

# **THE ECONOMIC AND SOCIAL CONTEXT OF MONOCULTURE TREE PLANTATIONS IN CHILE**

## **The case of the Commune of Lumaco, Araucania region**

*August 2005*

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## INTRODUCTION

The present research work describes and illustrates the development and impact of monoculture tree plantations through the situation presently faced by the commune of Lumaco in the ninth region of Chile. By means of testimonials, documents and figures, the present report sets out the problems faced by that commune of 11,405 inhabitants, where monoculture tree plantations have expanded violently, imposed by a forestry development model instituted during the military dictatorship and still currently in force.

The work describes the impacts and reproduction mechanisms of this model on the present development of the commune and the effects it has caused on the population's living conditions.

The approach used has been to look at the global economic model and at local living conditions. Local conditions are the ultimate concern of the study which seeks to disseminate and discuss the development of the monoculture tree plantation model as an economic activity prioritized and sustained by State policies with social and environmental costs that are invisible to the majority of the population.

### *General methodological background*

The study has been implemented from a complementary methodological perspective that has enabled us to contextualize the research procedure and validate the research approach with a social meaning.

The team has considered the possibility of complementing qualitative and quantitative background data, accepting that the figures or indicators are built on the basis of qualitative experience and images, generally made "invisible" by such figures. We assumed that the description of the situation of the commune of Lumaco required a non-conventional research approach making it possible to discuss and project inquiries from critical assumptions regarding the responsibility of plantation activities in the generation of the difficult living conditions affecting the population and their imposition as the sole valid alternative for the development of this commune.

The methodological approach implemented is based on the conviction that indicators such as poverty and employment require a reading that gathers the experience of the human communities living in such a situation. In this respect we consider that, although the indicators are a reference regarding the situation, they are insufficient on their own to fully understand it.

On a technical level, the present research has implemented interactive strategies such as semi-structured interviews in addition to the development of discussion groups. Strategies of a cartographic nature have also been incorporated, including the creation and analytical reading of maps, seeking to illustrate the expressions of contrast undergone by the commune of Lumaco.

### *Actors taking part in the research*

Concern over the economic, environmental and social situation of Lumaco is neither sporadic nor circumstantial but rather a concern spread over time, which has resulted in various papers describing and denouncing the situation. Latin American Observatory for Environmental Conflicts

(Observatorio Latinoamericano de Conflictos Ambientales – OLCA) has maintained links that have contributed in this respect generating in 1998, together with the Mapucho Ñankuchew Association, the first multidisciplinary study regarding the impact of monoculture tree plantations on the area. The aim of this study was to describe from a historical, anthropological and legal perspective the way in which the plantations model alters local life systems, deteriorating their material conditions and disintegrating their ecological and cultural imagery. Throughout the territorial conflicts in the Ninth Region, OLCA has maintained a working and supportive link with the Mapuche organizations, to get to know, discuss and understand their political and environmental dimension. The present paper is a further expression of this relationship and of the commitment the researchers and organizations involved maintain with environmental justice.

In order to prepare this paper, we established links with the Municipality of Lumaco, presently headed by Mayor Manuel Painiqueo Tragnolao. After presenting the objectives and discussing them, the Municipality contributed to the research work, enabling it to contain the greatest amount of official information possible, in order to describe the economic and social situation of the commune. It has been possible to gather descriptive information on the commune and its inhabitants from the various Municipal departments. In this way the Municipality of Lumaco has confirmed the relevance and importance of this type of work, highlighting the situation of the communities and enabling information to be generated for the design of strategies for municipal work.

Equally, through the contracting companies, we have obtained the technical point of view of forestry professionals and technicians working in the commune. Their version has enabled us to get to know the rationale behind the companies linked to plantation establishment and the relationship they establish with the communities through hiring of workers and the implementation of specific forestry tasks.

## I. LUMACO: LUMA WATER<sup>1</sup>

### *Geographical, political-administrative and political-cultural background*

The long Chilean territory, located between 17° and 56° latitude south, is divided politically and administratively into thirteen Regions. The capital of the country, centre of State power, is located in the Metropolitan Region (lying between the Fifth and Sixth Regions, in the centre of the territory), more specifically in the City of Santiago (IGM, 1986). Located at approximately 700 km to the south of the capital is the Ninth Region, known as La Araucania, which corresponds to the last autonomous Mapuche territory<sup>2</sup> and presently concentrates the largest number of rural Mapuche inhabitants in the country (MIDEPLAN, CASEN surveys 1996 and 2000; INE, Population Census 2002).

La Araucania (State of Chile) is administratively divided into 31 communes, one of them corresponding to the commune of Lumaco. Geographically it is located in the north-eastern quarter of the Region, approximately at 38° latitude south, at 120 km to the northeast of the regional capital, Temuco.

From the standpoint of the old, pre-Reducción Mapuche territory and of the present Mapuche territorial identities claimed in this region (Council of all the Lands, 1997; Nancuchew Association, 2005<sup>3</sup>), Lumaco corresponds to the political centre of the *Mapuche-Nalche* territory<sup>4</sup>.

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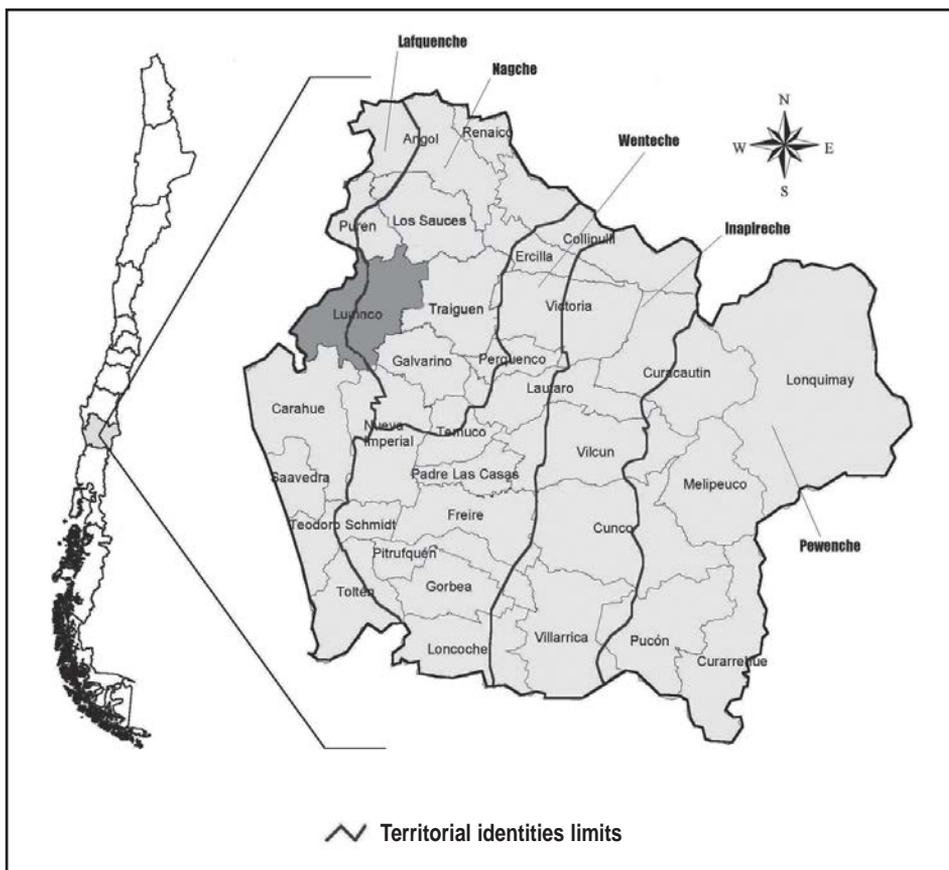
<sup>1</sup> Luma: From the Araucanian language: a Chilean tree of the myrtaceae family that grows up to 20 metres tall. Its wood is hard, heavy and resistant

<sup>2</sup> The *Mapuche* correspond to the originating people that until well into the nineteenth century inhabited and dominated a great part of the central south of the territories today comprising Chile and Argentina. In the Argentine territory they were fought against and overthrown in military extermination campaigns, while in Chile the military political strategy of the *Reducción* (Indian villages created by the Spanish missionaries during the colonization) was used, confining them to small strips of land assigned through *Títulos de Merced* (Grace and Favour Land Deeds). In this way it may be considered that in Chile the Mapuche conserved their political and territorial autonomy until 1881, when they were overthrown by the Chilean army (see chapter II).

<sup>3</sup> Interview with leaders.

<sup>4</sup> Also called **nagche** and **nag-che** depending on the phonetic alphabet used. In Spanish they have been called “**abajinos**” or “**gente del llano**” (people from the plains) on the basis of the translation from **mapudungun** (Mapuche language) into Spanish, where: **nal** (or *nag*), is low or plain; **che**, people or person (in its most simple form).

**FIGURE 1.** Plan locating the Lumaco Commune in Chile and the Araucania Region, including Mapuche territorial identities<sup>5</sup>



### *Soil-climatic and bio-ecological characteristics*

Set in the coastal Cordillera and its slopes towards the central valley, the commune has climatic characteristics corresponding to a marine Mediterranean climate, with annual rainfall close on 1000 mm and other agro-climatic characteristics shown in table 1.1.

<sup>5</sup> Mapuche territorial identities refer to differentiated identities which are related to cultural characteristics, political associations prior to the *reducciones* and the bio-ecological characteristics of the territories they occupy. In this way, the Mapuche living near the coast identify themselves as Lefquenche, those from the Cordillera as Pewenche, etc.

**TABLE 1.1** Agro-climatic indicators for Lumaco

<b>Agro-climatic parameter</b>	<b>Value</b>
Sum of base 5°C temperatures	3280.3
Number of days with an average temperature above 5°C	365
Hours of cold. Sum of no. of hours below 7°C	1281.5
Days free from frost (Days, P occurrence < 0.3). Period in which absolute min T is below 2°C	150 (Nov.-Feb.)
Average maximum temperature warmest month (°C)	27.5
Absolute minimum mean temperature coldest month (°C)	2.4
Rainfall and evaporation (mm) dry months (Nov. -March)	205.9 - 784
Rainfall and evaporation (mm) humid months (April-Sept.)	849 - 236

*Source:* Rouanet et al. 1988.

Lumaco soils are derived from ancient volcanic ash, defined as clayish red (*Ultisols*) which generally contain low organic matter (5-8%). A high proportion of clay in their profile (40-50%) and high pH in the acid range (4.5-6.0) are characteristic. Given the characteristics of Ultisols, these are relatively sensitive to degradation phenomena such as compaction, acidification or erosion. The risk of this latter process is even greater considering that a large part of the commune land has a rolling to uneven topography. Worked for over 100 years in an inappropriate way (see chapter II), over 80 per cent of the soils of the commune show severe to serious erosion levels.

Despite the fact that the commune has very much diminished areas of native forest (14,982 hectares representing 13.4 % of the area), with a disturbing state of conservation and much fragmentation, the Lumaco forest belongs to one of the last and largest Rainforests of the Cold Temperate Region of the planet. Among the unique characteristics of these forests are their great diversity of strata and biological types of plants. Thus, in the Southern Chilean temperate rainforest we may find 443 species of vascular plants, with 160 woody species (44 species of trees corresponding to 32 genus and 32 families) and 283 herbaceous species (Arroyo *et al*, 1997). Likewise, lichens of great importance in nutrient cycling are especially abundant and notorious, making these forests one of the main centres of lichen biodiversity in the world (Galloway, 1997). Furthermore, the birds (over 60 species) are another important element of biodiversity. The presence of some 38 species of mammals is also to be noted (Murúa, 1997).

From the standpoint of human food resources, in spite of the fact that fewer edible plant species are to be found than in tropical forests, there are many plants that can be used for food (fruit, stalks, tubers, fleshy roots and seeds), and a considerable number and quantity of mushrooms (among other types of species) (Schmit, 1997; Aldunate & Villagrán, 1991). Another

characteristic of Southern Chilean temperate forests is their high degree of plant endemism. The associated birdlife, on which many plant species depend for reproduction, shows similar levels of endemism and is comparable to the situation found in the oceanic islands (Rozzi, etc. al, 1997).

These characteristics were present before the destruction of the forest generated by the policies of the *Reducción* against the Mapuche population and the occupation of these areas by settlers who reduced the native forest to open up large stretches for crops, mainly wheat (see chapter II).

### *Social and demographic background*

A population of 12,792 inhabitants (2002 population census) lives in the 111,500 ha area of the commune, with a population density of 11.47 inhabitants per square kilometre. Fifty-four per cent of the population are men and 46 per cent women, with a rural population concentrating 68 per cent of the commune's population.

**TABLE 1.2** Urban-rural distribution of the population of the Commune of Lumaco.  
1970-2002 Censuses

<b>Year</b>	<b>Urban population</b>	<b>Rural population</b>	<b>Total population</b>
1970	2,563	13,624	16,184
2002	4,094	8,698	12,792
Variation (2002-1970)	1,531 (60%)	-4,926 (-36%)	-3,392 (-20%)

*Source:* INE 1970, 2002.

Table 1.2 shows how over a period of thirty years the commune's population has considerably dropped due a strong reduction in the rural population. This, added to the fact that over the same period the national population has grown by 64.5 %, reflects the existence of on-going migratory processes. In a commune with high poverty rates, such as the case of Lumaco, these processes are generally linked to the search for better living and working conditions in other rural villages or urban centres. Likewise, these migratory processes may indicate emerging effects of the commune's productive and economic transformation (expansion of tree plantations).

Cabieres (1985) provides information regarding this hypothesis, as on studying the patterns observed in the Bio-Bio region, he noted that forestry activities are inclined to reorganize rural spaces, clearing those where tree plantations are concentrated and congregating the population in rural villages and excluded urban towns that become the key points for forestry traffic to obtain labour for forestry contractors.

According to the 2000 CASEN<sup>6</sup> survey, poverty rates are high in Lumaco. Thus, 60 per cent of its population live under the poverty line and 33 per cent of these are in extreme poverty. Associated to these rates we find the following social indicators of relevance: illiteracy: 23.7%; school drop-out rate: 26.3%; infant mortality rate: 17.05%. Added to the fact that all these indicators show significantly higher values than the national average, we find that, according to UNDP (2000), the Human Development Index in the Lumaco Commune is 31.9%, considered to be very low<sup>7</sup>, placing Lumaco as one of the worst rated communes in Chile under this indicator.

The migration of Lumaco's rural population and the above-mentioned socioeconomic indicators taken from official statistics, are a first warning sign in the light of the so-called benefits of the vigorous monoculture tree plantation model (that promises production, work and wealth), 30 years after the initiation of the massive development of plantations.

### *Present land use and ownership and productive economic systems*

#### *Present land distribution*

The commune is administratively divided into 10 districts, with a greater concentration of population towards the north and north-east of the commune, where the districts of Capitán Pastene (2,609 inhabitants), Lumaco (2,212 inhabitants), Pichi Pellahuen (1,632 inhabitants) and Chanco (1,410 inhabitants) are. There is also the locality of Pichi Pellahuen, situated at 34 kilometres to the south of Lumaco, which is identified as a small town<sup>8</sup>.

The main urban zones in this commune are towns still showing signs of colonization and reflecting the polarization of its inhabitants' social and economic situation. Lumaco is the political and administrative centre but it is Capitán Pastene, the local symbol of colonization, that is home to the main landowners and administrators of the commune's relevant economic activities.

Evidence of the serious problems regarding inequality in land tenure is shown in table 1.3 with 50% of the properties - where over 80% of the rural population lives - occupying approximately 10% of the communal surface area, while 10% of the larger properties represent 55% of the communal area.

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<sup>6</sup> National Socio-Economic Characterization Survey (CASEN), applied by the Ministry of Planning of the Chilean Government (MIDEPLAN).

<sup>7</sup> According to the "Human Development in the Communes of Chile" report, Lumaco is among the communes of the 9<sup>th</sup> Region with a *very low* HDI, level of 31.9% comprising 20.3 in education, 29.6% in health and 38.3 % in income.

<sup>8</sup> This data on the population corresponds to the 1992 census.

**TABLE 1.3** Size of properties in the Lumaco commune and representation in function of communal surface area

Size of the property (ha)	Number of properties	% of properties	% of communal surface area
0-10	647	29.58	4.4
10-20	434	19.82	5.9
20-50	559	25.54	15.1
50-100	329	15.02	19.9
100 and more	220	10.04	54.7
<b>TOTAL</b>	<b>2,189</b>	<b>100</b>	<b>100</b>

Inequality among the areas occupied by the various types of properties is even greater if the quality of these lands is also taken into consideration. Thus for example, in table 1.4 we can see how over 85% of these properties are located on soils (classes VI and VII) that are barely suitable for agriculture and ecologically very fragile.

**TABLE 1.4** Surface area and percentage of small properties by soil class. Lumaco Commune

SOIL USE CLASS	CHARACTERISTICS OF SOIL CLASS <sup>9</sup>	% of small properties (0-20 ha)
I	Arable. May be cultivated without risk using common systems. Slopes under 5%, over 1.2 m depth with good drainage and regularly well supplied with nutrient elements. Droughts not exceeding one month and long frost-free period.	0
II	Arable. May be cultivated under simple methods of protection. Moderate limitations on use and moderate risk of damage.	0
III	Arable. Moderately good soils. May be used with adequate and regular rotation. Require intensive management treatment due to severe restrictions and risks	7.25

<sup>9</sup> Taken from: **Peralta, M., 1976.** *Uso, clasificación y conservación de suelos*. SAG, Centro de Divulgación Técnica. Santiago, Chile, 340 pages.

IV	Arable. Soils only good for occasional crops under careful management	7.32
V	Non-arable. Flat land, too humid, stony or rocky to be cultivated.	0.18
VI	Non-arable. Slopes exceeding 15%, high risk of erosion, climatic limitations, scant depth, etc.	17.59
VII	Non-arable. Very steep slopes, thin and dry, excessively eroded. Require very careful management.	67.46
VIII	Lands having no productive value. Only suitable for wild-life, recreation, water “production”.	0.17
Total ha		<b>100.0</b>

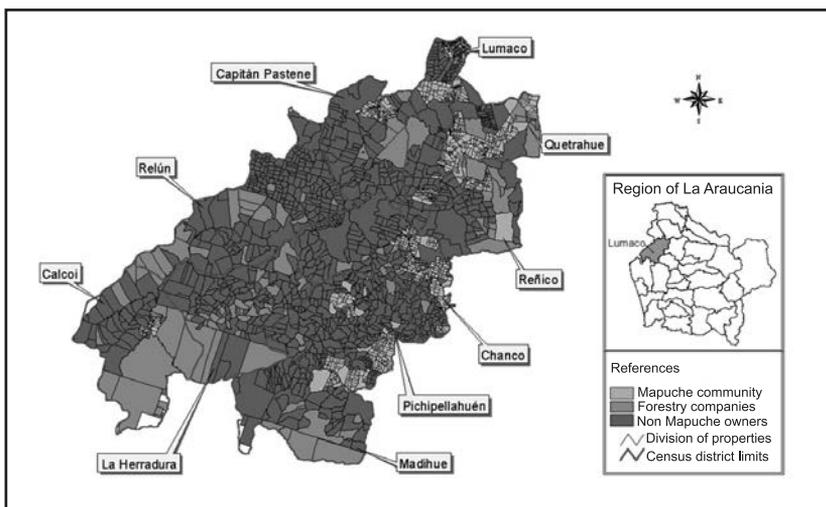
This data is relevant to understand the design and rationale of public policies pointing out that the lands in this commune, due to their scant suitability for agriculture and their ecological fragility, are rated as suitable for forestry, providing an opportunity to promote monoculture tree plantations as the only feasible activity to combat and curb erosion. However, this ignores the existence of alternative forms and techniques of agricultural production that are appropriate under these conditions, nor the development of alternative lines of production to industrialized tree plantations, such as some species of fruit (cherries, blueberries, olives), among other alternatives<sup>10</sup>.

There is also evidence of land-loss and usurpation processes. The fact that over 70 per cent of the population of the commune are Mapuche, but that Mapuche communities only occupy 15 per cent of its 111,900 hectares of surface area should also be noted (Figure 1.2).

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<sup>10</sup> This situation was observed during meetings with Mapuche leaders and community members and also among non-Mapuche peasants. They pointed out that they had insistently asked State organizations related with rural extension and development (CONAF, INDAP) for help with other production alternatives such as fruit-growing or the cultivation of native double purpose species (Chilean hazelnuts).

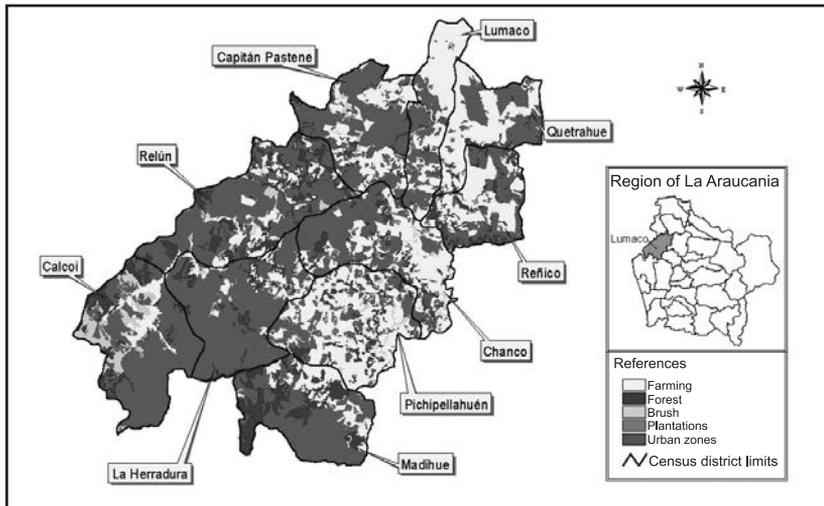
**FIGURE 1.2** Type of rural landowner in the Commune of Lumaco



### *Land Use*

As will be seen from figure 1.3 and table 1.5, the main forms of communal land use correspond to tree plantations, followed by agriculture and stock-raising and (degraded and fragmented) native forests. Table 1.5 also shows how the areas of monoculture tree plantations have increased, displacing farming systems and native forests.

**FIGURE 1.3** Land use in the commune of Lumaco, year 2003



Source: Prepared on the basis of the Regional GIS for La Araucanía.

**TABLE 1.5** Land use in the commune of Lumaco (%) and its variation between 1988 and 2003

Year	Farming	Native Forest	Plantations	Urban Zones
1988	60	16,5	14	0,2
1996	35,0	14,1	46,4	0,2
2003	30,9	13,4	52,5	0,2
% of variation regarding the total communal area (2003-1988)	- 29,1	- 3.1	38,5	0

Source: prepared on the basis of CONAF-CONAMA 1997-2003.

These figures correspond to the official land registry on plantations. On the basis of the situation observed by people and direct contacts of municipal officials with officers of the main forestry companies (particularly Forestal Mininco), there is a perception in the Commune that the expansion of plantations is even greater than that officially recognized. This is highly probably as the figures submitted are based on Landsat images, where it is very hard to differentiate soils used for agriculture and stock-raising from soils with plantations under 4 years old.

### ***Main communal economic and productive systems***

On the basis of the above information, field work developed in the commune and prior studies (Salamé, 1995), it is possible to identify three main types of economic and productive (rural) systems in Lumaco.

On the one hand we find monoculture tree plantation systems with production objectives, actions, structure and rational following the industry's patterns. These systems are represented by medium to large sized properties belonging to forestry companies or private farmers (many of them of Italian origin).

However, in spite of the enormous pressure and the incentives for productive transformation to monoculture tree plantations, medium sized properties used for stock-raising or grain production have subsisted that very often also diversify their production by allocating a variable portion of their area to tree plantations or other non-traditional items. Due to soil and climatic conditions, these systems offer a mean potential for the production of meat and grain, reaching a maximum productivity for wheat of 55-60 quintals (1 quintal=100 kg).

Finally, occupying properties of under 20 hectares, we find groups of Chilean peasants and Mapuche community members (the latter being the majority), who have economic strategies for self-consumption – sale of surplus – sale of labour.

We may differentiate three types of “peasant economies” in the commune of Lumaco.

a) The **wheat-livestock system** (corresponding to approximately 65 % of the commune's peasant economies) is developed in topographically rolling and uneven soils, with the main crops being wheat and oats in very small quantities. There are also some animals (cattle, pigs and sheep);

b) The **wheat-field-crop system** (25% of the peasant economies), mainly in the lower and damper locations in the area of the Lumaco River valley. The most important crops are wheat, beans, potatoes, oats, lentils and peas. A small stock of cattle is also incorporated in this system;

c) Finally the **wheat-vegetable system** (10% of the peasant economies), with a main production of lettuce, chards, cilantro, peppers, tomatoes, onions, garlic, carrots, beetroot and cabbage. Wheat-growing and stock-raising are also added to these activities.

As may be seen, these latter systems are more diverse and less fragile. It should also be taken into consideration that traditionally, and especially among the Mapuche, these productive activities are supplemented by hunting and gathering.

## II. THE FORESTRY INVASION

### *Past history of Araucania and its process of economic and environmental transformation*

No doubt the Mapuche must have produced important changes in their surroundings when they enjoyed autonomy in their territory, and more so following European contact (1550) which supplied new domestic species<sup>11</sup> (animals and plants), tools and agricultural practices, and intensified trade<sup>12</sup> (Bengoa, 1991; Guevara, 1898). However, it should be noted that in spite of the above, no records or reports exist indicating significant environmental degradation in the Mapuche Araucania, with the exception of Spanish or Chilean settlements (Guevara, 1898). Seemingly, Mapuche cosmovisional prescriptions and the cultural conception of integration between what is natural and what is supernatural acted better than any modern environmental legislation (Montalbanavarro, 2001).

This situation changed radically following the political and military occupation of the territory by the Chilean State (1883). From this time on, the Mapuche were confined to small spaces with marginal productive potential and ecologically of extreme fragility, known as the “Reducciones Indígenas” (Indigenous Reductions). The rest of the land was handed over to Chilean and foreign (mainly German, Swiss, Italian and French) settlers and auctioned off to the highest bidder (Bengoa, 1991; Guevara, 1898; Vidal, 2000). Through these measures, an attempt was made to transform the “wild Araucania” into the Chilean California, with vigorous agricultural activities as a driving force in the country’s development (Bengoa, 1991).

In this way, the enormous forested areas of the ancient Arauco, that according to Opazo (1910) covered the major part of its almost 5 million hectares, changed from being a source of food and resources and the habitat of supernatural beings, to become an obstacle to the country’s development (Donoso & Lara, 1997). Between 1887-1910 close on 580,000 hectares were burnt to “clean” agricultural lands and establish wheat sowing (Donoso & Lara, 1997). This period of settlement is one of the largest and fastest deforestation processes recorded in Latin America before the 1980s (Veblen, 1983).

Because of the ecological fragility of this area and the fertility of its soils, according to Opazo (1910), rapid soil depletion started becoming evident through low outputs in areas such as Mulchén and Collipulli where outputs dropped from four to one (5 or 6 quintals per hectare) making sowing impracticable. The continued use of practices unsuited to the area (such as slash and burn and fallow) and the fragility of the soil led to erosion processes over enormous stretches of agricultural land.

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<sup>11</sup> Animals: horses, sheep, cattle, pigs, goats among others. Crops: wheat, barley, oats.

<sup>12</sup> Already in the eighteenth century cattle-raising was the main economic activity of the Mapuche, largely supplying national markets and exporting from Chile hides and feed.

In the case of the Mapuche, since then they had to become the “peasants” that they had never been (Vidal, 2000), and learn to be farmers using as their model the immigrants and their extractive practices unsuited to the topographic, climatic and soil characteristics of this area. These practices caused more severe effects on their lands, due to the fragility and the greater population density they have had to support (originally 6 hectares per person; presently the average is 2 hectares per person).

The following table (table 2.1), shows the evolution over time of the transformation of Mapuche economy since the Chilean State’s ideological and legislative imposition. The two most notorious indicators are those of land tenure and the use of natural resources. The process of economic and environmental transformation may be observed on this basis.

**TABLE 2.1** Correlation between political and ideological periods of the Chilean Governments and transformation of “Mapuche property” and its uses

<b>Political and ideological periods and stages in Chilean history</b>	<b>Stages in Mapuche economy</b>	<b>Type of ownership</b>	<b>Use and objective</b>
Liberalism (1860-1930)	Transition from the merchant cattle system to a community peasant system	Community property is established Transhumance is banned.	Agriculture, gathering, cattle-raising. Subsistence oriented
National Developmentism (1930–1960)	Community peasant systems become family systems	Division of common property and origin of individual ownership	From community agro-silvi-pastoral to individual use
Neo-liberalism (1973 - ...)	Peasant systems	Almost complete transition of community property to individual ownership	Agro-pastoral or agro-silvi-pastoral subsistence oriented exploitations

*Source:* Montalba-Navarro, 2001.

Following the crisis of the thirties and until the sixties, the “national development” or “inward growth” model was applied, and Araucania was assigned the role of supplier of low cost “wage goods.” Known as the “Chilean granary” an intensive extractive cycle continued, degrading the natural resources.

Changes in the international situation and in Chile's economic and political model, together with the boom of the famous "Green Revolution," produced a great transformation of large and medium-sized property and also of small properties through technological transfer, credits and State subsidy systems.

As was to be expected, given the complete unsuitability for their conditions and characteristics, the Mapuche were those who least adopted these technological packages. Nevertheless, insofar as their possibilities allowed them, they have continued to poorly imitate some of the practices of their more affluent neighbours. These imitations have had serious consequences on the sustainability of their systems (Montalba-Navarro,2001).

Together with the above, following the 1973 military coup, Chile launched another transformation of its economy, implementing the so-called export model. Trade frontiers were opened up and tariffs were lowered (in the previous model these had been aimed at protecting national production). This, among many other effects on the national economy, caused a drop in the internal prices of wheat, which had to compete with international and very often subsidised, market prices.

Furthermore, during the eighties, sharp rises in the value of the dollar and in oil prices increased the price of inputs and with it, the cost of production. These factors led to profitability deteriorating to such a point that the situation became unsustainable even for medium and large-sized cattle-raising and grain properties. With erosion affecting 75 per cent of the land surface and the deforestation of thousands of hectares, the extractive system of plant biomass (forests, grasslands, crops) seemed to have reached its limit.

However, the new institutional and macro-economic conditions encouraged the development of forestry industries based on monoculture tree plantations for export, mainly of fast-growing exotic species.

### *The process of monoculture tree plantation expansion*

Forest administration and management of Chilean forests has a long tradition, going back to the beginning of the twentieth century. This tradition, promoted by Federico Albert and later continued by Ernesto Maldonado, was not only based on the economic (monetary) value of forests but also placed emphasis on the social and environmental benefits of forest conservation.

In this respect, the first relevant actions on an institutional level correspond to the promulgation of the Forest Law (1931) that regulates forest exploitation and management with the purpose of protecting it. The State's forest assets (forest lands, native forests and plantations) were administrated by various State bodies and institutions (CORFO, National Civil Servants and Social Security Fund) which incorporated forest production as part of other productive sectors or branches of economic activity. Later, other institutions were established (such as the Agriculture and Livestock Development Institute, the Forestry Institute and the National Forest Corporation), which fulfilled functions related to forestry, technical and productive tasks and the administration of the sector. Over this period and especially between 1970 and 1973, the State played a decisive role in production, taking on the tasks of promoting, coordinating and controlling the State's forestry assets. Thus, it was responsible for the administration and exploitation of vast areas of forest land, forests and tree plantations, directly executing productive activities related to forestry establishment, cultivation, management and exploitation on State and private land (through agreements). At the same time,

skills improvement for workers from the public and private sectors was massively promoted together with the conservation of natural resources associated with forests and plantations. In this way we can observe how Albert's forest tradition was in substance prolonged until the seventies.

As from September 1973 the military government launched the implementation of a "free market economic model" fundamentally based on: benefiting from the comparative advantages of the various regions of the country; opening up of Chilean economy to foreign markets; promotion of exports; privatization of the economy; limitation of the State's role; and resource allocation in accordance with the free play of supply and demand.

The new policies ended the tradition of the public forestry sector and its administrative institutions and bodies were emptied of their content and their remains placed at the service of the interests of the large private timber companies.

Under these conditions, the Chilean Timber Corporation (Corporación Chilena de la Madera - CORMA), an organization corresponding to the private forestry and timber business community, submitted a list of requirements necessary for its incorporation into the new economic scenario.

### *Decree Law 701 and subsidies to the expansion of tree plantations*

In October 1974, Decree Law 701 for forestry promotion was promulgated. This decree stipulated that the State would subsidize 75 per cent of the cost of plantations on lands qualified as preferably suitable for forestation (in some cases up to 90 per cent was subsidized). The State also contributed to concentrating the ownership of the land and tree plantations, through the privatization of public land and of state company land at very low prices (Quiroga & Van Hauwermeiren, 1996).

This Decree is fundamental to understand the initiation of the neo-liberal era in Chile, where the expansion of the forestry sector was to achieve a relevant place with a military dictatorship handing over sufficient opportunities for abuse from corporate practices. Decree Law 701 subsidized forestation, which it defined as the "action of planting with trees or shrubs lands that lack them or that were covered by vegetation unsuitable for economic exploitation or improvement by management." Finally, the destruction and substitution of considerable areas of native forests and secondary forests, erroneously called "undergrowth" by forestry companies, was rewarded (Donoso y Lara, 1996).

Thus, as suggested by Aylwin (2001), and various Mapuche territorial communities and organizations (Consejo de Todas las Tierras, 2001; Ñankuchew de Lumaco Association, 2005<sup>13</sup>), considerable stretches of indigenous lands were included in the process and usurped once again.

To this subsidy were added special loans for the plantations and the elimination of taxes, both on the land and on the resource created. The total liberalization of the forest product market further promoted the expansion of monoculture tree plantations as it eliminated quotas, tariffs and regulations that established minimum requirements for the export of these products (Cruz & Rivera, 1983).

However what is considered to have been the greatest subsidy was the transfer of lands and plantations from State ownership, some of them State properties and land expropriated during the Agrarian Reform. Out of a total of 10 million hectares expropriated, 3 million - located along the

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<sup>13</sup> Interviews with leaders, January-March 2005.

coastal strip - were sold at public bids. The low prices and favourable conditions granted by the State generated a rapid change in forest ownership (Catalán & Antequero, 1998).

The Mapuche did not escape from this situation as the leadership and communities that had taken part in the Agrarian Reform suffered from control and repression with no possibility of curbing the occupation of the territory, which was handed over for the entry of plantation companies.

### *The expansion of monoculture tree plantations and its macro-economic results*

These incentives to the private forestation sector, together with the liberalization of timber trading, produced an extraordinary growth in plantation rates. At the end of 1974, the area of plantations existing in Chile amounted to 450,000 hectares (mainly State-owned). However by 1994, the area planted in the country covered 1,747,533 hectares (78.8 per cent planted with Monterey pine and 13.6 per cent with eucalyptus), reaching 2,073,661 in 2002. This enormous increase of the area of monoculture tree plantations was encouraged for the subsequent development of the timber and pulp industry as a way to increase added value on production.

Thus, the large bankrupt properties of Araucania, and particularly those that were located in the province of Malleco, offered ideal sites for tree plantations. The farmers, indebted as a result of the profitability crisis and degradation of their properties from unsuitable agricultural practices, sold large stretches of land to the forestation companies that were paying attractive prices.

It is estimated that in 1973 (before the promulgation of Decree 701 in 1974), the regional area of Araucania covered by monoculture tree plantations amounted to 15,422 hectares. In 1992 the area totalled 251,140.4 hectares and by 2002 it had reached 371,768 hectares. In the case of Lumaco there are no exact figures regarding the area of monoculture tree plantations prior to 1974, however it is assumed that it was less than 2,000 hectares. In 1992 Lumaco already had a planted area of 31,550 hectares (28 per cent) and in 2002 over 55,000 hectares (50 per cent of the communal area), becoming the most planted commune in the region.

According to INFOR (2003) data on a national level, 65 per cent of the plantations of Monterey pine belonged to large companies and the remaining 35 per cent mainly to medium-sized and large individual producers. This situation is also reflected in Araucania, where the 10 main forestry companies concentrate almost 70 per cent of the plantations (table 2.2). In the case of Lumaco, the companies have delegated the production function to private, non-Mapuche people (mainly of Italian origin) who possess medium to large-sized areas, notoriously decreasing the purchase – by the companies – of property for plantations.

The conflict with the Mapuche and the changes made to DL 701 – where forestation incentives are aimed at supporting small farmers – are undoubtedly the factors behind this strategy of the forestation companies in Lumaco.

Thus, out of the approximately 55,000 ha of monoculture tree plantations in Lumaco, 55.7 per cent correspond to medium and large individual producers and 35.5 per cent to plantation companies. The remaining area of plantations corresponds to producers in areas of less than 20 hectares that have been incorporated into the system in recent times through changes in D.L. 701, which encourages the creation of new “peasant forestation” programmes.

The changes to Decree 701 made in 1998 increased for 15 years the benefits of forest rewards but only for small landowners with fragile or eroded soils, leaving the major companies out. The

legality of the forestry model was consolidated after the military dictatorship, increasing mechanisms for the participation of small landowners and Mapuche communities.

For the large companies, profit from the activity is to be found in industrialization and mainly in pulp. Thus, after 30 years, the ownership of the land where plantations have been increased is not as important as the mechanisms enabling the continuity and development of the plantations model.

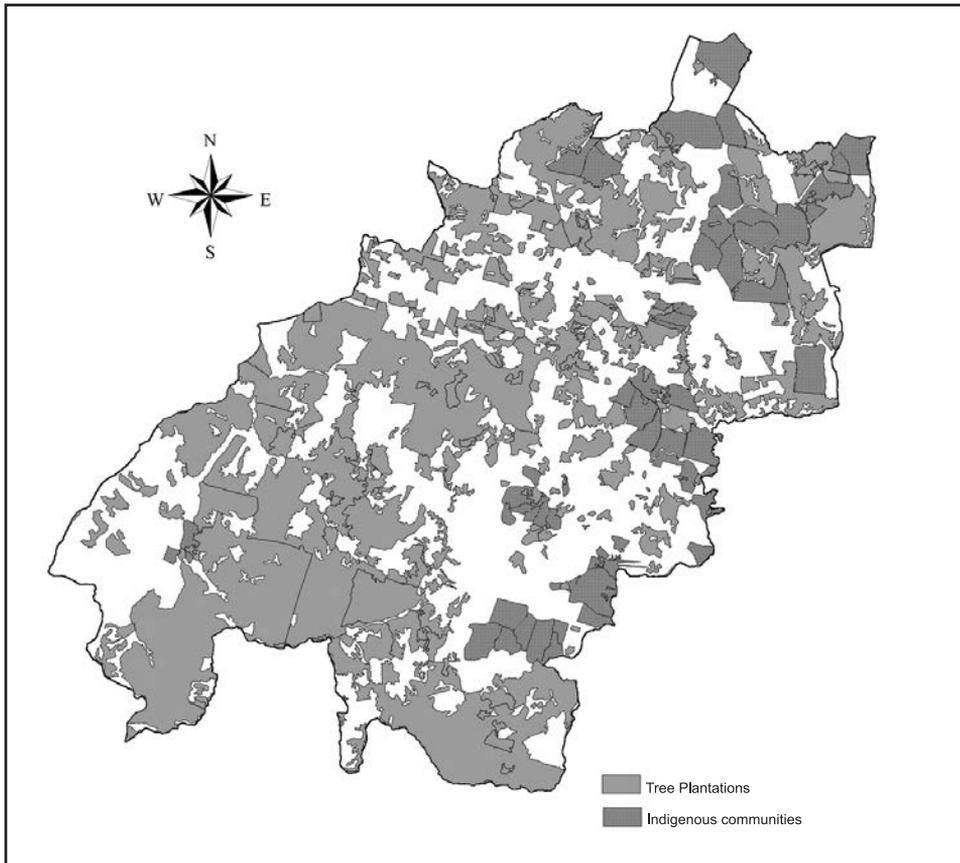
**TABLE 2.2** Main plantation owners in the Ninth Region and their representation vis-à-vis the total area of plantations in the Region, year 2001

Forestry owner	Total area per owner	Area accumulated by main owners	% of the accumulated area with regard to the total <sup>14</sup>
Forestal Mininco S.A.	143,962,70	143,962,70	39.3
Forestal Arauco S.A.	58,053,60	202,016,30	55.2
Forestal Millalemu S.A.	25,147,70	227,164,00	62.0
Forestal Bosques Cautín S.A.	7,082,80	234,246,80	64.0
Forestal Monte Águila S.A.	4,599,80	238,846,60	65.2
Forestal Tierra Chilena S.A.	3,565,90	242,412,50	66.2
Fourcade	3,136,10	245,548,60	67.0
Forestal Cementos Bio-Bio	2,150,20	247,698,80	67.6
Forestal Sompson	1,965,40	249,664,20	<b>68.2</b>
García Sabagul Mario	1,633,10	251,297,30	68.6
Muro Cuadra, Jaime	1,590,40	252,887,70	69.0
Forestal Tornagaleones S.A.	1,511,40	254,399,10	69.5
Agrícola y Forestal Las Raíces	1,270,00	255,669,10	69.8
Ind. Y Com. Maderera Lexister Ltda.	1,240,10	256,909,20	70.1
Pooley Roberts Sergio	1,189,50	258,098,70	70.5
Soc. Agr. Los Aromos Ltda.	1,171,90	259,270,60	70.8
Forestal y Agrícola Paillahuén	1,134,00	260,404,60	71.1
García Echeverría, José Miguel	1,081,50	261,486,10	71.4
Agr. Y For. Camino Pedro de Valdivia	1,065,10	262,551,20	71.7
Forestal Voipir Ltda.	1,018,00	263,569,20	72.0
Others	102,689,70	366,258,90	100.0

*Source:* Prepared on the basis of INFOR data, 2002.

<sup>14</sup> It will be seen how the 10 largest plantation owners in the region concentrate almost 70 % of the area under plantation.

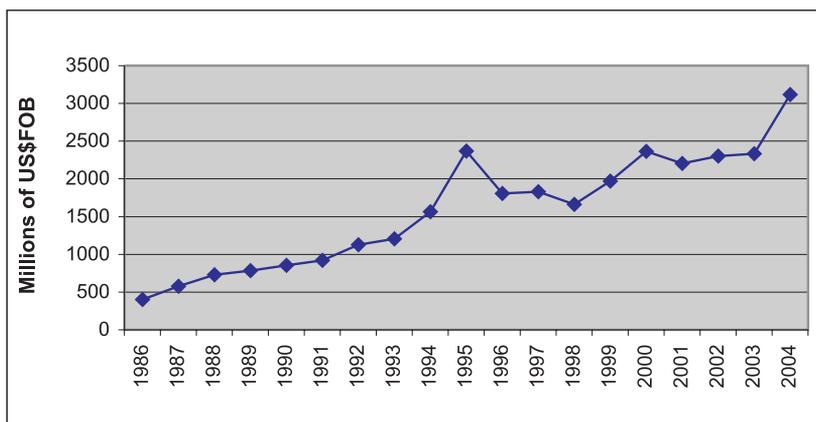
**FIGURE 2.1** Monoculture tree plantations in the commune of Lumaco



*Macroeconomic results: what is most advertised and known about the model*

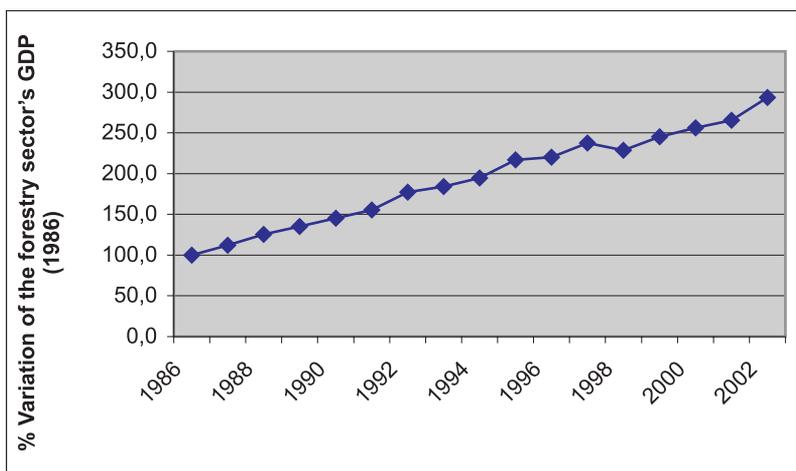
Productive transformation and incentives to the industrialization of forest activities (timber and pulp) have produced the effects sought by the model. Thus the most advertised and well-known results of the “Chilean forestry model” are increased forestry production, increased related exports and, consequently, the sustained increase of the forestry GDP.

**FIGURE 2.2** Variation of forestry exports (millions of dollars FOB) between 1986 and 2004



Source: Prepared from Chilean Central Bank data.

**FIGURE 2.3** Percentage variation of the forestry sector's Gross Domestic Product



Source: Prepared from Chilean Central Bank data (100 % = 1986).

**TABLE 2.2** Variation of the National GDP, Forestry GDP and participation of the latter in the National GDP

<b>Year</b>	<b>National GDP</b>	<b>Forestry GDP</b>	<b>% Forestry GDP vis-à-vis total</b>
1974	290,554	7,006	2.4
1975	253,043	5,392	2.1
1976	261,945	6,452	2.5
1977	287,770	6,940	2.4
1978	311,417	6,891	2.2
1979	337,207	8,111	2.4
1980	363,446	9,420	2.6
1981	383,551	9,993	2.6
1982	329,523	7,313	2.2
1983	327,180	8,100	2.5
1984	347,926	8,994	2.6
1985	356,447	9,402	2.6
1986	3,419,209	100,506	2.9
1987	3,644,681	112,723	3.1
1988	3,911,154	126,241	3.2
1989	4,324,181	135,709	3.1
1990	4,484,071	145,923	3.3
1991	4,841,447	155,981	3.2
1992	5,435,881	178,094	3.3
1993	5,815,646	185,176	3.2
1994	6,147,610	195,624	3.2
1995	6,800,952	217,887	3.2
1996	31,237,289	1,000,380	3.2
1997	33,300,682	1,079,391	3.2
1998	34,376,598	1,039,001	3.0
1999	34,115,042	1,114,262	3.3
2000	35,536,774	1,163,765	3.3
2001	36,626,087	1,207,168	3.3
2002	37,411,806	1,333,875	3.6

Source: Prepared from Chilean Central Bank data (1974 to 1985 millions of 1977 pesos, 1986 to 1995 millions of 1986 pesos, 1996 to 2002 millions of 1996 pesos).

With regard to monoculture tree plantations, the Ninth Region comes third in the country and the figures regarding greater forestry production and exports have also increased since 1985. However, this Region has scant participation with respect to the national total in income and exports vis-à-vis its planted area. This is mainly due to the fact that in Araucanía, in general it is the production of raw material that is developed, while the subsequent processing and increase in added value is undertaken in the Eighth and Tenth Regions.

**TABLE 2.3** Forestry exports from Araucanía as a percentage of the country's forestry exports

<b>Year</b>	<b>Ninth Region</b>	<b>Percentage of country's exports (%)</b>
1985	98,4	0.03
1986	187,0	0.05
1987	7,586,7	1.31
1988	8,442,9	1.16
1989	6,585,9	0.84
1990	10,590,2	1.24
1991	12,710,8	1.39
1992	84,133,1	7.47
1993	93,790,9	7.77
1994	170,025,6	10.87
1995	275,057,1	11.61
1996	182,055,2	10.07
1997	164,948,9	9.01
1998	158,194,4	9.53
1999	172,498,0	8.75
2000	220,993,4	9.34
2001	188,898,4	8.56
2002	168,088,0	7.30

Monoculture tree plantations should reach 2.6 million by the year 2010. The construction of 3 mega pulp mills in the country will involve a total investment of US\$ 3,100 million, increasing exports to US\$ 4,500 million by the year 2008 according to forecasts made by the National Timber Corporation (Corporación Nacional de la Madera - CORMA), a little over double those recorded in the year 2002, when forestry exports reached US\$ 2,200 million.

There is no doubt that macroeconomic data place the Forestry sector as a relevant actor in the national economy. Presently its strong promotional campaign “Forests for Chile” is a reflection of the power installed by the large forestry companies, and in particular Mininco and Arauco, branches of the CMPC and COPEC holdings. Their owners are the country’s two most powerful families<sup>15</sup>.

Another of the effects advertised in the “Chilean forestry model” is the generation of employment. According to INFOR 2002 (table 2.4), forestry sector related employment corresponds to 118,816 people on a national level, and only 12,194 in the Ninth Region.

**TABLE 2.4** Occupation resulting from forestry activities in the country and in the Ninth Region

Activity	Total country	Ninth Region	Participation (%)
Forestry and extraction	39,678	4,860	12.2
Raw materials	28,381	2,454	8.6
Secondary industries	36,158	4,248	11.7
Services	14,599	632	4.3
<b>TOTAL</b>	<b>118,816</b>	<b>12,194</b>	<b>10.3</b>

Source: INFOR 2003.

The quality of employment in forestry activities was marked by the new labour laws brought out during the military dictatorship, which involved instability regarding salaries and job security and which prevented organization. Today the quality of employment is questioned due to non-compliance with present-day labour legislation allowing for better worker conditions. Organization is still limited and even banned in tasks related to the contractor system and in the industries.

<sup>15</sup> Anacleto Angelini is the patriarch of the economic group behind Celulosa Arauco and COPEC, which has its main forestry investments in Chile and Argentina (Alto Parana), and interests in other lines such as the fishing industry and fuel distribution (Copec). Eliodoro Matte has CMPC as his main conglomerate in the timber industry, pulp and paper in Chile and Argentina. Other lines of business are banking and the mining and electric sector.



### III ENVIRONMENTAL EFFECTS AND CONFLICTS IN THE EXPANSION OF MONOCULTURE TREE PLANTATIONS

Official reasoning and advertising promoted by the holdings related to the timber industry equate monoculture tree plantations with the native forests of the area and consider that they have enormously favoured environmental conservation by providing soil cover (and protecting it from erosion), fixing carbon, regulating water sources, etc. (CORMA, 2004). However this reasoning is considered as secondary by those presenting forestry activities as a source of income and progress for the country, which presently represents a high percentage of Chile’s non-mineral exports (see section 2.3).

Although the environmental benefits of the model have been widely advertised by various mass media (newspapers, radio and television), and promoted at various fora, what is true is that the great majority of scientific research on the matter is of a different opinion. Thus, according to these studies, the large and concentrated extension of pine and eucalyptus trees produce a series of environmental costs exceeding the possible benefits that they may involve. Many of these impacts are related to the plantations’ levels of concentration, cultivation and harvesting systems and also with the timber processing industry associated with this activity.

A schematic presentation is made in table 3.1 of the most outstanding negative impacts of forestry activities found and collected qualitatively or quantitatively in the Commune of Lumaco. This table summarizes information regarding environmental impacts, provided by this and other research carried out in the area (of a physical, biological and ecological nature). It provides evidence of the seriousness of the impact of the plantations and of the situation faced day to day by the local community.

**TABLE 3.1** Some negative externalities associated with monoculture tree plantations in Lumaco

Impacts	Cause
Destruction of the native forest	Substitution of forests by exotic species is one of the main causes of the destruction of native forests in Chile. In the Ninth Region alone between 1985 and 1994 this substitution affected at least 30,958 hectares. There are no statistics on the deforested area in Lumaco. However testimonies gathered from the community members indicate that these areas are highly significant.
Decreased biodiversity	The establishment of pine and eucalyptus plantations, often replacing native forests, produces a great reduction in the biodiversity as it changes systems involving over 20 species of trees and many strata (see section 1) and associated bird-life, for vast areas of monoculture tree plantations.

Decrease in surface and groundwater sources	It is a fact that has been proven by many studies that pine tree plantations (due to their high levels of evapotranspiration) produce a reduction in surface water sources that can reach up to 60 % of the flow in comparison with grasslands and 30% compared with native forests. This, particularly in the summer, causes some sources to dry up. At the same time, under plantation conditions, the groundwater table drops as much as 4 metres more in the summer (compared to grasslands) (Huber et. al, 1990). These effects have been felt for decades now by the Mapuche community who directly blame the monoculture tree plantations surrounding them for the loss and contamination of their water.
Health problems in neighbouring communities	As a result of the expansion of monoculture pine plantations, serious problems have arisen over wide areas, such as plagues and diseases that in many cases require spraying of pesticides from the air to control them. At the same time the inclination towards diversification of the natural environment causes opportunist plants to appear that must be controlled during the first years of cultivation. Pesticides and weed-killers applied from the air cause serious health problems to the neighbouring communities or to communities that have been surrounded by these plantations. However the local health authorities have been unable (or have not wanted) to establish a direct relationship between the health problems affecting these communities and the plantations themselves, this relationship appears to be evident and the communities consider it so.
Water contamination	The pesticides and weed-killers sprayed from the air and affecting people together with mass pine tree pollination in the Spring, cause water contamination, resulting in troubles ranging from simple discomfort to serious health problems for the surrounding communities (this has been observed and testified in many Lumaco communities).
Soil degradation	Balancing the above mentioned effects of protection against erosion, a series of problems associated with monoculture tree plantations have been studied, ranging from complications such as soil acidification to compacting (mainly in logging) and depletion due to the nutrient extraction. Together with the drying up of waters, within the empirical knowledge handled by the communities, the fact that the plantations impoverish soils is considered as a fact and that where they are established (especially eucalyptus trees) subsequently the <i>“crops do not yield.”</i>

Source: prepared from information from Montalba-Navarro 2001 and research data.

### *Local economic and social impacts*

On an economic level, promulgation of Decree 701 for forestry promotion marked the beginning of a thorough-going process of transformation in which the cereal and grazing lands surrounding the communities were changed into green walls which, metaphorically, represent a material symbol of isolation from national society. Additionally, the large monetary benefits produced by the plantations (that made the Chilean forestry model an example for the world) are mainly collected by three forestry companies, while the impacts are absorbed by the local communities and in particular by the Mapuche communities. Many of these negative impacts have seriously affected their living conditions, their economic and productive systems and their culture.

At present Lumaco's "peasant" systems (particularly Mapuche peasants) are suffering from a severe maintenance and reproduction crisis and in order to subsist they have had to use multiple strategies. In this respect, and according to information gathered during this research, it should be emphasized that the present crisis has been caused by outside factors, forcing the Mapuche to abandon all their previous subsistence strategies. Among the main causes of the rupture of these strategies, constant mention is made by the community members of those originating from large-scale plantation on lands surrounding their plots. Table 3.2 shows the main subsistence strategies used by the Mapuche after they had been forced to reside in the "*reducciones*" and how the latest major transformation of their surroundings – the expansion of monoculture tree plantations – has produced a further breakdown and has deepened the crisis.

**TABLE 3.2** Subsistence strategies used by Mapuche community members following the “*reducción*” and the factors behind their breakdown

<b>Subsistence strategy</b>	<b>Factor causing its breakdown</b>
Gathering of forest products for consumption and sale	Felling and substitution of native forest by monoculture tree plantations.
Sharecropping systems with neighbouring tenements	The use of grasslands belonging to neighbours with larger tenements or sowing, when the Mapuche use their labour and animals in exchange for half the crop, is prevented by the sale of these tenements to forestry companies that enclose the land and prohibit passage, breaking up any type of relationship among neighbours.
Income-earning jobs in neighbouring tenements	The sale of land to forestry companies and subsequent planting of trees causes the loss of farm work, as labour is only required during certain periods (planting and felling) and these are specialized jobs. The stretches of pine trees surrounding the communities isolate them, leaving them with no possibility of obtaining resources (Montalba-Navarro, 2001).
Crops, vegetable gardens	Because of the sharp drop in the availability of water for crops or vegetables (that grow very well and earlier than in the rest of the Region), it is impossible to consider this activity as a means for marketing.
Cattle-raising	The difficulty in obtaining water, even for family consumption makes it very difficult for cattle to subsist in the summer.

*Source:* prepared on the basis of Montalba-Navarro, 2001 and research data.

Considering the above, we can see how, on one hand, the breakdown of local peasant systems makes them unable to satisfy the needs of the family groups living on them and, on the other, the breakdown of strategies used to attract complementary resources such as gathering, “stealing” pasture for cattle and the complete loss of sharecropping with larger neighbouring tenements. For many communities the only feasible strategy left is the sale of labour to larger neighbouring tenements that have mostly switched from cereal or cattle grazing lands to monoculture tree plantations.

Regarding employment in forestation using labour from the area, this is characterized by being seasonal and requiring very little training in skills and earns the minimum wage. This seasonality is shown in community studies (1994), indicating that, depending on the season, extra-tenement

employment<sup>16</sup> absorbed by forestry activities ranges from 23 % in the high season (plantation, pruning and thinning) to 4 % during the low season (guards and game-wardens). Additionally, it should be taken into account that, simultaneously with the increase in the area of plantations, more technology is used in the tasks and the system has started operating through outsourcing, so there is less and less incorporation of local, less skilled labour. The forestry companies even prefer labour from other areas of the country as they are considered to be “less conflictive” compared to the local Mapuche population.

The breakdown of peasant systems, the replacement of systems requiring labour and increasing forestry activities that do not generate new jobs or that exclude the Mapuche, have a direct impact on greater deterioration of an already impoverished quality of life. This explains the drop in population, particularly of the rural population and of young people.

### *The communities’ point of view*

This dimension is constituted through experience and is what is contained in the cultural impacts of the plantation companies’ action on the people of the Mapuche communities. It is a deeper dimension, where the environmental and physical effects trigger off a change in social and cultural behaviour and therefore in a different way of living in the communities. Assessment of the changes caused by the environmental effects of monoculture tree plantations is always negative and it is considered, from every standpoint (including the economic one) that these changes have caused many of the situations of loss that characterize Mapuche communities today. From the cultural point of view it is equally possible to maintain that the expansion of monoculture tree plantations has produced a negative impact, causing an impoverishment of Mapuche culture on the level of knowledge and preventing the reproduction of their own ways of life. Examples include the socio-cultural impacts caused by the loss of native forests: changes in eating habits, progressive abandon of traditional medicine; the collapse of beliefs and relationships established with the spiritual world, etc.

The following table summarizes the situation of the Mapuche communities in the commune of Lumaco. On the basis of the situation, considered as direct impacts, it is possible to visualize the secondary impacts of the expansion of monoculture tree plantations on the communities’ socio-cultural dynamics. Among these secondary impacts are the disintegration of social networks inside the communities and the disappearance of the Mapuche cultural substratum in the area. As mentioned in the section on the role of Mapuche organizations in facing the problem, the linking of these organizations on a local level has provided an opportunity for the maintenance of a critical reasoning on the basis of ethnic and political reasoning, which finally aspire to defend the cultural heritage of the communities of Lumaco. The table highlights those impacts that are visible and verifiable through data and indicators and those profound impacts that may result in vital risks to the Mapuche culture.

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<sup>16</sup> Non-agricultural occupation: sale of labour.



*View of tree plantations surrounding and threatening the Mapuche Community of Pantano III.*



*Repeating the degradation cycle: logging and forest fire, industrial agriculture and forestation.*



*Living in the border of tree plantations. Community of Collipulli, January 2004.*



*Repression of Mapuche women by the army at the service of forestry companies*



*View of tree plantations surrounding and threatening the Mapuche Community of Pantano IV.*



*View of tree plantations surrounding and threatening the Mapuche Community of Pantano II.*



*Tree Plantations on agricultural areas, surrounding Mapuche lands. Community of Chanco, November 2005.*



*Environmental vulnerability of Mapuche lands and poverty.*



*Threatening tree plantations. Community of Collipulli. February 2004.*



*Tree plantations expansion and isolation of Mapuche communities. Community of Calcoy, January 2000.*



*View of tree plantations surrounding and threatening the Mapuche Community of Pantano I.*

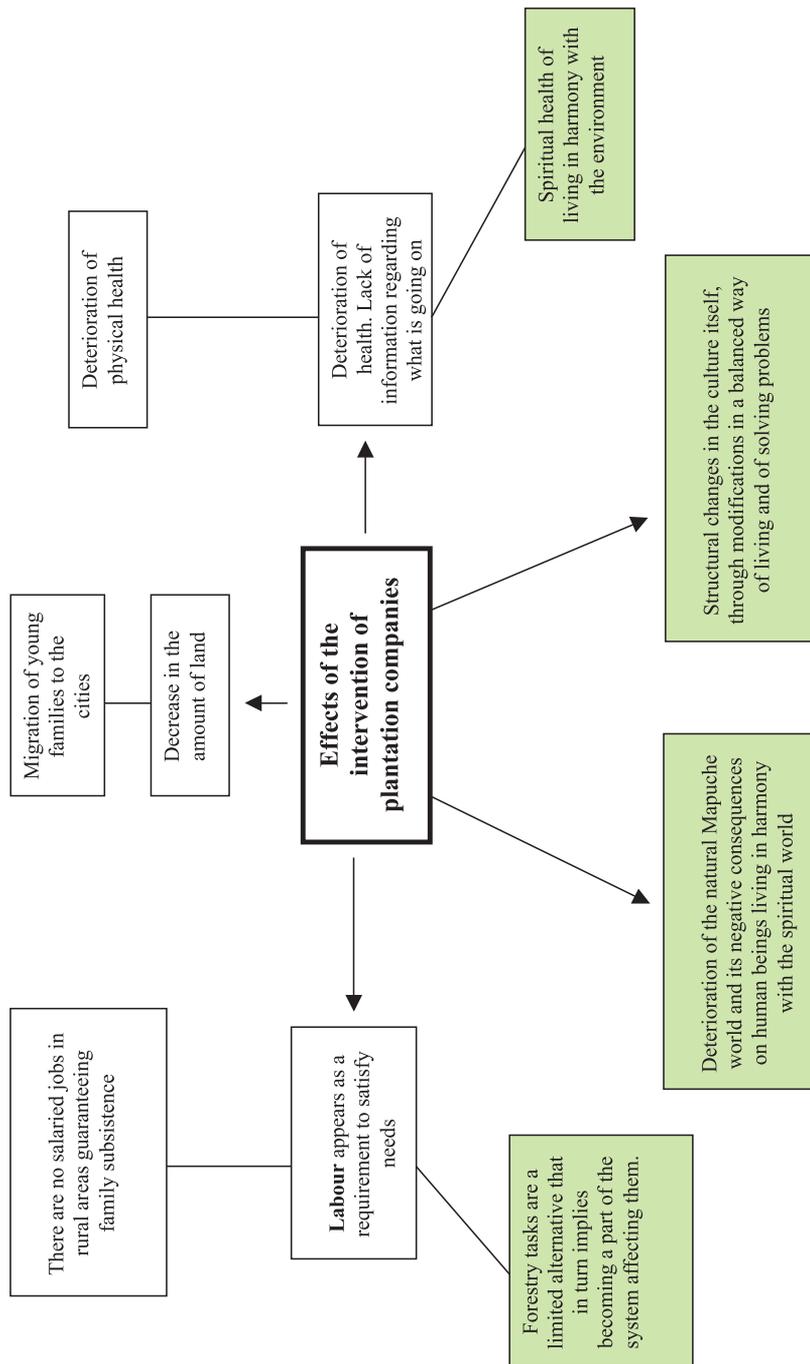


*Repression of a Mapuche woman struggling for her land*



*Chilean army "protects" Fundo Porvenir*

### Impacts of the expansion of monoculture tree plantations on the life of Mapuche families in the communities of Lumaco



### ***Deterioration of health and lack of information***

In a period defined by people as “before” – referring to before the seventies – there is a general agreement in recognizing it as “times of good health” when diseases did not affect the people, and if they did, they had the natural means to control them.

This situation enables us to corroborate that the relationship the Mapuche people established with their natural spaces is directly linked to human health, both in the cultural sense and in the strictly medical sense. From the standpoint of culture, various authors have already described the existence of the ideological and practical structure of the medical model in itself: “*The existence of a traditional medical structure is related to an ideological system and a set of medical practices and health agents playing an essential role in the health of the population*” (Citarella et al, 1995). The coherence of these and other descriptions of Mapuche medicine with the situation in force in the communities equally shows that the dynamics of the cultural heritage – ideological and practical – permanently keep close relationship with the contact with national society, conditioned by oppressive historical and political factors and now, by oppressive economic and ecological factors. In other words, the natural situation of existence and permanence of the people has been inevitably changed by contacts and takeovers – first by the Spanish State and then by the Chilean State. It is thus that today we find that the medical model characteristic of the culture is in a state of progressive deterioration due to different circumstances. One of these – and seemingly the most relevant one in the area of Lumaco – is the disappearance of the native forest, its replacement by monoculture tree plantations and with this, the definitive disappearance of medicinal species and the knowledge for their appropriate use and even the progressive discredit by people of the agents of culture, particularly of the Machi<sup>17</sup>.

According to community members interviewed “... *nothing is produced in those exotic forests, and on the contrary, the native plants die out – for example the medicinal plants called “Baweh” that our Machi use permanently in their role as doctors of the community – can no longer be found in this area. The Machi manage by going far away to the Nahuelbuta cordillera or to cordilleras in the east to seek baweh or they pay someone to go and get it.*”

Since the installation of the forestry companies in the area, people have been afflicted by various diseases they did not suffer from previously. Those recognized directly are those transmitted through the water to the stomach, to the skin and to the eyes. “*There are days when we are well and other days when we are ill. There are always stomach and eye problems as...some of us can no longer see... The pollen from pine trees makes a kind of yellow froth on the water and this is bad for us.*”

In addition to suffering from diseases, there is the important factor of lack of information. For although the people directly relate in their experience the appearance of diseases with the appearance of pine plantations, there is no scientific or medical corroboration of this situation. For this research, the provincial epidemiological units were requested to provide statistics

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<sup>17</sup> Shaman and medical-religious authority of the Mapuche people.

regarding morbidity and accidents in the commune. Although we did not obtain a formal answer, we got information that showed us the absence of institutional concern in assessing the relationship between forest management practices implemented by the companies and human health problems.

What we have observed is that the people get sick and suffer the consequences of such conditions – in the social, cultural and family economy sense – without being able to fight the causes of their sickness. These causes are not studied and therefore are ignored, both by official medicine and by the national political system, on evading any responsibility that the plantation companies might have in this context. *“...Finally, nobody knew what would happen with pine pollen. Perhaps it is damaging us. We hear talk of contamination, of how the water has to be for consumption, but finally, one just consumes what one has.”*

There is no alternative. To diseases are added uncertainty and lack of knowledge, not knowing what to do. According to people’s comments, the medical care of the National Health Service – through municipal teams and others – does not explain the problem in a clear way. They go to be cared for because they feel afflicted and receive attention in a normal way, as if they were ill with any disease, not as if they were sick because of the tree plantations close to their homes.

Neither do people receive specialized information about another equally serious problem that, at all events, affects them directly: the danger of the plantation companies’ waste and even more, of the long-term effects of the pollution of their lands over all these years. *“The company leaves drums containing liquid (chemicals) and some use them for chicha<sup>18</sup>...that is dangerous.”*

The logical lack of knowledge of scientific norms regarding biodegradability and non-biodegradability prevents people from relating the current contamination with permanent damage to their soils, human health and to culture.

The loss of local biodiversity – in scientific terms – has a Mapuche correlation, linked to the loss of medicinal plants and with it, the loss of the knowledge allowing for their appropriate use *“no longer are there any plants for medicine, they have to be sought far away...”*

In the meanwhile, needs increase but alternatives run out. The people still need plants, as instead of not getting sick, they are now getting sicker and there are fewer and fewer means to obtain medicinal plants and put them to use. With the loss of the plants, knowledge and culture are being lost. As illustrated by the following story, the chain of negative effects of the expansion of monoculture tree plantations for the Mapuche people is built through the various walks of their lives: *“... that we have no water, we have no natural plants, and the cinnamon tree is drying up, the laurel tree. It is the fault of the plantations that I don’t have water. And in the coming months there will be no water either, and if it falls it will be with much disease because my God is totally against these pine and eucalyptus plants. Because where we go we don’t see the colour of the earth but we see the colour of the sky here on earth and in the sky...in between those “famous”*

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<sup>18</sup> Chicha: corn liquor

*forests... and those mushrooms growing under the pine trees are an infection for the pigs, for the animals. The water becomes tepid...it comes with a powder on it, for the animals...the few we have die off. I had six or seven piglets and they all died, they get bloated. The same with the cattle, they swell up because they eat the pine and those mushrooms and those mushrooms have a worm underneath and that is what does harm.*

Ranging from the lack of water, the disappearance of native species – mainly for ceremonial, medicinal and other uses – to the appearance of these new introduced species, it is possible to describe the chain of impacts on human health which, as we have already pointed out, not only involve physical aspects but also psychological ones as the individuals feel affected in their interior by the changes taking place, restructuring ways of thinking and feeling about the situation. Furthermore, the effects on the family economy refer to the family experience of disease, in the Mapuche and peasant meaning, since the sickness of a family member troubles the normal development of daily activities, and with it, weakens the family's overall situation.

***Political and social situation in relation to national society and the implantation of the monoculture tree plantation model oppressing them***

Many of the community members of Lumaco consider the plantations to be a new strategy for intervention: *“They are arms against the communities. First of all alcoholism,... civilization... evangelization and now the plantations. Another type of weapon to exterminate the communities.”* Following a sequence of episodes of occupation and extraction, their culture has suffered from progressive deterioration and is presently a source of concern for the families of the community. This deterioration, which has a fundamental economic expression, has required they take upon themselves their condition of poor people. That the main expression of poverty in the region is to be found in the commune having the greatest expanse of monoculture tree plantations is an expression of the fact that the expansion of plantations cannot bring benefits to those who have to live with them.

Although it may seem that the “land conflict” is “another conflict” when inquiring about the impacts of monoculture tree plantations in Lumaco, spontaneously concern over the decrease of their own land appears together with the extension of lands under plantation. Although this is an effect that has been triggered off progressively in the Mapuche communities in general, the situation in the area of Lumaco is specific given the high concentration of land owned by entrepreneurs and individuals who use it for forestry activities.

On a regional level, the relationship between the present amount of Mapuche land and the original amount – prior to the application of the “*Reducciones*” Law in 1883 – has been described in the following way by Vidal: *“Approximately 526 thousand hectares were granted to approximately 80- 82 thousand Mapuche. The Chilean State’s desire to settle the Mapuche meant that suddenly they lost 9 and a half million hectares, because since the treaty they had made with the Spanish Crown, the Mapuche controlled some 10 million hectares”* (Vidal, 2000).

In the case of Lumaco, community members when interviewed indicated, *“the true original Communities, and their names are expressed by their territorial spaces, each one had its own*

logko<sup>19</sup> on whose behalf they were granted the Grace and Favour Deeds during the settlement process. Therefore, the so-called new Communities have their origin in the granting of the deeds of Individual Properties in 1935-36 in the Commune of Lumako, that is when the divisions started...”

Presently people feel “displaced” and in turn state that the problems caused by the plantation companies are neither recognized nor assessed by the Government as such but that on the contrary, it gives priority to the companies’ concerns “... the Government gives priorities to foreign companies and does not support organizations supporting the Mapuche, such as CONADI”.

Under these circumstances, Mapuche organization reflects the possibilities and difficulties in organizing a coherent discussion on ethnic, cultural, political and economic demands. The role of political organization becomes more important insofar as interventions take place. According to chroniclers and later descriptions made by anthropologists and historians, social linking among the Mapuche is basically a result of family relationships and the political and religious structure of each community or *lof*. In this context, they appreciate the risks the plantations may cause, both to the maintenance of their cultural activities and to the cohesion of local organization: “Forestry activities are an element that has contributed to accelerate acculturation. For example, it used to be said that there was always a relationship of friendliness and harmony between the communities of Pantano and Temulemu. They played palines<sup>20</sup>. Now the plantations have come in between them and it no longer exists. In the community of Quetrahue and Pantano they also played...the plantations came in the middle and this relationship was cut off”.

A Mapuche community leader explained his feelings in the following way: “We have been the best wardens of the Mininco forestry company. There have been no fires (making reference to the fires in other sectors). We should collect for this from the company. All the damage they have done to us, we should ask them how much each hectare cost them. As a community we have not been aware of this. That we have been Minico’s best warderns. And that is impotence that when you come to realize it... it is weighty. At least it is a big weight for me. I am prepared to collect on it from Mininco. We should be well prepared...that is how we should do it. For that we need to be united... Personally I think we should embark on that struggle.”

#### ***Changes in the Family: the lack of living space***

For the Mapuche community members of Lumaco, migration to the city has been forced by the limitation of their resources and means to survive in the rural environment: “now it is just us old people who remain. The family is in the city. Since this started becoming too small, there is no land. Sowing is done by half and harvests are poor.”

Depending on their sex and the age, Mapuche individuals have progressively resorted to moving to the city, mainly due to the problem of scarcity of land and the lack of possibilities for the families’ economic maintenance. The feeling of reduction has had a serious impact on the organization of child rearing: “the family grows and we feel increasingly reduced... our children cannot become independent and have their own land... each day we feel narrower.”

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<sup>19</sup> The Mapuche people’s highest authority.

<sup>20</sup> A game known in Spanish as “chueca”, a ball game resembling hockey, it is the Mapuche national sport..

The occupation of the original territory by Italian settlers and, over recent decades, by plantation companies, has limited the growth of the Mapuche population, as it does not enable the population to stay in its original context. The new generations – in their majority – maintain fluid contact with the city and therefore the culture receives considerable external influence. Although national education is one of these influences, they are not all seen or assessed in a positive way.

*“Before one worked the land, or as a sharecropper, growing wheat. Now there is less land and one has to go out and look for work, in the plantation companies or somewhere else, there is hardly any sowing done.”* Temporary jobs have become an alternative whereby families can keep themselves for a while, until resources become scarce again and it is necessary to go out again. According to the records made for this paper, one of the main sources of temporary labour for the Mapuche in the area is fruit-picking in the central area of the country, in addition to other jobs, such as domestic servants (for women). Forestry tasks are also alternative jobs for some community members who, faced by unsatisfied needs, get hired as workers by the companies of the area.

The cultural implications of this migration are assessed in relation to the past: *“Before...so many young people didn't have to emigrate, lose contact with older people, respect, conversations with older people. To participate in the gijatun<sup>21</sup>. But today that same thing, the scant amount of land, the crowding, the scant possibility of building a family according to the amount of hectares owned by each family. But it is precisely the need for life.”*

The interpretation made by the people of the migratory process characterizing them, involves the feeling of a loss of belonging and with it, of each person's ethnic and cultural identity. Thus they show that this identity has had to change vis-à-vis the socio-economic conditions the families must face, finally the pressure on them causes migration.

In the year 2000, twelve Lumaco communities signed an agreement with MIDEPLAN (Ministry of Planification and Cooperation) to benefit from the Land and Water Fund administrated by the National Corporation for Indigenous Development (CONADI, dependent of Mideplan) under an Indigenous Law mandate. This agreement had the purpose to prevent the migration of Mapuche to the cities. To date there are still four communities that are still awaiting a reply to this commitment. They complain that the institution had misled and abused them and firmly maintain their claim for rights as a people and for dignity as individuals.

### ***The origin and the present need for employment***

The introduction of modern technologies in the forestry industry has prevented the employment of local labour in their activities: *“the plantation companies started in 75... some people worked when they were sowing the pines... but now it is just machinery and the contractors bring in all their people”*.

As mentioned earlier on, the lack of land has hindered the families' economic reproduction, encouraging the community members to undertake other activities, with forestry tasks as a possible alternative. Although opportunities of becoming involved in these tasks have lessened over the

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<sup>21</sup> Solemn community prayer held every two, four or six years.

past few years, it is still possible to find that villagers are temporarily absent from their village due to employment in the companies of the area.

Employment in forestry tasks is still a possibility sought by Lumaco community members, as the needs are imperative “... *we ourselves asked for work and they told us they could not give us any...that we are conflictive.*” Their hopes of employment are affected by the stereotypes that the handling of the ‘Mapuche conflict’ has rooted in the area, increasing the division between their very Mapuche being and their having to work for those they consider are responsible for their impoverishment.

Another look at this situation shows that the intervention of forestry companies in the communities, through temporary contracts and semi-stable jobs for their tasks<sup>22</sup>, has given rise to the appearance of a further conflict in the communities, one that already exists between those who approve of this “submission” or “participation” in company activities and those who openly and explicitly reject the attitude of participating in what the plantation companies are doing in the area. According to inquiries, this type of situation is socially reorganizing the communities, dividing families and making each cluster aware of the possible action of the other, that is to say, establishing “sides” within the ideally constituted communities.

Furthermore, labour conditions have never been good: complaints have been made about clear cases of abuse during operations specific to the tasks, also concerning the economic conditions of hiring: “*they do not hire us Mapuche. Even some have had to lie to be given the job... and inside all the work is heavy and they don’t specialize...in the case of forestry tasks we have worked but we have never seen the taxes*”<sup>23</sup>.

### ***Transformation of the natural world***

The diseases affecting land, crops and animals of the families neighbouring the monoculture tree plantations are being caused by the spray systems used by the companies. Although this information has not been confirmed by any authority, the experience of the community members frequently relates the appearance of diseases in the environment – including of people – with the companies’ actions. Diseases such as “sectoria” affect wheat crops, causing a considerable decrease in the harvest.

According to Mapuche community members interviewed, in addition to drying up the water of springs, creeks and rivers, the plantations also prevent rain because, following extermination of the native forest, the powers or energies of the waters flee. That is why older people say: “*The water animals leave, the Mowelfe wigkul*<sup>24</sup> *is inside the plantation.*” Now if we translate and break-down this cultural concept in *Mapuzugun*<sup>25</sup> we understand that it means that these water energies have a relationship of brotherhood with the people and permanent visible communication through dreams “...*we believe that chemical products affect the crops. The red powder (pine pollen) is finishing our plants...the leaves of the crops are turning red.*”

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<sup>22</sup> As is the case of contracts made by the MININCO forestry company for 8 months per year.

<sup>23</sup> Tax paid by the companies to the State, guaranteeing access to health services and to a pension fund system.

<sup>24</sup> Concept referring to the forces possessed by the mountain.

<sup>25</sup> Mapuche tongue.

As corroborated by this story, some concepts verifying and characterizing the interactive relationship between human beings and the environment are still in force in Mapuche culture: “*The menoko*<sup>26</sup> acts on human beings, depending on how they relate with it and the generic cultural rule guides them not to ‘discover it’ but rather to maintain it in its natural and symbolic secretiveness”. Nature is the context for Mapuche knowledge and thought. They possess life, therefore it is necessary – from the standpoint of the Mapuche regulations – to protect it and thus maintain the welfare of both.

In general, the use of pesticides is a practice related to field crops. In the case of forestry exploitation, the chemicals used (insecticides and weed killers) cause irritation in their neighbours, as the effect of these practices lead to losses in addition to the constant risk involved for human health. “...*They put down poison where we have animals. The dogs go there and then they die. How many people have lost animals since the plantation companies started ...they say it is poison for the rabbits, but with it all the animals succumb...the oxen die too.*”

The experience of the Pantano community is an illustration of the situation: “*Pantano is surrounded by the plantations on lands where there had previously been wheat, oats, potatoes, hazelnuts and changle... maqui, boldo, digüeñes*<sup>27</sup> *now there is none of this...this is damage that the naked eye cannot see, but considering well, it is also damaging. This is caused by the plantations because under pine trees no grass grows, what are the birds going to eat? They die...*”

### ***The impact of the expansion of plantations on Mapuche thought***

Today monoculture tree plantations occupy spaces that were previously used to hold religious ceremonies. The disappearance of such spaces is also the disappearance from memory of those “sacred places” and therefore the knowledge of how the natural world is related to the spiritual world is being left in the past: “*Before there used to be a place for ceremonies that is now in the plantation...that place was sacred and there prayers were said to ask for water. Now, with the plantations, the native forests have been finished.*” Without the need for a very deep analysis, we see that the Mapuche world is deprived of the possibility of maintaining its beliefs and its religious thought in such a way as to enable it to reproduce them from generation to generation.

The spatial dimension that among the Mapuche distinguishes defined levels for cosmo-vision, refers in people to a regulated behaviour that guides daily action in relation to others. If that dimension is obstructed – in this case with the impossibility of the continuation of ceremonial and identification of the “sacred” places – the interrelationship between socio-cultural behaviour and ideological and cultural conceptions is broken, causing the disintegration of the basic spatial unity of the culture: that which arises from integration with the various dimensions of life.

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<sup>26</sup> Concept referring to a spring, conceived by the Mapuche as a sacred place.

<sup>27</sup> Changle (Chilean tree, the fruit is used to make preserves) and boldo (Chilean tree, the leaves are used for medicinal purposes), maqui and digüeñes (mushrooms).

*“Water is an essential resource for existence, all living beings need water, insects, animals, birds, crops, us. We have to weigh this, beyond the water itself...but they are destroying our kimün<sup>28</sup>, that günechen<sup>29</sup> left us. We young people do not understand.”* As can be seen from the above testimonial, the wholeness of what is natural and what is supernatural (and/or the various dimensions of Mapuche life) still remains in the communities in an explicit way – and thus an implicit way, given the anthropological relationship of thought on the basis of which it is estimated that individuals know, make and build their identity – even in people of the young adult generation (estimated at between 20 and 30 years of age).

With testimonials alluding to the transformation of traditional values, the people reveal that the behaviour of each individual is an act that protects or endangers the environment. In other words, according to the way people behave in each social and cultural circumstance – in their relationship with others and towards the natural environment – the Mapuche spiritual world reacts to regulate the balance of nature as a whole, where it defines the behaviour not only of nature itself but of humans and their relationship with it. Thus, each unbalancing action – such as interfering with natural sources of water, felling native vegetation, etc. – may also release a negative impact on personal or family life.

Wigkul means hill and hills always have water, but not just anywhere but below, in the brooks, where the native forest is usually thick and there are creeks or waterfalls, the place where the Mawelfe or little animals live<sup>30</sup>. As we said before, these energies communicate with people, that is to say, they appear to people in the form of animals, birds or some strange kind of reptile. For example, there has always been talk of a hairy snake that is almost shaped like a cat, or of a red cock that turns into a snake, also of animals such as the bull, the calf, cow or horse. In this way these Malwelfe let themselves be seen, that is to say, people see them and then they instantly disappear, but the community has conversations with them, they leave them food where they live, and *muday*<sup>31</sup>, they talk to them, pray to them, etc. and in turn they are responded to in their dreams. In this way they make themselves known, state their troubles, suffering, etc. When they are affected by the destruction of nature, in the case of Lumaco, caused by plantations, with water drying up in the creeks and rivers, they must flee to other sectors where something still remains of nature. They go to the cordilleras, also to *wenu mapu* (the high lands) or to *Bafkeh mapu* (sea lands); according to one testimonial: *“... the life of the mountain spirits at this time is comparable to the life of the young Mapuche who emigrate to the cities to continue living because they have no land left in their Community. However the powers or spirits not only emigrate suffering all kinds of malaises, some do not resist and die as many are mutilated by the heavy machinery or the native forest fires and those who are left are strong or take strength as they are determining energies and as such they also punish, sometimes in the long term, that is to say, if they do not punish the person initiating destruction of nature, his descendents are in danger of serious illness or accidents, etc. and this is not understood by western society.”*

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<sup>28</sup> Mapuche knowledge, thought.

<sup>29</sup> Figure of the god, creator of the Mapuche world.

<sup>30</sup> “kubme, wekuv or mawelfe = literally means “make rain.”

<sup>31</sup> Fermented wheat or corn beverage.

Maintaining knowledge about “how things should be” and of respect for what is “culturally respectable” is today synonymous with the permanence of their own culture and the way of being and living as a Mapuche, without conditionings coming from other forms of conceiving the world and of living in it.

***Past and present: the projection of forced changes. The defence of what is theirs and the right to continue living***

As set out in the second chapter of this report, while there is a record of the destruction of the native forest, there is also a record of its appropriate use – as a resource – by the Mapuche: “...they used this location to gather a great variety of fruit, stems, tubers, fleshy roots, seeds and mushrooms, in addition to hunting birds and smaller animals. The forest was of great importance as a source of an enormous amount of medicinal plants and for ritual uses... Additionally, it provided them with building materials, tools and domestic utensils, constituting the basis for their material culture.” (Aldunate, 1996, in Catalán & Ramos, 1999). To corroborate this, during our work the people suggested that delimitation of the territory itself was defined by the senses alone and links with the environment to which the people “belong,” that in turn shelters them and guides their identity and that of their family members. “Before, the old people, the most ancient ones...all they could see belonged to them...later came measuring” (Collipulli Community).

Regarding economy, as has been stated earlier on and confirmed by the older Mapuche’s narrations, families subsisted by gathering and hunting, with agriculture intrinsically introduced following territorial reduction with delimitations arising from the application of the 1883 *Reducciones* Law. “The seriousness of this measure should be weighed, considering that during their prior evolution, the Mapuche had never farmed the land, but rather were a cattle-raising society and their expansion as a powerful society took place precisely on the basis of this activity” (Vidal, 2000).

Presently the Mapuche have had to accept their condition of poverty, imposed through a continuous process of occupation of their lands and political and economic exclusion. In many cases, this condition of poverty is taken in a passive way, as part of a natural process which is their lot to live. In other cases, the contact and relationships between both societies and cultures have stimulated in some modern-day Mapuche a wholly critical awareness, on which they are able to build a general vision of their present situation: “If you calculate all that is implied by **evangelization**... its objective is to exterminate this conviction of ours. **Alcoholism** is to eliminate all that is our drink such as muzay... either of corn, wheat, pine kernels, all that we Mapuche can produce. They start eliminating it. Then comes the **Spanish language** and it eliminates our language and now **the plantations** and they eliminate all our native forest and eliminate our ecology. All is eliminated and the noodles, and the rice and the fast food come.”

***The environmental conflict***

The development of monoculture tree plantations is seen and criticised as a new form of invasion by the Mapuche population, particularly because it is developed on a territory that they claim as their own. The development of the Mapuche conflict as an environmental and territorial conflict is a good example to enable us to understand the complexity of the struggle against a

policy expressed through millions of trees that every day take over more land in the south of Chile. In order to continue the expansion, plantation proponents have developed various institutional mechanisms.

Monoculture tree plantations are the new soldiers of an invasion that initially attempted to devastate, but that has been resisted. Today it seeks development, penetrating into the community with new policies seeking integration of the plantation model and generating a new awareness towards the future to enable these plantations to be accepted as a development alternative.

The environmental dimension of the conflict has revealed the flaws and negative impacts of the economic model. For this reason strategies are established by all the actors – Mapuche organizations, companies and Government – attempting to achieve a new relationship and generate changes in forestry activities in Chile. For this to occur, changes in political and economic institutions and in corporate culture are fundamental, something that happens very slowly and only because of the effects of systematic action by those who feel themselves to be victims.

The expansion of plantations is a problem for the inhabitants of the commune of Lumaco and may be observed from:

- Complaints about environmental problems by the Mapuche and non-Mapuche population, such as soil degradation, lack of productive alternatives and scarcity of water.
- Complaints about long-standing problems of the Mapuche population that have become more acute since the expansion of the plantation model in the commune, such as the loss of land and weakening of their cultural heritage.
- Intervention by the forestry companies trying to get the plantations to become part of the natural imagery of the commune's population. This situation mainly explains why the Mapuche organizations are upholding a critical reasoning against the action of the forestry companies.
- Expressions by the population regarding the social and economic problems caused by the plantations, such as transformations in rural life and progressive impoverishment. Social problems are denounced such as unemployment, migration and lack of opportunities for young people.
- Land occupation and national and international complaints by the Mapuche population are mainly related to forestry occupation. This has led to repression through the legal system, under pressure from the major companies and endorsed by Government authorities.

However, even with this criticism, plantation activities have become an alternative for family economy because, although they do not provide sufficient income, as an economic and productive activity it has the most support of a technical and credit nature, to which the families to have access through the productive support programmes present in the commune.

### *The social conflict and the role of Mapuche organizations*

On 2 December 1997 a Mapuche group burnt two trucks that were removing timber from Fundo Pidenco, in the commune of Lumaco. This incident marked a change in what has been known as the Mapuche conflict. Since the middle of that year, the forestry and logging companies in the area

had been warning the authorities about the unease expressed by the Mapuche population. This alert, warning or accusation referred to the acts of violence that, according to the companies, Mapuche community members had been carrying out against their representatives and their properties. This event marked the initiation of a new stage in the complaints made by the Mapuche population, setting out the expansion of plantations as a new colonization agent. At this time too, a direct dialogue was established between the companies and the State to design actions that would curb the Mapuche population. These actions involved the intervention of justice against the Mapuche accused of violent acts and the generation of new social policies by the Government and of neighbourhood relationships by the major forestry companies.

The social conflict generated conditions for new stereotyped conceptions about the Mapuche. In addition to “lazy” and “drunk” the characteristics of violent and terrorist were added. Violent actions such as burning trucks or taking land are milestones that sustain the *image of a conflict*, socially not fully understood, as this image created on the basis of such milestones is a partial image that does not delve into the real basis of social tension. The social conflict projected up to now is an image built both by the mass media and by official speeches regarding the violence caused by *the Mapuche* of the area.

The Mapuche conflict is therefore a constructed problem; one of the ways to get to know and understand the cultural, political and economic situation of the Mapuche population of the region on the basis of the definition and the treatment of the ‘Mapuche conflict’ is to guide knowledge from the standpoint of the mass media, conditioned by stereotypes and limited to the assessment of some events only, particularly of violent events. From this mass media observation that conceives and strengthens the idea of the Mapuche conflict, is derived the presumption that they are a ‘threat’ to the State, including among the interests of the threatened party, the interests of private companies with investments in Mapuche territory.

The strategies for social control that have been operating over the past decade range from the pilot implementation by the government of the Lawsuit Reform in the region, to the appearance of ‘Good neighbourhood plans’ aimed at *support to rural education, more local employment and support to rural productive development*. All this has been intermediated by the application of the anti-terrorist Law to various persons accused of acts of violence, thus insisting on reducing the problematic relationship between the Chilean State and the Mapuche People to a specific conflict arising from a Mapuche attack on State interests. The intention of the Chilean Congress to start discussing a Bill for the establishment of the National Intelligence Agency (ANI) in July 2004 should be understood along these same lines. Among its objectives is the implementation of State internal security plans. The present scenario makes it possible to establish logical relationships between this type of initiative and complaints by the communities of the area about repression. They have complained both directly and also through technical interlocutors and specialists, that they suffer from the constant persecution of bodies in charge of order.

One of the most dramatic situations has been the one denounced in the Diagnostic and Intervention Report of the Araucania Norte Health Service. A psychologist and an intercultural resource person made a report on the serious situation affecting the children of the José Guiñon community in the Commune of Ercilla (belonging to the same Mapuche territory claimed as *nagche*). This report sets out how the violation of human rights can become an extended and institutionalized

process regulated by the very role the State has taken on vis-à-vis this situation. “*The children have been threatened, banged against the ground and the walls, hit with the butt end of firearms, and they have been made to witness scenes during which their parents, guardians or family members are physically and psychologically attacked.*” (Quote from the report). This situation contrasts with the subsequent measures for social investment in the zone, but nevertheless these are two actions stemming from the same body, the State itself.

In the case of the commune of Lumaco, communities started to disseminate and discuss accusations of political repression from the end of 1997, after a resolute process of police occupation and safeguarding of the interests of the plantation companies in the area. Lumaco was classed as the Chilean Chiapas, the Mapuche identified as violent Zapatistas and the State took on a defensive and offensive role made possible by invoking the State Domestic Security Law.

The forestry sector’s alarm rang at the same time as that of the Government of the time, which hurriedly convened the community leaders involved to testify. The event that had triggered off this situation was the occupation of land by Lumaco Mapuche community members and the subsequent burning of trucks belonging to the Plantation Company Bosques Arauco, on 2 December 1997.

From this time on, the commune of Lumaco, together with those of Traiguén, Ercilla and Collipulli, become the centre of regional, national and international attention, and became the actors in a scene where the Mapuche are linked with revolutionary and guerrilla movements. On the basis of this link, the words *terrorists*, *infiltrators*, *guerrillas*, are incorporated to characterize the commune. None of these accusations show any concern for the background to the situation, but only assess the indigenous communities’ expressions from an excessive, stereotyped and condemning ethnocentric perspective.

Concern over the background of the situation demands acknowledgement of the legitimacy of the communities and Mapuche organizations’ reasoning, in addition to the availability of a forum and the search for consensus recognized by the parties involved. This also implies the incorporation of a look at the past, providing an opportunity to see the way impoverishment and economic, ecological, political and cultural plundering of the Mapuche People have taken place in the region. However, on the contrary, the situation of the commune of Lumaco over the past decade has been characterized by a rigid way of conceiving and administrating the problems denounced by the communities, by being bogged down by bureaucracy and evasion, in addition to demanding from the Mapuche leaders tremendous dedication and efforts to transmit and make the communities’ problems understood.

The commune’s Mapuche organizations, mainly the Mapuche Ñankuchew Association and the Union of Mapuche Communities of Lumaco Lonko Leftraru, have established fora for direct intermediation between the communities and State bodies responsible for addressing the issues affecting them. They have built a discourse, claiming rights and demands with a view to the projection of a future for the communities, a process that has been strengthened through the establishment of links and access to opportunities in the local government. Both organizations have built up a record of encounters and differences with State representatives in charge of indigenous policies and today enjoy the confidence and support of the commune’s Mapuche communities that aspire to complain and to demand solutions to their problems.

By their speeches and testimonials, members and leaders of these organizations have been deeply critical of the presence of plantation companies in the area. This criticism is the only organized demonstration against the plantations' presence in the commune. It is organized around various pivots that from the Mapuche cultural perspective are recognized as being linked together. Among such pivots is the relationship between environmental and cultural matters, while the loss of resources also implies the loss of knowledge and with it pauperization of their living conditions. Through their proposals they have sought solutions to the problems of loss of land, water shortage and decreased agricultural production. Facing these problems, they recognize the plantation companies as directly responsible and the State as having concealed responsibility. Their proposals have hinged on reducing the negative impacts of forestry activities in the area, thus endeavouring to lessen impacts on the daily life of the Lumaco Mapuche communities.

Regarding loss of land, the organized communities, members of the Mapuche Ñankuchew Association, when negotiating and exerting pressure on the body responsible for the administration of the Land and Water Fund, have had the support of the National Corporation for Indigenous Development (CONADI). In May 2005, the Victorio Millan community of the Calcoi Sur sector faced this situation, relying on the support of the above-mentioned Mapuche Association and the backing that its leaders were able to provide at the time of starting and progressing in negotiations with CONADI.

During the water crisis of the present year (2005), the Municipality, headed by the Mapuche leader Manuel Painiqueo, promoted distribution of up to 500 litres of water per family and delivered an approximate average of 30 thousand litres a day<sup>32</sup>. However, this situation has various expressions in local social life, ranging from insistent and permanent demand for a solution to the problem of the scarcity of water for human consumption to the generation of strategies to adapt by Mapuche individuals and families affected by the situation. The demands made to the Municipality are satisfied through household delivery of water during critical times, while the adaptation strategies are being developed over time. In sectors such as Chanco, the situation in March 2005 showed that the people in the sector had become used to the problem and were using some springs that under other circumstances had not been considered as sources for human consumption.

Faced by absence or weakening of their traditional sources, the wells supplying water from groundwater tables have increased the number of options to access this resource, implying a transformation in their links with nature and a degeneration in their conditions for access and in the quality of resources for survival: *"...people are already used to water shortage in summer, at that time people start obtaining their supply from the small trickle"* (Rural postal clerk, March 2005). The impact of this situation on people's health is also evident as during the periods of water shortage there is an increase in gastric problems associated with the poor water quality consumed by the population. This consumption is direct and indirect – water in bad condition is drunk and used to water vegetables for family consumption. It should be observed that although the

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<sup>32</sup> Source: Municipal Record of Water Distribution for Human Consumption Lumaco Commune, period 31 January to 19 February 2005.

organizations and community government may aspire to address and seek solutions to urgent problems, the conditions to seek definitive solutions are not among the administrative and political possibilities within the scope of the commune's Mapuche organizations.

Finally, the Mapuche organizations have been fulfilling a mediatory role seeking to reduce impacts and to stake claims. On the one hand, they collaborate in solving and addressing problems that require an immediate solution and, on the other, they try to build up and sustain a coherent political reasoning, with ethnic and cultural contents, able to establish dialogues with the Government regarding basic issues such as land recovery, acknowledgement of political rights and access to economic resources. This last aspect should be emphasized, every time that it has demanded an effort that not all the Mapuche leaders have been able to overcome: the management of local and global circumstances, the use of languages and community and institutional communication strategies. In other words, during recent times only some organizations have had leaders able to move in community and institutional circles. This situation has had a direct impact on the degree of participation that the communities can recognize regarding State technical and social assistance programmes.

Furthermore, it should be emphasized that in their expressions, the Mapuche organizations have always criticised the plantation model and the occupation of their territory by monoculture tree plantations. They have identified in the plantations a factor contrary to their interests and therefore consider the companies responsible for the expansion of a monopolist and inhuman forestry model. The communities are making efforts to learn to subsist and, finally to live in peace and harmony with the plantations, despite the fact that this obliges them to endure a life style weighed down by contingencies, risks and extremes, marked by loss, deterioration and the impossibility of projecting their models of life.

### *State response*

The Government is promoting legal and social conditions to enable the plantation entrepreneurs to reach their production goals through the fostering of order and the solution of problems that cause the communities to rise up and criticise forestry dynamics. Thus, the new social and productive programmes developed by the Orígenes Programme<sup>33</sup> are mechanisms that are functional to forestry development.

The problem has been approached by the State from two angles:

- a) That of Mapuche and non-Mapuche social demand
- b) That of private demand (the forestry entrepreneurs)

Through mechanisms such as police repression and investment in social policies the State has accounted for its priorities, responding to the demand and to the requirements of the plantation industry for its expeditious operation. Simultaneously, it responds to social demands that, in the commune of Lumaco are complicated by territorial claims and long-standing policies.

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<sup>33</sup> The Orígenes Programme – funded by Inter American Development Bank – depends of the Mideplan and supposedly seeks a new relationship between the government and the indigenous communities (Aymara, Atacameño and Mapuche). See: <http://www.origenes.cl/quienessomos.htm>

Under the condition that the Mapuche communities and organizations in the area do not hinder the productive pace of the plantation companies, the State has allocated and transferred goods and generated public fora for dialogue as occurred during the government of Eduardo Frei, or has diversified programmes and projects to work with the communities, as is the case of the present Government of Ricardo Lagos. However, behind these public actions a legal and institutionalized position has prevailed regarding indigenous issues and major environmental issues, with a fragmented and uncoordinated treatment, preventing the generation of opportunities for a comprehensive discussion. Thus reaching a final discussion on the political and territorial rights claimed by the Mapuche population is avoided and mechanisms to take up and solve the problems of forestry intervention are absent.

From this standpoint, the action of the most recent governments is interpreted, guided by the objectives of maintaining domestic order and security, protecting the companies' interests and strengthening an image that reduces and underestimates the Mapuche critical of the plantation model. It is only from this approach that we can understand the coherence between the criminalization of the conflict (and the contribution to the creation of an image of the Mapuche as a violent and underdeveloped people) through their legal resolution and investment in social policies especially aimed at the indigenous population.

This criminalizing position was denounced by the Special Rapporteur for the United Nations Human Rights Commission<sup>34</sup>, regarding the land and territorial situation, making direct reference to the problems affecting the commune of Lumaco:

- a) the isolation of community land within private properties (mainly plantations)
- b) the loss of sources of water as an effect of the development of monoculture tree plantations;
- c) the weakening of human health and of agricultural alternatives caused by the use of weed-killers and pesticides for the growth and maintenance of the plantations;
- d) the contamination of water courses and of their biodiversity.

The Rapporteur ratifies the critical position maintained by the Mapuche movement in the commune towards the expansion of plantations. The demands and claims regarding this situation have been received by the State with a criminalizing vision, operating on the basis of legal mechanisms that are questioned because of their partiality and ethnocentrism. As we said above, the mass media has played a decisive role in this process of criminalization of the Mapuche's demands and claims, strengthening prejudice and social condemnation towards actions that a sector of the Mapuche movement consider to be legitimate and well founded. This vision has considered as violent and terrorist actions situations ranging from the peaceful occupation of land to the burning of trucks and the bearing of firearms. From this perspective all these are wrongful and unjustifiable actions, firmly assuming that the legislative bodies operating in Chile are sufficient and guarantee the effective exercise of social order.

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<sup>34</sup> Report by the Special Rapporteur on the Situation of Human Rights and fundamental freedoms of Indigenous Peoples, in conformity with Resolution 2001/57 of the United Nations Human Rights Commission.

Private demand has also been favoured by the Government on choosing to legitimise legal and public-private opportunities enabling the companies to generate mechanisms to increase their territorial intervention. An example of this is the continuity of Decree Law 701, and the parliamentarians' political support to the concept of "legal insecurity" invented for the region and the Mapuche conflict<sup>35</sup>. Through public-private initiatives such as CORPARAUCANIA<sup>36</sup>, the plantation entrepreneurs are also part of the main fora for discussion and decision regarding development policies for the whole Region.

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<sup>35</sup> "Legal insecurity" was a concept adopted this year by the Senate in a parliamentary agreement. With this, insistence is placed on increased police security on Mapuche lands.

<sup>36</sup> Corparaucania is a public-private organization funded by corporate and trade union organizations, regional universities and public institutions linked to the IX region. Its mission is to increase the regional productive development and insert it at the international level, mainly, in the field of agroforestry and tourism.

## IV. THE EXPANSION OF MONOCULTURE TREE PLANTATIONS AND HUMAN COMMUNITIES

Lumaco is a commune of passage. A commune set in a large area of monoculture tree plantations and impoverished communities offering very little to make people stay there. Capitan Pastene appears as the only attractive town in the area where “it can be observed how hardworking settlers managed to conquer these distant lands”<sup>37</sup>.

Mapuche constant claims only occasionally reach public opinion. However, the Mapuche organizations have achieved that the commune has a Mapuche mayor, who has to struggle against long years of poverty and exclusion and show possibilities and alternatives for the development of the population. This is a very complex matter in the relationship of power generated by decades of forestry intervention and Government action attempting to deal with increasing demand for social and productive support and to limit the claims of the Mapuche population.

The development strategy for the commune has forestry activities imposed on it as a priority and instruments to curb them or regulate them are not available. Plantation companies are a local power and a shadow over the Municipality that develops under the wing of many programmes, impossible to change from a local position and requiring implementation. Indeed, some of them are the only channels available for the reception of support for the population of the commune’s demand for solutions.

In the face of the impacts of plantation activities, no mechanisms exist enabling the local communities to denounce them. Nor are there any effective mechanisms to aid the population to prevent or sanction the impacts of this activity although there are some minor regulations through actions that can be launched by public bodies, such as the National Forestry Corporation (Corporación Nacional Forestal - CONAF), the Agriculture and Livestock Service (Servicio Agrícola y Ganadero - SAG) or the General Water Office (Dirección General de Aguas - DGA). There is no confidence that the State bodies’ function is to ensure environmental protection and the population’s health, only a deep feeling that the companies are there to stay and to grow. The Municipality has neither the tools nor the faculties to regulate the expansion of plantations, or to make the companies responsible for the social and environmental costs they cause.

Thus, the plantations sector has managed to deceitfully position itself in the commune as the only productive alternative. Its scant signs of economic, social and cultural integration are added to the numerous State programmes which are finally mechanisms to enable the companies to continue with their monoculture tree plantations while maintaining the imposition of a type of development.

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<sup>37</sup> According to a tourist guide information, this town is the only one worth visiting and the Mapuche *fiesta* of “Piedra santa” (holy Stone) is described as a primitive rite. Turistel. Sur. Page 60, 2002.

While preparing this report, it was not possible to find sufficient and clear data enabling us to describe with better precision the economic and social relationships of the forestry companies in the commune of Lumaco. It is only on the basis of the public policies of the large companies – Mininco and Arauco – and the various State programmes that some of these relationships can be described in order to understand the complexity of this activity and its relationship with the community.

### *Labour: Working conditions and mechanisms for the expansion of the monoculture tree plantation model*

The Public Relations Manager of Forestal Mininco states that they are a Socially Responsible company and that they carry out their daily activities through a Good Neighbourhood Plan and “collaborate” with their neighbours, reserving workstations for those who live within a radius of one kilometre from a location under forestry activity, supporting rural productive development, providing training<sup>38</sup> and talks on technology transfer and collaborating with formal education.

All this policy of public relations conceals critical situations of labour relationships and perverse neighbourhood relationships which enable the companies to improve the appearance of (and to expand) their forestry model.

#### *The employment situation in the commune*

The data provided by communal statistics show that most of the population is linked to agriculture and sylviculture and there are no real data in the commune on the true impact of forestry activities.

Out of a total of 11,405 inhabitants, 3,495 comprise the labour force (over 15 years of age) and of these, 3,086 had an occupation in the year 2004: 2,552 men and 534 women.

As we saw in chapters I and II, peasant and Mapuche economy is linked to agriculture and stock-raising activities. Out of the community’s employed labour force, 55% (1699 people) undertake forest farming and stock-raising (fishing, hunting and forestry). But there is no breakdown to identify the participation of forestry activities in these data.

According to the Statistical Bulletin for the Region of Araucanía regarding the qualification of labour, there are 1,053 people considered to be skilled workers and 720 non-skilled workers in agriculture, stock-raising and fishing.

Unemployment in relation to the labour force amounts to 316 people – only 9 per cent – which does not explain its qualification as a poor commune. The data on migration are also necessary as families and especially young people leave each year to carry out other activities such as fruit-picking and mining. The data from the last census show that 1,627 people emigrated from the commune and that 638 moved in, explaining the drop in population in this commune. There are more families leaving than arriving.

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<sup>38</sup> According to Mininco data, over 200 courses and over 80 talks are given annually, benefiting over 3,400 people. Of these, approximately 8 % are from the commune of Lumaco.

It is even harder to obtain statistics from the plantation companies themselves, although the websites of the main companies – Mininco and Arauco – show this information, but it does not necessarily coincide with information from the contracting companies or forestry worker trade unions. A clear example of this manipulation of information is the CELCO<sup>39</sup> case in Valdivia, where official information from the industry mentions a maximum number of 2 thousand people working directly or indirectly, and the contractors and companies associated to the industry have varied these figures to between 5 thousand and 15 thousand people<sup>40</sup>.

Lumaco does not have any industrial activity and only has medium-sized saw-mills. Forestry activities are concentrated in the commune plantation and the production feeds industrial activities in other communes having large saw-mills and pulp-mills.

### ***Labour activities in the exploitation of monoculture tree plantations***

The exploitation of monoculture tree plantations comprises a series of stages and processes ranging from the development of seedlings in a nursery and their plantation, to harvesting. During these stages, the companies optimize 100 per cent of the use of the plantation. For this purpose they sub-contract professional staff, implements and work teams for each stage (production of seedlings, preparation of the soil, plantation, pruning, thinning, harvesting).

Work in the plantations in these stages has the following characteristics:

- Labour is sub-contracted. This is the most frequent relationship in forestry activities, where various companies administrate the work of hundreds of skilled or unskilled workers or workers skilled in some stage of forestry activities, willing to move from one territory to another. This sub-contracting leads to a permanent lack of security, minimum social welfare or safety and the knowledge that the job will come to an end and the workers will either have to wait or seek another job.
- The legal framework for this employment was the Labour Code promulgated during the military dictatorship, limiting organization and cutting down the cost of labour (these costs were even lower due to the State subsidy to plantations). The present legal framework has not regulated the contractor system.
- The contracting companies carry out work with workers hired for the season and installed in camps close to the communities. The amount of local employment generated depends on the degree of specialization required by the activity to be carried out.
- The work is increasingly mechanized and this means less labour, particularly during the harvest. It also means that the scant labour required must be skilled.

The Mapuche population is not usually hired due to their reputation as being conflictive people, in addition to their scant skills and specialization for mass work in the plantations.

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<sup>39</sup> CELCO (Celulosa Arauco y Constitución S.A.). The ARAUCO name refers to the group of industrial, forestry and commercial companies owned by the Chilean Corporation Celulosa Arauco y Constitución S.A.

<sup>40</sup> The CELCO case was the first conflict that obliged a forestry company to show transparency regarding its personnel: <http://www.plantavaldivia.cl/pdf/Empleo2.pdf>

From this information we may conclude that:

- The participation of women in labour is outside the market indicators that only consider productive activities. In the context of forestry this lack of participation is associated to the danger of the job and to displacement and abandoning of the family nucleus.
- Migration rates are high, mainly among young people – both men and women – who leave their communities to find temporary jobs in fruit picking in the central area of the country.

### *Education: the 'good neighbourhood' plans*

The Forestal Mininco Company is the main protagonist of the 'good neighbourhood' policy promoting a relationship of cooperation and friendship with the local communities and their families<sup>41</sup>. This policy has been systematically developed since the generation of this new stage of the so-called "Mapuche conflict," launched in 1997. The *Boletín de El Buen Vecino* was presented as a channel for "communication in view of the enquiries, activities and information that are permanently being developed regarding the forestry issue and that are important to emphasize." It was a response to the poor neighbour relations between Mininco and various Mapuche communities.

However, the most direct input is made through formal education in which the Municipality is merely a channel for the circulation of inputs (teaching aids, grants for school materials), that in the case of Lumaco again reach institutions linked to the plantation companies.

There is presently an Agreement between the Municipality and Forestal Mininco S.A, as part of an educational support programme in the schools of Pichiellahuén and Capitán Pastene in the commune of Lumaco. The project is based on a method to support learning applied to mathematics and the Spanish language for students from first to eighth year of the basic cycle. This is a folder with copied material and activities to be used as teaching aids.

The Agreement involves material and teacher training for amounts of 9 million pesos per year, paid in three instalments. The procedure is carried out in the framework of the Grant Law, whereby the Company, instead of paying taxes to the State, delivers them indirectly to community development.

Income and management of this benefit by the commune is fictitious as the money enters the Municipality and is again paid out to the corporations doing the training, corresponding to Forestal Mininco companies. The Agreement is signed following a Resolution by the Regional Government and the clauses in force cannot be changed by the community or the Municipality.

Additional to these "donations" are study grants. These are allocated by Forestal Mininco and the Municipality has no influence or say whatsoever on the regulation and requirements about accessing this benefit. There are eight grantees in the Commune of Lumaco who receive an allocation of \$ 135.000 pesos, payable in 3 instalments over the year.

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<sup>41</sup> Forestal Mininco's plan can be found in: [http://www.cmpc.cl/esp/comunidad/frames\\_comunidad.htm](http://www.cmpc.cl/esp/comunidad/frames_comunidad.htm)

The CMPC Foundation, belonging to Forestal Mininco implements four areas of work: 1) language; 2) mathematics directly in classroom work; 3) personal development and management, to support this process from the school's organization and management; and 4) Forestry and the Environment that develops "educational material addressing different aspects of the productive process of timber, pulp and paper." The Fundación Educacional Arauco, FUNDAR, set up in 1989 operates in a similar way, with the mission of improving the **quality** of pre-basic, basic and secondary education, supporting it with material and numerous projects<sup>42</sup>.

All these formal acts and interventions and integration with the community are accompanied by numerous ceremonies in which the Foundations linked to the plantation companies advertise their fulfilment of important roles in support of the commune's social and cultural work. Although there is no quantification of these inputs, they are made through donations to education such as school materials, stationery and contributions and prizes for extracurricular activities.

Through this type of mechanism the population of the commune is incorporated in a forestry model that presents them with the requisite of making their lives, and those of their children, revolve around the plantations. This model is imposed on them and the expression that the process has been successful with regard to the ideological coverage it has achieved is precisely the passiveness with which an important sector of the population receives these initiatives. The population has become involved in a conditioning reasoning, in which their lives *depend* on the plantations and the presence of the plantation companies "*they have put on a cassette that says that if we don't plant we won't have any food tomorrow.*" The way of seeing the situation as organized by the forestry model is appropriate for the population of the commune that view their landscape of monoculture tree plantations as natural, that accept the presence of the plantation company in the School and that do not question the fact that they are living a transition from a past of their own to a plantation future.

### *Fostering of production: public and private programmes*

On revising public programmes it is easy to observe that plantation activity is the most relevant one and that it has mainly been oriented to offering monoculture tree plantations as the sole form of economic integration for small farmers, peasants and Mapuche communities to this line of development. The main instrument for this action is Decree Law 701, and its main operational agent is the Corporación Nacional Forestal.

In the field, the principal mechanism for plantation development is PROMACIN<sup>43</sup>, which works directly with the Mapuche communities, the Indap/ Municipalidad Agreement, the Liaison Credit of the Bancoestado and private operators that relate with small farmers.

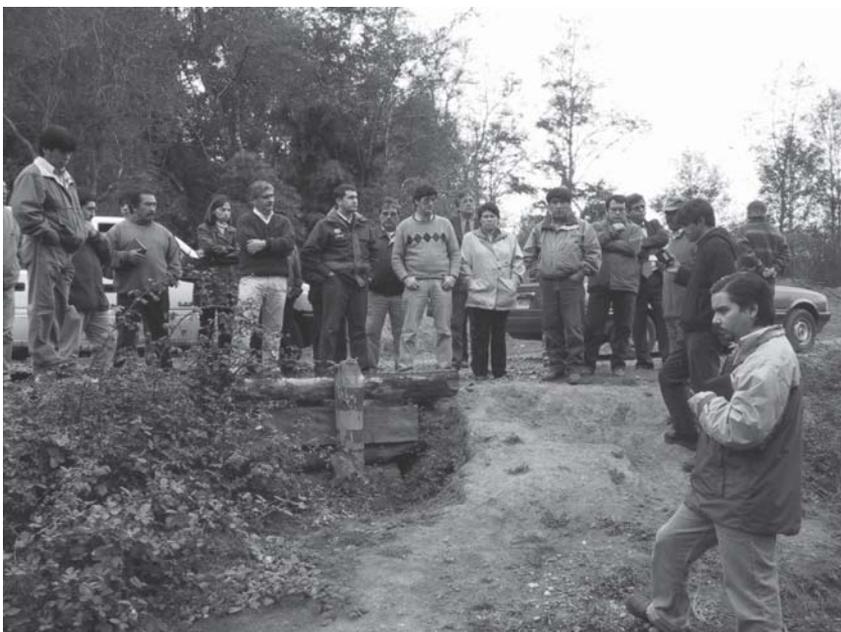
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<sup>42</sup> Information on these Foundations in <http://www.fundarauco.cl/> and <http://www.fundacion.cmpc.cl/>

<sup>43</sup> PROMACIN is a project developed by CONAF - National Forestry Corporation of Chile, IX Region, with the support of FFEM-The French Global Environment Facility (Fonds Français pour l'Environnement Mondial), ONF International (Office National des Forêts) and the participation of the Mapuche Communities Union of Lumaco "Lonko Leftraru".

The main programmes presently undertaking a comprehensive intervention and addressing problems generated by the plantation companies and the communities' demands for development are: the PLAN LUMACO and the ORÍGENES Programme.

The PLAN LUMACO – signed by the representatives of the Union of Mapuche Communities of Lumaco Eduardo Callupe and Manuel Painequeo, the mayor of La Araucanía Ricardo Celis, the vice-secretary of Mideplan Marcelo Carballo and directors of several public services offices (health, education, housing) – was established with the aim of addressing problems that are not set out in the documentation formalizing its tasks. At least nine of its 14 objectives are aimed at solving problems directly related with the expansion of monoculture tree plantations on its territory. A leader summed up the organizations' rationale in the following way: *“For the Mapuche People the problem of water is not only a matter of seasonal drought or environmental impacts as already denounced regarding plantation activities, but is also related to a deeper dimension of Mapuche culture.”*



*The PLAN LUMACO brought the officials from public services to the commune to directly observe the expression of problems for the generation of appropriate proposals (photo: Regional Government documents).*

The PLAN LUMACO recognized that the responsibility for this problem falls on the plantation of exotic species and proposed the establishment of a working Commission. This Commission initially intended to address the issue in depth. However, the PLAN LUMACO systematizes as an alternative to resolve problems more than an alternative to discuss their causes. Through the PLAN LUMACO it may be observed how the State assumes the negative effects of monoculture

tree plantations, taking on the responsibility that corresponds in the rational of neo-liberal economic productivity. It is impossible to calculate State investment in the implementation of the PLAN LUMACO, considering that it has been used to implement actions that should regularly have been fulfilled by the public services involved.

However, this plan has provided an opportunity to hasten the transfer of regular and emergency resources in order to resolve extreme problems of summer droughts and winter flooding.

From the standpoint of adaptation, it is important to point out that through unplanned initiatives such as the PLAN LUMACO, regional public administration has guided intervention towards the commune's new environmental conditions. PLAN LUMACO accepted the problem of water shortage as a natural condition of the commune, *from being an emergency it has become a habitual situation*. This latter condition thus obliges the municipalities to take on responsibility to solve the problem, a situation now in force in the commune of Lumaco for the past year, implying that it will no longer be the Regional Government but the Municipality itself that is called to cover the cost of the effects of the drought affecting it every year.

The PROMACIN or Project Management with Indigenous Communities continues to be the PLAN LUMACO's official channel, responding to one of the objectives set out and to the proposal of establishing working agreements with the organized communities this plan had launched. PLAN LUMACO's second objective stipulated the *establishment of plantations in order to provide soil cover, timber production and to sequester carbon*<sup>44</sup>. It answers to the public body CONAF with the support of GEF (Global Environment Facility) The local association established by PROMACIN is with the Union of Mapuche Communities of Lumaco, an organization that has played an important role in the formalization of the PLAN itself as well as through the role of the present mayor, fulfilled by one of its leaders.

The present communal government recognizes that the presence of plantation companies does not constitute a factor of relevant economic income to the commune as the Municipality itself does not have records that enable it to account for effective participation on the part of these companies. It only considers the registration of four commercial licenses linked to the plantations (none of which correspond to large companies but to service providers, mainly sawmills). The income from these licenses amounts to approximately \$30,000 pesos per year. *In the case of permits for the circulation of machinery and trucks, the figure for 2004 amounts to \$15,209,214. This amount is insignificant when considering the amount of machinery and trucks circulating daily inside the commune.* Inputs for forestry activities and products such as fuel are not acquired in the commune either, as *the large companies purchase all their inputs in other cities and the contracting companies have tankers to supply their trucks on operations and therefore do not acquire fuel in the locality of Capitán Pastene* – the sole locality offering the product in the commune (information in italics was supplied by the Municipality for the preparation of the present research).

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<sup>44</sup> This measure should be understood related to the environmental impact of tree plantations at family level and not as a mechanism to obtain financial gains. What people wants is to diversify the forestry production, considering that both pine and eualyptus have affected their soil and water, and that this situation obstructs them to use their lands for agricultural production.

It may therefore be understood that the alliance between the Municipality and PROMACIN could result in a municipal forest policy, derived from the implementation of environmental and economic strategies with an expected local impact. Contrary to the previous communal government, whose mayor was among the private owners possessing 55.7 per cent of the planted communal territory, during this period some conditions are emerging to enable the establishment of a relationship with the entrepreneurs. Finally, it is these businessmen that control the production of private owners and even the communities' forestry production, through marketing systems.

The ORÍGENES PROGRAMME is advertised by the government as *obeying to a Government decision to promote and install a new form of relationship with the indigenous peoples, thus improving their living conditions, using a comprehensive approach and a cultural and ethnic dimension*. As such, it is defined on the basis of the Policy of a New Deal with the indigenous people undertaken by the government of the Concerted Parties for Democracy. Following a loan agreed on between the Inter-American Development Bank and the Chilean State, the ORÍGENES PROGRAMME officially launched its work in September 2003 around six issues: community strengthening, public institution building, productive development, inter-cultural education, cultural salvaging, and inter-cultural health. This programme involves inter-institutional linking similar to the PLANLUMACO.

It has focused its work on 23 Mapuche communities in the commune, less than 50 per cent of the total of 57 communities. Over the period between 2003 and August 2004, the Origenes Programme supported the implementation of 23 projects in Lumaco in the different components mentioned earlier on. The projects funded correspond to agriculture (9), community initiatives (7) and forestry and farm forestry (5), in addition to a smaller number of projects in the areas of cattle-raising, crafts, education and bee-keeping.

Contrary to the PLAN LUMACO and to PROMACIN, the ORÍGENES PROGRAMME, is identified as seeking to neutralize communities that generate most conflict. This is because the start of the Programme coincided with the time of greatest tension in the relationship between the Government and the Mapuche.

The ORÍGENES PROGRAMME has been questioned by several actors, including the Mapuche, because of its focalization strategy as it does not seem to respond to a coherent social policy but rather is determined by the social conflicts and pressure brought by communities on the State, and also due to its bureaucratic way of working. In the indigenous case, this criticism would also be extended to other mechanisms such as the establishment of ADI or Indigenous Development Areas<sup>45</sup>. However, these mechanisms are the only alternatives to attract State resources, a situation that justifies the aspirations of local organizations to benefit from such programmes. The commune's Mapuche organizations, through their participation in the Nagche Parliament, have proposed the creation of ADI for communes included in their territory (Lumaco, Traiguén, Purén and Los Sauces), a situation that is expected to be solved in 2005<sup>46</sup>.

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<sup>45</sup> The ADI are defined in Indigenous Law 19.253, Title III Paragraph 2 in force since 1993. They are declared by the Ministry of Planning and Cooperation at the request of CONADI. Declaration as ADI implies institutional willingness on the part of CONADI to plan and coordinate plans and projects to benefit the communities involved.

<sup>46</sup> Gentes, 2004.

## V. FINAL COMMENTS

### *The population's ecological, economic and cultural adaptation to the monoculture tree plantation model*

The Communal Development Plans (PLADECO)<sup>47</sup> have been incorporated in the communal governments in Chile since the nineties. Through them, the municipalities organise work programmes based on the planning of thematic blocks and areas, providing an opportunity to discuss and reconsider communal projects with the community. PLADECO, as an instrument for planning communal development, is a first class referent to visualise the future from local, community and administrative perspectives.

In the case of Lumaco, the PLADECO organized for the period 2000-2006 is supported by *an objective image*, or the future vision of the community with the following characteristics: *a commune having overcome poverty, clean and orderly, fruitful and progressive, with development and unity, with expectations, with diverse, inter-cultural education and with a good quality of life for its Mapuche and non-Mapuche inhabitants* (IML, PLADECO 2000-2006, p.17).

Summing up, the picture of the commune and the Municipality is the following:

*An emerging and diverse commune, respectful of its people, traditions and territory, environmentally sustainable with a forest-farm-tourism projection;*

*A municipality with shared values and vision of the future, aimed at improving the quality of the services it delivers and the welfare of its inhabitants, with a modern and efficient structure, committed to communal development.*

The expression of these visions of the future indicates that at present conditions in the commune of Lumaco are contrary, showing a negative and underestimating self-perception by the local actors with regard to their commune.

The forecasts set out above are incorporated in the objectives for each thematic block, emphasizing the concern of the commune's inhabitants over improving the quality of life and living conditions in Lumaco, recognizing the predominance of sectors that have been relegated and the absence of a communal capacity to protect the harmony of human development. Furthermore, the inhabitants of the commune maintain their intention of living in an environment where the main economic activity is that of forest farming, adding to it the challenge of developing environmentally sustainable tourist attractions.

The PLADECO identifies the relationship between such expectations and the population's present problems "*...forestry overexploitation has triggered off the almost complete disappearance from the commune of the native forest. This has had negative repercussions on the quality of life of many peasant families affected by the severe droughts caused by the disappearance of water resources - mainly from the groundwater table - and soil erosion and desertification, consequently causing a considerable loss of biodiversity*" (IML, PLADECO 2000-2006, p.47).

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<sup>47</sup> PLADECO is part of a municipal institutional building plan and the communities have a major involvement in the definition of the objectives, mostly participating in workshops.

In chapter III of this report we set out the way in which problems such as water shortage are being faced by the population through mechanisms for adaptation that they themselves define on the basis of ideas such as: “*we are already used to it*”, “*we don’t get sick with water from the trickle, and if we do we go to the posta (rural outpatients clinic) or we make our remedies at home.*” The PLADECO allows us to consider that this is a compulsory situation brought about by the pressure that others are exerting on the environment and directly affecting the commune inhabitants’ self perception. The inhabitants of Lumaco, and mainly those in rural areas, have learnt to live in harmony with the presence of the plantations that have altered the quality and quantity of the water and productive resources, placing them in a dependent, minimized and pauperized condition, to which they have adapted themselves.

Adaptation to the economic development of forestry has implied that the population and above all the Mapuche population, sees itself as poor, relegated and invaded people, with an unsatisfactory quality of life and requiring the concern of those who can contribute to improve it.

Presently Lumaco has neither the institutions nor the organizations capable of acting as a counterweight to the power installed by the plantation companies. The Municipality, with a new administration, is just taking the first steps to establish its own policy that will enable it to set up a dialogue with the plantation companies and the government and to induce changes to diversify options for economic development and recover opportunities to address the objectives of identity and history set out by the community in the PLADECO.

There is no local development plan organizing and giving a meaning to the various concerns of local and community organizations. Co-optation practiced in the public policies and participation mechanisms, including the companies’ good neighbourhood policies, have cultivated a local Mapuche and non-Mapuche society that lacks the capacity to understand and act before the complexity of the forestry model in force.

## CONCLUSIONS

We make the following affirmations regarding the economic, social and environmental context of the process of monoculture tree plantation expansion in Lumaco on the basis of gathering and analysing information existing in the region of Araucania and more particularly the commune of Lumaco, field work carried out by the authors of this report and empirical, testimonial and critical experience of those who live in the rural areas of this commune:

- Social and economic indicators highlight Lumaco as a commune excluded from the achievements announced by governmental policies, such as economic growth, public freedom, equal opportunities, culture and technological development, that characterize Chile today.
- As acknowledged by the companies, monoculture tree plantations are developed as a profitable business and one of importance to the country's macro-economic indicators. Local indicators only reflect the social and environmental costs that the population has to take on.
- Mechanisms for the reproduction of the monoculture tree plantation model are to be found in the design and orientation of current public and private policies. These have an institutional framework that has not undergone any considerable alterations since it was launched 30 years ago. Its main instrument is Decree law 701. The present modifications and the generation of new programmes show a projection and consolidation of this economic activity.
- Lumaco is an appropriate case to illustrate the way in which productive models, in this case the forestry model, involve the population in a comprehensive way, harnessing their services, their resources and their way of thinking. This last factor is highly burdensome when the population has a different cultural origin and demands access and maintenance of its own cultural resources to define its development. In the case of Lumaco, the Mapuche population has shown that preservation of their culture can be a relevant strategy to face the forestry model, defending its right to think of the landscape and nature with its own criteria and to denounce the presence of plantations as an invasion of its territories and ways of thinking.
- The oppression of the plantations is therefore a visual, psychological and economic oppression. It operates through economic and political blackmail making the inhabitants unable to consider their survival and their future unless they are surrounded by monoculture tree plantations and exploited by plantations companies on their own lands. This ideological imposition has been politically institutionalized through mechanisms described in this report and socio-culturally expanded through official images of the environment, development and society.
- Despite the promises of economic welfare advertised by the promoters of this forestry model and the much advertised macroeconomic indicators, the fact is that, at least in the case of Lumaco, the population that inhabit areas where productive (extractive) activity is developed does not have access to these so-called benefits. On the contrary, the exclusion from monetary benefits (through direct or indirect employment or other participation) is

added to the impacts of the rupture of this population's economic systems and strategies for subsistence. Both effects (exclusion from benefits and economic damages) are two of the main causes of the pauperization of the economic situation of Lumaco's rural population.

- the explosive expansion of areas planted with pine and eucalyptus trees in Lumaco is associated with a series of processes of serious environmental degradation in the commune: loss of biodiversity, reduction and contamination of surface and groundwater sources, etc. Despite being commonly associated with the conservation of degraded soils, it is a fact that this temporary protection is followed by a long period of total lack of protection (felling, preparation of the soil, 5 first years of growth of the new trees), increasing erosion processes and other soil degradation processes, such as soil compaction.

These affirmations, arising from the research process on which the present report is based, enable us to reach the following general conclusion.

The Forestry Model promoted in Chile since 1974 and applied since that date in the commune of Lumaco, was neither created nor oriented with the social and environmental perspective that its defenders give it today. Rather it has been functional to a model that is inclined to enrich a few without considering the damage done to many others. Concordant with the model, we can see how this phenomenon is reproduced in the commune of Lumaco. Thus, while a small group of medium and large sized timber producers (who mainly reside in the urban areas of Lumaco and neighbouring communes) and pulp mill owners (national and trans-national groups) are the beneficiaries, the local population receives the negative impacts of the model on its productive economy systems, its environment, health (physical and mental) and culture, implying as a whole a severe prejudice to its quality of life. In this way, the organization, structuring and operation of the forestry model in the commune of Lumaco has caused the disorganization, dissolution and weakening of the local economic, environmental and cultural systems.

## Bibliography

**Aldunate, C. & C. Villagrán, 1991.** *Recolectores de los bosques templados del cono sur americano*. In: Moesbach, W. 1991. Botánica indígena de Chile. Fundación Andes - editorial Andrés Bello. Santiago, Chile. Pages 18-32.

**Armesto, J., J. Araneda, C. Villagrán & G. Parker. 1997.** *Bosques templados de la Cordillera de la Costa*. In: *Ecología de los bosques Nativos de Chile, chapter 10*. J.J. Armesto, C. Villagrán & M.K. Arroyo (editors). Editorial Universitaria, Santiago. Pages 199-213.

**Arroyo M. K., L. Cavieres, A. Peñaloza, M. Riveros, A. M. Faggi, 1997.** *Relaciones fitogeográficas y patrones regionales de riqueza de especies en la flora del bosque lluvioso templado de Sudamérica*. In: *Ecología de los bosques Nativos de Chile, chapter 4*. J.J. Armesto, C. Villagrán & M.K. Arroyo (editors). Editorial Universitaria, Santiago. Pages 71-100.

**Aylwin J., 2000.** *Los conflictos en el territorio mapuche: antecedentes y perspectivas*. In: Revista Perspectivas en Política, Economía y Gestión. Departamento de Ingeniería Industrial de la Facultad de Ciencias Físicas y Matemáticas de la Universidad de Chile. Volumen 3 N°2. Pages 277 - 301.

**Bavarovic, I., 1987.** *Campesinado mapuche y procesos socioeconómicos regionales*. Grupo de Investigaciones Agrarias, Santiago de Chile.

**Besoain, E. & S. Gonzáles, 1977.** *Mineralogía, génesis y clasificación de los suelos derivados de cenizas volcánicas de la región centro-sur de Chile*". In: *Ciencia e Investigación Agraria, (Chile) n°4*, Pages 109-130.

**Bosch, J.M. & Gadow, van K., 1990.** *Regulating afforestation for water conservation in South Africa*. In: *S. Afr. For. J.* , n° 153, Pages 41-54.

**Bulnes, G., 1985.** *Los mapuches y la tierra. Política y legislación chilena respecto al pueblo mapuche*. Editorial PAS. Santiago, Chile. 120 Pages.

**Caniullan, V., 2000.** *El Mundo mapuche y su medicina*. In: *Acercamientos metodológicos hacia pueblos indígenas. Una experiencia reflexionada desde La Araucanía, Chile*. T. Duran, E. Parada & N. Carrasco (Eds.). Universidad Católica de Temuco. Chile. Editorial LOM. Pages 123-140.

**Cariola, C. & O. Sunkel, 1991.** *Un siglo de historia económica de Chile*. Editorial Universitaria. Santiago, Chile.

**Castañeda, P., 1995.** *Veinte años de fomento forestal en La Araucanía. 1974-1994*. Tesis para optar al grado de Magíster en Ciencias Sociales Aplicadas. Universidad de La Frontera. Temuco, Chile. 70 Pages.

**Catalán R. & R. Ramos, 1999.** *Pueblo mapuche, bosque nativo y plantaciones forestales*. Ediciones Universidad Católica de Temuco. 81 Pages.

**Caviaras, M., 1985.** *Especialización productiva, población y medio ambiente*. Grupo de Estudios Agrarios (GIA). Academia de Humanismo Cristiano. Santiago, Chile.

**CEPAL, 1985.** *Transformaciones en la situación social de la población mapuche*. Paper prepared by Arturo Leiva, consultant from the division of social development, ECLAC LC/R.458. 4 November 1985.

**Citarella, L., 1995.** *Medicinas y culturas en La Araucanía*. Editorial Sudamericana, Santiago, Chile.

**Claude, M., 1997.** *Una vez más la miseria. ¿Es Chile un país sustentable?* Ediciones Lom. Santiago, Chile.

**CONAF-CONAMA, 1999.** *Catastro y evaluación de recursos vegetacionales de Chile. Informe Regional Novena Región*. 90 Pages.

**Conroy, M.T., D.L. Murray & P. Rosset, 1996.** *A cautionary fable: failed US development policy in Central America*. Boulder, CO: Lynne Rienner Publishers.

**Consejo de Todas las Tierras, 1997.** *El Pueblo Mapuche su territorio y sus derechos*. Aukin Wallmapu Ngulam-Consejo de Todas las Tierras. Temuco, Chile. 112 Pages.

**Contraloría General de la República, 1929.** *Legislación sobre tierras y colonización*. Santiago, Chile.

**Contreras, A. & R. Montalba, 1998.** *Agroecologic handing records on pest performed by the Mapuche people of Chile*. Libro de conferencias, XII Congreso científico internacional IFOAM. Mar del Plata, Argentina.

**Conway, G.R., 1997.** *The doubly Green Revolution: food for all in the 21st century*. London, UK: Penguin Books.

**Duncan, M.J., 1980.** *The impact of afforestation on small – catchment hydrology in Moutere Hills*. In: *Seminar on Land–Use in relation to Water Quality*. Nelson Catchment Board. New Zealand. Pages 60-90.

**Donoso, C., 1993.** *Bosques templados de Chile y Argentina. Variación, estructura y dinámica*. Editorial Universitaria. Santiago, Chile.

**Donoso C. & A. Lara, 1997.** *Utilización de los Bosques Nativos en Chile: Pasado y Presente*. In: *Ecología de los bosques Nativos de Chile*, chapter 19. J.J. Armesto, C. Villagrán & M.K. Arroyo (editors). Editorial Universitaria, Santiago. Pages 363 - 368.

**Duncan, M.J., 1980.** *The impact of afforestation on small – catchment hydrology in Moutere Hills*. In: *Seminar on Lan – Use in relation to Water Quality*. Nelson Catchment Board. New Zealand. Pages 60-90.

**Emanuelli, P. 1997.** *Las cosas por su nombre: la realidad del bosque nativo de Chile*. In: *Chile Forestal* n° 247.

**Galloway, D., 1997.** *Los líquenes del bosque templado de Chile*. In: *Ecología de los bosques Nativos de Chile*, chapter 5. J.J. Armesto, C. Villagrán & M.K. Arroyo (editors). Editorial Universitaria, Santiago. Pages 101-112.

**Gentes, Ingo, 2004.** *Agua, derechos locales e indígenas y su interacción con la legislación nacional. Estudio de casos de Chile*. Available at: <http://www.eclac.cl/dnri/proyectos/walir/doc/walir33.pdf> consulted in May 2005.

**Guevara, T., 1898-1902.** *Historia de la Civilización de Araucanía*. Imprenta, Litografía y Encuadernación Barcelona. Santiago, Chile. 3 volumes.

**Guzman, G., M. González de Molina & E. Sevilla, 2000.** *Introducción a la agroecología como desarrollo rural sustentable*. Ediciones Mundi-Prensa, Madrid, Spain. 534 Pages.

**Huber, A. & D. Lopez, 1990.** *Cambios en el balance hídrico provocado por tala raza de un rodal adulto de Pinus radiata*. In: Bosque 14(2), Pages 11-18. Valdivia, Chile.

**Huber, A. W., P. Barriga & R. Trecaman, 1998.** Efecto de la densidad de plantaciones de Eucaliptus nitens sobre el balance hídrico en la zona de Collipulli, IX Región. In: Bosque 19 (1), Pages 61-69.

**IGM (Instituto Geográfico Militar), 1986.** *Atlas de la República de Chile*. Instituto Geográfico Militar, Santiago, 2nd. edition.

**Ilustre Municipalidad de Lumaco, 1999.** *Plan de Desarrollo Comunal 2000-2006*.

**INE, 1971.** Resultados de *Censo nacional de Población 1970*.

**INE, 1993.** Resultados de *Censo nacional de Población 1992*.

**INE, 2003.** Resultados de *Censo nacional de Población 2002*.

**INFOR, 1993.** Estadísticas Forestales 1992. Santiago, Chile.

**INFOR, 2004.** Estadísticas Forestales 2003. Santiago, Chile.

**Leiva, A., 1985.** *Transformaciones en la situación social de la población mapuche*. CEPAL, document N° LC/R.458, november 4 1985.

**Meyer W., 1955.** Los bosques nativos en el sur de Chile, en las provincias de Valdivia, Osorno y Llanquihue. In: Falso dilema: ¿bosques de especies exóticas o nativas?. A. Levy (compiler). Pages 55-77.

**Montalba-Navarro, R., 2001.** *Historia de la transformación de los agroecosistemas y los recursos naturales del territorio mapuche-nalche de la IX Región: una aproximación agroecológica*. Trabajo de Investigación para optar a la suficiencia investigadora del programa de doctorado en “Agroecología, Sociología y Desarrollo Rural Sostenible” de la Universidad de Córdoba. Spain.

**Montalba-Navarro, R., 2002.** *Incorporación de prácticas agrícolas modernas en sistemas tradicionales y su efecto en la incidencia y daño de plagas: una aproximación agroecológica a partir del estudio de sistemas hortícolas mapuche*. In: Actas 1er Congreso Iberoamericano de Agroecología. Gijón, Spain. Pages 243-250.

**Montalba-Navarro, R. & N. Carrasco, 2003.** *Modelo forestal chileno y conflicto indígena. ¿Ecologismo cultural mapuche?*. In: Ecología Política N°26. Barcelona, Spain.

**Opazo, R., 1910.** *Desarrollo agrícola de los territorios que constituían la antigua Frontera*. Conferencia dada durante la exposición internacional de agricultura. Imprenta Santiag. Santiago, Chile.

**PNUD, 2000.** *Informe ‘Desarrollo Humano en las comunas de Chile’*. Programa Naciones Unidas para el Desarrollo N° 5. Available at <http://www.desarrollohumano.cl/otraspub/Pub04/Desarrollofinal.pdf> consulted in April 2005.

**Quidel, J. & F. Jineo. 1999.** *Las raíces para nuestro cultivo*. In: Estilos de desarrollo para América Latina. A. Caro, T. Duraçán & J. Tereucán (editors). Universidad Católica de Temuco, Universidad Católica del Maule and Universidad de la Frontera. Temuco, Chile. Pages. 147-158.

**Riveros, M. & C. Smith-Ramírez, 1997.** *Patrones de floración y fructificación en bosques del Sur de Chile*. En: Ecología de los bosques Nativos de Chile, chapter 12. J.J. Armesto, C. Villagrán & M.K. Arroyo (editors). Editorial Universitaria, Santiago. Pages 235-250.

**Rouanet, J. L., O. Romero, R. Demanet, 1988.** *Áreas agroecológicas de la IX Región: descripción*. In: IPA-Carillanca, año 7, n°1. Temuco, Chile. Pages 18-24.

**Rozzi, R., D. Martínez, M. Willson & C. Sabag, 1997.** *Avifauna de los bosques templados de Sudamérica*. In: Ecología de los bosques Nativos de Chile, chapter 7. J.J. Armesto, C. Villagrán & M.K. Arroyo (editors). Editorial Universitaria, Santiago. Pages 135-152.

**Salome, A.M., 1995.** *Impacto de la expansión forestal en las economías campesinas de subsistencia de la IX Región*. Tesis para optar al grado de Magíster en Ciencias Sociales Aplicadas. University of La Frontera. Temuco, Chile. 48 Pages.

**Smith, P., 1987.** *Variation of water yield from catchments under grass and exotic forest, East Otago*. In: Journal of Hydrology (New Zealand) 26: 175-184.

**Smith-Ramirez C., 1997.** *Algunos Usos Indígenas Tradicionales de la Flora del Bosque Templado*. In: Ecología de los bosques Nativos de Chile, Chapter 20. J.J. Armesto, C. Villagrán & M.K. Arroyo (editors). Editorial Universitaria, Santiago. Pages 369 - 404.

**Stavenhagen, R., 2003.** Informe del Relator Especial sobre la situación de los derechos humanos y las libertades fundamentales de los indígenas, en conformidad a la resolución 2001/57 de la Comisión de Derechos Humanos de Naciones Unidas.

**Van Lill, W.S., F. Kruger & D. Van Wyk, 1980.** *The effect of afforestation with Eucalyptus gladii Hill ex Maiden and Pinus patula Schlecht. Et Chan. On Streamflow from experimental catchments at Mokobulaan, Transvaal*. In: Journal of Hydrology n° 48. Pages 107-118.

**Vidal A., 2000.** Conocimiento Antropológico Sobre los Mapuche de Chile. Efectos Socioculturales y Económicos de su Integración Forzada a la Nación Chilena. In: Acercamientos metodológicos hacia pueblos indígenas: una experiencia reflexionada desde la Araucanía, Chile. T. Duran, E. Parada & N. Carrasco (Editors). Universidad Católica de Temuco, Centro de Estudios Socioculturales. Pages 75 - 101.



