

Mission:

The Harvesting and Operations Programme of the CRC for Forestry develops new and innovative knowledge, work methods, technology and tools through sound practical research.

This assists our industry partners to improve the safety, efficiency, effectiveness, environmental impact and overall competitiveness of their operations.

Vision:

The Harvesting and Operations Programme's vision is to be the partner of choice for industry, universities and governments in the maintenance and improvement of Australian forest operations competitiveness.

Objectives:

- Provide new and innovative knowledge, work methods, technology and tools that would allow the Australian forest industry to:
 - Significantly reduce operating costs (by more than 10 per cent)
 - Significantly reduce the energy and greenhouse gas emission intensity of operations (by more than 10 per cent)
 - Significantly increase the value recovered from operations (by more than 5 per cent)
 - Significantly improve the safety and wellbeing of the workforce.
- Implement these results with all industrial partners to achieve one or more of the following benefits:
 - Reduction in operating cost by 10 per cent or more
 - Reduction in energy intensity of operations by 10 per cent or more
 - Increase value recovery by five per cent or more.
- Enhance the competitiveness of partners.
- Build an increased capacity in Australia for forest operations research.

Research areas:

Main activities occur within six focus areas:

- Harvesting technology and equipment
- Harvesting systems, planning and procedures
- Value recovery and waste reduction
- Workforce management and training
- Transportation technology and equipment
- Transportation systems, planning and logistics

Various levels of activity will be conducted with partners in each of these areas over the next five years. Data will be collected and analysed in all activities so as to offer value to all partners.

Harvesting technology and equipment

A key component to any industrial operation is the equipment used to perform the job. It is important to have the right equipment, use it to its full capacity and effectively track and measure performance to allow for ongoing improvements and management. Accordingly, research in this area will focus on the equipment used in the harvest operations. Efforts will be made to evaluate, develop and adapt both technology add-ons intended to improve harvesting operations as well as new and existing machines in order to understand their performance. Particular effort will be placed on technology for improved productivity, enhanced automated data collection, reduced energy demand, improved sorting capabilities in pine and mixed stands and improved debarking of eucalyptus.

Current activities:

- Evaluate the accuracy of length and diameter measurement from multifunctional head for value recovery optimisation with *Pinus radiata*. (Martin Strandgard)

Planned activities:

- Evaluation of the accuracy of diameter measurement from multifunctional head for value recovery optimisation with *Eucalyptus* species.
- Implementation of operational tracking technology for improved resource management and machine productivity.

Harvesting systems, planning and procedures

When planning harvesting operations there is a wide range of equipment available to choose from and an equally wide range of combinations in the way that equipment can be assembled into harvesting systems. The key is to get the right system with the right machines in the right stands to be cost effective. This research area will focus initially on the performance of existing systems in different stands and operating conditions to identify which systems offer the best performance, productivity, recovery and site impact, which will feed into decision support tools for the industry. Once the performance of the various systems is better understood research efforts will also be targeted to identify and address the weaknesses of different systems.

Current activities:

- Evaluation of productivity and cost of alternative harvesting systems for thinning in native forest re-growth stands (Mauricio Acuna).

Planned activities:

- Evaluation of system productivity and cost as they relate to piece size in thinning and clear-felling in plantations. (Mauricio Acuna and Loren Kellogg).
- Quantify the impact of alternative harvesting systems on the production capacity, cost and effectiveness of harvest operations.

Value recovery and waste reduction

As important to the bottom line as minimising costs is retrieving the maximum value possible from the forest being harvested. This can involve optimisation of merchandising to extract as much higher value products (veneer logs, posts, saw logs, etc.) as possible, the extraction of new and novel products (biomass, fuel wood, etc.) and / or simply reducing waste. This research area will look at the operational implications of producing higher value products and maximising recovery within current specifications, evaluate the economic viability of extraction and transportation of new and novel products and adapt equipment to optimise their production.

Current activities:

- Evaluation of potential existing and developing markets for forest operations biomass utilisation (Loren Kellogg)

Planned activities:

- Evaluation of new technology and software for improved merchandising
- Evaluate the implications of using LiDAR and transportation modelling for biomass feedstock assessment
- Evaluation of sub-optimal recovery of products within current specifications.
- Evaluation of ground-based LiDAR for improved pre-harvest inventory modelling and harvest planning

Workforce management and training

In almost every area of the world forest operations are suffering from either a lack of work force or a lack of a properly trained workforce. The Australian industry is no different. This is of particular concern to operations as equipment and methods become more complex. Effective adoption of efficient new technology and work procedures can only be effective with a skilled, engaged workforce; without properly trained people the best equipment and procedures will fail. The area will identify knowledge gaps in forest operations and target technology transfer of results and international best practices to fill these gaps

Current activities:

- Industry workshops December 2007 (Mark Brown and Loren Kellogg)

Planned activities:

- Promoting acceptance and adoption of new technology and work methods within the forestry workforce.
- Affecting change with contractors while maintaining an independent business relationship.

Transportation technology and equipment

Like harvesting, efficient transportation operations are very reliant on the equipment used. Poorly specified equipment can easily add 25 per cent to transportation costs. This research area will evaluate transportation equipment performance indicators to identify the best in class and identify where improvements can be made across the forestry fleets, and identify methods to do so. Such performance indicators include payloads, fuel consumption, availability, operating costs and productivity. With this base knowledge, the programme will work with industrial partners and regulators to develop and test new specifications and configurations for increased transportation efficiency.

Current activities:

- Evaluation of existing partner fleets to identify the range of efficiency in payload for each common configuration and identify opportunities for efficiency gains (Mark Brown).

Planned activities:

- Optimised performance-based, designed trucks for forestry transportation in Australia.

Transportation systems, planning and logistics

A typical transportation approach is to focus on a single harvest location and to plan transport of the various products to their associated destinations. This approach is often very inefficient on a regional level where - were all operations to be considered - truck efficiency could be increased and costs reduced. However, the complexity of planning and management makes this approach unattractive. As more products are extracted from the forest in an attempt to increase value recovery, transportation planning and management at this regional level becomes more complicated.

This research area will look at the opportunities that exist within current operations to reduce transportation cost through better logistics and work to develop, adapt and implement systems, software and tools to facilitate the integration of complex logistics into normal operational planning and management.

Current activities:

- Investigate and model trucking operations with forestry plantation expansion in Australia to determine trucking needs, road impact and identify options to reduce adverse effects and costs through alternative approaches. (Maryam Habibi, PhD student)

Planned activities:

- Evaluate and implement backhaul opportunities in forest operations to create a modelling and decision support tool.
- Optimise logistic planning and management methods and tools for forestry transportation.

Organisational priority matrix (partner input)

As an indicator for Programme Three planning please indicate the percentage of our resources that should be targeted at these research areas as described above.

	Harv. Equip	Harv. Systems	Bio mass	Workforce	Trans. Equip	Trans. Logistics	Other	Total
e.g.	16%	17%	16%	17%	16%	17%	0%	100%
Importance or effort committed								

Activity ideas (from partners):

- Harvesting technology and equipment:
- Harvesting systems, planning and procedures:
- Value recovery and waste reduction:
- Workforce management and training
- Transportation technology and equipment
- Transportation systems, planning and logistics