified cropping are unclear. The 50-year lease currently given to RPCs for existing, fully operational enterprises would not be adequate for totally new enterprises which require a 99 year lease. There is a long gestation period for most estate crops and consequently a long period of high interest payments with no returns after the investment has been made. This period is of 6 years with rubber but only 1 or 2 years with tea. Most land earmarked for diversification, especially in the non-viable estates, is moderately to severely degraded meaning substantial investments are required to rehabilitate these lands. Some workers in tea and rubber estates are probably too old to be re-trained for the newly selected crops, in particular oil palm. There is a general shortage of planting materials for all except the main established plantation crops. This has been a **major** constraint in many projects and diversification programs in Sri Lanka. Markets would have to be found for new products and/or new processing plants would have to be built (e.g. in the case of oil palm).

Tea (though not necessarily rubber) is more labor-intensive (and remunerative!) than most other diversification alternatives. This might mean that, where there is complete diversification to another crop or activity (e.g. forestry, oil palm), a

significant proportion of the workforce would not find gainful employment under the new set-up.

Some RPCs have started programs of diversification to oil palm after comprehensive feasibility studies. Even when rubber prices were good, profits from oil palm were said to be more than four times higher in Malaysia. The oldest rubber is being replanted with oil palm, mainly in the peripheral areas. In this case, there is a clear substitution by oil palm.

The cultivation of oil palm will also probably be most attractive to estates in the southern region of the country where, due to heavy rainfall, rubber tapping is restricted for many months of the year, adversely affecting the income of both the estates and the workers. This problem would not affect oil palm plantations, which have lower labor requirements in terms of both numbers and skills<sup>6</sup> (see annex 6).

Currently, only 3 00 ha have been converted to oil palm. Galle and Kalutara districts are considered as suitable for oil palm. Oil palm may prove to be a serious competitor for rubber in these areas.

The local consumption of crude palm oil was approximately 80,000 tons in 2002, and almost 90% is now imported.

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However, a major problem for oil palm growers is how to dispose of the palm trunks when replanting is due. Trunks of oil palms that were cut down for replanting in some fields of Nakiyadeniya Estate are still lying around, providing convenient housing for rats. These trunks were not used to make palm wine which seems rather astonishing in a country producing alcohol from coconut trees and there seems to be no other use for them.

## **4.7 Other important factors**

### **4.7.1 The climatic constraints: impact on practices.**

The agro-climatic conditions in Sri Lanka are generally favorable for rubber production. Rubber in Sri Lanka grows below 370 m altitude on terrain that ranges from flat or rolling land to steep slopes. The crop is most easily managed on flat land or moderate slopes, but can be grown satisfactorily on slopes of up to 20 degrees provided that suitable soil and moisture conservation measures, such as terraces, are taken (World Bank, 1988).

The climate is monsoonal with an annual rainfall of 2,000-4,000 mm, which is mainly associated with the southwest monsoon (April-June) and the north-east monsoon (October-December).

Water is not a constraint in itself in most traditional rubber areas except for morning rainfalls. Morning rainfalls are a serious constraint that lead to significant losses (reduced yields), a reduced number of tapping days during the rainy season and extra cost for rain protection that is beyond the reach of smallholders. Sri Lanka is the only country to have developed rainguards that appear to be relatively efficient with respect to the problem of the connection between the rainguard and the tree. In addition to this technical problem, they also have to be replaced every year adding additional cost to a cost of production that is already considered to be too high.

The major negative effect of the normally abundant rainfall is that the number of days suitable for tapping is restricted to 160-200 and that fungal diseases develop more rapidly.

However, officials we met focus mainly on the number of tapping days per year. 160 tappings /day is a normal D2, 6D/7 when D2 is 180. This implies some rethinking is needed with respect to tapping frequency, risks, and the use of reduced frequency with stimulation (already implemented in some estates).

While for mature rubber the rainfall is more than adequate, prolonged droughts can interfere with planting programs and can cause setbacks to the development of young rubber. That may partially explain why so much replanting, often poorly managed and monitored, results in plantations with less than 400 trees at opening and 300 trees 5 or 10 years later. The first 3 years are always critical. Temporary drought may severely affect plantation growth and chances of survival.

### **4.7.2 Rubber in marginal land**

Rubber is grown mainly in the wet region of the country that has two monsoons per year. However, some rubber production can also be found in the mid-country intermediate zone and the mid-country dry zone. There is a potential of 29 000 ha of state land with abandoned tea in marginal areas in Uva district that

provides room for expansion. Potential problems in marginal zone need to be seriously considered as poor or unsuited agronomic practices could lead to a significant reduction in the production potential. However rubber is a relatively rough plant, it still need correct soils and proper rainfall patterns. Soils in this 29 000 ha of degraded old tea land may be very poor, with severe erosion and nutrients depletion. In this case, nutrient rebuilding and appropriate agronomic practices during immature period should be seriously considered.

As an industry based on local supplies of raw material the rubber sector has a most encouraging future, Sri Lanka's private sector has already ventured to grow rubber in Monaragala, not a traditional area for planting rubber (see annex 8).

The Wellassa Rubber Company brought together in a pilot project the biggest manufacturers of rubber products and the RPCC in order to test rubber replanting with smallholders in this area. The objective was replanting at the rate of 2000 hectares per annum. However, the total acreage replanted in this area in 2004 was insignificant mainly due to the acute shortage of plants in this area.

But the initiative is very interesting. RRISL is contributing to this project through the participation of socio-economists in an EU project (called INTEREST). This is a good example of partnership between institutions, private sector and farmers.

#### **4.7.3 The reduction of cost of production (COP) for estates**

The cost of production for estates is described in detail in the ESW report.

The estate sector has a structural problem with COP. Many rubber studies (World Bank, 1997; IFAD, 2002; Sri Lanka Rubber Cluster, 2002) suggest that high cost of production negatively affects Sri Lanka's international competitiveness.<sup>7</sup> According to these studies, Sri Lanka's cost of production (COP) is the third highest compared internationally<sup>8</sup>.

Ageing plantations, low rubber stand trees, low productivity, labor shortage and no control of wages (impact of the trade-unions) are responsible for this situation. There are few possible ways to improve the situation in existing plantations except by the use of the low frequency tapping method using stimulation that reduces labor requirement and increases return to labor.

But new plantations or replanting with proper practices could increase productivity considerably and consequently reduce the impact of a high COP.

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<sup>7</sup> However, the latest available data comparing the cost of production in Sri Lanka with other countries date from the mid 1990s (see World Bank, 1997).

<sup>8</sup> Only Malaysia and Ivory Coast had higher production costs. The Malaysian wage rate was five times higher than in Sri Lanka's private sector. Nevertheless, Malaysia's production costs were very close to Sri Lanka's.

The real impact of current replanting will be felt in 10 years time when plantations reach their standard yield.

#### 4.7.4 The myth of fertilization improving yields

Soils are not particularly fertile in Sri Lanka and therefore “significant fertilizer application is needed to guarantee higher yields” (IFAD, 2002). However, there is no clear evidence that in many areas fertilization will increase yield, particularly where rubber yield is already good and quite close to the maximum production potential of the trees. In normal conditions, rubber does not need fertilization during the production period as nutrient exports are extremely limited.

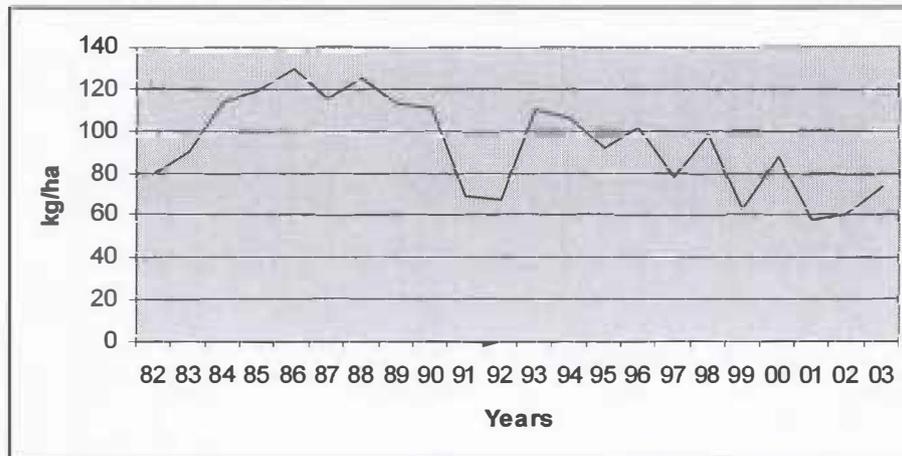
The use of fertilization during the immature period is clearly necessary and a key factor in ensuring satisfactory rubber growth. Fertilization during the mature period may be useful only under certain conditions. Some of these conditions may exist in Sri Lanka:

- rubber is now replanted for the third and sometimes fourth time and the soil may be depleted in nutrients, particularly if erosion occurs (during the immature period) or if rubber timber has been collected and sold. In this case, it is true that large quantities fertilizers are required to restore the nutrient content of the soil at planting and during the immature period.
- Fertilization during the production period should only compensate for nutrient exports, and as these exports are very limited, fertilization should also be very limited.
- It has been reported that fertilization during the mature period increases bark regeneration and increases the overall health of trees.
- RRISL claims that fertilization can increase production by 15-20 %. If we look carefully at the data, the figure appears to be closer to 10 % and concerns plantations with an average yield of 900 kg/ha/year. With such a low yield, it might be possible to increase production slightly. But in new plantations with yields between 1400-1800 kg/ha/year, i.e. close to the full production potential of the trees, the effect of fertilization on yield is questionable. It thus seems reasonable not to expect too much from an increase of fertilization.

In conclusion, fertilization during the immature period is absolutely necessary to ensure satisfactory rubber growth. Fertilization during the production period may be implemented to sustain long-term soil fertility and to improve the overall health of the trees but in our opinion it is not a priority in Sri Lanka. The use of appropriate agronomic practices for replanting and good quality tapping with stimulation should take precedence.

Thus it is not very realistic to link fertilization application with yields (see Figure 9).

**Figure 9: Fertilizer Application on Rubber in Sri Lanka, 1982-2003 (kg/ha)**



Source: Department of Census and Statistics (various issues); Ministry of Plantation Industries, 2004

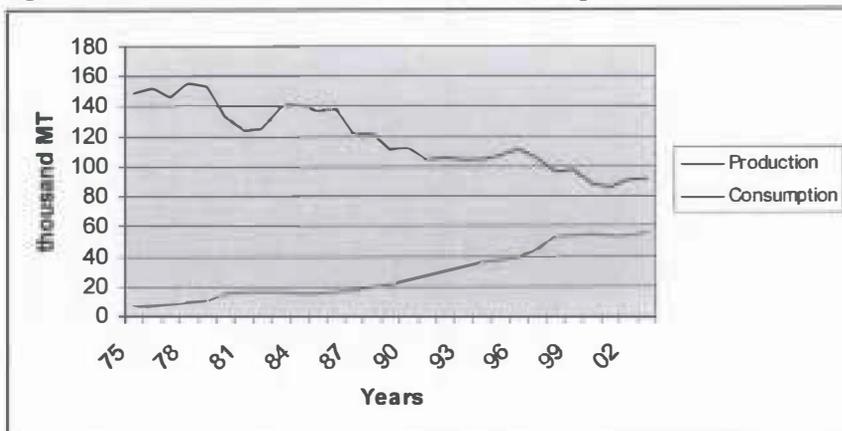
#### **4.8 Types of rubber products**

Rubber is marketed in various forms: ribbed smoked sheets (RSS), latex crepes, sole crepes, scrap crepes, pale crepe, brown crepe, technically specified rubber (TRS), latex concentrates, and a variety of specialty rubber.

Globally, automotive tires account for more than 60 % of all rubber consumed; general rubber goods make up the remaining 40 % of the rubber consumed and comprise more than 10,000 products, such as wiper blades, cables, gaskets and seals, and footwear. Market dynamics for rubber end products, and the amount of natural and synthetic rubber used in those products, determine demand for raw rubber (Sri Lanka Rubber Cluster, 2002).

There has been a constant decrease in production but an increase in domestic consumption: a very active SL private manufacturing sector for rubber based products as seen in figure 10.

**Figure 10: Sri Lanka's Production and Consumption Levels 1975-2003**



Source: Department of Census and Statistics (various issues); Ministry of Plantation Industries, 2004.

The global trend is towards local consumption of rubber. Exporting is an incentive only when commodity prices are close or above that of 1 US \$/kg/. Sri Lanka produces tires, tubes, carpets, hot water bottles, auto parts, rubber bands, industrial components, surgical and household gloves and condoms, balloons boots/shoes with rubber components out of rubber. The country now has a super quality crepe rubber known as *Lankaprene* that is (more or less) odor free, light colored and clean and is ideally suited for medical equipment and up-market, value-added products.

The bulk of the rubber production is for the large tire industry that requires TSR 20 or RRS 3 to 5 rubber (rubber of low quality). According to the Sri Lanka Rubber Cluster (2002) about 75 % of the natural rubber is used for tire production (and more than 65 % for automotive tires). However, the remaining 25 % accounts for numerous non-tire applications, such as belts, hoses, gaskets, vibration dampening, and wire sheathing. Quality is only an issue for a niche market for some specific manufactured rubber products. But this sector may increase in the coming years (see table 6).

In 1995, total production of TSR increased significantly and reached 20 % of total rubber production. However, in the following years its share declined considerably to only 1 % in 2003. Latex crepe reached a maximum of more than 50 % in 1998 before decreasing to less than 20 % in 2003. The volume of latex (concentrate and others) increased in the past decades from 1 % of total production (or 1,472 MT) in 1980 to 20 % of total production (or 18,359 MT) in 2003. Almost all concentrated latex is consumed domestically (for surgical gloves, etc.).<sup>9</sup>

<sup>9</sup> Surgical gloves have been increasingly produced in Sri Lanka by Dipped Products Limited, the world's fourth largest glove manufacturer (Sri Lanka Rubber Cluster, 2002). For more details on the exports of different rubber types see section 7.

**Table 6****CURRENT RUBBER POSITION IN SRI LANKA (IRSG)**

	Year 1999	Year 2000	Year 2001	Year 2002
<b>Total Production:</b>	<b>96,6</b>	<b>87,6</b>	<b>86,2</b>	<b>90,5</b>
<b>of which Latex:</b>	<b>17,9</b>	<b>15,3</b>	<b>19,5</b>	<b>20,5</b>
<b>Exports to:</b>				
Canada	0,2	0,1	0,1	0,2
U.S.A.	2,2	1,8	1,8	4,6
Chile	0,1	0,0	0,0	0,0
Mexico	0,7	0,4	0,4	0,3
Belgium/Lux.	0,1	0,0	0,0	0,0
France	0,4	0,3	0,3	0,5
Germany	5,0	3,3	3,3	4,0
Italy	2,0	2,2	2,2	1,2
Netherlands	0,6	0,5	0,5	0,1
Spain	0,8	0,9	0,9	1,5
U.K.	1,4	1,5	1,5	2,0
Czech/Slovak	-	0,0	0,0	-
Poland	0,2	0,1	0,1	0,2
Romania	0,1	0,0	0,0	0,0
Russian Fed.	0,0	0,1	0,1	-
Yugoslavia	-	-	-	-
Other Europe	0,3	0,3	0,3	0,8
Kenya	0,8	0,5	0,5	1,1
South Africa	0,1	1,1	1,1	0,5
Australia	0,0	0,0	0,0	0,0
Bangladesh	1,4	1,0	1,0	1,5
China	0,2	0,6	0,6	1,3
Iran	0,4	0,2	0,2	0,3
Japan	3,1	2,7	2,7	2,5
Pakistan	5,3	8,6	8,6	7,9
Others	17,3	6,5	5,9	5,6
<b>TOTAL EXPORTS:</b>	<b>42,7</b>	<b>32,6</b>	<b>32,0</b>	<b>36,1</b>
<b>of which Latex:</b>	<b>0,8</b>	<b>0,4</b>	<b>0,7</b>	<b>1,6</b>
<b>Total Consumption:</b>	<b>53,8</b>	<b>55,1</b>	<b>54,0</b>	<b>54,4</b>
<b>of which Latex:</b>	<b>18,8</b>	<b>14,9</b>	<b>18,8</b>	<b>18,9</b>
<b>Stocks:</b>				
Estates	4,7	4,6	4,7	4,7
Dealers	5,0	4,9	5,0	5,0
Government	-	-	-	-
Shippers	4,0	4,2	4,3	4,3
Manufacturers	4,9	5,0	5,0	5,0
<b>TOTAL STOCKS:</b>	<b>18,6</b>	<b>18,7</b>	<b>19,0</b>	<b>19,0</b>
Source IRSG, 2005				

The rubber industry in Sri Lanka possesses its own facilities for testing and quality control. In addition, there are several research institutions which undertake advanced testing to suit the individual needs of the industry. Quality assurance and total quality management techniques are implemented to create a quality product that meets customer specifications and demands.

### **The future**

Burger and Smit (2004) expect the production of natural rubber to level off in the near future, with a recovery expected in about 10 years. The global demand for natural rubber is closely linked to the global economy. GDP growth rates have a significant impact on production and registration of passenger cars and commercial vehicles and therefore also on the production of tires for these two groups. In addition, GDP growth rates also affect the consumption of general rubber goods (Burger and Smit, 2004).

## **5 Institutions**

### **5.1 Research**

The Rubber Research Institute (RRI) of Sri Lanka (formally RRIC, of Ceylon) is Asia's oldest research institute and carries out research activities, provides planting material from its nurseries for replanting (however this activity has recently been transferred to RDD), introduces new, improved clones and provides technical advisory services for all actors of the industry. Testing of rubber and products is also carried out by the technology department of RRISL. It has close links with the private sector, RDD and the international community. RRISL is a key technical advisor and a central actor for all technical purposes.

The Industrial Technology Institute (ITI) is concerned with rubber technology and the manufacture of rubber products, and has highly trained chemists, engineers and technicians who provide information and innovations to the manufacturing sector. No information has been gathered on this institution.

### **RRISL**

RRISL has produced very interesting results in terms of agronomics, clonal planting material and agroforestry systems. RRIC is the main (or sometimes the only) technical advisor for many operators. Good quality articles, reports, bulletins, leaflets, advisory circulars, handbooks and field-guides have been produced, widely disseminated; however history and our experience in other countries tells us that dissemination of these products is never sufficient. Information technology should be promoted to enable wider dissemination of these publications.

### **Agroforestry systems (intercropping with rubber)**

Profitable agroforestry systems (see annex 5), in particular those associating rubber with tea or cinnamon with double spacing, have not yet been adopted by farmers due to the lack of quality extension services, adequate dissemination or insufficient knowledge. Some estates have implemented demonstration plots since 1998 to demonstrate the potential scope of such systems. The first trials were based on low spacing between rubber which is obviously not suitable for both farmers and estates. The double spacing system with 2 lines of rubber and an inter-row of 18 meters is far better.

For estates, intercropping enables more labor flexibility as labor can be used either for rubber or tea depending on the weather and on availability, resulting in increased productivity and reducing the cost of production. For smallholders, the combination of the two increases return to labor and reduces reliance on one crop only, in particular if land is scarce and access to new land very limited as it is already the case in most situations in the western districts where rubber is cropped.

In the low country, inter-planting of the two major plantation crops tea and rubber has the following advantages:

- Areas with marginal soil conditions could be put to better use through multi-cropping, in particular in Monorelaga where farmers already practice intercropping.
- In all regions, rubber trees profit from tea weeding and management during the immature period that ensures satisfactory rubber growth. Tea is produced after a year and a half and provides an economic return during the long rubber immature period (5 to 7 years).
- When the weather is wet and tapping of rubber is not possible, tea can continue to be plucked. For smallholders in particular, this alternative could be very useful during lean periods.
- Labor use between the two crops is complementary..
- Conversely, in the case of drought, tea as a leaf crop would provide poor yields while rubber could continue to be tapped profitably.
- The association would generate revenue from both crops and build up capital through the sale of rubber trees after 35 years. This could help to partially offset the replanting costs of subsequent cycles.
- Rubber can be easily replanted when tea is already established as there is no competition for light.
- Tea and rubber prices tend to follow different cycles and when rubber prices are down, as is the case at present, tea prices are often up, and *vice versa*, thus allowing the enterprise to survive the lean periods of each commodity. Such a system enables farmers to cope with volatile commodity prices and reduces economic risks as well as economic dependence on only one crop.

Agroforestry systems with rubber and tea with double spacing are very promising and should be promoted through demonstration plots implemented at farm level with groups of farmers in order to increase dissemination.

Some surveys have been made to investigate the socio-economic conditions needed to promote these systems<sup>10</sup>. More surveys should be probably done given the wide variety of situations farmers can face. More trials should be performed to maintain the capacity to make research proposals in this field. The team working on this topic is quite motivated and should be supported.

### **Clonal recommendations**

Meantime, it seems that the clonal recommendations are too restrictive. The introduction, use and dissemination of more clones is need in order to increase the total number of clones planted. The AFDI report already mentioned this particular point which is very important for the future of rubber and for sales of rubber in the future.

The IFDA report conceded: *“One of the more glaring weaknesses is the limited number of clones on which it presently depends. Any disease or natural stress to which these clones are highly susceptible could wipe out the entire industry. Clonal diversity is very important and this fact is only just now being realised by the plantations. Fortunately, there are a number of new rubber clones available for replanting, including RRI 102,121, 130, 131, 133 and the Malaysian clone PB 260. These new clones are expected to yield about 50g of latex per tapping as against the present yields of 30g per tapping. Plant densities of 535 plants per ha have been adopted with a view to getting 500 plants per ha at maturity”.*

This statement which has made in 2002 is still valid: i) enlarge the range of clonal planting material offered and ii) suggest a higher planting density than 500 trees/ha as has been adopted in Indonesia by SRDP with 6 m x3 m i.e. 550 trees /ha. Losses in the tree stand during the immature period then have less impact on production. However, maintaining a correct tree stand of 500 trees/ha is still a major target for new planting or replanting.

### **Rainguards**

Obviously, RRISL firmly believes in the use of rainguards to maintain the number of tapping days and the level of production. Some economic calculations made by the RRISL show them to be beneficial. But this should be analyzed once again as a function of the situation of each estate's plantations.

On the other hand, the use of the low frequency tapping method, (highly recommended for estates by RRISL, and recommended by the author for both estates and smallholders under certain conditions) means the use of rainguards to reduce the risks of losses is all the more important when production depends on a limited number of tapping days. Rainguards cost 18 Rp each, the equivalent

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<sup>10</sup> A financial evaluation at the smallholder farmer level on three widely used intercropping systems such as banana, tea and pineapple was the focus in this survey.

of 9 000 Rp (US\$ 90) and they should be replaced every year. So the use of rainguards has to be integrated as an operational cost.

Meanwhile, the Ministry has decided to reimburse 50% of the cost of fixing rain guards in 2005 out of the cess income for both the smallholders and the corporate sectors. This is quite a strong incentive. In these conditions, the annual cost is reduced to US\$ 45 per year which seems to be very reasonable, and the cost is covered by the gain in latex production.

### ***Socio-economic analysis of the smallholder sector***

The socio economic research programme is not really viable as there are only 2 scientists to implement surveys and analyze the problematic of the farmers. This is far too few to be able to understand farmers' strategies, the structures and changes in the smallholder sector and be able to tackle the challenges facing the farmers. There is insufficient information on farming systems, and no operational typology has been built to enable identification of recommendations in similar areas or to group targets for specific actions such as setting up demonstration plots, on-farm trials, training, surveys, dissemination etc.

The smallholder sector being the weakest sector in terms of support and probably the most complex to understand, it is vital to enhance RRISL capacity in the domain of farming systems analysis in order to strengthen its ability to cope with farmers' problems.

A complete plan for operational and effective research on farming systems and livelihood systems is necessary with 2 main focuses:

- i) the implementation of a complete survey for the characterization of farming systems, with an operational typology, possibly with modeling of the farming systems of the main types of farms in order to test the economic impact of the adoption of technology and the resilience of farming systems to the volatility of economic commodity prices or climatic events. The distribution and generation of income should be identified at the farming systems level to understand the place and the role of rubber among other farming and non farming activities.
- ii) the creation of a network to monitor farming systems in order to test impact of changes and of the adoption of technology over time.

Social factors are also very important and up to now there is no sociologist at RRISL to cope with this component.

RRISL contributes to the creation of Thurusavyia societies for smallholders. The Thurusavyia fund was created by the government to create farmers' organizations called "Thurusavyia societies" A rubber stabilization fund for

smallholders was also created to protect them from fluctuations in rubber prices. So far, no information is available on this topic.

The idea behind setting up structures for the producers is good and necessary, though the efficiency of this operation remains to be assessed. It is probably more efficient to allow farmers' organizations to appear by themselves and to support any endogenous trends that are independent of both government and private institutions.

RRISL also contributes to the Wellassa Rubber Company formed by the biggest manufacturers of rubber products and the RPCC, which is located in Monoregala in the south-eastern part of the country. The bulk of the work by this very small socio-economic unit of RRISL is currently concerned with this project which is funded by the EU.

The Adaptive Research Unit also conducts some work in the area between extension and socio-economic research. This unit examined the feasibility of expanding rubber cultivation to the eastern province<sup>11</sup>. Trials on mixed clone systems in the smallholder sector were implemented. New programs on combined Rubber/Anthurium cultivation and Rubber/poultry systems have begun

The Agricultural Economic Unit is currently implementing a study on marketing in the smallholder rubber sector on the following topics: existing status and possible improvements, changing rates of interest, prices and the cost to the climate with special reference to rubber cultivation. The Agricultural Economics Unit was involved in the research on Interaction between Environment, Society and Technology (INTEREST) and Innovative Initiatives to address Poverty with the Biometry section and the Advisory Services Department of the Institute.

The Advisory Services Department functions at national and regional level and its mission is to increase the productivity of the smallholder rubber industry in Sri Lanka. Medium scale rubber growers associations were formed at the regional level to facilitate the transfer of technology. A number of training programs, workshops and seminars were conducted to improve the performance of this sector. Training programs to improve tappers' skills in the rubber industry was considered a high priority area and a special field training program was successfully conducted in collaboration with the Thurusaviya Fund.

### ***Production of planting material***

The management of all government nurseries, including the newly opened Moneragala nursery was taken back by the RDD in August 2004. For the planting

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<sup>11</sup> The area in the intermediate zone was initially targeted for the establishment of rubber. Growth performance of rubber in two small smallholdings established in Padiyathalawa was comparable with that recorded in the traditional rubber cultivation area

season in May-June, 575,000 plants were produced from these nurseries by the RRISL.

Research is also responsible for providing high quality clonal planting material and for maintaining its purity and is also in charge of managing mother budwood gardens.

All planting material for budwood gardens, intended for the production of planting material for estates and for smallholders as well as for private nurseries, should come from RRISL in order to maintain clonal purity (with a certificate of purity, in particular if the clone base is widened).

In other words, it would be very efficient to subsidize the production and distribution of very high quality clonal stumps for budwood gardens established primarily to ensure quality and production. The government could significantly improve the situation by providing sufficient free planting material for the establishment of budwood gardens by any stakeholders. As planting material sales are uncontrollable, the only way to ensure clonal purity is to guarantee a free and sufficient supply of budwood.

### **Conclusion**

The major achievements of RRISL in 2004 that are relevant for our study are the following:

- New clones (RRISL 203, 211, 2001) bred and released by the RRI have produced high commercial yields of more than 2500 kg/ha/yr. It is always necessary to have a wide range of recommended clones. Whatever the clones used, it would be realistic to expect an average yield of between 1400 and 1800 kg/year/ha from both estates and smallholders, depending on the local situation.<sup>12</sup>
- 1.9 million high quality poly bag plants and budded stumps were raised in government nurseries and the majority were distributed to smallholders up to August 2004. Then the nurseries were transferred to RDD. It might be more efficient to give the responsibility of nurseries to RRISL and dissemination to RDD. It has been claimed that only 0.7 millions plants were actually used for the establishment of smallholder plantations out of the 1.6 million that were prepared. I have not been able to check the truth of this information that but it seems clear that planting production should be done with the maximum quality. RRISL and RDD should work in very close collaboration on this key issue.

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<sup>12</sup> RRISL 2001, which is a new vigorous and high yielding clone was upgraded from Group III to Group II in the clone recommendation list

- Authentic planting materials from new clones provided by the Genetics and Plant Breeding Department were issued to Plantation Companies for the establishment of their own budwood nurseries. This is a very important point.
- Possible use of d/4 tapping with stimulation for Sri Lankan clones was confirmed. Labor shortage, high cost of production, as well as a good return to labor for smallholders, really favor the use of the d/4 technique.
- Fertilizer recommendations were revised for the smallholder sector based on the results of soil and foliar analyses, in particular for the immature period.
- Feasibility studies for planting rubber in the Eastern Province were completed.
- Investigation of the long term effect on intercropping during the immature stage of rubber was completed and intercropping was shown to have no negative effect, on the contrary, the yield and vigor of rubber trees increased. Although this fact has been well known since the 1990s (the SRAP project in Indonesia with CIRAD/ICRAF, and the EU funded STD intercropping project in Ivory Coast, Gabon and Indonesia), it is interesting to confirm it in Sri Lanka conditions.

Meantime, the 1 % cess on rubber export devoted to Research was completed in 2004. Its efficacy is questionable, but it may be a way to provide funds to enable Research to fulfill its requirements.

The private sector strongly advocates commercially oriented research.

For estate plantations contractualization of research activities with the private sector is probably the best way to provide suitable research for estates and their particular problems as well as funds for research to invest in other fields. This is also a form of partnership between the private sector and Research that can be interpreted as a contribution from the private sector to the commodity system as a whole.

The general statement of AFDI with respect to rubber, focuses on the high cost of production and suggests that “obvious approaches to the problem will involve (a) increasing the yield per hectare (b) reducing the cost of production and (c) diversifying into other more profitable crops. This program underlines the challenge facing Research to find solutions for the structural problems of the rubber sector.

Research should also place more emphasis on the smallholder sector mainly through socio economic activities in order to acquire a better knowledge about farmers, this being a prerequisite for any future action

In conclusion, RRISL is a key actor for technical advice but its weaknesses should be addressed, in particular in socio economy, the production of planting material and its ability to cope with smallholders' problems

## 5.2 Extension

Extension is widely considered to be inefficient, lacking in motivation, and there are permanent complaints about the lack of an operational budget. However the solution to these problems does not seem to be only an increase in budget. Appropriate high quality training as well as building motivation, (or providing incentives), is probably needed to rebuild its dissemination capability. Training is provided by RRISL with up-to-date technologies and technical messages to disseminate. It is hard to accurately assess the impact on the smallholder sector but the fact that smallholders do not replant or adopt certain technologies raises some doubts about its efficiency (although there may be other explanations for this). Extension has 195 extension offices for rubber which is too few for a sector covering 48 000 ha and probably as many smallholders. And quantity alone is not sufficient. Reforms and experiments in other countries have shown that extension services are not efficient if the personnel are not regularly and adequately trained and have real incentives and responsibilities.

In Indonesia, local "Dinas" extension services faced the same problems. In the 1980s the World Bank supported the SRDP programme, that in the 1990s was transformed into the TCSDP program and that has been very efficient in terms of planting, transmission of technical advice and the acquisition of knowledge by smallholders. High quality training of staff, linked with high quality expertise from other countries to support training, independence through project management but links still maintained with local extension and the accountability of staff were key factors in that success. Indonesia has still 3 million hectares of ageing jungle rubber (an extensive agroforestry system based on the use of unselected seedlings) to convert into clonal plantations. The task is gigantic. But the SRDP/TCSDP approach has proved to be efficient with smallholders. Sri Lanka could profit from that particular experience.

Meanwhile, the NES (Nucleus Estate-Smallholder) approach in Indonesia has been relatively successful, although it should be recalled that it was implemented with migrant farmers in an official transmigration program. The NES approach, with core estate plantations that provide services to smallholders, could be appropriate for rubber development in new areas such as the eastern province of Sri Lanka.

It is very important to consider farmers as “local entrepreneurs with several activities and cropping systems”. In other words, considering the situation from a livelihood perspective is a pre-requisite for a better understanding of smallholder constraints and opportunities, why they can, or cannot, adopt certain technologies, or transform them and eventually adopt them in their own way resulting in a real process of innovation. Given the current situation with land scarcity and social problems, the relatively high differentiation in social status,, and the co-existence of farmers, landless workers and estates, taking social factors into account is crucial to understanding innovation processes.

In other words, by itself, technology is not sufficient to ensure success.

The private sector is very active and is able to shift policies and strategies as a function of prices and the economic (or political) context. This is the sector which has lost more rubber area than the others, either through cutting or replacement with another crop (oil palm, tea, etc.) or by stopping tapping while waiting for commodity prices to recover. The total area abandoned or where another crop is now grown instead of rubber is not known. Those who maintained their rubber plantations even when the cost of production was higher than the sales price have shown real resilience. This sector is very efficient and able to rapidly improve the quality of its plantations. Private producers are currently interested in replanting. They may play the role of a “triggering factor” as well as providing a technical model for others, including smallholders, to copy. Through different forms of partnership they could also contribute to exploring possible cooperation with other segments of the commodity system, in particular smallholders, if they are looking for quality raw rubber material.

## **6 Poverty trends, social issues and livelihood improvement in rubber-dependent households.**

This chapter is partly based on the IFAD 2002 report which is still very relevant.

There are several major problems and causes of poverty that keep the resident worker population on estates and the people in adjacent villages poor. The first of these is the inadequacy of their incomes from their work for the estates. This is partly due to their low productivity, which is reflected in the high cost of production plantations.

Payment of incentives for outputs above a quota has improved the possibility of workers earning higher wages. However, this has not been combined with improved productivity enhancing technology.

The insistence by unions on a minimum number of days of work for each worker on the estate’s payroll and their unwillingness to allow redeployment of workers to other divisions or estates where there is a shortage of labor, also makes for underemployment and unemployment of workers.

The lack of access to land among estate workers and villagers in adjacent areas denies them the possibility of engaging in land-based income generating activities. Meantime, in some areas, a portion of estate land is not cropped and sometimes is encroached by local people.

The idea of leasing or even selling small extents (1 to 3 ha) of tea/rubber land to unemployed members of worker families was strongly resisted by plantation managers when the idea was broached with them (IFAD, 2002). Their objections were that (a) it would be opposed by the companies which are already running on tight budgets and (b) there was the possibility that instead of becoming out-growers providing leaf to the estate factory, the smallholders would start growing other profitable crops like vegetables and potato. They now can also grow rubber intercropped with tea as rubber prices have recovered. This question should be reconsidered by estates.

At higher levels of management in the RPCs and among officials at the MPI, it was felt that this was probably the only way to go if the problem of the lack of labor on estates is to be solved.

The lack of non-land-based opportunities (including credit) for income generation is a major concern.

The excessively long hours of work (including work in the home) of women makes it impractical for them to take up new income generating activities. This is a factor that needs to be taken into consideration in designing projects aimed at poverty alleviation. A number of constraints, which could be addressed through project support, identified by IFAD in 2002, are:

- overcrowded and often dilapidated housing; this is already being addressed, though not adequately, and the institutional arrangements for its implementation are already in place;
- lack of basic amenities such as clean drinking water, toilets and sanitary facilities; electricity for their homes; basic healthcare; schooling for the children; these deficiencies are even more apparent in the surrounding villages than in the plantations; and
- lack of opportunities to migrate out of the estate or village and enter the national job market, especially for the youth living in the estates and adjacent villages.
- problems of alcoholism, drug abuse and domestic violence.

Improvement of the social interactions and social capital of villagers and plantation workers would result from a programme of diversification that involves both groups, preferably as producers rather than simply as plantation laborers.

Thus, diversification of production from tea and rubber into other crops presents opportunities for increased social integration of village and estate populations. Villagers are often familiar with the cultivation of the crops currently being considered for diversification. Opportunities would also arise for formation of producer interest groups around the new crops that would be promoted by diversification. In particular, the abandoned and neglected estates present opportunities for integrating landless villagers and estate workers in a mosaic of farming systems involving tea and rubber growing (intercropping), export agriculture crops, vegetable cultivation, fodder production for dairy and forestry among other production activities.

In other words, addressing poverty means taking into account smallholders (who are also part time farmers and may increase their off-farm activities) as well as estate workers at the same time.

## **7 New hope for rubber?**

Once the assessment has been made of local low rubber yield on plantations established in the past, we must admit that there are still plenty of reservoirs of productivity: new planting material with a larger variety of clones, planting techniques to shorten the immature period and improve the tree stand at opening and later, the use of suitable low frequency tapping and stimulation, including by smallholders who should receive the appropriate technical information .....

The diffusion of more clones from different sources can be implemented by RRISL. RRISL is also the best place to provide the required training and proper equipment to train staff in better agronomic practices that are already well known.

Concerning the use of stimulation and of low frequency tapping and stimulation, most research and extension institutions in the world are reluctant to introduce it. Their belief is that smallholders cannot manage this technique properly and will choose to act in a way that provides immediate improvement of yields but kill their trees in less than 2 years. We strongly disagree with this belief for many different reasons. First, once they are well trained and dispose of the proper information, most farmers are not fools and they realize that they have no interest in destroying their tree capital through misuse of the stimulation technique. Second, in Malaysia this technique was introduced to a relatively large number of farmers by RISDA without any major problems occurring. Lastly, it would be nice, for once, to consider smallholders as real entrepreneurs with a real capacity to make decisions and to foresee their own future, rather than to consider them to be too limited to understand the issues and challenges inherent in this technique. Therefore, the issue here is more one of the quality and intensity of training of farmers.

A program of small demonstration plots could be initiated with most innovative farmers in order to introduce the technique properly, step by step, with a highly qualified and well trained extension staff. In the first phase, this program could be run by RRISL which has the best technical background to implement it.

### ***Is recovery possible?***

Technically speaking, Sri Lanka can recover its 1980 level of production but it will probably not be possible only using traditional areas where good quality replanting is required, but also require the deployment of marginal land in the eastern region. Global productivity could be considerably increased with yields of 1500-1800 kg/ha/year if proper agronomic practices are widely adopted.

## **8 Options, policy, institutional and technical recommendations**

Rubber has still a future for both estates and smallholders. The trend of rubber decline has changed at least in the perception of those involved. But serious investment is required to ensure high quality technology, good quality tree planting and agronomic practices, dissemination, well-trained staff farmers, high quality rubber for some niche markets and finally the availability of quality planting material.

### ***Increase in productivity***

It would be extremely difficult to significantly improve productivity in existing plantations with the notable exception of labor productivity that can be improved by using the low frequency tapping method with stimulation. Rubber stands are too low (below 300 trees/ha most of time) and clones may not be optimal. But new plantations have the potential to produce yields of 1500/1800 kg/ha if proper agronomic practices are adopted during the immature period, with a wide variety of suitable high yielding clones as well as the use of low frequency tapping. This potential can be achieved for both estates and smallholders. Smallholder schemes in Malaysia and Indonesia have proved that smallholders can do as well as estates (and sometimes even better) if access to information and good quality inputs is ensured.

Agroforestry systems with tea and cinnamon intercropped with rubber have already been adopted and promoted providing an excellent opportunity for small farmers to rely on two sources of income, profiting from the complementary aspects of these two crops.

### ***A livelihood perspective is required for the smallholder sector***

Again, as farmers now mostly have diversified cropping systems (and sometimes also have part time off farm activities), characterization of farming systems should provide relevant information to understand farmers' decision-making processes and strategies and the role of rubber in these strategies. A livelihood (non sectorial) perspective is highly recommended. It is clear that sufficient knowledge is lacking about farming strategies with respect to recent changes, and about farmers' ability to adapt to changes and to cope with crisis; a serious farming systems characterization consequently needs to be implemented in different regions to obtain an operational typology of situations and relevant knowledge on constraints and opportunities. We need to know in detail the factors that limit or favor rubber at the level of farming systems, and not only from a sectorial perspective limited to rubber.

Among the different opportunities (that we definitely need to identify), farmers will allocate their production factors according to various criteria among which gross margin per hectare and return to labor may not be the most relevant. We need to contextualize farmers' decision process, and in particular the factors that lead to farmers to adopt, replant or develop rubber as one of several possible activities. In other words, a livelihood perspective is highly recommended if we are to be in a position to promote the right technology at the right place to the right farmers.

### ***From west to east: rubber's move to non traditional marginal areas***

The development of rubber in non traditional areas such as the Monoragala district is already underway and is a promising way to cope with land scarcity in traditional areas. However, rubber production in marginal areas should be carefully thought out to reduce cropping risks related to rainfall. This requires a very high quality of extension to smallholders who may not have skills and experience in rubber. The process of acquiring knowledge through "learning by doing" with proper technical support has to be secured. 29 000 ha of abandoned tea on degraded land are already available for this purpose.

### ***Recovery of rubber production through partnership***

Part of this change may (should) be market driven as well as driven by stakeholders in the private sectors, both in production and manufacturing.

The rubber renaissance will occur if all actors agree to work together. In other words, the production sector needs to address manufacturers and exporters needs while the latter should also invest in rubber production to ensure the rubber they need is available.

There is no question about the need for quality extension with appropriate financial means for action, but research should not be forgotten. Sustaining the Research institution and its capacity for innovation will not only ensure the recovery of rubber in the present but also ensure it has a future. The linkage

between Extension, Research, Farmers and the private sector should be developed and promoted.

### ***Future Pattern for some estate plantations in the traditional rubber areas***

The traditional estate model of corporate ownership, with a high capital base and large work force, has to gradually give way to smallholdings, at least in some areas where land is obviously underused.

The smallholder sector in the low country of Sri Lanka has proved beyond a doubt that it is capable of increasing both land and labor productivity in a sustainable manner and this appears to be a promising strategy for the future. Labor productivity is higher in smallholdings and labor costs apparently lower thanks to the use of family labor.

It may be that entire divisions of estates or fields bordering villages would have to be converted into family units, on an outreach system, with field activities being entrusted to smallholders, and perhaps worker co-operatives.

This could best be implemented using the concept of the Indonesian Nucleus Estate-Smallholder (NES) model which was designed to consolidate production, processing and marketing activities and improve the socio-economic conditions of participating smallholders at the same time. The Nucleus Estates, which could be either RPC-managed estates or private estates, would not only provide support and expertise to smallholders, but also buy and process their leaf? rubber? latex? at a fair price. This scheme is considered mutually advantageous in that the smallholders could develop their farms and increase their productivity and incomes, while the Nucleus Estate would be able to increase its scale of profitable operations through increased throughput. The Nucleus Estate would be playing the role of a successful implementing agency for smallholder development. This statement by IFAD in 2002 is still very valid and could provide fresh air, more land and partnership opportunities for smallholders.

### ***Relevant policies in the sector identified in 2002 by AFDI and still relevant in 2005***

The main elements of government policy with respect to the plantation industry included the following components identified by AFDI in 2002:

- (i) Maintaining (there's a word missing here) and **transparent policies**, developing **efficient markets** and providing satisfactory **infrastructure** for the private sector to function effectively.

Note: developing efficient markets may be possible for rubber related manufactured products. For dry raw rubber exports, Sri Lanka has no means to weigh on international rubber prices. But ensuring "satisfactory structure" by solving structural problems is definitely required. Partnership between all actors

of the commodity system is strongly recommended, and already partially implemented.

- (ii) Advocating the diversification of production within monocrop estates and among estates of the same company to minimize the impacts of price fluctuations and, to some extent, the vagaries of the weather.

Note: this strategy has been widely adopted by all actors. Agroforestry practices such as rubber intercropped with tea is parts of the same dynamic and is now widely accepted as a useful alternative.

- (iii) Reaching and maintaining international certification standards in manufacture TSR for rubber as already applied for high quality crepes.

Note: this concerns mainly rubber factories but quality of rubber cannot be increased if no pricing policy is developed, which is currently the case.

- (iv) Improving the country's competitiveness in the world market through improved productivity, market development and finding niche markets for estate crop products.

Note; the rubber industry is already quite active in finding these niches. Improving productivity is a reachable target for new plantations and replanting. Existing plantations may be able to increase productivity to a certain extent through the wide use of the low frequency tapping method using stimulation. Other reservoirs of productivity have been presented elsewhere in this report.

- (v) Improving the **quality** of products and adding **value** to products from plantations to obtain more favorable prices.

Note: this is achievable in the export and manufacturing sectors. Again, a pricing policy is required by buyers (factories and exporters) if quality is to be achieved at the farmers' level.

- (vi) Increasing the productivity of labor in the sector and providing **decent standards of workers' welfare**.

- (vii) Reforming the cess-subsidy programme.

Note: that has been **done**.

- (viii) **Maintaining market share** in export products.

- (ix) Completing the privatization process by getting rid of the remaining SLSPC and JEDB estates.

Lastly, rubber has been a reliable source of income for estates as well as for smallholders for a century. The sector has been living on its past, and did not take sufficient measures to maintain its capital of production and severely suffered from the world rubber crisis in 1997-2002. But rubber remains a good opportunity with the recovery of prices, the privatization of the estate sector, an active manufacturing sector, motivation for almost all stakeholders and an international market that is expected to sustain its demand at least for the next decade.

Partnership between all stakeholders, appropriate government policy (subsidies and tax), sufficient knowledge about the smallholder sector, a strong research and extension system and the use of good agronomic practices for new plantations and replanting are the keys to success.



**Map of Sri Lanka : field visits and area visited.**

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## Annexe 1

### Team distribution

Subject : Sri Lanka Tea/Rubber Study: coordinating mission activities  
Introduction of the members of the team, and their areas of focus for the mission.

#### Coordinator

**Dina Umali-Deininger** (co-Task Team Leader, June 12-25): will lead in coordinating mission activities.

Contact ;

Lead Agricultural Economist

South Asia Agriculture and Rural Development Unit

The World Bank, 1818 H St, N.W.

Tel. (202) 473-0419, Fax. (202) 522-1770,

Washington, DC 20433, USA

Rm MC10-177, Mail Drop: MC 10-1011

E-mail: dumali@worldbank.org

#### Public expenditures team

**Terrence Abeysekera** (co-Task Team Leader): will be assisting Dina Umali-Deininger and working with Johannes Woelcke on the public expenditure review of the programs in the tea and rubber sectors.

**Johannes Woelcke** (June 4-15): will work with Terrence Abeysekera on the public expenditure review of the programs in the tea and rubber sectors.

#### The tea team

**C. Barbora** ( June 12-25): will review the status and production performance of the tea plantation (public and private) and smallholder sectors, with a focus on examining the challenges to increasing the productivity of and returns to tea production. He will also work with Malathi Jayawickrama with regards to production-marketing linkages.

**Malathi Jayawickrama** (June 10-25): will review the structure and performance of the tea marketing and value-chain system for the plantation (public and private) and smallholder sectors and examine the policy, technical and institutional constraints to improving its marketing efficiency and domestic/international competitiveness. She will also work with Dr. Barbora with regards to production-marketing linkages.

#### The rubber team

**Eric Penot** (June 14-25): will review status and production performance of the rubber plantation (public and private) and smallholder sectors, with a focus **on examining the challenges to increasing the productivity and returns to rubber production**. He will work with Dr. Chowdhry with regards to production-marketing linkages.

**Yusuf Chowdhry** (June 12-25): will review the structure and performance of the rubber marketing and value-chain system for the plantation (public and private) and smallholder sectors and examine the policy, technical and institutional constraints to improving their marketing efficiency and domestic/international competitiveness. He will also work with Dr. Penot with regards to production-marketing linkages.

**Social issues :Barbara Verardo** (June 13-15): to initiate discussions with government and other stakeholders on social issues in the plantation sector.

## Annex 2

### Sri Lanka Tea and Rubber Study

#### Terms of Reference: Sri Lanka Improving Rubber Productivity and Competitiveness

##### Overview:

The tea and rubber sectors in Sri Lanka is critical to sustaining growth and poverty reduction. These sectors comprise both smallholder and estate (plantation) sub-sectors. The estate sector in tea accounts for 56% of area and 40% production. The estate sector in rubber accounts for 58% of area and about 37% production. These sectors contribute about 13% of agricultural GDP and about 15% of total export revenues. They are a major source of livelihoods in rural areas. The tea and rubber sector performed relatively well in the 1990s, growing at an annual average of 3.4% and 4.3% per year respectively. Sustaining this strong growth over the longer term is therefore an important priority of the government.

At the same time, despite this strong growth performance in the 1990s, this has not translated into a more rapid rate of poverty reduction among tea and rubber dependent households. Recent estimates find that poverty rates in the estate sector rose from 26% in 1990/91 to 38.4% in 1995/96, declining to 30% in 2002 but still higher than the early 1990 levels. The challenge for the future is how to make this growth process more pro-poor.

The tea and rubber sector study will review key development challenges and reform options for the tea and rubber sectors in Sri Lanka. Specifically it aims to: (i) review the status and performance of the tea and rubber sector; (ii) analyze poverty trends and other social issues pertaining to tea and rubber producers; (iii) identify the main constraints to more rapid tea and rubber sector growth and improving the livelihoods and welfare of tea and rubber-dependent households; and (iv) explore options (policy, institutional and technical) for reform drawing on international experience.

The main objectives of this consultancy are to review the production performance of the rubber estate and smallholder sectors, identify the constraints in increasing their productivity and increasing the returns to tea production; and propose options for policy and institutional reforms.

##### Main tasks of the consultant:

1. Describe the current agronomic practices in both the rubber smallholder and estate sectors, and assess their impact on current productivity levels. Identify constraints to increased productivity and competitiveness and propose options of addressing them, drawing on international experience.
2. Rubber Research---describe the agencies involved in rubber research (including the Rubber Research Institute, private sector, etc) review its organizational structure/staffing, functions and responsibilities, infrastructure and facilities, level and sources of funding over the last 5 years and allocation of these resources across programs, level of coordination among agencies, arrangements for impact assessment, issues requiring priority attention. Assess the shortcomings of program execution and their effectiveness to producing appropriate technologies and practices to meet the needs of the smallholder and estate sector. Compare the performance of the rubber research system in Sri Lanka with other countries . Propose options drawing on international experience on improving the effectiveness of the rubber research system to achieve the increased productivity and competitiveness at the farm level (e.g. improving research capacity, making it more demand driven, public-private partnerships, international alliances, etc).

3. Rubber Extension-- Describe the agencies involved in rubber extension (including government agencies, private sector, etc) review its organizational structure/staffing, functions and responsibilities, infrastructure and facilities, level and sources of funding over the last 5 years and allocation of these resources across programs, level of coordination among agencies, arrangements for impact assessment, issues requiring priority attention. Assess the shortcomings of program execution and their effectiveness to transferring appropriate technologies and practices to meet the needs of the smallholder and estate sector. Review related services in linking farmers to markets including farmer organizations and postharvest technologies and practices. Compare the performance of the rubber extension system in Sri Lanka with other countries. Propose options drawing on international experience on improving the effectiveness of the rubber extension system to achieve the increased productivity and competitiveness at the farm level (e.g. improving public and private capacity, making it more demand driven, strengthening research-extension linkages, public-private partnerships, use of innovative communication technologies, etc).
4. Coordinate with other mission members on public expenditures (Johannes Woelcke and Terrence Abeysekera) and marketing (Malathi Jayawickrama).

**Output:**

The output of this consultancy is a report of about 40 pages single spaced (not including supporting annexes) in WORD format. The consultant will provide all quantitative data used in the report in a spread sheet format (EXCEL).

The consultant will report to Dina Umali-Deininger (Lead Agricultural Economist, Washington, D.C.) and Terrence Abeysekera (Senior Agricultural Economist, Colombo).

**Timetable:**

This consultancy will involve a two week mission of about (12 days) to Sri Lanka to collect information and discuss to relevant stakeholders (government, private sector, academics, other donors, etc) during the period June 14-24, 2005. The first draft of the report should be submitted to the Bank by June 30, 2005. The final draft should be submitted by July 8, 2005.

This consultancy will be for a total four staff weeks.

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**Annex 3**  
**Mission Schedule: Tea and Rubber Sector Study**  
**(June 13 - 23 June)**

**June 15, 2005 (Wednesday)**

3.00 p.m. Meeting with Mr. Damitha Dharmasena, Rubber Manufacture's Association (0777 637876)  
*At Ministry of Plantation Industries, 55/75, Vauxhall Lane, Colombo 2 (Mr. Choudhry and Dr. Penot)*

**June 16, 2005 (Thursday)**

9.00 a.m. Meeting with the monitoring division of Ministry of plantations.

10.00 a.m. Meeting with Mr. Bandula Jayasekera, Chairman, Tea Cluster/ Chairman, Mabroc Tea (Pvt.) Ltd (2878711), Mr. Avindra De Silva, Director, Lipton Ceylon Ltd (4725800 ext:801), and other members of the Tea Cluster  
*244, Union Place, Colombo 2. (For Malathi and Dr. Barbora, Mr. Choudhry)*

14.00 a.m. Meeting with Mr. Kulatunga Rajapaksa, Managing Director of DSI Group, chairman of Monaragala Wellassa Rubber Company, project partner.

15.00 a.m. M...

**June 17, 2005 (Friday)**

10.00 a.m. Mr. Leelasena, Director, Planning, (2431667)  
*At 55/75, Vauxhall Lane, Colombo 2 (Dr. Penot)*

13.30 p.m. Presentation of the Monoregala rubber scheme by DSI.

3.00 p.m. Meeting with Mr. Dhamitha Perera, Mr. Ranjith Pieris, Lankem Plantation, (0777 289802/ 2381504)  
*At 53-1/1, Baron Jayathilake Mawatha, Colombo 5 (For Dr. Choudhry & Dr. Penot)*

**June 20, 2005 (Monday)**

10.00 a.m. Meeting with Mr. R.B. Premadasa, Deputy Director General, Rubber Development Department  
*At 55/75, Vauxhall Lane, Colombo 2 (2304815/ 0777 070282)*

*(Dr. Penot)*

13.00 p.m

*Meeting with Dr. Thilakaratne, Director, Rubber Research Institute, Ratmalana (Dr. Penot)  
2605171, Thelawala Road, Ratmala (Saravathi Statue)*

**June 21, 2005 (Tuesday-Public/ WB Holiday)**

8.00 a.m.

**Travel to the field (Dr. Penot) :**  
*Field Trip to Rubber Research Institute, Agalawatte)*

10.00 a.m.

*Meeting with Dr. L.M.K. Thilakaratne, and visit Rubber Research Institute, Agalawatte, At Darton Field, Agalawatte (034 224 8457)  
Discussion with local researcher Visit of the RRI factory*

01.30 p.m.

*Visit of the area and several estates in Neboda, Horana, Padujka and Pimbuna.*

**June 22, 2005 (Wednesday)**

10.00 a.m.

*Meeting with Dr. L.M.K. Thilakaratne, and visit Rubber Research Institute, Agalawatte,  
At Darton Field, Agalawatte (034 224 8457)  
Discussion with local researcher  
Visit of the RRI factory*

01.30 p;m.

*Visit to 2 farmers in the Agalawatte region*

**June 23, 2005 (Thursday)**

09.00

*Discussion with researchers  
Visit of the intercropping rubber trials in RRISL  
Return to Colombo*

**June 24, 2005 (Friday)**

10.00

*Mr Amanda Weerasinghe, Rubber Traders Association, Almar Cie*

12.30

*Meeting with Mr Pote Chumsri , FAO representative in SL.*

3.00 p.m.

*Wrap up with Mr. J. Abeywickrama, Secretary, Ministry of Plantation Industries (2380587), Mr. Leelasena, Director, Planning, (2431667)  
At 55/75, Vauxhall Lane, Colombo 2 (For all)*

5.00 p.m.

Mission de-briefing with Mr. Peter Harrold, Country  
Director

**June 25, 2005, Saturday,**

09.00

Meeting with Mr Lakna Paranawithana, The competitive  
ness programme , USAID.

## Annex 4

### List of persons encountered

DSI, D Samson Industries	DK Rajapaksa, managing director Chairman of DSI group
CW Mackie & Co Ltd Rubber Traders Association	W T Ellawata, chairman
DSI Sanson Group	Latith Jayawadema, group treasurer
Lalan rubbers private Ltd	Gamini Jayasurya, director plantations
Lalan rubbers private Ltd	Sunil de Alwis, general manager , operations
FAO	Pote Chumsri, FAO representative
Almar trading Co Former chairman of the rubber traders association	Amanda Weerasinghe, general manager , director
Almar trading Co	Lanil Waniganayake, director, chief trader
RRISL, agronomy	Mohamed Iqbal
RRISL, socio-economy	Jagath edinisinghe
RRISL, biometry	Teminda Herath
RRISL, biometry, socio-economy	Wassane Wijesunya
RRISL	MK Tillekaratne, Director
RDD, Ministry of plantation	AB Leelasena, director planning
Jafferjee Br exports Ltd	Don B Ilapperuma, technical director
Richard Pieris export Ltd	Damitha Dharmasena, director, CEO
Consultant to rubber industry Collaboration with GTZ	C Dias Bandaranyake, consultant
Ministry of plantation, monitoring division	Abeynanda Dias, director
Ministry of plantation, rubber development Department	RB Premadasa, Deputy director general.
Lankem	Dhamita Perera, director
Lankem	RC Peries, executive director
Pet Lankaa enginneers	Lacksham Abeywardana, owner.
Smallholders	
Consultant	Lakna Paranawithana

## Annex 5

### Analysis of intercropping practices with rubber

*Source : From IFAD COUNTRY STRATEGIC OPPORTUNITIES PAPER, STUDY OF FARMING SYSTEMS OF THE ESTATE SECTOR; from K. A. de Alwis And R. K. Nathaniel (INTERNATIONAL FUND FOR AGRICULTURAL DEVELOPMENT)*

#### INTERCROPPING TEA WITH RUBBER

Given the agronomic feasibility, inter-planting of the two major plantation crops, tea and rubber, in the low country, has the following advantages:

- Areas with marginal soil conditions could be put to better use through multi-cropping.
- When there is wet weather and tapping of rubber is not possible, tea could continue to be plucked. For smallholders, in particular, this alternative could be very useful during lean periods.
- Conversely, when drought conditions prevail, the leaf crop would be poor in tea while rubber could continue to be tapped profitably.
- The enterprise would generate revenue from both crops and build up capital as well through the sale of rubber trees. This could help to partially offset the replanting costs of the subsequent cycles.
- Tea and rubber prices tend to follow different cycles and when rubber prices are down, as at present, tea prices are often up, and *vice versa*, thus allowing the enterprise to tide over the lean periods of each commodity.

**Planting:** Based on the joint TRI/RRRI studies, carried out over the past two decades, the most suitable combination for the low-country comprises two rows of rubber planted 2.4 m apart with tress within the row planted 2.4 m apart. The next two rows of rubber are planted 18 m apart in a similar manner. Seven rows of tea (1.2m x 0.6 m) are accommodated between two twin (or double) rows of rubber plants. This works out to 75% of monocrop tea stand and 70% of a monocrop rubber stand giving 9,375 tea bushes and 341 rubber trees per hectare. Both crops are not planted simultaneously, as it has been found that the area where tea is to be planted requires 2 years of rehabilitation under grass. Therefore, rubber and grass are planted in the same year, and tea follows in two years, when the grass is removed and tea planted.

**Constraints and Limitations:** The two-decade experimentation has helped identify and rectify some of the problems as indicated below:

- **Over Shading:** It was observed that due to over-shading, resulting in poor light penetration, healthy growth and yield of tea was affected. To overcome this, relatively wider spacing (than that indicated above) are now recommended for rubber and that too as twin rows. Other means of avoiding undue over-shading are planting in an east-west direction on gently sloping lands (particularly below 20% slope), and removal of side branches of rubber at frequent intervals, both of which have helped improve the growth of tea.

- **Root competition:** This was overcome by cutting a trench on either side of the rubber row, and also by planting tea and rubber simultaneously, which means that rehabilitation with grass is undertaken prior to planting of both crops. Formulation of an appropriate fertiliser mixture for the tea-rubber intercropping system has also helped.
- **Pests and diseases:** Blister blight, White root disease, horse-hair blight etc were seen as problems and were overcome by the use of resistant clones, adoption of prophylactic spraying and soil rehabilitation with grass of the entire area to control White root disease.

**Profitability:** Analysis of total capital investment shows that intercropping of tea and rubber requires less capital compared to cultivating tea alone.

**Table 20: Costs of Intercropping Tea & Rubber vs. Cultivating Tea Alone**

Cost Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	TOTAL
<b>Worker requirement (md)</b>	503	157	601	214	137	108	<b>1,720</b>
<b>Worker cost (Rs)</b>	68,442	21,318	81,770	29,138	18,666	14,722	<b>234,056</b>
<b>Material cost (Rs)</b>	22,340	11,199	73,577	24,797	628,603	24,717	<b>185,233</b>
<b>Total Cost for RxTea (Rs)</b>	90,782	32,517	155,347	53,935	47,269	39,439	<b>419,289</b>
<b>Cost of tea replanting (Rs)</b>	131,933	30,126	221,681	60,069	49,044	44,194	<b>537,047</b>

\* From paper presented at the 204th Experiments and Extension Forum, of the TRI, in February 2002.

**Cost Benefit Analysis:** This was undertaken using data gathered over 10 years, even though it was realised that a 10-year period was too short for such an analysis, due to the unavailability of data over a longer period. The results of analysis are given below:

**Table 21: Gross Margin and Cost Benefit Analysis of Intercropping Rubber with Tea**

	Total Revenue (Rs)	Total Variable cost (Rs)	GM in the 10 <sup>th</sup> Yr (Rs)	NPV at 15% (Rs)	IRR (%)	Pay back Period (years)
Tea as a monocrop	574,056	298,787	275,269	6,061	9	8.5
Rubber as a monocrop	152,500	67,942	84,558	(32,564)	15	7.5
Rubber X Tea	314,496	146,234	168,262	(5,729)	14	7.5

It is seen that the gross margins are the highest when tea is grown as a monocrop and least when rubber is grown as a monocrop. The NPV at 15% is also positive only when tea is cultivated as a monocrop.

## ***Intercropping Tea with Spice Crops***

Where tea is uneconomic without any possibility of improvement through replanting, then consideration should be given to inter-planting with compatible crops, suited for the particular agro-climate of the region. This would be the most economically attractive proposition to upgrade productivity in an area where little could be done to improve or replant the tea. The mid-country tea-growing district have considerable extents of such land which could be planted with pepper, cloves and to a limited extent coffee. Cardamom is also suited, but requires heavy shade, and is hence usually grown in association with forest.

**Cloves:** This is the most demanding of all the above crops in its ecological requirements. Cloves need a warm humid climate with well-distributed rainfall, but with a clearly defined dry season for flowering and fruiting. Shade is essential during the early years and strong winds are harmful. Deep, free-draining soils of medium texture with relatively high organic matter content in the surface soil are the most suitable. Cloves should, thus, be planted in sheltered sites of deep soil having moderate slopes in the warmer areas between 600 and 800 m elevation. Both cloves and temporary shade trees could be planted at the same time around June/July. Plant density for cloves is 280, being planted at a spacing of 6 m x 6 m. Gliricidia or dadap cuttings are planted at a spacing of 6 m x 3 m along with the cloves. Large planting holes of 60 x 60 x 60 cm are necessary, and these are filled with 2 baskets of cattle manure, 500 g of dolomite and 200 g of Epawella rock phosphate. Two-year-old seedlings are put out and fertilised when necessary as recommended by the Export Crops Department. The clove plants need no pruning, but the shade trees are lopped as is normally done for tea.

**Pepper:** This crop is less demanding than cloves and can be grown over a wide range of conditions. Pepper requires a humid climate with well distributed rainfall without an extended dry period. Shade and shelter are essential, as is free draining soils with high organic matter content. In the mid-country, pepper could be grown between 600-1,000 m elevation on moderate slopes of 20-50%. The vines could be grown on low shade trees of gliricidia or dadaps, in existing tea areas, or in a new stand in new clearings, planted at the conventional spacing of 6 m x 6 m when 280 vines would be required per ha.

**Coffee:** This crop could be grown between the elevation range of 800 to 1200 m, but the variety *Robusta* could be grown even at lower elevations. Coffee requires deep, rich well-drained soils on gentle slopes. A minimum of 2,000-mm rainfall is required for successful growth. However, dry weather is essential between December and January to enable ripening of the pod bearing wood. Shade being essential, trees for this purpose (dadaps) are generally established about one year before the coffee plants are due to be put out. Some level of training is required, for bush formation. For this purpose, when the plant is about 80 cm high, the main stem is topped by removing the growing bud. This encourages the development of adequate primary and secondary branches.

**Cardamom:** This is grown under natural jungle shade in the higher wetter and steeper areas of tea estates in the mid-country, and not as an intercrop in tea. It requires a fairly cool climate with well distributed rainfall, and requires shade and shelter, as direct sunlight and wind adversely affect productivity. Cardamoms require a free-draining soil of medium texture with a high organic matter content in the topsoil. It can be grown in areas above 1,000 m on steep slopes where nothing else except forestry could be established.

## Anne 6

### Oil Palm as an Alternative to Rubber

(From IFAD report , 2002)

In Sri Lanka, oil palm was planted in the early 1970s, at Udugama Group (now a part of Nakiadeniya Estate managed by Watawala Plantations Ltd.) in Nakiadeniya, with a view to reducing the country's dependence on imported oil. The area under oil palm has now grown to 2,050 ha with Nakiadeniya being the largest producer with 1,095 ha (3 000 ha in 2005). The Udugama area has several out growers (mainly other plantations) who supply their fresh fruits for processing to the centralized mill in Nakiadeniya. The current annual production is around 4,000 tons of crude palm oil, and around 1,000 tons are from the out growers.

The other companies (Elpitiya, Namunukula and Agalawatte Plantations), have embarked on a oil palm planting program in the Nagoda and Matugama districts as an alternative crop for rubber which now has little or no future. They are expected to plant up to 3,000 ha this year with an investment of around Rs 550 million. A mill is to be constructed at Agalawatta at a cost of around Rs 200 million, which would process the fruits from these estates. Watawala Plantations have drawn up a forward replanting program to increase the area by 150 ha per year for the next 5 years, and to reach 2,800 ha producing 75,000 tons of oil by 2005.

Galle and Kalutara districts are considered as suitable for oil palm. The palm begins to bear fruit in 32 months and continues to be economical and productive for about 20 to 30 years. Oil palm has not spread among smallholders, except in Udugama. The reason for this is that the fresh fruit bunches have to be taken to the mill within 24 hours of harvest, and should be processed within three days.

The net income that could be derived from cultivating oil palm is said to be far higher than rubber. Even when based on rubber yields at 50% more than the current national rubber yield and modest anticipated oil palm yields, the difference is significant as shown below (calculated on 2002 rubber prices, stil low : the result would be significantly different with 2005 rubber prices)..

**Table 22: Comparison of Net Income from Oil Palm and Rubber**

	Immature Phase	Mature Phase (Years)			
		Year 4	Year 8	Year 16	Year 20
<b>Oil Palm</b>					
Input Cost -Years 1-2 (Rs)	200,000				
Yield MT/ha (Fresh fruit)		16,000	26,000	20,000	20,000
<b>Net income (Rs/ha)</b>		<b>46,000</b>	<b>132,000</b>	<b>137,000</b>	<b>185,000</b>
<b>Rubber</b>					
Input Cost -Years 1-6 (Rs)	200,000				1,000
Yield MT/ha		0	600	1,200	1,000
<b>Net Income (Rs/ha)</b>		<b>0</b>	<b>15,000</b>	<b>30,000</b>	<b>25,000</b>

Last year, on Nakiadeniya Estate, Watawala Plantations recorded a loss of Rs four million on rubber while oil palm brought in a profit of Rs ten million. On Talgaswela Estate, Elpitiya Plantations recorded a loss of Rs 2.8 million but made profit of just under Rs one million from their 10-year old oil palms. The RPCs claim that diversification into oil palm is being carried out only after comprehensive feasibility studies by teams of professionals, who have carefully considered all factors including the viability of the company and income of the workers. The cultivation of oil palm will be confined to the southern region of the country where, due to heavy rainfall, rubber tapping is restricted during many months of the year, thus adversely affecting the income of workers. This does not happen in the case of oil palm workers. There is also a shortage of tappers in the southern region, which has resulted in loss of revenue to the RPCs and the country.

The Minister of Plantation Industries had recently promised the government's unqualified support for the cultivation of oil palm in neglected, unproductive lands in rubber estates. However, he did not advocate the replacement of well yielding rubber trees with oil palm. Based on the plans of plantation companies to replace rubber with oil palm, it is estimated by some rubber growing RPCs that such a venture could remove nearly 30,000 tons of domestic rubber production, which could take the bottom out of the local rubber industry.

The local consumption of crude palm oil is approximately 80,000 metric tons, and almost 90% is now imported, at US \$ 350 per metric ton. Local production of crude palm oil would save considerable foreign exchange through import substitution.

**Environmental Concerns:** In regard to ecological problems, there is no indication whatsoever that there has been any adverse impact consequent to large scale planting of oil palm in Malaysia and Indonesia. To allay the fears of the local public on the expansion of oil palm cultivation, the Ministry of Plantation Industries commissioned the Coconut Research Institute (CRI) to do a study and their report was published in August 2000. They concluded that oil palm had no adverse effect on the environment, and in particular on the water table. The perception of the people living around Nakiadeniya group was that expansion of this crop could lead to a depletion of water in the area. The report submitted by the CRI categorically stated that the cultivation of oil palm in the Nakiadeniya area had not adversely affected the ground water level or the water flow in the streams.

## Anexe 7

### Assistance to the plantations Sector

#### From IFAD, 2002

The estate sector has benefited over the years, both directly and indirectly, from government and donor assistance. Tea, rubber and coconut plantations have all benefited from research and advisory services provided by the respective research institutes. These services, as well as the various subsidy schemes have been maintained through a cess on exports of the respective commodities. The cess was, however, discontinued for rubber in 1998 and reintroduced in 2003, (50 000 Rp/ha) and then extended to 100 000 Rp/ha in 2004. A concerted programme of "rehabilitation" of tea and rubber lands, involving replanting subsidy schemes, along with soil conservation and factory renovation, was supported by the government since the late 1950s. The Medium Term Investment Programme (MTIP) was financed jointly by the World Bank and ADB in 1980 to rehabilitate and improve the declining productivity of the public estates through new investments. The Fourth Tree Crops Project for State Plantations was financed by the World Bank under this programme and completed in 1992. In 1989, ADB funded the Tea Smallholder Development Project, a similar project for the private smallholder sector. Assistance to the rubber plantations was forthcoming from the World Bank under the Smallholder Rubber Rehabilitation Projects (SRRP I and SRRP II). The coconut industry was supported during the 1980s by an IFAD/ADB funded Coconut Development Project aimed at developing the research, extension and planting material production infrastructure and providing some assistance in supporting planting/ replanting. Subsequently, the government has been providing assistance to smallholder producers through various subsidy schemes and to desiccated coconut mill owners through grants under its Factory Modernisation Scheme.

More recent, on-going and planned external assistance to the sector include:

- The **Plantation Reform Project** supports the privatisation programme and aims to improve the productivity and profitability of eligible privatised RPCs, and to increase the export earning potential of the tree crop subsector and its competitiveness in the world markets. The project, which became effective in May 1996 and is due to close at the end of 2002, was financed by ADB (US \$ 60 million) and the Overseas Economic Co-operation Fund of Japan (US \$ 40 million). Of the total commitment of \$ 100 million, \$ 20 will be on a grant basis. The Project's objectives are to (i) enhance the profitability and financial position of the sector, and (ii) improve the living and working conditions of the estate workers. The Project area covers 15 districts where the RPC estates are located. The Project components comprise (i) an investment component to provide finance (in the form of credit or equity and quasi-equity instruments) for core business activities in tea, rubber and coconuts, crop and non-crop diversification, factory consolidation and automation, effluent treatment plants and marketing; (ii) a social and environmental component to cover self-help housing and amenities, social awareness programs, strengthening of estate workers' cooperatives and societies, and worker welfare facilities; (iii) marketing initiatives through product research and development, fair trade labelling and support for compliance with requirements of ethical trade, and (iv) institutional strengthening through support for an industry umbrella body, consulting services, training and development of outgrower models.

- The ADB is now in the process of processing another follow-up project to the Plantation Reform Project. To be called the **Plantation Project**, its goal is to ensure the long-term sustainability of the plantation sector without external assistance. The objectives are essentially the same as those of the Plantation Reform Project. The Project area covers 15 districts where the RPC estates are located. The Project components comprise (i) investment component to provide finance (in the form of credit or equity and quasi-equity instruments) core business activities in tea, rubber and coconuts, crop and non-crop diversification, factory consolidation and automation, effluent treatment plants and marketing; (ii) social and environmental component to cover self-help housing and amenities, social awareness programs, strengthening of estate workers' cooperatives and societies, and worker welfare facilities; (iii) marketing initiatives through product research and development, fair trade labeling and support for compliance with requirements of ethical trade, and (iv) institutional strengthening through support for an industry umbrella body, consulting services, training and development of outgrower models. The project financing would amount to US \$ 60 million and loan approval is expected by the end of 2002. The project would be implemented over a period of five years.
- The **Plantation Development Support Programme (PDSP; 1998-2005)**. The project cost of US\$ 37 million includes a donor contribution of USD 18.6 million, which is funded largely by the Netherlands Development Assistance (NEDA). The programme also gets inputs from the Governments of Norway, the plantation communities, the private banks, the plantation companies and the programme's beneficiaries. It is implemented, **largely in the privatised plantation sector**, by a Programme Support Group (PSG) through the Plantation Housing and Social Welfare Trust (PHSWT) which is an independent tripartite organisation of companies, unions and government established in 1992. PSG is a multi-disciplinary team with senior Sri Lankan experts and an expatriate team leader. The PDSP aims to improve the social well being of the plantation community, to raise productivity and retain labor supply for improving economic performance and gainful employment for the plantation worker, and to contribute to the stability of the plantation sector. The PDSP investments are mainly in housing (new construction and upgrading totally 42,000 units) and are channelled through private banks and governmental agencies. The PSG supports the PHSWT with the targeting of investments, the involvement of the private banks, claim verification, guiding maintenance practices for facilities and buildings, as well as running training programmes. PSG also helps in pursuing settlement development and social mobilisation strategies, and in introducing new developments in healthcare on the plantations. PSG supports the PHSWT with its own institutional development for the implementation of the PDSP. PSG also provides policy advises to the plantation sector in general on request. The participation of the estate workers in the planning, construction and operation of the investments (self-help approach) is a key feature of the PDSP and requires social mobilisation, institutional development and related training activities with attention to gender equity.
- **Shakthi**, a project funded by CARE International (Rs. 69 million; 2002-2004) is aimed at fostering a closer dialog between workers and management, improving access to and use of information and improving community cohesion and access to and use of services. This project also has a programme to combat the problem of alcoholism among estate workers.
- Another CARE funded project, **SECURE** (Rs. 60.35 million; 2002-2004), is supporting the development of client-owed community banks to provide financial services to members of Estate Worker Housing Cooperatives. The MOU on this project is about to be signed.
- The **Plantation Communities Project** is funded by CIDA (Can\$ 3.5 million; 2000-2005) and implemented by World University Service and local community-based organizations,

plantation management, government institutions and NGOs. The project is designed to promote the social and economic empowerment of people living and working in and around the tea plantations of Sri Lanka. The three central elements of the project are: improving the working and living conditions for plantation workers through small-scale initiatives which promote worker-management dialogue; community mobilization to advance self-identified priorities; and promoting economic alternatives through job-oriented vocational skills training and income generating activities.

- The NGO, **Alcohol and Drug Information Centre (ADIC)** runs a project by that name, which has been supported by UNICEF and seeks to reduce consumption of alcohol and improve the health of workers to "enable them to return to work and be better parents to their children". No details are available.

## Presentation of the the Moneragala Rubber Project

This annex has been made with various extracts from documents provided by TCI. We express many thanks for their active collaboration.

The Competitiveness Initiative (TCI), a United States Agency for International Development (USAID) funded project to assist the private and public sectors in Sri Lanka, works with selected industries to devise and implement strategies to accelerate growth, increase productivity, and improve their competitiveness in the international markets.

The Sri Lanka Rubber Cluster (SLRC), representing almost the entire rubber industry in Sri Lanka was formed in December 1999 with the assistance of TCI. In July 2004, the SLRC graduated to become the apex organization for Sri Lanka's rubber industry, namely, The Sri Lanka Society of Rubber Industry (SRI), which is a non-profit entity registered under the companies' ordinance. The objective of SRI is to promote rubber industry interests in Sri Lanka while providing a sustainable platform for industry-wide collaborative action to achieve global competitiveness.

The rubber cluster strategy targets capturing a minimum of 1% of the global market for rubber and rubber products, which is approximately US \$ 100 million, in another 8 to 10 years. Moneragala rubber program, the cluster's supply chain stabilization strategy, is one of the major initiatives that would help the cluster reach this target.

The RRI has conducted a series of experiments to grow rubber in non-traditional areas and the results are very promising. One area identified by the USAID consultants is the semi-dry Moneragala district where large tracts of land available under suitable conditions for rubber growing in addition to the availability of a pool of unemployed persons live in abject poverty that are willing to own and work in out-grower rubber plantations.

The USAID/TCI strategy consultants recommend reviving the declining rubber plantation sector by extending rubber plantations into more the productive Moneragala region, which falls beyond the traditional rubber areas, and specifies a minimum planting target of 40,000 ha over a period of 8 years. They suggest going up to 90,000 ha if possible. The recommendations are based on detailed field studies and expert opinions of relevant specialists including RRISL agronomists who have conducted extensive trials in this region. The financial viability of the proposal has been duly confirmed by a study conducted recently by a team of TCI consultants<sup>13</sup>. If effectively implemented the

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<sup>13</sup> Mirchandani, Dissanayake, Rathnasiri and Peramune, February 2003. USAID/TCI funded preliminary Financial Feasibility Study: Moneragala Rubber Program

proposed program would provide an extra 78,000 metric tons of rubber per year, provided the new RRISL plantation management model<sup>14</sup> is adopted by the growers. This volume is sufficient to maintain the critical mass required by the rubber products manufacturing industry.

A Consortium of seven large companies who are members of the rubber cluster has expressed interest in participating in the program, by signing an MOU, if the right factors are available for long-term investments. In fact, the rubber cluster members have given first priority to implementation of this program, realizing the significance of supply side consolidation to their sustainable competitiveness. Their intention is to establish state-of-the-art model plantations or nucleus estates of limited extent around which clusters of out growers would be developed.

The global potential objective of the program is to expand rubber cultivation in the Moneragala region by cultivating at least 40,000 ha within a period of 10-12 years and extend if possible to 90,000 ha in 16-18 years.

The Business Plan identifies the core business of MRC as the development of 27,600 ha of new rubber plantation in Uva Province and the management of the overall project. The goals of MRC are 1) to develop 27,600 ha of new rubber cultivation in the Uva Province. 2) To develop a nursery to supply adequate amount of planting material over the entire life span of the project. 3) To design and implement an ideal contract farming system for the project. 4) To obtain necessary financial resources for the project from both local and foreign sources. 5) To design and implement a comprehensive cultivation and marketing program for the parallel crops to enable contract farmers generate sufficient income for sustenance during the immature period.

Since conventional mainstream planting models, smallholder model & private sector estate model, have inherent weaknesses a new planting model based on contract farming principles is proposed in this Business Plan. This model is envisaged to be a perfect hybrid of private sector management and farmer ownership & control characterized by farmers' decision-making power. The contract farmers will grow the majority of the rubber while the MRC will provide a secure market, access to technology and finance, access to extension services and private sector impetus to the Project. This private sector thrust will be provided by assisting the contract farmers to form their own Moneragala Contract Farming Company (MCFC). MRC will take the initiative in forming the MCFC, which will be a public limited liability company and run as a profit making enterprise. Contract farmers will become shareholders of the Company to the extent of their holdings. The MCFC will be managed professionally. Farmers will sign contracts with MCFC to obtain financial and technical assistance. MCFC will administer all the necessary agronomic practices and other related project specific requirements in joint consultation with MRC.

MRC will manage nucleus estates and the related contract farming system will be managed by MCFC. In setting up a model project MRC will finance all expenditure involved in setting up the first 600 ha of contract farms. Thereafter MRC will provide only planting material, fertilizer and extension services to all contract farmers. This will

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<sup>14</sup> Dr. Asoka Nugawela, Deputy Director, Rubber Research Institute of Sri Lanka: January 2003, "Technical Aspects of Rubber Growing in Moneragala"

ensure MRC has an involvement in eliciting the best productivity from the land by the use of correct agronomic practices. These inputs will form a loan by MRC to MCFC. Alternatively MCFC will obtain its own finances through a development-funding agency at low interest rates. The land given by the government to farmers will be held as collateral for the investment to be committed by MCFC.

Developing the right human resource skills will be important in achieving the productivity targets. The project will need to encompass a tapper training school and also provide for the development of bud grafting skills for the nurseries.

The Business Plan recommends the setting up of a model project of approximately 500 ha of nucleus estates and 600 ha of contract farms. The model project will serve to position the project benefits to attract concessionary development financing, explore the nature of extension services required and will serve as a learning experience for managing the relationship between MRC and MCFC. The contract farmers on the model project will be the first members of MCFC.

The rainfall pattern and the soil condition in Uva Province create an ideal agro climatic situation for rubber cultivation. The increase in the tapping days in Moneragala is bound to improve productivity. According to the past average rainfall figures, it is evident that Uva Province is ideal for rubber growing and harvesting. Over 300 tapping days are possible given the rainfall distribution. The rainfall of the district varies from a little under 1250 mm in the south to over 2000 mm towards the center and the north. Refer Appendix 2. As evident from this rainfall statistics, the D.S. divisions of Badalkumbura, Monaragala, Medagama, Bibile and Madulla have a rainfall of over 1750 mm and therefore should be suitable for the cultivation of rubber. In addition, the Northern part of Siyambalanduwa, Buttala and Wellawaya too gets rainfalls of over 1500 mm thus making them suitable for rubber cultivation.

Availability of labor is critical as harvesting of the crop and the productivity are functions of labor. According to the demographic survey of 1994 a total of 14,903 persons were unemployed Uva Province is the least developed region as far as socio economic parameters are concerned. Approximately 60% of families are Samurdhi recipients. The unemployment level is about 12% and more importantly employed labor is largely under employed making the effective unemployment level higher than 12%.

In the context of growing opportunity cost of land, one of the critical factors for rubber cultivation is the availability of land at a relatively lower cost. Moneragala district being the second largest district of the Island and the district with the lowest population density has the required land for the project. In addition, a large extent of unutilized and underutilized land is also available. The Moneragala district, is 5,638 Km<sup>2</sup> in extent and is divided in to 11 Divisional Secretaries (D.S) Divisions. The region extends from the southern plains to highland terrain not exceeding 500m above sea level except for 12 peaks the highest of which rises up to 1111m. Based on the ecological parameters such as rainfall, vegetation elevation and land use, Moneragala can be divided into agro-climatic zones viz. Dry zone lowlands, Intermediate zone and wet zone midlands.

### ***The Contract Farming Arrangement***

The proposed contract farming methodology for this project deviates considerably from mainstream contract farming arrangements currently practiced in the world. Generally, contract farming can be defined as an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices. The arrangement also invariably involves the purchaser in providing a degree of production support through, for example, the supply of inputs and the provision of technical advice. The basis of such arrangements is a commitment on the part of the farmer to provide a specific commodity in quantities and at quality standards determined by the purchaser and a commitment on the part of the company to support the farmer's production and to purchase the commodity.<sup>15</sup>

The contract-farming model for the Moneragala Project is an agreement between Moneragala Rubber Company( MRC) and the Moneragala Contract Farming Company (MCFC). Contract Farmers will automatically become shareholders of the Company to the extent of their holdings. MRC will take the initiative in forming MCFC that will be registered, as a public limited liability company under the companies Act no 17 of 1982. MCFC will administer all the necessary agronomic practices and other related project specific requirements in joint consultation with MRC. MRC will manage nucleus estates and the related contract farming system will be managed by MCFC.

The government may lease land to MCFC, which in turn leases the land to contract farmers. Alternatively the government may lease land to the farmers directly which will be vested with the MCFC as collateral against a planting period loan. The operational scope of the agreement between the two companies is defined by a contractual agreement. The relationship between farmers and MCFC will be governed by a code of conduct. MCFC will purchase latex from the farmers at market price less an amount for the recovery of loan for immature upkeep.<sup>16</sup> MRC will have a buying agreement with MCFC for the purchase of latex.

This model is envisaged to be a perfect hybrid of private sector management and farmer ownership & control characterized by farmers' decision-making power. Farmers are cohesively tied to a common agreement so that planned agronomic practices are properly adhered to.

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<sup>15</sup> Contract Farming - Partnership for Growth, Eaton and Shepherd - FAO Agricultural Services Bulletin

<sup>16</sup> Immature upkeep costs include – planting material, fertilizer and extension services

**Annex 9**  
**Brief concept note**  
**The rubber production sector**

### **1 Introduction**

Rubber is both *a crop opportunity for smallholders and a labor opportunity for landless workers* who are employed by estates, either RPC's or private. Labor is a significant social and economic issue in the rubber sector as well as a certain political sensibility. Rubber is still an *important source of income for smallholder but most farmers have diversified to reduce risks* and to avoid to depend only on one source of income. The rubber sector in Sri Lanka is critical to sustaining growth and poverty reduction, but *the rubber production sector has structural problems, social, economical; technical (agronomical) and climatical*.

Today, the rubber industry consists of two closely interdependent sub-sectors: the plantation sector: including private estates, governmental estates and smallholders (3 types of actors), and the rubber products manufacturing industry (including exporters). Another sector can be added with the rubber wood industry.

### **2 The structural problems of the rubber production sector**

The rubber sector is in constant decline since 1985, having root as soon as 1975. The rubber sector has been living on its past and did not maintain the production capability. But good prices since 2003, the necessity of the manufacturing sector to secure access to dry rubber and restored hope in prices stability have revived interest in rubber.

*Low yields, poor management and status instability had discouraged investment in the plantation area since the 1970's* and low prices in the world market have deepened this trend since 1997. Rubber area is decreasing regularly since the 1970's *due to ageing plantations, no sufficient replanting, poor management in some estates, losses due to rainfall leading to poor productivity, high cost of production with few possibilities of improvement, labor shortage, land-use change to the profit of urban and industrialized areas and generally poor agronomic practices that lead to poor yield and consequent poor global productivity*. So what happened ?

The price factor is important in the recent past but far not sufficient to explain the decline in the long run.

*Yields in general are relatively low* compared to other countries (however almost all plantations are planted with clones) and *empeded productivity*

### **3 Historical factors**

*Smallholder have generally a better resilience*, in particular in the context of Sri Lanka when estates have greater cost of production on which they have no sufficient margin to cope properly with the crisis. Smallholders have developed an infinite variety of strategies according to contexts, access to resources and skills that need to be better known in a world becoming economically more uncertain for them.

*Political factors have been very important*, explaining the trend of rubber declining initiated as soon as 1975 with demotivation, incompetence, no incentive in foreseeing the future and virtually no interest in developing the sector due to *status instability* and political risks, at least for estates.

**A major structural change in the plantation industry occurs in 1995** when the government sold RPCs' shares to the private sector.

To reverse this declining trend in the rubber production area, the Government provided generous incentives in the 1980s and 1990s, but it does not stop the decline, even with smallholders (- 20 % between 1980 and 2003). *The recent increase of the subsidy for planting rubber will be probably very cost effective as it covers 80 % of smallholders' investment costs.*

#### **4 The impact of institutions**

Research has produced very interesting results in terms of agronomics, clonal planting material and agroforestry systems. RRIC remain the main (if only) technical advisor for many operators. *Research is a key operator which innovation capacity that should be maintained with appropriate funding*

*Extension is largely considered as rather inefficient*, being de-motivated, without means of action. The problem does not seem to be resolved only in increasing budgets however this is a prerequisite. *The link with research should be even more improved to ensure the quality of service.*

*The private sector is very active* and innovative and can shift policies and strategies according to prices and economical (as well as political) context This sector is very efficient and prone to improve rapidly the quality of their plantations though replanting. They may *play the role of "triggering factor" as well as technical model for others to copy them, including possibly smallholders.* To that respect, they may be considered as future core for Indonesian like NES schemes. *They should as well contribute, in various ways of partnership, to explore possible cooperation with other segments of the commodity system, in particular smallholders if they are looking for quality raw rubber material.*

*The RPC sector (governmental) is probably now paying the price of decennies of poor management.* The sector may be also demotivated by years of uncertainty since the 1970-80's with the privatization process. The current *trend of better prices seems to have revived the sector but structural problems remain.*

The smallholder sector has probably diversified its activities and cropping systems but we don't know to which extend. *Diversification is the key strategy* in order to reduce risks and not to depend only from one commodity. *A serious farming systems characterization has to be implemented in various areas in order to be able to have an operational typology of situations and a relevant knowledge on constraints and opportunities.*

We need to know in details the factors that limit or may promote rubber, at the farming system level, and not only with a sectorial perspective limited to rubber. We need to contextualize farmers' decision process, and in particular the factors that lead to adopt, replant or develop rubber among the other activities. In other words, *a livelihood perspective is highly recommended to be in a position of promoting the right technology at the right place with the right farmers.* It is necessary to see all farm activities and the rubber contribution to income generation. *Agroforestry systems seems to have a good prospects in particular rubber and tea.*

In all cases, low yields of rubber do limit seriously potential productivity and therefore potential income of both farmers and estates. Low yield results from complex and sometimes inter-related factors. The factors that explains low rubber yields are the following:

- low number of tapping days due to rainfall and rain losses,. *Tapping frequency can be reduced with the use of stimulation, providing a reservoir of productivity and a challenge for the labor shortage.* However, this technique has to be properly introduced with sufficient technical information.
- The number of tapable trees is too low, around 300 trees/ha. *No possibility to improve the current plantations.*
- The quality of planting and quality of planting material
- The clonal diversification in plantations is not sufficient.
- Being largely at the third or fourth generation of rubber, soils may be depleted and degraded. *An adapted large fertilization at plantation and during immature period may be adopted in order to maintain soil fertility and guarantee a good rubber growth that condition future production.*

## **5 Rubber in marginal or non traditional land**

The rubber is grown mainly in the wet zone of the country that has two monsoons per year. However, some rubber production can also be found in the mid-country intermediate zone and the mid-country dry zone. *New zones can be developed but caution should be put due to agro-ecological requirement of rubber.* Potential problems may occurs in marginal zone. The first 3 years are always critical. Temporarily drought may severely affect plantation growth and survivability.

## **6 A need to re-launch planting material availability**

*There is a shortage of clonal planting material of high quality.* Budwood gardens have not been maintained and nursery capacity has significantly reduced in these years of low prices. Therefore, we are today facing the impossibility for the nursery sector to provides immediately the high demand triggered by good prices back since 2003. It takes 2 years to replant budwood gardens and initiate nurseries to produce sufficient planting material . Added to the 6 years of immature period of rubber, the first kg or rubber from replanting might be expected in only 8 years. In other words, *all efforts done to day will be effective in the next decade in term of production.*

### ***7 The rubber challenge for rubber smallholder***

The global challenge is for Sri Lanka to address the issue of not having firm, policies in stability, inadequate credit facilities as well as information dissemination for smallholders, not providing sufficient means to Research and Extension institution (a well as training and building capacity) and also change the present mentality of the labor force in respect of rubber tapping for the estates sector).

The private sector may play a leading role in modernizing production as well as boosting replanting to meet industry requirements.

Smallholder sector ***challenge is to boost replanting, productivity and increase rubber income among other sources of income for all farmers***, in particular for poor farmers with a limited rubber area (below 1 hectare).

### ***The smallholder sector and its challenge***

About 42 percent of the rubber production area is provided by smallholders (see Table 2). Smallholder rubber area has decreased by 18 percent from 59,437 ha in 1982 to 48,655 ha in 2002. However farmers follow the general trend in rubber decline, it is important to know why ***the smallholder sector, traditionally more resilient than the estate sector*** has also suffered from such a decline. This seems to be ***a long term trend independent from the 1997-2003 rubber price crisis***, however that period has probably worsened the situation.

Smallholder have probably developed ***strategies based on diversification*** in order to reduce risks of depending on one commodity only. Therefore, they are very susceptible to return to labor. They may even work part-time on off-farm activity if an agricultural activity provide a return to labor inferior to that of the opportunity cost (that can be considered for instance as that of a tapper at 250 rp/day).

***Diversification is the key strategy in order to reduce risks*** and not to depend only from one commodity. ***Diversification occurs mainly with tea***, and also cinnamon and other crops. It seems clear that ***we lack sufficient knowledges about their farming strategies according to recent changes***, their ability to adapt to changes and cope with crisis. In other words ***a serious farming systems characterization has to be implemented in various areas in order to be able to have an operational typology of situations and a relevant knowledge on constraints and opportunities***. Income structure and return to labor for each activity will help us to understand farmers' decisions and choices. ***It will also enable us to assess the potential interest for farmers to adopt new technologies***, to replant rubber or to do something else. Such research activity should be put on RRISL agenda.

So far, RRISL is not putting sufficient means, funds, personnel and focus on socio-economy and farming system research. ***Socio-economical factors at livelihood systems are key factors to assess impact of ant action promoting rubber and should be a prerequisite. Therefore, more funds should be provides to RRISL to cope with that challenge.***

*Agroforestry systems with cinnamon and tea intercropped with rubber for instance are already adopted and promoted providing an excellent opportunity for small scale farmers to rely on two sources of income, profiting from the evident complementarity between the two crops. Currently, farmers seem to put emphasis on tea which has a faster return to investment and a limited immature period (1,5 years). The current better rubber prices and the amount of the subsidy covering at least 80 % of the total inputs cost for the immature period are very strong incentive for farmers at the condition that they have access to proper information.*

*Clonal planting material should be provided by RRISL and disseminated through RRD which is already managing the subsidies for rubber. The subsidy management should be also more flexible in order not to discourage farmers to go on replanting with a limited number of steps.*

*However, the marketing system of rubber through the traders/collectors networks, does not provide any price incentive to quality and most farmers would go on for quality if correctly paid.*

#### **8 RRISL : a major actor in technology.**

RRISL is a key actor in providing technologies, information and technical advises. It has produced very interesting results in terms of agronomics, clonal planting material and agroforestry systems. RRIC remain the main (if only) technical advisor for many operators. Good quality papers, reports, bulletins, leaflets, advisory circular, handbooks and field-guides have been produced, widely disseminated, however history and other experience in other countries tell us that *dissemination of these products is never sufficient*. Another effort has to be done to promote these technical information means in order to disseminate on a larger basis all these publications.

*However, its socio-economic research component is too weak related to the real challenge with smallholders and should be strengthen.*

A complete *plan for an operational and effective research on farming systems and livelihood systems* is necessary with 2 major focus:

- i) the implementation of a complete farming systems characterization survey, with an operational typology, with, potentially farming systems modeling of the main types of farms in order to economically test the impact of technology adoption as well as test farming systems resilience to economic commodity prices volatility or climatic events. Income distribution and generation should be known, at farming system level , to understand the role and place of rubber among other farming and non farming activities.
- ii) the implementation of a farming system monitoring network in order to test impact of changes and technology adoption in time.

Social factor are very important as well and there is so far no sociologist at RRISL to cope with such component.

For smallholder: technically speaking, the AFDI 2002 statement is still valid: i) *enlarge the clonal planting material offer* and ii) *suggest a higher planting density* above that of 500 trees/ha such as adopted in Indonesia by SRDP with 6 m x3 m which makes 550

trees /ha. Losses in tree stand during immature period has therefore less impact on production. However, ***maintaining a correct tree stand*** of 500 trees/ha is still a major target for new planting or replanting. We can add that ***low frequency tapping using stimulation is definitely an issue to double return to labor at the condition that farmers should well aware of the pros and cons of this technique. More demo plots on various technical issues are needed as the visual value for farmers is very effective.***

**RRISL is a key actor and its role, actions and funds should be strengthened in a significant way.**

## **9 Conclusion**

***Rubber has still a future*** for both estates and smallholder.

***The trend of rubber decline has changed at least in actors' mind.***

But serious investment has to be implemented in technology (quality), quality plantings and agronomic practices, dissemination, staff and farmers' training, rubber quality for some niche markets and availability of quality planting material.

***Productivity can hardly been significantly improved for existing plantations with the notable exception of labor productivity improved by low frequency tapping method using stimulation.*** Rubber stands are too low (below 300 trees/ha most of time) and clones may not be optimal. ***But new plantations have a potential of 1500/1800 kg/ha if proper agronomic practices*** during immature period are adopted, with a wide variety of high yielding adapted clones as well as low frequency tapping. This potential can be achieved for both estates and smallholder. Smallholder schemes in Malaysia or Indonesia have proven that smallholder can do as well as estates (even better sometimes) if access to information and inputs of good quality are secured.

***Agroforestry systems with cinnamon and tea intercropped with rubber are already adopted and promoted providing an excellent opportunity for small scale farmers to rely on two sources of income,*** profiting from the evident complementarity between the two crops.

As farmers have now most of time diversified cropping systems (and sometimes develop part time off farm activities), ***farming system characterization should provide relevant information to understand farmers' decision process and strategies*** and part of rubber in it. A livelihood (non sectorial) perspective is highly recommended.

***Development of rubber in non traditional areas,*** such as the Monoragala district, is already under way and ***display great scope in coping with land scarcity in traditional areas. However, rubber in marginal land should be carefully considered to reduce cropping risks related to rainfall.*** That requires a very high quality of extension to smallholders who may not have skills and experience in rubber. Knowledge acquiring process through "learning by doing" with proper technical information has to be secured. 29 00 ha of abandoned tea on degraded land are already available for that purpose.

***Part of this change may (should) be market driven as well as driven by private sectors' actors , both in production as well as manufacturing.***

The rubber renaissance will occur if all actors accept to work in common. In other words, *the production sector needs to address manufacturers and exporters demands when the later should a well invest in rubber production to ensure rubber availability for their industry.*

If quality extension id definitely required with appropriate means of actions, research should not be forgotten. *Sustaining the research institution and its innovation capability ensure current rubber recover as well as rubber future.*

The rubber report (production sector), July 2005. Food and Agriculture Organization of the United Nations, in collaboration with the World Bank, Sri Lanka tea and rubber study. Sri Lanka improving rubber productivity and competitiveness

### **Summary**

The aim of the study is to provide a comprehensive analysis of the rubber sector today in Sri Lanka, and to describe the main trends that can be observed as well as the constraints. Key development challenges and reform options for the rubber sector in Sri Lanka are discussed.

The main objectives of this consultancy are to review the production performance of the rubber estate and smallholder sectors, to identify the problems preventing an increase in their productivity, increasing the returns to rubber production; and finally to propose options for policy and institutional reforms.

### **Key words**

Rubber, Sri Lanka, commodity system.