

## MODELING AND CONTROLLING THE SPREAD OF INVASIVE SPECIES OVER HETEROGENEOUS LANDSCAPES

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The objectives of this project are to explain the spatial and temporal rates of spread of two invasive weeds in Puerto Rico (*Mimosa pellita* and *Melaleuca quinquenervia*) and to help decide among alternative measures to control their rate of spread. The project started by building suitability maps for each of the selected invasive species. We will then model the spread of these species over time and space under different scenarios, among which are a set of alternative chemical control programs. Finally, the project aims at improving public awareness on the relative merits of alternative spread control measures.

**Where we are at.** In order to capture the texture and heterogeneity of landscape, a GIS framework was adopted. To this effect, we are using both commercial (ArcGIS) and open source (GRASS) GIS software. We are constructing suitability maps by either using expert knowledge to generate suitability indexes based on environmental variables, or by using statistical methods (mainly with R).

**Where we plan to go.** Later on we will explore the use of algorithmic approaches to building suitability maps. In the second stage of this project we plan to supplement these findings with a series of programs aimed at capturing the alternative dispersal mechanisms available to the selected invasive species. For instance, contiguous spread behavior will be captured with cellular automata rules, while long distance dispersal will be captured through a sequence of draws from probability distributions that determine the occurrence of a long distance dispersal event, its direction, and its distance. Mathematical modeling software geared to GRASS will be used to model the spread of the invading species. Survival over time will be determined by the previously generated suitability maps.

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