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INTRAREGIONAL COOPERATION IN DEVELOPMENT
OF PLANTATION-BASED FOREST INDUSTRIES

DU/RAF/87/117

Technical report: An overview of the furniture and joinery industries in the following PTA countries: Burundi, Comoros, Djibouti, Ethiopia, Kenya, Malawi, Mauritius, Mozambique, Rwanda, Swaziland, Uganda, Zambia, Zimbabwe*

Prepared for the Preferential Trade Area for Eastern and Southern African States (PTA) by the United Nations Industrial Development Organization, associated agency of the Food and Agriculture Organization of the United Nations, which acted as executing agency for the United Nations Development Programme

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ABSTRACT

Stephen J Taylor, An overview of the furniture and forestry industries of the following PTA countries: Burundi, Comoros, Djibouti, Ethiopia, Kenya, Malawi, Mauritius, Mozambique, Rwanda, Swaziland, Uganda, Zambia and Zimbabwe, May 1991

This overview extracts from the individual surveys of these countries a summary of the secondary wood processing industry throughout the subregion, with respect to general market conditions, level of technology, product development and supply and utilization of plantation based materials. It indicates opportunities for increased exports and the obstacles needed to be overcome to achieve them. Attention is drawn to enterprises with expertise in particular areas of production and which could be transferable within the region. The overview also includes the suggested programme of technical assistance and 'eye-opener' seminars currently being proposed by UNIDO.

INTRODUCTION

1. TITLE OF MISSION: Overview of the secondary wood industries of surveyed PTA countries
2. MISSION EFFECTED BY: Stephen J Taylor
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3. PERIOD OF MISSION: May 1991
4. TITLE AND NUMBER OF PROJECT: Intra-Regional Co-operation in Development of Plantation-based Forest Industries - RAF/87/117 (UNDP-funded regional project)
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Headquarters: Lusaka, Zambia
8. OBJECTIVES OF MISSION: Based on the surveys of the existing woodworking enterprises and assessments of the technical, managerial and commercial situation of these enterprises, to make recommendations on rationalization and development of the enterprises within the PTA context.

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CHAPTER I - SUMMARY AND CONCLUSIONS

1. Summary

Despite wide variations in area, climate, population, forest reserves and general economic development within the PTA countries surveyed, there are a number of problems common to the secondary wood products industry throughout the region. These problems may be grouped under the following headings:

- Materials
- Machinery
- Manpower
- Management
- External factors

There are several enterprises scattered throughout the PTA subregion which, by virtue of their organization and/or expertise in some aspect of furniture or joinery manufacture, set criteria for the remainder. These standard setters could, if willing, form the basis of a study-tour itinerary within the PTA subregion for a group of senior managers.

2. Conclusions

2.1 Materials

- 2.1.1 Inappropriately dimensioned and graded boards from the saw-mills lead to excessive raw material wastage in the secondary wood products industry.
- 2.1.2 Regularity of supply and consistency of quality of the timber supplied is problematical.
- 2.1.3 The importance of properly seasoned (kilned) timber in the manufactured product is not fully appreciated by either the saw-millers nor their customers.
- 2.1.4 The specific problems associated with the use of pine and eucalyptus in furniture manufacture, and the techniques to surmount them are not understood.
- 2.1.5 Because of lack of understanding and prejudice, little use is made of man-made panel material - particleboard, medium density fibreboard, plywood and hardboard.
- 2.1.6 Product design for "knock-down" or "knock-up"

products is difficult because the special fittings required have to be imported.

- 2.1.7 Many process materials - sanding belts, special adhesives and lacquers - as well as most upholstery fabrics and springing mediums, have to be imported from outside the subregion.

2.2 Machinery

- 2.2.1 Much equipment stands idle or is under-utilised for want of spare parts and/or process materials (see 2.1.7 above).
- 2.2.2 The absence of routine (preventive) maintenance leads to serious breakdowns.
- 2.2.3 Other equipment is idle either because it is too sophisticated and not understood or it cannot be economically loaded.
- 2.2.4 Limited technical understanding of the capabilities of precision (but basic) woodworking machinery leads to under-utilization of such equipment.
- 2.2.5 Little use is made of jigs and gauges to aid production and ensure consistency.
- 2.2.6 Industrial finishing processes (staining and lacquering) are basic (brushing rather than spraying) and produce poor quality results.
- 2.2.7 Tool/cutter/saw sharpening and repair equipment and facilities in-company are inadequate and specialized service of this nature to the industry is rare.
- 2.2.8 Little use is made of basic materials handling devices and equipment with the consequence of not only higher handling costs, but also increased damage.

2.3 Manpower

- 2.3.1 There is a shortage of skilled wood-machinists - existing technical institutions tend to concentrate upon artisanal rather than production skills (see 2.2.4 above)
- 2.3.2 Production supervisors being ex-production operatives themselves, lack the skills they are expected to direct in their subordinates.
- 2.3.3 Skilled machine setters, tool and cutter grinders, saw-doctors are in short supply (see also 2.2.7 above).
- 2.3.4 Incentives to encourage skill-acquisition and bonus schemes to encourage productivity are generally absent.
- 2.2.5 Formalized, in-company training is non-existent.

2.4 Management

- 2.4.1 There is little professionally qualified management.
- 2.4.2 The basic organizational philosophy is that of 'made-to-order' manufacture with machinery regarded fundamentally as an aid to production rather than the basis of production.
- 2.4.3 Principles of production planning and control, quality control, cost analysis and control, work study, incentives, personnel selection and training are little understood.
- 2.4.4 Routine production management meetings are rare - meetings tend to be called on an ad hoc basis to tackle the current crisis.
- 2.4.5 Management performance tends to be re-active rather than pro-active.
- 2.4.6 Corporate plans and the detailed analysis required to produce them are absent.
- 2.4.7 Management in general tends to be weak in man-management (in disciplining and motivating) and, at junior level, reluctant decision makers.

2.5 External Factors

- 2.5.1 Shortage of foreign exchange is largely responsible for machines being idle for the want of (often) simple basic spare parts and/or process materials.
- 2.5.2 Import controls slow down the purchase of essential raw materials and fittings.
- 2.5.3 Tariff barriers inhibit intra-regional trade.
- 2.5.4 It is often easier to sell outside the region (to S Africa, Europe, USA) than within because of the bureaucratic controls.
- 2.5.5 Expansion and contraction of world trade and demand for primary products directly affects GNP and eventually demand for the output of the secondary wood industry.
- 2.5.6 The potential opportunities presented by population growth and increased urbanization are offset by the resulting tendency in the region towards lower per capita income.
- 2.5.7 Donor country assistance to the industry tends to be subject to their domestic policy changes which affect the frequency and amount of assistance.
- 2.5.8 Past restrictions on repatriation of dividends and capital have tended to discourage overseas investment in the industry.

CHAPTER II - SUMMARY OF AND RECOMMENDATIONS FOR ACTION

1. Summary

There are a number of actions that may be initiated within the context of this FAO/UNIDO project which will assist the secondary wood products industry in the PTA subregion to develop. Many are in the realm of training and education and all can be biased towards the increased use of plantation timber.

The proposals are, for ease of presentation, classified into the same categories as in Chapter I.

2. Recommendations

2.1 Materials

- 2.1.1 Organize regional/national seminars/workshops for saw-millers and secondary wood products manufacturers to:
 - a) Discuss timber standards, and
 - b) Set up on-going consultative procedures to develop appropriate standards.
- 2.1.2 Arrange workshops to introduce modern construction technology in the use of man-made panel materials and knock-down/knock-up furniture fittings.
- 2.1.3 Disseminate information on the effective use of pine and eucalyptus (and cypress) plantation timber in the manufacture of furniture and joinery.
- 2.1.4 Investigate and establish which existing plantations and primary conversion operations are or are likely to become, commercially viable and direct available funds to them.
- 2.1.5 Provide specialist assistance to the rehabilitation of under-utilised particleboard manufacturing units where a feasibility study has established the prospects for financial viability over an acceptable term.

- 2.1.6 Investigate the prospects for setting up a large scale veneer production and veneered particleboard manufacture in the PTA subregion - Mozambique? Malawi? Tanzania?
- 2.1.7 Investigate the possibility of establishing (perhaps joint-enterprise?) manufacturing units to produce one or more of the basic process materials used in the industry eg sanding belts, lacquers, adhesives.

2.2 Machinery

- 2.2.1 Institute training programmes (initially regionally) to show supervisors, technical managers, general managers the capabilities of their existing machinery and combine this with the use of jigs and gauges.
- 2.2.2 Provide instruction on proper tool, cutter, saw maintenance and sharpening and the selection of suitable equipment for that purpose.
- 2.2.3 Provide lectures/seminars on routine machine maintenance procedure and collate existing knowledge into a handbook.
- 2.2.4 Assess the commercial viability of establishing a centralized tool/cutter maintenance service in each country's main wood processing area.
- 2.2.5 Provide information and insights into modern industrial finishing techniques, equipment and materials.
- 2.2.6 Arrange national surveys of the machinery currently being operated in the industry with the aim of establishing what idle equipment can be reinstated and at what cost.
- 2.2.7 Carry out a feasibility study of the equipping of one or two heavy duty vehicles as mobile demonstration units of basic precision woodworking machinery and mobile lecture theatres to tour the principal furniture and joinery manufacturing areas to provide demonstrations and lectures by attached personnel.

- 2.2.8 Provide information on simple in-factory materials handling and transportation equipment and devices.

2.3 Manpower

- 2.3.1 Develop training programmes for technical institutions which will enable them to produce more skilled wood machinists.
- 2.3.2 Develop 'follow-up' courses to 2.3.1 for supervisory personnel to introduce them to basic man-management skills, production planning, cost and waste and quality control, materials handling etc.
- 2.3.3 Develop curricula for short courses in tool setting, grinding, saw doctoring.
- 2.3.4 Establish the curricula for a progressive range of certificates and diplomas in furniture manufacture and management.
- 2.3.5 Create a nucleus of work-study/production engineering consultants to service their national industry.
- 2.3.6 Develop appropriate incentive/bonus schemes for 'in-company' application.
- 2.3.7 Provide outline programmes for 'in-company' training.

2.4 Management

- 2.4.1 Provide introductory 'eye-opener' courses on modern manufacturing methods, planning, cost and quality control, work-study, product design and development (see Annex I).
- 2.4.2 Develop follow-up short courses of greater depth in, for example, production planning, cost control, budgeting.
- 2.4.3 Encourage the development of professionalism in the industry through the sponsorship by donor countries of academically suitable candidates to obtain appropriate degrees in overseas institutions, eg the BSc Furniture Production at Buckinghamshire College in the UK.

- 2.4.4 Initiate discussions on timber standards with the saw-millers (see 2.1.1 above).
- 2.4.5 Arrange PTA/national seminars on marketing and design, plantation-based materials, worker motivation, production incentives, in-company training and management development.
- 2.4.6 Arrange study tours of exemplary enterprises in the PTA subregion for selected senior managers (see Chapter III listing).
- 2.4.7 Provide examples and data on the successful use elsewhere of plantation timbers for furniture manufacture and its marketing.

2.5 External Factors

- 2.5.1 Encourage the current initiatives in the region directed towards the liberalisation of trade by the reduction of tariffs, simplification of documentation, the de-restriction of imports.
- 2.5.2 Encourage governments in the PTA to promote exports (particularly to hard-currency areas) by permitting the retention of an increasingly large proportion of foreign currency earnings.
- 2.5.3 Promote to donor countries the idea that funds devoted to providing technical and managerial training in regional-based institutions will be highly cost-effective.
- 2.5.4 Provide statistical analysis of the likely effect on national industry of the changes in population of urban growth and in forecasts of per capita income.

CHAPTER III - LISTING OF EXEMPLARY ENTERPRISES

Amongst the PTA countries surveyed there were a number of companies which stood out not only in general organizational/managerial terms, but were notable for an expertise in one or more specific areas of furniture/joinery manufacture. As such, if willing, they could collectively

provide practical illustrations of many of the desirable characteristics that a progressive enterprise ought to be demonstrating. They could therefore become the nucleus of a senior management study tour WITHIN THE PTA SUBREGION ITSELF!

- Woodwork Ltd,
Mbabane, Swaziland
- PS - a company successfully processing eucalyptus to manufacture domestic and contract furniture of outstanding design. Exporting to S Africa.
- Swazi Timber Products
Manzini, Swaziland
- a company engaged in the large scale (mass) production of simple laminated pine products and exhibiting tight control over costs. All its output is exported to hard-currency areas.
- International Timber Ltd
Blantyre, Malawi
- another company successfully manufacturing on a large scale laminated eucalyptus (for both its own use, and as supplier to other manufacturers). Also large producers of glulamated beams and of plywood.
- Furncoz Ltd
Ndola, Zambia
- a large company (500+ employees) producing in large batches, standardized products using accurately machined, interchangeable components manufactured from a wide range of materials - timber, steel, particleboard, plastic foam, upholstery covers, wire.

Wilgro Ltd
Harare, Zimbabwe

- a professionally managed, vertically integrated company using modern techniques to manufacture in large batches a wide range of quality products for the home and export markets. Possesses modern kilns and carving machines.

Economic Housing Ltd, Nairobi, Kenya

- a well-managed company producing prefab houses of pine and furniture of cypress using also hardboard and plywood. It has introduced innovative designs and plans to expand into low-cost doors.

ANNEX 1 PROGRAMME OF TECHNICAL ASSISTANCE AND 'EYE OPENER' SEMINARS ALREADY PROPOSED IN THE INDIVIDUAL COUNTRY SURVEYS

OBJECTIVES	OUTPUTS	MAIN ACTIVITIES	INPUTS
<p>Objective 1</p> <p>To expand the manufacturing know how of an initial group of managerial staff in the furniture and joinery industry sector from Zambia and the other PTA countries aimed at optimizing the benefits of industrialized wood processing.</p>	<p>Output 1.1</p> <p>60 plant managers and production supervisors gained an appreciation of all critical aspects involved in the serial production of standard furniture and joinery, towards increasing productivity, quality standards and overall operative efficiency. The areas of expanded know-how include: selection of machinery; selection of cutting tools; inter changeability of parts and quality control; product costing; tool and machine maintenance; general techniques of surface staining and coating; plant layout; product design as applied to industrialized production; quality standard specification. (Objective 1 and Activities 1.1 to 1.3 refer)</p>	<p>Activity 1.1</p> <p>To survey proposed host facilities in Kenya and Malawi in order to discuss Seminar arrangements, prepare a tentative Work Programme and specifications of production supply items (such as quality control instruments, jig accessories, special cutting tools, etc.) to be purchased under the project for seminar demonstration work.</p> <p>Activity 1.2</p> <p>To prepare terms of reference for the lecturers and final Work Programme.</p> <p>Activity 1.3</p> <p>To conduct 2 General Seminars of two weeks each with 30 participants at each seminar in Malawi and Kenya.</p>	
<p>Objective 2</p> <p>To provide a basis for:</p> <p>(a) An increasingly relevant role on the part of Polytechnics and Technical Schools in Zambia and the other PTA countries in stimulating a proper transition of the furniture and joinery sector from artisan methods to the industrial system; and</p> <p>(b) A permanent reference source on plant operation for the management of furniture and joinery plants.</p>	<p>Output 2.1</p> <p>Produce a set of woodworking Training/Reference Manuals covering the main topics dealt with in Output 1 above. (Activities 2.1 and 2.2 refer)</p>	<p>Activity 2.1</p> <p>Collect and review woodworking text books dealing with industrial techniques, in use in Polytechnics and Technical Schools in the PTA.</p> <p>Activity 2.2</p> <p>Adaptation of existing UNIDO woodworking manuals and preparation of new ones, as required, to cover the topics in Output 1.1</p>	
<p>Objective 3</p> <p>To provide a decision making basis for the rehabilitation of Zambia's existing production lines for the manufacture of panel based furniture in view of their potential PTA regional complementary role.</p>	<p>Output 3.1</p> <p>Produced reports with an appraisal of the constraints preventing the full utilization of the existing machinery at the plants surveyed. The reports are also to provide details and cost of corrective steps to be taken to rehabilitate the equipment which is not in operating condition. (Activity 3.1 refers)</p> <p>Output 3.2</p> <p>Produced a pre feasibility study for setting up a typical self contained furniture manufacturing operation based on the type of panel line equipment available. The study will include: survey of general market conditions; definition of typical products to be produced; material input requirements; general factory building requirements; general ancillary equipment needs; manpower requirements; general assessment of financial viability; details of further technical assistance requirements. (Activities 3.1 to 3.5 refer)</p>	<p>Activity 3.1</p> <p>To conduct a survey of the panel line machinery and provide a full inventory of the machinery and accessories available.</p> <p>Activity 3.2</p> <p>To collect and analyze the local data necessary for the preparation of a pre feasibility study.</p> <p>Activity 3.3</p> <p>To adapt, for the purpose of preparing a pre feasibility study, a typical panel based modular furniture system suitable for a wide range of uses (wardrobes, bookcases, living room and dining room cabinets, etc).</p> <p>Activity 3.4</p> <p>To prepare a typical pre feasibility study on the basis of the above.</p> <p>Activity 3.5</p> <p>To elaborate details of technical assistance required to start regular serial production of panel based furniture.</p>	

ANNEX 1 PROGRAMME OF TECHNICAL ASSISTANCE AND 'EYE-OPENER' SEMINARS ALREADY PROPOSED IN THE INDIVIDUAL COUNTRY SURVEYS

OBJECTIVES	OUTPUTS	MAIN ACTIVITIES	INPUTS
<p>Objective 4</p> <p>To provide the basis for the improvement of tool maintenance methods of the furniture and joinery industry in Zambia and in the other PTA countries in order to attain: longer life span of costly imported machine cutting tools; quality improvement of machined parts; reduced safety hazards in the use of machinery; and reduced material reject rate.</p>	<p>Output 4.1</p> <p>Three Project Profiles on the setting up of tool maintenance units within small- and medium-scale furniture/joinery plants, or an self-contained Tool Maintenance Centre. The Profiles include: workshop layout; specifications and estimated cost of machinery, accessories and supplies for a two year operation; specifications of storage arrangement for tools and supplies; lighting requirements, etc. (Activity 4.5 applies)</p> <p>Output 4.2</p> <p>Trained 24 senior technicians in carrying out the maintenance of machine cutting tools in use in the furniture/joinery industry such as: planing knives, moulding cutters, routing cutters, standard circular saw blades, carbide tipped circular saw blades, blades for band resawing, mortising chains, square chisel mortiser bits, and boring bits. The participants would subsequently act as counterparts in similar courses to be conducted at a national level. (Activities 4.1, 4.2, 4.3, and 4.4 refer)</p> <p>Output 4.3</p> <p>Extended utilisation of the Project Profiles and Data Sheets prepared for the training course for the benefit of the PTA furniture/joinery industry as a whole. (Activity 4.5 refers)</p>	<p>Activity 4.1</p> <p>To survey the tool maintenance workshop of the Warca Furniture Factory and the WUANC Tool Maintenance Centre of Addis Ababa which, being representative in the PTA of well-equipped tool maintenance facilities for the furniture and joinery industry qualify for hosting the Tool Maintenance Training Courses.</p> <p>Activity 4.2</p> <p>To prepare specifications of supplies and accessories to be purchased for the purpose of conducting the training courses.</p> <p>Activity 4.3</p> <p>To prepare training Data Sheets and visual aids as a basis for conducting the maintenance courses.</p> <p>Activity 4.4</p> <p>To conduct 3 training courses on Tool Maintenance Techniques of one month duration each for 8 PTA trainees at a time.</p> <p>Activity 4.5</p> <p>To prepare Project Profiles as a reference on the setting up of tool maintenance units.</p> <p>Activity 4.6</p> <p>To reproduce and distribute widely, in the secondary woodprocessing industry, the Project Profiles and Data Sheets prepared under the project.</p>	
<p>Objective 5</p> <p>To expand the capability of efficiently utilizing, in Zambia and in other PTA countries fast growing plantation timber species (such as Pinus patula, Eucalyptus spp and Cupressus lusitanica) in the furniture and joinery industry as well as in building construction.</p>	<p>Output 5.1</p> <p>Report on the use of Eucalyptus in the PTA and overseas for the production of furniture, joinery, structural building components and wood-based panels. (Activities 5.1, 5.2, 5.3 and 5.6 refer)</p> <p>Output 5.2</p> <p>Manual on standard wood treatment and wood processing requirements of Eucalyptus, Pine and Cypress, to cover subjects such as: kiln drying; cutting speeds; cutting-tool geometry with respect to main wood machining operations; choice of surface coating material and methods; dipping against blue stain and pressure treatment of Pine; choice of adhesives for standard and structure applications; choice and dimensioning of joints in chair manufacture. The manual shall also propose a set of minimum quality standards for furniture intended for intra-PTA trade and for government contracts. (Activities 5.4 and 5.6 refer)</p> <p>Output 5.3</p> <p>Reference Manual on the design of standard roof trusses made of Pine and Cypress, and on the design and fabrication of roof trusses made of Eucalyptus poles as practised in Ethiopia. (Activities 5.5 and 5.6 refer)</p>	<p>Activity 5.1</p> <p>Review the experience gained by the International Timber Group in Kianjira, Malawi and PA Woodwork PTY, Mbabane, Swaziland, in the manufacture of furniture components, joinery and structure building components made of laminated Eucalyptus.</p> <p>Activity 5.2</p> <p>Review the experience gained by ETHANSO and REAFCO plants in Addis Ababa, Ethiopia in the manufacture of fibreboard and particle board made of Eucalyptus.</p> <p>Activity 5.3</p> <p>Compile information on overseas experience in the utilization of Eucalyptus in the primary and secondary wood processing industry.</p> <p>Activity 5.4</p> <p>Compile information from African and overseas research institutions, including Bureau of Standards, on woodprocessing requirements and durability and performance standards as applicable to the use of Eucalyptus, Pine and Cypress in furniture and joinery production and structural building applications.</p> <p>Activity 5.5</p> <p>Compile information from African research institutions and ministries of works on the use of Pine, Cypress, and Eucalyptus in the design and fabrication of roof trusses.</p> <p>Activity 5.6</p> <p>To reproduce the report and manuals under outputs 5.1, 5.2 and 5.3 for wide distribution in the industry, send research institutions and ministries of work in the PTA.</p>	

ANNEX I PROGRAMME OF TECHNICAL ASSISTANCE AND 'EYE-OPENER' SEMINARS ALREADY PROPOSED IN THE INDIVIDUAL COUNTRY SURVEYS

OBJECTIVES	OUTPUTS	MAIN ACTIVITIES	THREATS
<p>Objective 6.1</p> <p>To enable the saw milling forest industries to become more aware of:</p> <ul style="list-style-type: none"> a) The dimensional needs of the furniture/timber engineering industries in respect of solid timber, particle board, plywood, fibre board. b) The importance of appropriate and reliable quality grading. c) The critical importance of adequately kilned (seasoned) timber in furniture construction. d) An opportunity to obtain a higher price for some of its output. 	<p>Output 6.1</p> <p>15 Influential forest products managers will better appreciate the needs of the secondary wood products industries (and in satisfying such needs be able to obtain a premium price for the material).</p> <p>Output 6.2</p> <p>15 Secondary wood products managers will be better able to design products to utilize more efficiently the better quality and more suitable output of the saw millers. They will themselves better appreciate the benefits to themselves and the final consumers arising from the use of properly kilned timber.</p>	<p>Activity 6.1</p> <p>Survey the saw milling industries in the PTA countries to select personnel able to be articulate on the process of selection and conversion of both softwood (and as appropriate) hardwood logs and prepared to listen to the needs of the down stream industries.</p> <p>Activity 6.2</p> <p>Select from previously surveyed secondary wood products industry suitable managers able to articulate their material needs (in quality terms) and prepared to listen to and consider the problems of the foresters.</p> <p>Activity 6.3</p> <p>Select suitable wood science trained personnel able to present technical information comprehensively.</p> <p>Activity 6.4</p> <p>Conduct a prototype seminar of 50 participants in one of the PTA countries.</p>	
<p>Objective 6.2</p> <ul style="list-style-type: none"> a) To make the secondary wood products industry aware of the natural and physical constraints of the basic material that the millers have to process. b) To familiarize them with the advantages/disadvantages of using man made board. c) To re-emphasize the benefits derivable from the use of properly seasoned (kilned) timber. 	<p>Output 6.3</p> <p>General an on going dialogue between those producers (the saw millers) and their consumers (the down stream wood products industries).</p>		