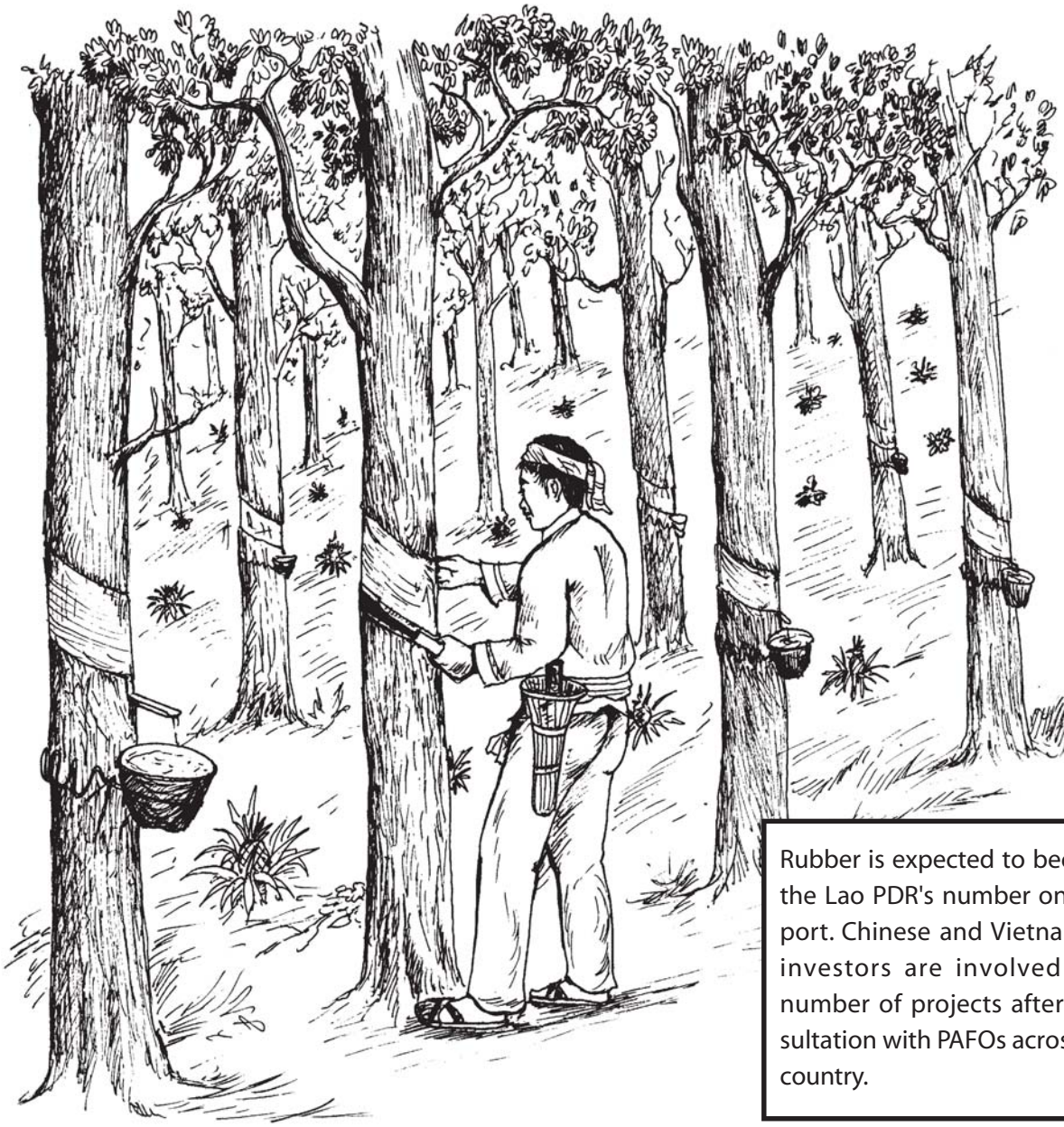
Intercropping with Rubber for Risk Management



Rubber is expected to become the Lao PDR's number one export. Chinese and Vietnamese investors are involved in a number of projects after consultation with PAFOs across the country.

The rubber boom in the Lao PDR and elsewhere in "New Asia"

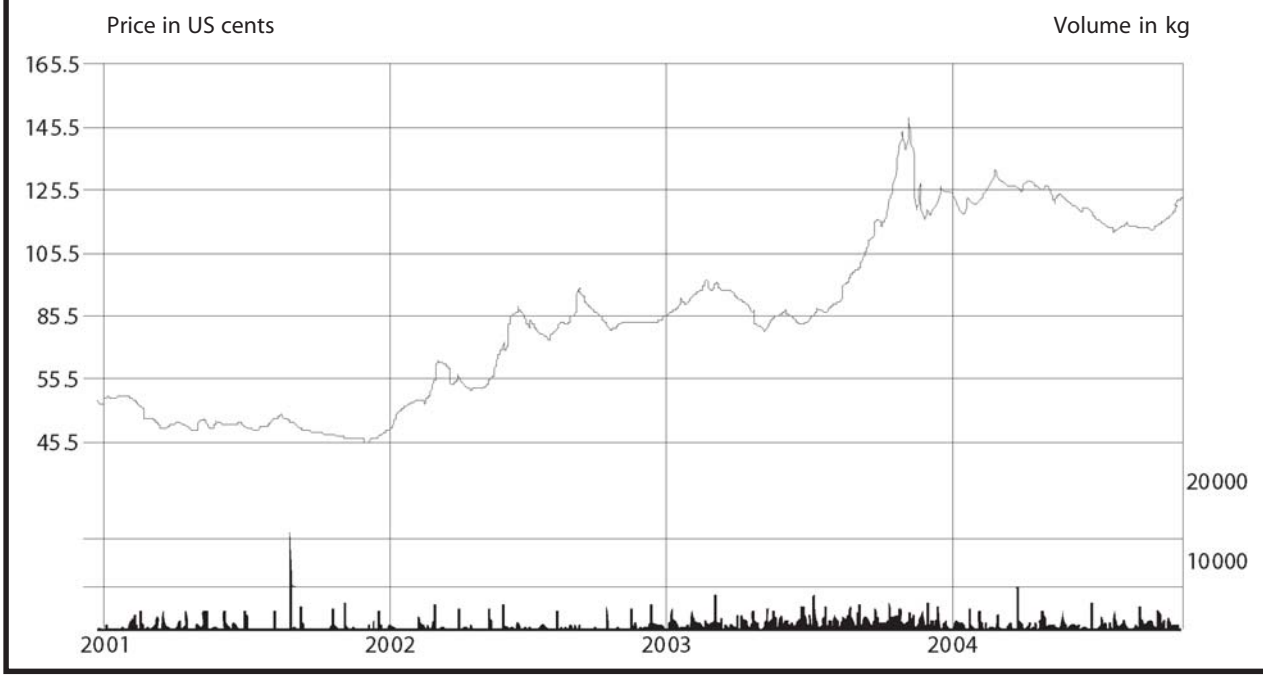
The market for rubber in developed countries is saturated and not expected to grow, but in "New Asia" (China, India and the ASEAN countries) rubber is booming. After a long decline, the rubber price rose in 2002. The rising price is caused by surging demand, especially in China where in 2003, rubber imports rose almost 24%. Rubber replanting programmes are on again in established rubber producing countries and there is an opportunity for new rubber plantations close to the Asian demand centres.

Estimated area of rubber to be planted in selected provinces			
Province	**Area (ha)**	**Comment**	**Investing Country**
Champasack	13,000	To be planted	Vietnam
Luangnamtha	4,000	Total area to be increased to this level	China
Saravan	1,500		Vietnam
Oudomxay	1,100	To be planted	China

Source: *Vientiane Times*, 21 September 2004

As shown below, the price of rubber has consistently risen in the past few years. Unless the Chinese economy stalls, natural rubber is likely to remain in high demand over the next decade.

Rubber price on the Singapore Commodity Exchange



Opportunities for smallholder rubber

While smallholder rubber growers benefit from current high prices, price fluctuations are a risk. The 2004 price on the Singapore Commodity Market was about US$1.25/kg and the projection is that it will rise to about US$1.75 by 2010. Thereafter, like other commodities, it will fluctuate around a slightly lower equilibrium price.

Even at lower prices, the economic benefits of growing rubber are attractive for smallholders. It is easy to grow and provides abundant employment in tapping. A recent survey of northeast Thailand rubber farmers reports that they are better off with rubber than without it. The rate of return for rubber plantations is around 17-20%. A favourable characteristic of rubber in northern Laos is that farmers can adopt it with other things they need - extension, marketing and finance. Arrangements may vary but the "joint venture" model in Luangnamtha gives an indicative glimpse of how it might be done.

The Luangnamtha Rubber Development Co. is a joint venture between the Sino-Lao Rubber Co. and the Luangnamtha PAFES. The company's capital is US$1 million, and PAFES was given a 40% equity stake by the Chinese government. The company provides rubber seedlings, technology extension and marketing and operates a research facility to support new northern rubber varieties. Since 1994, the province has given low-interest loans to villagers for seedlings and other costs. Presumably, it will continue to do so (Phouyyavong et al. 2004).

The need for risk management

While opportunities in rubber are currently good, risk management is needed to protect farmers from price instability and the environmental risks of rubber monoculture.

Price fluctuations are normal for any commodity and rubber is a volatile commodity. Major rubber growing countries like Thailand have sophisticated financial instruments providing price fluctuation insurance to farmers. These programmes require complicated rural banking arrangements, well-organised markets and large amounts of capital. More achievable risk insurance for Laos might be crop diversification. If they have a diversified farm economy, farmers can concentrate on other crops and stop tapping rubber until the price rises again.

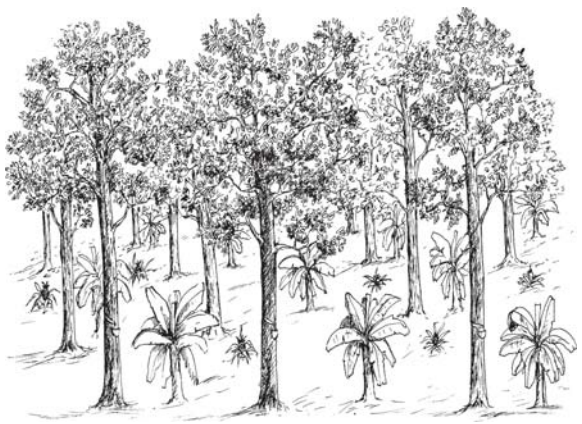
Main environmental risks of rubber monoculture

- Clearing forests to plant rubber results in less biodiversity, increased soil erosion and reduced watersheds.
- Erosion and soil fertility decline on sloping land under rubber monoculture, which has 42 times more annual soil loss (erosion) than forested land.

Risk management through rubber intercropping

Rubber's great potential for intercropping is a key factor that makes it different from other plantation crops. Examples of rubber intercropping systems in Asia are:

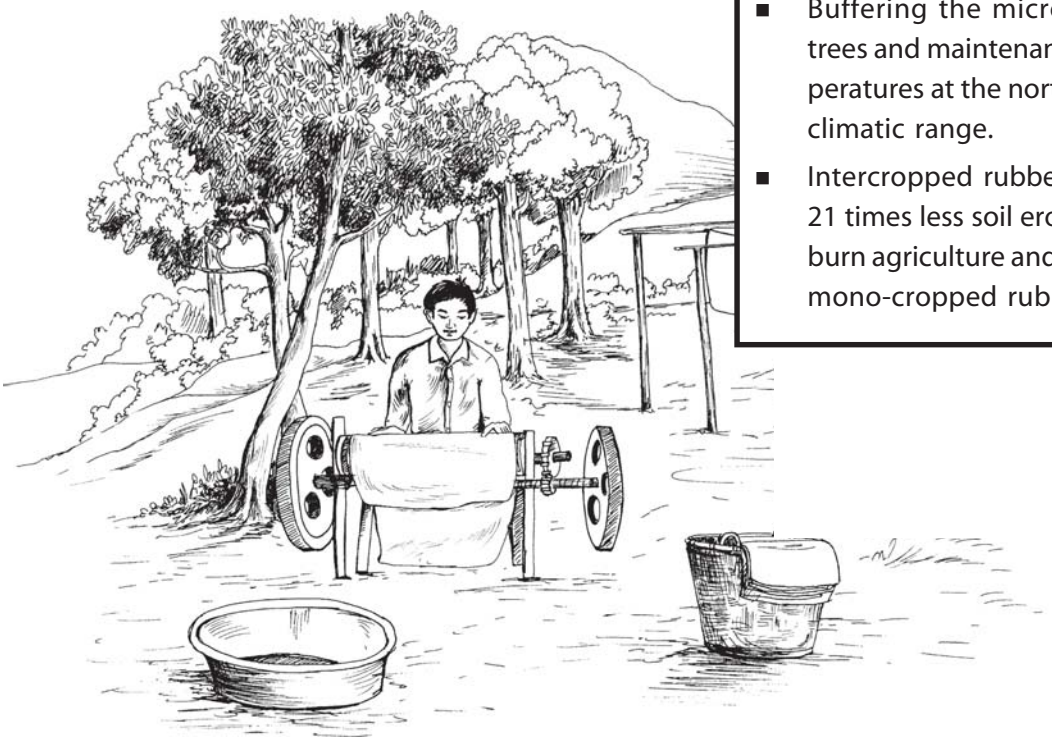
- Rubber and livestock.
- Rubber and food crops (rice, maize, cassava, peanuts and banana).
- Rubber and cash crops (tea, coffee, sugarcane, pineapple, chilli, cardamom and medicinal plants).



Two interesting systems for Laos are the rubber-cardamom agro-forestry system and the rubber-tea agro-forestry system. Because there is no data on the rubber-cardamom system at this time, the rubber-tea system is used as an example of what is possible.

The advantages of intercropping

- Increased income and income stability.
- Improved ecological sustainability and rubber yield because of reduced runoff and soil erosion.
- Buffering the microclimate for rubber trees and maintenance of moderate temperatures at the northern end of rubber's climatic range.
- Intercropped rubber has approximately 21 times less soil erosion than slash-and-burn agriculture and about 17% less than mono-cropped rubber.

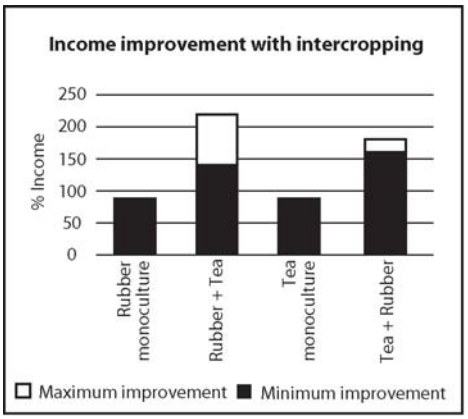


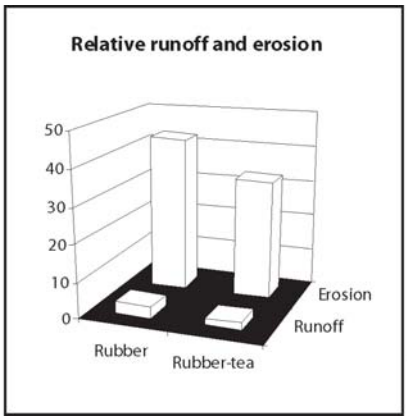
The rubber/tea agro-forestry system in China

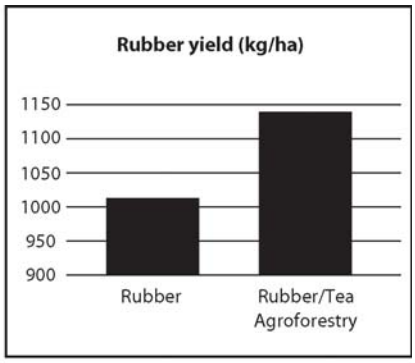
The cropping sequence

1. Plant and fertilise rubber tree seedlings (the goal is to provide 30% shade for tea). One effective spacing is double rows of rubber trees at 2 m between rows and 2.5 m in-row spacing, with 18 m between the rubber hedgerows and 0.4-0.6 m between tea bushes (spacing of 2 x 12 or 2 x 15 m in single rows with corridors for rubber tending are alternatives).
2. Plant upland rice, maize, peanuts and other leafy crops between the rubber trees.
3. Harvest the rice and other ripe crops at the end of year one and plant pineapples in spaces previously occupied by harvested crops.
4. Harvest peanuts in year two and pineapples in years 2 to 4.
5. Replant spaces previously occupied by pineapples with tea in year four (rubber trees at this time are tall enough to provide enough shade for tea plants).
6. Tap the rubber trees in years 6 to 30.
7. Harvest tea in years 7 to 30.

The rubber/tea system operates effectively for 30 years, after which the rubber trees must be replanted and the whole system started again. Income from the system is 58-131% higher than rubber monoculture and 75-96% higher than tea monoculture. Additional benefits include increased longevity of the system because of continuous vegetative soil cover, reduced runoff, and reduced erosion. Other intercropping systems offer similar benefits.







Reported benefits of other rubber intercrops		
Intercrop	**Direct benefit from intercrops**	**Benefit to rubber**
Coffee and pineapple	Pineapple harvested years 2-7 Coffee harvested from year 4	Enhanced rubber growth
Lemon grass	Harvested until canopy closes	Reduced runoff and erosion
Sugarcane	Harvested until canopy closes	Enhanced rubber growth
Amomum	Harvested years 8-30	Reduced runoff and erosion
Banana	High yield on good soil	Reduced runoff and erosion
Pepper	150-300 kg/year	Reduced runoff and erosion by more than 50% + benefits from fertilizer added to pepper
Note: Some of the reported benefits may not materialize in dry climates where there is significant moisture competition between the intercrops and rubber. The benefits will also be less under low input systems where no additional inputs are given to the intercrops, but many low-input rubber intercropping systems still give much higher returns than low input upland rice farming.		

Policy support

Laos should not establish policies that discourage intercropping, as happened in Thailand, where the regulations of the Rubber Replanting Fund favoured monocultures and blocked the greater economic and ecological efficiencies of intercropping.

- It is important for Laos to adopt a policy that discourages forest clearing for rubber plantations and instead encourages rubber growing on the farmer's own degraded shifting cultivation land. This is consistent with government policies on reduction of deforestation, poverty and shifting cultivation.

- If an intercropping and forest-friendly rubber planting policy is adopted and supported by giving credit to farmers for purchasing high-quality rubber seedlings to plant on degraded fallow land, then low-productivity shifting cultivation will be phased out naturally. The table below shows the advantages of converting degraded shifting cultivation land to intercropped rubber agro-forests.

- The employment opportunities in the new rubber agro-forests will act as magnets for the rural population, relieving pressure on forestland, restoring watersheds and regenerating biodiversity.

Agro-forestry intercropping with rubber seedlings

Land Use	Labour (man-days/ha)	Returns (relative to minimum wage)	Equivalent Population Support (pop/km)
Rubber agro-forests	150	1.0 - 1.7	80
Rubber monoculture	133	1.7	71
Traditional rubber agro-forests	157	1.0	59
Intensive short fallow upland rice	98-104	1.05	54
Extensive long fallow upland rice	15-25	0.75	11

Note: This is indicative data from Sumatra, Indonesia. Equivalent data is not available for Laos. The estimate of population support capacity is based on an assumption of 150 workdays/person/year and 80% of the land available for productive use. The corresponding numbers will be different for Laos but the relative differences should be the same.

Adapted from Murdiyarso et al 1998

Selected references

Murdiyarso, D., van Noordwijk, M., Wasrin, U.R., Tomich, T.P. & Gillison A.N. 1998. "Environmental benefits and sustainable land-use options in the Jambi transect, Sumatra, Indonesia". *Journal of Vegetation Science*.

Phouyyavong, K., Veokham, P. & Silivanh, S. 2004. *Field report on rubber economic production survey*. Socioeconomics Component. LSUAFRP. NAFRI. Vientiane.

Author:
John Raintree, johnraintree@yahoo.com

Improving Livelihoods in the Uplands of the Lao PDR was produced in 2005 by NAFRI, NAFES and NUOL.