

Importance of rubberwood in wood export of Malaysia and Thailand

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Abstracts We examined the contribution of rubberwood to the timber export markets of Malaysia and Thailand. In Malaysia, rubberwood has grown from 26% of total exported wood products in 1998 to 35% in 2007. A high proportion of furniture products (80%) is rubberwood, whereas the contribution of rubberwood to other wooden products is less than 20%. Only 10% of sawn timber and logs is rubberwood. In Thailand, rubberwood contributes to around 60% of total exported wood products, arising from a high share of not only furniture products (70%) but also other wood products (around 50%) and sawn timber and logs, which have increased in share from 40% in 1998 to 79% in 2007. We conclude that the high proportion of rubberwood products in the wood export markets of these two countries is a result of: (1) scarcity of raw wood materials because of strict controls on the logging of natural forests; and (2) governmental support to rubberwood production, including financial support to rubber planters and technical assistance to downstream timber processors.

Keywords Forest plantation · Rubberwood · Governmental support · Rubber plantation management

Introduction

Deforestation and degradation of natural tropical forests are global issues (Tole 1998; Giambelluca et al. 2003), and it is imperative that wood production be largely based on sustainably managed plantation forests (FAO 2000, 2004; Bevege 2005). Plantation forests have doubled globally over the last decade (FAO 1999, 2006) and display high growth rates (Campinhos 1999; ITTO 2009). The area of forest plantation in Asia and the Pacific, Africa and Latin America and the Caribbean in 2005 has increased into 54.07, 4.62, 8.80 and 67.50 million ha, from 24.00, 2.16, 6.05 and 32.20 million ha in 1995 (ITTO 2009). Studies have shown that plantation forests will supply about 50% of the world's wood

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demand by 2030 (WWF-GFTN 2001) and about 75% of global timber consumption by 2050 (FAO 2001a). Although the proportion of the total forest area made up of plantations is still minor in most tropical countries, in some countries plantations have been contributing strongly to domestic wood production (ITTO 2009).

Rubber tree (*Hevea brasiliensis*) plantations form the second largest category of global tropical forest plantations by area, but they are not normally regarded as a sustainable wood resource. Rubber plantations account for 18% of global forest plantations, after *Eucalyptus spp.* (24% of the total area) and *Pinus spp.* (18% of the total area) (ITTO 2009). Rubber plantations produce two raw materials: rubber latex and wood. While rubber latex has been extensively utilized in industrial manufacturing, wood from rubber plantations (rubberwood) has traditionally been regarded as waste (Hong 1995a; Arshad 1996) due to difficulties preserving the timber after milling. Although industrial utilization of rubberwood has gradually accelerated in recent years (Hong 1995b; Kiam 2002; Sylva 1992; Varmola and Carle 2002; Yamamoto 1997) with technological advances in rubberwood treatment methods (Killmann 2001; ITTO 2005a, b), rubber plantations are still managed only for latex production with the wood regarded as an incidental by-product. This is because the usefulness of rubberwood as a timber has not been sufficiently demonstrated; exploring the contribution of rubberwood products to industrial wood production is therefore essential.

More than 80% of the area of the world's rubber plantations is located in Southeast Asia, and Malaysia and Thailand have the highest production capacities of rubber in the world. The trend in the area planted to rubber worldwide and in Malaysia, Thailand, and the rest of Southeast Asia (Indonesia, Laos, Vietnam and Myanmar) from 1985 to 2005 is presented in Table 1. Malaysia has 1.47 million ha of rubber plantations and Thailand has 2.02 million ha (ITTO 2009). Indonesia actually has the largest area planted to rubber (3.28 million ha) (FAO 2010), but the productive area is only 0.92 million ha (ITTO 2009), and its utilization has been still limited (ITTO 2005b). In most of the small-scale rubber plantations in Indonesia, the rubber trees are intercropped with other crops and a very long rotation period is used (Gouyon et al. 1993; Ketterings et al. 1999). Although the rubber plantations have doubled in other parts of Southeast Asia including Vietnam, Cambodia, Laos for last two decades (GTZ 2005; Liu et al. 2006; SOFRECO 2007; Manivong and Cram 2008; Stone 2008), the total area (0.67 million ha) of those countries is still smaller than that of Malaysia and Thailand (2.92 million ha) (FAO 2010). Consequently, Malaysia and Thailand remain the two largest sources of rubberwood globally. Rubberwood can contribute to the wood industry, but there have been few investigations to determine the contribution of rubberwood to wood export markets.

Table 1 Planted area of rubber worldwide, in Asia, SE Asia, Malaysia and Thailand (Unit: million ha)

Year	World total	Asia						Other SE Asia	Other regions
		Asia sub-total	Southeast Asia (SE Asia) (ha)				Other SE Asia		
			SE Asia sub-total	Malaysia	Thailand	Indonesia			
1985	6.04	5.67	4.95	1.54	1.41	1.69	0.31	0.72	0.37
1995	7.21	6.63	5.69	1.48	1.50	2.26	0.45	0.94	0.58
2005	8.81	7.94	6.87	1.23	1.69	3.28	0.67	1.07	0.87

FAO (2010)

The first rubber plantations were established in both countries in the early 1900s (ITTO 2005a, b; Abdullah and Hezri 2008). Rubber plantations are classified into types according to the size of the plantation under individual ownership, estates (larger than 40 ha), and smallholdings (smaller than 40 ha) (Sylva 1992; SOFRECO 2007; Viswanathan and Shivakoti 2008). Smallholdings account for 76% of the total area of rubber plantations worldwide (ITC 1993), and this is also the main form of ownership in Malaysia and Thailand. The proportion of smallholding rubber plantations within the total area of rubber plantations was 86% in Malaysia (ITTO 2005a) and 93% in Thailand (FAO 2009a). Rubberwood accounts for 80% of the wood used in furniture production in Malaysia and 70% in Thailand (FAO 2009a, b). However, the proportion of total wood products contributed by rubberwood is still unknown. Such information is vital to evaluate the importance of rubber plantations in industrial wood production. Because the export of wood products is an important source of foreign currency earnings in Malaysia and Thailand (Woon and Norini 2002; FAO 2009a), it is important to clarify the contribution of rubberwood to the market. In addition, the institutional structure and support system for rubberwood production is not well documented. The information on current rubberwood utilization system would be useful to present the future research arena to utilize rubberwood more efficiently as wood resources (FAO 2009a). The objectives of this study, therefore, were to: (1) quantify the contribution of rubberwood products to the timber export markets of Malaysia and Thailand; and (2) reveal the institutional structure and forest resource situation underpinning the rubberwood contribution to the wood export market in these countries.

Contribution of rubberwood to wood export markets

The share of rubberwood in the total wood product exports, other wood products, and sawn timber and logs in Malaysia and Thailand are shown in Tables 2 and 3. As databases for wood product exports are not integrated at a national level in most developing countries (FAO 2002; Ratnasingam and Ioras 2005), we applied figures from several government agency sources. All the export values were converted into US\$ from the local currency (ringgit in Malaysia and baht in Thailand) (ADB 2008a; ADB 2008b). In Malaysia, rubberwood's share of the total wood product exports increased from 26% in 1998 to 35% in 2007 because of the increase in the proportion of rubberwood used in furniture products (80%), whereas the rubberwood contribution to other wood products (<20%), sawn timber, and logs (<10%) is very small. The export values of rubberwood furniture shown in MRB (2009) was based on the assumption that rubberwood had an 80% share of the total export value of wooden furniture. This figure of an 80% share is likely to have come from various reports (Hong 1995a; Woon and Norini 2002; MRB 2009). The export value of total wood products in 2002 and 2004 are not presented due to missing data. In Thailand, rubberwood accounts for about 60% of the aggregate export value of wood products, in this case arising from a high share of not only furniture products (70%) but also other wood products (around 50%) and sawn timber and logs, its share of which increased from 40% in 1998 to 79% in 2007. Because detailed export values of wood furniture by tree species are not available, we assumed that the rubberwood share was 70% for all years examined, as in Malaysia (ITTO 2005b).

Although forest plantations strongly support the wood market in several tropical countries (Sedjo 1999; Turnbull 1999), the impact of rubberwood on the wood export market has not previously been clearly defined. The high share of the export furniture market

Table 2 Export values of total timber products and rubberwood products in Malaysia

Year	Total wood products (million US\$) (1)	Total rubberwood products (million US\$) (2)	Rubberwood share (%)		Wooden furniture		Other wooden products			Sawtimber and log		
			(2)/(1)	Rubberwood share (%) (2)/(1)	Sub-total (million US\$) (3)	Rubberwood share (%) (4)/(3)	Sub-total (million US\$) (5)	Rubberwood share (%) (6)/(5)	Sub-total (million US\$) (7)	Rubberwood share (%) (8)/(7)		
1998	3,631	946	26	80	828	662	2,803	275	1,132	9	1	
1999	4,493	1,129	25	80	995	796	3,361	308	1,403	0	0	
2000	4,658	1,342	29	80	1,127	902	3,388	412	1,425	0	0	
2001	3,772	1,207	32	80	964	771	2,693	388	949	22	2	
2002	na	1,290	na	80	1,065	852	na	387	1,022	23	2	
2003	4,294	1,412	33	80	1,191	953	2,971	413	1,099	15	1	
2004	na	1,703	na	80	1,387	1,110	na	522	1,209	35	3	
2005	5,675	1,904	34	80	1,488	1,190	3,999	571	1,508	99	7	
2006	6,387	2,049	32	80	1,635	1,308	4,345	633	1,413	18	1	
2007	6,618	2,315	35	80	1,700	1,360	4,107	749	1,345	14	1	

(1), (3), (5), (7): MRB (2009) Rubber export statistics: export values of rubberwood products. Malaysia Rubber Board web. <http://www.lgm.gov.my/mrstat/T23.htm>. Accessed 26 July 2010

(2), (4), (6), (8): MTC (2009) Malaysia Export of Major Products statistics: 1995–2007. Malaysia Timber Council Web. <http://www.mtc.com.my/trade>. Accessed 26 July 2010

Table 3 Export values of total wood products and rubberwood products in Thailand

Year	Total wood products (million US\$) (3)	Total rubberwood products (million US\$) (1)	Rubberwood share (%) (1)/(3)	Wooden furniture		Other wooden products			Sawntimber and log			
				Sub-total (million US\$)(4)	Rubberwood share (%) (2)	Sub-total (million US\$) (5)	Rubberwood (million US\$) (1)-(2)-(7)	Rubberwood share (%) ((1)-(2)-(7))/(5)	Sub-total (million US\$) (6)	Rubberwood (million US\$) (7)	Rubberwood share (%) (7)/(6)	
1998	897	566	63	360	252	70	455	282	62	82	32	40
1999	810	524	65	338	236	70	373	235	63	99	53	53
2000	1,062	611	58	444	311	70	480	213	44	138	87	63
2001	1,085	na	na	449	314	70	498	na	na	138	75	55
2002	1,088	na	na	444	311	70	483	na	na	160	110	69
2003	1,156	na	na	463	324	70	478	na	na	214	161	75
2004	1,416	na	na	543	380	70	585	na	na	288	224	78
2005	1,446	na	na	546	382	70	617	na	na	283	222	79
2006	1,563	na	na	509	356	70	708	na	na	345	278	80
2007	1,682	na	na	497	348	70	827	na	na	358	281	79

(1), (2): ITTO (2005b) Report on the development of the Thai rubberwood industry: Promotion of the Thai rubberwood industry in the years 2002–2005. International Tropical Timber Organization, Yokohama

(3), (4), (5), (6), (7): RFD (2009) Forestry statistics of Thailand. Royal Forest Department of Thailand Web. <http://www.forest.go.th/stat/stat.htm>. Accessed 26 July 2010

occupied by rubberwood has been known since the 1990s (FAO 2000; Killmann 2001; Durst et al. 2004; MRB 2005), but rubberwood's role in the overall wood export market has not been explored. This is because rubber plantations were previously categorized as agricultural plantations in forest resource assessments (FAO 2001a), and wood production was not considered important enough to quantify. However, rubber plantations have been defined as forest plantations in global forest resource assessments since 2000 (FAO 2001b; Varmola and Carle 2002). Our results (Tables 2 and 3) show that the percentage of export values of total wood products occupied by rubberwood is at least 20% in Malaysia and 60% in Thailand. This matches well with the assertion of Durst et al. (2004) that rubberwood would become one of the largest sources of wood in the major rubber producing countries.

Two reasons explain the high contribution of rubberwood to total wood exports. First, the supply of wood from traditional sources (natural forests) has been severely curtailed due to stricter logging controls in Malaysia and Thailand. In Malaysia, natural forest logging is not prohibited, but it is controlled. The forest cover of Malaysia was 63.6% (20 million ha) in 2005, which is higher than the average figure for South and Southeast Asia of 33.6% (FAO 2005, 2006). Nevertheless, natural forest, including mangroves, is expected to continue to degrade over the next two decades (Chuah et al. 2006; Abdullah and Nakagoshi 2007; Abdullah and Hezri 2008). The area of natural forests designated as permanent forest estate has been slightly increased into 15.3 million ha in 2005 from 14.0 million ha in 1995 (FAO 2009b), so as to ensure a sustainable supply of logs (FAO 2009c). In Thailand, the supply of forest resources is much tighter than in Malaysia. The forest cover declined sharply from 53% (27.2 million ha) in 1960 to 30.9% (15.8 million ha) in 2006 (FAO 1999; FAO 2009a). Logging of natural forests have been banned by the government since 1989 (Hirsch 1990; Prasertsan and Sajjakulnukit 2006; Angelsen and Kaimowitz 1999), and this ban resulted in a sharp decline in the supply of the main natural timbers, including teak (*Tectona grandis* Linn f.) and ching-chang (*Dalbergia oliveri*). Consequently, rubberwood has come to be widely utilized as an alternative wood resource to help meet wood consumption together with wood imported from adjacent countries (ITC 1993; ITTO 2005a). Another reason for the high proportion of rubber plantations in wood exports is that rubber plantations are the most widespread type of forest plantation in both Malaysia and Thailand. The area of rubber in Malaysia is 1.48 million ha, followed by acacia plantations (180,000 ha) and pine plantations (50,000 ha) (ITTO 2009). Rubber plantations also dominate in Thailand (2.02 million ha), whereas teak, pine and eucalypt plantations amount to 840,000, 690,000 and 440,000 ha, respectively (ITTO 2009). Even if compared with the mean annual increment, rubberwood is the largest-producing single species of wood (ITTO 2009).

The main reason for the differences in rubberwood's share of the export market in Thailand and Malaysia is the respective forest resource conditions. Thailand faces tighter constraints on timber resources and therefore rubberwood's share of the export market there is about double that in Malaysia. The large contribution of rubberwood to wood exports in Thailand has also been strengthened from its 31% share of domestic industrial roundwood production and 6% in Malaysia in 1991 (ITC 1993). Although the eucalyptus plantations are growingly adopted in wood industries of Thailand, its use is still limited to the paper and pulp production (FAO 2009a). Considering that deforestation and forest degradation are continuing in both Malaysia and Thailand (FAO 2005), rubberwood is expected to maintain a high share of wood product exports together with wood from other forest plantations.

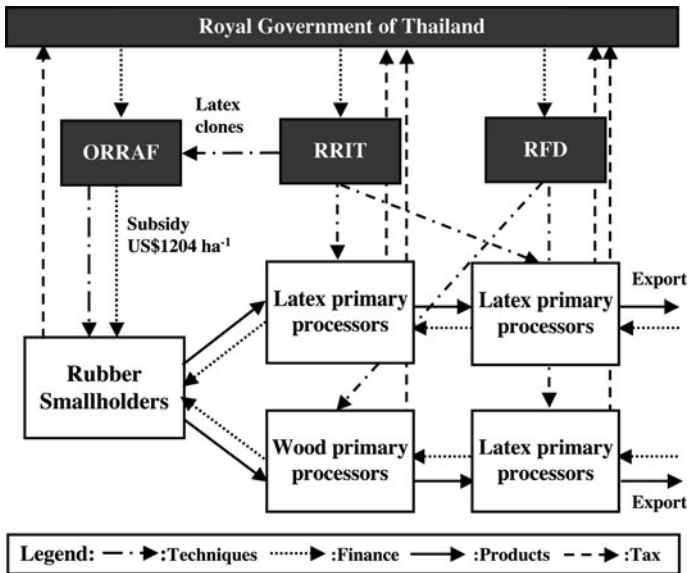


Fig. 2 Schematic diagram of the organizational system related to rubber plantations in Thailand. *ORRAF* Office for Rubber Replanting Aid Fund, *RRIT* Rubber Research Institute of Thailand, *RFD* Royal Forest Department of Thailand

SOFRECO 2007; World Bank 1994b). To begin with, ORRAF provides planting material support includes the distribution of fertilizer and nursery stock of high yielding latex clones (ITTO 2005b) developed by the Rubber Research Institute of Thailand (RRIT). The extension service is intended to ensure that appropriate technical practices are introduced to rubber smallholders to enhance latex production (SOFRECO 2007). In regard to downstream processing, latex and rubberwood are mostly processed within Thailand and the products are consumed domestically and exported. Second, financial support is provided to rubber smallholders to subsidize the replanting of old rubber plantations at a rate of US\$1,204 ha⁻¹ disbursed over 7 years. While there is an established market for latex and processed latex products, governmental supports have been lacking in the distribution of rubberwood between rubber plantations and processing factories (ITTO 2005b). Exports are taxed at a rate of 3% (US\$27–28 t⁻¹ on average) (SOFRECO 2007).

In both Malaysia and Thailand, the government organizations have assisted smallholders by providing: (1) technical assistances including high yielding clones (Ong 2000; MRB 2005) as well as field technical advice (Killmann 2001; Ratnasingam and Ioras 2007) and (2) financial assistance for re-establishment of rubber plantations (Prunamasari et al. 2002; ITTO 2005a; FAO 2009a). The main source of the grants originates from tax income from the export of rubber latex products (Hasan 2007). This subsidy based on the circulation of tax revenue from rubber product exporters could be an effective means of achieving sustainable rubberwood production. The long-term government supports are effective to enhance the productivity of latex and wood (ITTO 2005a), and the share of rubberwood in wood market has been increased in both Malaysia and Thailand. However, the potential of rubberwood utilization in wood market is not fully achieved. While 75% of rubberwoods production potential has been achieved in Malaysia (ITTO 2005a), only 41–48% of it has been satisfied in Thailand (FAO 2009a). The annual potential of rubberwood exploitation in

Thailand is 21.0 million m³, but it is estimated to be only 8.7–10.0 million m³ (FAO 2009a). This is because of the lack of coordination between owners of rubber plantations and local wood industries in Thailand (FAO 2009a). It would be ideal to encourage rubber planters to make a long-term contract with wood processors (Loke et al. 2009), or to develop a system to match rubber replanting individuals and wood industries (Aziz 1999). Furthermore, it would also be important to continue to enhance the yield of both latex and wood in rubber plantations while paying attention to the environment (ITTO 2005a). New clones have been developed that can achieve high yields of both latex and wood in Malaysia and Thailand, but a management plan that fits the clones is not sufficiently revealed (FAO 2009a). It would be necessary to further execute agronomical researches, which reveals the relationship between different combinations of clones, planting densities and tapping intervals and the yield of both latex and wood. The government of Malaysia has launched a trial to establish a new type of rubber plantations which objective is to boost the production of not only latex but also wood (MRB 2005). Such efforts should be appreciated and be continued to enhance the capacity of rubberwood as useful wood resources.

Conclusions

Our study shows that rubberwood has become an important contributor to the timber export markets of Malaysia and Thailand in recent years. Evaluation of the contribution of such new forest resources to wood product exports is essential to assist public policy and decision-making in global efforts to combat degradation and deforestation of tropical forests. Rubberwood accounts for about 30% of all timber product exports in Malaysia and 60% in Thailand. These high proportions likely reflect the strict controls on commercial logging of natural forests and the fact that rubber plantations are the main type of forest plantation from which to draw alternative wood sources. Furthermore, government support to provide subsidies for rubber replanting activities and technical assistance to improve wood processing efficiency in Malaysia and Thailand may help encourage the utilization of rubberwood as an alternative timber resource.

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