



Australian Government  
Australian Centre for  
International Agricultural Research



# ACIAR POLICY BRIEF

Research Findings with policy implications

## SMALLHOLDER TEAK WOODLOTS AND AGROFORESTRY SYSTEMS IN LAO PDR

Enhancing the efficiency and sustainability of the  
planted forest industries in Lao PDR



Teak in landscape (Photo: Hilary Smith)

## ACIAR POLICY BRIEF: Smallholder Teak Woodlots and Agroforestry Systems in Lao PDR

This policy brief summarises findings, outcomes, and recommendations from several ACIAR research projects on teak woodlots and agroforestry systems in Lao PDR. A consortium from Lao PDR and Australia implemented the projects, and this brief is provided at the request of Lao PDR's Ministry of Agriculture and Forestry.

### SUMMARY

The plantation sector in the Lao PDR is becoming increasingly important as a consequence of policy measures such as the Lao PDR Prime Minister's Office Decree, 15/PMO on *Strengthening Strictness of Timber Harvest Management and Inspection, Timber, Transport and Business*. This decree aims to reduce illegal and unsustainable harvesting of natural forests and expanding domestic wood processing. Trees planted in small plantations (woodlots) and agroforestry systems are an important source of the timber needed to achieve these policy objectives.

Australian and Lao researchers want to better understand the extent of teak plantations in Northern Laos, and how to improve their management. Poor management of plantations, limited market access, and complex government policies reduce financial returns and discourage investment in new plantations. This Policy Brief sets out key actions that could address these barriers in the Lao teak value chain, and benefit farmers and the wood industry while helping to meet Government priorities.

### INTRODUCTION

The Lao PDR has a long history of plantation development, and planted trees have been promoted widely to reduce poverty, improve forest cover, and supply future timber. In recent policy decisions, the Lao Government has reiterated the importance of legal wood and sustainable forest management, and how wood from plantations and agroforestry systems can contribute to domestic supply and processing. As the Government further regulates timber harvesting in natural forests, the demand for plantation grown wood is expected to increase. Teak grown by farmers in woodlots and agroforestry systems could be important in developing the domestic wood processing sector, and so improve the on-farm incomes of thousands of families who have invested in teak.

Out-dated policies and extension based on out-of-date knowledge have, however, created risks of low returns to teak growers and poor quality timber supplies for wood processors. Farming households have integrated teak-based production systems integrated into their livelihood strategies in different

ways. Understanding this diversity is essential when designing new policies and extension activities to ensure they both improve the economic performance of teak-based production systems, and are compatible with the households' livelihood strategies.

Making teak woodlots and agroforestry systems and timber value chains more efficient is critical to this process. Many teak plantations in Northern Laos are over-stocked, limiting the production of high-quality timber. Most teak trees in Luang Prabang, for example, are small, and technical interventions are needed if these are to reach their full potential as a timber resource. Strategies can make teak plantation and agroforestry systems more productive, but policy, social, legal, economic, cultural and technological barriers need to be overcome to fully realise the potential of the teak resources. Teak is not suited to producing high-quality timber on all sites in Northern Laos. Other timber species, with shorter rotation periods, may be more appropriate for small sites meeting farmers' and wood processing industries' needs.

## WHAT ARE TEAK WOODLOTS AND AGROFORESTRY SYSTEMS?

Teak (*Tectona grandis*) occurs in natural stands in some parts of Northern Laos and is widely recognised for its timber qualities. It has been planted in the region for over 50 years, and strong policies promoted it to farmers in the 1980s and 1990s. As a result, farmers have integrated teak trees into agricultural production systems in the form of woodlots and agroforestry plantings, or as small stands of trees as boundary markers, along roadsides or around paddy fields. Farmer-owned teak woodlots range in size from a few trees to

around 5-hectare plots. Urban-based absentee owners are also buying larger woodlots.

ACIAR projects have conducted research on improving the quality of teak germplasm, optimal tree spacing, growth rates and responses to thinning of teak woodlots. They have also covered alternative agroforestry systems where wide-spaced teak is inter-planted with agricultural crops and non-timber forest products.



Graded Teak Logs (Photo: Hilary Smith)

### SECTOR SNAPSHOT

Teak woodlots and agroforestry systems represent approximately 11% of the planted forest area in Lao PDR, and 42% of the plantation timber resource; there are over 15,300 hectares of teak in Luang Prabang Province alone.

Farmers own a large proportion of planted teak. The average plantation parcel size is small, at around 0.75 hectares. How many farmers grow teak on their land is not known; in some regions, absentee owners are rapidly acquiring the more accessible land on which teak is planted.

Farmers integrate teak trees into their agricultural systems as a long-term investment, for land security, and as a source of emergency income. Farmers' decisions about teak management and harvesting are not well understood. Broader livelihood strategies influence individual households' decisions about planting and harvesting teak trees. There is high competition from other land uses. As a result, teak plantations and trees may be harvested and not replanted, which would affect the sustainability of supply.

The small plantations and agroforestry parcels are fragmented and geographically dispersed; they are also remote from major markets, and transport costs can be high. Teak farmers depend on timber traders to sell, harvest and transport their trees. Consequently, wood supplies to Lao wood processing industries are unpredictable.

Teak timber is a valuable commodity for Lao PDR's wood processing sector and global markets. Local small-scale sawmills and larger national and international processing companies use the resource to manufacture value-added products for domestic use and export.

Demand for farmer grown teak is expected to increase as new policies take effect. Before 15/PMO was introduced, wood from teak plantations competed with timber harvested from under-regulated natural forests. As a result, a lot of plantation teak was exported directly to China as logs and sawn wood.

Regulations for plantations and plantation grown wood are complex, and compliance can be costly for farmers with limited cash reserves. Regulatory costs provide important government revenue, but are barriers to tree growing and the efficient and cost-effective flow of timber from farmers to wood processors. Certification, which international markets sometimes demand, is not economic for individual, farmer-owned plantations. The complex regulations even make verifying legality difficult.

Farmer and community-based timber enterprises, close to the plantations, could improve wood supply to the domestic processing sector, but the complex regulatory environment and high transaction costs make them uncompetitive.

***The Lao PDR urgently needs policies that promote the planting of trees on farms and in agroforestry systems; that recognise the benefits plantations can provide; and that take into account the diversity of farmers' livelihood systems.***

## KEY MESSAGES

- Teak plantations established with high stocking and unimproved germplasm produce a large proportion of low quality trees with poor returns
- Without technical intervention, the teak woodlots and agroforestry systems in Northern Laos will not reach their potential growth, yield or wood quality. This will reduce their economic contribution to households, the industry, and the Lao economy.
- Unnecessarily complex and costly regulations discourage farmers from harvesting and replanting teak. Informal and illegal wood supply chains may compromise policy measures for timber legality. Basic services such as plantation registration and harvesting permissions can be simplified and delivered through local institutions, such as Village Forestry Units. The capacity of the institutions should be increased, so extension based on current research results and updated technical advice can improve farmers' knowledge.
- Unpredictable wood supply and wood quality make it difficult for the industry to rely on farm grown timber, resulting in weak value chains.

Local enterprises focused on producing and marketing wood products with local branding, that use local farm-grown timber and employ local people, are likely to improve returns to farmers.

- Broader forest and plantation policies should promote and develop farmer-based woodlots and agroforestry. Robust legislation and a national oversight group with representation from farmers, local and national timber industry, timber merchants, government and research partners would enhance them further. This oversight group would be well placed to advise on new species under different plantation and agroforestry models.

ACIAR-funded research has provided a suite of technical recommendations that can be immediately developed into extension materials.

Australian researchers and Lao partners have the necessary skills and on-ground experience to help Lao agencies develop appropriate communication materials and recommend ongoing policy and legislative reform processes and detailed policy options.



Sawmill Workers (Photo: Hilary Smith)

### POLICY CONSIDERATIONS

Most existing teak plantations have been established with unimproved teak germplasm and contain many poor quality trees. The poorer quality trees will never develop high-value timber products, nor do these trees grow when thinning operations remove better quality trees. Germplasm from more than 100 superior teak families has been collected and established as seed production stands. Three tissue propagation laboratories have been established to mass produce high quality teak germplasm.

Any financial support for farmers who plant and grow teak should be linked to the use of good quality germplasm, at appropriate stocking, and with ongoing management. More investment in the genetic improvement of teak, and the distribution of improved planting stock through DAFO nurseries would be beneficial.

**Improve the availability of high quality teak germplasm for use in new plantations and agroforestry systems**

Regulations prescribe stocking rates and spacing for woodlots and agroforestry plantings regardless of species and products. Only plantations that meet the regulations can be registered and the wood legally harvested and sold. Registered plantations with stocking >1100 stems/hectare are exempt from land tax and other fees, and many teak agroforestry plantations are ineligible for land tax exemption on this basis. Farmers are planting trees at too high a stocking because of this rule, and because they think highly stocked stands are more valuable than stands with lower stocking. These higher stockings reduce the growth and value of these woodlots. Nor do most farmers manage their plantations well. They think each tree has the same value, even if tree quality is poor; and when they need income, they harvest the largest trees from the stand. The absence of

legal markets for products from thinning discourages this important silvicultural practice, which would improve stand quality and provide an intermediate income for farmers. These practices reduce the value farmers and industry could derive from teak woodlots and farm trees.

Regulations need to be reformed to address these issues, and extension services strengthened by providing them with the evidence and tools to encourage farmers to grow better quality trees. Regulation 1849/AF-99 concerning the registration of tree planting parcels, and all extension materials, should be amended to recommend an initial stocking rate for teak woodlots of 1,111 trees/hectare (3 x 3m) on flat land (< 10° slope) and 1,000 trees/ha (5 x 2 m) on lands sloping (≥10° slope). Policies should promote progressive thinning of small and poorly formed trees to a residual stocking of 800 trees/hectare by 4 to 6 years after planting, and 625 trees/hectare by 6 to 8 years after planting.

**Promote better establishment and management practices that will improve returns to farmers and industry.**

Complex regulations and high regulatory costs act as disincentives to farmers to comply with the rules. Farmers must register their woodlots, but this is costly and takes a long time. As a result, most farmer-owned woodlots are not registered. While plantation (woodlot) registration has become important to industry and government, it directly benefits farmers little. Those who do register their woodlots must also seek and pay for government approval to harvest their trees. When they need an immediate source of income, farmers may prefer to access the informal market, which may put the reputation of Lao PDR Voluntary Partnership Agreement for timber legality at risk with the European Union and other international markets.

Another way of promoting plantation registration would be to provide people who have registered their plantations with full operational control with respect to management, harvesting and sales. The requirement for government approval for each thinning or harvesting event should be replaced with a single approval for each registered plantation parcel for a given term (e.g. 20 years for teak) and volume. Local level institutions such as Village Forestry Units could monitor plantations and collect data about plantation ownership and harvesting. All registered woodlots and agroforestry plantings should be exempt from land tax.

***Simplify regulations to make it easier for farmers to legally register, harvest and sell their teak trees to improve the efficiency of the value chain***

The long-term future of teak woodlots and agroforestry plantings is uncertain. Some farmers may not intend to harvest their teak, but instead retain them for land security or emergency purposes; for others, the timeframe until they receive income from their trees is too long. Land use competition for annual crops is high, and development is destroying some plantations.

Promotion policies and incentives, such as better access to improved teak seedlings, need to be increased and strengthened for tree planting of a range of species. The Forestry Law and Decree 96/PM on Plantation Promotion and Investment should recognise that agroforestry plantings are important for producing timber, generating short-term income, reforestation of the upland regions, and reducing erosion. Actively promoting agroforestry systems involving the contour

planting of trees in combination with agricultural crops, forage crops, grasses, non-timber forest products and grazing animals can provide these benefits.

***Increase the promotion of timber agroforestry planting and woodlots, including of other timber species.***

Thousands of households own teak plantations which are geographically dispersed across the landscape. This makes it challenging to provide regular consignments of wood of commercial size and quantity that meet regulatory and market requirements. The cost of transport is high.

Grower groups might help them to transfer knowledge, share skills and resources, and improve individuals' bargaining power, thus increasing income. ACIAR research found, however, that groups based on collective sales and marketing of teak were neither feasible nor sustainable. The costs of grower group membership outweigh the benefits; the viability of the teak groups depends on being able to supply the market regularly, and on buyers being able to meet customer orders for wood. Improved returns to farmers are more likely to occur as a result of developing local processing enterprises, employing local people and paying higher prices for local timber. The Law on Processing should be revised to support the development of local enterprises for wood processing. Simplified operating standards are also needed.

***Promote local processing enterprises, since these are more likely to increase financial returns to teak farmers.***



Square teak logs (Photo: Hilary Smith)

## CONCLUSION

Farm-grown planted teak and other trees can significantly contribute to livelihoods and the national wood industry development, but socio-economic, technical and policy issues limit its contribution. The national goals of poverty reduction, economic development and forest cover restoration will be advanced with revised policies and regulations designed to promote tree planting and management practices that enhance value to farmers and industry.

Implementing these policy recommendations will increase teak wood supply to domestic processors and improve returns to farmers, increase the contribution from teak value chains to regional economies, and support greater adoption of teak woodlots and agroforestry systems as a sustainable and competitive land use option for farmers.

## STATISTICS

- ▶ Luang Prabang Province has **15,300 hectares** of teak plantation.
- ▶ **39% of mapped teak is small in size** (less than 15 cm diameter at breast height); only 4% is bigger than 25 cm or commercial size.
- ▶ Farmers should plant **1,111 stems/hectare**.
- ▶ Teak plantations should be thinned to a residual stocking of **600 trees/hectare** before they are **6–8 years old**.
- ▶ **9.54 million hectares** is the area of forest in Lao PDR in 2011
- ▶ **US\$250 million** is the value of timber exports from Lao PDR in 2008
- ▶ **20,000 m<sup>3</sup>** is the volume of plantation grown teak harvested in Luang Prabang Province in 2010.

## ACKNOWLEDGEMENTS

Hilary Smith, Mark Dieters (UQ), Jonathon Newby (CIAT), Peter Kanowski (ANU), Rodney Keenan (UoM), Tony Bartlett (ACIAR)

## PARTNERSHIPS

### FST/2012/041:

- University of Queensland
- Agricultural Research Centre, Laos
- National Agriculture and Forestry Research Institute
- Souphanavong University
- Northern Agriculture and Forestry College

### FST/2010/012:

- University of Melbourne
- Australian National University
- National University of Laos
- Burapha Agroforestry Co., Ltd.
- Department of Agriculture, Fisheries and Forestry
- Souphanavong University
- Pakpasak Technical College
- Department of Forestry
- National Agriculture and Forestry Research Institute
- Luang Prabang Teak Program
- Department of Forest Inspection
- Lao Furniture Industry Association
- Department of Industry and Handicraft
- National Wood Industry Association
- The Forest Trust

The Australian Centre for International Agricultural Research (ACIAR)

[www.aciar.gov.au](http://www.aciar.gov.au)

ISBN 978 1 86320 025 7 (print)  
ISBN 978 1 86320 026 4 (PDF)

