Working Group on Development and Environment in the Americas

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Effects of Foreign Investment versus Domestic Investment on the Forestry Sector in Latin America (Chile and Brazil)

-Demystifying FDI effects related to the Environment

Nicola Borregaard
Annie Dufey
Lucy Winchester

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Nicola Borregaard holds a PhD in Land Economy from Cambridge University, and a Master in Economics from SUNY at Albany, she has created the Environmental Economics Unit in the National Commission on Environment in Chile, was Executive Director of the Centro de Investigación y Planificación del Medio Ambiente, CIPMA, and one of the founders and Executive Director of Recursos e Investigación para el Desarrollo Sustentable, RIDES.Since 2004 she has worked as Advisor to the Chilean Minister of Economy and in 2006 was appointed Director of the National Energy Efficiency Program. She is author of numerous publications in the area of environmental economics and trade and environment.

Lucy Winchester is currently a freelance consultant in sustainable development in Chile and Latin America. She has worked as an advisor for the Sustainable Development and Human Settlements Division, at the Economic Commission for Latin America and the Caribbean, and as a senior researcher to SUR, Centre for Social Studies and Education (Chilean Independent Research and Training Centre). Her previous employers include United Nations Commission for Sustainble Development, UN-Habitat and the Chilean Government, among others. Lucy Winchester is a specialist in the evaluation of public policies and programmes in social policy, urban and municipal development, and poverty. She recieved her MA from Michigan State University.

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Introduction

One of the characteristics of the world economy over the last two decades has been the strong growth in foreign direct investment (FDI) flows. More and more companies, in an increasing number of economic sectors and countries, now invest beyond the borders of their home countries; meanwhile, the governments of receiving countries are competing more and more to attract foreign investment.

By 2005, about a third of the stock of global FDI have gone to developing countries. Latin America accounts for 10% of the global FDI stock. Three countries, Brazil, Argentina and Chile, attracted 82% of FDI flows into the region between 1990 and 2002.

The economic benefits of FDI include technological innovation, increases in competitiveness, improvements in efficiency and transfers of intangible resources such as new forms of organization, administration and marketing.

Expectations regarding the environmental impacts of FDI are rather mixed. On the one hand, some argue that FDI brings negative environmental impacts, especially in developing countries that have lower environmental standards and could constitute "pollution havens." On the other hand, some claim that foreign firms help to improve environmental performance in developing countries by transferring both cleaner technology and management expertise in controlling environmental impacts.

The environmental impact of FDI in Latin America is a sensitive issue, as Latin American countries are characterised by natural-resource-based production and exports, primarily in the mining, forestry and fishery sectors. These are environmentally sensitive sectors, with significant potential effects of both resource extraction and processing.

This document aims to determine the environmental impacts of FDI in the forestry sector in two of the region's major producing countries, Chile and Brazil. Environmental effects from forestry are, by now, relatively well studied. There are various certification initiatives aiming at improving the social and environmental performance of forestry companies, including the Forestry Stewardship Council (FSC), the Programme for the Endorsement of Forest Certification schemes (PEFC) and national labelling initiatives including the CERTFOR in Chile and Certflor in Brazil.

Rather than discussing the different environmental impacts from forestry in general, the focus of this paper is on the question of the environmental impact specifically attributable to foreign direct investment. Rather than examining individual projects in detail, which is beyond the scope of this

paper, we have taken a macro approach, based on a literature review and interviews, combined with a more detailed examination of selected large investment projects.

The paper approaches the effects of FDI on the environment through a familiar three-part framework for identifying and evaluating environmental impacts from trade and investment. According to this framework effects can be differentiated into:

- Scale effects – Positive scale effects occur when economic growth (in this case deriving from FDI) causes an increase in the demand for environmental goods and economic gains are used to tackle environmental problems. Negative scale effects occur in the absence of environmental regulations and management; economic growth increases the use of natural resources and the generation of pollution. On a micro level, scale effects can refer to any impacts on the environment of increases in the scale of individual operations.

  Technological effects – These refer to positive effects from the use of environmental technologies in foreign operations as well as to positive spillovers to domestic firms.

- Regulatory/policy effects – These refer to potential effects on domestic environmental regulation. Positive impacts refer to pressures to tighten environmental regulation and enforcement, and negative impacts refer to downward pressure due to competition for foreign investment (the "race to the bottom").[i]

National and Foreign Investment in the Chilean and Brazilian Forestry Sectors

While Chile only accounts for 0.5% of forested land worldwide and 1.9% in Latin America, it is the second most important pulp producer in the region after Brazil (equivalent figures of 20.8% and 66.3%, respectively). Chile is the world's fourth largest exporter of wood chips (8.9% of world exports) and fifth largest exporter of boardword (FAO, 2006). Brazil is the world's top tropical timber producer and sixth largest producer of pulp (Bracelpa, 2007)[ii]. The Brazilian forestry industry accounts for 4.5% of the country's GDP and 7% of its total exports (FAO, 2004). Its key activities include timber exploration, production of wood products, and production of pulp and paper.

Production in the Chilean and Brazilian Forestry Sectors

Chile

The Chilean forestry sector includes timber extraction as well as production of wood products and pulp and paper. According to the National Forestry Institute (INFOR), in 2005 there were over 30 million hectares of forested land in Chile, equivalent to 20.5% of the country's territory. Of this territory, 48% was virgin, 45% native forest and 7% plantation. Despite the fact that forestry plantations make up the smallest portion of forested areas, they produce most of the raw material used by the forestry industry. Close to 98% of the timber used as a component of the forestry industry comes from plantations and only 2% from native forest.[iii] Plantation acreage increased by 154.4% between 1979 and 1997 (from 739.6 to 1,881.9 thousand hectares). The main planted species are radiata pine (accounting for 75.5% of forest plantation acreage) and eucalyptus (16.9%). Between 1997 and 2005, total plantation acreage increased by just under 10%, to 2,078.6 thousand hectares (67.8% and 23.6% dedicated to radiata pine and eucalyptus, respectively). Since the year 2000, total expansion of land planted and dedicated to industrial

plantations has been very limited, and industry experts believe that the total land dedicated to plantations is reaching its upper limit.

In Chile, the native-forest contribution to the added value of the forestry sector is far less than that of plantations. Of all the timber produced in the country in 2005, 20.3% came from native forests,], of which 86% was used for firewood production and the remaining 14% for industrial materials. In industry, native forest wood is mainly used for sawnwood (71.1%) and boardwood (28.1%). The pulp production industry does not use native timber as a raw material. While native forest use in wood-chip fabrication reached a peak in the mid 1990s (accounting for 74.2% of total industrial usage), since 2003 it has been entirely replaced by eucalyptus. The use of native forest is also decreasing for sawnwood. Currently, only 2.9% of the raw material comes from native forests (in contrast to the 1960s, when they were the principal source of raw materials for the sector) (INFOR, 2005).

In Chile, plantation landholding is highly concentrated. IN the case of radiate pine a 71.1% of the plantations is n the hands of the 2% of all forestry owners with holdings over 1,000 hectares Two companies alone own more than 75% of these plantations. Similar conditions exist in the eucalyptus plantations sector (ECLAC, 1999). This ownership concentration reflects the concentration of production and vertical integration that characterize the forestry sector. The largest sawmills, panel companies, and pulp and paper companies are owners of the plantations that provide their raw materials. In the pulp production sub-sector, 100% of the production is concentrated in the hands of only two companies: Celulosa Arauco y Constitución SA (CELCO) and Compañía Manufacturera de Papeles y Cartones (CMPC) (Table Nº1). In the boardwood subsector, similarly, 100% of the production is concentrated between three companies: Celulosa Arauco y Constitución SA (CELCO), Compañía Manufacturera de Papeles y Cartones (CMPC), and Masisa S.A.

Table 1: Chilean pulp Exports by Company, 2005

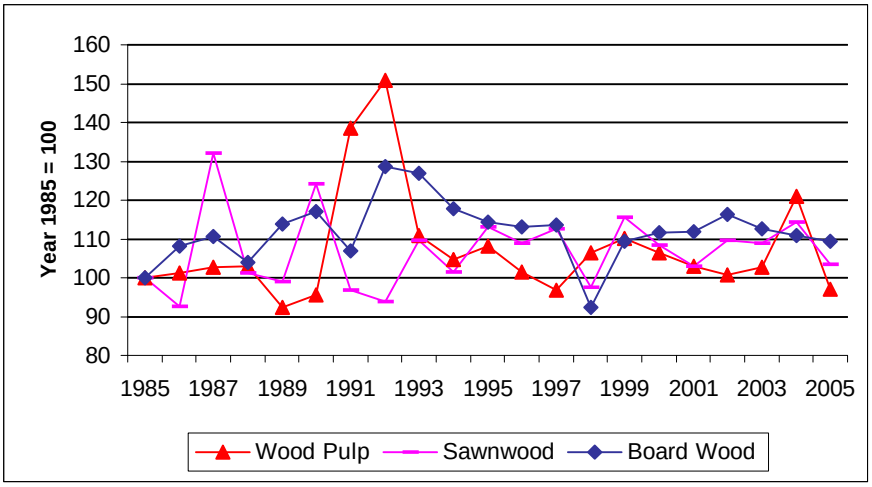
Company	Export (millions of US$)	Participation (%)
Arauco y Constitución SA	743,7	61,7
CMPC SA	460.8	38,3
Total	1.204,5	100,0

Source: Foreign Trade Statistics, PROCHILE

In 1970, Chile's forestry sector represented only about 1.2% of GDP; by 2005, this percentage had increased to 3.3%. Effectively, in the mid 1970s the forestry sector began to increase in importance relative to national output, reaching values of over 3% of GDP by the mid 1990s, though dipping slightly in the latter years of the decade. Since the year 2000, the forestry sector's contribution to GDP has reached 3.2% to 3.4%. The comparative advantages[iv] that Chile has in timber production, the government's introduction of tree-planting incentives, the adoption of reforms to attract private capital to the sector, and the capacity of the industry to adapt to international market forces are factors that explain the success and development of the country's forestry sector.

In Chile, sawed timber and furniture production stand out as the most important industries within the forestry sector, accounting for 50.6% of the sector's total output by value in 2005. The pulp-and-paper industry follows in importance (40.6%) and then forestry planting and timber extraction (8.8%). During the last ten years, the importance of the timber and furniture subsector relative to the pulp-and-paper industry has steadily increased.

Graph 1: Production of key forest products Chile



Source: Elaborated from data from INFOR

Brazil

A major participant in the global short-fiber pulp market, Brazil has five million hectares in plantations. Most of the forest plantations are concentrated in the South near the Atlantic coast, in the states of Bahia, Espírito Santo, Minas Gerais, São Paulo and Paraná (see figure 1). About 40% of plantation output is used as raw material by the pulp production industry, 35% is used as fuel for the iron and steel industries and 25% is for the log and sawnwood industries (Mendoca, 2000). By 2006, companies in the pulp and paper sector owned 1.7 million hectares of plantations (BRACELPA, 2007), making the sector not only self-sufficient for raw materials, but also a supplier of wood to other industries.

Plantation acreage in Brazil has grown fast over the last few decades, especially in the 1970s and 1980s, after the government introduced reforestation plans and fiscal incentives for tree planting. In response to deforestation, the government encouraged the private sector to invest in plantations and did away with incentives to exploit native forests. The 2nd Forestry Code, established in 1965, required large companies using forestry raw materials to replace the forests with new plantations, and required the iron and steel industries, transport companies and other parties using coal as a raw material to have their own forests to cover their consumption needs. The government also established a Fiscal Incentives Program for Forestation or Reforestation, which, for example, allowed individuals and companies to use 50% of their income tax payment for reforestation. Although the program was directed at small and medium-scale producers, the pulp and paper industry increasingly took advantage of its provisions (Mendoca, 2000). In addition, in 1990, the government established different uses for different types of forest, depending upon whether they were National Forests, Extraction Reserves, "Indian" Reserves or Protected Areas. National

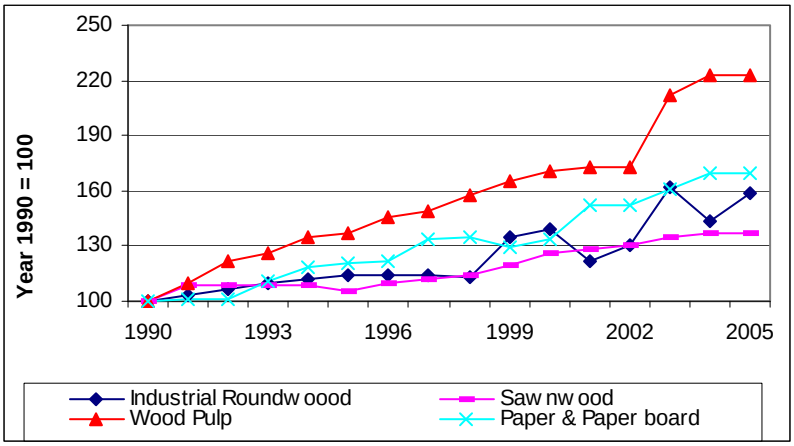
Forests, Extraction Reserves, Indian Reserves and other protected areas are managed as a permanent estate, i.e. conversion to other land uses is not permitted. While multiple-use forestry is permitted in the first two, logging is normally prohibited in Indian Reserves and protected areas. (Lendell- Mills, 1999). (Lendell- Mills, 1999).

In tropical timber, Brazil is both the world's largest producer and consumer, with 86% of the timber production from the Amazon being consumed internally (Smeraldi & Verissimo, 1999) and the State of São Paulo alone consuming more tropical timber than France, the UK and Spain combined.

The tropical Brazilian forests are mainly concentrated in the North, in the Amazon region, although there is also a less important forest zone in the tropical Atlantic region. Close to 40% of the land in the Amazon region is privately owned, and is principally dedicated to farms and rubber plantations. Only a small portion contains native forest. These forests primarily supply the log and sawnwood industries, accounting for 75% of the raw materials used by these industries (Landell-Mills, 1999).

The deforestation rate for year 2000 was 0.33% (FAO, 2004), lower than the 0.5% rate for the 1990-1995 period (Landell-Mills, 1999). About 2.3 million hectares of forests are cut annually for agricultural expansion and other purposes (May 2003). Although clearance for agriculture is the main driver of Amazonian deforestation, much of Brazil's tropical timber originates from deforestation. Concerns about deforestation and illegal logging have resulted in the introduction of trade restrictions by the government as well as suspensions on forest management plans (Richards et al 2003).

Graph 2: Production of key forest products, BRAZIL



Source: Elaborated from FAOSTAT

Table 2: Production of key forest products, Brazil and Chile

		Brazil				Chile				
	Unit	**1990** (Million)	**2005** (Million)	**Increase 1990-2005** (%)	**Annual Average Increase** (%)	**1985** (Thous)	**1990** (Thous)	**2005** (Thous)	**Increase 1985-2005** (%)	**Annual Average Increase** (%)
Industrial Roundwoood	Cum [???]	74.3	118.1	59.0	3.1	211	349	2111	900.5	12.5
Sawnwood	Cum	17.2	23.6	37.0	2.1	2191	3327	8298	278.7	7.3
Wood Pulp	Tons	4.3	9.6	122.8	5.5	849	804	3237	281.3	7.7
Paper & Paper board	Tons	4.8	8.2	71.3	3.7	w.d.	w.d.	w.d.	w.d.	w.d.

Source: Elaborated from FAOSTAT and data from INFOR.

Domestic and Foreign Investment in the Chilean and Brazilian Forestry Sectors

Chile

Chile has a dynamic market-oriented economy characterized by a high level of foreign trade. During the early 1990s, Chile's reputation as a role model for economic reform was strengthened when the democratic government which took over from the military in 1990 deepened the economic reform initiated by the military government[1][1]. From an economic point of view, the era of military dictatorship (1973-90) can be divided into two periods. The first, from 1975 to 1981, corresponds to the period when most of the reforms were implemented: Chile was transformed gradually from an economy isolated from the rest of the world, with strong government intervention, into a liberalized, world integrated economy, where market forces were left free to guide most of the economy's decisions. The period ended with the international debt crisis and the collapse of the Chilean economy. The second period, from 1982 to 1990, was characterized by economic recovery and a further movement towards a free market economy, although at a slower pace than that of the early 1980s. By contrast to the "automatic adjustment" strategy used in the initial period of reforms, this period of reform relied on careful policy management. Three policy areas became critical in the implementation of the program: active macroeconomic policies, consolidation of the market-oriented structural reforms initiated in the 1970s, and debt-management policies geared toward rescheduling debt payments and making an aggressive use of the secondary market. There were several structural goals of the 1985 adjustment program: rebuild the financial sector, which had been nearly destroyed during the 1982 crisis; reduce import tariffs below the 35 percent level that they had reached during 1984 to a 15 percent uniform level; and promote exports through a set of fiscal incentives and a competitive real exchange rate.

In this overall context, in Chile, factors sustaining the growth of the forestry sector include the state’s adoption of incentives for private investment; the international “opening” of the economy; the privatization process; and the encouragement of foreign investment.

The Decree 701 of 1974, later modified in 1998 (Law 19.561), falls into the first category and has been the most important instrument for the development of the country's forest wealth. The decree establishes total protection from expropriation of forestry land, establishes a subsidy of between 75% and 90% for reforesting costs and plantation management, and introduces reductions of and exemptions from land taxes and utilities fees for companies exploiting native and planted forests.

The planting of nearly one million hectares of trees – principally radiata pine and eucalyptus – has been subsidized through this policy, generating both economic and environmental benefits for Chile. The forestry industry's easy access to capital and technology permitted extensive use of these subsidies: between 1974 and 1995, small property owners and indigenous groups, however, received only 5% of the total funds allocated by the state. The modifications introduced in 1998, and again in 2000, were aimed at the extension of benefits to these small landowners;[v] the creation of incentives for the prevention of desertification and soil degradation, and the recuperation of eroded soil.

In 1974, export tariffs were lowered and the ban on exports of raw or semi-processed forestry products was lifted. Between 1974 and 1978 the state privatized the forestry sector, with two national economic groups acquiring a large percentage of forestry property. In 1982, the state had to repurchase the properties in the face of economic crisis, and in 1984 carried out another privatization process. The Grupo Angelini took control of COPEC and its important forestry resources – Celulosa Arauco, Forestal Arauco, Celulosa Constitución and Forestal Constitución – and the Grupo Matte, already owners of CMPC, took control of Inforsa. In addition to the participation of domestic private interests, foreign companies also invested in the forestry sector.

The government also promulgated, in 1974, policies to increase the role of foreign investment in the Chilean economy. Decree 600 (DL 600) established equal treatment for domestic and foreign investors, free access for foreign companies to all markets and sectors, the elimination of payments for the consignment of utilities, and an optional special tax regime for foreign investors. Between 1974 and 1999, FDI inflows under DL 600 totalled US$1,067 million; by 2005, an additional US$435 million in FDI entered the country. Since 1974, forestry FDI under DL 600 has accounted for 2.7% of all FDI under the decree (Graph 3). As seen in Table 3, with the exception of the early 1990s, the forestry sector accounted for a very small fraction of total FDI under DL 600. Forestry FDI under the decree, as a share of the total, reached a peak in 1991 with 12.7%, but declined gradually to a 1999 share of only 0.7 %. In the last decade, the forestry sector's share of total FDI under DL 600 has been fairly stable, except for 2003, when the paper-and-printing subsector attracted substantial inflows from the United States and Switzerland. While FDI investments in forestry reached US$176.5 million in 2003, these investments are not significant relative to the costs of production facilities in the sector: for example, a single new boardwood plant costs about US$50 million, and a new pulp plant costs nearly US$ 1,000 million.

Chapter XIX of the Compendium of Regulations for International Exchanges of the Chilean Central Bank has been far more important than DL 600 for FDI inflows into the forestry sector. This measure was introduced in 1985 in order to stimulate FDI and diminish foreign debt. Between 1985 and 1989, total FDI into the forestry sector under Chapter XIX was US$1,026 million, equivalent to 22.7% of the total FDI under this provision. This is five times the amount of capital coming into the country under DL 600, which only brought in US$190 million dollars between 1982 and 1989

FDI inflows to Chile via Chapter XIX peaked at US$1,321 billion in 1989, dropping considerably in 1990 and in 1991, when this mechanism ceased to exist.

The majority of foreign companies carried out investments in Chile through alliances with domestic companies already established within the sector. The New Zealand group Carter Holt Halvey partnered with the group Angelini to buy 50% of COPEC. The UK-based Shell acquired Bosques de Chile SA, Aserraderos Copihue and Forestal Colcura Ltda., and established the company Forestal e Industrial Santa Fé in conjunction with the U.S.-based Scott Paper and Citibank (CEPAL, 1999). An alliance between the North American Simpson Paper Co. and CMPC created Celulosa del Pacífico SA, one of the most modern and important Chilean long-fiber cellulose companies. Finally, Japanese and North American companies undertook some minor land acquisitions for forestation. Both Shell and Simpson Paper, however, withdrew from the pulp business by selling all their assets to the Matte Group in 1998.

During the last 10 years, the Chilean forestry sector has seen considerable vertical integration and concentration of market shares by the Matte and Angelini Groups (CMPC and Arauco, respectively). This process brought the exodus of many of the foreign companies which had entered in the early to mid nineties. Foreign investment in the sector continues to exist, but on a small scale, compared to the large domestic companies. During the last five years, FDI from the United States has been concentrated within the boardwood subsector, in certain remanufacturing activities. Masisa S.A., which resulted from a merger between Nasisa and Terranova, related to the swiss.based Schmidtheiny Group, and which is now owned by a 53% by GrupoNueva, also related to the Schmidtheiny Group, maintains a modest position in the boardwoods subsector.

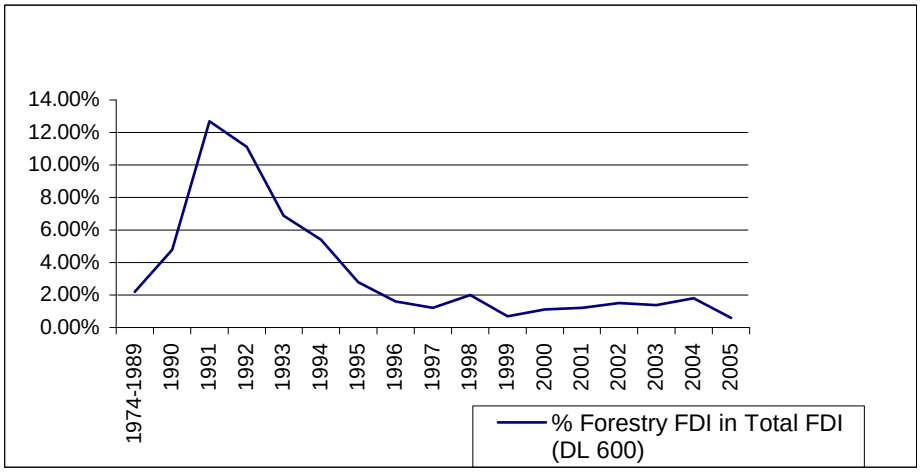
Table 3: FDI in the Forestry Sector and Total FDI, Chile (through DL 600)

(millions of dollars)

Year	Forestry FDI (A)	Total FDI (B)}	(A)/(B) (%)
1974-1989	114	5.111	2,2
1990	62	1.280	4,8
1991	125	982	12,7
1992	110	993	11,1
1993	120	1.736	6,9
1994	135	2.522	5,4
1995	86	3.031	2,8
1996	78	4.838	1,6
1997	64	5.225	1,2
1998	123	6.039	2,0
1999	63	9.226	0,7
2000	34	3.039	1,1
2001	60	5.020	1,2
2002	51	3.381	1,5
2003	176	1.286	13,7
2004	82	4.635	1,8
2005	11	4.635	0,6
Total	1.067	40.660	2,7

Source : Comité de Inversiones Extranjeras (Foreign Investments Committee) 2007

Graph 3: Contribution of FDI in Forestry to Total FDI, Chile (through DL 600)

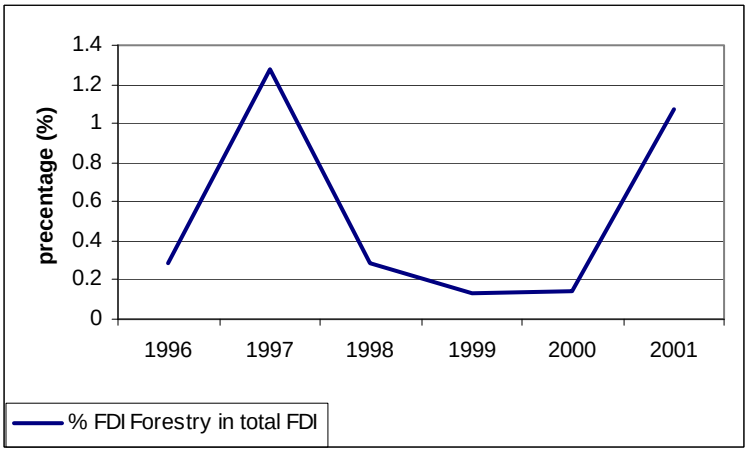


Source: Comité de Inversiones Extranjeras (Foreign Investments Committee) 2007

Brazil

Although latest official data on FDI in the forestry sector in Brazil date from 2000, foreign investment is certainly low. Graph 2 shows FDI in the forestry sector relative to total FDI in Brazil between 1996-2000: it varies between 0.1% and 1.3%.

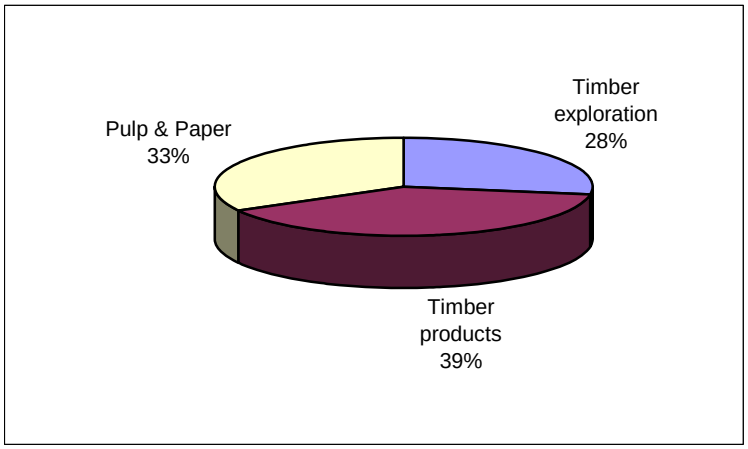
Graph 4: Contribution of FDI in Forestry to Total FDI, Brazil



Source: authors' elaboration based on data from Censo do Capital Estrangeiro, 1995 a 2000, the Departamento de Capitais Estrangeiros (FIRCE), Banco Central Do Brasil

Between 1996 and 2000, timber products accounted for 39% of the FDI in the forestry sector, pulp and paper for 33%, and timber exploration for the remaining 28%.

Graph 5: distribution of FDI in forestry by subsector, brazil, 1996-2001



Source: authors' elaboration based on data from Censo do Capital Estrangeiro, 1995 a 2000, the Departamento de Capitais Estrangeiros (FIRCE), Banco Central Do Brasil

Adario and D'Avila (1999) suggest that there have been two important foreign investment flows to the forestry sector in the Amazon region, specifically in the states of Amazonas and Pará. The former, attracted by fiscal incentives in the 1970s and 1980s, came from countries consuming tropical timber such as Germany, the U.S. and China. The latter, during the second half of the 1990s, was dominated by Asian timber groups, who basically acquired existing companies and timber rights, generally exceeding 1 million hectares (Landell-Mills, 1999). The investors in this case included the WTK Group (Malaysia), Samling Corporation (Malaysia), Rimbunan Hijau Group (Malaysia), KTS Group (Malaysia) and Fortune Timber (China). The main factor behind the arrival of the Asian companies was a shortage of inputs due to bans on logging or log-and-export activities in various Asian countries in the early 1990s.

Amazonas state has a strong export orientation and substantial presence of foreign-owned companies, while Pará state has mainly domestic companies supplying the national market.[vi] The most important foreign-owned companies in the Brazilian tropical timber sector are Gethal (U.S.), Carolina (Asia), Mil (Switzerland) and Braspor (Portugal). These companies are totally export oriented and in 1997 were responsible for 67% of all the timber exported from Amazonas state, accounting for 13% of all timber exported by Brazil (McQueen, *et al*. 2004). Cotton and Romine (1999) estimate that foreign companies in Brazil have been responsible for about 3% of timber extraction, 8-12% of semi-processed timber output, and 25% of the sector's exports.

The pulp-and-paper industry, in the South of Brazil, achieved a high degree of competitiveness during the 1980s, making it a very attractive to foreign investment. FDI into the sector reached more than US$18 billion in total between 1989 and 2006 (Mendoca, 2000; BRACELPA 2007) and is projected at US$14.4 billion for the period 2003-2012 (BRACELPA, 2007).

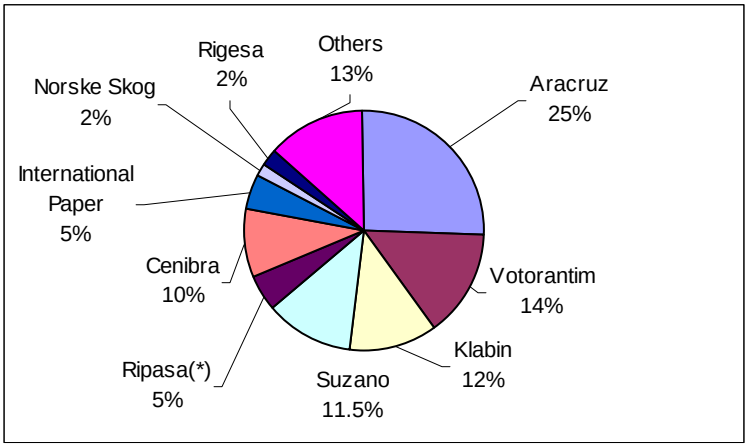
By 2006, FDI represented about 20.7% of the pulp production output (Valor Economico, 2007). Key foreign companies are Cenibra (Japan), International Paper (U.S.), Norske Skog (Denmark), Rigesa (U.S.) and the recently established Veracel, which is a 50-50 joint venture between the Brazilian Aracruz and the Swedish-Finnish Stora-Enso. The main producers, however, are

domestic companies, such as Aracruz, Votarantim and Klabin. Graph 4 presents the share of total output for each of the main companies in the pulp sector in 2004.

FDI in the paper subsector, on the other hand, represented 16% of total output in 2004 (Valor Economico, 2007).

As noted in Graph 6, the Brazilian pulp and paper industry is a highly concentrated sector. Although there are 220 companies producing pulp and paper in the country, only eight companies account for more than 87% of the total output (Valor Economico, 2007). Six out of the eight key companies were vertically integrated (i.e., produced both pulp and paper).

Graph 6: Share of Main Companies in Pulp and Paper, 2004



Source: elaborated from dos Santos Rochas et al 2007

FDI and Environment in Chilean and Brazilian Forestry Sectors

In Chile, FDI in forestry has not had the same economic significance as FDI in other industries, such as mining. Foreign involvement in the sector has, however, permitted investment flows in periods when domestic finance has been scarce (such as the late 1980s), or in which the industry faced specific capital flow constraints (such as the 1990s)[vii].

At first view, the environmental impact of FDI in the forestry sector would not appear to differ from that of domestic investment. Whether foreign or domestic, large investment projects have been the main focus of environmental concerns. In the late 1990s, these were potential foreign investment projects that raised concerns about the sustainability of native forest exploitation (Trillium and Cascada).[viii] In this decade, these have been domestic projects (CELCO-Validivia and CELCO-Itata) that have raised concerns related to industrial pollution.

Domestic and foreign companies are implicated in the same types of environmental problems – especially native forest substitution (as well as the same social issues, such as property rights and the rights of indigenous people). Environmental certification has advanced rapidly, with most large companies, both domestic and foreign, having gained both International Organization for Standardization (ISO) 14001 approval and some kind of sustainable management certification by one of the major forest certification schemes. Several experts interviewed[ix] argue that there is no significant difference between FDI and domestic investment in terms of environmental

management and impact. Authors such as Donoso (1999) explicitly argue that foreign and domestic investment did not differ in exploitation and substitution of native forests.

Today, many domestic as well as foreign companies are certified under ISO 14001. In the area of sustainable forest management, however, foreign companies obtained Forestry Stewardship Council (FSC) certification while domestic companies in Chile concentrated on the national CERTFOR certification. This latter certification is recognized by Programme for the Endorsement of Forest Certification schemes (PEFC), though it is widely viewed as less rigorous than FSC certification[x]. With the buyout of many of the foreign investments, some plantations certified through FSC are now owned by domestic companies.

In Brazil, as the previous section suggests, FDI in the forestry sector has little economic significance compared to domestic investment. In environmental performance, the differences in performance between foreign and domestic companies depend on whether these are located in the tropical wood or pulp-and-paper sectors.

In the tropical wood sector, it seems that today the worst environmental offenders are domestic companies. Foreign companies are less likely to be involved in illegal logging – the key environmental concern in the sector – are more law abiding and are more likely to embrace environmental standards such as ISO 14000 and FSC. Even though there were important worries about negative environmental impacts associated with massive Asian FDI, these never materialized.

In the pulp-and-paper sector, on the other hand, domestic companies tend to perform better than their foreign counterparts in terms of emissions and effluents. Moreover, although today there are no significant differences among FDI and national companies regarding the adoption of environmental management or compliance with the law, it seems that latter lead the introduction of more advanced environmental approaches.

Analysts emphasizing the similarity, in environmental behaviour and impacts, between domestic investment and FDI in the forestry sector have failed to account for some differences, both positive and negative. One difference is in the use of different environmental certification schemes by foreign versus domestic companies [xi]. Another relates to the use of transgenic species. Finally, some differences relate to the lag in domestic companies' introduction of environmental management systems.

Scale Effects

Chile

Most new investment projects in the pulp and paper sector in Chile make use of the latest technologies – including filters, closed loops, evaporation, and recycling[xii] -- thereby reducing emissions or effluents. The environmental impact assessments (EIAs) for investment projects, however, indicate that there will always be emissions, effluents and solid waste and in this sense any new project brings new environmental damage. Given that each investment project is different, producing different products and being located in different geographical settings, a quantitative environmental comparison between domestic and foreign investment is impossible.

One important kind of environmental impact in the forestry sector is deforestation and native forest substitution. In Chile, the role of foreign-owned companies in native forest substitution has never been explicitly treated or isolated from the overall picture of deforestation/substitution.[xiii]

Another issue regarding scale effects is the alternative uses of land. Haltia and Keipi (2000), for example, compare the net environmental benefits from forestry versus cattle farming investment in Chile and Brazil, concluding that forestry investments, especially pine and eucalyptus plantations, involve significantly larger environmental benefits than cattle farming. This suggests that scale effects are not only negative but also positive, especially when compared to other land-use alternatives. The positive effects include prevention of soil erosion and CO2 sequestration. These effects can be strengthened if forest operations are based on plantations, and these do not replace native forest but are planted on land previously destined to agriculture[xiv].

Individual foreign investment projects, implying not only a previously unknown scale for native forest exploitation, but also dealing, in some cases, with forest species that have been little researched, usually fall into the large-scale category, as in the cases of US-based Trillium and Boyse-Cascade. These projects imposed new challenges for environmental enforcement, required new regional policies or land use policies, and involved considerable uncertainties. These are explained in the section of regulatory effects, given that both projects finally abandoned their logging plans.

Enforcement issues continue to be of great concern for large-scale investment projects, now primarily of a domestic nature. In 1996, the Comisión Nacional del Medio Ambiente for Chilean Region X (COREMA) accepted the environmental impact study drafted by Celulosa Arauco y Constitución (CELCO-ARAUCO) and approved construction of a US$1 billion kraftbleached type paper pulp mill on the Rio Cruces near San Jose de la Mariquina and what was to later become the Carlos Anwandter Nature Sanctuary. COREMA's approval was subject to 2 conditions: 1) a company guarantee that hazardous waste would be treated in an environmentally safe way (tertiary treatment) and 2) a company promise to develop a monitoring and follow-up plan for its waste products. Since the mill began full operations in February 2004, however, it has faced repeated complaints from the public concerning noise and odors[xv] It has also been accused of being responsible for water pollution and the loss of black-necked swans and other wildlife in the Nature Sanctuary. Even though after extensive research by the National Commission on Environment it was not possible to establish a cause-effect relationship for the death of the black-necked swans, there have been fines to the operation on the grounds of unauthorized effluents. [xvi]

Brazil

In Brazil, as shown in Table 2, forestry sector output has increased in the last two decades, both in timber and, especially, in pulp and paper. Forestry is an environmentally sensitive sector and, thus, any expansion may increase the pressure on the ecosystems. Although there is no information on what proportion of such expansion is attributable to foreign companies, the former section makes it clear that FDI – either in tropical timber extraction in the North or in the pulp industry in the South – has not been a dominant factor.

Tropical timber extraction in Brazil is associated with deforestation and illegal logging. According to Macqueen et al (2004) about 20% of timber extraction in the Amazon is clearly illegal. The Asian capital inflows of the mid 1990s were linked to illegal extraction of tropical woods (Adario and d'Avila, 1999; Viana, 1998). The fears prevailing in the mid 1990s about the Amazon being invaded by Asian companies with poor environmental practices, however, never

materialized. Most illegal logging involves the small domestic companies that account for the bulk of tropical timber production. Richards *et al*. (2003) argue that foreign-owned companies are less likely to be involved in illegal logging (are more law-abiding) than domestic companies due to fear of eviction,.

While the vast majority of timber companies in the Amazon are small and medium enterprises, foreign-owned companies are usually large. This may exacerbate some of their negative environmental effects (Macqueen *et al*. 2004).

The pulp-and-paper sector is very concentrated, with eight companies accounting for about 87% of domestic pulp production. This means the size of each company's operations tends to be very large. But the largest ones are domestic companies. Although important environmental improvements have been introduced in the sector in recent years, resulting in reduced emissions and effluents per unit of output, there is always some pollution. This means that any increase in production puts additional pressure on the ecosystems.

The key environmental issues in processing operations involve water effluents, airborne emissions, and odors. Dos Santos Rocha, *et al*. (2007) compare the environmental performance of foreign-owned and domestic companies in pulp and paper. They analyse efficiency in water consumption, effluent pollution levels, and emissions of malodorous gases for a set of nine companies, representing 86% of Brazil's total pulp production in 2004. They find that domestic vertically integrated pulp-and-paper companies (i.e., Votorantin, Suzano and Ripasa)[xvii], on average, perform better in terms of emissions and effluent levels than foreign companies. abut tt the level of individual companies, the Danish company Norske Skog shows the best performance for all the analysed indicators[xviii] while the U.S.-based International Paper produces the worst environmental indicators.

Impacts on timber extraction also matter, since the sector uses wood as an input. By 2006 pulp-and-paper companies owned 1.7 million hectares of eucalyptus and radiata-pine plantations (BRACELPA, 2007). The environmental community raised concerns in the past about impacts of the expansion of industrial plantations linked to the pulp-and-paper industry on watersheds and biodiversity (IIED, 1996). Again, however, this is attributable to both domestic and foreign companies that have responded to government incentives policies. On the other hand, there have been important increases in productivity in the wood for pulp (63% for eucalyptus and 58% for pine between 1980 and 2005) (BRACELPA 2007), which means that not all the expansion in pulp production has been accompanied by equivalent growth in the plantations feeding the industry. Moreover, today most companies hold some type of environmental certification for their plantations (see next section).

Technology Effects

Chile

It goes beyond the scope of this paper to establish quantitatively and in detail the differences between foreign and domestic-owned companies in terms of emissions or effluents and the adoption of related technologies. However, a literature review and expert interviews allow us to draw some broad conclusions.

There is no clear difference between foreign and domestic owners in the development of new process and production technologies. New technologies have been developed and introduced by

each of these groups.[xix] A study on the pulp-and-paper industry in Chile suggests that there is no substantial difference between foreign and domestic-owned facilities (Herbert-Copley, 1998, cited in UNCTAD, 1999b). The study shows that the dominance of outside supplier and equipment firms and engineering companies has left limited scope for dramatic differences in mill design. Export market pressure has a common influence on both foreign and domestic-owned firms, which leads to similar types of environmental changes (e.g., decreases in the use of bleaching). The role of lenders has also influenced companies' behavior, since international agencies have tied funding to environmental performance.

FDI has had an impact on the introduction of the Clean Development Mechanism[xx] in the framework of international programs on climate change in the forestry sector in Chile. The two projects first incorporated in the Register of Activities Implemented Jointly (AIJ)[xxi] of the Intergovernmental Panel on Climate Change (IPCC), were presented by Chile/foreign company consortiums.[xxii] Regarding the first forestry related projects implemented under the Kyoto Protocol, however, in 2005, are all Chilean based: three biomass projects, two by Arauco and a third by a small forestry company from Magallanes (Russfin Forestal).

On the other hand, in Chile one fo the most important policy instruments for spurring technological progress in the environmental area are the Clean Production Agreements. Today there are 95 companies (3 cellulose and 92 sawmills) in the forestry sector that have signed clean production agreements with the National Council for Clean Production. There is no difference in the participation rate of foreign owned or domestic companies. .

On the other hand, according to the environmental organization RENACE, Forestal Monte Aguila (owned by Shell) was the first company to use transgenic species on its plantations. (The plantations were later burned and the use of transgenic species discontinued due to FSC-certification and other issues.)

The ISO 14000 standards set target indicators to guarantee the sustainable management of forests and environmental management of production processes. In Chile, more than 1.2 million hectares of forest plantations are currently managed in agreement with this system, this being equivalent to 60% of the country's total plantation acreage (CORMA). Differences between domestic and foreign companies regarding ISO standards are not discernible.

However, there are subtle differences between the use of the international certification FSC and the domestic certification scheme CERTFOR. The initial interest in forest certification has been attributed to guidelines from European parent companies.[xxiii]

There are currently 422 thousand hectares of forests (principally plantations) certified under the Forest Stewardship Council (FSC), representing 15 companies, with another 26 having certification for Chains of Custody.[xxiv]

Since its creation in 2002, the CERTFOR standard has certified a steadily growing area of forests. Today, the system has a certified forest area of nearly 1.6 million hectares, including all plantations owned by large domestic companies. The trend towards certification of chains of custody (CoCs) started in 2004. Numerous companies joined in 2005 as a result of stricter international labelling demands. To date, the system includes fourteen certified CoCs. The main goal of CoCs is to guarantee a connection between the input of certified wood to a process and the products exiting that process. To achieve a chain of custody and to be able to label the final products as certified, each unit responsible for the wood, from the forest up to the minor

distribution channels, must have a CoC certificate that endorses that the wood came from forests handled under recognized criteria of sustainability.[xxv]

Different authors[xxvi] as well as experts[xxvii] interviewed note that both domestic and foreign companies have pursued certification. The first attempts at achieving certification were, in fact, taken by foreign-owned companies. In Chile, the first company ISO 14001 certified was Santa Fé, at that time owned by Shell. Some years later, three foreign-owned operations were among the first certified under FSC.[xxviii] Today, ownership of these operations has passed to domestic hands, making it very difficult to trace differences in certification to differences in preferences between foreign-owned and domestic operations.

Finally, there are very slight differences between domestic and foreign companies with regard to sustainability reporting. The half foreign originated Masisa SA (related to the swiss-based Schmidtheiny Group) has, since 2005, been alone in making sustainability reports registered under the Global Reporting Initiative (GRI). The large domestic companies Arauco and CMPC, however, have, since 2005 and 2006, respectively, also made sustainability reports according to GRI guidelines, but have not registered them officially under the GRI.

Brazil

Technology effects for Brazil, including the embrace of higher environmental standards, the use of environmental technology, and the implementation of environmental management techniques, can be evaluated by looking at the level of environmental certification in the sector.

According to May (2003), the certified forest segment in Brazil began to emerge in the late 1990s in response to consumer concerns, such as the impacts of plantations on watersheds and biodiversity, poor working conditions on plantations, and fears of the export-led deforestation of the Amazon. The certification process linked to the Forest Stewardship Council (FSC) is perceived principally as a reinforcement of existing regulatory requirements, such as observance of environmental and labor law, but also introduces new practices (May 2003).

The pulp-and-paper and industrial charcoal segments were the first to adopt ISO 14000 environmental management and FSC certification. Today all major operations, whether they are foreign- or domestically owned have ISO 14000 and some sort of environmental forest certification (see Table 4). Although no big differences are now apparent between foreign and domestic companies, the latter played a key role in the initial adoption of voluntary environmental standards in the sector. In 1998 the domestic company Klabin became the first enterprise to receive FSC plantation forest certification in Latin America, for its operations in Paraná. At the time, a number of major pulp and paper enterprises in Brazil were seeking certification according to ISO 14000 environmental management norms (May 2003). With the considerably more rigorous FSC certification of Klabin's operation, the rest of the sector was soon incentivised to follow suit

One of the unique factors in Klabin's certification was the extension of its management area to third party suppliers, and its provision for resolution of land tenure disputes. Outsourcing has presented a problem for certified wood-products manufacturers. If a certified company obtains supplies from firms whose forests are not certified or have disputed titles, it is required to split its industrial processing operations to assure the chain of custody of certified products. By extending the certified area to include external suppliers, Klabin guaranteed that its flow of certified raw material would be sufficient to fill orders, and at the same time helped to resolve land-tenure disputes in its surrounding area.

Most certified companies in the pulp and paper sector have FSC certification, which is considered the most stringent standard. The Brazilian company Aracruz, and the foreign Norske and Rigesa companies are certified under the national certification scheme CERFLOR. CERFLOR was promoted by some industry leaders, especially Aracruz, that did not want to comply with the more stringent FSC norms. CERFLOR's standards are similar in name to those established by FSC in Brazil, but are considerably more flexible in regards to observance of international environmental norms, socio-cultural impacts and labour relations with third party suppliers (May 2003).

Table 4: Adoption of environmental standards in the Brazilian pulp-and-paper industry

Name	ISO 14000	FSC	CERFLOR
DOMESTIC			
Aracruz (including Veracel which 50% owned by Stora-Enso)	Yes	No	373, 938 ha
Votorantim	Yes	70,529 ha	No
Klabin	Yes	361,972 ha	No
Suzano Bahia Sul	Yes	243,242 ha	No
Ripasa(*)	Yes	77,066 ha	No
FOREIGN			
Cenibra	Yes	233,779 ha	223,778 ha
International Paper	Yes	Yes	29,941 ha
Norske Skog	Yes	No (not sure whether it has own plantations)	??
Rigesa	Yes	No	35,000 ha

Source: elaborated from dos Santos Rocha et al; http://www.fsc.org.br/; http://www.inmetro.gov.br/qualidade/cerflor.asp

Regarding the introduction of environmental practices and technologies in processing, dos Santos Rocha, *et al*. (2007) find that while all the companies in the pulp-and-paper sector in their sample have at least one plant certified under ISO 14001, more Brazilian-owned plants are certified than foreign-owned plants. Moreover, the authors also argue that while all pulp-and-paper companies have environmental management systems and technologies at the intermediate level (i.e., efforts are made to prevent pollution), Brazilian companies were leading the transition towards a more advanced level.

Forest management certification only covers a small percentage of total tropical-timber extraction in the Amazon region. According to Macqueen, *et al*. (2004), only 20 to 30 operations producing a total of about 500,000 m^3/year, approximately 1,7% of the timber produced in the Amazon, are certified under FSC. However, despite the scant adoption of forest management certification, foreign-owned companies, particularly those of European origin, have embraced environmental technologies to a greater extent than their national counterparts. Authors such as Richards, *et al*. (2003), note that foreign companies in tropical timber in Brazil have greater financial and technical capacities than their Brazilian counterparts. They also note that, among those companies in Amazonas state that have a greater export orientation and are more exposed to foreign ownership, environmental certification is becoming significant for reasons of international market

access. The first company to be certified under the FSC scheme was the Swiss company Mil Madeireira (or Precious Woods Amazon) in 1997.

Table 5:Adoption of environmental certification schemes by foreign companies in tropical timber industry

Company	State	Country of Origin	Certification scheme
Amacol	Para	US	None
Amaplac and WTK Forestal	Amazonas	Malaysia	None
Braspor	Amazonas	Portugal	FSC
Cifec	Amazonas	China	None
Compensa	Amazonas	China	None
Eidai	Amazonas e Pará	Japan	None
Eldorado	Pará	France	FSC
Gethal	Amazonas	Germany	FSC
Janus Brasil	Pará	US	None
Jaya Tiasa Carolina Maginco Selvaplac	Amazonas e Pará	Malaysia	None
Lawton	Pará	US	None
Mil Madereira	Amazonas	Switzerland	FSC
Nordwisk	Pará	Danish	FSC
Robco	PArá	US	None
Terra/Equatorial Resources	Pará	US	None

Source: based on Macqueen 2004; http://www.fsc.org.br/

In Pará state, likewise, foreign companies such as Gethal Amazonas were the first ones to be awarded FSC certification, in the year 2000. However, the Brazilian firm Cikel Brazil Verde also adopted FSC certification early on, in 2001. May (2003) highlights both firms among the first major timber companies in the Brazilian Amazon whose forest management systems were FSC certified. Both companies have also gained chain of custody certification, and are now expanding the management areas under their control to better respond to growing demand for certified wood products.

In all these cases, access to overseas markets (U.S. and EU) represents the main factor behind the decision to certify their forests. Another factor influencing this decision is capital investment. When the U.S. fund manager GMO Renewable Resources purchased Gethal, its buyers insisted that the company first complete FSC certification, perceiving this as a precondition for successful market penetration for its tropical plywood (May 2003).

Domestically owned companies, on the other hand, are mostly small-scale and family-based companies with low levels of technical and managerial capacity and communication skills (Richards, *et al*., 2003). A report commissioned by the government of Brazil in 1996 surveyed 34 logging companies in Paragominas, Pará state, which is dominated by domestic firms. It found that none met the requirements of the International Tropical Timber Organization. The report concluded that the timber industry in Paragominas was purely extractive, with no forest management of any sort.[xxix]

Regulatory Effects

Chile

While a lack of environmental enforcement capacity can result in significant environmental damage from large scale investment projects – both foreign and domestic – these large scale projects can, at the same time, raise awareness of environmental problems and spur pressure for change.

Two above-mentioned large foreign investment projects – Trillium and Boyse Cascade - have spurred debate on the need for refinement of the EIA system, the lack of a clear legislative framework and of enforcement on native forests, a lack of regional planning, and an absence of policy debate around overall sustainable-development objectives.[xxx]

Donoso (1999) regarded the large foreign forest investment project Cascada as an opportunity for native forest management, emphasizing existing problems but pointing out the company's voluntary commitments regarding requirements on their suppliers, as well as materials and training provided to forest owners and workers. Experts such as Armesto (1999) have proposed concrete legal changes in the context of the new foreign investment projects. Armesto proposed a legal requirement to protect one hectare of forest for each three hectares of forest where activities are undertaken. However, since neither of the two large foreign investment projects that induced this policy debate has ultimately materialized, the impact of these proposals is unclear.

Both projects, Trillium and Boyse Cascade, were submitted to the EIA system and were discussed in a public participation process as well as subjected to the technical assessment of the regulatory agencies. Especially due to the high degree of uncertainties regarding the growth rates and other biological data of the species and the ecosystems involved, this process took several years respectively. Finally the precautionary requirements imposed by the regulatory authorities on the projects in order to confront the incertainties, combined with the pressure of environmental groups as well as financial constraints, led the companies to abandon their projects.

No policy or legislative changes have occurred directly related to or immediately after the increased policy debate around the projects, but an indirect effect has certainly existed.

Brazil

The current weak enforcement of legislation in Brazil can imply significant environmental impacts from forest projects – both foreign and domestic. The evidence is mixed regarding FDI in tropical timber. On the one hand, the accusations against Asian companies of illegal timber extraction suggest negative regulatory effects. On the other hand, the early adoption of FSC certification by foreign-owned, mainly European–owned, companies suggests positive regulatory effects, as the FSC process is principally a reinforcement of existing regulatory requirements. May (2003) suggests the adoption of certification by these companies could also having positive effects on companies oriented to the domestic market.

More widely, Richards, *et al*. (2003), find that foreign-owned companies in Amazonas state are generally more law-abiding than domestic companies due to fear of eviction.[xxxi] They find a much higher level of private-sector corruption in the Pará sawmilling industry, which is dominated by relatively small-scale and family-based domestic companies. These companies face an oligopsony of timber traders who retain most of the rent. Such conditions tend to make domestic companies more rent-seeking (and likely to try to cut compliance costs) in their behavior than foreign companies.

Table 5: Summary of Scale, Technology and Regulatory Effects of FDI in Forestry Sector: Chile and Brazil:

Scale, Technology and Regulatory Effects	Chile	Brazil
Scale Effects	- Native forest substitution: No studies isolating foreign owned companies, but overall no significant impact over the last two decades - Deforestation: no clear evidence, requires further research to analyze smaller scale foreign operations - Alternative land uses: potentially positive effects for plantations versus agriculture in prevention of soil erosion and capturing of CO2. - For large scale projects (both foreign and domestic), enforcement and environmental compliance issues exist (see also regulatory effects)	**Tropical Timber:** -Ecosystem stress: in overall, FDI has a lower participation than domestic companies but the intensity in the use per unit likely to be higher due to the larger size of operations - FDI less likely to involve illegal logging **Pulp & Paper**: - In average, FDI has a smaller size of operations than domestic companies - In average, domestic companies perform better in terms of their emission and effluent levels - Both FDI and domestic companies supply from plantations
Technology Effects	Overall: Foreign companies slightly more connected to latest technological development, this report proves this for several soft technologies - Environmental certification: Today no discernable differences between domestic and foreign companies. First steps towards implementing certification often initiated by foreign owned companies. - Development of new technologies: No distinction between foreign and domestic owners. - Clean Development Mechanism: foreign company that was the first to incorporate a project in the Register of AIJ of the IPC. - Sustainability reporting: slight differences discerned between domestic and foreign companies.	**Tropical Timber:** - Environmental certification: FDI was first awarded FSC certificates and is more likely to embrace better environmental technologies **Pulp & Paper**: - Environmental certification: although today no perceived differences among FDI and domestic companies, the latter were the first in introducing FSC certificate - Environmental management: domestic companies leading transition towards more advanced environmental approaches
Regulatory Effects	- FDI in forestry has had no apparent effects on environmental policy, or regional planning. - However, large scale FDI projects have stirred environmental policy and regulatory debate	**Tropical Timber:** - FDI more likely to be law abiding - FDI greater exposure to sensitive markets led to introduction of new legislation and greater law enforcement by the government **Pulp & Paper** - Both FDI and domestic companies are law abiding and in some cases FDI ahead of legislation

Source: Authors´ elaboration.

Moreover, in the case of the Asian companies, the rather larger size of the foreign-owned operations, their poor past environmental records, and their greater exposure to international scrutiny have helped to raise awareness of environmentally damaging practices and spurred pressure for change. Illegal logging activities by Asian companies attracted the attention of legislators. The Chamber of Representatives analysed the situation and possible courses of action, approving several legal responses including[xxxii]:

- The 1998 Environmental Crimes Law increasing the power of environmental protection agencies like the Brazilian Environmental Institute (IBAMA);
- Stricter regulatory enforcement and higher penalties reducing the level of illegal logging;
- Returning considerable private forest to the state;
- Adopting better enforcement techniques (e.g. Matto Grosso state using remote sensing and GIS technology in environmental enforcement)
- The federal initiative to introduce long-term National Forest logging concessions (FLONAs)

For the pulp-and-paper sector, the available evidence does not indicate a negative regulatory effect. The research of dos Santos Rochas, *et al*. (2007), suggests that although foreign companies do not perform better than national ones, they do not use Brazil as a "pollution haven." These researchers observe that the two foreign companies operating in Sao Paulo, at least, had a level of environmental performance higher than that required by the Brazilian law.

Policy recommendations

Since the late 1990s, there has been an intense debate about the effects of natural-resource FDI on the environment. FDI supporters argue that foreign companies tend to introduce better environmental technologies and environmental management practices than domestic companies, while those skeptical about FDI suggest that the former have more rent-seeking goals and therefore they are not interested in controlling the environmental impacts of their activities. However, as the above analysis suggests, neither of these views is completely true for FDI in the forestry sector in Latin America.

Given the mingling between domestic and foreign ownership in the forestry sector, it is a challenge to identify and draw clear lines between domestic and foreign operations. Moreover, compared to domestic companies, foreign-owned companies in the forestry sector account for a small proportion of national forestry production. However, there are some subtle differences worth mentioning:

Regarding scale effects, although the increasing scale puts greater pressure on natural resources, the domestic companies in Chile and Brazil are those that account, by far, for most national production. Moreover, at the level of the scale of individual operations, there is no evidence that foreign investment is always of larger scale, or especially related to products with severe environmental impacts. Indeed, with the exception of FDI in timber extraction in the Amazonas region of Brazil, where foreign operations tend to be larger than their domestic counterparts, the largest companies operating in the pulp-and-paper sector in Brazil are domestic. Moreover, in terms of pollution per unit of output, although a foreign-owned company boasts the best performance, on average the domestic companies perform better in terms of both emission and

effluent levels. In Chile, the two largest native-forest operations proposed in the last decade involved foreign companies, but they did not come to fruition due to environmental requirements by the government and environmental pressures by NGOs.

Regarding technology effects, the use of environmental technologies and management seems very similar for foreign and domestic companies in both countries. However, there are differences in the two countries in terms of the type of investors that initially pushed for the introduction of better environmental practices.

In Brazil, it seems that FDI – especially of European origin – played a big role in pushing the introduction of certified environmental management in the tropical timber sector. In the pulp-and-paper sector, however, a Brazilian company played the key role in the initial adoption of voluntary environmental standards. In Chile, the first steps towards implementing internationally based certification were taken by foreign-owned companies. Domestic companies prefer the domestic certification scheme CERTFOR.

The results of this analysis suggest, as some previous studies have,[xxxiii] that foreign companies are more heavily focused on international requirements and on reputation. If elevated international requirements were not matched by local pressure, however, foreign companies might put their environmental reputations ahead of real environmental commitments ("green washing"). The early interest of foreign companies in international certification schemes should be emphasized, as well as the success of domestic certification schemes in both Chile and Brazil, the CERTFOR and the CERTFLOR, respectively with regard to the elevated percentage of certified plantations in the total of plantations.

Sustainability reporting seems to follow a similar pattern, with foreign companies, especially European companies, enjoying a slight headstart over the domestic companies.

On regulatory effects, the existence or lack of an environmental regulatory framework is important in several ways: to attracting foreign investment, to closing the gap between foreign and domestic companies in environmental management, and finally to preventing environmental damage. In general, there is no evidence linking FDI in the forestry sector with negative regulatory impacts. In Brazil, foreign companies in tropical timber extraction tend to be more law-abiding than domestic companies and, where foreign companies have been targeted by NGOs due to bad practices, this has induced tougher environmental laws and enforcement, not to a drop in regulation. In the pulp-and-paper sector, domestic and foreign companies are generally law-abiding and foreign companies do not use the country as a "pollution haven." In Chile, large foreign investment projects have spurred discussion on the necessity of a native forest law, even as existing regulation proved effective in confronting the environmental risks imposed by the large investment projects.

However, the research also suggests that it is too simplistic to make a distinction only on the basis of the domestic or foreign ownership of the companies. There are other factors for policy makers to consider in attempting to maximize the positive contributions of companies operating in the forestry sector and minimize the negative ones. Robust environmental laws and enforcement are the most important factors affecting companies' environmental performance. The existence of economically oriented policy incentives, such as the DFL 701 in the case of Chile is affecting the environmental impact of both domestic and foreign companies alike. Global insertion and exposure to international markets also seem more important than country of ownership. Other factors influencing the environmental results of companies in the forestry sector include: the

environmental policies of headquarters, parent companies or key shareholders; reputation; pressure from environmental groups; the costs of environmental management systems and technologies; access to credit; value chain governance; and land ownership concentration.

Companies that orientate their production to environmentally sensitive markets (e.g., the EU and U.S.) tend to introduce better environmental practices and technologies, providing proof of their environmental credentials through recognized certification schemes.

Among the foreign companies in the sector, there are differences in environmental performance depending on country of origin (e.g., whether the FDI comes from OECD or non-OECD countries). Indeed, whereas European and North American investors tend to be at the forefront of environmental management, Asian companies show significantly less interest in the environment.

All this suggests several points for policy intervention for those governents aiming to increase the contribution of investment, whether foreign or domestic, in the forestry sector. The most important include:

- The need for *ex-ante* environmental assessments of economically oriented forestry policies
- The need for robust environmental regulation and adequate resources for their enforcement
- The need for government policies facilitating private companies' adoption of better environmental practices and technologies, including by establishing national environmental standards; improving access to credit especially for smallest companies and providing environmental training.
- The need for awareness-raising, on environmental issues in general and environmental certification in particular, to increase public pressure for better environmental practices and enforcement
    - More domestic attention to environmental certification programs is necessary in both countries, especially given the increased share of domestically sold products in Chile for example. The result of this would be two-fold: on the one hand increased public recognition of that certification would exert more pressure on the non-certified companies to initiate certification, and more pressure on the certified companies to maintain themselves in the system. On the other hand with more NGOs, the general public and the media knowledgeable of certification, monitoring of forestry activities in general would increase.
    - Further research on the current perception of the certification schemes by clients and consumers would be necessary in this case
- The need for better practice on information disclosure and handling:
    - On the part of the public sector, greater availability of statistics on FDI by sector and company
    - On the part of private or public institutions, continuous updates of statistics on certification and sustainability reports

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[i] For a more detailed description of this framework and the analytical aspects see for example UNEP (1999), or OECD (1995)

[ii] This section concentrates on FDI in the Brazilian forestry sector in tropical timber and the pulp and paper industries.

[iii] In the mid nineties, the share of timber from native forest used as a component of the forest industry peaked at nearly 5%, diminishing its share to close to 2% since the late nineties.

[iv] These advantages are the availability of land apt for forestation and the ecological characteristics which allow planted species to grow much more rapidly than has been registered in traditional timber-producing countries of the northern hemisphere

These advantages are the availability of land apt for forestation and the ecological characteristics which allow planted species to grow much more rapidly than has been registered in traditional timber-producing countries of the northern hemisphere.

[v] Current estimates show that nearly two million hectares of barren land, owned by around 100.000 property owners, could qualify for benefits under this law.

[vi] See for example Richards et al 2003

[vii] Aldo Cerda, Fundación Chile and María Teresa Arana, CORMA.

[viii] Both projects have gone through several years of environmental impact assessment and court suits on environmental grounds. Trillium was initially approved in 1998 and Forestal Cascada in 1999. However, Forestal Cascada withdrew its investment in 2001, and Trillium withdrew in the late 1990s, both having been severely environmentally conditioned by the authorities. The project Trillium involved a total amount of investment of US$ 250 million and consisted of the exploitation of 75.000 ha of lenga forests, one of the native forests in the south of Chile. Environmental groups argued that the project area was a very isolated and sparsely populated region, making enforcement an enormously difficult task. The project Cascada involved a total amount of investment of US$ 180 million and consisted in an industrial complex for the production of strand boards and chips, as well as a port for the shipment of the products. Production was estimated at 925.000 cubic meters of wood annually. The reaction of environmentalists referred, basically, to the magnitude of the operations, their effect on the native forest, and the lack of policies and enforcement capacity related to management plans of the native forest. For both of these initiatives, especially Trillium, the challenges for environmental regulation went far beyond existing Chilean environmental legislation.

[ix] Eladio Susaeta, INECON, Fernando Raga, CORMA, Maria Teresa Arana, CORMA, personal communications.

[x] CertforChile was constituted as a legal independent corporation, to manage the forest certification standards in Chile. Its founding associates include Fundación Chile, CIPMA, the Chilean Wood Corporation CORMA, the Department of Agriculture, CONAMA, and the Association of Registered Professional Foresters. According to CERTFOR`s website, the objective of Certfor is to develop an internationally recognized National Forest Management Certification Standard for radiata pine and eucalyptus plantations, natural forests of Lenga and second-growth forest.

[xi] Whereas ISO 14.001 is a certification related basically to environmental management in industry, the Forest Stewardship Council and CERTFOR are certification schemes referring to the sustainability of forest management.

[xii] See EIA studies for the different forestry projects - www.conama.cl/seia

[xiii] For references on substitution see for example Dourojeanni (2000), or Borregaard and Bradley (1999)

[xiv] INFOR (2005a) reports that nearly 85% of the total land substituted for plantations between 1962 and 1990, was either agricultural lands, brush lands, or cut forests.

[xv] See for example Radio Cooperativa, 21st of december 2004: “Pulp Plant of Celulosa Arauco was fined with US$70.000,- for bad odours”

[xvi] See for example Resolución Exenta 182, Comisión Regional de Medio Ambiente,, Región de Los Lagos

[xvii] The Brazilian Aracruz in the largest pulp producer but is not vertically integrated.

[xviii] However, the authors argue it is difficult to compare its performance as the company is the only one producing newsprint paper.

[xix] In the case of domestic investment Forestal Arauco developed a new chlorine-free bleaching process. In the case of foreign investment Shell, when owning Santa Fé, embarked on the introduction of Totally Chlorine Free (TFC) production, a line of production that has later been discarded by almost all producers.

[xx] The Clean Development Mechanism is a system for financing emissions-reducing or emissions-avoiding projects in developing nations as defined by the Kyoto Protocol. This international agreement, which builds on the United Nations Framework Convention on Climate Change, sets legally binding targets and timetables for cutting the greenhouse-gas emissions of industrialized countries.

[xxi] In order to build experience and "learn by doing", the first United Nations Conference of the Parties in 1995, launched a pilot phase of activities implemented jointly (AIJ) under which projects could be implemented that reduce emissions of greenhouse gases or enhance their removals through sinks. AIJ were undertaken on a voluntary basis and were to bring about climate change mitigation benefits that would not otherwise occur.

[xxii] The first register is from June 2000, a forest preservation initiative, the Río Cóndor Carbon Sequestration Project, is reducing carbon emissions from a 272,880 hectare forest management project in Tierra del Fuego, Chile. The land is owned and managed by Forestal Savia Ltda., a Chilean company. CFix, L.L.C., a Washington State Limited Liability Company, is managing the carbon offset opportunity in partnership with Fundación Chile, a Chilean non-profit organization focused on technology transfer, new business development and sustainable development in Chile. The second register is an afforestation project from June 2001, the SIF Carbon Sequestration Project which seeks to bring about the afforestation and sustainable management of approximately 7000 hectares in regions VII and VIII of Chile. The Project consortium includes the Sociedad Inversora Forestal, a private chilean company, Cfix LLC, a Washington State based Liability Company, two Chilean forestry companies (Forestal Mininco and Forestal Millalemu), the later associated with Terranova, and a Netherlands based certification company.

[xxiii] This situation was confirmed in personal communication with Fernando Raga, Environmental Manager in the Chilean Forestry Association, CORMA.

[xxiv] For lists with the companies and operations that have been certified see www.icefi.cl

[xxv] For lists with the companies and operations that have been certified see www.certfor.cl

[xxvi] see for example Dubois et al (1995)

[xxvii] Aldo Cerda, Fundación Chile, María Teresa Arana, CORMA, María Inés Miranda, CERTFORCHILE, and Hernán Verschure, CODEFF.

[xxviii] Forestal Monte Aguila, at that time owned by Shell, Millalemu (at that time owned by the Swiss Schmidheiny Group), and Forestal Los Lagos, at that time owned by the Swiss based mining complex Xstrata.

[xxix] Quoted in Johnson Annic 1996 'Asian logers latest threat to Brasil rainforest' World Wide Fund for Nature, September

[xxx] See for example Ambiente & Desarrollo, Vol.XII, No.4, 1996 or Vol.XV, No.3, 1999

[xxxi] Richards M, Palmer C, Frickmann Young C and Obidzinski K, 2003 'Higher international standards or rent-seeking race to the bottom? The impacts of forest product trade liberalisation on forest governance' A Background paper for the Global Project: Impact Assessment of Forest Products Trade in Promotion of Sustainable Forest Management GCP/INT/775/JPN, Food and Agriculture Organization (FAO) of the United Nations

[xxxii] From Richards et al 2003

[xxxiii] Borregaard, N. y Annie Dufey (2001). «Environmental effects of foreign investment versus domestic investment in the mining sector in Latin-America**".** World Resources Institute and CIPMA.