A Study of the Cambodia Timber Trade:
Market Analysis for the Commercial Community Forestry Project

Forestry Administration

& Wildlife Conservation Society Cambodia Program

A STUDY OF THE CAMBODIA TIMBER TRADE: MARKET ANALYSIS FOR THE COMMERCIAL COMMUNITY FORESTRY PROJECT

FORESTRY ADMINISTRATION & WILDLIFE CONSERVATION SOCIETY

FINAL REPORT

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Abbreviations

CCF	Commercial Community Forestry
CTIA	Cambodia Timber Industry Association
ELC	Economic Land Concession
FA	Forestry Administration
FITDO	Forest Industry & Trade Development Office
GERES	*Groupe Energies Renouvelables, Environment et Solidarités*
MoEYS	Ministry of Education, Youth and Sport
NGO	Non-governmental Organization
TFT	Tropical Forest Trust
WCS	Wildlife Conservation Society

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Very many people from a wide range of organizations willingly gave their time to answer questions about forestry, the timber trade, timber markets and utilization. All are thanked for their wide ranging contributions that provided useful insight, essential to developing a rapid understanding of the problems and to making any conclusions or recommendations for the future.

Summary

The market analysis of the Cambodia timber trade was undertaken in August 2008 on behalf of the Forestry Administraion and the Wildlife Conservation Society with the purpose of evaluating options for the development of Commercial Community Forestry (CCF) in the Seima Biodiversity Conservation Area. To gather information the consultant visited the project area to discuss issues with communities and met with people involved in timber sector in Kampong Cham, Phnom Penh and Siem Reap.

Much of the timber produced and sold in Cambodia is illegally sourced and community management authorized under the Sub-Decree on community management is a potential source that will increase the availability of legal timber derived from responsible forest management.

The CCF project is expected to manage 29,600 hecatres of forest for production. Inventory indicates that the standing volume of trees greater than 60cm dbh is over 160m^3/ha and of this over 50% is Sralao. It is intended that the area will be managed on a 30-year cycle and that production from an anuual coupe of 990 hectares will initially be restricted to two trees per hectare. The yield of sawn-timber, allowing for a probable low recovery rate of about 26%, is expected to be about 2,400m^3.

While it is assumed that the low harvesting intensity will be sustainable, little is known of the ecology and particularly whether Sralao is regenerating adequately. Ecological studies are recommended to confirm if harvesting of Sralao can be sustainable.

Cost of production and transport to villages is estimated to be about \$110/m^3. Management cost were not looked at in this consultancy, but were previously estimated to be about \$40/m^3 including harvesting. Timber should be transported from villages to Keo Seima market and from there using large trucks for the remainder journey. The total cost for transport from villages to Phnom Penh will be about \$87/m^3.

With reasonable profits, which could be \$40/m^3 or more, and full royalty charged it is expected that timber can sell in Phnom Penh for about 15% less than current prices for illegal timber. It will be essential that the sawn-timber from the project is recognized as legal and is not subjected to hindrance or unofficial payments to enforcement agencies, as is common when illegal timber is transported in Cambodia. These unofficial payments make illegal timber unexpectedly expensive.

Constraints and uncertainties include

- the capacity of communities to increase production to 2,400m^3/year
- the feasability of establishing a timber depot at Keo Seima
- the adequacy of arrangements to ensure unobstructed transportation without levy of unofficial fees
- how long it will be before harvesting can be permitted
- the level of royalty that will be payable by the communities.

The timber markets in Phnom Penh can easily absorb the timber that will be produced. Quality will not be a problem and nor is it a problem that the principle species produced will be Sralao, which is good for interior use and used in many applications such, as beams and rafters, flooring, furniture and carving.

The most promising market is the construction industry. On internationally financed projects use of legal wood is often stipulated and wood requirements on large projects can easily utilize the entire output from the CCF project.

It is recommended that the project attempts to establish a link with a large construction company, such as LBL. The advantage to a buyer would be that it can achieve steady supply of a reasonable volume of legal timber at less than the current market price. In return, the buyer may be willing to invest in establishment of a timber depot at Keo Seima and provision of portable sawmills to improve production efficiency. Involvement of a strong commercial enterprise could help to ensure long-term continuity even if donor inputs are no longer forthcoming.

In conclusion, the CCF project has strong potential to be profitable. There is adequate demand for Sralao on the local market without having to consider export options, and the proposed marketing strategy can be of benefit to both communities and buyers. Early commencement of harvesting would allow prompt identification of problems and development of solutions to ensure that in the near future Cambodia has an example of successful commercial community forestry that can serve as a model for other projects.

សេចក្តីសង្ខេប:

ប្រធានបទស្តីពី "ការវិភាគទីផ្សារសំរាប់ផលិតផលឈើនៅកម្ពុជា" ត្រូវបានគេសិក្សា កាលពីខែ សីហា ឆ្នាំ ២០០៨ ក្នុងនាម រដ្ឋបាលព្រៃឈើ និង អង្គការសមាគមអភិរក្សសត្វព្រៃប្រចាំកម្ពុជា (WCS) ដើម្បីប៉ាន់ប្រមាណពីលទ្ធភាពក្នុងការអនុវត្តគំរោងសហគមន៍ពាណិជ្ជកម្មព្រៃឈើ ដែលស្នើធ្វើការសាកល្បងនៅក្នុងតំបន់អភិរក្សជីវៈចម្រុះ "សីមា"។ ក្រុមការងារបានចុះប្រមូលពត៌មានដោយផ្ទាល់ ដល់តំបន់គោលដៅ ដោយបានជួបពិភាក្សាជាមួយសហគមន៍មូលដ្ឋាន ម្ចាស់ក្រុមហ៊ុនសំណង់ សិប្បកម្ម និង ដេប៉ូឈើ ឈ្មួញកណ្តាល និង ប្រជាជន ដែលពាក់ព័ន្ធនឹងអាជីវកម្មព្រៃឈើ នៅក្នុងខេត្ត កំពង់ចាម ខេត្ត សៀមរាប និង រាជធានីភ្នំពេញ។

ផលិតផលឈើភាគច្រើននៅក្នុងប្រទេសកម្ពុជា មានប្រភពមកពីអាជីវកម្មមិនស្របច្បាប់។ ការគ្រប់គ្រងព្រៃឈើក្រោមកិច្ចព្រមព្រៀងព្រៃសហគមន៍ ដែលអនុលោមតាមអនុក្រឹត្យស្តីពីការគ្រប់គ្រងសហមន៍ព្រៃឈើ គឺជាប្រភពសក្តានុពល ដែលនឹងជួយបង្កើនអោយមានផលិតផលឈើស្របច្បាប់ ចេញពីការគ្រប់គ្រងព្រៃឈើប្រកបដោយការទទួលខុសត្រូវ។

គំរោងសហគមន៍ពាណិជ្ជកម្មព្រៃឈើ ត្រូវបានគេរំពឹងថានឹងស្នើសុំគ្រប់គ្រងព្រៃផ្តល់ផលចំនួន ២៩.៦០០ ហិកតា។ លទ្ធផលសារពើភ័ណ្ឌព្រៃឈើបានបង្ហាញថា មាឌឈើឈរដែលមានអង្កត់ផ្ចឹតធំជាង ៦០ សង់ទីម៉ែត្រ មានចំនួនច្រើនជាង ១៦០ ម^{3}/ហិកតា ដែលនៅក្នុងនោះច្រើនជាង ៥០% គឺជាប្រភេទឈើស្រឡៅ។ ប្រតិបត្តិការអាជីវកម្មនេះគេរំពឹងថានឹងគោរពទៅតាមខួបវង្វិលជុំរយៈពេល ៣០ ឆ្នាំ ដែលបែងចែកជាគុបអាជីវកម្មប្រចាំឆ្នាំ ចំនួន ៩៩០ ហិកតា ហើយសំរាប់ដំណើរការអាជីវកម្មជាលើកដំបូង គំរោងនឹងកំរិតការដកហូតត្រឹមតែ ២ ដើម ប៉ុណ្ណោះក្នុងមួយហិកតា។ ដូចនេះ បរិមាណមាឌឈើកែច្នៃជាឈើអារ សរុបប្រចាំឆ្នាំ ប្រហែល ២.៤០០ ម^{3} បើសិនកម្រិតកំហាត (Recovery Rate) ប្រហែល ២៦ %។

ទោះបីជាបរិមាណនៃការដកហូតនេះមានកម្រិតទាប ហើយធានានិរន្តរភាពក៏ពិតមែន ប៉ុន្តែមានពត៌មានតិចតួចពាក់ព័ន្ធនឹងលក្ខណៈអេកូឡូស៊ីរបស់ប្រភេទឈើសំខាន់ៗ ជាពិសេស ប្រភេទឈើស្រឡៅ (អំពីដំណុះកូនឈើមានគ្រប់គ្រាន់ដែរឬអត់)។ គេបានផ្តល់អនុសាសន៍អោយមានការសិក្សាបន្ថែមទៀត ពីអេកូឡូស៊ីរបស់ប្រភេទឈើស្រឡៅនៅក្នុងតំបន់នេះ ដើម្បីអោយប្រាកដថា ការធ្វើអាជីវកម្មលើប្រភេទឈើនេះ អាចធានាបាននូវនិរន្តរភាព។ ការចំណាយលើប្រតិបត្តិការអាជីវកម្មរួមបញ្ចូលទាំងការអូសទាញនិង ដឹកជញ្ជូនឈើពីក្នុងព្រៃមកកាន់គំនរនៅតាមភូមិគោលដៅត្រូវបានគេប៉ាន់ប្រមាណថាប្រហែល ១១០ ដុល្លា /ម^{3}។ ការចំណាយលើការគ្រប់គ្រងអាជីវកម្មមិនត្រូវបានគេលើកយក មកពិភាក្សាក្នុងការសិក្សានេះទេ ប៉ុន្តែគេអាចប៉ាន់ប្រមាណថាប្រហែលជា ៤០ ដុល្លា/ ម^{3} គិតរួមទាំងការចំណាយលើការដកហូតផលឈើ។ ផលឈើទាំងនោះគួរធ្វើការដឹកជញ្ជូនបន្តពីភូមិគោលដៅទៅកាន់ទីប្រជុំជនកែវសីមា ហើយដឹកបន្តទៅកាន់គោលដៅនានាដោយប្រើរថយន្តដឹកទំនិញធុនធ្ងន់។ ចំណាយសរុបសំរាប់ការដឹកជញ្ជូនពីភូមិគោលដៅទៅកាន់ភ្នំពេញ ប្រហែលជា ៨៧ ដុល្លា/ ម^{3}។

ឧបមាថា បន្ទាប់ពីការទូទាត់ចំណាយលើការបង់ថ្លៃសួយសារតាមការកំណត់របស់រដ្ឋ ហើយអាចចំណេញយ៉ាងតិចត្រឹម ៤០ ដុល្លា/ ម^{3} នោះ គេរំពឹងថា ថ្លៃឈើរបស់គំរោងដែលលក់នៅទីក្រុងភ្នំពេញ អាចថោកជាង ១៥ % បើធៀបនឹង

ថ្លៃឈើដែលមិនស្របច្បាប់ នាពេលបច្ចុប្បន្ន។ ដូចនេះ វាពិតជាចាំបាច់ខ្លាំងណាស់ ដែលផលិតផលឈើអាររបស់គំរោង ត្រូវបានទទួលស្គាល់ដោយស្របច្បាប់ និង មិនតម្រូវអោយបង់ថ្លៃចំណាយមិនផ្លូវការ ទៅដល់ភ្នាក់ងារអនុវត្តច្បាប់ ដែលនេះជាទំលាប់សំរាប់ការដឹកជញ្ជូនឈើមិនស្របច្បាប់ នៅក្នុងប្រទេសកម្ពុជា។ ការចំណាយមិនផ្លូវការនេះហើយ ដែលកត្តាធ្វើអោយផលិតផលឈើមិនស្របច្បាប់មានតម្លៃថ្លៃជាង។

បញ្ហា និង ភាពមិនល្បឿជាក់របស់គំរោង:

- សមត្ថភាពរបស់សហគមន៍ក្នុងការបង្កើនការផលិតអោយបាន ២.៤០០ $ម^{3}$/ឆ្នាំ។
- លទ្ធភាពក្នុងការបង្កើតដេប៉ូឈើនៅទីប្រជុំជនកែវសីមា
- ការគាំទ្រនិងទទួលស្គាល់អោយបានគ្រប់ជ្រុងជ្រោយ ដើម្បីធានាការដឹកជញ្ជូនដោយមិនបាច់បង់ពន្ធមិនផ្លូវការ
- រយៈពេលដែលត្រូវរង់ចាំ មុនពេលមានការអនុញ្ញាតិអោយដកហូតផលឈើ
- ថ្លៃសួយសារឈើឈរដែលសហគមន៍ត្រូវបង់ជូនរដ្ឋ

តម្រូវការទីផ្សារឈើនៅក្នុងរាជធានីភ្នំពេញអាចទទួលយកនូវបរិមាណឈើទាំងស្រុង ដែលគំរោងនឹងផលិតបាន។ ទោះបីប្រភេទឈើចំបងជាឈើស្រឡៅ ក៏មិនមែនជាបញ្ហាចោទដែរ ព្រោះថា ឈើប្រភេទនេះមានគុណភាពល្អអាច ប្រើបានសំរាប់ផ្នែកខាងក្នុងអាគារ និង ក្នុងគោលបំណងជាច្រើនទៀត ដូចជា គ្រឿងចម្លាក់ គ្រឿងសង្ហារឹម កម្រាល និង ធ្នឹម។

ទីផ្សារដែលជាទីក្តីសង្ឃឹមរបស់គំរោងគឺឧស្សាហកម្មសំណង់ ព្រោះថា គំរោងប្រើប្រាស់ហិរញ្ញវត្ថុអន្តរជាតិទាំងនោះ តម្រូវអោយមានការប្រើប្រាស់វត្ថុធាតុដើមជាឈើដែលមានប្រភពស្របច្បាប់ ហើយតម្រូវការផលិតផលឈើរបស់ គំរោងធំៗទាំងនេះ អាចទទួលរ៉ាប់រងយ៉ាងងាយស្រួលនូវបរិមាណឈើ ដែលគំរោងសហគមន៍ពាណិជ្ជកម្មព្រៃឈើ ផលិតបាន។

ការសិក្សានេះ បានផ្តល់អនុសាសន៍ដល់គំរោងអោយព្យាយាមកសាងទំនាក់ទំនងជាមួយក្រុមហ៊ុនសំណង់ធំៗ ដូចជា ក្រុមហ៊ុន LBL។ ផលប្រយោជន៍ដោយផ្ទាល់ដែលក្រុមហ៊ុនទទួលបានគឺការផ្គត់ផ្គង់នូវបរិមាណឈើដ៏សមស្រប ដែលមានប្រភពស្របច្បាប់ និង មានតម្លៃថោកជាងតម្លៃទីផ្សារឈើ នាពេលបច្ចុប្បន្ន។ ចំណែកឯផលប្រយោជន៍ ដែលសហគមន៍អាចទទួលបានត្រឡប់មកវិញ គឺក្រុមហ៊ុនអាចនឹងយល់ស្របក្នុងការដាក់ទុនវិនិយោគ តាមរយៈការ បង្កើតអោយមានដេប៉ូឈើនៅទីប្រជុំជនកែវសីមាតែម្តង និង កសាងរោងចក្រអារឈើ ដើម្បីបង្កើនប្រសិទ្ធិភាពក្នុង ការផលិត។ ការចូលរួមពីសំណាក់សហគ្រាសពាណិជ្ជកម្មដែលរឹងមាំ អាចជួយអោយគំរោងមានលទ្ធភាពដំណើរការ បន្តអាជីវកម្មដោយខ្លួនឯង ទោះបីនាពេលខាងមុខ ម្ចាស់ជំនួយពុំមានការគាំទ្របន្តក៏ដោយ ។

សរុបសេចក្តីមក គេអាចសន្និដ្ឋានបានថា គំរោងសហគមន៍ពាណិជ្ជកម្មព្រៃឈើ មានសក្តានុពលក្នុងការរក ប្រាក់ចំណេញ។ ទីផ្សារក្នុងស្រុកមានតម្រូវការគ្រប់គ្រាន់សំរាប់ប្រភេទឈើស្រឡៅ ដោយពុំចាំបាច់ស្វែងរកការគាំទ្រ សំរាប់ការនាំចេញនោះទេ។ យុទ្ធសាស្ត្រដែលបានស្នើឡើង អាចផ្តល់ផលប្រយោជន៍ដល់ភាគីទាំងសងខាងគឺ ភាគី អ្នកទិញ និង ភាគីសហគមន៍។ នៅពេលដែលអាជីវកម្មចាប់ផ្តើមដំណើរការ ទាមទារអោយមានការសិក្សាជាបន្ទាន់

ដើម្បីកំណត់នូវបញ្ហារាំងស្ទះ និង ដំណោះស្រាយជាយុទ្ធសាស្ត្រ ដើម្បីធានាថាពេលអនាគតដ៏ខ្លីខាងមុខ ប្រទេសកម្ពុជាមានឧទាហរណ៍ស្តីពីភាពជោគជ័យរបស់តំរោងសហគមន៍ពាណិជ្ជកម្មព្រៃឈើ ដែលអាចធ្វើជាគំរូដ៏ល្អសំរាប់តំរោងដទៃទៀត។

1. Introduction

The Wildlife Conservation Society (WCS) is providing financial and technical support to the work of the Cambodia Forestry Administration (FA) in the Seima Biodiversity Conservation Area located in the south of Mondulkiri Province. The aim is to maintain the integrity of the forest, its wildlife and the livelihoods of its indigenous communities through development of appropriate strategies, including commercial forest use by local communities.

Development of a Commercial Community Forestry (CCF) project is being undertaken in the western zone of the conservation area. It is intended that local communities gain increased benefit from the forest resource and participate effectively in its sustainable management. To explore the commercial options the project partners wished to investigate the potential for selling responsibly sourced timber within Cambodia. Potential buyers were thought to include handicraft producers, manufacturers of high quality furniture and construction companies undertaking building projects for donors, Non-governmental Organizations (NGOs) and other organizations concerned about responsible wood purchasing. The size of the market and the true level of interest in legal, responsibly produced timber were unknown. Nor was it known whether any demand exists for the available species or what would be the cost of transporting timber to the main markets.

In order to investigate the uncertainties WCS commissioned a consultancy, undertaken during August 2008, to analyse the Cambodia timber trade in the context of the CCF project. With assistance from staff of WCS and the FA, the role of the consultant was to review the domestic timber market in Cambodia, evaluate the potential for domestic sale of timber from the project area and to update economic projections. The consultancy looked only at aspects concerning timber trade and did not cover trade in non-timber products or opportunities that may develop to earn carbon credits. The Terms of Reference are shown in Annex 1.

2. Methods

Visits were made to the project area to observe the forest, meet local communities and discuss local timber related activity, and to Phnom Penh and Siam Riep to meet representatives of government, trade and industry. The schedule of travel and meetings is shown in Annex 2. Information was gathered widely during discussions with relevant people, including WCS and FA staff, community representatives, loggers, timber processors, timber transporters, potential buyers, traders and representatives of timber sector organizations. People met are listed in Annex 3.

This report provides an analysis of the various discussions, updated economic assumptions including production costs and sales values, and recommendations on the best marketing options for timber from the project area. Results were presented at a meeting on 29 August 2008 with FA staff and NGO representatives and the final report reflects comments and questions raised at that meeting.

Details of species mentioned in this report are provided in Annex 4.

3. The Forest Sector & Community Forestry

3.1 General

About 3.4 million hectares of forest concessions are allocated to 12 local and foreign owned companies, but a moratorium on concession logging imposed by the government in 2002 has halted formal concession logging and has curtailed the processing activities of many companies.

To varying degrees timber industries and the timber trade still operate. Limited amounts of legal timber are available through a bidding process, whereby the FA identifies bidding coupes, conducts inventory of the coupes, and prepares management plans, which are submitted for public tender. The successful bidders are allowed legally to harvest and transport timber to market, subject to payment of royalty and premium. Clearance of old rubber plantations is a further legal timber source providing logs for plywood manufacture and for fuelwood required by industries making bricks, tiles and garments.

One concession holder, Cherndar Plywood Manufacturing, reports that it is possible to obtain sufficient log supply to operate for three to five months per year, but overall the plywood industry does not have adequate raw material to produce plywood sufficient to meet local demand. To make up the shortfall Cambodia is apparently reliant on imported plywood from China. Although many people claimed to have problems sourcing timber, there is no obvious shortage in Phnom Penh's timber markets, where much of the supply is from illegal sources.

Officially recorded exports are minimal and in 2005 amounted to about 4,530m^3 of plywood and 440m^3 of sawn-timber (Chheng Kimsun & Hang Suntra, 2006). However, there are allegations of high levels of

illegal exports, both plywood and sawn-timber, being transported overland or via the Mekong River to Vietnam and through Sihanoukville and Oknha Mong Ports, mainly to China.

Large-scale firewood production from Sway Chanti (*Anacardium occidentale*) was observed at Angkuonh Dey in Kampong Cham District enroute from Phnom Penh to the project area, and apparently production of firewood and charcoal is a widespread activity in other locations in Cambodia.

Timber is also widely sourced illegally without any permits, or legally with permits issued by the FA for local community use. There is apparently some flexibility in the definition of local use and so this is a source of timber that may be considered to be at least quasi-legal. Permits may cover single trees or a few trees. Permits are also granted for forest clearance under Economic Land Concessions (ELC), which allow plantation development, normally rubber, on areas of up to 10,000 hectares. It is illegal under Cambodian law to grant an ELC on forested land, or to harvest Luxury Grade species of Beng (*Afzelia xylocarpa*), Kra Nhoung (*Dalbergia cochinchinensis*), Neang Nuon (*Dalbergia bariensis*) and Thnong (*Pterocarpus pedatus*), but despite this permits are issued and the practice results in further timber supply that has quasi-legal status.

Forest management by communities was legalised through a Sub-Decree on Community Forest Management (Royal Government of Cambodia, 2003) that aims to determine rules for the establishment, management and use of community forests, and allows for:

- establisment of Community Forest Agreements giving local communities management rights for 15 years, renewable for a further 15 years subject to compliance with the original agreement
- sustainable harvesting, in accordance with an approved management plan, sale of non-timber forest products and, five years after signing of an agreement, sale of timber products subject to payment of agreed royalty fees.

The Sub-Decree on Community Forest management forms the broad legal framework for the CCF project being implemented by WCS and the FA in the Seima Biodiversity Conservation area, but the project aims to pilot a new model with some notable departures from the current sub-decree.

3.2 The Commercial Community Forestry Project

3.2.1 Area Description

The Seima Biodiversity Conservation Area is located in Mondulkiri and Kratie provinces in eastern Cambodia and extends to 305,000 hectares. Technically it is still production forest located in a suspended concession formerly operated by Samling International from Malaysia. It was established as a conservation area by Ministerial Declaration in August 2002. Approximately 155,000 hectares was designated as the core area and the remaining 150,000 hectares is in buffer zones to be managed for sustainable production (Grimm *et al*, 2007).

The CCF project is situated in the west of the conservation area and covers an area totaling around 37,000 hectares. Of this it is envisaged that potentially up to 20% may be set aside from commercial logging in order to as they are unsuitable for timber logging, as well ecologically and socially sensitive areas. The net area of forest available for logging is therefore conservatively estimated 29,600 hectares, which is sub-divided among three communes as follows:

- Khseum 12,800 ha
- Sre Chukk 5,600 ha
- Sre Preah 11,200 ha

Results of an inventory (see Table 1 & Annexe 5) conducted by Tropical Forest Trust (TFT) and WCS indicate that the total standing volume in trees of 60cm dbh and greater exceeds 160m^3/ha. Of this over 55% is Sralao (*Lagerstroemia* spp.) and nearly 80% is concentrated in the five most commonly occurring species. Analysis of tree numbers per hectare (see Table 2) produces a similar result. Note that the total volume of over 250m^3 per hectare (Annexe 5) is higher than expected for a partly logged forest of this type. This suggests there may have been some errors in the inventory. These figures should be treated with caution. A thorough inventory of the site will be carried out prior to any logging operations

Table 1 Estimated Volumes (m^3/ha) for Trees of 60cm dbh & greater

Species	Class	Volume		
		m^3/ha	%	Cumm (%)
Sralao	I	92.49	55.5	55.5
Chhetiel Toeuk	II	10.86	6.5	62.0
Popoul Thmor	I	11.12	6.7	68.7
Chambork		9.29	5.6	74.3
Phdeik	II	5.22	3.1	77.4
Other		37.75	22.6	100.0
Total		166.73	100.0	

Table 2 Estimated Numbers (#/ha) for Trees of 60cm dbh & greater

Species	Class	Tree Numbers		
		#/ha	%	Cumm %
Sralao	I	18.9	54.2	54.2
Popoul Thmor	I	2.2	6.4	60.6
Chhetiel Toeuk	II	1.9	5.4	66.0
Krakoh	I	1.8	5.2	71.2
Chambork		1.5	4.3	75.5
Other		8.6	24.5	100.0
Total		34.9	100.0	

3.2.2 Production

Within the core area logging is allowed for customary use only, for example for home construction. This requires permission from FA officials and is in accordance the Forest Law. All other logging is conducted entirely illegally and although logging continues, particularly for the Luxury Grade species of Beng, Kra Nhoung, Neang Nuon and Thnong, the FA and Army have had considerable success in apprehending and impounding illegally transported timber and the chainsaws and vehicles used in its production and transport.

Outside the core area logging is conducted legally or quasi-legally by villagers under permits issued by the FA, but harvesting operations are not extensive. The villagers of Pu Char in Sre Preah Commune reported that only 50m^3 is harvested per year of which about 30m^3 is for local use and the remainder is cut for transport outside the area.

Production from the CCF project will be modest in the initial stages. It is intended that the total area of 29,600 hectares of production forest will be harvested on a 30-year cycle thus setting the annual coupe at about 990 hectares. It is initially proposed that only two trees will be harvested per hectare, which will result in a total annual harvest of about 1,980 trees.

The proposed minimum diameter of trees harvested will be 60cm dbh with an assumed minimum bole volume of 4.6m^3. With a total of nearly 35 trees greater than 60cm dbh per hectare recorded during the inventory (see Table 2), this is extremely conservative and in the future it is likely to be possible to increase the level of harvesting. Also, many Sralao, which will be the main species harvested, at least during the first cycle, are larger than 60cm dbh so the harvested volume could be greater, but to be prudent projections of timber production are based on this assumed bole volume.

It can be expected that it will take some time before community logging operations are sufficiently organized to achieve even the low level of harvesting envisaged and it would be impractical to aim initially for higher yields.

Recovery from Sralao is apparently influenced by the fluted nature of the trunk and the high incidence of hollows. Recovery rates calculated from figures provided by villagers are in the range of 18 to 34% for Sralao, but for other species can be as high as 49% as shown in Table 3.

Table 3 Indicated Recovery Rates

Species	Height	Diameter	Volume	Volume Basis	Trees or logs for 1m^3 of Sawn-timber	Recovery (%)
Sralao	8	50	1.57	Log	2.00	32
Sralao	15	50	2.06	Tree	1.43	34
Sralao	15	50	2.95	Log	1.43	24
Sralao	7	50	1.37	Log	4.00	18
Klong/Tbeng	7	50	1.37	Log	3.00	24
Koki	15	50	2.06	Tree	1.00	49
Koki	15	50	2.95	Log	1.00	34

It was not clear whether villagers were talking of about log diameters or tree diameters at breast height. In one case they were almost certainly talking about tree diameters, but this uncertainty could have a considerable impact on the figures as the volume equation used will be different and the estimated production is approximated to 2,400m^3 from the median value as shown in Table 4.

Table 4 Estimate of Total Production per Year

No. of trees harvested	1,980	
Assumed tree volume	4.6	m^3/tree
Total volume	9,108	m^3
Recovery at 18%	1,639	m^3
Recovery at 34%	3,097	m^3
Recovery (median value)	2,368	m^3

When harvesting commences in the CCF project there is going to be a considerable problem in achieving the intended level of production. The Pu Char villagers reported that about 50m^3 is produced per year. In the three communes there are a total of 19 villages, of which 11 are probably close enough to the forest areas to be involved in logging. If it is assumed that these 11 villages all harvest similar amounts it will mean that current annual production by all villages is 550m^3/year. With the anticipated harvest being about 2,400m^3/year there will have to be a considerable increase in harvesting output and maybe capacity.

It is possible that increased production can be achieved by bringing loggers in from further afield or introducing greater efficiencies that might be possible, for example, with outside investment that could provide portable sawmills enabling more rapid production of sawn-timber. The low technology approach would seem to be appropriate for the communities and it is not advocated that there is any increase in mechanisation, which would be completely inappropriate for the indended low intensity production. The only improvement should be the introduction of improved sawmilling techniques, although even in this context the technology should be simple and in line with what local people are familiar with, which at present are simple circular saw benches.

A further issue to be resolved regarding harvesting and sawn-timber production at stump is that the Forest Law does not permit sawmilling in forests and stipulates that sawmills should be located at least 5 kilometres from the forest.

3.2.3 Ecology

Forests visited in the core area of the Seima Biodiversity Conservation Area included semi-deciduous and mixed deciduous types similar to that in the proposed CCF project area.

Sralao is dominant over much of the area with trees having a diameter of about 90 to 110cm and height in the order of 40 to 50m. There are also many emergent Sralao (50 to 70cm diameter & 30 to 40m in height). The question arose of whether Sralao was regenerating as no pole stage trees were seen and only one Sralao sapling was observed. However, reports from subsequent observations in different areas by WCS staff do note the presence of Sralao regeneration. The inventory results also indicate greater numbers of trees of 30 to 50cm dbh than was apparent from casual observation.

Among other species there are a number of dipterocarps. These are far less abundant, but according to Grimm *et al* (2007) Chhetiel Toeuk (*Dipterocarpus alatus*) is the next most common tree and inventory records indicate that the most common Class I timber species are Popoul Thmor (*Vitex pinnata*), Sokram (*Xylia xylocarpa*) and Krakoh (*Sindora siamensis*). Chhetiel Toeuk is of importance to local communities for its resin, which is the most valuable commodity traded by villagers in the CCF area.

Phon (2000) records the existence of seven species of *Lagerstroemia* in Cambodia. These include *L. calycultata* (Sralao), *L. duperreana* (Sralao Kanchreap) and *L. ovalifolia* (Sralao Chou), all of which occur in the mixed deciduous and semi-deciduous forests and are large trees that attain heights of at least 30m. The Bunong residents of the SBCA recognize two types of Sralao, distinguished by bole, flower and fruit characteristics. It is assumed that most of the large Sralao in the CCF area is *L. calycultata*, with L. speciosa provisionally identified as the second species (MacDonald 2004b). These identifications are still unconfirmed.

Regardless of which species of *Lagerstroemia* occurs in the CCF area little is known of the ecology. Casual observation indicated a possible lack of regeneration. A harvesting strategy focused on Sralao might eventually lead to its disappearance and alteration of the forest structure. Possibly it will be replaced by dipterocarps. Sustainable harvesting of Sralao might be unrealistic, but overall sustainable harvesting should be possible, initially of Sralao and in future of dipterocarps. The success of this would depend on the actual outcome of any ecological succession and which dipterocarp species replace the Sralao. If the resin producing Chhetiel Toeuk is the main dipterocarp species, the villagers may be resistant to it being harvested for timber.

Studies conducted in Cat Tien National Park in Vietnam (Blanc, L. *et al*, 2000) show a similar forest structure dominated by Sralao, but with regeneration almost absent and the authors surmise that the species will eventually be replaced.

The implication for the proposed CCF project is that without an improved understanding of the ecology of Sralao and the overall ecology of the deciduous and semi-deciduous forests, any harvesting strategy wil lack scientific justification and there is little basis on which to predict whether the impacts might be negative or whether sustainable management can be achieved. Some investigation of the ecology is recommended in order to provide scientific support for the proposed strategy.

4. Costs & Prices

Cost of production, transport and market prices for timber were determined to evaluate the financial options and feasibility of the CCF project and to update the previously developed economic model.

In 2006 the price of Sralao was \$250/m^3 (Grimm *et al*, 2007), but traders in Phnom Penh now advise that they pay \$500/m^3 and upwards so with prices of timber having roughly doubled in the last two years it could be that there is continual and substantial change in the figures. Although, prices determined during the consultancy are likely to change in future, they are sufficient for an indicative analysis of the feasibility of the CCF project.

4.1 Cost of Production

Production costs were advised during discussions with residents in Pu Char village, Sre Preah Commune and by two loggers in Khseum Krau village, Khseum Commune, both of which are villages that will be involved in the CCF project.

Current production uses simple technology whereby trees are felled and converted into boards using a chainsaw and then transported to the village by ox-cart. Loggers claim to be able to produce anything from 0.25 to 1.3m^3 of sawn-timber per day with Sralao likely to be at the lower end of this range because of the low recovery rates as discussed in Section 3.2.2. There were variations in logging costs provided but typical figures are shown in Table 5. Despite variation there was reasonable consistency and the range was in the region of \$100 to \$110/m^3. The capital cost of a chainsaw is not included in the figures, but they apparently cost \$350 and with maintenance will last for ten years.

Trees are purchased from individual villagers because the local customary practice is that villagers 'own' resin trees and also the adjacent timber trees that form discretely owned 'coupes'. This is ownership is not recognised in Cambodian law, but is the traditional Bunong system that is followed informally in the SBCA. Trees are sold for as little as $2.50 with higher grade species being sold for $5.00, and $15.00 charged for a Beng tree. As technically the villagers do not own trees or have the right to sell them, and consideration will have to be given as to whether this established local practice is to be accommodated in the CCF procedures.

Payment of royalties will be an additional cost that will be incurred by the CCF project and currently for Class I species the rate is set at $81/m^3 of sawn-timber produced. Whether the communities will be expected to pay the full royalty rate is unknown as the Sub-Decree on Community Forest Management specifically states that "Royalties and premiums should be set after consultation with [communities] in order to support community development, equitable benefit sharing and poverty alleviation". A meeting at MAFF on 13th November 2007 confirmed that following the development phase the Ministry will be willing to negotiate royalty rates.

Table 5 Costs to Produce 1m^3 of Sawn-timber Delivered to Village

Details	Unit cost ($)	Units	Cost ($)
Labour	3.75	6 mandays	22.50
Food	3.75	3 rations	11.25
Fuel	1.625	15 Litres	24.38
Chainsaw oil	0.625	5 Litres	3.13
2-stroke oil	1.125	3 Litres	3.38
Chain	17.50	3 M^3/chain	5.83
Maintenance	2.50	2 per m^3	5.00
Tree purchase	5.00	2 Trees	10.00
Transport	25.00	1 m^3	25.00
Total ($)			110.46

Management costs are not included in the cost of production. Approximate management costs were determined at an earlier stage of the project by TFT and were estimated to be $40/m^3 including harvesting. No review of these costs was undertaken during this consultancy and when management procedures are established it will be necessary to factor in revised management costs. It is predicted that financial returns (see Section 4.4) will be adequate to cover the estimated operational costs.

4.2 Cost of Transport

Roda & Santosh (2006) give the cost for various methods of transport in Cambodia as shown in Table 6. These figures serve to show the comparative expense, but were prepared at least two years ago and will be now out-of-date. Railways are not an option from the CCF project area and although transport by barge on the Mekong River is possible from Kampong Cham to Phnom Penh, this would involve charges for double handling and normally a river-going barge will carry about 1,000m^3 or more, which is well beyond the requirements of the CCF project. Transport by road is therefore the only option considered.

Table 6 Estimated Transport Costs in Cambodia

Transport mode	Transport cost ($/tonne/km)
Ox cart	~0.5
15 tonne trucks on unpaved roads	0.2 to 0.23
Rail road	~0.027
Large trucks on paved roads	0.054 to 0.055
River transport, by barge	~0.025

Roda & Santosh (2006)

The current practice after harvesting is to transport sawn-timber to villages by ox-cart, the cost of which is included in the logging costs (see Table 5). From the villages sawn-timber will need to be transported to an accessible loading point. Because of the poor condition of the roads, this is done using small trucks, known locally as *kouyun*, which can transport about 1.5 to 2m^3 of sawn-timber to a roadside loading point. Local practice is then to move sawn-timber from Keo Seima market and other locations to Suong Market near Kampong Cham using small pick-up trucks transporting 3 to 4m^3. This intermediate transport covers a distance of about 130 kilometres and costs $175/trip, including payment of informal fees to government enforcement officials, or $75 excluding payment of fees.

The preferable option at the main loading point, avoiding the costly and inefficient intermediate use of pick-ups, is that sawn-timber is transferred to larger trucks for transfer to the destination markets. Cost estimates are therefore based on the assumption that the main loading point will be Keo Seima market, which is the closest point to the villages that is easily accessible by large trucks. It is also assumed that the main transport will by 15 tonne trucks, which can carry 15m^3. Larger trucks carrying 20m^3 are also used in timber transport, but 15 tonne trucks seem to be the favoured vehicle of civilian timber transporters.

Distances involved in transport over various routes and estimated transport costs based on assumed costs per kilometre are given in Table 7. Quotations for transport are normally based on a flat rate for a trip and not detailed by volume and distance. Information provided by a timber transport operator in Kampong Cham was that the transport charge for carrying 15m^3 from pick-up point to Phnom Penh, a distance varying from 150 to 200 kilometres, was $200/trip. The unit cost ($0.076/m^3/km) derived from this is used to calculate cost of transport over various routes. Labour costs incurred for loading and offloading are included in the transport costs, which is the normal practice of timber transporters in Cambodia.

Table 7 Transport Distances & Costs for Movement of Timber on Various Routes

Route	Distance (km)	Transport Mode	Volume (m^3)	Cost ($/m^3/km)	Total Cost ($)
Villages to Keo Seima	15 (avg)	Kouyum	1.5	4.44	100
Keo Seima to Kampong Cham	150	15t truck	15	0.076	170
Kampong Cham to Phnom Penh	124	15t truck	15	0.076	140
Kampong Cham to Siem Reap	253	15t truck	15	0.076	290

Local transport using a kouyum is expensive, but because of the bad condition of roads is unavoidable. However, in future with an appropriate marketing strategy (see Section 8) it may be possible to encourage investment, some of which could be allocated for road improvement and maintenance, thus reducing high cost of kouyum transport.

The overall transport cost to move 15m^3 from village to market will require ten trips using a kouyum and a single trip using a 15 tonne truck. Costs derived from Table 7 for transport to main markets are as shown in Table 8.

Table 8 Transport Distances & Costs for Movement of Timber on Various Routes

Destination	Total Cost	
	($)	($/m^3)
Kampong Cham	1,170	78
Phnom Penh	1,310	87
Siem Reap	1,460	97

4.3 Current Sale Prices for Sawn-timber

Price quotations that were given for sale of sawn-timber at various locations are influenced by species, profit, transport costs and informal charges collected during transit.

Basic prices quoted by villagers for sale of timber varied from $120/m^3 for Klong and Tbeng to $350/m^3 for Krakoh. For Sralao, villagers from Pu Char advised that they sell from the forest for $100/m^3 or at village for $150/m^3, which they claim includes a profit of about $10/m^3, and in the latter case some profit for ox-cart transportation. However, logging costs (see Table 5) would indicate that the profit might be closer to $40/m^3. At the roadside village of Khseum Krau the price quoted for Sralao was $250/m^3, which is assumed to reflect the cost of transport from source village to roadside.

The purchase price advised by a timber transporter for Phdeik and Chhetiel at roadside was $250/m^3, but Sralao was not one of the species traded and so prices quoted for roadside sales could not be confirmed. Only one timber transporter was willing to talk and all others refused presumably because much of their business is based on illegal activity. It is therefore assumed that $250/m^3, albeit based on limited information, will be the roadside price of Sralao.

The major species found to be traded in timber stores in Phnom Penh were Chhetiel, Doon Chaem and Phdeik. All are sold as boards, the common sizes being 2 x 20cm x 4 to 6m and 4 x 12cm x 4 to 10m. Other species traded include Sralao and Krakoh, and Sway and Deum Kor for low grade use such as concrete form-work.

Prices in Phnom Penh will reflect additional transport costs, including transporter's profit and, importantly, because much of the timber transported is illegally sourced, informal payments to government enforcement agencies are routinely required to facilitate movement. Although limited information was available on this aspect of the trade, it was reported that 15m^3 loads of low grade boards of Sway and Deum Kor are transported for $300/trip of which about $100 is paid in informal fees and $200 is therefore the actual cost of transport. Such timber attracts limited interest from enforcement agencies. In contrast, 15m^3 loads of Phdeik and Chhetiel, which attract significant attention, are transported for $150/m^3 or $2,250/trip. The indication is that informal payments for movement of timber from Kampong Cham District to Phnom Penh are in excess of $130/m^3.

Prices for timber delivered to Phnom Penh, reflecting all profits and other charges were provided by various timber traders and are summarized in Table 9.

Table 9 Timber Prices ($ delivered Phnom Penh)

Species	Prices by Trader (US$/m^3)					Rounded Average (US$/m^3)
	A	B	C	D	E	
Chhetiel (*Dipterocarpus* sp)		430	480	500	420	460
Doon Chaem (*Tarrietia javanica*)		500				500
Krakoh (*Sindora siamensis*)			500	600		550
Phdeik (*Anisoptera* sp)	400	430	480	420	420	430
Sralao (*Lagerstroemia* sp)			500			500
Deum Kor (*Ceiba petandra*)					130	130
Swai (*Magnifera indica*)					130	130

In summary the current prices paid for Sralao are assumed to be:

- Forest $100/m^3$
- Village $150/m^3$
- Roadside $250/m^3$
- Phnom Penh $500/m^3$

For special sizes and high grade lumber Sralao may sell for as high as \$600 to 650/m^3, which was the purchase price quoted by a furniture manufacturer in Beong Trabek, Phnom Penh for buying baulks of about 15 x 30 x 200cm supplied directly from Kratie and Kampong Cham Provinces by speculative traders who arrive with truck loads and sell on a 'door-to-door' basis. However, to be conservative, the standard price for Sralao boards is assumed to be \$500/m^3.

Prices quoted in Siem Reap were for different species, but seemed to be considerably lower. For example, Koki, a Class I species that was widely reported to be favoured as a utility timber or for high quality joinery and carving was not available in Phnom Penh at timber traders visited, but in Siem Reap was available for \$300 to 400/m^3. Carvers in Siem Reap were purchasing Beng, a Luxury Class timber, for as little as \$400/m^3, whereas the cost of Beng delivered in Phnom Penh was reported to be \$1,000/m^3. There are clearly different factors involving supply in Siem Reap and while the additional transport cost from the CCF project area would only be \$10/m^3 it would seem improbable that timber can be supplied at competitive prices.

4.4 Financial Returns on Timber Sales

From previously discussed figures and assumed rates of profit the returns from Sralao sold in standard sizes in timber markets in Phnom Penh are as shown in Table 10.

Table 10 Estimated Costs of Delivery to Phnom Penh (\$/m^3)

Details	Illegal Trade (\$/m^3)	Legal Trade (\$/m^3)
Production cost	110	110
Logging profit	40	40
Royalty		81
Sale price (village)	**150**	**231**
Transport to Phnom Penh	87	87
Informal fees	130	
Cost of Delivery to Phnom Penh (\$/m^3)	**367**	**318**

The influence of informal fees has a major impact on the cost of delivery for all timber sold in Phnom Penh, although is less than shown in the above table for low-grade boards used in concrete form-work (see Section 4.3). The surprising result of this impact is that, in contradiction to normal assumptions, illegal timber is not cheap and Sralao, legally harvested, transported and traded, should be about 15% cheaper than the illegally traded equivalent even if full royalty is paid. If the royalty was negotiated at a lower rate, for example, \$40/m^3, legal Sralao could be 25% cheaper.

With an approximate saving of at least \$50/m^3 and predicted harvest of 2,400m^3 the total saving to end-users could be \$120,000, possibly doubling in time if monitoring of the initial stages indicates that higher harvesting rates, as expected, could be sustainable. This should be a considerable incentive in negotiations between communities and end-users and the marketing strategy should minimize, as far as possible, the involvement of too many timber transporters and middlemen, who might erode the advantage to communities by capitalizing on increased profit opportunities.

With an assumed sale price of \$500/m^3 or upwards for Sralao in Phnom Penh, and the various figures provided for cost of production and village sale price, it would appear that large profits are being made somewhere in the supply chain. This would mean that there is an opportunity for the village sale price and community profits to be increased, while still being able to sell legal timber more cheaply than illegal timber.

Communities could arrange to sell timber directly in Phnom Penh, perhaps in a similar way to the speculative traders supplying timber merchants and furniture makers in Chabar Ampao and Beong

Trabek in Phnom Penh, or by establishing links with timber traders. However, this would require investment in transport and experience which the communities, in all probability, do not have. The way in which the communities can best benefit from this project is to sell in bulk at Keo Seima market to one or two large-scale buyers prepared to collaborate with the communities to ensure that arrangements are equitable to all parties. Communities would be able to maintain substantial control of the business by dealing with a large buyer, sales should be steady and the only middlemen to be involved would be the kouyum operators that the communities are already familiar with.

4.5 Other Opportunities

Waste material derived from harvesting could potentially be an additional source of income for communities, sold as firewood or after conversion to charcoal.

An estimated 100,000 tonnes of charcoal are sold annually in Phnom Penh, although current production is located much closer to Phnom Penh than the project area and it is unlikely that the supply would be competitive.

Fuelwood consumption by the garment making industry in Phnom Penh and brick and tile manufacturers strung out along the Mekong River between Phnom Penh and Kampong Cham is also considerable. Most is sourced from clearance of old rubberwood plantations. It is estimated by GERES that clearance of 4,000 hectares is required to sustain requirements, but it is thought that there are only 4,000 hectares of areas remaining to be cleared for replanting. Large-scale firewood production observed at Angkuonh Dey in Kampong Cham District may perhaps be a response to declining availability of rubberwood and as pressure to obtain supply increases, the brick and tile factories could be a convenient market for firewood from the project area.

A typical brick and tile factory apparently uses about 500m^3 of firewood per month and currently pays \$15/m^3. When harvesting commences it would be worthwhile to investigate the cost of producing firewood to verify whether the CCF project can sell for a reasonable profit, although at present it is unlikely that this would be the case with the transport distance being around 150 to 200 kilometers, almost double the distance of current source areas. However, this is an option that should be monitored as it could become feasible as current supplies diminish and the industry is forced to accept higher prices.

5. Constraints & Uncertainties

There is considerable potential for profit to the communities but there are a number of potential constraints and uncertainties that could undermine this conclusion.

5.1 Harvesting Capacity

In the early stages of harvesting the communities may not be able to achieve the predicted levels of harvesting, which will require that ouput is increased from current estimated levels of about 550 to 2,400m^3/year.

It would be useful to discuss with the communities and potential buyers the reality of the strategy and the financial projections. If the communities understand and confirm the potential profitability there will a major stimulus for them to react to the challenge, which might require purchase of more chainsaws or could be simply achieved by more time being committed to logging.

Alternatively, loggers might be engaged from a wider area or improved technology introduced, particularly portable sawmills, which should reduce the time required to convert logs to sawn-timber and improve the quality of production.

5.2 Sales Procedures

Normal procedure is to transport timber from Keo Seima market using pick-up trucks. There would seem to be no reasonable justification for this expensive and inefficient approach as Keo Seima is perfectly accessible by larger trucks.

With the cooperation of a large buyer it is recommended that timber from the CCF project is transported no further than Keo Seima market for loading on to 15 tonne trucks for transportation to final market. This will require the establishment of a depot and procedures for the secure handling of CCF timber. Given potential savings on the cost of sawn-timber, it is possible that a large buyer may be willing to cooperate to establish and manage a suitable depot.

5.3 Transport Costs

The major cost in transport of illegal timber is the payment of informal fees to enforcement agency staff. Payment of informal fees on top of royalties would seriously distort the financial projections and it is essential that such payments are avoided.

The Chairman of the Cambodia Timber Industry Association, who also owns Cherndar Plywood, reports that he has little problem in transporting timber officially purchased from bidding coupes, and others who have applied to the FA for transportation of timber on specific projects such as rural schools and clinics claim that they also have had no problem. Ironically, the experience of the Ministry of Education, Youth & Sports (MoEYS) contradicts this as it has had huge problems transporting timber furniture to rural school developments because of loads being impounded by the police.

It is critical that the FA are able to agree with all enforcement agencies that CCF timber is being legally harvested and transported, and arrangements should be made to guarantee that transportation to market can be done without any levy of informal fees.

5.4 Commencement of Harvesting

Early commencement of harvesting will avoid community frustration that might arise from delay. At present, under the Sub-Decree on Community Forestry, harvesting is not permitted until five years have elapsed since the date of any agreement between communities and the FA.

A request was submitted to the FA by WCS and TFT to waive this requirement and expedite harvesting, but this request has not yet been approved. It is revommended that this request is given early consideration to avoid losing any momentum that may now be developing.

Rapid agreement to implement will mean that lessons to be learned can be learned now and early solutions can be found for problems. With successful and early implementation the CCF project could very quickly become a model for the rest of Cambodia, and there is no perceivable benefit in any delay.

5.5 Royalties Payable

While the CCF project would seem to have considerable potential to generate profits for the community and to alleviate rural poverty, the financial projections would be significantly improved if the FA, as allowed by the Sub-Decree on Community Forestry, was willing to negotiate lower rates for royalty and premium, even if only for a limited period to ensure maximum benefits to communities in the early stages of implementation.

6. The Domestic Timber Market

6.1 Timber Supply & the Size of the Market

In Cambodia timber is widely produced by felling trees and converting in-situ to rough-sawn boards using chainsaws. The use of portable sawmills is also reported and will result in production of better quality boards with greater dimensional consistency. Boards are then transported from the forest by ox-cart for local use, or to road or riverside for onward transport to urban markets by lorry or barge. The rough-sawn boards produced either by chainsaw or portable sawmill appear to be the mainstay of the domestic timber trade.

Larger-scale harvesting operations are also occurring. Logs are extracted for processing by sawmills and plymills. Some plywood is sold on the local market, but good quality sawn-timber, reportedly produced in significant volumes by sawmills at Km 6 on Route 5 to Siem Reap and Battambang, and at other locations, is thought to be destined mainly for export and not domestic markets.

Timber is widely used in Cambodia. It is the principle raw material used for construction and furniture manufacture in rural areas, where it is widely available and economic. In urban areas timber is sold by numerous small timber traders, such as those located at Chabar Ampao timber market near the Vietnamese Bridge in Phnom Penh. It is sold to end-users such as the construction industry, furniture manufacturers and handicraft producers. Most is sold geen or air-dried, but may be processed by kiln drying companies located in the Beong Trabek area of Phnom Penh, then supplied to small carpentry workshops manufacturing a range of products in the vicinity.

Without detailed study the overall structure and size of the domestic market is impossible to guage, but despite the clear availability of timber in Phnom Penh large users consistently indicated that supply is a problem. Construction companies commonly encourage the use of alternative materials that are more easily sourced, such as steel for rafters and beams instead of timber. The volume expected to be available from the CCF project is only 2,400m^3 and the size of the domestic market and the demand is

more than adequate to ensure that there will be no problem selling all of the timber produced. While there is a small demand specifically for legal timber, everyone wants cheap timber. The CCF project is in a position to meet both requirements, albeit in limited volumes.

6.2 Use of Sralao & Other Species

With a density in the range of 505 to 810kg/m^3 at 15% moisture content Sralao has limited durability and is not widely used in external applications, but is easy to work and commonly used for internal purposes. Although opinion varies, many users advised that Sralao splits easily when nailing, but this is easily overcome by pre-drilling and is not a problem for applications requiring no nailing such as tongue and groove parquet flooring, and furniture manufacturers in Beong Trabek in Phnom Penh said it was not a problem.

Sralao is used by villagers, mainly for internal use as flooring, rafters, beds and doors, but also for external cladding. It is considered acceptable according to the MoEYS for manufacture of furniture such as school desks and is popular in the handicraft industry as it easy to work, mainly into decorative trays, and results in attractive light coloured carvings. Manufacturers in Beong Trabek use a lot of Beng, but also Sralao to produce less expensive furniture. Architects advised that it is very good quality timber and that it is an excellent and attractive timber for flooring. Reported use of various timbers in rural areas is shown in Table 11.

Table 11 Timber Use in Rural Areas

Name		Grade	Use			
Local	Scientific		Posts	Boards	Frames	Luxury
Beng	*Afzelia cochinchinensis*	Luxury				X
Klong	*Dipterocarpus tuberculatus*	Class II		X		
Koki	*Hopea odorata*	Class I		X	X	
Krakoh	*Sindora cochinchinensis*	Class I	X	X		
Neang nuon	*Dalbergia bariensis*	Luxury				X
Pchek	*Shorea obtuse*	Class I	X			
Popel	*Hopea shorea*	Class I			X	
Sokram	*Xylia dolabriformis*	Class I	X			
Sralao	*Lagerstroemia spp*	Class I		X		
Thnong	*Pterocarpus pedatus*	Luxury				X
Trach	*Dipterocarpus intricatus*	Class II		X	X	

Note: logging of Luxury Grade species is illegal & conducted for outsiders

Very limited amounts of Sralao were available from most timber traders visited in Phnom Penh, although considerable volumes were available at Chabar Ampao timber market. The most popular species traded are Chhetiel, Doom Chaem, and Phdeik. However, availability at Chabar Ampao provides clear evidence that Sralao does sell. There it is sold mainly in a single size of 5 x 15cm x 6 to 10m, used for beams and rafters. Other sizes are harder to obtain, which is a problem for the handicraft industry using wide, narrow boards of 2 x 18, 20 & 30cm and lengths of 1 to 2m. However, the Beong Trabek furniture manufacturers (as discussed in Section 4.3) are able to obtain alternative sizes.

Of trees greater than 60cm dbh, 54% of the trees recorded during the inventory were Sralao. The next most dominant trees are Popoul and Chhetiel at 8% and 6% respectively. Timber supplied from the CCF area will therefore be very largely Sralao. If investigations of the ecology indicate that regeneration is satisfactory and concentrated in useful timber species, it would be reasonable to concentrate production entirely on Sralao until second cycle logging when the focus might change to species such as Chhetiel or Phdeik. However, predicted volumes would be as shown in Table 12 if the total production volume of 2,400m^3 is split according to percentages of species occurrence. Phdeik and Chhetiel, with a combined volume of 192m^3, could be sold without difficulty. Chhetiel is the source of an important NTFP. Oleoresins are tapped from nearly all mature Chhetiel trees in the SBCA (Evans et al. 2002). Harvesting of these trees will have to be carefully negotiated with their customary owners. Timber traders visited

were selling none of the other species available and it is unknown whether there would be ready markets. However, if any low-grade boards are produced, it should be possible to sell for concrete shuttering.

Table 12 Predicted Production Volumes from the CCF Project

Species	Class	Inventory Records (%)	Predicted Production (m^3)
Sralao	I	54	1,296
Popoul	I	8	192
Chhetiel [to be negotiated]	II	6	144
Krakoh	I	5	120
Chambork		4	96
Sokram	I	3	72
Phdeik	II	2	48
Thlok	III	2	48
Lumbor	II	2	48
Koki Masau	I	1	24
Trach	II	1	24
Others (31 spp)		12	288
Total		100	2,400

6.3 Price Premiums

The common concerns among timber buyers are availability and reliable supply, quality and above all, price fluctuation. The last concern obviated against any enthusiasm for paying price premiums in the current market environment of rapidly inflating timber prices.

However, even without direct payment of price premiums, the communities stand to benefit considerably. Figures provided indicate that communities may be able to derive profits of $\$40/m^3$, which is four times greater than what they estimate they are making at present. The veracity of this should be confirmed by actual monitoring when harvesting operations commence, but the potential from available information is encouraging.

The further benefit to the community is that the projected costs of sales indicate that sawn-timber from the CCF project can sell at 15% less than the normal market price of illegal timber. The savings that this could generate for a buyer might be used as leverage to persuade buyers to pay some level of price premium, but an alternative, and perhaps more advantageous option would be to use this bargaining counter to generate investment in the community, either through supply of portable sawmills or road improvements.

The normal justification for price premiums is not strong for the CCF project. In other countries price premiums are routinely expected by bad forest managers to cover the costs of becoming good forest managers able to achieve certification. Although this is ridiculous logic, the justification is that there are costs in achieving certification and retailers may be able to sell certified products at higher prices. As there is no talk at present of the CCF project area becoming certified the opportunities for buyers to capitalize on the possible higher sales value of certified products does not exist. However, because of the favourable financial projections, price premiums are not seen as essential to make this project work as both communities and buyers should be able to benefit from trade based on legal timber.

6.4 Attitudes to Legality

From most discussions with people involved in the timber trade and processing, the issue of source and legality was not important. Almost without exception Cambodian users, although widely aware that most timber is illegally harvested, are concerned solely with availability and price. Timber trade is conducted

with impunity. It appears that no formal restrictions are applied although informal payments to facilitate transport are routine. There is no pressure for anyone to show any concern.

The exceptional cases, where concerns about legality were expressed, included:

- architects and building contractors involved in projects financed by private sector foreign investors demanding the use of legally and/or sustainably sourced timber
- some handicraft manufacturers and furniture producers with a social conscience and an awareness of the destructive nature of illegal timber production
- donor financed school development projects experiencing major problems in transporting consignments of school furniture, which are routinely impounded by police, a problem which may be resolved by exclusive use of legally sourced timber.

7. Market Sectors

The consultancy required assessment of the potential interest of handicraft manufacturers, furniture producers, shopfitters and the construction industry in legally and responsibly sourced timber that may eventually be available from the CCF project. The characteristics and attitudes of these buyers is discussed in the following sections.

7.1 Handicraft Manufacturers

Handicraft manufacturers selling predominantly to foreign tourists, possibly aware of the issues of forest destruction and illegal wood-use, are a potential outlet for timber from the project, but are very variable in attitude and requirements.

Artisan d'Angkor based in Siem Reap is one of the biggest organizations in Cambodia producing local crafts. It has a firm policy of using only legally sourced raw-material and buying from responsible local community initiatives. Although 30% of turnover is from wood-carving, the focus is on lacquered rubberwood carvings. Only 1% of carvings are produced from natural wood, principally using Beng. Although there could be an interest in the wider availability of legal wood it is not seen as a financially practical option to transport timber from Mondulkiri to Siem Reap. The only possible interest would be if carvers in Mondulkiri could produce work of acceptable standard, but the timber volumes required would be small.

Khmer Angkor Art Workshop is a Taiwanese owned company and probably more typical in attitude. It is the largest wood-carving company in Siem Reap and uses mainly Beng, Thnong and Koki. The manager is fully aware that the timber used is illegal, but obtains raw material very cheaply (Beng is about $380 to 400/$m^3$). In response to questions from customers about timber legality the company advises that everything is licensed and approved by the authorities, which apparently provides adequate assurance. Sralao is not widely used because of local lack of availability, but even if the company was concerned about sourcing legal wood the cost of transporting from Mondulkiri would be prohibitive.

Watthan Artisans Cambodia is a worker run cooperative located in the grounds of Wat Than Pagoda in Phnom Penh. It produces a wide variety of local artwork including wood-carvings, which it sells on-site or distributes to other local outlets. It has the fundamentally philanthropic objective of providing training and work for disabled Cambodians. The principal species used for carving is Sralao, which is obtained from local timber stores, although supply is a problem as required sizes are 2 x 18, 20 or 30cm in lengths of 1m, whereas the size sold by traders is almost exclusively 5 x 15cm in lengths of 6m and up. The workshop supervisor is aware of issues of legality and, subject to the economics being favourable, would be willing to buy timber sourced from the project and to market carvings as being manufactured from legal, responsibly produced timber, in turn sharing some of the profit with the communities. However, the total monthly requirement is modest, only about 0.3 to 0.5 m^3, and there is little prospect that this can be an important outlet for community produced wood.

While there could be some interest from the handicraft sector the volumes required by any single workshop are small and a viable commercial proposal would be dependent on establishing effective central distribution to a large number of workshops – timber from the project would be adequate to supply over 400 workshops. It is unknown if an adequate number of workshops exist or if sufficient interest could be generated and it would appear that the complexities of any focus on the handicraft trade are likely to render this option impractical.

7.2 Furniture Manufacturers, Interior Designers & Fitters

Furniture manufacturing, interior design and fitting are often carried out by the same companies and the options for sale of timber from the CCF project are similar.

Traditional local furniture is largely manufactured from Beng and Thnong, the harvest of which is illegal. However, small roadside workshops provide abundant testimony that the illegal basis of the business is not a problem. Such businesses do not use Sralao and so will not be a useful sales option for the CCF project. Manufacturers that do use Sralao were encountered in Beong Trabek, but the requirements are small, only about 50m^3/year for one producer. Production is sold locally and there is no issue regarding legality of timber.

There are considerable requirements for furniture under a World Bank funded project to develop infrastructure in the education sector. Of $36 million to be spent over the next three years by the MoEYS about 10% will be for purchase of desks, chairs and other timber fittings. On the current project, worth $10 million, there have been major problems with timber supply. Quality has been a problem and supply was frequently disrupted by the police impounding deliveries, presumably because the timber cannot be verified as legal. One solution was to supply steel furniture, but the MoEYS has reverted to timber furniture as damaged items can be more easily repaired. A steady supply of legal timber would be of great interest to the project, although neither the World Bank nor the MoEYS specify legal timber in tender documents. A complication is that World Bank tendering procedures do not allow mention of any specific supplier, such as the CCF project, although could specify legal timber, which would mean that manufacturers, mainly located in Kampong Cham and Kratie, would be encouraged to buy from the CCF project or its agents. Other donor supported projects can be assumed to face similar problems, but many will require timber now and the CCF project cannot yet offer an instant solution.

European style furniture is produced and sold by a limited number of companies in Phnom Penh, and the sector was thought to be a potential option as typical customers may be familiar and concerned with issues of timber origin as well as price. Companies in this sector include Icheng (discussed below) which produces and sells locally, and its main competitors, MW and Roseana, which import from China, Vietnam and Thailand and do not produce locally.

Icheng sells wooden and upholstered furniture to foreign and local customers and undertakes interior design and furnishing projects, which have included the VIP lounge at Phnom Penh airport, large offices of multi-national companies, smaller offices, restaurants and private residences. The owners, on grounds of conscience, are concerned about the legality of wood supply, although it is not an issue normally voiced by their customers. The company would support efforts to supply legal timber and would consider investment in a suitable opportunity as availability of legal timber could allow them to expand business into export markets. Current wood use is mainly imported plywood and MDF, with solid wood components being manufactured from locally sourced Doon Chaem, although Sralao is considered an acceptable alternative. The problem is that raw-material requirements are extremely variable as they are linked to sales and projects, the latter having very different wood requirements depending on whether the design preference is for a traditional wooden style at one extreme or for a more modern synthetic appearance at the other extreme.

While there is some interest from this sector, the problems are that amounts are modest and very variable.

7.3 Construction Industry

The construction industry requires considerable volumes of timber for structural use, for doors and windows and for floors, other interior fittings and for façade work. Where possible, steel is often preferred because of difficulties in obtaining timber supply.

Developments discussed with local designers and contractors included karaoke bars and small apartment blocks with a floor area of about 500m^2. Projects of this size do not use large volumes of timber and a multitude of small companies will be involved in the development of individual projects. A predilection for cheap timber may not be a problem as timber from the CCF project could be cheaper than regular sources. However, marketing legal timber is complicated by the number of companies likely to be involved, the small amounts of timber required in many different locations and the lack of concern about legality or sustainability of timber sources.

A small Australian owned construction company, Redfurnesse, works almost entirely with foreign clients, but is rarely asked about timber sources. The owner is aware of the issues, but prefers that clients do not ask for timber from certified or legal sources. He strongly prefers to discourage timber use, offering instead steel and other compounds. As with local companies mentioned above, there would seem to be little opportunity for sale of CCF timber.

On larger internationally funded projects such as hotels and large apartment blocks the source of timber can be an issue according to Archetype Group, a French architectural firm responsible for many of the larger internationally funded developments in Cambodia. Clients frequently stipulate the use of legal or certified wood. Because of this, and because the general quality of local workmanship is poor, the solution at present is to import, normally from Malaysia or Indonesia. A major use of timber is flooring and a typical apartment block development with a floor area of 10,000m^2 might require about 2,000m^3 of timber, and Sralao is considered to be highly acceptable. While Archetype are involved only in design and purchasing specifications, and not timber purchase, the type of projects they are involved with are

normally undertaken by the LBL Group, a major construction company in Cambodia, and this could be a very promising option for the sale of timber from the CCF project.

LBL Group's projects are large-scale and include hotels, apartment blocks and hospitals, which, depending on the clients' wishes and specifications prepared by Archetype, may require some form of verification of timber source. The Group's Sourcing Manager, Lysine Khao, was extremely interested in any timber immediately available, but was not very enthusiastic about Sralao, rather preferring Doon Chaem, Koki, Thnong and Chhetiel. However, as LBL is working on many projects with Archetype, whose architects were enthusiastic about Sralao, there is a clear opportunity for large volumes, and possibly the entire production of the CCF project to be sold to LBL. According to Archetype, LBL is a sufficiently large company to buy and hold large stocks of timber and this could be a very realistic option. Although the Sourcing Manager was only interested in discussing immediate delivery, this was countered by her husband, Jean Claude Levasseur, who was formerly the FAO Representative in Cambodia. His professional understanding and support for development projects meant that he was very open to future options and he will be a valuable contact in developing any relationship between LBL and the CCF project.

The construction sector is the most promising for sale of CCF timber with large volumes required and some interest in legal or certified timber. Requirements may change in the future, but even if there was a significant reduction it is likely that there always be adequate demand for the modest volumes being produced by the project.

8. Marketing Strategy

It is apparent from wide ranging discussions that there will be no problem finding buyers for the Sralao that will be produced from the CCF project. The quality of boards that can be produced is consistent with what is widely being sold at present and should not be an issue for local market sales. Local sales are recommended, as there is no strong justification for export sales, to Vietnam for example. The local market can easily absorb all sawn-timber produced by the communities and prices are acceptable.

Distribution of the timber should be done in a way that it is sold to people who require and support the idea of legally and sustainably produced timber and may accept small price premiums or even be willing to invest in the project. This would require some form of centralized marketing rather than piecemeal sales to any opportunistic buyer. Two clear possible strategies emerge for marketing the timber and there would seem to be considerable potential to make either strategy work, given that the communities may be able to sell sawn-timber for at least 15% less than the price of illegal timber and generate savings to buyers of $120,000 as discussed in Section 4.4.

The first option would be to identify a timber trader prepared to collaborate in handling marketing arrangements and making timber available as widely as possible to a range of buyers. The benefit of this is that CCF timber could be available to low volume users such as furniture manufacturers or handicraft producers that have expressed an interest in legal wood supply. A problem could be finding a suitable trader with an interest in supporting the project objectives. A further problem would be the sales location, with Phnom Penh being the obvious choice, but Kampong Cham also being attractive as it is nearer to the project area and convenient for sale to furniture manufacturers selling to World Bank funded school developments. However, the Kampong Cham option could become academic if timber is not made available in the near future and there is no other obvious demand in the area for legal timber. Extending the number of traders involved could allow timber to be sold at more than one location, and would avoid the risk of dependence on a single buyer.

The second option would be to establish marketing arrangements with LBL, or a similar company, to buy the entire production for use, as it chooses, on its own projects or sale to other buyers. This option is exteremly attractive as it is might be much simpler to arrange than identifying cooperating timber traders. Also, a company of LBL's size may be able to provide much assistance such as facilitating transport arrangements and perhaps investment support, for example, by providing the communities with a portable sawmill, contributing to rural road improvement and supporting establishment of a timber depot at Keo Seima. Importantly, interest from LBL might guarantee a long-term approach with LBL able to monitor delivery, identify problems and assist in finding solutions when necessary. This could relieve WCS and the FA of some of the management burden and ensure future continuity when donor support may no longer be available. Achieving continuity is consistently a problem faced by projects if donor support is no longer forthcoming, and it may be that the involvement of a strong private sector company is the solution. The disadvantages of developing a relationship with LBL are that there would be dependence on a single company, which can always be a risk although one that is regularly taken by investors in large building projects, and it means that LBL has complete control over how the wood is used and other interested buyers may not have an opportunity to access legal CCF timber.

Despite minor disadvantages, negotiating a deal with LBL would seem to be the most promising solution. The recommended approach is that LBL and the communities agree monthly delivery quotas at a fixed price on the basis of a rolling contract having built-in procedures for renegotiation of prices every six months. It would be attractive for LBL to know that fixed volumes can be obtained on a regular basis

without uncontrolled price fluctuations. For the communities, a strong relationship with the buyer might ensure that they can secure external support and investment to help them improve the quality of operations and the condition of local roads.

9. Verification of Timber Origin

There is no intention at present that the forest operations will seek certification, although the Forest Stewardship Council (FSC) initiative to increase access to FSC Certification for small and low intensity managed forests could be an option to be considered in the future.

Regardless of whether the CCF area does or does not eventually become certified, the requirement in many internationally financed projects is that some type of reliable documentation can be provided to verify that timber used in construction comes from legal and possibly sustainably managed sources. Normally, suitable procedures and documents would require monitoring and verification by an independent organization.

At present there are no agencies operational in Cambodia providing independent monitoring services to verify either legal origin or sustainability. Such services may be provided by SGS in Vietnam or in Malaysia, and eventually it may become essential to engage the services of SGS or a similar organization. Meanwhile in the early planning and implementation appropriate arrangements will have to be established that will allow identification and recording of timber and its origin. TFT who were formerly involved in the project may be able to provide advice and assistance in this respect, and the FSC certified forests in Laos of Dong Phousoi in Khammouane Province and Dong Sithouane in Savannakhet Province should be able to serve as useful examples of appropriate procedures.

10. The Economic Model

The economic model previously prepared by TFT and WCS has been revised to reflect changes in costs and sale prices to give an indication of the potential financial returns to the communities. Based on figures stated in this report, calculations of the total return to communities are shown in Table 13.

Table 13 Predicted Financial Return to Communities

	Details	Units	Commune			Total
			Khseum	Sre Chukk	Sre Preah	
Production	Total area	ha	16,000	7,000	14,000	37,000
	Conservation area	%	20	20	20	
	Total production forest	ha	12,800	5,600	11,200	29,600
	Rotation length	years	30	30	30	
	Annual coupe	ha	430	190	370	990
	Average harvest rate	trees/ha	2	2	2	
	Total # of trees harvested	#/year	860	380	740	
	Estimated tree volume	m3	4.60	4.60	4.60	
	Estimated sawn-timber recovery	%	26	26	26	
	Average sawn-timber recovery	m^3/tree	1.20	1.20	1.20	
	Total volume of sawn-timber produced	m3/year	1,030	454	885	2,370
Costs	Estimated FA management fee	$/$m^3$	20	20	20	
	Production cost (including profit of $40/$m^3$)	$/$m^3$	150	150	150	
	Royalty	$/$m^3$	80	80	80	
	Transport from villages to Keo Seima	$/$m^3$	67	67	67	
	All costs	$/$m^3$	317	317	317	
	Total cost of production	$	326,510	144,070	280,560	751,140
Revenue	Sale price at Keo Seima	$/$m^3$	330	330	330	

	Total revenue	$	339,900	149,980	292,060	781,940
	Total return to community	$	13,390	5,910	11,500	30,800

In the above calculations it is assumed that the sale price at Keo Seima will be $330, which is the current roadside price plus royalty. It is alos assumed that the FA will charge a management fee and full royalty, and that the profit from logging and transportation to villages includes a profit for the logger of $40/m^3. The management fee is intended to cover inventory, preparation of management plans, tree marking, enforcement, monitoring and other activities undertaken by the FA, but how much the FA will actually charge remains to be determined.

From the above calculations the return per household is shown in Table 14.

Table 14 Financial Returns

Commune	Families	Return ($)	
		Total	Per Family
Khseum	1,316	13,390	10
Sre Chukk	469	5,910	13
Sre Preah	284	11,500	40

While the value of benefits per family is modest, especially in Khseum, the total amount available at a community level could be used for the collective benefit of the communities. Also there is considerable scope for increasing the benefits by selling sawn-timber for higher prices, reducing FA management fee or reducing royalties. It should also be noted that villagers advised that $125 is considered to be a reasonable annual income. There are also other benefits that will accrue to communities. These include wages earned for logging, profits from logging, and profits to local transport operators.

Assumed production by communes is:

- Khseum 1,030m^3
- Sre Chukk 454m^3
- Sre Preah 885m^3

Based on the above figures the approximate overall benefits that might be derived within the communities are shown in Table 15, although these will not be shared equally by all households as greater amounts will accrue to those actually involved in logging or transport operations.

Table 15 Overall Community Benefits

Details	Units	Amount ($/m^3)	Amount ($)			Total ($)
			Khseum	Sre Chukk	Sre Preah	
Logging wages	$/m3	22.50	23,180	10,230	19,910	53,343
Logging profit	$/m3	40.00	41,200	18,180	35,400	174,182
Kouyum transport profit	$/m3	20.00	20,600	9,090	17,700	47,390
Community revenue	$		13,390	5,910	11,500	30,800
Total community benefits	**(ha)**		**98,370**	**43,410**	**84,510**	**226,290**
Households	#		1,316	469	284	
Average benefit/household			**75**	**93**	**298**	

From the calculations shown in Table 13 the overall benefits to the FA will be as shown in Table 16.

Table 16 Overall FA Benefits

Details	Units	Amount ($/m^3)	Amount ($)			Total ($)
			Khseum	Sre Chukk	Sre Preah	
FA management fee	$/m^3	20.00	20,600	9,090	17,700	
Royalty	$/m^3	80.00	82,400	36,360	70,800	
Total FA benefits	**(m^3/year)**		103,000	45,450	88,500	236,950

The overall financial benefit could be in excess of $450,000 annually, with this amount considerably increasing in future if it becomes clear that the modest production proposed can be increased and still remain sutainable.

11. Conclusions

The CCF project has strong potential to achieve the objective of alleviating rural poverty through sustainable forestry management.

Sralao is likely to be the main species produced and there would seem to be no insurmountable barriers to selling the entire projected sawn-timber production of 2,400m^3 from the CCF area. Phnom Penh is the most promising market and the most efficient means of selling the timber will be to establish contractual arrangements with large-scale buyers from the construction industry.

While harvesting levels proposed are modest and, in all probability, sustainable, the limited knowledge of the ecology of Sralao dominated semi-evergreen and deciduous forests mean that there is no scientific basis to justify this assumption. It would therefore be prudent to conduct studies of the ecology to verify that the assumption is reasonable.

To make the project work the additional and straightforward actions recommended are:

- Potential buyers should be approached to confirm whether there is a real interest in the strategy proposed and if there would be any interest in investing to support community implementation, with LBL Group considered to be the most promising option
- The financial benefits and the costs should be discussed with the communities to verify projections and to establish their enthusiasm
- The realities and options for selling directly from Keo Seima market should be investigated and the transport options discussed with potential buyers, a possible strategy being that the buyer establishes a timber depot in Keo Seima
- The FA should negotiate or confirm royalties and premiums payable with the recommendation that, at least temporarily, fees are payable at a reduced rate to provide some early impetus to project implementation by increasing profit to communities and reducing purchase price to buyers
- The FA should confirm that satisfactory arrangements can be established to ensure that CCF timber is transported to market without payment of any informal fees to staff of enforcement agencies or any other hindrance
- The FA should review the request by WCS and TFT to waive the requirement that commercial timber exploitation may not be undertaken during the first five years of an agreement thus allowing early commencement and development of community expertise.

Although there will undoubtedly be lessons to learn in the future, by the above actions, and with the strong financial potential, the early implementation of harvesting in the CCF area can serve as a model that might be replicated elsewhere for the wider benefit of communities, forestry and conservation in Cambodia.

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Annexe 1 - Terms of Reference

Cambodia Timber Trade – Market Analysis

Location: Phnom Penh, Siem Reap & Mondulkiri, Cambodia

Period: 5 to 29 August 2008

Since 2000 the Wildlife Conservation Society (WCS) has been helping to conserve a landscape of exceptional importance for wildlife in southern Mondulkiri Province, Cambodia. By providing both financial and technical support to the Government's Forestry Administration (FA), WCS hopes to secure the long-term integrity of the forests of this landscape, its wildlife, and the livelihoods of its indigenous communities.

The western buffer area of the Seima Biodiversity Conservation Area has been selected as the pilot site for a new arrangement for the management of Cambodia's forest resources. WCS is partnering the FA to develop a system of 'Commercial Community Forestry' whereby forest communities are more actively involved, and gain greater benefit from, the management of timber resources.

In the first phase of the project the Tropical Forest Trust investigated the potential to sell wood products from the CCF area to buyers in Vietnam. The project and its partners are currently interested in investigating the potential for selling products within Cambodia. Some potential buyers have been tentatively identified, including handicraft manufacturers, and up-scale furniture producers, but nothing is known about the size of the market, the true level of interest in legal, responsibly produced timber, or whether there is a demand for the wood available (principally Lagerstoemia spp, but also other 2nd, 3rd and 4th grade timbers). In addition in the first phase it was assume that timber would be exported from close to the forest site. Nothing is known of the costs of transporting wood from the site to Phnom Penh.

The role of the consultant will be to carry out a review of aspects of the domestic timber market in Cambodia, evaluate the potential for selling timber from the CCF area on the domestic market, and to update the 'economic model' based on current prices and costs.

The consultant will be assisted by Khmer staff from the CCF project, including one on secondment from the FA.

Duties will include:

- Investigate the price of wood at the forest gate, Phnom Penh and Siem Reap, focusing on species likely to be available from the CCF area. Consultations will need to take place at least with wood merchants and other bulk buyers, and the FA.
- Investigate the potential market for legal, responsibly produced timber, including consultations with construction industry, furniture manufacturers, shop-fitters, handy-craft manufacturers etc. Important information that is needed include the potential volumes required, the species demanded by the market, and whether there is the potential for any price premium on CCF timber.
- Examine different options for marketing timber, for example does the CCF enterprise organise the transport of timber to markets in Phnom Penh or Siem Reap, or simply sell the timber at the forest gate, with the purchaser responsible for transport etc.
- Update the economic calculator. In addition to the information gathered this will require:
  - Visit to the field site to check assumptions for harvesting costs
  - Consultations with appropriate sources over transport costs to Phnom Penh or Siem Reap
  - Consultation with government authorities regarding fees and other costs related to the harvesting, transport and sale of timber.

Outputs:

Within 1 week of the completion of the field work the consultant will produce:

1. A narrative report outlining methods used to gather information, results of the study including clear information on potential timber markets, current prices for wood, current estimated extraction and transport costs, and recommendations on how and where to market CCF timber. The conclusions should include a comparison of the domestic market with current knowledge of the international market, principally Vietnam.
2. An up-dated economic calculator based on the new information.

Annexe 2 - Timetable

Day	Date	Details
Mon	04-Aug-08	Travel to Cambodia
Tue	05-Aug-08	Preliminary meetings with WCS & arrangements for meetings, field visits & travel. Meeting with CTIA
Wed	06-Aug-08	Meeting with GERES & FA FITDO
Thu	07-Aug-08	Wood markets visits, Phnom Penh
Fri	08-Aug-08	Travel to Mondulkiri
Sat	09-Aug-08	Forest visit
Sun	10-Aug-08	Visit to communities (Pu Char village) & sawmillers
Mon	11-Aug-08	Travel to Phnom Penh visiting sawmillers (Snoull), timber transporters (Kampong Cham) & brick & tile factories
Tue	12-Aug-08	Data analysis & research
Wed	13-Aug-08	Meeting organisation, data analysis & research
Thu	14-Aug-08	Visits to Chabar Ampao & Watthan Artisans
Fri	15-Aug-08	Visit to Archetype Group & research
Sat	16-Aug-08	Research & reporting
Sun	17-Aug-08	Travel to Siam Riep
Mon	18-Aug-08	Meetings with timber traders, contractors and artisans
Tue	19-Aug-08	Meeting with eco-tourism developers and travel to Phnom Penh
Wed	20-Aug-08	Research & reporting
Thu	21-Aug-08	Meetings with Red Furnesse Co., LBL Group & Tim Grayling
Fri	22-Aug-08	Meetings with Oxfam GB, Forestry Administration & CTIA
Sat	23-Aug-08	Research & reporting
Sun	24-Aug-08	Research & reporting
Mon	25-Aug-08	Meeting with Ministry of Education, Youth & Sports and research & reporting
Tue	26-Aug-08	Data analysis & report preparation
Wed	27-Aug-08	Visit to Beong Trabek market and report preparation
Thu	28-Aug-08	Report preparation
Fri	29-Aug-08	Report submission
Sat	30-Aug-08	Travel to Malaysia

Annexe 3 - People Met

Name	Organization	Position	Telephone
Borey Pisith	Forest Administration	Head of Forest Inventory	
Brout Khin		Pu Char villager	
Butler, Nick	Sam Veasna Centre	Coordinator	092 650096
Chanhet Thannarak	WCS	Community Forest Specialist	011 888088
Chheng Srey Touch		Timber merchant, Phnom Penh	012 836900
Ching Chong	Watthan Artisans Cambodia	Supervisor	023 216321
Gately, Mark	WCS	Country Program Director	012 807455
Grayling, Tim	Ministry of Interior	Infrastructure Adviser	012 985864
Guidal, Arnaud	GERES Cambodia	Forestry Unit Manager	012 213942
Hang SunTra	FA FITDO	Office Chief	012 802699
Heng Chai Tith		Brick & tile factory owner	
Hing Mesa	WCS		
Khao, Lysine Ms.	LBL Group	Sourcing Manager	012 802195
Khoeung Sivanna	Artisans d' Angkor	Sales Director	063 963330
Kom Saret	Forest Administration	Chief of Forest Management	
Leng Vy		Pu Char villager	
Levasseur, Jean Claude	Ream Resort Development	Advisor	012 811612
Lu Chu-Chang	CTIA	Chairman	012 809909
Mak Aneth, Mrs.		Timber merchant, Phnom Penh	012 480865
Mao Mov	Khmer Angkor Art Workshop	Manager	012 990603
Marida	Timber trader, Siem Reap	Timber merchant, Siem Reap	
Meng Thavy	Artisans d' Angkor	Communications Manager	063 963615
Nang Yay Hong, Mrs.		Timber merchant, Phnom Penh	
Ngeum Lounh		Pu Char villager	
O'Keefe, Garvan	MoEYS	Construction Advisor	012 530442
Pollard, Edward	WCS		012 820189
Reb, Jeremie	Archetype Group	Design Manager	
Redfern, Paul	Redfurnesse Co. Ltd.	Managing Director	012 670333
Rodriguez, Joel	Oxfam GB	Field Operations Manager	012 832700
Ros Chrea		Timber merchant, Phnom Penh	012 658000
Sam Rath		Pu Char Community Chief	
Sopheak Lim		Designer/Contractor	
Tok Ha		Timber merchant, Siem Reap	
Touch, Mr.		Door merchant, Beong Trobek	012 838168
Wouters, Bernard	Archetype Group	Senior Design Manager	012 975406

Annexe 4 – List of Selected Cambodia Timber Species

Local Name	Scientific Name	Family	Class	Comments
Alauk	?	?	Other	
Arm	?	?	Other	
Bakmot	?	?	Other	
Bangkow	*Aglaia cambodiana*	Meliaceae	III	
Beng	*Afzelia xylocarpa*	Fabaceae	Luxury	
Chambork	*Irvingia malayana*	Irvingiaceae	Other	
Chankrasna	*Aquilaria crassna*	Thymelaeaceae	III	Sandal wood
Chantamparng	*Sterculia alata*	Sterculiaceae	III	
Chhaung Krabei	?	?	Other	
Chheam Tokke	?	?	Other	
Chhetiel	*Dipterocarpus* sp	Dipterocarpaceae	II	Keruing
Chhetiel Bangkuey	*Dipterocarpus costatus*	Dipterocarpaceae	II	
Chhetiel Toeuk	*Dipterocarpus alatus*	Dipterocarpaceae	II	
Chhleek	*Terminalia alata*	Combretacae	I	
Chhoepleung	?	?	Other	
Chhor Chong	*Shorea vulgaris*	Dipterocarpaceae	II	
ChongKran	?	?	Other	
Chramas	*Vatica odorata*	Dipterocarpaceae	II	
Deum Kor	*Ceiba pentandra*	Malvaceae		
Doeukpor	*Markhamia stipulata*	Bignoniaceae	Other	
Doon Chaem	*Tarrietia javanica*	Sterculiaceae	I	
Hab	?	?	Other	
Kabbahs prei	*Cochlospermum religiosum*	Cochlospermaceae	Other	
Katek	?	?	Other	
Kchahs	*Diospyros sylvatica*	Ebenaceae	Other	
Kdol	*Sarcocephalus cordatus*	Rubiaceae	I	
Khmeas	*Memecylon edule*	Melastomataceae	Other	
Khnorprei	*Artocarpus asperula*	Moraceae	III	
Klong	*Dipterocarpus tuberculatus*	Dipterocarpaceae	II	
Koang kang/Poga	*Rhizophora mucronata*	Rhizophoraceae	III	
Koki	*Hopea* sp	Dipterocarpaceae	I	
Koki Masau	*Hopea odorata*	Dipterocarpaceae	I	
Komuoy	*Euonymus cochinchinensis*	Celastraceae	Other	
Kondaul	*Careya sphaerica*	Lecythidaceae	III	
Kontoutprey	*Phyllanthus emblica*	Phyllanthaceae	Other	
Kra Nhoung	*Dalbergia cochinchinensis*	Fabaceae	Luxury	
Krakoh	*Sindora siamensis*	Fabaceae	I	
Kralanh	*Dialium cochinchinensis*	Fabaceae	I	
Kray sar	*Albizia thorelii*	Fabaceae	III	
Longeang	*Cratoxylum formosum*	Clusiaceae	III	
Lumbor	*Shorea farinosa*	Dipterocarpaceae	II	Meranti
Maisak	*Tectona grandis*	Verbenacae	I	
Mean Prey	*Dimocarpus longan*	Sapindaceae	Other	
Neang Nuon	*Dalbergia bariensis*	Fabaceae	Luxury	
Nho Prey/Nho Thom	*Morinda tomentosa*	Rubiaceae	Other	
Nieng Pha Ae	*Dehaasia cuneata*	Lauraceae	III	
Pang	?	?	Other	
Pchek	*Shorea obtusa*	Dipterocarpaceae	I	
Phaong	*Calophyllum* sp	Clusiaceae	III	
Phcheung	?	?	Other	
Phdeik	*Anisoptera* sp	Dipterocarpaceae	II	Mersawa
Phlong	*Ternstroemia penangiana*	Theaceae	Other	

Local Name	Scientific Name	Family	Class	Comments
Plu Thom	*Dillenia ovata*	Dilleniaceae	Other	
Pongro	*Schleichera oleosa*	Sapindaceae	Other	
Ponsva	*Spondias pinnata*	Anacardiaceae	Other	
Popealkhe	*Terminalia bialata*	Combretacae	Other	
Popel	*Shorea obtusa*	Dipterocarpaceae	I	
Poplea	*Grewia asiatica*	Malvaceae	Other	
Popoul	*Vitex* sp	Lamiaceae	I	
Popoul Bay	*Vitex* sp	Lamiaceae	I	
Popoul Thmor	*Vitex pinnata*	Lamiaceae	I	
Prahphnov	*Terminalia triptera*	Combretacae	Other	
Pramat Kontrong	?	?	Other	
Preah Phnov	*Terminalia triptera*	Combretacae	Other	
Pring	*Syzygium* sp	Myrtaceae	III	
Prous	*Gercinia ferrea*	Clusiaceae	III	
Roka	*Bombax anceps*	Malvaceae	Other	
Roleiy	*Nauclea sessiliflora*	Rubiaceae	Other	
Rolous	?		Other	
Rumduel	*Goniothalamus repevensis*	Annonaceae	Other	
Samrong	*Sterculia villosa*	Sterculiaceae	Other	
Sangkuet Thmat	*Stereospermum cylindricum*	Bignoniaceae	III	
Sdok Sdau	*Walsera villosa*	?	Other	
Se Moen	*Nephelium hypoleucum*	Sapindaceae	Other	
Sleng	*Strychnos nux-vomica*	Loganiaceae	Other	
Smach	*Melaleuca leucadendron*	Myrtaceae	III	
Smakrabei	*Knema corticosa*	Myristicaceae	III	
Snaeng Krabei	*Desmodium heterocarpon*	Fabaceae	Other	
Snay	*Streblus asper*	Moraceae	Other	
Snoul	*Dalbergia nigrescens*	Fabaceae	Other	
Sokram	*Xylia xylocarpa/dolabriformis*	Fabaceae	I	
Soy	*Anogeissus acuminata*	Combretaceae	Other	
Spung	*Tetrameles nudiflora*	Datiscaceae	Other	
Sralao	*Lagerstroemia calyculata*	Lythraceae	I	
Sramor	*Terminalia chebula*	Combretacae	Other	
Svay Chhoeu Neang	?	?	Other	
Svay Pongdrong	*Mangifera cochinchinensis*	Anacardiaceae	Other	
Sway	*Magnifera indica*	Anacardiaceae		
Sway chanti	*Anacardium occidentale*	Anacardiaceae		Cashew
Sway Prey	*Mangifera duperreana*	Anacardiaceae	III	
Tbeng	*Dipterocarpus obtusifolius*	Dipterocarpaceae	II	
Thkow	*Neolamarkia chinensis*	Rubiaceae	Other	
Thlav	?	?	Other	
Thlok	*Parinari anamensis*	Chrysobalanaceae	III	
Thnong	*Pterocarpus pedatus*	Fabaceae	Luxury	
Trach	*Dipterocarpus intricatus*	Dipterocarpaceae	II	
Trameng	*Carallia lucida*	Rhizophoraceae	III	
Tramoung	*Garcinia olivieri*	Clusiaceae	III	
Tranab Banki	?	?	Other	
Trasek	*Peltophorum ferrugineum*	Fabaceae	I	
Trasiet	*Vitex negundo*	Lamiaceae	Other	
Trayoeung	*Diospyros pilosanthera*	Ebenaceae	Luxury	

Annexe 5 – Summary Inventory Results

Estimated Volumes (m^3/ha) by Diameter Class

Species	Class	Diameter				Total		
		30-39	40-49	50-59	60+	(m^3)	(%)	Cumm (%)
Sralao	I	4.82	8.80	13.39	92.49	119.50	47.6	47.6
Chhetiel Toeuk	II	0.90	1.43	1.84	10.86	15.03	6.0	53.6
Popoul Thmor	I	0.89	1.32	1.33	11.12	14.67	5.8	59.5
Chambork		0.56	0.82	0.34	9.29	11.02	4.4	63.9
Phdeik	II	1.10	1.79	2.14	5.22	10.24	4.1	68.0
Krakoh	I	0.37	0.63	1.29	7.06	9.35	3.7	71.7
Sokram	I	0.70	1.66	2.03	3.77	8.16	3.3	74.9
Thlok	III	0.36	0.47	0.70	4.55	6.08	2.4	77.4
Koki Masau	I		0.91	1.31	1.83	4.05	1.6	79.0
Lumbor	II	0.21	0.25	0.66	2.89	4.02	1.6	80.6
Trayoeung	Luxury	0.97	1.11	0.83	0.67	3.59	1.4	82.0
Popoul Bay	I	0.40	0.47	0.44	2.07	3.39	1.3	83.4
Se Moen		1.28	0.81	0.73	0.30	3.11	1.2	84.6
Chramas	II	1.76	0.49	0.12	0.18	2.55	1.0	85.6
Phcheung		1.17	0.92		0.28	2.37	0.9	86.6
Trasiet		0.70	0.41	0.54	0.54	2.18	0.9	87.4
Popoul	I	0.31	0.33	0.12	1.34	2.10	0.8	88.3
Popealkhe		0.11	0.14	0.33	1.51	2.09	0.8	89.1
Roka		0.08	0.27	0.33	1.10	1.79	0.7	89.8
Nieng Pha Ae	III	0.98	0.19		0.45	1.62	0.6	90.5
Other		6.31	4.85	3.57	9.21	23.93	9.5	100.0
Total		24.00	28.09	32.04	166.73	250.86*	100.0	

Estimated Tree Numbers (#/ha) by Diameter Class

Species	Class	Diameter				Total		
		30-39	40-49	50-59	60+	No.	(%)	Cumm (%)
Sralao	I	6.8	7.3	6.7	18.9	39.7	35.4	35.4
Popoul Thmor	I	1.5	1.3	0.8	2.2	5.8	5.2	40.5
Sokram	I	1.5	1.5	1.1	1.2	5.3	4.7	45.3
Se Moen		3.0	1.2	0.7	0.2	5.1	4.6	49.8
Chhetiel Toeuk	II	1.0	0.9	0.8	1.9	4.5	4.0	53.9
Phdeik	II	1.4	1.3	0.9	0.9	4.4	3.9	57.8
Chambork		0.9	0.8	0.2	1.5	3.4	3.1	60.8
Krakoh	I	0.5	0.5	0.7	1.8	3.4	3.1	63.9
Trayoeung	Luxury	1.4	1.1	0.5	0.2	3.2	2.8	66.7
Phcheung		1.7	0.7		0.1	2.6	2.3	69.0
Chramas	II	2.1	0.3	0.1	0.1	2.6	2.3	71.3
Thlok	III	0.5	0.5	0.3	0.8	2.1	1.9	73.2
Trasiet		1.2	0.4	0.2	0.2	2.0	1.8	75.0
Popoul Bay	I	0.7	0.4	0.3	0.4	1.8	1.6	76.6
Nieng Pha Ae	III	1.5	0.2		0.1	1.8	1.6	78.2
Koki Masau	I		0.6	0.5	0.4	1.5	1.3	79.5
Lumbor	II	0.2	0.2	0.2	0.6	1.2	1.1	80.6
Kondaul	III	0.4	0.3	0.2	0.1	1.1	1.0	81.5
Bakmot		0.4	0.2	0.2	0.2	1.0	0.9	82.5
Other		10.2	4.4	2.1	3.1	19.7	17.5	100.0
Total		37.0	23.9	16.5	34.9	112.3	100.0	

* This total volume of over 250m^3 is higher than expected for a partly logged forest of this type. This suggests there may have been some errors in the inventory. These figures should be treated with caution. A thorough inventory of the site will be carried out prior to any logging operations

Annexe 6 – Summary Presentation