



Background

INTRODUCTION

This section provides a brief review of recent global fibre studies and the themes they highlighted, and an overview and analysis of industrial roundwood production by region since 1970. Taken together this material provides the necessary contextual backdrop for the material presented in the subsequent sections of this report.

RECENT GLOBAL FIBRE STUDIES

The interest in fibre supply studies which examine the resources needed for the production of wood products is significant and it is increasing. There is less forest undisturbed by man, the dynamics of the forest disturbed by man are frequently unknown and the area of plantations is increasing significantly. In addition, there are significant new fibre sources emerging in the form of non-wood and recovered fibre. Finally, there are emerging new fibre sources, such as trees outside of forest, non-forest land and other lands, which play a very significant role in some regions. Given this complex matrix of fibre sources and the many variables which play upon them, it is necessary to persevere with the challenging task of developing and maintaining the basic forest and fibre statistics since they provide a key foundation for forest and forest product planning.

In addition to the statistics, it is necessary to identify some of the critical factors that will have an impact on future fibre supply. Table 2 summarizes a review of recent literature which identifies some of the major supply themes. The selected reference list included in this table is not meant to be exhaustive but to serve as a quick overview of some major issues that are being raised by researchers and analysts. The GFSM attempted to include some of these issues in the factors which influence supply and these are described more fully in Section 5. It is worth bearing in mind that the outlook studies process, as described in Figure 1, will address a much broader and complex range of factors than those discussed here.

INDUSTRIAL FIBRE PRODUCTION TRENDS

In analysing fibre supply it is useful to have an overview of the historic and current developments in the use of different types of forest products in various regions since it helps to place in context the current reported utilization of forest resources. There are at least three possible benefits to such a comparison:

Table 2
Summary of recent fibre supply analyses by thematic area

Major Industrial Roundwood Supply Issues	# of Citations	GFSM Factor or other Element (n/a = not addressed)	Reference														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Level of investment in silviculture & countries investment stimulation policies	10	SFM	US	AF AS GL		GL	GL			RU	EU		GL	GL	GL	GL	
Land use change (deforestation, afforestation, protected area)	9	Forest area & accessibility	CA	GL	GL		GL					GL	GL			TE BO TR	
Better ecosystem management	8	SFM	US CA	GL	GL		GL				EU	GL	GL			GL	
Material efficiency & technology change	8	Material efficiency	US	GL	GL	GL				RU			GL	GL	GL		
Higher prices expanding supply	8	Accessibility	US	GL		GL	GL	GL					GL	GL			GL
Land ownership (non-industrial landowner, fragmented ownership, privatization trends)	5	Forest ownership	US	GL							EU		GL			GL	
Higher management or harvesting costs	5	Accessibility		GL				GL			EU		GL			GL	
Poor wood quality or poor forest condition	4	Accessibility & harvest intensity	CA		GL			GL			EU						
Poor industrial and institutional infrastructure	4	Accessibility	CA	RU						RU			GL				
Natural forest depleted	4	SFM		AS									GL		GL	TE BO	
Emergence of recovered and non-wood fibres	4	Non-wood & recovered fibre		GL							EU	GL	GL				
Plantations	3	Afforestation & development gains										GL		GL	GL		
Re-classification of the growing stock	2	Forest area & volume	US	GL													
Sustainable forestry with broader social objectives	2	SFM	CA		GL												
Financial abilities of the wood industry	2	n/a		GL									GL				
Product substitution	2	n/a				GL	GL					GL					
Air pollution & global warming	2	SFM								RU						GL	
Difficult operating terrain	1	Accessibility	CA														
Competition for roundwood supply	1	n/a			GL							GL					
Age class imbalances & lower yields on subsequent rotations	1	Harvest intensity			GL											GL	
Data uncertainty and error	1	Simulation modelling								RU							

Key to authors

1 Boulter & Darr 1996	6 Reed 1995	11 Sedjo & Lyons 1990
2 Margules, Groome & Poyry 1996	7 Nilsson 1995	12 Sedjo & Lyons 1995
3 Waggener & Lane 1996	8 Wall 1995	13 Arnold 1993
4 Reid Collins 1995	9 Nilsson 1996	14 Zhang & Buongiorno 1996
5 Apsey & Reed 1995	10 McNutt 1996	

Key to region

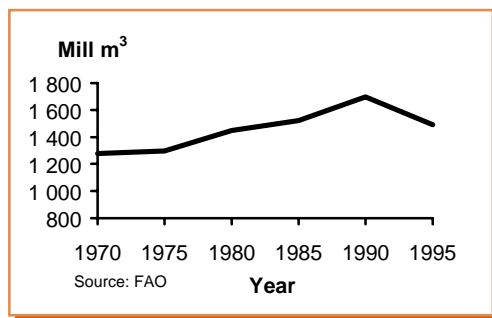
GL Global	EU Europe
US United States	RU Former USSR
CA Canada	TR Tropical
AF Africa	TE Temperate
AS Asia	BO Boreal

1. The difference between the total fibre forecast and the historic trends in production may provide some guidance to assessing the economics of the future timber supply under a given set of conditions.
2. In the longer term, the relationship between industrial roundwood production and potential fibre availability, which is linked to the growth/drain ratio or a growth/removal ratio, is a very useful one to monitor since it is one of the indicators of the available country's forest resources to meet production targets (see Section 4, Tables 6-8 for discussion on potential removals for industrial production).
3. The difference also helps to highlight errors in the statistics, particularly at the country level. For example, the reported production statistics in Cambodia and Angola are very much lower than potential fibre availability calculations. This indicates that the reported statistics from the countries are not including the illegal fellings that are sometimes 300 percent higher than the reported production in some countries.

Industrial roundwood is still the major source of fibre for the wood-processing industries. Industrial roundwood comprises "sawlogs and veneer logs", "pulpwood and particles" and "other industrial roundwood".

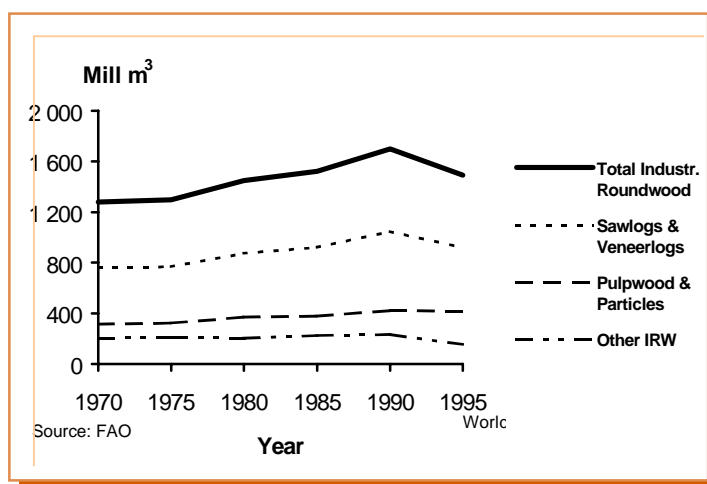
Other industrial roundwood consists of roundwood used for such applications as tanning, distillation, match blocks, poles, posts, and pitprops.

Figure 6
Global industrial roundwood production 1970-1995



Demand for forest products is driven by many factors and one of the most important ones is population growth. Between 1970 and 1994, world population increased by more than 50 percent. In the South American and African regions, it increased by more than 60 percent and 90 percent, respectively (FAO 1997). Global production of industrial roundwood has, until recently, shown sustained increases that parallel population growth. Total reported industrial roundwood production in 1990 was about 1.7 billion m³ (Figure 6). Since 1990, however, reported world production has declined to about 1.5 billion m³ in 1995.

Figure 7
Global industrial roundwood production by product group 1970-1995



An analysis of industrial roundwood production by product group (see Figure 7) demonstrates that the decline of world production between 1990 and 1995 results mainly from a decline in the production of sawlogs and veneer logs

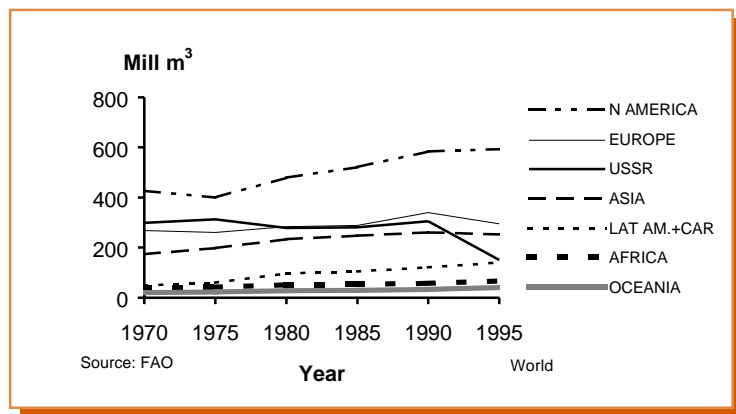
and other industrial roundwood. Pulpwood production has continued to grow between 1990 and 1995, but at a reduced rate.

There are several possible reasons behind the decline in sawlog production. An obvious one is increased substitution by wood-based panels in traditional sawn timber applications, for example the use of veneered fibreboard or particle board in traditional sawn timber applications such as furniture and joinery. It can also be postulated that the leading consumer countries in North America, Scandinavia and Europe are approaching saturation levels for per caput requirements. Similarly the current group of rapidly developing countries may not have the same timber construction traditions that drove the high demand in developed countries when they were at the same income levels. In the main producing countries there might also be a preference for higher value-added products being made directly from sawnwood so that an increasing share of sawnwood output is not produced as a commodity for sale but for input into secondary products (FAO 1997). On the supply side, increasing scarcity of large-diameter logs suitable for cost-competitive sawing may be promoting the use of engineered wood products and other non-wood alternatives.

Figure 8 shows the regional distribution of industrial roundwood production. Major producers are North America, Europe, the former USSR and Asia. The world's five largest producer countries are United States, Canada, the Russian Federation, China and Brazil. A steadily increasing portion of the world production comes from Latin America. Figure 8 also suggests that the decline in world roundwood production between 1990 and 1995 was primarily triggered by a sharp production decline in the former USSR and by moderate reductions in Europe and Asia. All other regions maintained or increased their production level.

The decline in production from the 1990 level reflects both supply and demand conditions. While a major factor was the dislocation of output in the Russian Federation, where reported industrial roundwood removals were down substantially (around 50% from the 1990 level), the decline also reflects weak demand in industrialized countries. Further, the supply of logs was increasingly affected by environmental restrictions on harvesting in North America and the main tropical Asian countries. Some African countries also increased their restrictions on logging and export, both for forest management reasons and to encourage greater domestic processing (FAO 1997).

Figure 8
Global industrial roundwood production by region 1970-1995



Asia-Pacific

The Asia-Pacific region currently produces about 20 percent of the world's industrial roundwood (Figures 9 and 10). Industrial roundwood production

Figure 9
Industrial roundwood production in Asia 1970-1995

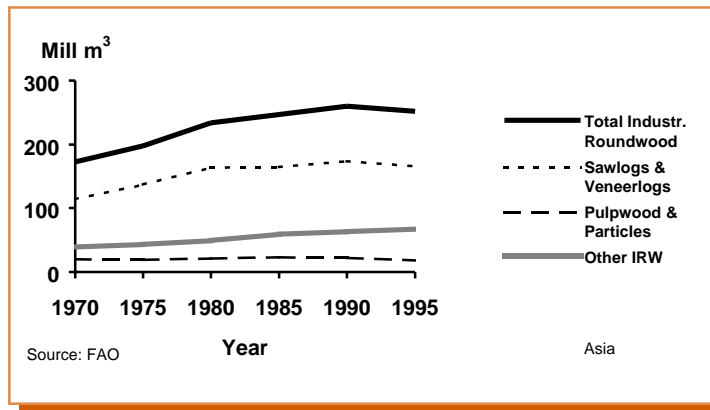
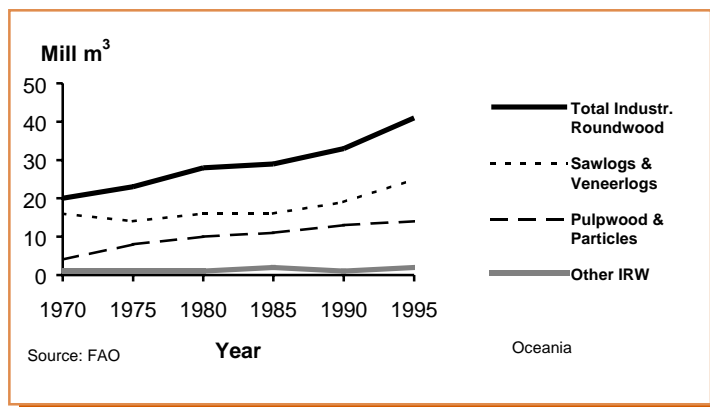


Figure 10
Industrial roundwood production in Oceania 1970-1995



increased steadily in the two decades preceding 1990 but has declined slightly between 1990 and 1995. The Pacific subregion, however, has continued to increase production. Leading producers of industrial roundwood in Asia are China, India, Malaysia, Indonesia and Japan. In Oceania the major producers are Australia, New Zealand and Papua New Guinea. The Asia-Pacific forestry sector provides a good example of a demand-driven expansion of industrial roundwood production. Concerns continue to exist, however, over the long-term sustainability of wood supplies.

The production decline in Asia is mainly due to declines in sawlog and veneer log production. These represent the higher quality logs coming mainly from

natural forests. Decreases in log production in Malaysia and Indonesia are responsible for most of this decline. Potentially the most significant response to shortfalls in industrial wood supplies has been the establishment of plantation forests. In the future, plantation-grown wood is likely to supplement significantly natural forest production in the Asia-Pacific region, particularly as a source of pulpwood; as a raw material for reconstituted wood-based panels; and for "other industrial roundwood" applications. Furthermore, roundwood production might be influenced by higher processing efficiency through the use of more residues, the adoption of better technologies, increased recycling and reduction in wastes (FAO Asia-Pacific Forestry Sector Outlook Study 1998).

The proportion of logs processed domestically in Asia is continuing to increase and is expected to exceed soon 90 percent from the current 88 percent. This reflects increasing populations, growing economies and the emphasis on exporting value-added products in this region (ITTO 1996). The major exporters of unprocessed logs are currently Malaysia, New

Zealand and Papua New Guinea. Australia also exports a large amount of industrial roundwood as wood chips.

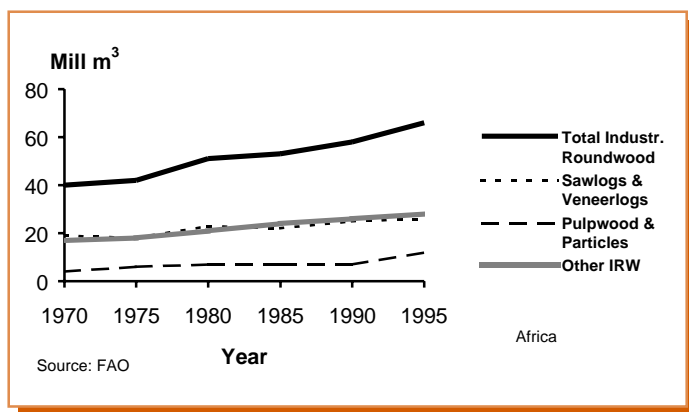
Africa

Africa's industrial roundwood production increased by 65 percent from 40 million m³ in 1970 to 66 million m³ in 1995. Its global share of production increased from 3.2 percent to approximately 4.5 percent in the same period. Several countries have, however, reduced production during this period, mainly for forest management reasons. The largest producers of industrial roundwood in Africa are South Africa, Nigeria, Democratic Republic of Congo, Côte d'Ivoire and Cameroon.

The proportion of log production processed domestically in Africa is declining and is currently estimated at about 60 percent (ITTO 1996). This is mainly due to increasing volumes of logs being exported to Asian markets. Asian companies are reported to be harvesting in Cameroon, Gabon, the Republic of Congo and the Central African Republic. A recently reported establishment of new forest industries in connection with concession rights in the Democratic Republic of Congo may contribute to an overall production increase in the future, although production from this initiative could be limited by the economic accessibility of the forests.

Figure 11 shows that in Africa production volumes of sawlogs and veneer logs are approximately equal to production volumes of other industrial roundwood. Very recently the production of pulpwood and particles has increased. This is mainly influenced by increasing plantation production in South Africa.

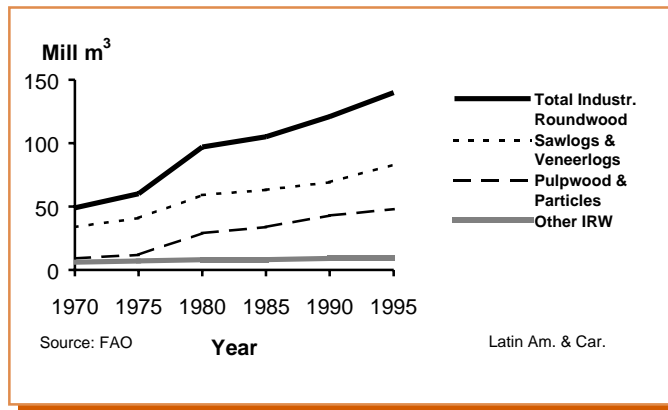
Figure 11
Industrial roundwood production in Africa 1970-1995 by region



Latin America & Caribbean

Industrial roundwood production in Latin America and the Caribbean increased rapidly between 1970 and 1995. Production grew by 186 percent, from 49 million m³ to 140 million m³ annually. This increase was largely a result of increasing production of sawlogs and veneer logs and pulpwood. The region's production accounts for about one-tenth of the world total. Currently Brazil is the world's fifth largest producer of industrial roundwood and by far the largest single producer in the region. Brazil accounts for about 55 percent of the region's industrial roundwood production. Other major producers are Chile, Argentina and Colombia. Almost all logs produced in the region are processed domestically (ITTO 1996).

Figure 12
Industrial roundwood production in Latin America and Caribbean 1970-1995



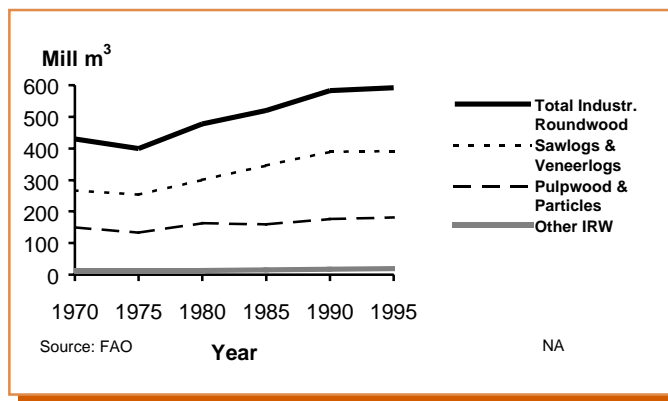
Industrial roundwood production in this region is expected to continue to increase. It is possible, however, that large areas of natural forest in South America may be withdrawn from industrial production for policy reasons. The economic accessibility of wood in the Amazon region may also prove to be a constraint. A considerable portion of future production growth, however, is expected to originate from fast-growing plantations.

North America

Aside from a brief downturn in the early 1970s, production in North America increased steadily until 1990 when the rate of growth again began to slow down (Figure 13). This is the world's largest industrial roundwood producing region with the United States and Canada together accounting for almost 40 percent of total global production.

In the United States industrial roundwood production may be constrained in

Figure 13
Industrial roundwood production in North America 1970-1995



the short term by an unprecedented age class situation for softwood inventories during the decade beyond 2000. By 2000 or thereabouts, large-diameter softwood timber will have been harvested on private lands and the harvest on public lands will be constrained by non-market forces. After the year 2010, plantations initiated in the last two decades will reach merchantable size in the South and Pacific Northwest (ECE/FAO 1996b).

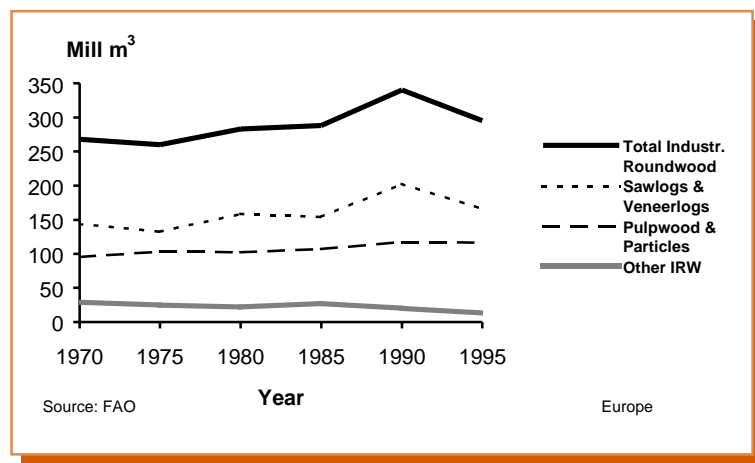
In Canada there are still physical stocks of mature and overmature timber available for harvest. However, there is considerable variation in the quality and condition of this timber, and the rate of harvest is constrained, to a greater or lesser extent, by public sustainable forest management policies and a growing demand for other values on the forest land base. Prospects for timber supply vary considerably on a regional basis. Most of the available timber is hardwood, while most demand is for softwood. Even with these constraints there appear to be some further surpluses available to facilitate further expansion of the Canadian harvest which means industrial roundwood production increases are possible (ECE/FAO 1996b).

Europe

Since peaking in 1990, industrial roundwood production in Europe has declined to about 295 million m³ in 1995. As Figure 14 shows, this decline is mainly due to a reduced production of sawlogs and veneer logs.

For the Nordic countries (Sweden, Finland, Norway) it is estimated that harvest levels are currently well below the estimated net annual increment. Theoretically these countries have considerable potential for expansion of production. In Western Europe the main producers are Germany, France, Austria, Spain and Portugal. Industrial roundwood production in these countries has increased only modestly since 1970. In 1990 a number of European countries markedly increased production as a result of windthrow salvage harvests. For example, Germany doubled its annual production in that year. This explains partly the production peak in 1990 and also the reduced production in subsequent years. Production levels in most Eastern European countries have also declined since 1990. Changes in political structures and related efforts in transition to market economies have resulted in some dislocation in the forest and forest industry sector.

Figure 14
Industrial roundwood production in Europe 1970-1995



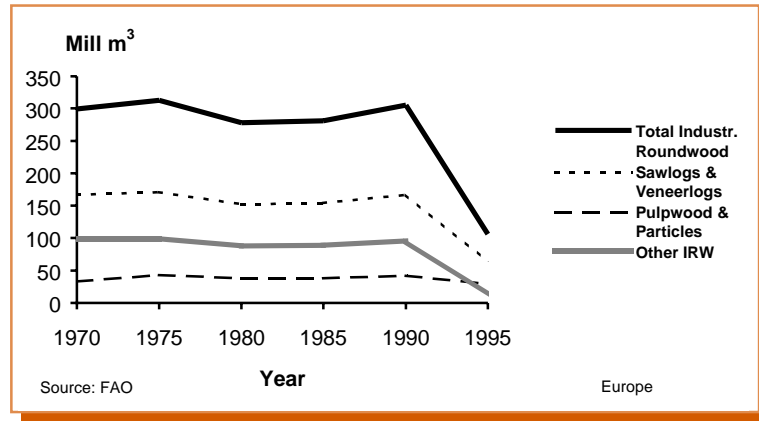
Russia

Since 1990 the reported industrial roundwood production in the former USSR has declined by about 50 percent (Figure 15). Significant uncertainty exists, however, as to the proportion of the observed decline that is real, and the proportion that originates from severe disruption to statistical systems. This is especially the case with respect to "other industrial roundwood", which accounted for about one-third of the 1990 production volume and contributes heavily to the production decline since 1990.

Despite the decline, the Russian Federation is still the world's third largest producer of industrial roundwood behind the United States and Canada. A significant proportion of the former USSR's production came from Siberian forests that were made accessible by the development of infrastructure in the region, principally the trans-Siberian railway. This enabled export to Western Europe from Baltic ports. In 1990, Siberian sawlogs travelled, on average, more than 1 000 km from forest to mill. Sawnwood was also transported over very long distances.

A major factor in the production decline since 1990 was the imposition of market driven freight charges on the trans-Siberian railways. This new charging mechanism made huge areas of central Siberia economically inaccessible overnight.

Figure 15
Industrial roundwood production in former USSR 1970- 1990



The former USSR is therefore a “wild card” in all future developments in the forest sector. Russia, in particular, contains some of the world’s largest potentially usable forests. It also spans the East and the West, being able, therefore, to influence events in both the Pacific Rim basin and in Western Europe (FAO 1997).

PRODUCTION TREND ANALYSIS

It can be reasonably postulated from examining these production trends that:

- ❑ the level of industrial roundwood production varies widely from region to region;
- ❑ there are conflicting trends between regions (although they may be temporary in nature);
- ❑ the product types are changing significantly over time in most regions;
- ❑ the historic trends provide no strong evidence of a decline in the future production of industrial wood products. Indeed the latest econometric forecasts indicate an average annual increase in production of 1.3 percent per annum.

In some past studies it has been frequently assumed that, if demand for forest products is to be met, market forces will make the necessary raw material available to meet demand. However, this approach to forecasting industrial production does not identify the source of raw material for industrial production. Earlier it has been argued that this is a critical analytical issue, and so, the remainder of this report attempts to describe the most recent efforts to improve our basis for analysis.



