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Demographic variation and land use in the coastal mountain range of the Araucanía Región of Chile (1960-2017). Study of the rural census-district “Maitenrehue”. Angol-Chile

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Demographic variation and land use in the coastal mountain range of the Araucanía Región of Chile (1960-2017). Study of the rural census-district “Maitenrehue”. Angol-Chile

Abstract: The Maitenrehue census district (37°47'55" Lat. South, 72°42'30" Long. West) is located in the coastal mountain range of the Araucanía region, Chile. In the second half of the 19th century colonisation began, modifying the area for agricultural use. The agrarian communities based their production systems on subsistence schemes (exploitation of the forest, livestock and cereals) on soils with little productive capacity. Since the 1970s, the area of land under agricultural use and native forest decreased by 87% and 16% respectively being replaced by forest plantations for industrial purposes which increased by 2869%; at the same time (1960-2017) the population of the district decreased by 78.3%, with an increase in the older adult and male population. The background allows us to conclude that from the 1970s onwards the economic dynamics of the territory directed land use towards industrial forestry plantations significantly increasing its surface area using a non-integrative production system that was alien to the peasants who inhabited the territory; also under the social and economic context of vulnerability present in rural communities the process of migration of the population and the continuous depopulation of the district accelerated from that moment.

Keywords: Migration, depopulation, coastal mountain range, Araucanía, forestry industry.

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1. INTRODUCTION AND JUSTIFICATION

This article presents the evolution of the population structure and land use in the rural census district "Maitenrehue" located in the coastal mountain range of La Araucanía Region.

The area occupied by the district has its origins in an old hacienda inhabited since the second half of the 19th century, which then began to break up into small properties (1960s). Later (1970s to the present day) properties were acquired and planted to produce raw materials for the nearby pulp and paper industry.

This process of transformation over time provoked profound demographic and landscape changes; this phenomenon has not been documented in the sense of relating the variation of the population in contrast to what happened in the landscape (land use); this considering that the social and economic system of the population of the place is linked to the use of the land.

2. OBJECTIVES AND METHODOLOGY

The objective of the article is to explain the demographic change that has taken place in the rural census district of Maitenrehue, and to understand why the total population and the young population have decreased and there has been an increase in the elderly population as the territory has undergone significant changes in land use to industrial plantations. This analysis has a timeline of 57 years (1960 to 2017), through unified cuts according to the available data resource.

It should be noted that the Maitenrehue district is a formal classification of the Chilean National Institute of Statistics; it is located on the eastern slope of the coastal mountain range (37°38'55" South Latitude, 72°45'31" West Longitude).

Background information on land use cover was collected with old material from 1962-1987 and digital cover cadastres from 1997, 2007 and 2017; these were analysed with the annual forest growth rate.

Population was analysed with population-census data from: 1960-1970-1982-1992-2002 and 2017. The variables were total population, female-male and age ranges, forming, from these data, indicators for analysis and comparison.

Other indicators were used: absolute and relative growth rate, variation and dynamics in age structure (young population (0-14 years), young-adult and adult population (15-45 years) and adult and older adult population (45-65, and 65 years and over)) and demographic dependency index.

In order to establish a contrast between demographic variation and planted area, correlation (Rho) was used with the time-court 1960-1970, 1970-1982, 1982-1992, 1992-2002 and 2002-2017.

3. RESULTS

The changes in the population of the Maitenrehue district are of high magnitude. The population of the district has declined by 78.3%, (1678 inhabitants) from 1960 to 2017, of which 54% are male and 46% female, with a negative annual rate of 2.64% over the last 57 years.

The period of least variation and magnitude of demographic change was in the decade from 1960 to 1970 with an annual growth rate of -1.2% and with the greatest variation and magnitude in the period 1982-1992 with -3.03% and 1992-2002 with -4.77%.

The data indicate that the working age population (labour force aged 15-64 years) constantly migrates from the district and does not return, constantly decreasing the population between censuses.

The transformation of the territory is drastic. Agricultural land used by peasants is mostly transformed into plantations after being acquired by the forestry industry; in the case of native forests there is a continuous decrease either in fragmented, low density or dense condition, which were then replaced and this space occupied with industrial plantations.

Between 1962 and 2014, land destined for agricultural use decreased by 87%; similarly, native forest decreased by 16% and industrial plantations increased by 2869%.

4. DISCUSSION

The Maitenrehue rural census district has undergone a steady process of population decline from 1960 to 2017, while at same time the landscape from agricultural and native forest use to industrial plantations, mainly of *Pinus radiata* for the pulp and paper industry. The area of land used for agricultural purposes decreased by about 60% and plantations increased from 1.67% (1962) of the original area to 35% of the district's total (2017).

The depopulation observed in the rural district of Maitenrehue has occurred in other regions of Chile, such as the “Ñuble” and “Biobío” regions, where the expansion of the area of industrial forestry plantations and its effects have been attributed as the main causes of the phenomena of migration of young people and population decline in rural areas, an increase in the poverty rate and adjustments in the cultural life of settlements or villages. This is occurring under complex contexts of adaptation to the new scenarios of economic dynamics that affect the territory.

The results suggest that the process of land use transformation, the expansion of the forestry industry and migration during the 57 years of data collected obey the following inferences:

- From the 1970s onwards there are dynamics of increased demographic change and land use. The development of the forestry industry promoted the acquisition of land from the peasant population of the district in order to have their own patrimony and supply raw material (trees) to the nearby cellulose industries.
- The economic incentive granted by the State to forestation (in force until 1996) was a stimulus for industrial plantations in the district, this from its enactment and implementation; that is to say, the incentive was a trigger that caused the expansion of the forestry industry over the district and the entire coastal mountain range.
- The changes in land use in the period 1960-2017 coincide in time with the occurrence of complex social and cultural conditions of the peasant society of the territory, such as the fragmentation of the traditional property structure as a result of the agrarian reform, the

formation of new owners with smaller properties (post agrarian reform, decade of the 60s and 70s) and generational changes.

-Incident factor as limitations in land use potential, profitability and asymmetric information of economic dynamics towards the inhabitants influenced decision-making processes such as the transfer of land and migration of the labour force causing a decrease in population and ageing.

5. CONCLUSIONS

According to the information collected, there is a negative correlation in time between the increase in the area of industrial plantations and population in the Maitenrehue district in the period 1960 to 2017 along with changes in the demographic structure as the population decreased such as less young population, increase in the adult, population migration of the working-age population (15-64 years) and increase in the elderly and male population.

Regarding the direction of change in land use, a clear trend is observed to move from soils used for agriculture and native forests to industrial plantations with greater evidence from the 1970s onwards.

The above indicates relationships between spatial variables (plantation, agricultural use and native forest) and time (years) from 1960 to 2017.

It is concluded that the promotion of the forestry industry did not integrate the rural peasant population of the sector in the analysed time line.

In this regard, it is established that the objective of the forestry industry was to transform the territory into a supplier and site extraction space of raw materials for industrial purposes outside the existing population.

Industry does not integrative sense of the local population in this moment from adding it to the emerging industrial economic dynamics.

Circumstantial factors such as land tenure, social structure, low profitability of production systems, social vulnerability, information asymmetry, among others, gave space for the continuous labour migration, sale of property and results such as population ageing and continuous rural depopulation.