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## Chile: Tree monocultures threaten unique forest type

The fragmentation of habitats resulting from human activities --among which industrial tree plantations-- provokes restrictions in the supply of resources and the spacial needs of animal and plant species, which can even lead to the extinction of entire ecosystems. Once landscape structure has been altered the persistence of both plant and animal populations is menaced.

The central and southern regions of Chile have been and are being extensively planted with fast-growing tree monocultures. These regions gather in their temperate forests the highest diversity and endemism in the country. Plantations' present area is estimated in some 2.5 million hectares, with Monterrey pine (*Pinus radiata*) representing 80% of the total. A study carried out by the government agency CONAF in 1997 already showed that the annual deforestation rate during the 1985-1994 period had been of 36,700 hectares and that almost 40% of such area was destroyed to clear land for industrial tree plantations.

Additionally to the social conflicts that such development has generated, several studies since the decade of 1980 point out that changes in the landscape provoked by plantations have caused negative effects on the environment, included the affection of the habitats of native species. Independent research coincides in stating that the degree of perturbation caused by plantations of *P. radiata* is high. Ecological alterations have sometimes affected the plantations themselves as happened during outbreaks of defoliating insects and rodents registered in plantations in Chile.

A research published by a group of researchers of the Universidad de Chile and the Carleton University of Canada analyses the deforestation and fragmentation of the ruil forest (*Nothofagus alessandri*), a temperate and endemic formation restricted to 100 km of the coastal range of Central Chile, in association with *Nothofagus glauca*, *Nothofagus obliqua* and other species. The ruil forest area was estimated as comprising 825 hectares in 1981, but had shrunk to 352 hectares in 1991, mainly due to the expansion of plantations of Monterrey pine. The remnants of the ruil forest now have the configuration of an archipelago --composed of several small, regular fragments and few large, irregular ones, relatively isolated-- and surrounded by a matrix of pine plantations. Despite being a unique and severely threatened ecosystem, only 45 hectares of the ruil forest are under protection in the Chilean System of Protected Areas, and such protection --even without taking into account that the area is insufficient considering the present state of the ruil forest-- is not actually implemented.

The research considers that the situation is critical, since the effects of deforestation and fragmentation imply, in the short term, the loss of species and that of this unique ecosystem: "The ruil forest as an ecosystem is heading toward extinction. If the current rate of deforestation remains unabated, even ignoring deleterious effects other than area reduction, the ruil forest as a recognizable biome will disappear within the next decade due to the extinction of many species associated with this forest", expresses the document.

Additionally, Monterey pine presents further threats to the ruil forest: it is an invasive species intruding on the fragments of ruil forest; due to its higher ability to obtain water, it could outcompete

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native trees; Monterey pine is also fire-prone and since the ruil forest is embedded in a pine matrix, any fire in plantations may obliterate the ruil remnants.

The authors conclude that land use in central Chile is not sustainable. "Sustainability implies economical, ecological and socio-cultural issues. Even when pine plantations may offer a profitable economical income (under current market interests), this benefit is reached at the expense of socio-cultural and ecological aspects. From a socio-cultural point of view, extensive forest plantations increase poverty and unemployment as plantations demand low workforce. The increasing local unemployment has triggered the emigration of peasants (Lara & Veblen 1993, Unda et al. 1997). Furthermore, the loss of native forest because of an inappropriate management is considered by local people to be one of the main environmental problems of the region (Hajek et al. 1990). From an ecological point of view, land management is definitively unsustainable. We have no evidence that Monterey pine is degrading the land where it is planted, but as discussed above, this exotic species is the main reason for ruil forest loss and fragmentation, and ultimately for its current endangered status."

Article based on information from: "Landscape Ecology, Deforestation, And Forest Fragmentation: The Case Of The Ruil Forest In Chile." by Audrey A. Grez, Ramiro O. Bustamante, Javier A. Simonetti and Lenore Fahrig