Eucalyptus plantations in Brazil

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The history of Eucalyptus in Brazil dates back to the 19th century, when a Dr. Navarro de Andrade began planting this hardwood species adjacent to newly laid railways and foresaw a need to replant the wood used in the tracks. During the 1970s, the Brazilian Enterprise for Agricultural Research (Embrapa) began researching the Australian species, and this work lifted its average national growth rate from 7.5 m³/ha/year to the current level of 45 m³/ha/year. This extraordinary performance has social, economical and environmental implications.

In Brazil, Eucalyptus found in the bountiful water and the tropical sun the perfect environment for such planted species, which helped them to now comprise the largest proportion of plantation forests in the country. However, planted Eucalyptus forests represent only a fraction of the less than 0.6% of the arable land available - the whole country uses less than 20% of its agricultural land these days, and the world average forest plantation cover is 4 to 5%. While globally there has been a steady decrease in the per capita availability of agricultural land, Brazil is one of the countries with the lowest level of land occupation.

The country has the highest Forest Investment Attractiveness Index - IAIF score, promoted by the Inter-American Development Bank - IADB (Figure 1), making it the best option for investors, regarding sustainable forest management activities. This index measures the business climate for investments in the sustainable forest business, considering three sub-indexes (SUPRA, INTER, INTRI), 20 major indicators and over 80 variables (NASCIMENTO, 2005). Brazilian forest sector is definitely a great opportunity for domestic and international investors.

Within the scenario of global changes, the forest sector surges as a major source of clean water, soil conservation and carbon sequestration. The strong growth of tree species in Brazil reflects positively on the quantity and quality of "green water" (rain, rivers etc), which is basically responsible for 65% of the water available for human use, the remain-

Figure 1: IADB's IAIF
ing 35% comes from “blue water” (reservoirs, lakes etc). Therefore, Eucalyptus is a major contributor.

Water consumption studies indicate that Eucalyptus does not consume more of the liquid per biorenewable unit, than any other vegetation. At different locations within the world, the species portrayed transpiration rates between 0.2 and 7.7 mm/day (Whitehead & Beadle, 2004), or 1.2 to 46.2 litres/tree (for plantations with 6 m² area). Figure 2 is from a Eucalyptus plantation in the Northwest region of Brazil with an average rainfall under 600 mm/year, and illustrates the behaviour of the species under water stress conditions.

Source: Energetic Forest Project, Embrapa

Eucalyptus, in common with other fast-growing species, uses a large amount of nutrients, especially at the three initial years of development. After this initial period, a recycling phase starts, when the tree crowns constantly deposit leaves, branches and barks to the ground as litter which is processed by soil microorganisms into new nutrients to help keep up the pace of growth. Trees are far better for the balance of soil nutrients balance than any other annual crop.

Trees reduce wind speeds also and, as a result, erosion, protecting soil surfaces by litter deposits and forming root network. Fast-growing tree species within areas with immense agricultural land use as excellent wind barriers, preventing soil loss due to excessive winds at the same time as improving the land.

Brazilian Eucalyptus plantations hold the world record in terms of carbon dioxide sequestration, capturing average 26 tCO²eq/ha/year and therefore make a major contribution on removing industrial pollutants from atmospheric moisture.

One of the major constrains to Eucalyptus cultivation is the public perception that extensive monocultures of the species create a monotonous and visually impacting scenery, changing the established relationship between the local society and their natural environment. In order to reduce the impact of those extensive monocultures and turn this highly attractive economic activity into a socially desirable environment, forest design concepts can be applied on larger scale.

Designing a forest site involves understanding local society and natural features (declivity/slope, rain, seasons etc) and producing a forest plantation that can be sensitive to “spirit” of the local people, reflecting the relationship they have with their natural sites. This can be achieved through careful planning and a creative mind, capable of capturing society’s desires and reflecting them within the context of a forest project - presenting a major challenge for forest engineers.

This concept of forest design addresses another challenge for forestry in general and, in particular, forest plantations: to integrate forestry to other land uses within rural scenery. This is part of the general architecture process, assumed as a pragmatic approach to human necessities and engineering possibilities, in order to create an environment which is both useful and beautiful. The forest architecture therefore emerges as a potential tool to address those challenges, combining natural features and society needs into a project answering for both supportive and productivity.

Eucalyptus plantations in Brazil reflect a history of success, a present time full of challenges and a cordial and vigorous future, making it an important part of Brazilian society and culture.

Bibliography
