

Energy and Resources Group Spring 2008 Colloquium Series (ER295)

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**Modeling the Spatial Patterns of
Plants: pragmatic predictions from
minimal information**

110 Barrows Hall / 4:00 p.m.

My research, joint with colleagues, concerns a class of simple, tractable, and broadly applicable models of the spatial distributions of plants. The models build on a statistical "colonization rule" for mimicking the outcome of biological processes. The approach allows closed form analytic solutions and can be implemented with minimal information. The models improve on existing models by incorporating more realistic spatial clustering of individuals of a species. The improvement is confirmed by a variety of empirical tests using a large body of census data on tropical trees and serpentine grassland species. Lessons learned from these models are applied to the problem of predicting the abundance of a species in an area from data on its presence or absence in the cells of a grid. In the standard prediction approach, the number of occupied cells on the grid is the sole prediction variable. Our hypothesis is that a second variable - a measure of the spatial clustering of the occupied cells - will improve prediction. An adjacent-cell autocorrelation emerges as the most effective measure. Over six census datasets, it improves prediction with high statistical significance, reducing the mean square error of log-predictions on the order of 60%.