

Size distribution of ecological niches

Charo I. del Genio and T. Gross

Many species exist in a kind of ecological relation of interdependence, so that their survival can depend on the viability of other species. The strongest simplification is the reduction of this interdependence to only two kinds of relation, namely necessity and incompatibility. An example of necessity is a particular species A needing the presence of a species B to survive; similarly an example of incompatibility is the viability of a species A depending on the absence of a species B.

This project aims to represent ecosystems as random networks, in which the nodes represent species, and the links correspond to dependence relations. The viability of a species is encoded in the state of a node: 1 for viable, and 0 for non-viable. In the beginning, all species are assumed to be viable. However, not all will survive, as not all the interdependence conditions can be satisfied.

We want to study the size distribution of the surviving ecological niches as a function of the probability p of the existence of dependence relations, and of the relative probability of the occurrence of the two types of relation. The work will involve computer simulations and theoretical modelling.