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Forest evaluation of the State of Acre, Brazil

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Market analysis for Acrean timbers

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Introduction

The state of Acre is located in the tropical north-western part of Brazil, and south-west of the Amazon river, bordering Bolivia and Peru. It represents about 150 000 km² within the Amazon region. About 90% of the land is covered by natural dense forests, of which about 65% can be devoted to sustainable timber production. The few 500 000 inhabitants live mainly in the urban centers, among which the capital is Rio Branco. There is very little industrial or agro-production activity, and most of the needs are fulfilled by imports from south Brazil. Only one road crosses Acre and connects it to the south of the country : the road distance from main southern Brazilian centers reaches 2 000 to 4 000 km, making the State one of the most remote within Brazil.

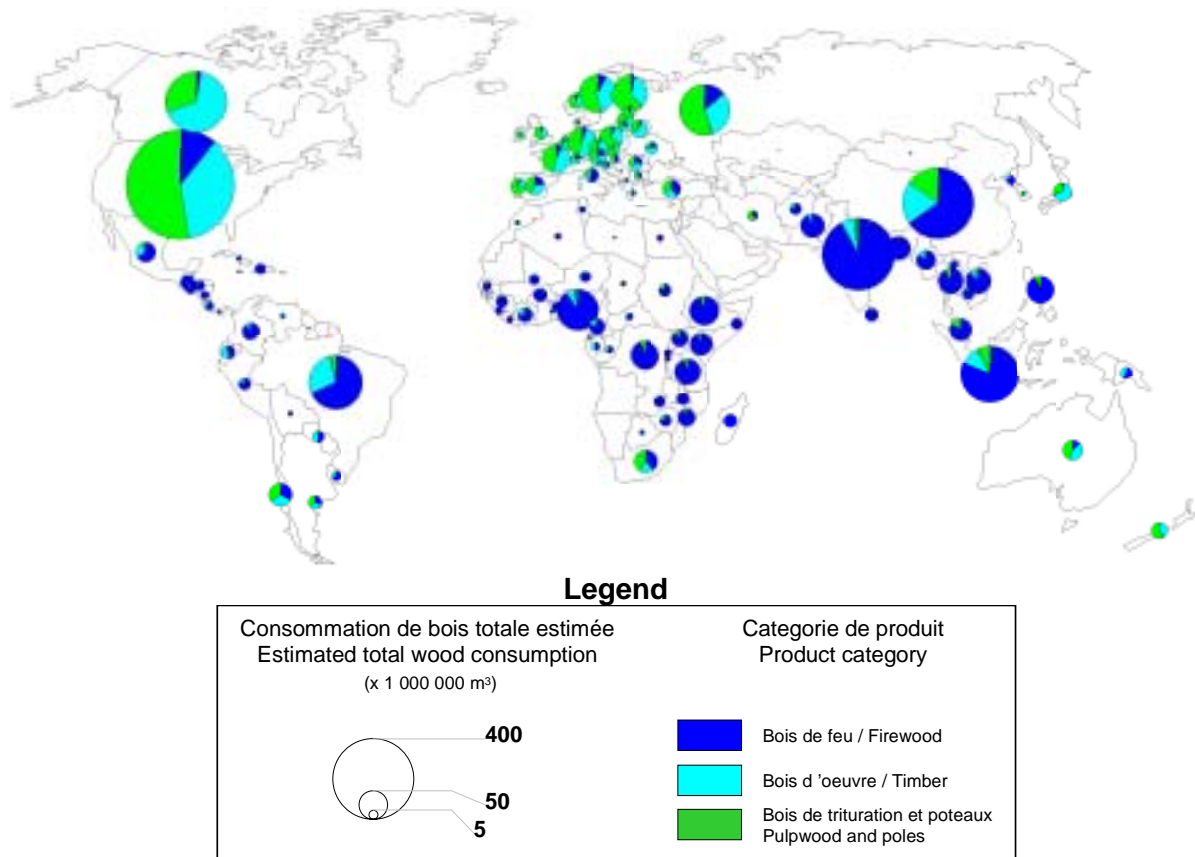
In this difficult context, keys of development are the valorization of natural resources, which include non-ligneous and timber products. The need to develop a sustainable wood industry lead to assess markets that can be targeted from Acre in an sustainable and economic way. The objective of this analysis is so to highlight the opportunities and the marketing strategies that are the most suitable from a timber business point of view, in the specific context of Acre. Care should be taken that all the conclusions that can be interpreted from this work are valid from a timber business point of view, but these market considerations don't necessarily prevail on other considerations, such as social or political ones.

From a general point of view, Acre State, despite its remote location, is not independent of the globalization process. This means that the market analysis is required to start from the world level markets, and has to deepen progressively down to national, regional and local levels, in order to correctly isolate which are the competitive advantages and disadvantages of the specific Acrean context.

Tropical timber markets at the world scale

Stands of tropical forest account for slightly over half the area of the world under forest cover and help to satisfy a similar proportion of world needs for ligneous materials, wood and derivatives. Consumption takes very varied forms, and the potential uses of wood (Fig. 1 - Roda, 2000) , from energy generation to paper and its composites through to building materials, have led to the development of markets and economic situations with very varied characteristics. Although wood as an energy source has the largest market share, it is primarily traded relatively locally, on home or (less frequently) on regional markets. Wood for paper pulp comes from very specific stands of forest and, in tropical environments, from industrial plantations. There is no interest in considering here the products of such plantations, since about 90% of the forest cover in Acre is constituted of natural forests, which address very different markets. But timber is the main resource to be considered within this analysis. The timber produced in the tropics is also, contrary to common belief, mainly destined for the home market. The remaining products to be internationally traded are high value logs, sawn timber, and plywood. It is essential to set the main markets for these products, which are the present and future driving force of this economic sector, in a planetary context. This is done here by analyzing the available data collected by international organizations such as the ITTO and the FAO.

Fig. 1 Estimated world wood consumption in 1998 (Roda, 2000 – from FAO data)

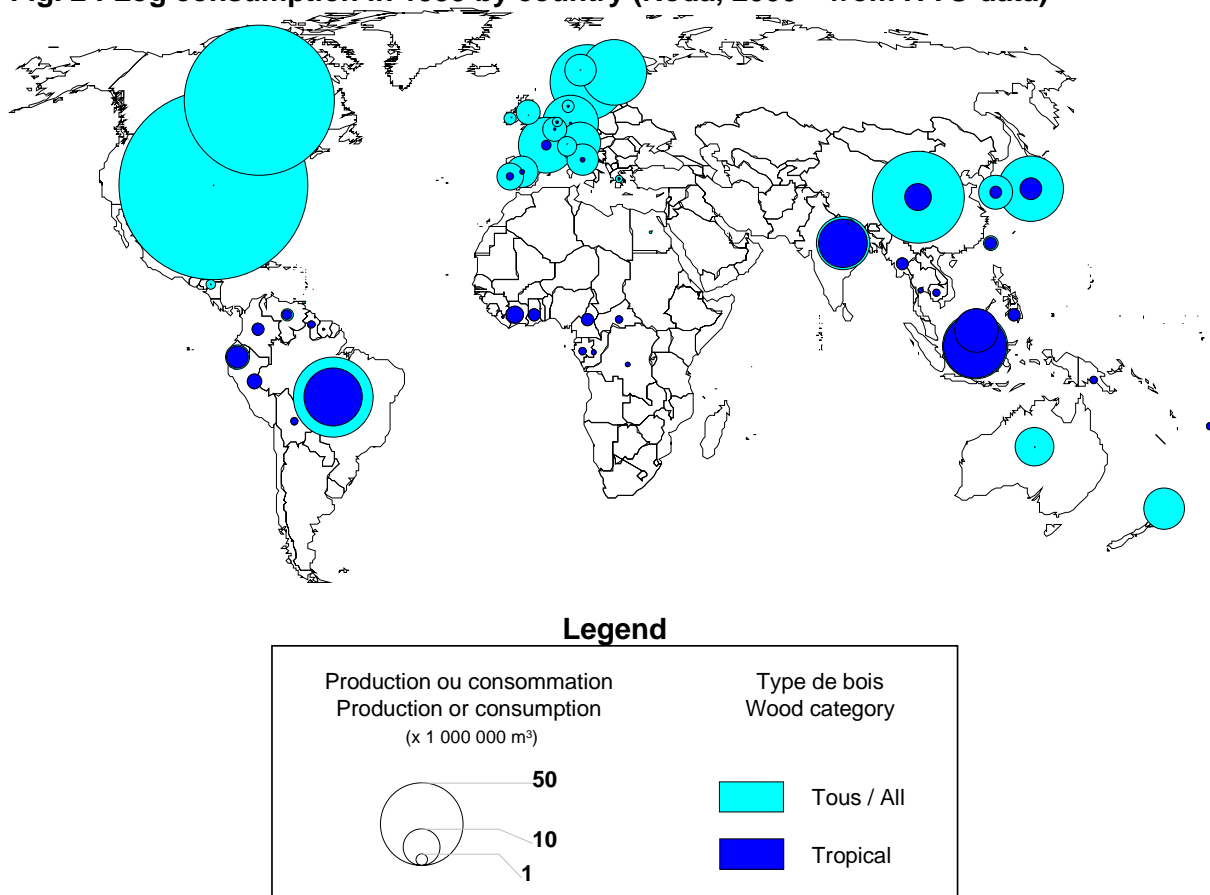


Log markets

Volumes

Tropical timber accounted for less than a sixth of world log production in 1999, i.e. 114 million m³ out of an overall total of 777 million m³, despite the fact that tropical forests represent half the area of the world under forest cover (FAO, 1995). International trade accounted for a very small percentage of world production. Trade in tropical timber accounted for 2% of world production, while trade in non-tropical timber accounted for 4%. Domestic consumption therefore had a decisive effect on log production. The Asian continent was both the dominant producer and the dominant consumer of tropical logs : in both cases, it accounted for around two-thirds of the total volume. Latin America was in second place, with less than a third of the production and consumption volumes. Africa (9% of production and 6% of consumption) and Europe (2% of consumption) had little effect on the tropical log situation. In terms of individual countries, there was very little connection between the markets for tropical logs and those for non-tropical logs (Fig. 2 – Roda, 2000). As the producers were also the main consumers, the countries of the South appear in general to have been relatively independent of the countries of the North.

Fig. 2 : Log consumption in 1999 by country (Roda, 2000 – from ITTO data)



In 1999, the leading producers of tropical logs were Indonesia, Brazil, Malaysia, and India (Table 1 – Roda, 2000). The leading consumers of tropical logs were Indonesia, Brazil, India, and Malaysia (Table 2 – Roda, 2000). These four countries accounted for over 80% of tropical log production and over 70% of tropical log consumption. As a consequence, the policies of each inevitably had a major effect on the world situation.

Table 1 : Leading producers of tropical logs (Roda, 2000 – from ITTO data)

Ranking	Country	Volume (m ³)	World %
1	Indonesia	29,000,000	26%

2	Brazil	24,500,000	22%
3	Malaysia	20,000,000	18%
4	India	18,350,000	16%

Table 2 : Leading consumers of tropical logs (Roda, 2000 – from ITTO data)

Ranking	Country	Volume (m ³)	World %
1	Indonesia	28,950,000	25%
2	Brazil	24,502,000	21%
3	India	16,995,000	15%
4	Malaysia	14,170,000	12%

One exporter, Malaysia, and two importers, China and Japan, accounted for the bulk of the international tropical log trade (Fig 3 – Roda, 2000). The leading exporters of tropical logs were: Malaysia, Papua New Guinea, Gabon, and Cameroon (Table 3 – Roda, 2000). The leading importers of tropical logs were China, Japan, India, and Taiwan (Table 4 – Roda, 2000). Brazil disappeared from the market completely as a result of the log export ban in force there. For some countries, exports represented a large part of production. These were Malaysia and the African countries of the Congo Basin, which were particularly sensitive to changes in international demand.

Fig. 3 : Major trade lines for tropical logs in 1998 (Roda, 2000 – from ITTO data)

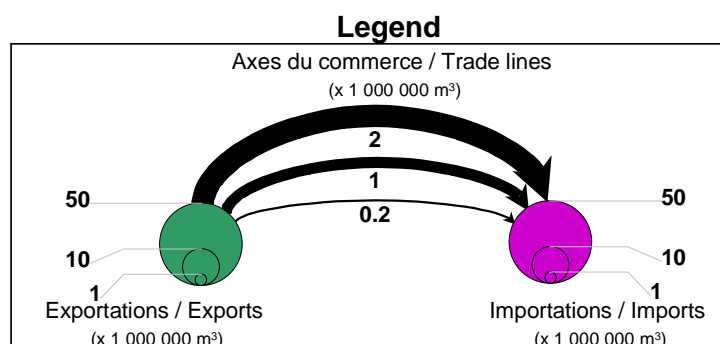
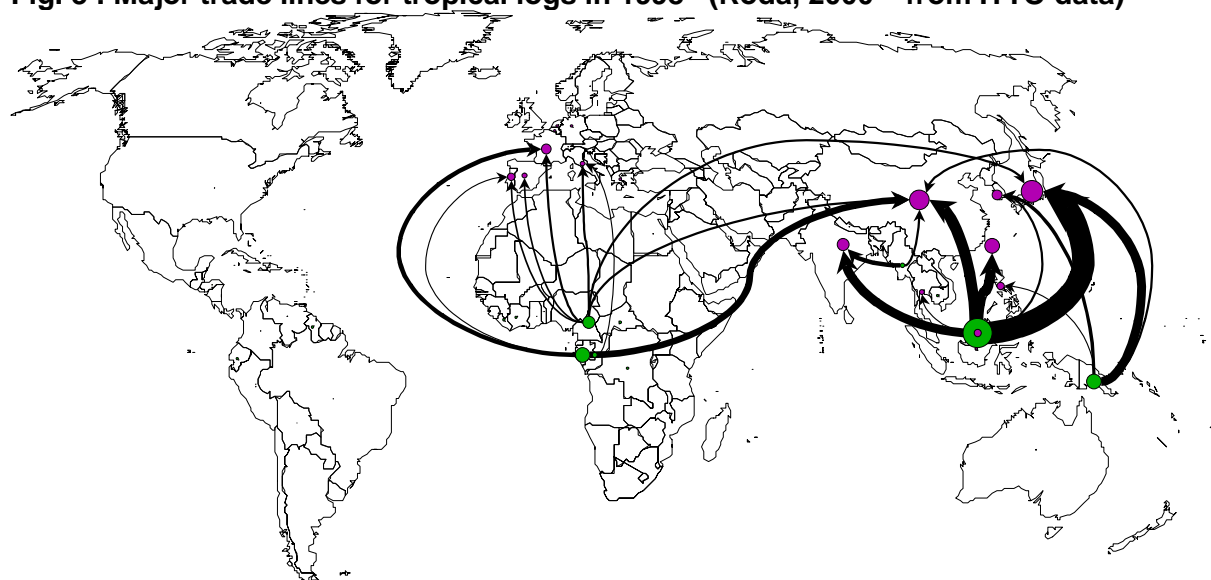


Table 3 : Leading exporters of tropical logs (Roda, 2000 – from ITTO data)

Ranking	Country	Volume (m ³)	World %
1	Malaysia	6,000,000	17%
2	Papua New Guinea	2,000,000	16%

3	Gabon	1 800,000	14%
4	Cameroon	900,000	7%

Table 4 : Leading importers of tropical logs (Roda, 2000 – from ITTO data)

Ranking	Country	Volume (m ³)	World %
1	China	4 910,000	31%
2	Japan	3 850,000	24%
3	India	1,500,000	9%
4	Taiwan	1,300,000	8%

Values

In terms of value, world imports of all categories of logs were worth around \$7.2 billion in 1998. Tropical log imports accounted for a quarter of this sum, i.e. about \$1.9 billion. Overall imports of all categories of logs were primarily shared in more or less equal proportions by Asia (\$3.5 billion) and Europe (\$3.3 billion). World imports of tropical logs were worth around \$1.9 billion, of which almost two-thirds were imports to Asia (\$1.2 billion) and over a third imports to Europe (\$686 million). World exports of tropical logs were worth around \$1.4 billion, of which three-fifths were exports from Asia (\$788 million) and two-fifths exports from Africa (\$559 million). In term of values, the leading exporters of tropical logs were Malaysia, Cameroon, Gabon, and Papua NG (Table 5 - Roda, 2000). The leading importers of tropical logs were Japan, China, France, and Portugal (Table 6 – Roda, 2000).

Table 5 : Leading exporters of tropical logs (Roda, 2000 – from ITTO data)

Ranking	Country	Value (\$)	World %
1	Malaysia	479,000,000	35%
2	Cameroon	190,000,000	14%
3	Gabon	159,000,000	12%
4	Papua NG	156,000,000	11%

Table 6 : Leading importers of tropical logs (Roda, 2000 – from ITTO data)

Ranking	Country	Value (\$)	World %
1	Japan	449,000,000	24%
2	China	375,000,000	20%
3	France	199,000,000	11%
4	Portugal	140,000,000	7%

Trends

Although relatively stable for all other continents, tropical log production and consumption decreased steadily in Asia, the dominant continent. The trend for Asian exports and imports was similar, the difference being that these decreased sharply in 1993 then less rapidly in the following years.

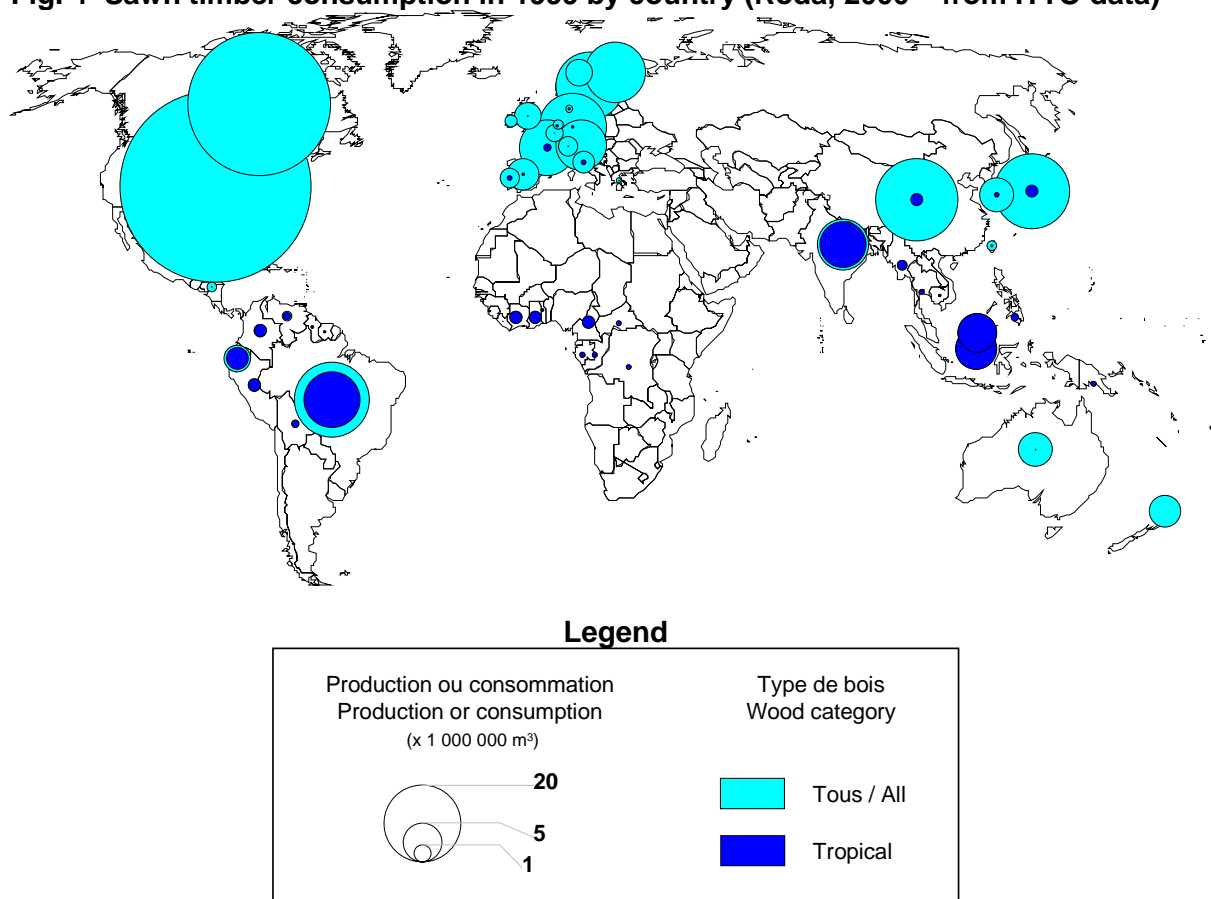
Production in Indonesia and Malaysia, the dominant countries, has decreased unevenly over the decade. Production in Brazil increased until 1995, then leveled out. In Indonesia, the largest consumer in 1999, consumption had been decreasing since 1994 and appears to have picked up again in 1999; consumption in Malaysia has been uneven, falling significantly in 1999; while Brazilian consumption has exactly followed changes in the country's level of production. Malaysian exports fell dramatically in 1993, then more gradually in the following years. Japanese imports have been decreasing steadily and significantly since the same date, whereas Chinese imports have been increasing rapidly since 1997.

Sawn timber markets

Volumes

Tropical timber accounted for only a tenth of world production of sawn timber in 1999, i.e. 36 million m³ out of an overall total of 352 million m³. International trade in tropical sawn timber accounted for a small percentage of world production. As with logs but to a lesser extent, domestic consumption had a significant effect on production. Trade in non-tropical sawn timber was of considerable importance, accounting for 25% of world production. The Asian continent was both the principal producer and the principal consumer of tropical sawn timber : in both cases, it accounted for over half the total volume. Latin America played a major role in second place, with over a third of the total volume. Africa (6% of production and 2% of consumption) and Europe (7% of consumption) had relatively little effect on the overall situation for tropical sawn timber. In terms of individual countries, a very small percentage of tropical sawn timber was consumed by non-tropical countries (Fig. 4 – Roda, 2000), the bulk of their consumption being non-tropical sawn timber. Of the non-tropical countries, Japan and China were the largest consumers of tropical sawn timber, but the largest share of tropical sawn timber consumption was that of the main producer countries.

Fig. 4 Sawn timber consumption in 1999 by country (Roda, 2000 – from ITTO data)



In 1999, the leading producers of tropical sawn timber were Brazil, India, Indonesia, and Malaysia (Table 7 – Roda, 2000). The leading consumers of tropical sawn timber were also Brazil, India, Indonesia, and Malaysia (Table 8 – Roda, 2000). These four countries accounted for over 70% of production and over 60% of consumption of tropical sawn timber. As a consequence, the policies of each inevitably had a major effect on the world situation.

Table 7 : Leading producers of tropical sawn timber (Roda, 2000 – from ITTO data)

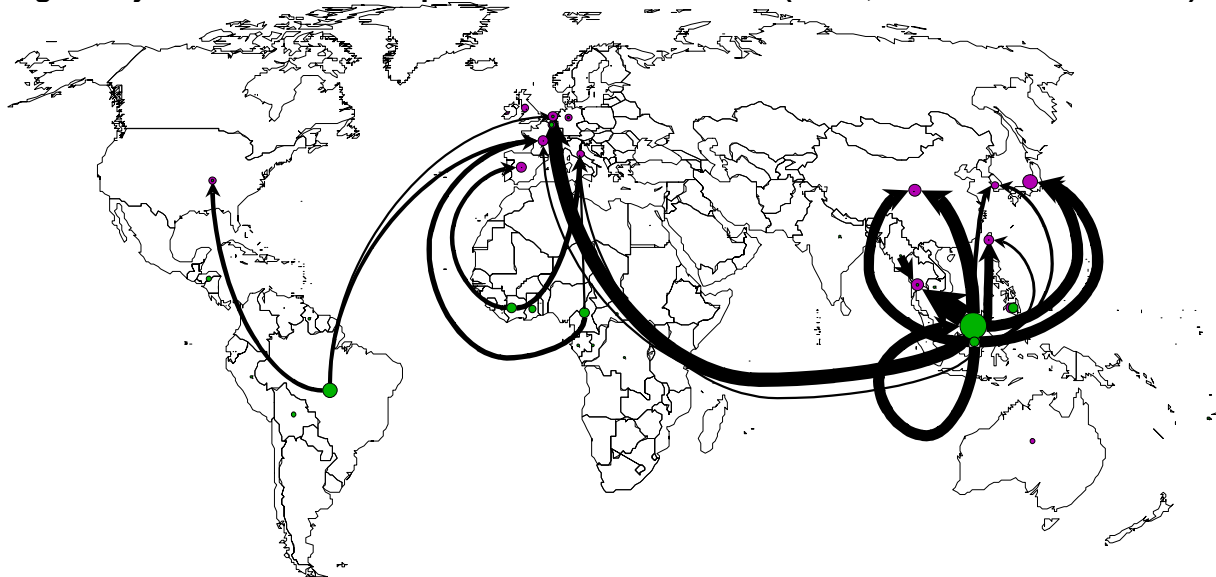
Ranking	Country	Volume (m ³)	World %
1	Brazil	9 860,000	27%
2	India	7,000,000	19%
3	Indonesia	5,500,000	15%
4	Malaysia	5,000,000	14%

Table 8 : Leading consumers of tropical sawn timber (Roda, 2000 – from ITTO data)

Ranking	Country	Volume (m ³)	World %
1	Brazil	9,522,000	26%
2	India	6,980,000	19%
3	Indonesia	4,958,000	13%
4	Malaysia	2,400,000	7%

Malaysia was the main exporter of tropical sawn timber, while China and Japan were the main importers (Fig. 5 – Roda, 2000). In 1999, the leading exporters of tropical sawn timber were Malaysia, Indonesia, Côte d'Ivoire, and Brazil (Table 9 – Roda, 2000). The leading importers of tropical sawn timber were China, Japan, Italy, and Spain (Table 10 – Roda, 2000).

Fig. 5 Major trade lines for tropical sawn timber in 1998 (Roda, 2000 – from ITTO data)



Legend

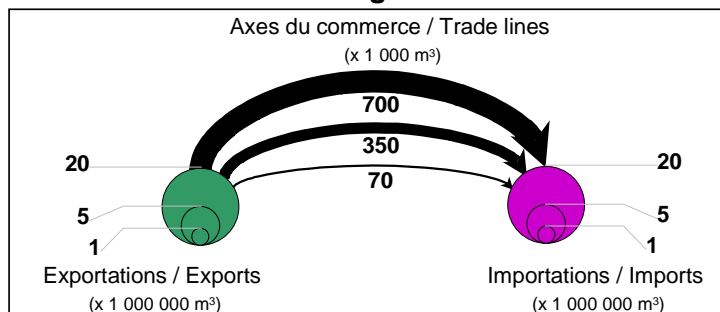


Table 9 : Leading exporters of tropical sawn timber (Roda, 2000 – from ITTO data)

Ranking	Country	Volume (m ³)	World %
1	Malaysia	3,000,000	49%
2	Indonesia	543,000	9%
3	Côte d'Ivoire	500,000	8%

4	Brazil	392,000	6%
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Table 10 : Leading importers of tropical sawn timber (Roda, 2000 – from ITTO data)

Ranking	Country	Volume (m ³)	World %
1	China	1,288,000	18%
2	Japan	1,150,000	16%
3	Italy	450,000	6%
4	Spain	450,000	6%

South-East Asian producers sent their exports to various Asian countries and to Europe. Brazil divided its exports between Europe and the United States. African producers, on the other hand, primarily relied on Europe for the sale of the bulk of their sawn timber, making them very dependent on changes in European demand.

Values

In terms of values, world imports of all categories of sawn timber were worth around \$20 billion in 1998. Imports of tropical sawn timber accounted for over a tenth of this sum, i.e. about \$2.7 billion. Overall imports of all categories of sawn timber went primarily to Europe and North America (\$9.2 billion and \$7.1 billion respectively), followed by Asia (\$3.6 billion). World imports of tropical sawn timber were worth around \$2.7 billion, of which half were imports to Europe (\$1.3 billion) and over a third imports to Asia (\$973 million), the remainder going primarily to North America (\$338 million). World exports of tropical sawn timber were worth around \$2.3 billion, over half of which were exports from Asia (\$1.3 billion). The remainder were exports from Africa (\$453 million), Europe (\$332 million) and Latin America (\$249 million). In terms of value, the leading exporters of tropical sawn timber were Malaysia, Myanmar, Indonesia, and Brazil (Table 11 – Roda, 2000). The leading importers of tropical sawn timber were Japan, USA, Italy, and Spain (Table 12 – Roda, 2000).

Table 11 : Leading exporters of tropical sawn timber (Roda, 2000 – from ITTO data)

Ranking	Country	Value (\$)	World %
1	Malaysia	651,000,000	28%
2	Myanmar	263,000,000	11%
3	Indonesia	255,000,000	11%
4	Brazil	249,000,000	11%

Table 12 : Leading importers of tropical sawn timber (Roda, 2000 – from ITTO data)

Ranking	Country	Value (\$)	World %
1	Japan	368,000,000	14%
2	USA	328,000,000	12%
3	Italy	227,000,000	8%
4	Spain	217,000,000	8%

Trends

Although relatively stable for all other continents, production and consumption has decreased steadily in Asia, the dominant continent. The trend for Asian exports was similar, but with an upturn in 1999. Asian imports peaked in 1993, then decreased up to 1998, picking up again in 1999. Production and consumption in Brazil and India have been stable since 1995. Production in Indonesia and Malaysia has been decreasing slightly since 1993-1994, while consumption in both countries has been relatively stable over the same period, except for a major decrease in Malaysian consumption in 1999. Malaysian exports, which had been

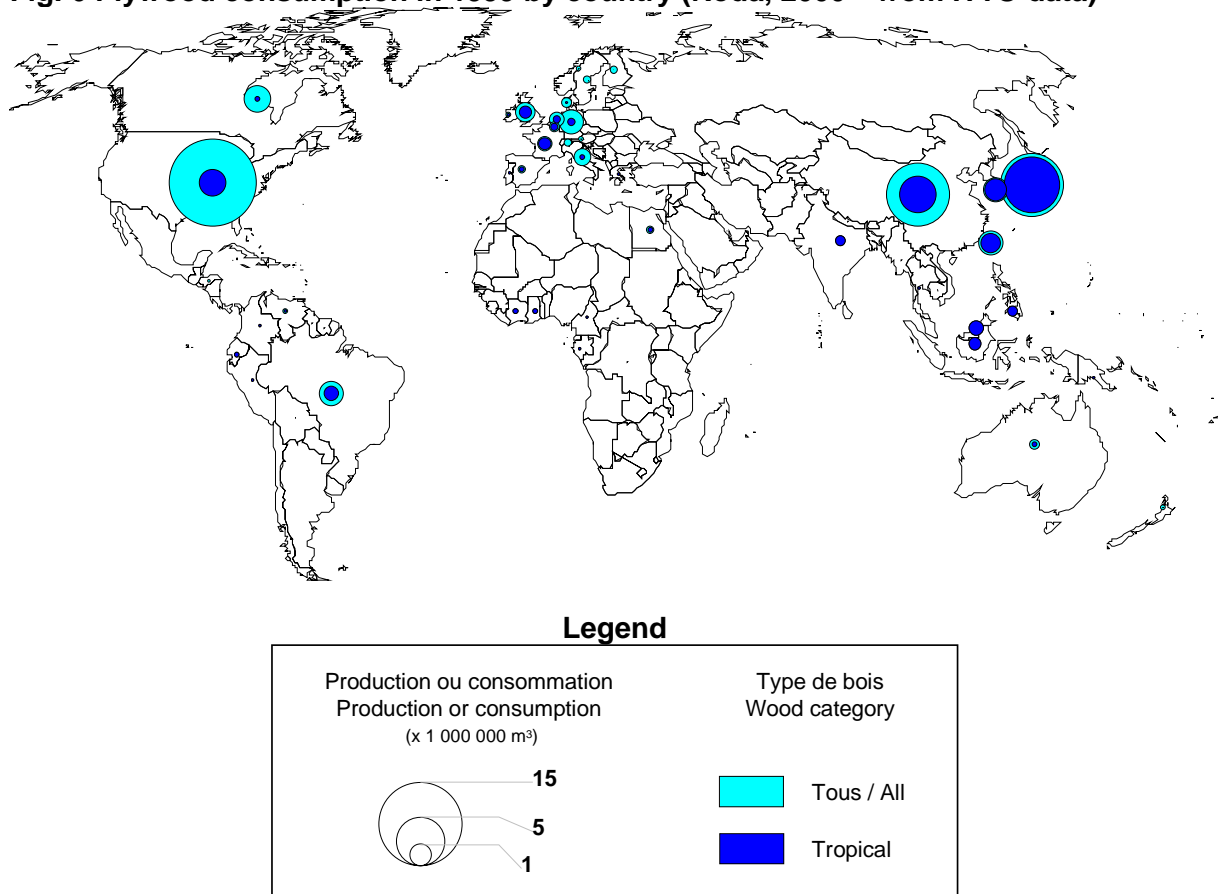
decreasing considerably and steadily from 1994 onwards, picked up again in 1999. Japanese imports have fluctuated throughout the decade, while Chinese imports virtually doubled in 1999.

Plywood markets

Volumes

Tropical timber accounted for around two-fifths of world plywood production in 1999, i.e. 20 million m³ out of an overall total of 48 million m³. International trade in tropical plywood accounted for a quarter of world production. Trade in non-tropical plywood accounted for only 9%, while tropical plywood exports accounted for 25% of world production. Trade in tropical plywood thus had a decisive effect on world plywood production. The Asian continent was both the basic producer and the basic consumer of tropical plywood : it was responsible for 90% of world production and 75% of world consumption. North America and Europe had accessory roles, accounting for 10% and 8% of consumption respectively, together with Latin America (7% of production, 5% of consumption). In terms of individual countries, the situations of tropical and non-tropical plywood were very different (Fig. 6). As far as non-tropical plywood is concerned, the main producer countries were also the main consumers. With tropical plywood, on the other hand, the main producers (Indonesia and Malaysia) consumed relatively little and were totally dependent on the consumption of other countries, while the main consumers (Japan and China) were also major producers.

Fig. 6 Plywood consumption in 1999 by country (Roda, 2000 – from ITTO data)



In 1999, the leading producers of tropical plywood were Indonesia, Malaysia, China, and Japan (Table 13 – Roda, 2000). The leading consumers of tropical plywood were Japan,

China, USA, and South Korea (Table 14 – Roda, 2000). Indonesia and Malaysia were responsible for over 60% of tropical plywood production, while Japan and China together accounted for over half of world consumption. As a consequence, the policies of each inevitably had a major effect on the world situation.

Table 13 : Leading producers of tropical plywood (Roda, 2000 – from ITTO data)

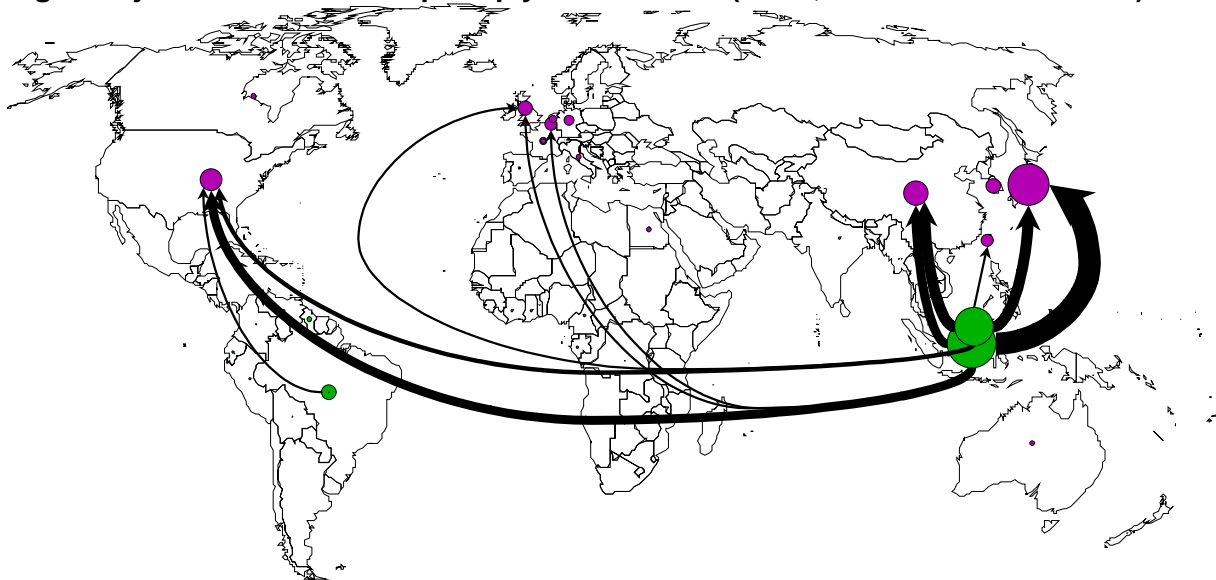
Ranking	Country	Volume (m ³)	World %
1	Indonesia	7,900,000	40%
2	Malaysia	4,000,000	21%
3	China	2,000,000	10%
4	Japan	1 800,000	9%

Table 14 : Leading consumers of tropical plywood (Roda, 2000 – from ITTO data)

Ranking	Country	Volume (m ³)	World %
1	Japan	6,636,000	37%
2	China	3,092,000	17%
3	USA	1,620,000	9%
4	South Korea	1,120,000	6%

Indonesia was by far the largest exporter of tropical plywood, while Japan was the main importer (Fig. 7 – Roda, 2000). The United States was the largest world consumer of plywood from all sources, but only a relatively small proportion of this was tropical plywood. This country was nevertheless the second largest importer of tropical plywood after Japan, making the tropical plywood trade very sensitive to possible changes in US import policy. The leading exporters of tropical plywood were Indonesia, Malaysia, Brazil, and Belgium / Luxembourg (Table 15 – Roda, 2000). The leading importers of tropical plywood were Japan, USA, China, and South Korea (Table 16 – Roda, 2000).

Fig. 7 Major trade lines for tropical plywood in 1998 (Roda, 2000 – from ITTO data)



Legend

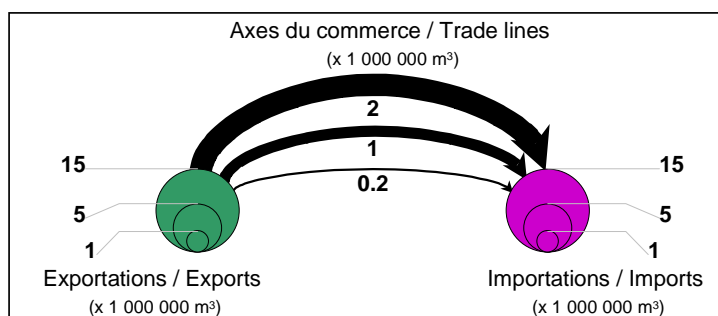


Table 15 : Leading exporters of tropical plywood (Roda, 2000 – from ITTO data)

Ranking	Country	Volume (m ³)	World %
1	Indonesia	7,500,000	62%
2	Malaysia	3,500,000	29%
3	Brazil	401,000	3%
4	Belgium /Luxembourg	150,000	1%

Table 16 : Leading importers of tropical plywood (Roda, 2000 – from ITTO data)

Ranking	Country	Volume (m ³)	World %
1	Japan	4,838,000	46%
2	USA	1,680,000	16%
3	China	1,100,000	11%
4	South Korea	700,000	7%

Values

World imports of all categories of plywood were worth around \$5.6 billion in 1998. Imports of tropical plywood accounted for over half this sum, i.e. about \$3 billion. 80% of overall imports of all categories of plywood went in equal proportions to Asia (\$2.3 billion) and Europe (\$2.2 billion), followed by North America (\$868 million). World imports of tropical plywood were worth around \$3 billion, of which two-thirds were imports to Asia (\$1.9 billion), followed by Europe (\$589 million) and North America (\$482 million). World exports of tropical plywood were worth around \$3 billion, 80% of which were exports from Asia (\$2.5 billion). The remainder were primarily exports from Europe (\$339 million) and Latin America (\$199 million). In terms of value, the leading exporters of tropical plywood were Indonesia, Malaysia, Brazil, and France (Table 17 – Roda, 2000).

In terms of value, the leading importers of tropical plywood were Japan, China, USA, and Belgium / Luxembourg.

Table 17 : Leading exporters of tropical plywood (Roda, 2000 – from ITTO data)

Ranking	Country	Value (\$)	World %
1	Indonesia	1,524,000,000	50%
2	Malaysia	905,000,000	29%
3	Brazil	170,000,000	6%
4	France	133,000,000	4%

Table 18 : Leading importers of tropical plywood (Roda, 2000 – from ITTO data)

Ranking	Country	Value (\$)	World %
1	Japan	1,101,000,000	36%
2	China	570,000,000	19%
3	USA	456,000,000	15%

4	Belgium/Luxembourg	134,000,000	4%
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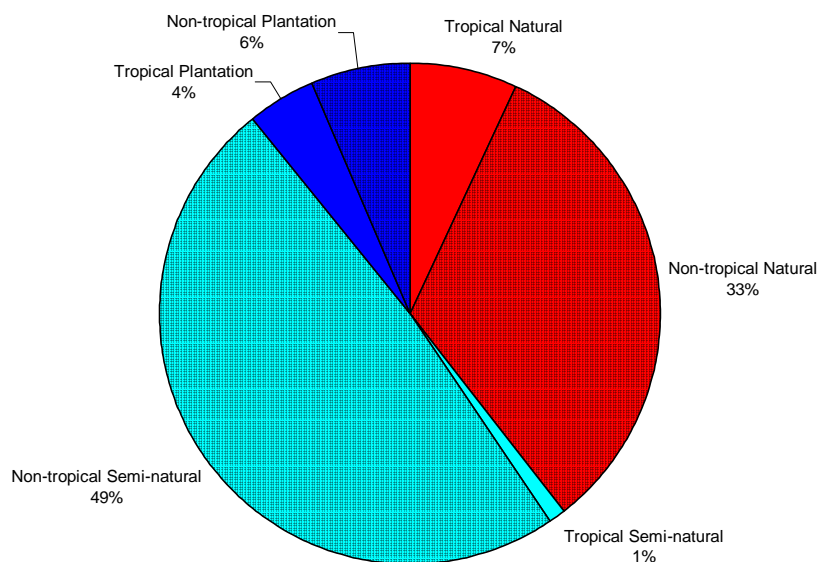
Trends

Asia has been by far the largest producer, consumer, exporter and importer. Asian production and consumption, which had been decreasing since 1995, picked up again in 1999. Asian exports and imports have been uneven, recovering in 1999 after a fall in 1997-1998. Indonesia has been dominant with uneven production, which picked up again in 1999 after a major fall in 1997-1998. Japanese production has been decreasing since 1991, while Malaysian production increased up to 1997. Consumption in Japan, the dominant country, has decreased overall. Indonesian and Malaysian exports have followed changes in levels of production in these two countries. Japanese imports have been increasing overall, despite a marked decrease in 1998.

Ecocertification

Up to now, forest ecocertification has not been successful from a marketing point of view, since only about 22 millions hectares of forest areas are certified in the world today (FSC, 2001). That is 0,99% of the forest area of the 38 countries in which these certified forest are located. 17 countries have more than 1% of their forests that are certified, and 21 have less than 1%. This « marketing failure » is even worse when specifically considering forests within tropical countries, which account for only 13% of the certified forests in the world (Fig 8 – FSC, 2001).

Fig. 8 Types of certified forest (from FSC data)

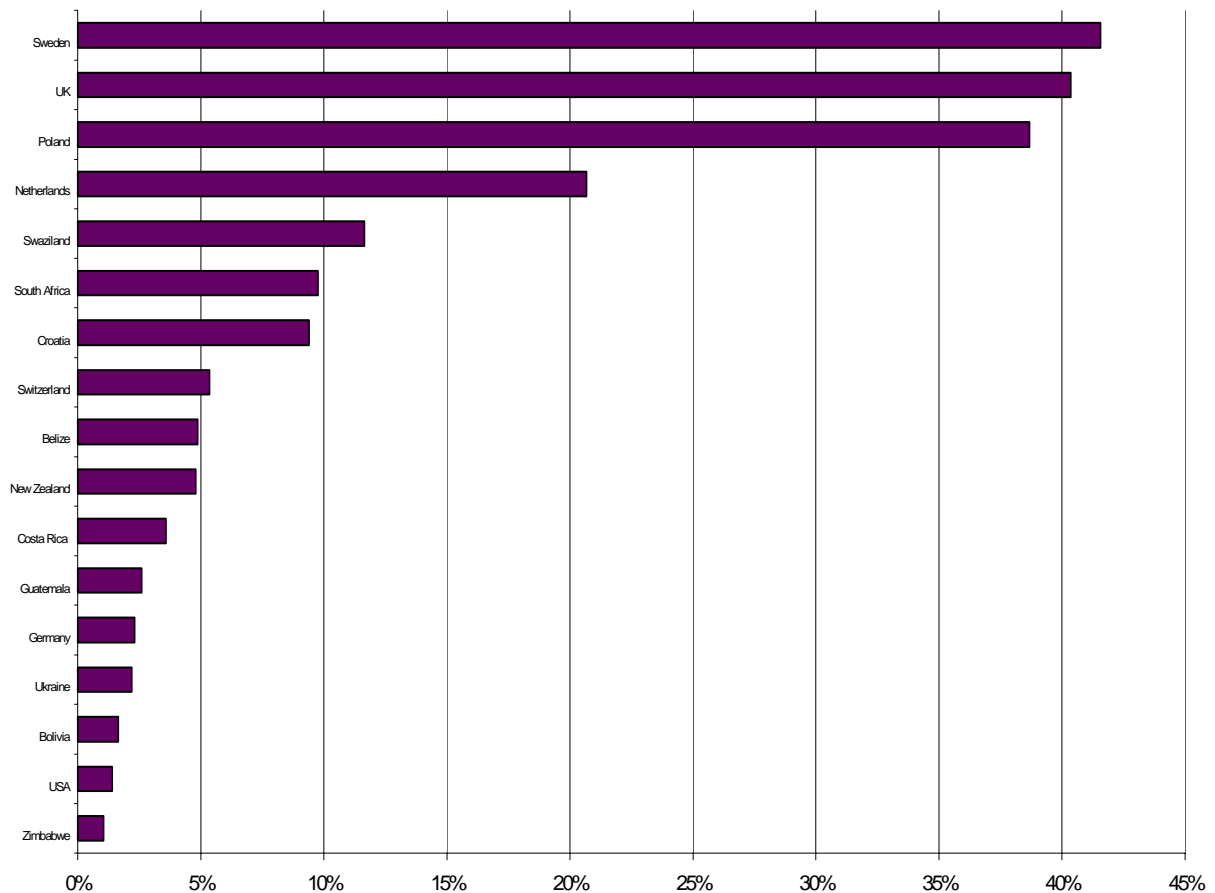


Regarding specifically non-tropical forests, 7% of the certified forest, are classified as « plantations forests », 56% as « mixed plantations » or « semi-natural forests », and 37% are classified as « natural forests ». Regarding specifically tropical forests, 42% of the

certified forest, are classified as « plantations forests », 2% as « mixed plantations » or « semi-natural forests », and 17% are classified as « natural forests ».

In fact, for tropical countries, the benefits of the certification only overcome its opportunity cost for a few cases, since only northern customers may be sensible to certification, and since they account for a small part of the tropical timbers consumption. The rate of certified forest within a country is a relevant index of the « eco-sensibility » of the markets of this country (Fig. 9 – FSC, 2001). Following this index, only markets of Sweden, UK, Poland, Netherlands, and Swaziland are really eco-sensitive, since these countries already certified more than 10% (and up to 40%) of their forests. The only tropical countries that have certified more than 1% of their forests (but less than 5%) are Belize, Costa Rica, Guatemala, Bolivia, and Zimbabwe. In each of this 5 cases, forest ecocertification occurred in order to keep a market that decided to stop the consumption of non-certified tropical timbers. In these cases, the opportunity cost of losing these markets was higher than the one of certification. So up to now, forest ecocertification has not shown evidence of helping in increasing the value of tropical timbers, but acting as a trade barrier.

Fig. 9 : Eco-sensibility index for forest certification, by countries (from FSC data)



Tropical timber markets at the Brazilian scale

Introduction

Brazil production of tropical timbers is characterized by its very high independence of foreign markets, since exports represent only 797 000 m³, that is about 2% of the volume of logs, sawn timbers and plywood that are produced altogether each year (fig.10 – ITTO, 2000). But the Brazilian production of plywood (40% of exports), although low, is very dependent of the international climate. In 1999, exports of logs, sawn timbers and plywood were respectively 4 000, 392 000, and 401 000 m³, but self consumption volumes were respectively 24 496 000, 9 468 000, and 599 000 m³. This level of production and consumption is more or less stable since 1995 after a 30% increase of log production in the early nineties. The share of exports have shown very little evolution since 1991, regarding logs and sawn timber, but evolved from 30% to 40% regarding plywood (fig.11 – ITTO, 2000).

Fig. 10 : Brazilian consumption and exports of logs, sawn timber, and plywood altogether - 1999

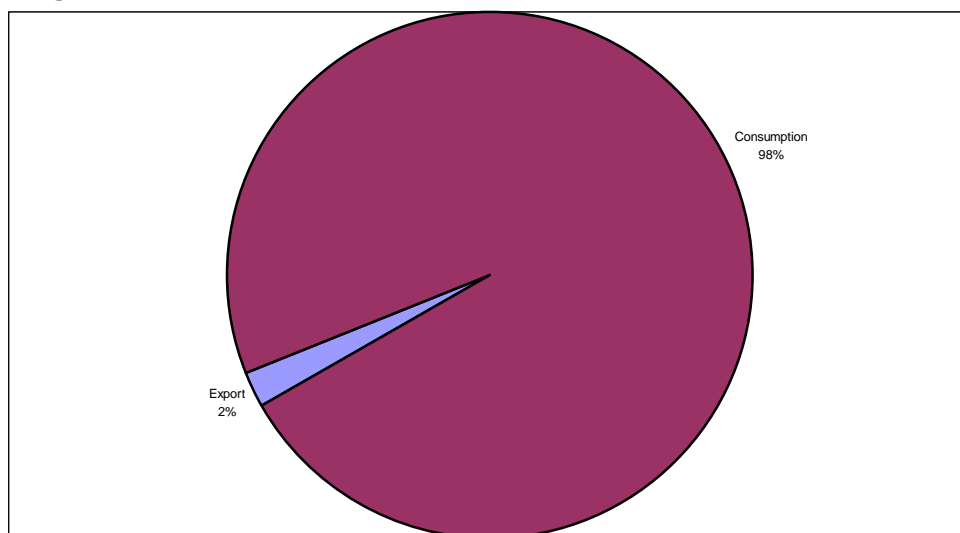
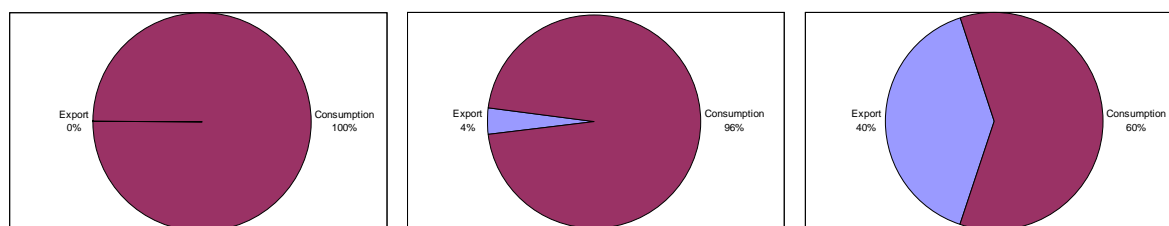


Fig. 11 : Brazilian consumption and exports of logs, sawn timber, and plywood - 1999



Export markets

The last detailed figures available are the 1998 sawn timber exports. They accounted for 758 000 m³ towards 75 countries (Table19 – FAO, 2000). The 2 main importers of Brazilian sawn timbers are Europe, then Middle East, followed from far by South America and Asia (fig. 12 – FAO, 2000). But Middle East and Asian imports of Brazilian timbers are continuously increasing, and this trend may be able to completely change the future export climate.

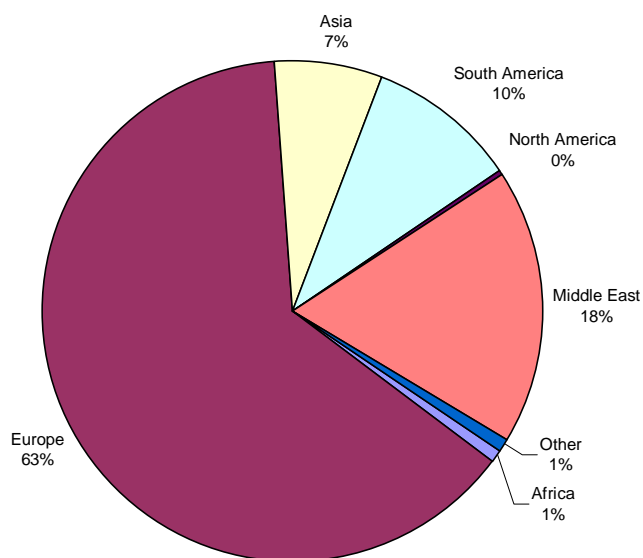
Table 12 : Brazilian tropical sawn timber exports, 1998

IMPORTATEUR (Pays partenaire)	Quantité (CUM)
-------------------------------	----------------

Afrique du Sud	4 606
Allemagne	3 748
Antilles néerlandaises	374
Arabie saoudite	126
Argentine	60 698
Australie	780
Autriche	82
Bahreïn	15
Barbade	674
Belgique	14 685
Belgique-Luxembourg	30 125
Bolivie	78
Canada	955
Cap-Vert	48
Chili	97
Chine	26 541
Chypre	164
Colombie	31
Corée, République de	2 749
Cuba	365
Danemark	270
Dominicaine, République	17 414
Dominique	825
Égypte	32
Émirats arabes unis	77
Espagne	86 836
États-Unis d'Amérique	130
Fédération de Russie	9
Finlande	291
France	117 243
Gambie	293
Grèce	70
Guadeloupe	14 610
Guatemala	77
Guyane française	23
Haïti	471
Hongrie	37
Irlande	893
Islande	283
Israël	314
Italie	16 442
Jamaïque	171
Japon	13 791
Liban	748
Malaisie	39
Malte	80
Maroc	379
Martinique	6 572
Mexique	1 671
Norvège	22
Nouvelle-Zélande	1
Oman	37

Panama	130
Paraguay	175
Pays-Bas	59 123
Philippines	42 869
Pologne	18
Portugal	59 616
Réunion	28
Royaume-Uni	12 592
Saint-Vincent/Grenadines	671
Singapour	104
Slovénie	9
Suède	132
Suisse	12
Syrienne, Rép arabe	187
Tchèque, République	21
Thaïlande	567
Trinité-et-Tobago	235
Tunisie	73
Turquie	123
Uruguay	13 395
Venezuela, Rép boliv du	10 864
Viet Nam	362
Non-designé	5 417

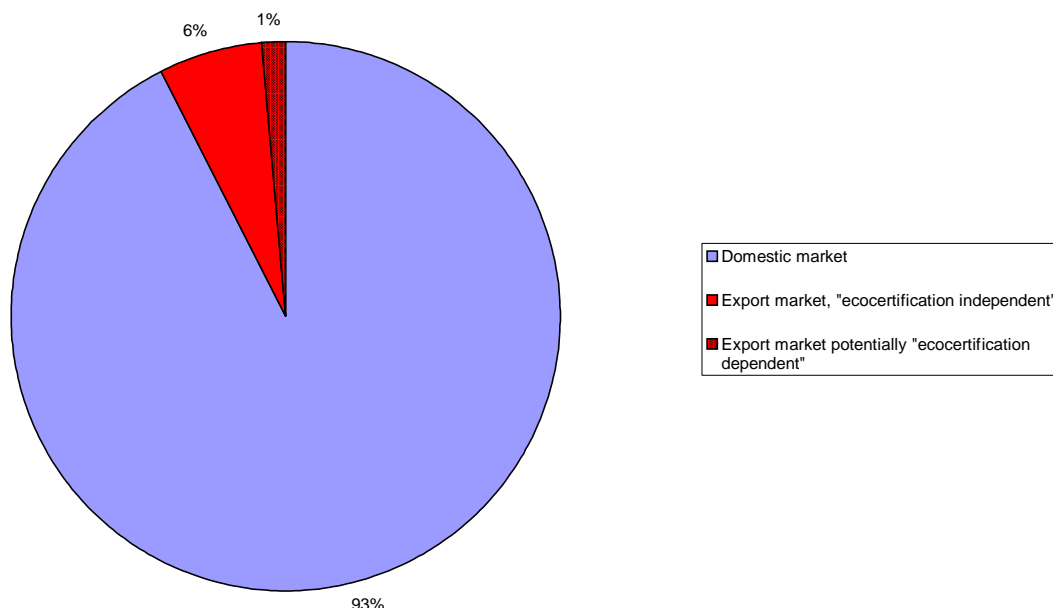
Fig. 12 : Brazilian foreign markets – Tropical sawn timber exports, 1998



Ecocertification

720 000 ha of Brazilian forests are certified (FSC,2001), that is 0,13% of the national forest area. Within these certified forest, only 3 are natural, and belong to the Amazon region, accounting for 133 000 ha. The 9 remaining certified forests are industrial and private plantations. Despite most of the exports target Europe, only a part of them target Eco-sensitive countries. Altogether, only 1% of the markets for Brazilian tropical sawn timber are potentially “ecocertification dependent” (Fig. 13).

Fig. 13 : Sawn timber markets potentially “ecocertification dependent”



In fact, despite this apparent independence, the susceptibility for a Brazilian forest to be sensitive to the existing certification barriers highly depends of its production chain. Products that are extracted through the Amazon river system and that are exported from Manaus and from Belem, have a higher probability to be affected by certification barriers since exports that follow this logistic chain are mainly directed towards Europe. On the other hand, export products that are extracted through the south road system have a far lower probability to be affected, since they are mainly directed towards Middle East, Asia, and Latin America.

Forest production tools

The 1998 census recorded in Brazil 4 179 firms specialized in the field of silviculture, forest harvesting, forest services and associate activities. The structure of this sector is rather unbalanced, with a lot of small firms and a few big (table 13 - IBGE, 2001).

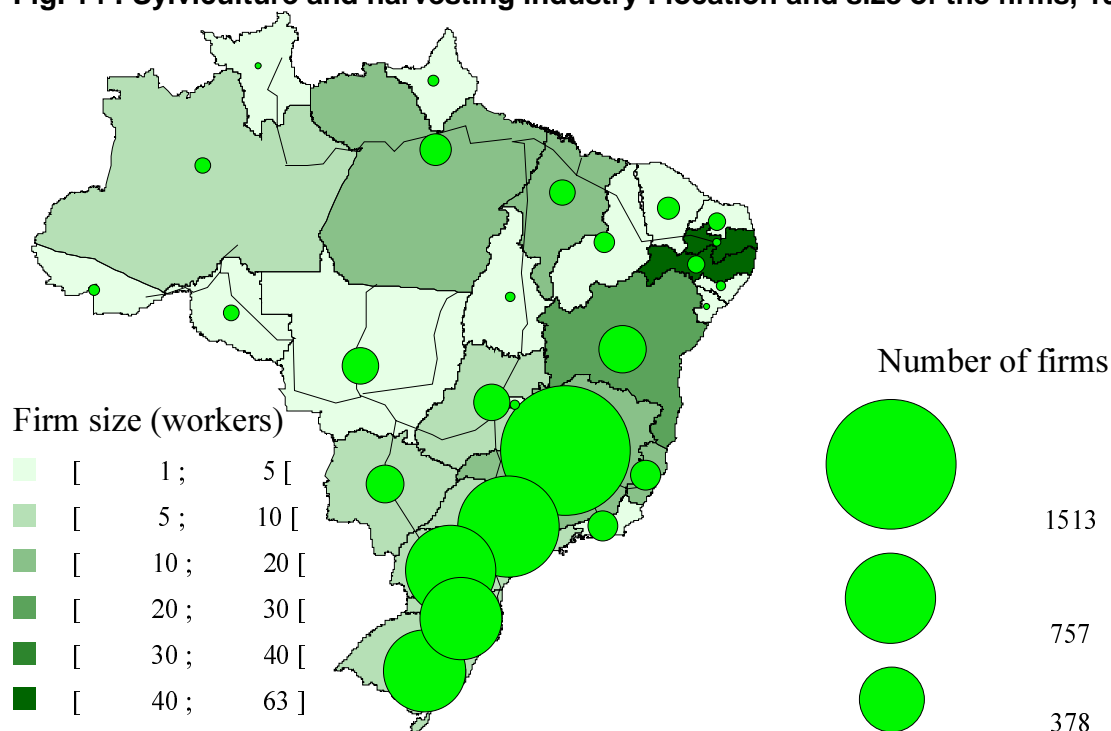
Table 13 : Census of Brazil forest sector firms, 1998

Divisão da classificação de atividades e faixas de pessoal ocupado total	Número de empresas	Pessoal ocupado em 31.12	Salários e outras remunerações (1 000 R\$)

		Total	Assalariado			
Silvicultura, exploração florestal e serviços relacionados com estas atividades		4 179	51 992	45 920	187 284	
Faixas de pessoal ocupado total						
0	a	4	2 982	4 727	919	5 642
5	a	9	482	3 180	2 248	7 315
10	a	29	446	7 478	6 621	20 023
30	a	49	118	4 581	4 367	12 091
50	a	99	87	6 099	5 940	24 407
100	a	499	52	10 373	10 280	55 855
500	e	mais	12	15 554	15 545	61 951

The location of these firms is also rather unbalanced, being concentrated in the South East states, and the bigger of them being located in the East of the country (Fig. 14 - IBGE, 2001). Despite the fact that this figure is biased because it does not differentiate tropical forest activities of temperate plantation forest ones, this clearly underline the forest production tool under development within the remotes parts of the Amazonian region. This fact will affect the future ability of the considered states to sustainably provide the demand.

Fig. 14 : Silviculture and harvesting industry : location and size of the firms, 1998



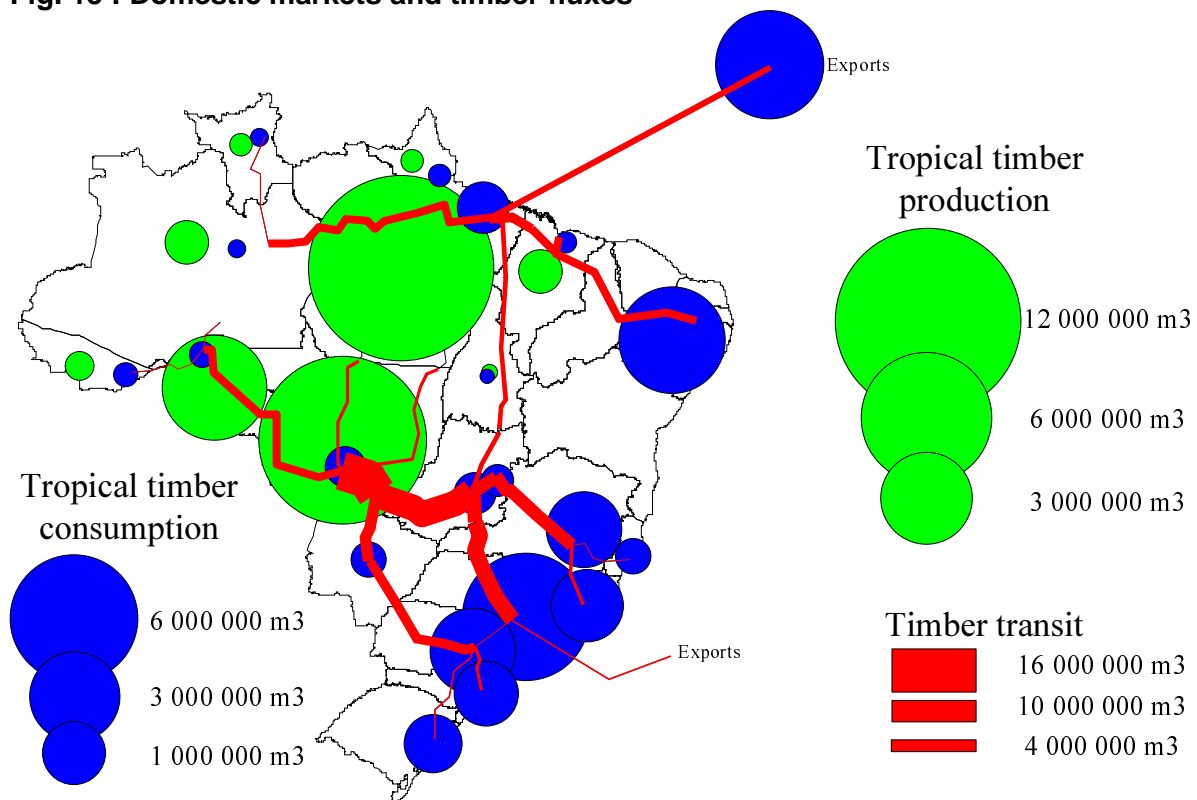
Domestic markets

The last detailed figures available come from the 1997 forest products census (IMAFLOA-IMAZON, 1999). The tropical timbers situation is polarized between the central Amazonian states and the south east states. Para and Mato Grosso are by far the main producers, followed by Rondonia. Acre, Amazonas, Amapa, Roraima, and Maranhao contribute a little to the production. The consumption essentially takes place in the South East of Brazil, Sao Paulo state being the biggest consumer (Fig. 15 - IMAFLORA-IMAZON, 1999). A deep divide occurred during the last 15 years in the logistics of Amazonian timbers. Indeed, these were formerly concentrated in the Amazon river system, and in the North-South axis from Belem to

Goiana. Nowadays, they let place to an already intense and still growing road flux between Mato Grosso and the South East states. The North river system has decreased in proportion, and the traffic in the Belem to Goiana axis is even more reduced (Fig. 15 - IMAFLORA-IMAZON, 1999).

Brazilian markets are now almost divided into 2 distinct timber networks with very little connection between them. The North one, where products are transported through the Amazon river system and are exported from Manaus and from Belem, seems to specialize in exports, mainly towards Europe. The South and bigger one, where products are transported by road along Rondonian and mainly Mato Grosso towards Sao Paulo, Paranaagua, and Belo Horizonte, specializes in local consumption. The few exports that go out of Sao Paulo and Paranaagua target mainly Asia.

Fig. 15 : Domestic markets and timber fluxes



First processing industry

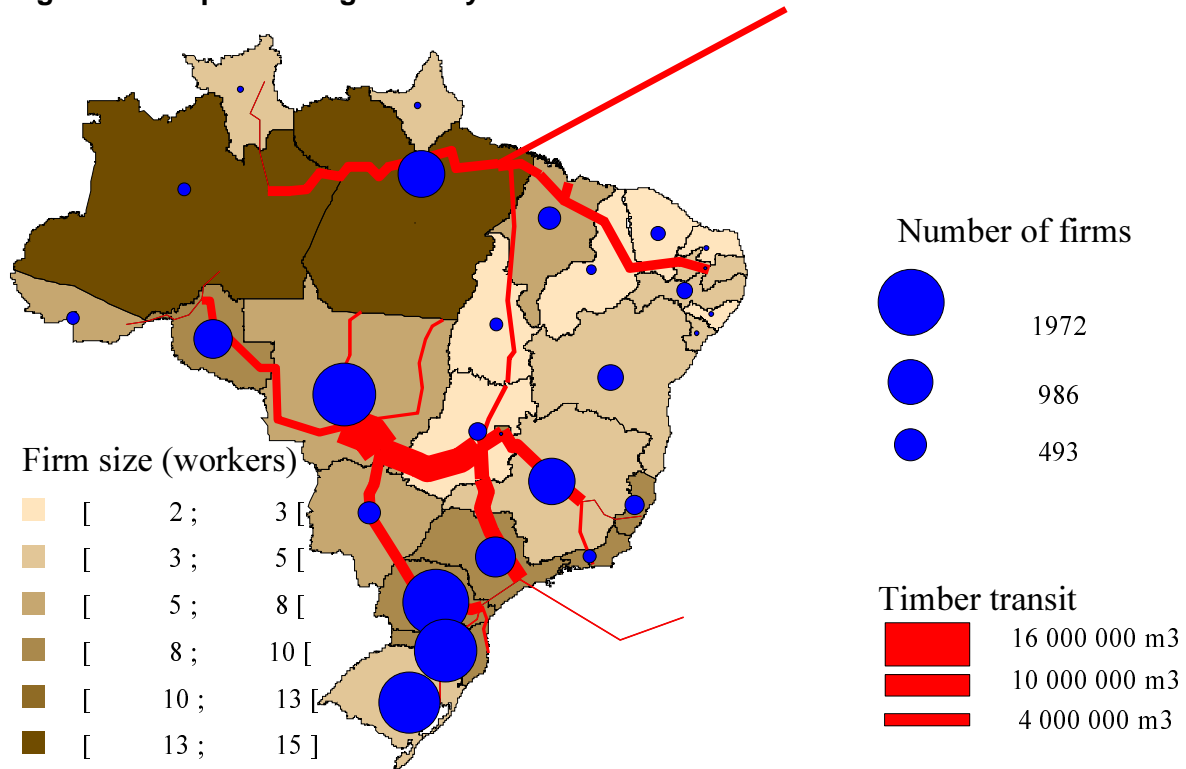
The 1998 census recorded in Brazil 11 852 firms specialized in the first processing industry (table 14 - IBGE, 2001). These firms are widely distributed along the south timber network, as a result of the perpetual contradiction between the interest of locating the mill as close as possible of the resource (in order to save transport costs of the material) and the dynamics initiated by the demanding cities and ports (fig. 16 - IMAFLORA-IMAZON, 1999). The impressive number of firms located in Mato Grosso illustrates the exploding dynamic of the timber activity in this state, but also points out the retreat of the forest frontier. The growing relative timber scarcity changes the production costs of the industry in this state, and push west some new units, as shown by the increasing number of firms within Rondonia.

Table 14 : Census of Brazil timber first processing firms, 1998

Grupo da classificação de atividade	Número de empresas	Pessoal ocupado em 31.12	Salários e outras remunerações	Média salarial mensal
-------------------------------------	--------------------	--------------------------	--------------------------------	-----------------------

		Pessoal ocupado em 31.12		s (1 000 R\$)	(salários mínimos)
		Total	Assalariado		
Desdobramento de madeira	11 852	94 036	75 012	261 585	2,11

Fig. 16 : First processing industry



Second processing industry

The 1998 census recorded in Brazil 13 876 firms specialized in the second processing industry (table 15 - IBGE, 2001). These firms are concentrated in the South East states of the country, as their location closely fits with the size of the market for the end-products, that is the amount of population and the economic activity in each state (Fig. 17 - IMAFLORA-IMAZON, 1999). Taking the construction activity as a rough index of this market (Fig. 18 - IBGE, 2001), one can predict that the attraction of the South East states will still increase in the next years

Table 15 : Census of Brazil timber second processing firms, 1998

Grupo da classificação de atividade	Número de empresas	Pessoal ocupado em 31.12		Salários e outras remunerações (1 000 R\$)	Média salarial mensal (salários mínimos)
		Total	Assalariado		
Fabricação de produtos de madeira, cortiça e material trançado - exclusive móveis	13 876	128 265	106 941	531 891	3,01

Fig. 17 : Second processing industry

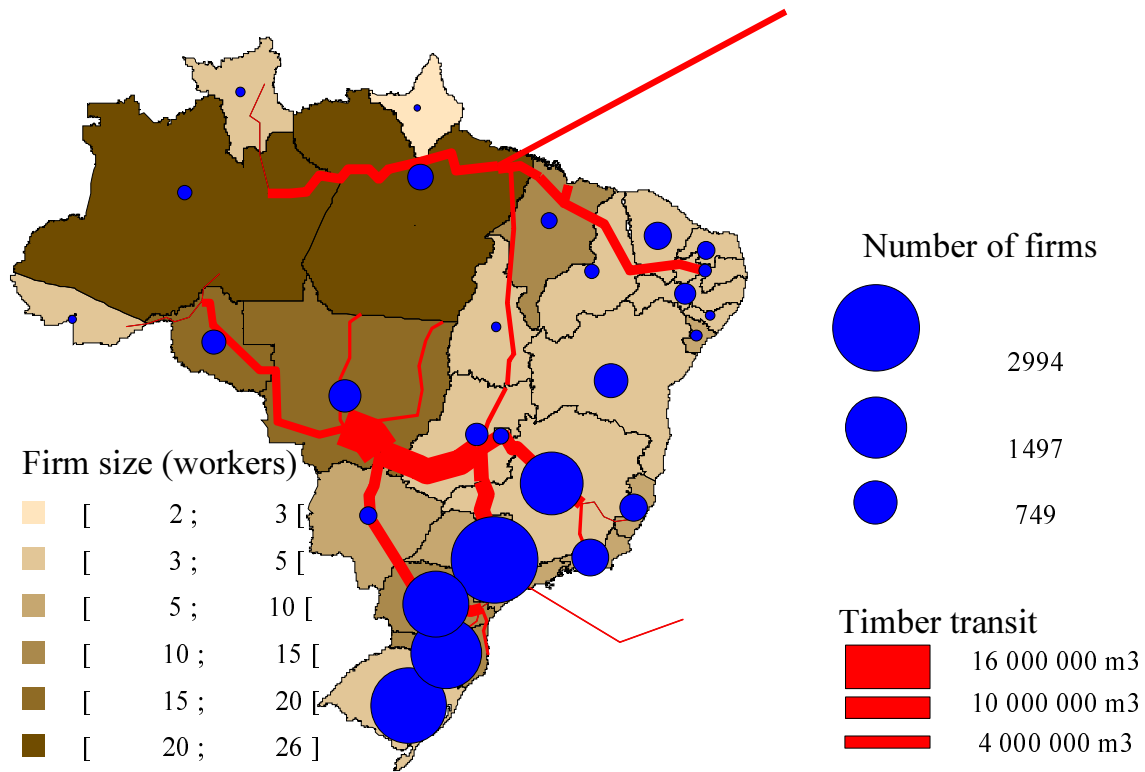
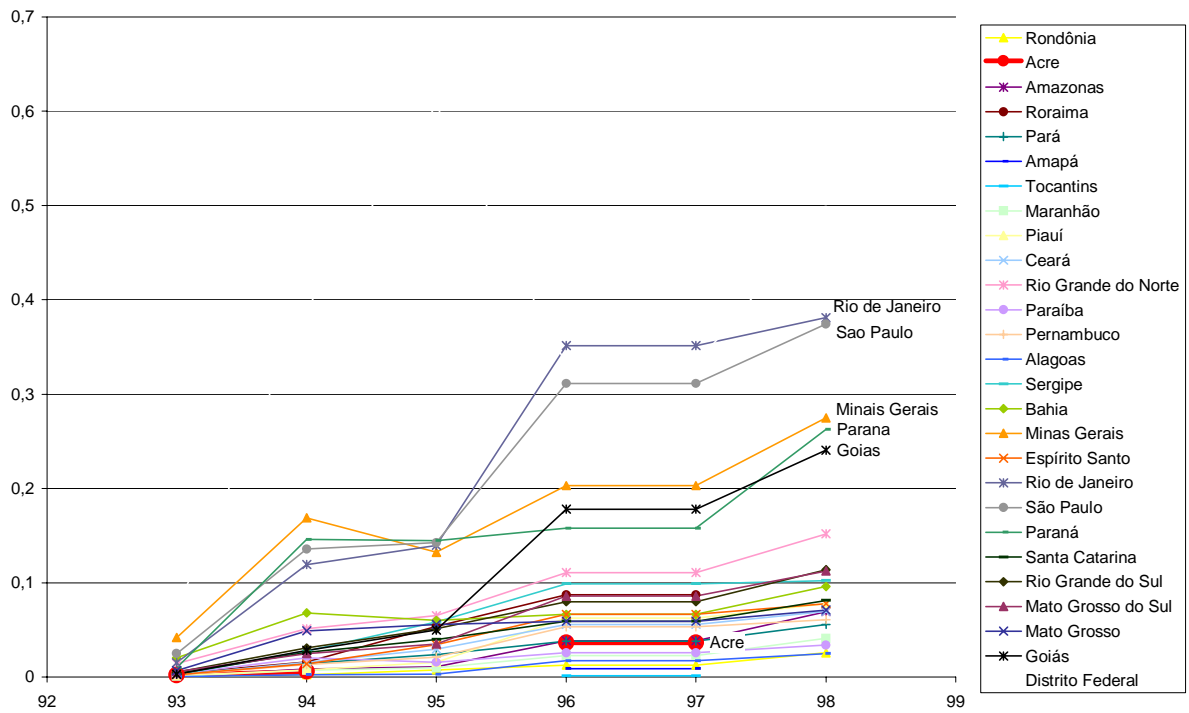


Fig. 18 : Value of new constructions from 1993 to 1998 (x \$R 1000 / inhabitant)



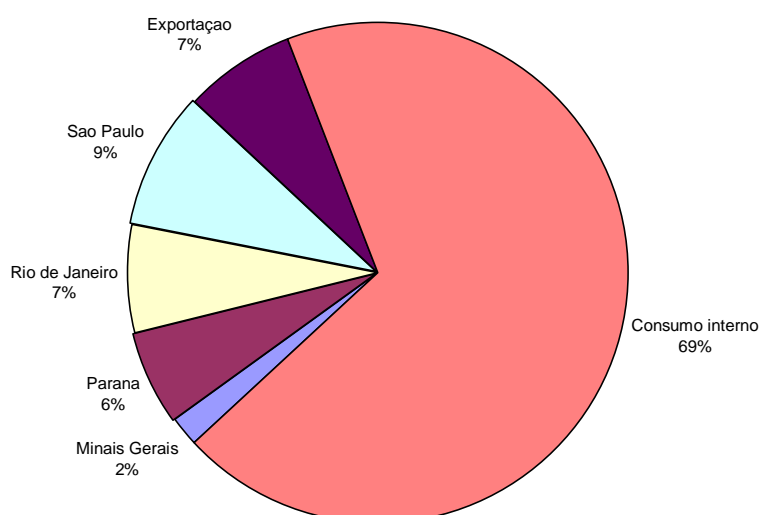
Tropical timber markets at the Acrean scale

Markets seen from Acre

Nearly 70% of the Acrean production were locally consumed in 1997 (Fig. 19 - IMAFLORA-IMAZON, 1999). According to all the firm managers we surveyed, this has even increased to maybe 80% or more, due to the new policy of the local government, that engaged a lot of furniture orders for public buildings equipment. So care should be taken that all the following conclusions have to be interpreted in the way that all fluxes out from Acre are probably by now weaker than described. In the same way, Acre produced in 1997 about 300 000 m³ of various timber products, but the exports should be around 200 000 m³ by now, due to the strengthening control of illegal production.

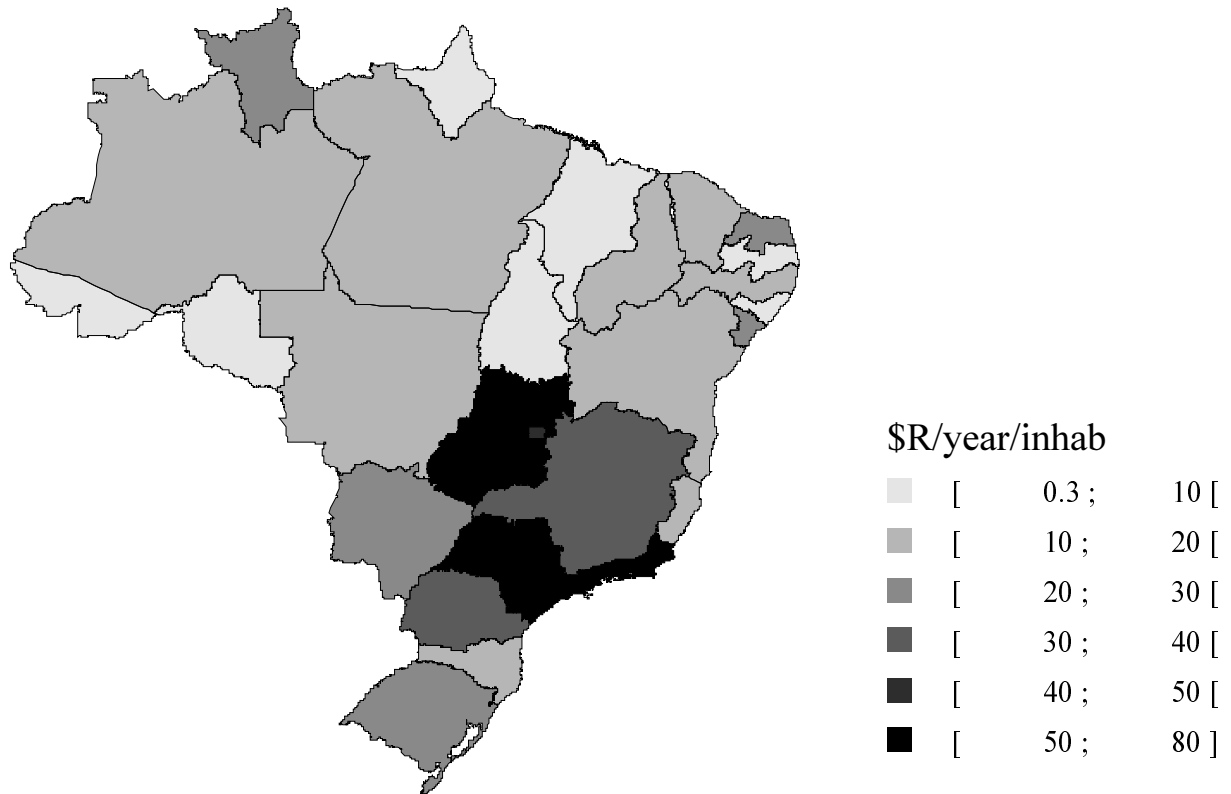
The customers of Acre form an oligopsony and are constituted by the main South East Brazilian states, among which Sao Paulo is the first (absorbing maximum 9% of the Acrean production), and accounting altogether for more than 20% of the Acrean timbers market. Exports regard a few part of the Acrean production, that is 7%, this proportion being higher than the national one. These exports mainly target the Asian market (China).

Fig. 19 : Destination of Acrean timbers, 1997



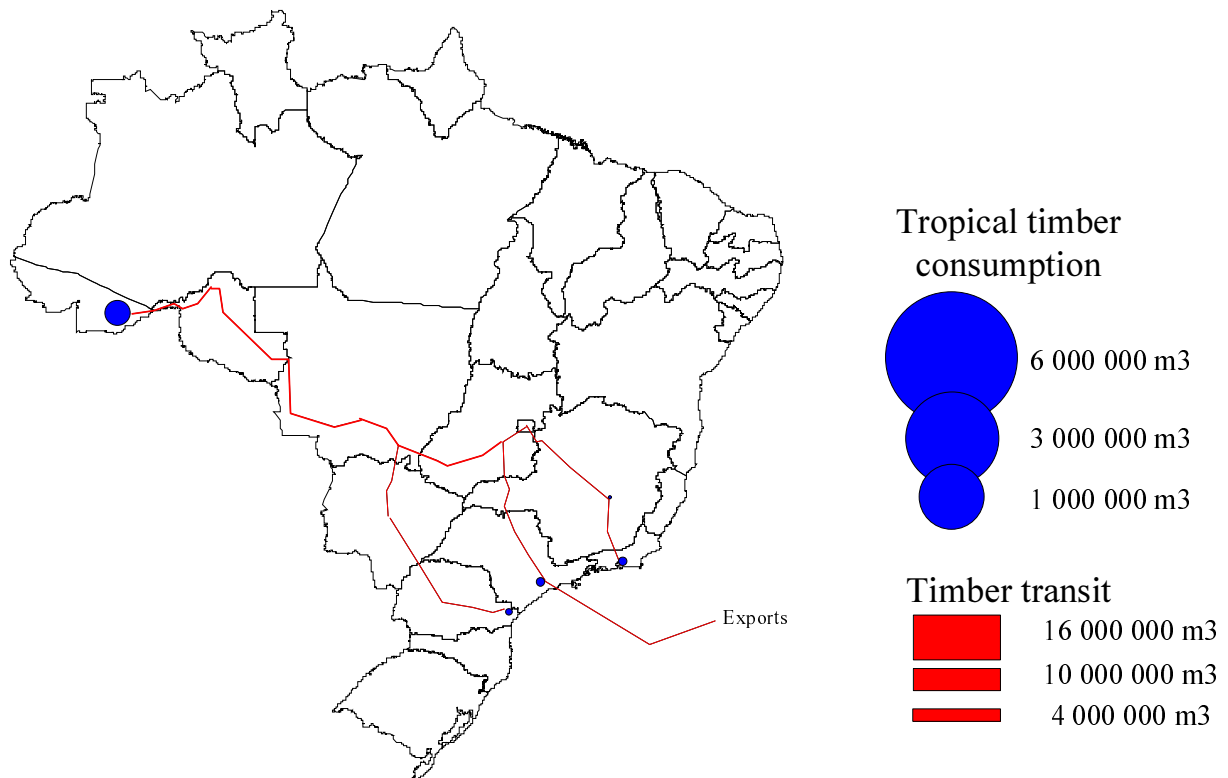
As the consumption of Acrean timber is essentially local, it is crucial to assess the future of this market. The rate of construction investment per year and per inhabitant is a relevant index to assess the probability of a future increase of the local demand (Fig. 20 – IBGE, 2001). With less than 10 \$R per year and per inhabitant, Acre is one of the Brazilian states with the lower construction investment. This is not a sign of a blooming future for the timber local timber demand in the next years, therefore the development of the timber network in Acre will hardly rely on the local market.

Fig. 20 : Construction investment from 1993 to 1998 in Brazil, by states



So the opportunities for the future development of the Acrean timber network have to be found among external markets. In fact, potential external markets are very few, since the potential exits from Acre are very few. The Pacific road can hardly be considered before a long while, as so as the Amazon river system. In this last case, even if the exit technically works already for some products and for a very few quantity of timbers, it will hardly increase in a significant manner. Indeed, this exit rely on the demand for timber products from Manaus and Belem. And as long as this demand will be more than enough be provided by the closest resources of Para and Amazon that are still huge, the traffic by the river system will remain almost non-existent. Up to now, the development of the Acrean timber network is definitely completely captive of the south road system, and of the South East states climate (Fig. 21 - IMAFLORA-IMAZON, 1999).

Fig. 21 : Acrean timbers markets and timber fluxes, 1997



Acre seen from markets

The market share of Acrean timbers is lower than 1% of the Amazonian timber market in Sao Paulo, and Minas Gerais, and accounts for around 1% in Rio de Janeiro and in Parana (Fig. 22 to Fig.25 - IMAFLORA-IMAZON, 1999). This means that these markets are completely independent of Acrean timbers. The survey shows, that these markets use the products from Acre as an alternative source to compensate for irregular and occasional shortages of the same products, which are produced in a wider scale in Matto Grosso, Rondonia, and in Para. They differentiate the Acre resource of other resources in this way, that products from Acre have a lower finishing quality, have a higher transport cost since they come from almost 4 000 km, and are available in lower quantities. Of course, the more dynamic Acrean mill managers have organized their business in order to have regular customers for some definite products, but they are not representative of the Acrean timber network.

There is indeed a competition between Acre and Rondonia / Matto Grosso. The first can provide the same product at the same quality and the same price, but with a far lower beneficial margin, due to the distance and the lack of scale economies. This put a strain on the Acrean mills capacity to increase their market share in the South Eastern markets.

But a relative resource scarcity in Matto Grosso and Rondonia has begun to be perceptible, by the way of the slowly but progressive increase of the production costs. As a result, some managers are already looking to set some activity in Acre. This trend is by now not so intense, but in a foreseeable future, the pressure will become more appreciable. For example, some managers of the most dynamic Acrean mills we visited, already got some propositions from managers from Rondonia or Matto Grosso, in order to take control of these mills.

Fig. 22 : Sao Paulo market share of Amazonian timbers, by states of origin, 1997

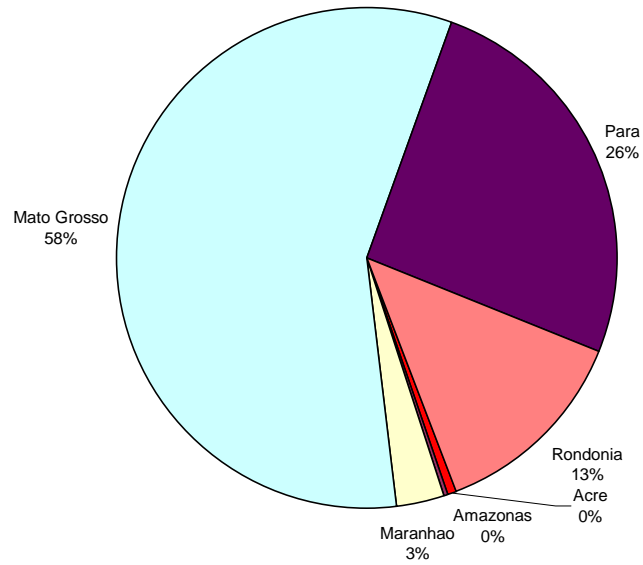


Fig. 23 : Rio de Janeiro market share of Amazonian timbers, by states of origin, 1997

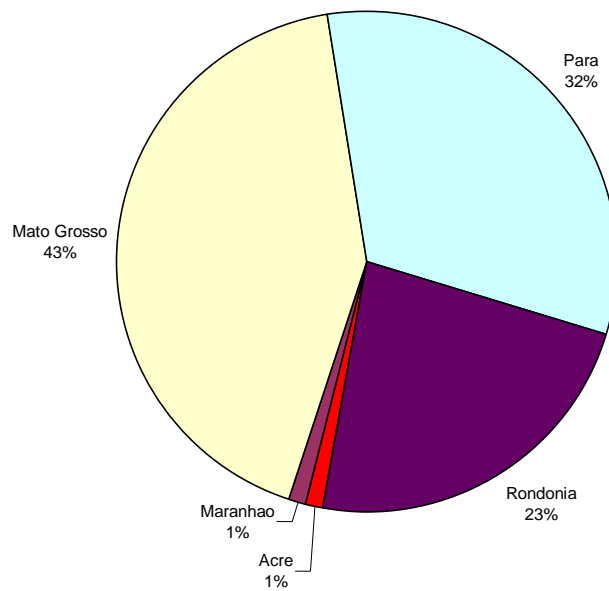


Fig. 24 : Parana market share of Amazonian timbers, by states of origin, 1997

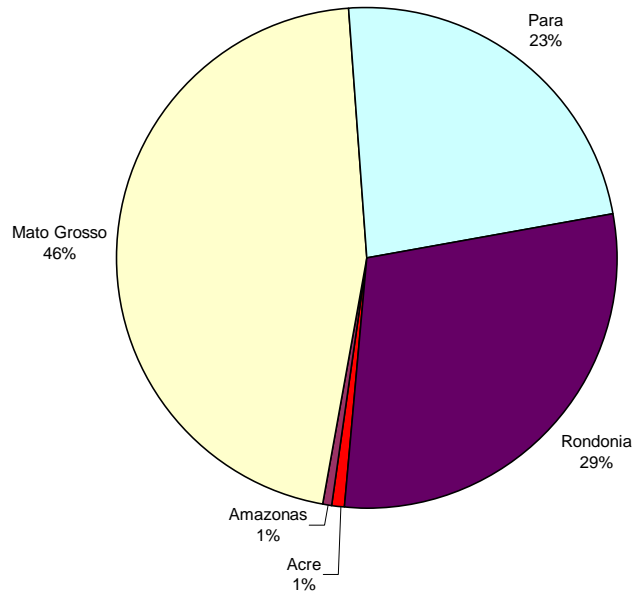
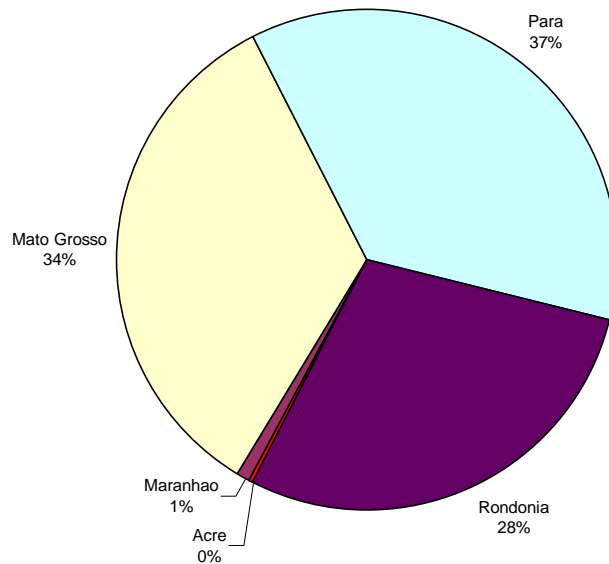


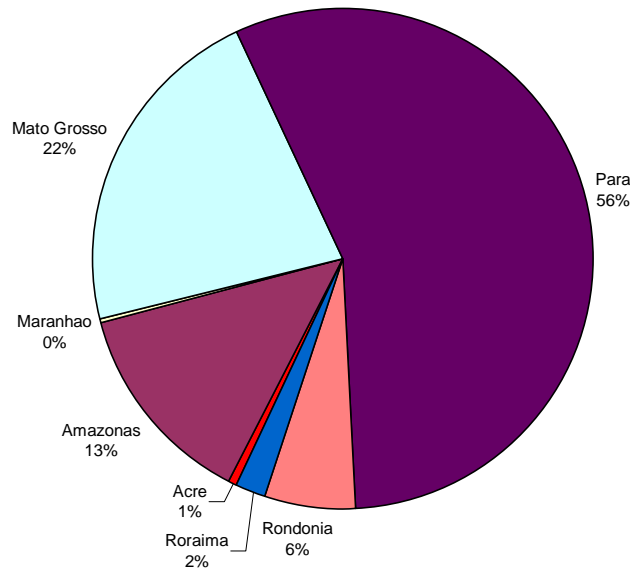
Fig. 25 : Minas Gerais market share of Amazonian timbers, by states of origin, 1997



At a global level, timbers from Para never account for more than a third of the domestic markets, whereas they account for most of the half of the foreign market. This is due to the specialization of the northern Amazonian timber network for the exports, especially towards Europe. Acrean timbers account for only 1% of the foreign market (Fig. 26 - IMAFLORA-IMAZON, 1999). But they have to be considered at the specific level of the exports that are produced by the south timber networks, for which we have unfortunately no detailed figure. At this level, we just know from our survey that a ridiculous part of the timbers is shipped

towards Europe, the remaining being shipped towards Asia. In the case of Acrean timbers, China is said to be the main importer. This is surprising regarding how Acre is remote from the main active Brazilian areas, but knowing the characteristics of the Chinese demand, this provide information of interest that is to be linked with the analysis of the key factors of the Acrean situation.

Fig. 26 : Foreign market share of Amazonian timbers, by states of origin, 1997



Key factors of the Acrean situation

Resource

Acre represents about 150 000 km² within the Amazon region. About 90% of the land is covered by natural dense forests, of which about 65% can be devoted to sustainable timber production. The 500 000 inhabitants and the very little industrial activity let its important forest potential still nearly virgin. Among the 782 recorded species, about 350 species are potentially of commercial use. About 60 are indeed used, but only around 40 are often processed. Today, the most commonly processed and trade species are respectively Cumaru Ferro , Cumaru Cetim , Samaúma, Jatobá, Manité , Cedro , Angico, Maçaranduba , Assacú , Matamatá , Cerejeira , Tauari , Imbirindiba, Amarelão , Castanharana , Guariuba , Copaíba, Angelim , Guaribeiro , Catuaba, Maparajuba , Aroeira , Jutaí , Fava Orelhinha, Bálsamo , Ipê , Corrimboque , Mulateiro , Samaúma Branca , Marupá , Samaúma Preta , Tamarino, Abiu, Pereiro , Violeta , Sucupira, etc. 34% of the state area is considered of high forest value (above \$R 400 /ha of logs), 36% is considered of medium value, and 22% is considered of low value (under \$R 200 /ha of logs). These conditions are excellent for the development of wood industries.

Logistics

The transportation infrastructure is very limited, as there is only one main transit road going from Porto Velho (Rondonia), to Mancio Lima (Acre), via the capital, Rio Branco. This main road is connected to the different smallest cities of the state, but only this main road is paved, until Sena Madureira, that is a very small part of the network. This causes time consuming operations and high transportation costs during the dry season. During the wet season (7 to 8 months), timber transport is impossible on the unpaved part of the network.

This poor road condition increases the production costs, but is not a limiting factor. According to the mill managers, it is possible to overcome these difficulties by organizing the harvesting during the 4 months of dry season, stocking the logs in the mill or nearby, and processing and selling the products during all the complete year. But this is only possible when having enough investment capacity, in order to get the proper mechanized equipment.

The long way from Rio Branco to the South East markets has normally about the same cost than the one from Belem to the same markets, that is \$R 130 / Ton, when the transporter arrives in Rio Branco with a load. But Rio Branco is an end-line, that means that on several occasions, the lorry has to come empty from Rondonia. In that case, the same transport costs \$R160 / Ton. This is enough to make the prices of Acrean mills less competitive than the ones from Rondonia and from Matto Grosso, when regarding the same products.

River transport towards Manaus is cheaper, but not so easy to set up at an industrial scale. Besides the today inappropriate state of the river shore facilities, that is easy to correct and to develop, the main difficulty comes from the fact that shipments are completely submitted to the demand from Manaus or from Belem. But the same products in quality and quantity can be found far before Acre, at lesser cost, when coming from those places, so the demand do not exist for Acrean timbers by this river way. Furthermore, when a mill anyway sends a shipment to Manaus or to Belem, the bargaining conditions become definitely unfavorable, making the operation at a loss.

Costs

According to all the mill managers, the best advantage of setting a mill in Acre comes from the running costs, that are lower than elsewhere. Low site costs and low wages make definitely interesting an industrial settlement operation.

Work force

Correlating with the low wages and the remote situation of the state, the work force is dramatically lacking of training and of specialized skills. At equal level of production, a mill from Acre has far more employees than a mill from Mato Grosso or Rondonia, so its productivity is lower. The mill from Acre has also to spent more time and money for the training of its workers. In practice, this lower productivity leads to a lower activity, another competitive disadvantage. In addition, the lack of skills entails a chronic impossibility to manufacture perfectly finished products that are the condition "sine qua non" to compete in the field of first quality products. The manager of one of the more specialized mill we visited told us that in order to remain competitive, he recently had to go until Sao Paulo in order to debauch some skilled worker, able to lead the process of some new range of second process product.

Investment capacity

All of the firms located in Acre dramatically lack of investment capacity. None has the capacity to finance the equipment of the new modern and computerized machines that are necessary to ensure the level of finishing that is required to compete with Mato Grosso or Rondonia productions. Furthermore, according to the interviewed managers, it seems that the local bank bureaucracy would not be a positive factor in helping to solve this investment capacity difficulty.

The worse point of the situation is that, as long as the Acrean mills will lack of investment capacity, then they will not be able to efficiently compete with timbers from Mato Grosso or Rondonia, and then the correlated low activity and low cash-flow will prevent the firms to increase their investment capacity.

Industrial dynamics

Nowadays, the Acrean timber industry has no chance to be developed in another way than to increase its production and trade through the South road system. But this means to be confronted to the South East demand which leads to a dramatic competition with Rondonia and Mato Grosso in the field of first quality products, were Acre has no chance to success. Timbers from Acre seem today sentenced to occasionally substitute for timbers from Mato Grosso and Rondonia, when these lasts are in shortage (what is occurring time to time, and does not allow the processed volume to grow). This lets no chance to escape of the vicious circle where the Acrean mills are locked up, desperately seeking for investment capacity.

This situation will for sure change in the future, as the growing timber scarcity and the growing production costs within Mato Grosso and Rondonia will change the competition play, giving its chance to Acre. But this will take some years, and when it will occur, today's Acrean mills will not benefit of the situation, since their lack of investment capacity will prevent them to adapt to the increasing demand they will face. Instead of, today's mills from Mato Grosso and Rondonia will move their extraction field to Acre, as we see already the signs of this trend. For example, a big mill from Rondonia recently tried to take the control of the more sustainable firm we visited in Acre, threatening to change this sustainability into predation.

The only way to quickly escape this situation would be to find a comparative advantage that would differentiate the products of Acre, and maybe would help the local mills in getting better investment capacity.

Differentiation possibility

The only clear comparative advantage of Acre, beside its natural resource, that other states also have (on a wider scale), is located in its low running costs. Since this advantage is not useful to compete within the field of first quality products, let's see if no other field allows the valorization of this advantage ? Indeed, such a field exists; the field of products of second quality and / or secondary species, with good but non perfect finishing, and at low prices.

This field offers a lower benefits margin than the field of first quality products. Rightly because this lowest margin, this field is not exploited by the firms from Rondonia or Mato Grosso, what makes that no hard competition is to be waited within the South road system. Because the low margin, the highest level of processing should be preferred in order to maximize the added value.

As a matter of fact, the most dynamic Acrean mills have already chosen this differentiation, already integrating second processing, or seeking for it, but just lacking of investment capacity to buy new machines and to increase the production level. The Asian demand that precisely look for this kind of products, already demands more than the local firm can produce, according to their managers.

Success keys of this differentiated field are a low cost of production, allowing the required low price, investment capacity, and specialized skills of foreman workers.

Ecocertification

Ecocertification does not mean permission of bad quality products and processes. It means first quality production in order to fulfil the requirements of European markets that pay ecocertified products, it means also top competitiveness in order to keep the prices at a reasonable level that will not overcome the ability of potential customers. Ecocertification does not mean only forestry management sustainability. It also means industrial sustainability and chain of custody reliability. This is somewhat difficult to reach, but not impossible. The details of the forest management and the chain of custody certification check lists (FSC, 2001) show precisely that, apart to be difficult, ecocertification of the Acrean timber network requires first the improvement of its competitiveness (modernized industry with higher investment capacities, skilled and trained workers able to fulfil all the requirements of the chain of custody...). Ecocertification is a voluntary approach that will require that Acre first improve the characteristics of its industry. But ecocertification can not be first obtained, in order to secondly improve the competitiveness of the timber network by escaping the realities of the market.

Today the government of Acre want to set up the sustainability of its forest resource. This is a voluntarist approach that will have a very high cost, because of all the hidden implications of the concept. Fortunately, this is paying in a long term. Once all the necessary means took in order to set up the sustainability, it will be possible to launch the process certification. The cost of this is very affordable, compared to the costs of the setting up the sustainability :

- Assessments costs varies from US\$ 7,000 to US\$ 40,000 depending on the complexity of the operations, access etc.

- Annual monitoring is on average 25% of the first assessment,

- Annual Certification Fee varies from US\$ 100 to US\$ 5,000 depending on the Gross Sales of the operation.

(In Brazil IMAFLORA/SmartWood run a social certification fund which is maintained by a fee of 5% of each assessment. This fund is used to subsidize the certification of small landowners and communities) (Azevedo, 2001). For example, this would represent a cost of about US\$ 350 000 in the case of a 30 years concession of 60 000 ha, with a complex and productive forest.

Conclusion : possible strategies for Acre

- A first voluntarist strategy would be to invite a big international and industrial group to set up in Acre. Only this kind of group should have enough investment capacity in order to manage several big forest concessions, to give enough financial impulse into the industrial sector, and to fulfil the necessary conditions that would be negotiated between the government of Acre and the group. But, given the evidence of similar experiences elsewhere in the world, it is predictable that this group would seek to harvest more than 30 m³ / ha, and maybe up to 60 m³ / ha, in order to more or less quickly cover its investments. This strategy should give an important impulse into the industrial sector of Acre, but would not be necessarily compatible with a sustainable management.
- A second strategy would be to quickly develop ecocertification and to negotiate some advantages (maybe fiscal ?) with some medium sized firms already connected to the high quality eco-demanding European markets in order to attract them in Acre. Given the key factors of the Acrean situation, and besides the fact that the process could be more or less unfair regarding already existing Acrean firms, this strategy does not ensure the sustainability of the timber network, since it is very costly and does not solve the problem of the Acrean lack of competitiveness in the field of high quality products.
- A third and last strategy would be a more modest but surer one, consisting firstly in financing flexible and advantageous loans to the existing mills, in order to help them in solving their lack of investment capacity. Secondly, training of skilled workers could be financed on a more or less long term. This strategy has the advantages that the money invested into loans can be recovered, and reused, and that it preserves the necessarily low production costs required to perform in the differentiation market that suits the best to Acre ("integrated secondary process, second quality and / or secondary species, with good but non perfect finishing, and at low prices"). It is not incompatible with the parallel and progressive development of a sustainable forest management, neither than with a later possible ecocertification development, once the competitiveness of the timber network will be ensured. Later evolution of the differentiation market into a more "first quality" market would be still possible and maybe desirable. Given the key factors of the Acrean situation, this strategy is by far the more probable to be successful.

Of course these strategies and conclusions may be valid from a timber business point of view, but these market considerations don't necessarily prevail on other considerations, such as social or political ones.

References

ABIMCI. Mechanically processed timber, sectorial study. Associação Brasileira da Industria de Madeira Processada Mecanicamente, 1999, Brazil.

ABIMCI. Asian commercial mission. ABIMCI, 1999. URL : <http://www.tropical.congress.com.br>

ANGELO, Humberto. As exportações brasileiras de madeiras tropicais. Universidade Federal do Parana, 1998, Curitiba, 1998.

AZEVEDO, Tasso. Personal communication, IMAFLORA, 2001.

BNDES. Produtos florestais, madeira em tora, madeira serrada e painéis : panorama 1980-1992. Banco Nacional de desenvolvimento Economico e Social, 1995, Brasil.

FAO. FAOSTAT CD-ROM 1961-1998. Food and Agriculture Organization of the United Nations, 2000, Rome, Italy. ISBN: 92-5-004230-2

FSC. Forest Stewardship Council. List of certified forests, April 2001. URL : <http://www.fscoax.org/>

IBDF. Analise do setor industrial florestal : Acre - Rondonia Instituto Brasileiro de Desenvolvimento Florestal, 1984, Brasilia, Brasil.

IBDF. Identificação e agrupamento de especies de madeiras tropicais Amazonicas – Síntese. Instituto Brasileiro de Desenvolvimento Florestal, 1985, Brasilia, Brasil.

IBGE. Brazilian census and statistics. Instituto Brasileiro de Geografia e Estatística, 2001 URL : <http://www.ibge.gov.br/>

IMAFLORA-IMAZON. Hitting the target : Timber consumption in the Brazilian domestic market and promotion of forest certification. IMAFLORA, IMAZON, 1999, Sao Paulo, Brazil. ISBN : 85-86928-03-8.

IMAFLORA-IMAZON. Acertando o alvo : Consumo de madeira no mercado interno brasileiro e promoção da certificação florestal. IMAFLORA, IMAZON, 1999, Sao Paulo, Brazil. ISBN : 85-86928-04-6.

ITTO. Annual review & assessment of the world tropical timber situation 1999. International Tropical Timber Organization, 2000, Yokohama, Japan. URL: <http://www.itto.or.jp/>

PRO-NATURA / IIED / GTZ. Barreiras à certificação florestal na Amazonia Brasileira : A importancia dos custos. Pro-Natura / IIED / GTZ, 2000, Brazil.

RODA, Jean-Marc. State of the tropical timber economics 2000 / Etat de l'économie des bois d'oeuvre tropicaux 2000. Bilingual English-French. CIRAD, 2000, Montpellier, France. ISBN: 2-87614-441-7