

# Presentation

## Computer simulation as a tool for understanding theory and models in Ecology

**“Essentially all models are wrong, but some are useful”** George Box

**“Theory without data is fantasy, but data without theory is chaos”** Lawler, E. 1971

**“When observation and theory collide, scientists turn to carefully designed experiments for resolution. Their motivation is especially high in the case of biological systems, which are typically far too complex to be grasped by observation and theory alone. The best procedure, as in the rest of science, is first to simplify the system, then to hold it more or less constant while varying the important parameters one or two at a time to see what happens”**

Wilson, E. O. 2002. *The Future of Life*, Alfred Knopf, New York.

## Coordinators

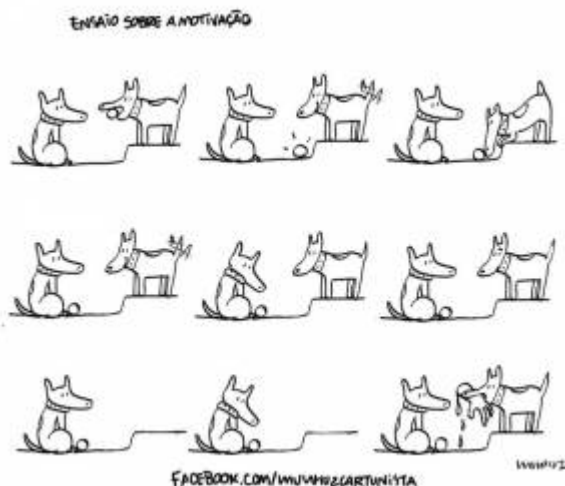


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## Motivation



Ecology Graduate programs in Brazil have invested heavily in field courses to train students in the practice of the scientific method in ecology. These courses, in general, reproduce all phases of scientific production, from the elaboration of pertinent questions, through planning, data collection and the dissemination of the work. We believe that this has been an important instrument in the transformation of Brazil's Ecology into a more robust science inserted in the global context. However, one of the assumptions of these courses is that the students has a basic theoretical framework in ecology, which does not always correspond to the reality of students entering graduate programs.

# EcoVirtual: Didactic Tool

Focusing on this demand, we created a set of tools to help teaching and learning basic ecological theories and models. These instruments incorporate:

- site built on a wiki platform (DokuWiki) with exercises tutorial and specific bibliography indications for each topic;
- code in R language for simulating models in each topic;
- a graphical user interface (GUI) package to allow users with no programming skills to run simulations.

At the moment, the project already has several themes developed with simulations, almost all of them with a graphical user interface. Themes address different organizational levels in ecology:

1. Population dynamics
2. Metapopulations
3. Interaction and coexistence between pairs of species
4. Conflicting demands and coexistence of multiple species
5. Neutral dynamics of communities
6. Biogeography

Some undergraduate and graduate courses at the Institute of Biosciences of the University of São Paulo use these simulations that have already been tested at least at the R code level. Any problems you find on the site or in the simulations, we ask that you contact the project's creators, who are also the platform maintainers, through the emails listed at the beginning of this page. If you are a github user, we ask that you open an *Issue* at <https://github.com/ecovirt/EcoVirtual>

**Problems with math expressions** If you have problems viewing mathematical expressions and symbols on this wiki, look for a plugin or extension that has ASCIIMath in the name for your browser. In **Chrome** the extension is named *MathML-2-CSS*. Firefox recognizes formulas by default, other browsers have not been tested.

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