

FORESTRY DEVELOPMENT, WATER SCARCITY, AND THE MAPUCHE PROTEST FOR ENVIRONMENTAL JUSTICE IN CHILE¹

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1. Introduction

In the last decades of the 19th century ancestral Mapuche lands (“Wallmapu”), which extended from the Biobío River to Chiloe Island, came under state control following military occupation. While the Mapuche were enclosed within “*reducciones*” or reservations (BENGOA, 1985, 2012; KLUBOCK, 2014), the state began to manage its new territories and natural resources under the definition of fiscal lands. In the process, the government allocated land titles and concessions to national and foreign private settlers. The land concessions included vast areas of native forests, some of which were gradually cleared for agriculture¹. Other lands were given over to the incipient forestry development, while yet other lands were conserved. This represented the early beginning of forestry development in Chile, which in historical terms has had two major periods,

1. We are especially grateful for the financial support through the project CONICYT/FONDAP/15130015, as well as for CONICYT/FONDECYT 1150770, CONICYT/ANILLO CS 9976, and CONICYT/FONDAP/15130009

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the first from 1931 to 1973 under the direction of the State, and the second from 1974 to the present which is driven by the neoliberal market (CLAPP, 1995; KLUBOCK, 2014).

In the latter stage, an accelerated propagation of monocultures of pine and eucalyptus is observed in southern Chile. This type of forestation emerged initially as an adaptive response to the problem of soil erosion resulting from the extensive agriculture of large estates during the first years of occupation (GOBIERNO DE CHILE, 1974; KLUBOCK, 2014). Consequently, forestry development in Chile has historically been represented as sustainable by the private sector and the state (CLAPP, 1995; MONTALBA et al, 2005; KLUBOCK, 2014). While forestry has contributed to economic development—becoming the second most important extractive activity in the country after mining—recent studies have shown that the geographic expansion of forestry monocultures has contributed significantly to socio-environmental problems that fall outside the type of sustainable forestry management that proponents of the industry claim it develops. Particularly, soil erosion and water scarcity in densely forested areas inhabited by rural Mapuche and non-Mapuche peasant communities (BENGOA, 1999: 227; MONTALBA et al, 2005; HUBER et al, 2010; SHER et al, 2010; AYLWIN et al, 2012; KLUBOCK, 2014; PERIÓDICO RESUMEN, 2014; VOCES EN LUCHA, 2015; TORRES et al, 2015).

In this contribution, we analyze the relationship between forestry monoculture and water scarcity, and how this socio-ecological relation affects Mapuche protest against the forestry development. The relationship between forestry plantations and water scarcity is based on growing evidence indicating that within a few years after establishing a forestry plantation, there are decreased flows of rainwater filtering through soil and recharging aquifers. This is due to increased evapotranspiration. However, “following the last harvest, water flow rates are restored to previous levels and the rates of sediment transport increase” (HUBER et al, 2010: 219), resulting in more filtration of rainwater to aquifers. In effect, forestry plantations increase aridity and produce “the desiccation of topsoil and diminish[es] the amount of water in the valleys at the feet of planted hillsides, leading to the deterioration of the conditions of agricultural production on which peasants [Mapuche and non-Mapuche] depend[...] for their subsistence” (KLUBOCK, 2014: 257). This growing evidence leads us to interrogate the current neoliberal approach to forestry development, especially because of the lack of water sustainability and socio-environmental justice for the Mapuche people. We ask: Is forestry development a truly sustainable activity from a hydrosocial and cultural point of view?

Through the critical lens of political ecology and environmental justice, we argue that the development of forestry monocultures of pine and eucalyptus has significantly contributed to water scarcity in southern Chile, and consequently has influenced Mapuche protests for environmental justice. In this sense, we understand political ecology as a political economy of the environment (CASTREE, 2008) that focuses its analysis on conflicts and socio-environmental changes (SWYNGEDOUW, 2004), currently structured by the neoliberal dynamics of accumulation by dispossession (HARVEY, 2003; GLASSMAN, 2006). These dynamics include the privatization of natural commons like land, native forests, and water (AGRAWAL, 2006; BAKKER, 2007; ROBBINS, 2012; WALL, 2014; LINEBAUGH, 2014; COMPOSTO et al, 2014). In this work we analyze

these processes of change and socio-environmental conflicts as a historical continuum, linking the environmental degradation of forestry development to historic patterns of social and environmental injustices with Mapuche communities in Chile. In the context of neoliberal globalization, these conflicts are structured by the jointly actions of the state and large private forestry corporations (KLUBOCK, 2014; TORRES et al, 2015). In light of the global neoliberal agreements, these global players expand forestry production while attempting to control externalities within normative frameworks that do not succeed in preventing socio-environmental impacts or limiting their scope.

In response, a process of social protest by the Mapuche has arisen in recent decades (BENGOA, 1999, 2012). This movement seeks to recover ancestral lands, but also responds to the advance of environmental degradation and water scarcity associated with forestry monoculture. However, Mapuche social protest has not been homogeneous, but rather involves a range of strategies and internal alternatives (CARRASCO, 2012). They include direct action movements and takeovers of forestry estates, which has led to the Mapuche struggle being criminalized and its leaders arrested and jailed under the “anti-terrorist” law enacted by Pinochet (MELLA, 2007; RICHARDS, 2010; BENGOA, 2012; LLAITUL, 2014; PINEDA, 2014). However, the Mapuche movement also includes other integrated forms of protest that, although critical of the state and forestry companies, nevertheless participates in formulating development and forestry policies, contributing to adjustments of the model of development, but without modifying its basis (CARRASCO, 2012). We analyze this diversity within the Mapuche movement from the point of view of its possibilities and obstacles as strategies for environmental justice in southern Chile. We note that the Mapuche protests have a timely historical significance, because from their multiple expressions—from radical and direct actions to integrated and participatory—emerge elements that can be understood as a politically and culturally sustainable alternative that have been termed Mapuche environmentalism (MONTALBA et al, 2014). Through a historical-geographical and ethnographic analysis, we put forward an interpretation of the Mapuche movement as a significant historical and political bloc to reverse environmental degradation and thus contribute to environmental justice in Chile.

2. Approaches: poststructuralist political ecology, theories of common property, and the movement for environmental justice

To analyze these dynamics, we have drawn on three interdisciplinary bodies of literature: A) The emerging poststructuralist perspective within political ecology, in this case focused on the historical construction of forestry power-knowledge (PEET et al, 2004; AGRAWAL, 2006; KLUBOCK, 2014); B) Theories of common property, both in liberal (OSTROM et al, 2012) and critical approaches (AGRAWAL, 2006; BAKKER, 2007; ROBBINS, 2012; WALL, 2014; LINEBAUGH, 2014; COMPOSTO et al, 2014). Both approaches are relevant in this work, given the historical intervention of the state and private capital in both the dispossession of Mapuche’s common lands and forestry development. Finally, C) what is termed the movement for environmental justice and recent applications to water justice (PULIDO, 2000; HOLIFIELD, 2001; BOLIN et al,

2005; CUTTER, 2005; SIKOR et al, 2014; ZWARTEVEEN ET AL, 2014), which we propose as an analytical framework for research the socio-ecological conflict between the state, forestry corporations and Mapuche people.

2.1 Governing the environment and the making of environmentalist subjects

From the perspective of political ecology, several forms of political technologies for governing the environment (*environmentality*) have been identified as explanations of environmental degradation (AGRAWAL, 2006; ROBBINS, 2012). Despite the historical control of land by communities, with the imperialist expansion of the capitalist accumulation model at the world level, especially since the end of the 19th century (HARVEY, 2003), it is the state that has designed and implemented different technologies to manage natural commons. This has been made through policies and regulations that have centralized the governance of natural commons, which in turn have resulted in diverse practices of resistance by communities (PEET et al, 2004; AGRAWAL, 2006; ROBBINS, 2012). With the neoliberalization of nature in recent decades (cf. CASTREE, 2008), the market has created mechanisms of installation and control from the global understanding of sustainability, which is expressed, for instance, in certification systems for sustainable forest management (CARRASCO, 2015). These technologies of centralized environmental management are counterpoised to the decentralized management of natural commons based on community organization and local knowledge, typical of Mapuche social organization.

Consequently, there are at least three logics for governing the environment that co-exist, in this case, in territories of indigenous occupation: state, markets, and the communal. In different parts of the world where the state and/or the market centralize the functions of regulating and governing the environment, diverse modes of resistance, especially indigenous, arise (AGRAWAL, 2006; KLUBOCK, 2014). For Agrawal, this resistance produces new environmental subjects, who are defined as “persons that have come to think and act in new ways in relation to the environmental domain being governed” (AGRAWAL, 2006: 7). Precisely, neoliberal environmentality of the Chilean forestry sector is contributing to the emergence of new environmental subjects that have come to think and act in new ways in relation to forestry development, in particular, we argue, because of the negative socio-environmental consequences and water scarcity associated with forestry monocultures.

2.2 Theories of common property

Liberal perspectives on common property advocate for the autonomy of communities to manage natural commons, for example, through face-to-face cooperation and interaction among members (OSTROM et al, 2012; ROBBINS, 2012: 51-54). The critical proponents of natural commons agree on this point (WALL, 2014; LINEBAUGH, 2014; COMPOSTO et al, 2014). However, the latter do not defend privatizing or anti-state perspectives that to different degrees are defended by liberals and especially

neoliberals. Unlike the latter, the critical theorists of common property base their analysis on the material and historical-geographical context of a determined territory (HARVEY, 2003), the global political economy and power relationships, which are factors that always accompany the creation of the institutions or rules (OSTROM et al, 2012) that provide legal and normative support for governing the environment and natural commons.

Although liberal proponents of natural commons have begun to consider the historical-geographical contexts that structure rules and institutions, in the end these institutions and rules are the main focus of their interest (AGRAWAL, 2006: 208). This argument is problematic for the critical theorists of common property given that it focuses on institutions and rules (results) and not on the processes that produce them. This liberal view of common property consequently yields an apolitical ecology (ROBBINS, 2012: 54) of natural commons, that is, a perspective that ignores historical processes of appropriation and dispossession, for example, of land and water.

In contrast, the critical theorists of common property considers that the dispossession of communal lands, carried out essentially by capitalist elites and the state, is an inherently historical part of the process of global capitalist accumulation. Marx described this in his analysis of primitive accumulation (DUSSEL, 1985; GLASSMAN, 2006). Subsequently, the dispossession of communal lands acquired new expressions in the transformations of capitalism, now neoliberal, global and hegemonic. For Harvey, new waves of capitalist accumulation have been generated since 1970 (HARVEY, 2003: 157-169), dispossessing natural commons like land and water resources. The privatization of water in Chile in 1981 (BAUER, 2015) is the radical expression of this new historical period of the neoliberalization of nature (HEYENEN et al, 2007; CASTREE, 2008). In synthesis, the privatization of natural commons is a central part of the neoliberal counter-revolutionary project (HARVEY, 2003; GLASSMAN, 2006).

In the face of this global trend and as a local resistance strategy, BAKKER (2007) indicates that social movements can be strengthened in their struggles against the privatization if they use theories of common property as a counter-hegemonic discourse. That is, water, land and forests as commons, as opposed to the discourse on human rights (e.g. water as a human right), precisely because the latter argument has also been appropriated and mobilized politically by neoliberals. For Bakker, the main advantages of focus on commons are its conceptual coherence and political efficiency (BAKKER, 2007). According to the author, this is because neoliberals are unlikely to defend the argument of water as a common property. This is because, for instance in the Chilean case, the same neoliberal groups have privatized and created markets of private rights to water resources and continue to the present defending this model (BAUER, 2015). In this article we take up the argument of Bakker and use critical approaches to common property (HARVEY, 2003; WALL, 2014; LINEBAUGH, 2014; COMPOSTO et al, 2014), with the objective of interpreting the Mapuche case as a social movement arising justifiably out of the historical dispossession of lands and the severe environmental degradation of ecosystems.

2.3 Environmental justice and Mapuche movement for water justice

Born out of African-American struggles against racial and environmental discrimination in the United States, the environmental justice movement is based on the premise that environmental degradation is distributed unequally in terms of geography, race, and social class (CUTTER, 2006). Certain social groups like Latinos and African-Americans have suffered the effects of environmental degradation with greater intensity than have others (PULIDO, 2000; BOLIN ET AL, 2005). In our case study, the racialized ethnic group that has been most affected by environmental degradation and water scarcity associated with forestry development is the Mapuche. Consequently, we have analyzed environmental injustices arising from the environmental governance technologies in the south of Chile. For more than a century these technologies have permitted the strategic unfolding of what has been termed in the context of the environmental justice approach as “white privilege” (PULIDO, 2000). In a first phase this took place through the imposition of state sovereignty over Mapuche territory, subsequently consolidated through neoliberal forestry development, which intensively exploits soil, native forest and water resources. This has resulted in increasing levels of Mapuche’s exposure to environmental degradation and water scarcity, a situation that since the 1990s has sparked a new stage of communal resistance (BENGOA, 1999, 2012; KLUBOCK, 2014). In particular, we emphasize how these water injustices are being mobilized politically (ZWARTEVEEN ET AL, 2014). The emerging concept of water justice incorporates cultural (recognition) and political dimensions (participation) of the water struggles in socio-ecologically situated contexts (ZWARTEVEEN ET AL, 2014). This configures new political and hydrosocial conflicts that challenge the academic, political and activist debate to advance environmental and water justice in Chile.

3. Methods

To analyze the relationship between forestry development and water scarcity and how the Mapuche people are affected, we consider three data sources. First, studies of socio-ecological conflicts in southern Chile (CLAPP, 1995; CAMUS, 2006; KLUBOCK, 2014), that provide relevant historical information about historical practices for governing the environment (regulations, development policies), and the advance of environmental degradation/water scarcity associated with forestry monoculture. Second, socio-spatial data is presented for the area of forestry development and Mapuche occupation, which includes coverage of forestry monoculture, lands allocated by the state to Mapuche communities, water shortage in Biobio, and an example of land dispute between Mapuche communities and forestry companies in Temuco. Finally, a third level is the ethnographic analysis of Mapuche communities in conflict. Our objective is not to make a detailed ethnographic analysis of the Mapuche social structure (cf. BENGOA, 1985, 1999), but rather to analyze their different strategies to advance environmental and water justice in the context of forestry monoculture. The scope of the analysis is from the Biobio to Los Lagos Regions (Figure 1)

Figure 1. Study area



Source: authors' elaboration

4. Water scarcity, Mapuche resistance, and environmental justice in Chile

4.1 Technologies for governing the environment: state sovereignty in southern Chile

The regulations of the Chilean state, created to govern the environment in the south of the country, began to take effect at the beginning of the 20th century, initially to put brakes on the deforestation of native forests (Forestry Law of 1873) and later to scientifically manage native forests and incipient forestry plantations (Forest Laws of 1911, 1925, and 1931) (CAMUS, 2006; KLUBOCK, 2014). Once the Mapuche had been dispossessed of their lands, the state distributed the new territories, very rich in native forests, to new European colonists mainly from Switzerland and Germany, and to a lesser extent to non-Mapuche or mestizo Chileans, with special laws and decrees established for the purpose. The new settlers initiated large-scale agricultural activities in contrast to the small-scale and mobile agriculture practiced by the Mapuche that, among other

things, respected the regeneration cycles of native forests (KLUBOCK, 2014: 11). The colonists expanded the agricultural frontier through burning native forests on a large scale, destroying forests steadily from 1881 to the 1920s. Millions of hectares of rich plant and animal biodiversity were destroyed by fire. Once native forests had been removed and lands were put to use for agriculture and raising cattle, a new problem emerged, namely soil erosion. Initially, the erosion was caused by the intensive exploitation of lands that were not suitable for agriculture and by inadequate management practices (KLUBOCK, 2014: 59-67).

Faced with this situation, in the decade of 1910 public officials began to associate the destruction of native forests with problems of climatic change in southern Chile (KLUBOCK, 2014: 67). Native forests act as regulators by intercepting precipitation (IROUME et al, 2000), so that their destruction and the introduction of large-scale agriculture intensifies the reduction of water flows and consequently a significant reduction in the availability of water. In this sense, the first anthropogenic water scarcity began to affect southern Chile with the military occupation of Mapuche territory in 1881, increasing in intensity up to 1910. An important effect of the trend toward water scarcity in this period was declining agricultural productivity (KLUBOCK, 2014: 65-67), which occurred precisely when the Mapuche were dying of hunger and disease in their *reducciones*, mainly because of the lack of land to grow food. It is estimated that from 1881 to 1907 between 20 and 30 thousand Mapuche died of hunger and disease to the south of the Biobío (BENGOA, 1985: 339).

The emerging state reacted to this unprecedented socio-ecological crisis. The first environmental policies were designed to counteract the environmental degradation affecting southern Chile. To do this, in the late 1880s the Chilean government hired the German Federico Albert, who would become the director of the newly established Forestry Department (1910) and the brain behind future conservation and forestry development regulations. These regulations sought to cope with the sustained advance in environmental degradation through the scientific management of forests (CAMUS, 2006: 158; KLUBOCK, 2014: 18). Besides to introducing forestry science as a power-knowledge mechanism to legitimize the forestry policies of the state, the main contribution of Albert, and one that still has repercussions today, was his proposal to deal with soil erosion by reforesting areas with Monterey Pine imported from the USA, known in Chile as *pino radiata* or *pino insigne* (CAMUS, 2006; KLUBOCK, 2014: 18-20). The ideas of Albert took form in the Forest Laws of 1911, 1925, and 1931. The latter law gave rise to a forestry development strategy directed by the nascent developmental state, which with the active participation of the private sector, continued until the military coup d'état in 1973 (CLAPP, 1995; KLUBOCK, 2014: 101-105).

Based on these new policies and regulations, new knowledges about governing the forests emerged and in consequence new subjects were produced, mainly Mapuche and non-Mapuche peasants that resisted the new practices of the forest's centralized government of southern Chile. For the many Mapuche and non-Mapuche peasant communities, land and native forests were depicted as common property and not belonging to the state or to large estates, and consequently they demanded their rights to land as

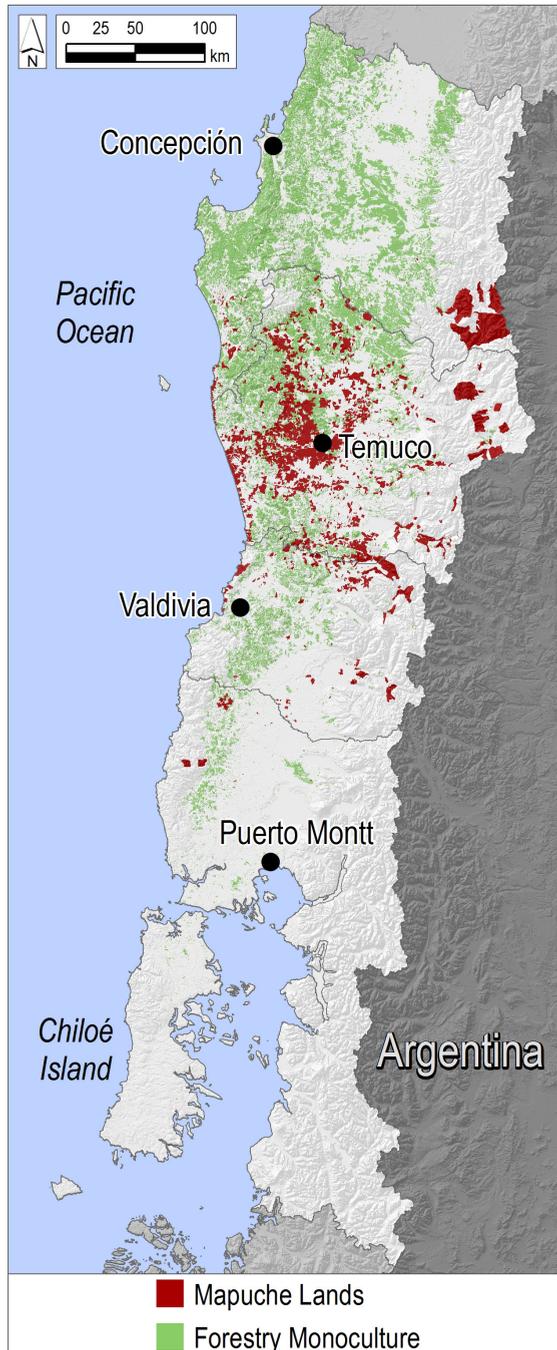
a means to subsist by farming. However, the state and large landowners opposed these demands and consequently the process of primitive accumulation of lands in southern Chile was violent. Cases like the massacre of peasants in Ránquil (1934) illustrate this period of life and death struggle for land, which would culminate with agrarian reform from 1964 to 1973 (LOVEMAN, 1976; KLUBOCK, 2014: 90-117).

With the advent of neoliberalism beginning in 1973, and in particular with Decree Law 701 (1974), there was an abrupt change in the underlying ideology of forestry policy. The change was from a developmentalist strategy directed by the state to a global strategy driven by private corporations (CLAPP, 1995). The new forestry regulatory regime took shape in the context of the privatization of forestry companies that had been created previously in the framework of state-driven forestry development that would be taken from the public sector and transformed into private corporations. Under the new policy, since 1974 the neoliberal Chilean state has provided economic subsidies and tax exemptions for establishing forestry plantations, encouraging the rapid and substantial growth of forestry and related industries in southern Chile (KLUBOCK, 2014; BENGGOA, 2012; TORRES et al, 2015). It is estimated that by 1974 there were 480,000 hectares of pine and eucalyptus plantations in Chile (AGUAYO et al, 2008), while by 2013 the figure had climbed to 2,447,591 hectares. In total 57.9% of such plantations are located in the Biobio and Araucanía Regions, where there is a strong presence of Mapuche. 37.7% of the plantations in Chile are located in the Biobio Region, representing 923,506 hectares, making it the center of forestry development in Chile. The Araucanía Region contains 20.2% of forest plantations in Chile, equivalent to 494,390 hectares (INFOR, 2015: 24). (Figure 2)

In this new neoliberal stage, the expansion of forestry plantations is still based on the argument made by Federico Albert at the beginning of the 20th century: to establish forestry to protect the soil and control erosion. However, the driving idea of Decree Law 701 was to cope with soil erosion by reforesting solely in lands suitable for forestry plantations (hillsides and slopes). However, highly productive agricultural lands in southern Chile have been reforested, among them lands in the Andean foothills used for growing wheat and irrigated lands in the central valley, which contrary to preventing soil erosion, has in fact contributed to increasing it.

The most reforested regions in southern Chile are associated with water scarcity. For example, in May 2014 some 646 rural communities, with 18 thousand households and 57,171 individuals in the Biobio Region were severely affected by water shortages (TORRES ET AL, 2015: 120). This new wave of environmental degradation once again gave rise to political technologies. The Regional Government of Biobio and the National Emergency Office (ONEMI) implemented an emergency plan that provided drinking water to affected communities, including the distribution of funds to municipalities to efficiently manage water distribution. The mechanism is through trucks that supply drinking water for the population of new peasants without water, including Mapuche and non-Mapuche communities among hundreds of rural villages and towns. Between September 2013 and May 2014, water trucks provided drinking water to 571 rural Mapuche and non-Mapuche

Figure 2. Forestry monoculture and Mapuche lands recognized by the State

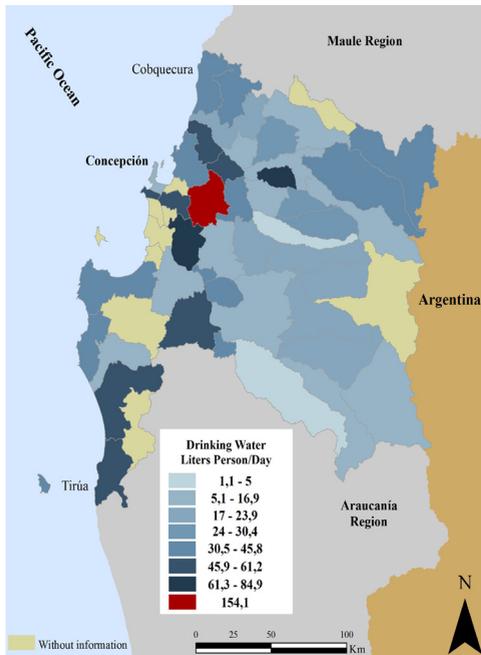


Source: authors' elaboration.

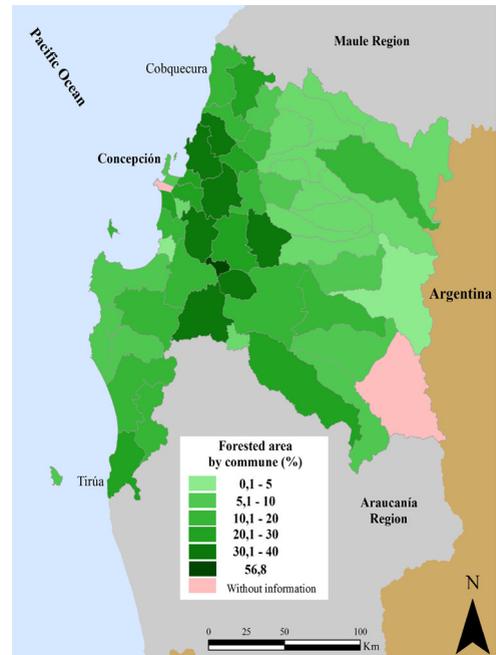
communities of the communes in the Biobío, which in turn have variable degrees of their surface covered by forestry plantations (Figure 3)

Figure 3. Water shortageⁱⁱ and surface covered by forestry monocultures according to communes, Biobío Region

3A



3b

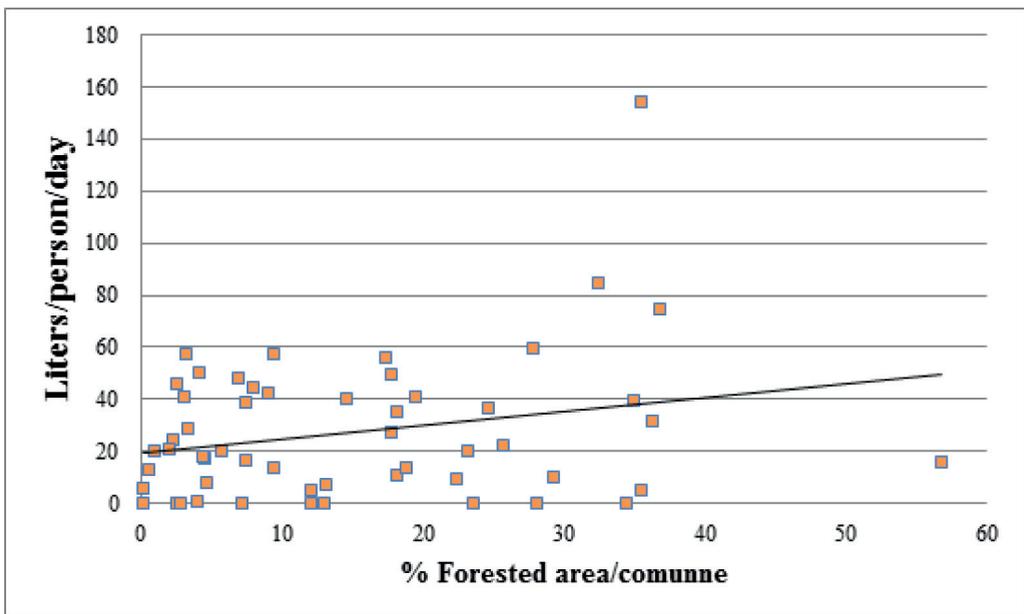


Source: authors' elaboration

Figure 3A shows the average value of drinking water that was distributed daily per person (liters/person/day) for the period September 2013 – May 2014. Darker areas indicate a higher level of water distribution to the population affected by the water shortage (with a maximum value of 154.1 liters/person/day), while lighter areas indicate a lower level of water distribution (with a minimum value of 1.1 liters/person/day). Information is presented for the majority of the 54 communes in the Biobío Region. The highest water distribution figures are observed in communities located in the dry lands of the coastal cordillera. It is assumed that higher levels of water distribution by water trucks reflect a condition of greater water scarcity affecting the benefiting rural population. In effect, greater volumes of water are associated with higher demand and consequently with more severe water scarcity. It is also possible that variations in demand for water is associated with the economic and management capacities of local governments and ONEMI. Nevertheless, we can affirm that in rural areas of Arauco Province, where there is a significant presence of Mapuche-Lafquenche communities, a greater quantity of water was distributed per inhabitant, which indicates more severe water scarcity and therefore greater demand for water.

As a way to demonstrate the relationship between water shortage and forestry development, the variable “percentage of forested area per commune” (Figure 3B) was related to the variable “liters/person/day” (Figure 3A). Figure 4 presents the results, where it can be observed that there is a positive and linear correlation ($r=0.43$) between the two variables. This means that the larger the forested area per commune, the greater the average of liters per person per day of water distributed by the trucks to Mapuche and non-Mapuche peasants. The relationship between forestry monoculture and water shortage is evident statistically and socio-spatially.

Figure 4. Relationship between forested areas and water shortage according to communes, Biobio Region



Source: authors' elaboration

Although implicit, Figures 3 and 4 also show that water scarcity is unequally distributed among urban and rural users in the Biobio Region. In urban areas water consumption was between 200 and 250 liters per day per person and there was no indication of a water shortage given that private companies remained responsible for supplying drinking water through the large-scale infrastructure for urban water provision. As Figure 3 shows, the highest levels of water shortage and demand were in rural areas along the dry lands of coastal cordillera, which are highly eroded areas reforested with plantations of pine and eucalyptus (HUBER ET AL, 2010). These plantations affect the availability of ground water, an important source of drinking and irrigation water for rural Mapuche and non-Mapuche communities. These communities are mainly provided through small-scale and artisanal infrastructures of water supply systems, such as wells, *norias*, *punteras*, and Rural

Potable Water (APR for its acronym in Spanish). This pattern of water scarcity associated with forestry monoculture is also present in other forestry regions like Araucanía.

Like the beginning of the 20th century, in the 21st century the history of socio-ecological disorder in southern Chile has been repeated (KLUBOCK, 2014). The neo-liberal spread of forestry monoculture is today generating environmental problems similar to those at the beginning of the 20th century: lower availability of water and increasing aridity in reforested areas. This is occurring along with the substitution of native forests by monocultures of pine and eucalyptus. For example, between 1997 and 2007, the total area of native forest in the Biobío Region decreased by 22%, mainly in dry coastal areas, which have largely been reforested with monocultures (TORRES et al, 2015: 116). This accumulation by dispossession of native forests and water can be traced back to the original accumulation of ancestral Mapuche lands during the military occupation at the end of the 19th century.

4.2 Dispossessing natural commons in Mapuche territory

The first census of the Mapuche population was conducted in 1907, after more than 25 years of occupation and enclosure of the Mapuche people in reduced geographic areas. The census yielded a population of 101,118 persons (BENGOA, 1985: 339), who had previously occupied more than 10 million hectares of lands between the Biobío River and Chiloé Island. Between 1884 and 1927, through the state-military device of Mapuche “reducciones” (reservations), the state provided 3,008 land titles (*Títulos de Merced*), with a recognition of Mapuche ownership of only 500,000 hectares, less than 5% of their original lands (Figure 2) (CENTRO EULA-CHILE, 2010; BENGOA, 2012).

These lands were provided to 77,751 Mapuche families (BENGOA, 1999: 57-59), with an average of 6.1 hectares per family. Chart 1 shows the distribution of lands in the Biobío, Araucanía and Los Lagos Regions to Mapuche through land titles.

Chart 1. Indigenous lands of *Títulos de Merced* in the Biobío, Araucanía, and Los Lagos regions

Region	Surface of Divided Communities, Decree Law N° 4.111, Law N° 14.511, Law N° 17.729 (ha)(1)	Surface of Divided Communities, Decree Law N° 2.568 (ha) (2)	Total (ha)
Biobío	23,189.82	5,987.63	29,177.45
Araucanía	110,932.89	322,202.89	433,135.78
Los Lagos	8,607.98	63,125.57	71,733.55
Total	142,730.69	391,316.09	534,046.78

(1) Indigenous communities divided before 1980. Total: 824 communities, 32 from Biobío, 687 from La Araucanía, 105 from Los Lagos.

(2) Indigenous communities re-surveyed and divided since 1980. Total: 1.053 communities, 51 from Biobío, 617 from La Araucanía, and 385 from Los Lagos.

Source: CENTRO EULA-CHILE, 2010.

Throughout the 20th century, as part of an ideological effort to suppress common ownership of lands recognized in land titles, the state undertook legal actions to subdivide communal titles (*Títulos de Merced*) into individual ones. It was thought that individual property of land would be a factor in developing Mapuche communities without considering their ancestral communal use. As part of this process, and over a period of 80 years, more than 3,000 land titles were divided up and assigned to more than 100,000 small plots. In parallel, during the same period new processes of land dispossession of the Mapuche emerged, now within their *Títulos de Merced*, with the estimated loss of 180,000 hectares, or 34% of the 530,000 hectares originally recognized by the state.

The state-military technology of “reducciones” and subsequently individual land titles were the devices used to dispossess the Mapuche from their communal lands in southern Chile. As Chart 1 shows, these new waves of land dispossession to the Mapuche began to intensify in the 1980s, a period that coincided with the beginning of the current neoliberal forestry regime. According to the testimony of Mapuche leaders and individuals, during the state forestry period (1931-1974), the white colonists that began agricultural and forestry activities continued privately the land dispossession begun by the state half a century earlier using legal and extra-legal means. For example, “landowners frequently sought to trick Mapuche and [non-Mapuche peasants] colonos by getting them to sign inquilinaje contracts and then taking over their lands” (KLUBOCK, 2014: 95). Subsequently, with the advent of neoliberal forestry development, state-military power reappeared favoring the reproduction of the historic process of land dispossession to the Mapuche in southern Chile. In many cases, these lands are now property of forestry companies. This constitutes a historical reference of the Mapuche movement and its territorial demands. An example is shown in Figure 5, where the areas in red represent the distribution of land titles around Temuco city, the capital of the Araucanía Region. The green areas represent lands demanded by the Mapuche that are currently the property of forestry companies.

The lands designated by the state for Mapuche were of low agricultural quality, while the best agricultural lands and abundant native forests were provided to domestic and foreigner settlers. Low productivity and unforested lands were designated to the Mapuche. This illustrates the pronounced socio-environmental injustices of the Chilean state toward the Mapuche.

Since the recovery of democracy in Chile in 1990 and with the objective of responding to territorial and socio-cultural demands (see below), the state has restored ancestral lands demanded by Mapuche communities. The regulatory instruments for indigenous affairs are the National Corporation for Indigenous Development (CONADI) and the Ministry of National Property (*Ministerio de Bienes Nacionales*). The Indigenous Law 19.253 (1993) was still in force in the first decade of 2000. Among other aspects, this Law regulated access to indigenous lands and water by means of two mechanisms: a) subsidies to expand land ownership, y b) direct purchase of lands under dispute. Between 2005 and 2014, CONADI purchased approximately 113,127 hectares for Mapuche communities and families in the Biobío, Araucanía and Los Lagos Regions. Of these purchases, 78% were of lands demanded by Mapuche communities (Article 20-b, Law

forestry companies as the face of transnational capitalism. The *Coordinadora Arauco-Malleco* (PINEDA, 2014; LLAITUL & ARRATE, 2013) and the communities of Alto Biobio (VOCES EN LUCHA, 2015) are representative cases. These perspectives are also critical of neoliberal globalization that has allowed the presence of large-scale monocultures that have only brought poverty to communities (PERIÓDICO RESUMEN, 2014). Beyond the geographic and territorial enclaves of these organizations, their anti-capitalist and anti-forestry monoculture's discourses and practices locates them as a reference of the resistance movement. They are not engaged in dialogue with forestry corporations given that they do not consider dialogue as an appropriate strategy. The anti-capitalist character establishes this position as a radical critique of the neoliberal development model that has reinforced the private property of lands (Chart 1) and it has also introduced the private property of water, both resources considered ancestral natural commons. For these Mapuche land cannot be separated from water, even when the legal fiction of the 1981 Water Code abstractly separated the indivisible ecological unity of land and water (cf. BAUER, 2015; MUNDACA, 2014)

In contrast, there are other modes of Mapuche resistance represented by different Mapuche communities that, aside from their critique and open conflicts with forestry companies, confront them using legal and institutional mechanisms to negotiate for and defend Mapuche causes. In this integrated mode of Mapuche resistance, the struggle is structured as a means for cultural recognition, survival with dignity, with land, water and the right to decide their horizons of development (CARRASCO, 2012), which has been systematically reorganized over a history of more than 130 years of dispossession.

In the context of the heterogeneity of Mapuche resistance, it is relevant to note the actions that establish recovering water and natural water cycles as a priority through the reforestation of recovered lands with native forests, which have traditionally been a means of subsistence for the Mapuche (PERIÓDICO RESUMEN, 2014; KLUBOCK, 2014; VOCES EN LUCHA, 2015). The underlying logic is that native forests allow for reestablishing organic life on the soils of previous forestry estates, as well as recharging aquifers and groundwater sources (cf. HUBER ET AL, 2010). This is a recent tendency associated with the recovery of lands that began in the late 1990s. Fifteen years later, Mapuche experiences of land recovery have shown that the regeneration of native forests can be a real alternative for water sustainability and the development of Mapuche environmentalism, given that native forests contribute to the gradual recovery of water flows in previously forestry plantations areas (PERIÓDICO RESUMEN, 2014). This puts the Mapuche movement and its diverse expressions in the front line for the recovery of natural commons like land and water that have been legally and biophysically appropriated by the neoliberal environmental governance. Put in another way, it establishes the organizations of the Mapuche movement as emblematic cases in the search for environmental and water justice in Chile, challenging to the interdisciplinary sciences to contribute to this challenge (UNIVERSIDAD AUSTRAL DE CHILE, 2015)

The issue of environmental and water justice clearly goes beyond Mapuche organizations, involving state bodies, civil society, national and international environmentalists, sympathizers with the Mapuche cause and ecologists opposed to the expansion of forestry

monoculture. This broad movement is expressed through diverse initiatives in Chile, among them the “Social Movement for the Defense of Water and Life” (MUNDACA, 2014), in which some Mapuche organizations participate along with a wide diversity of civil society organizations, which have a common opposition to the privatization of water and the indiscriminate exploitation of natural commons. A representative statement of the Mapuche critique is “it is not possible that President Bachelet goes abroad to lobby politically with our territory, with our water, with international companies [...] we are here to defend life, we defend our territory” (Mapuche woman, representative of the Puel Willi Mapu Territorial Alliance)ⁱⁱⁱ. Alternatively, a defense of natural goods as common property is envisioned, whether managed by communities or the state, or some combination of the two, which implies a concept of forests and water as use values as opposed to their current status of exchange values, expressed for example in the Chilean water markets (BAUER, 2015; MUNDACA, 2014).

Consequently, ethnographic evidence from southern Chile reveals contested knowledge and positions regarding the nature of forestry development. On the one hand, there is forestry monoculture and its presumed sustainability, which is steadily losing credibility in the face of its evident contribution to water scarcity (HUBER ET AL, 2010; PERIÓDICO RESUMEN, 2014). On the other hand, there is the Mapuche counterpart that, in addition to struggling to recover lands and win rights that have also far been denied to them, defend the territory and promote native forests, particularly in the case of the latter, because of their importance in maintaining natural water cycles. However, the social power associated with the geographic spread of pine and eucalyptus plantations jeopardizes the possibilities of hydrosocial sustainability based on the Mapuche environmentalist alternatives, while internally suffocating the multiplicity of vocations and local productive systems, impeding both the local economic development and the expectations of the Mapuche struggle for autonomy and environmental recovery. While forestry corporations and current state regulations defend private property and promote the expansion of forestry monoculture (DL 701), they also contribute to water scarcity in southern Chile. In contrast, the autonomous Mapuche movement defends the common property of natural goods and their ecological regeneration. These are two opposed ecological and cultural logics that collide in southern Chile.

5. Conclusion: Water justice and neoliberal governmentality in the Wallmapu

After more than a century of forestry development in southern Chile, this geopolitical project has been related gradually and with increasing force to the emergence of water scarcity. In this work, we have advanced some exploratory indicators of this relationship. However, we recognize that they are still insufficient and consequently the research field remains open for new findings. Future research should consider that the socio-ecological relationship between forestry development and water scarcity is rooted in historical-geographical processes, which have produced the dispossession of natural commons of Mapuche in southern Chile. Following the military occupation of 1881, state

forestry development was established on Mapuche ancestral lands (1931-1973), which was intensified with the advent of neoliberal forestry development (1974 onwards), reproducing historical processes of dispossessing Mapuche from their lands and water. Consequently, since the 1990s, the Mapuche have been resisting in radical and integrated modes, but converging in a common struggle that challenges the advance of environmental degradation and water injustices associated with forestry development in southern Chile.

The Mapuche can be considered an environmental justice movement because it promotes alternatives in the sustainable use and management of natural commons like land, native forests, and water resources^{iv}. In particular, the Mapuche movement seeks water justice, that is, it seeks to reverse the dispossession of water associated with forestry monoculture, questioning the capitalist logic of understanding and managing of land, forests, and water. However, given its internal complexity and the diverse communal strategies associated with the Mapuche social structure (cf. BENGOA, 1985), empirical research will have to explore how these multiple resistance strategies open new horizons for the development of Mapuche environmentalism, and how this environmentalism is associated or not, and in which ways, with more sustainable modes of managing natural commons. This could be a way to promoting the institutionalization of water justice, not only with Mapuche and non-Mapuche peasant communities in the territory, but also in relation to regenerating ecosystems severely damaged by more than hundred years of environmental degradation associated with forestry development.

However, there are obstacles to the Mapuche agenda for sustainability and water justice. In the face of the radicalization of Mapuche resistance, neoliberal governmentality has adopted a series of devices that strengthen the neoliberal regime that defends private property, which excludes ancestral and collective forms for managing the natural commons. In response to the Mapuche uprising, over the last 15 years, neoliberal governmentality has employed a series of military and police devices of persecution and criminalization of Mapuche resistance in their ancestral territory of Wallmapu (MELLA, 2007; RICHARDS, 2010; BENGOA, 2012; LLAITUL, 2014; PINEDA, 2014). Evidence of this repressive politics is the investment by the Chilean government in 2015 of a dozen armored police vehicles to suppress the Mapuche with advanced military weapons technology (EL CIUDADANO, 2015). There is a hegemonic regime that is defended by the state, its police and military apparatus, as well as by various public and private institutions associated with the forestry sector. Neoliberal governmentality and its associated power-knowledge certainly defend the interests of forestry corporations. This power-knowledge regime is being challenged by the multiplicities of radical and moderate groups of the Mapuche movement for water and environmental justice. To the degree that the advance of forestry monoculture continues to produce water scarcity, it can be expected that the Mapuche movement for water and environmental justice will be radicalized. Thus, the neoliberal governmentality regime also opens new research questions about the new repressive state-military apparatuses to confront the communal Mapuche resistance in their ancestral lands of Wallmapu. Consequently, to investigate the water sustainability of forestry development, it is certainly important to consider the multiple modes of Mapuche resistance and its historical-geographical relationships of

conflict and alliances with forestry corporations, the state, and civil society organizations nationally and internationally.

Notes

- i It is estimated there were 38.9 million hectares of native forest in Chile in 1923 (KLUBOCK, 2014: 69). By 2010 there were only 13.6 million hectares, representing a decrease of 65% (FRÉNE et al, 2010: 25).
- ii For this analysis, “water shortage” is considered to be equal to the average amount of water per person distributed each day.
- iii Extract from a speech at the “March for Water and Against Alto Maipo” in Santiago, December 13 2014.
- iv Assuming this theoretical and political approach does not imply arguing the absence of Mapuche communities that could go in the opposite direction or alternative development options. This is the main reason we do not seek to “essentialize” the Mapuche culture and movement as “intrinsically” sustainable from the hidrosocial point of view. Nevertheless, this is a key issue that should be investigated empirically.

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Submitted on: 15/06/2015

Accepted on: 19/12/2015

<http://dx.doi.org/10.1590/1809-4422ASOC150134R1V1912016>

FORESTRY DEVELOPMENT, WATER SCARCITY, AND THE MAPUCHE PROTEST FOR ENVIRONMENTAL JUSTICE IN CHILE

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Abstract: From a theoretical approach based on political ecology and environmental justice, we assess how forestry development has generated socio-spatial dynamics of environmental degradation and water scarcity in southern Chile. Through historical-geographical and ethnographic methods, we discuss how and why the spread of forestry plantations has significantly influenced social and environmental degradation of the Mapuche's modes of living. In response, during recent decades a political articulation of a Mapuche social movement is observed. Their demands include land, autonomy, rights and opportunities to frame their own development strategies. Within the internal diversity of this movement, a key principle is reversing the spread of environmental degradation by recovering the native forest and its natural water cycles, which have been disrupted significantly by the increasing of forestry plantations. We explore these dynamics of the Mapuche movement from an environmental justice approach.

Keywords: Forestry monoculture, water scarcity, Mapuche, water justice, natural commons

Resumen: Desde un enfoque basado en la ecología política y la justicia ambiental, evaluamos cómo el desarrollo forestal silvícola ha generado dinámicas socio-espaciales de degradación ambiental y escasez hídrica en el sur de Chile. Mediante métodos histórico-geográfico y etnográfico, discutimos cómo y porqué el avance y consolidación del sector forestal ha influido significativamente en una creciente degradación social y ambiental de las condiciones de vida de las comunidades Mapuche. En respuesta, durante las últimas décadas se observa la articulación política de un movimiento social Mapuche, cuyas demandas son tierra, autonomía, respeto de derechos y posibilidades de guiar su propio desarrollo. Dentro de la diversidad interna de este movimiento, destaca la idea de revertir el avance de la degradación ambiental, que implica recuperar el bosque nativo, especialmente sus

ciclos naturales de agua, interrumpidos significativamente por el avance de monocultivos forestales. Exploramos estas dinámicas del movimiento Mapuche desde la mirada de la justicia ambiental.

Palabras clave: Monocultivo forestal, escasez de agua, Mapuche, justicia hídrica, bienes comunes naturales

Resumo: Com um enfoque baseado na ecologia política e na justiça ambiental, avaliamos como o desenvolvimento florestal silvícola tem gerado dinâmicas socio-espaciais de degradação ambiental e escassez hídrica no sul do Chile. Através de métodos histórico-geográfico e etnográfico, discutimos como e porque o avanço e a consolidação do setor florestal tem influenciado significativamente na crescente degradação social e ambiental das condições de vida dos Mapuches. Em resposta a isto, durante as últimas décadas se observa a articulação política do movimento social Mapuche, cujas demandas são terra, autonomia, respeito de direitos e possibilidades de guiar seu próprio desenvolvimento. Dentro da diversidade interna desse movimento, se destaca a idéia de reverter o avanço da degradação ambiental, que implica recuperar a mata nativa e seu ciclo natural de água, interrompidos significativamente pelos avanços dos monocultivos florestais. Estas dinâmicas do movimento Mapuche são exploradas desde o ponto de vista da justiça ambiental.

Keywords: Monocultivo florestal, escassez de água, Mapuche, justiça hídrica, áreas comunais
