

Spatial Ecology in R

Duccio Rocchini

Full Professor

Alma Mater Studiorum Università di Bologna

<https://www.unibo.it/sitoweb/duccio.rocchini>



Outline

1 Introduction and Program

2 Contacts

3 Books and Exam

Prof.



Teaching activity:

- Full Professor (Professore Ordinario), Alma Mater Studiorum University of Bologna (IT)
- Honorary Professor, Czech University for Life Sciences, Praga (CZ)

Scientific dissemination:

- TEDx Talk, September 6th 2015, Pale di San Martino, The Dolomites, elevation 2200 metres!
https://www.youtube.com/watch?v=_mamjG6I_rM

Research activity:

- Biodiversity analysis at multiple spatial scales — GIS — Ecological Informatics — Remote Sensing
- Nominated expert by the European Commission and the European Space Agency for the Biodiversity sector for the development of the ESA Space program until 2030

Satellite images for biodiversity estimate



European
Commission



Duccio Rocchini



Nominated expert
by the European Commission and
the European Space Agency for the Biodiversity sector
for the development of the ESA Space program until 2030



Satellite images for biodiversity estimate



Program in a nutshell

From theory...



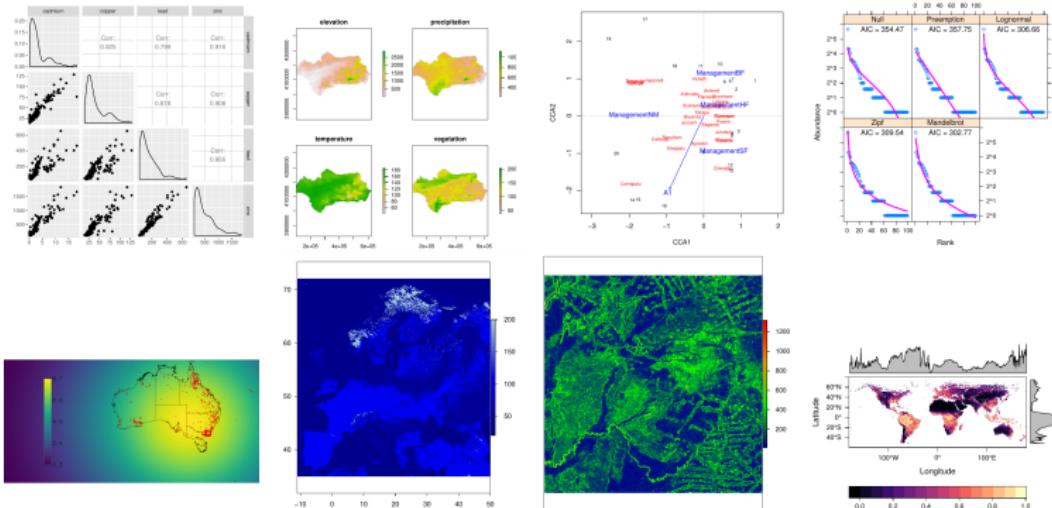
- Spatial distribution of populations
- Spatial distribution of communities
- Spatial structure of ecosystems and functions

... to practice



- Introduction to the R Software and the Free and Open Source philosophy
- Dispersal maps of organisms
- Multivariate analysis of communities
- Remote sensing

Program in a nutshell



Program in a nutshell

SUSTAINABLE DEVELOPMENT GOALS



Program

- Spatial structure of populations and population change in time: introduction to population ecology

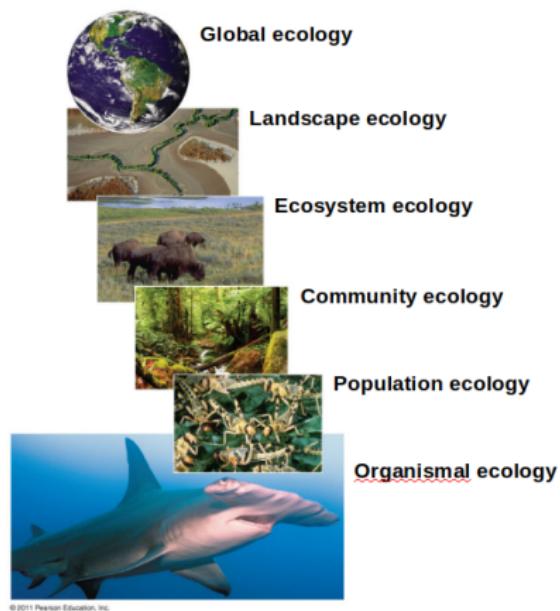
Program

- Spatial structure of populations and population change in time: introduction to population ecology
- Spatial structure of communities: introduction to community ecology and community monitoring metrics

Program

- Spatial structure of populations and population change in time: introduction to population ecology
- Spatial structure of communities: introduction to community ecology and community monitoring metrics
- Spatial structure of ecosystems and functions: exploring the main ecosystem functions

The ABC of Spatial Ecology



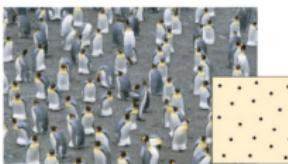
[https://earthobservatory.nasa.gov/world-of-change/
Deforestation](https://earthobservatory.nasa.gov/world-of-change/Deforestation)

Spatial structure of populations and population change in time

Patterns of dispersion within a population's geographic range



In a **clumped** dispersion, individuals aggregate in **patches**. A clumped dispersion may be influenced by **resource availability** and behavior.



A **uniform** dispersion is one in which individuals are evenly distributed. It may be influenced by social interactions such as **territoriality**.

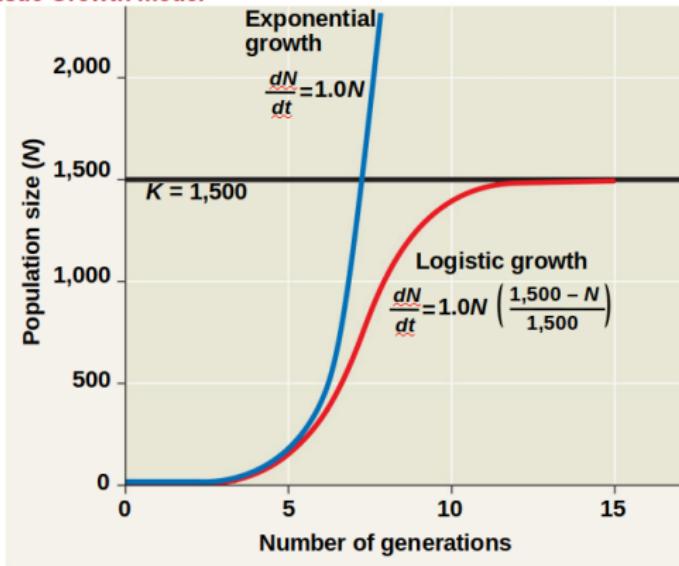


In a **random** dispersion, the position of each individual is independent of other individuals. It occurs in the **absence of strong attractions or repulsions**.

Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

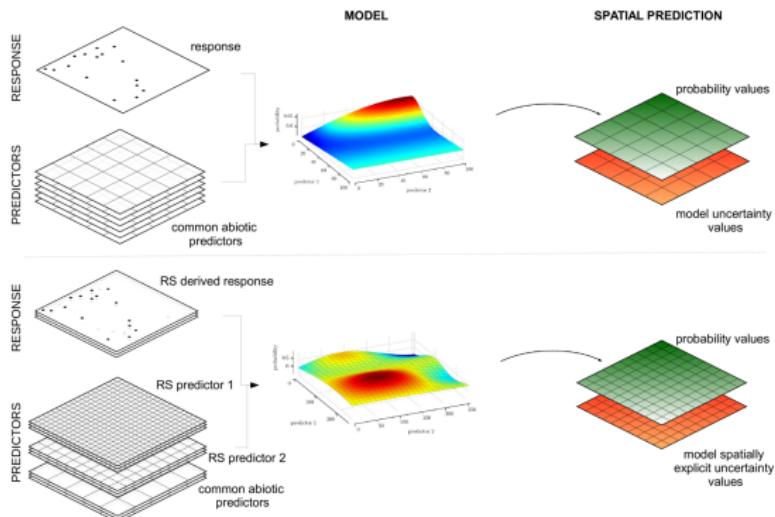
Spatial structure of populations and population change in time

Logistic Growth model

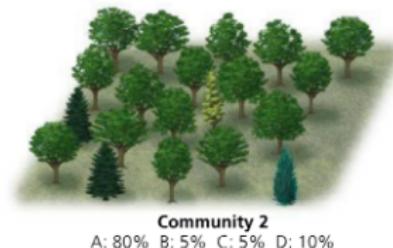
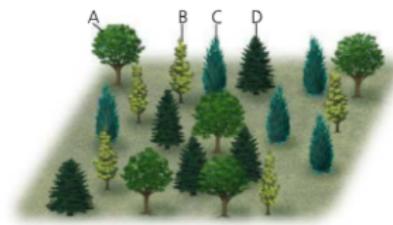


Copyright © 2008 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

Species Distribution Modelling: modelling the main drivers shaping species distributions

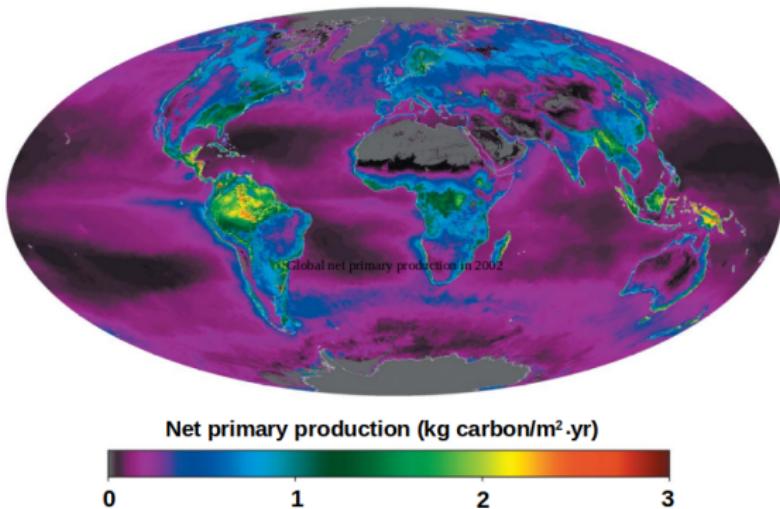


Spatial structure of communities: introduction to community ecology and community monitoring metrics



Spatial structure of ecosystems and functions

Global net primary production in 2002



R





Time Table

- Tue 4PM-6PM
- Thu 4PM-6PM

Outline

1 Introduction and Program

2 Contacts

③ Books and Exam

Contacts



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

Duccio Rocchini, PhD - Professore Ordinario @: Alma Mater Studiorum University of Bologna, Italy



- e-mail: duccio.rocchini@unibo.it [alta priorità!]

Contacts



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

Duccio Rocchini, PhD - Professore Ordinario @: Alma Mater Studiorum University of Bologna, Italy



- e-mail: duccio.rocchini@unibo.it [alta priorità!]
- facebook: [@ducciorocchini](https://www.facebook.com/ducciorocchini)

Contacts



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

Duccio Rocchini, PhD - Professore Ordinario @: Alma Mater Studiorum University of Bologna, Italy



- e-mail: duccio.rocchini@unibo.it [alta priorità!]
- facebook: [@ducciorocchini](https://www.facebook.com/ducciorocchini)

Contacts



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

Duccio Rocchini, PhD - Professore Ordinario @: Alma Mater Studiorum University of Bologna, Italy



- e-mail: duccio.rocchini@unibo.it [alta priorità!]
- facebook: [@ducciorocchini](#)
- twitter: [@ducciorocchini](#)

Contacts



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

Duccio Rocchini, PhD - Professore Ordinario @: Alma Mater Studiorum University of Bologna, Italy



- e-mail: duccio.rocchini@unibo.it [alta priorità!]
- facebook: [@ducciorocchini](#)
- twitter: [@ducciorocchini](#)

Contacts



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

Duccio Rocchini, PhD - Professore Ordinario @: Alma Mater Studiorum University of Bologna, Italy



- e-mail: duccio.rocchini@unibo.it [alta priorità!]
- facebook: [@ducciorocchini](https://www.facebook.com/ducciorocchini)
- twitter: [@ducciorocchini](https://twitter.com/ducciorocchini)
- mobile phone

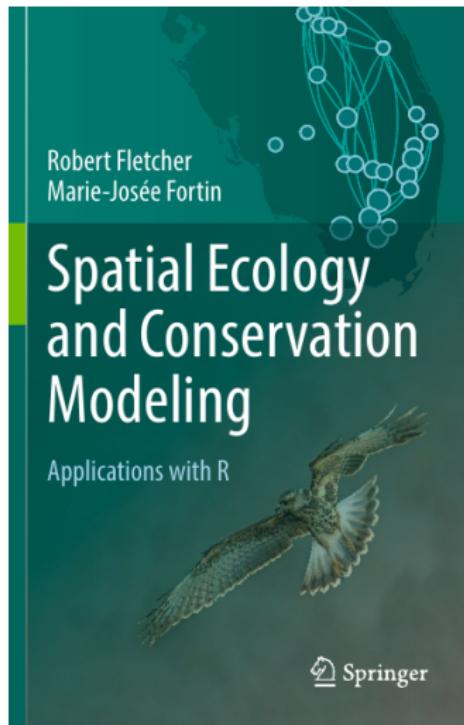
Outline

1 Introduction and Program

2 Contacts

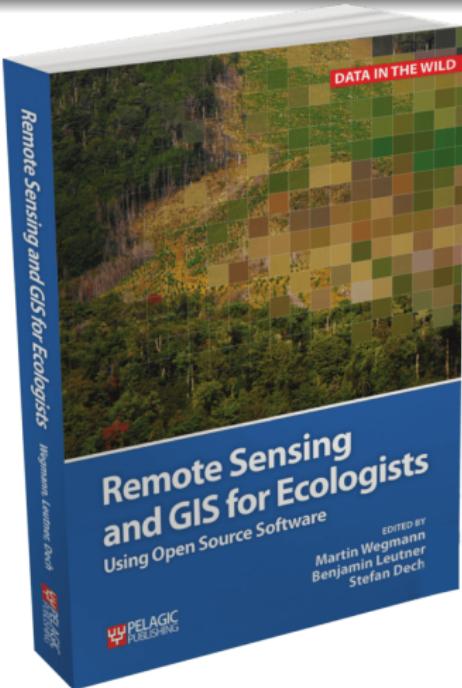
3 Books and Exam

Books



<https://www.springer.com/gp/book/9783030019884>

Books



[https://pelagicpublishing.com/products/
remote-sensing-and-gis-for-ecologists-wegmann-leutner-dech](https://pelagicpublishing.com/products/remote-sensing-and-gis-for-ecologists-wegmann-leutner-dech)

Exam: when?

- Summertime: June, July, September
- Wintertime: January, February

Exam: how?

A screenshot of a Microsoft Teams window titled "Microsoft Teams - Preview". The window shows a presentation slide about an R-PROJECT for remote sensing analysis. The slide includes text: "Student: Elisa Castelnuovo - 933415", "Professor: Duccio Rocchini", "R-PROJECT", "remote sensing analysis", and "MONITORING ECOSYSTEM CHANGES AND FUNCTIONING". Below the slide, there is a toolbar with video, audio, and other controls. At the bottom of the slide, there is a footer with the text "Elisa Castelnuovo - elisa.castelnuovo@studio.unibo.it". In the bottom right corner of the Teams window, there are two video feeds: one for "Martina Marel VTB" and another for "Elisa Castelnuovo". The Teams window is set against a dark background with a red and blue abstract graphic.

Your turn!

