

experiment replicated seven times in the Coast and Cascade ranges of western Oregon, USA. This paper focuses on patterns observed 6 years following thinning. Early-seral cover was related to interactions among broad-scale variation in climate, intermediate-scale variation in insolation, and fine-scale neighborhood interactions. Late-seral species cover was related primarily to fine-scale neighborhood interactions. Furthermore, cross-scale interactions partially explained patterns of spatial correlation among neighboring subplots for early-seral species but not late-seral species. The authors hypothesize that residual patterns of spatial autocorrelation were related to unmeasured environmental variables for early-seral species and historical conditions (i.e., pre-treatment stand composition and structure) for late-seral species. Results suggest responses of understory plants to overstory density management depend on cross-scale interactions among environmental drivers, neighborhood-scale interactions, and species traits.

Future demand for ecosystem services from terrestrial ecosystems from global power production scenarios to 2100: the role of forest biomass. Callesen, I. (*University of Copenhagen, Denmark; ica@ign.ku.dk*).

The world's electrical power production depends on the current energy infrastructure, and future investments in new power supply facilities using renewable and non-renewable energy sources. Continued growth in energy production in the 21st century will cause global environmental change. Along with climate change, global environmental change as an important driver will affect the environment and the economy in multiple ways that can be summarized as losses of biodiversity and changing ecosystem services, but with very diverse temporal and spatial impacts. Using a global growth model for power production that includes non-renewable and renewable energy sources, this paper investigates the potential role of forest biomass, and outlines the demands for ecosystem services imposed by global power production on ecosystems. Three scenarios called 'renewable,' 'efficiency,' and 'fossil' represent environmental impact scenarios for global power supply to 2100 as a simplified proxy of the global energy supply. The introduction of such future electrical power-mix scenarios in product life cycle assessment combines pressures from climate change, nitrogen enrichment, acidification, land use changes, and associated biodiversity impacts with the role of provisioning and regulating ecosystem services delivered by forests.

Influence of spacing regimes on the development of loblolly pine (*Pinus taeda* L.) in southern Brazil. Cardoso, D., Lacerda, A., Rosot, M., Garrastazu, M. (*EMBRAPA, Brazil; denise.cardoso@embrapa.br; andre.biscaia@embrapa.br; augusta_rosot@hotmail.com; marilice.garrastazu@embrapa.br*), Lima, R. (*Ideal Florestas, Brazil; renato.lima@idealflorestas.com.br*).

This paper reports the 24-year growth of *Pinus taeda* in Southern Brazil in response to five cultural regimes. Five initial spacing regimes (2.5 m × 1.2 m, 2.5 m × 2.0 m, 2.5 m × 2.8 m, 2.5 m × 3.6 m, and 2.5 m × 4.4 m) combined with cultural procedures generally used in commercial stands were studied. Dendrometric variables analyzed include DBH, average and dominant height, site index (SI), basal area, volume per tree and per hectare, and assortment volume. The results indicate a final lower average DBH in denser spacing regimes but no significant difference in relation to volume per hectare and basal area at the end of the 24-year cycle. It is possible to obtain the same volume per hectare, on average 385.7 m³/ha, at the age of harvesting by combining different initial spacings with thinning intensities. The mean annual increment (MAI) has a positive correlation with initial spacing; the densest spacing had a MAI 45% higher than the widest treatment. The results provide managers with long-term data that can be used in forest management planning, for example by allowing companies to adjust their operations depending on the costs of planting, maintenance, and other cultural treatments.

The afforestation present in the squares of the city of Ponta Grossa, Paraná, Brazil. Carvalho, S., Dos Santos, Z. (*State University of Ponta Grossa, Brazil; silviameri@brturbo.com.br; zihngara@hotmail.com*).

Open spaces, especially parks, are an essential element of the urban environment because they are meant to provide the chance for leisure and increase the quality of life for the population. The afforestation in 83 squares in the city of Ponta Grossa, in southern Brazil, was evaluated quantitatively and qualitatively. The size and condition of 2 369 trees from 69 species and 33 families were also evaluated. It was found that 65.86% of the species are exotic. The most frequent species was *Ligustrum lucidum* (22.08%), a percentage considered high. Most of the trees, 57.83%, are in good condition, 36.81% in satisfactory condition, 4.1% in poor condition, and 1.3% dead. Regarding size 48.8% are large trees, 23.17% are medium sized, 21.82% are small, and 6.21% are seedlings. Regarding the Density Index Arborea (IDA) for each square, it was observed that of the 71 squares with vegetation, only 33.8% are above 1, that is, have one or more trees for every 100 m². The afforestation of city squares was found to be heterogeneous, as there are squares with many trees, and some without any.

Environmental valuation of trees in the city of Ponta Grossa, Paraná, Brazil, by emergy analysis. Carvalho, S., Carneiro, D. (*State University of Ponta Grossa, Brazil; silviameri@brturbo.com.br; dacriscar@hotmail.com*).

Emergy is a universal measure of the real wealth of the work of nature and society made on a common basis. In this sense, emergy analysis is presented as a methodology that recognizes and measures the universal hierarchy of power, in this case, the urban forests of the city of Ponta Grossa, in southern Brazil. A total of 2 379 trees on the streets and in the city squares of downtown Ponta Grossa were recorded and measured. Their respective values, in terms of components of the economy (labor and expenses related to afforestation) and from the environment (average local rainfall, soil nutrients, and biomass of the analyzed trees) were estimated. Thus, the emergy value per tree was obtained. The average value 5.54E +15 seJ per tree was found. Use of the *emdollar*, which is obtained from the emergy analysis of the local economy, is recommended. Therefore, the average value of \$1 240.00 per tree was obtained, which takes into account the average contribution per tree to the economy and to the environment. With the emergy environmental valuation, it can be seen that the work of nature is recognized, and that environmental and urban planning—in this case, urban forestry in Ponta Grossa—can be better conducted.

Blue carbon of selected natural and plantation stands of mangrove forests in the Philippines. Castillo, J. (*Ecosystem Research and Development Bureau, the Philippines; allan536@yahoo.com*).

This study estimated the carbon stored in the biomass and sediment in selected natural and plantation stands of mangrove forests in the Philippines. For natural stands, the total carbon stock in biomass and sediment combined was 262.66 metric tons C/ha, on