

Chapter 4.32

Zoning Based on Climate and Soil for Planting Eucalyptus in Southern Region of Rio Grande do Sul State, Brazil

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ABSTRACT

Zoning based on climate and soil characteristics does not represent a full ecological-economic zoning procedure, as the Brazilian law establishes, but it is a positive step forward toward a sustainable use of natural resources. The Embrapa Temperate Climate Research Center has developed, with the collaboration of several entities from Brazil and Uruguay, a zoning procedure based on climate and soil for planting eucalyptus in southern region of Rio Grande do Sul State covering a total area greater than 3,5 million hectares. Three eucalyptus species were considered: *Eucalyptus grandis* W. Hill ex Maiden, *Eucalyptus dunnii* Maiden and

Eucalyptus globulus Labill. Data were processed and integrated through statistical procedures and by using a GIS. The potential surface area for forestry surpasses 900,000 hectares, but a homogeneous exploitation of that territory is limited by legal restrictions.

INTRODUCTION

The Brazilian legislation that first established the country's official National Environmental Policy was Law 6938, signed into effect in 1981. It specifies environmental zoning as one of the instruments officially sanctioned to implement this national policy. Regulation of specific aspects of Law 6938 came to fruition 20 years later when

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ecological-economic zoning was detailed in 2002 by Ordinance Number 4297. This ordinance indicates the representation of the real world through a geographic information system (GIS), with minimum scale of 1:250000, including several information levels, as cartography, economics, geology, geomorphology, hydrology, meteorology, sociology, remote sensing and land use and performing analysis on these data by constructing models and simulating scenarios.

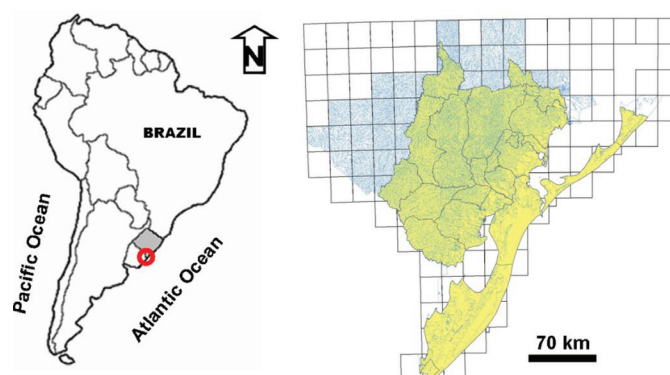
While zoning based on climate and soil characteristics does not represent a full ecological-economic zoning procedure, it is a positive step forward toward planning the sustainable use of natural resources. The Embrapa Temperate Climate Research Center has developed a zoning procedure based on climate and soil for planting eucalyptus in southern region of Rio Grande do Sul State covering a total area of 3,714,096 hectares (Figure 1). The region has a temperate to subtropical climate with elevation ranging from sea level to 400 meters. Prairies are the prevailing landscape, but rocky fields occur in the western sector, and wetlands together with sandy terrain appear in the eastern sector (coastal region).

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institutions provided meteorological data and productivity data for the three eucalyptus species (*Eucalyptus grandis* W. Hill ex Maiden, *Eucalyptus dunnii* Maiden and *Eucalyptus globulus* Labill) commonly planted in this region. The results of the project have been previously published (Flores, Filippini Alba & Wrege, 2009) and are summarized in this present chapter.

Eucalyptus spp. originated in Australia and on several islands of Oceania. More than 600 species and subspecies have been identified. One of the main characteristics of eucalypts is their ability to adapt to different environments. Some species occur in arid regions whereas others do well in cold and humid conditions, meaning eucalypts are included in all plant formations of Oceania. The name “eucalyptus” is derived from the conjunction of two Greek words and means “true coverage” due to the magnificent expansiveness of trees that may grow to a height of one hundred meters (Pryor, 1976). *Eucalyptus grandis* has a large volumetric annual increment when grown in favorable conditions of climate and soil, meaning geographic regions with low occurrence of frost and drought (Golfari et al., 1978; Poyton, 1979; Elridge et al., 1994). While *Eucalyptus dunnii* has lesser volumetric increment, it is more tolerant to frost. *Eucalyptus globules*, on the other hand,

Figure 1. Location of the study region (red) within contexts of South America, Brazil and Rio Grande do Sul State (gray) and geographic details study area (yellow) including hydrographic network (blue lines), and municipal demarcations (gray lines on yellow background)



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