Preservation of Ecosystems for Sustainable Development – AID 12432

Curso:
Ecological Models: Diversity, Abundance, and Modeling the Occupancy of Mammals

Duração: 30 horas
Créditos: 01
Período: 23 a 28 de Outubro, 2024
Horário: das 9 às 13 + 4 horas diárias de prácticas.
Docentes: Profa. Dra. Irma Alejandra Soto Werschitz (Universidade Autónoma de Querétaro, Mexico)
Local: Sala A10 do Departamento de Ciências Biológicas, Faculdade de Ciências (Universidade Eduardo Mondlane)

Condições para a participação:

- Licenciatura em ciências biológicas, ambientais, florestais ou áreas afins;
- Experiência prévia em programação é uma vantagem;
- É recomendável que os estudantes possuam um laptop.

Vagas limitadas!

Instruções para candidatura:

Os interessados devem enviar o seu CV para mestrado.bec@uem.mz, cc para mangrowth.ss@gmail.com e celiamacamo@yahoo.com, até ao dia 18 de Outubro de 2024.

Importante: (1) Colocar no Assunto "Candidatura Curso Modelos 2024", emails com um assunto diferente não serão considerados; (2) Candidaturas recebidas após a data limite não serão consideradas.

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ManGrowth - Gabinete de Ciências Biológicas (B7) – Faculdade de Ciências – UEM – Av. Julius Nyerere 3453 – Maputo
https://www.youtube.com/@ManGrowth-2 email: **mangrowth.ss@gmail.com**

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Ecological Models: Diversity, Abundance, and Modeling the Occupancy of Mammals

JUSTIFICATION

Training students and researchers in the use of quantitative tools to evaluate the population and community dynamics of mammals is essential for advancing conservation science. As human-induced changes to ecosystems intensify, the study of anthropogenic effects on species richness, abundance, and occupancy has become increasingly critical. Understanding how activities such as deforestation, urbanization, and agriculture impact wildlife populations is key to developing effective conservation strategies.

Ecological models offer a robust framework for assessing these impacts, enabling researchers to predict species' responses to environmental changes, evaluate the success of conservation efforts, and design management practices that promote biodiversity preservation. This knowledge is fundamental for informed decision-making and the sustainable use of resources, especially in regions with high biodiversity. By analyzing ecological data through these models, conservationists and policymakers can mitigate the negative effects of human activities, fostering ecosystem resilience and promoting sustainable development.

GENERAL OBJECTIVE

Develop students' ability to apply ecological models to analyze and understand patterns of diversity, abundance, and occupancy of mammals, as well as the effects of anthropogenic activities on species distribution and dynamics, to implement conservation strategies based on scientific data.

PARTICULAR OBJECTIVES

1. Provide a solid understanding of the importance of ecological models and the concepts of species diversity, abundance, and occupancy in studies on mammal populations and communities.

2. Improve the ability to manage and ensure the quality of ecological data collected for use in ecological models.
3. Introduce participants to the use of ecological models to estimate the richness, abundance, alpha, beta, and gamma diversity, and occupancy of mammals in R.
4. Apply African case studies to illustrate these impacts and their consequences for mammal conservation.

COURSE SCHEDULE

Day 1: Introduction to ecological models and key concepts

Module 1. Welcome.
- 1.1. Presentation of the objectives.
- 1.2. Expectations.
- 1.3. Course dynamics and program.

Module 2. Introduction to anthropogenic effects on ecosystems
- 2.1. Human impacts on biodiversity.
- 2.2. Global and regional examples.

Module 3. Fundamentals of ecological modeling
- 3.1. Introduction to ecological models: definition, basic concepts, and key definitions.
- 3.2. History and evolution of ecological models.
- 3.3. Types of models.
- 3.4. Model assumptions and limitations.
- 3.5. Software tools for ecological modeling.
- 3.6. Practical applications in species conservation.

Module 4. Introduction to ecological models
- 4.1. Importance of ecological models in mammal studies.
- 4.2. Discussion on practical application in Africa.

Day 2: Data management and quality in ecology

Module 5. Basic Mammalogy
- 5.1. Population ecology.
- 5.2. Community ecology

Module 6. Species monitoring.
- 6.1. Sampling techniques.
- 6.2. Experimental designs.

Module 7. Data management.
- 7.1. Basic programs.
- 7.2. R introduction.
- 7.5. Practical examples.

Module 8: Introduction to Statistical Analysis in R.

8.1. Parametric statistics.

8.2. Non-parametric statistics.

8.3. Practical examples.

Day 3: Ecological models in R

Module 9: Analysis of species richness and abundance.

9.1. Methods.

9.2. Case study.

9.3. Practical exercises.

Module 10: Analysis of Diversity.

10.1. Diversity indices vs Hill numbers.

10.2. Alpha and beta diversity.

10.3. Case study.

10.4. Practical exercises.

Module 11: Multi-model Inference.

11.1. GLMs (Generalized Linear Models).

11.2. Model selection: Akaike Information Criterion and Bayesian Information Criterion.

11.5. Case study.

11.6. Practical exercises.

Module 12: Occupancy Models.

12.1. Introduction to occupancy modeling.

12.2. Case study.

12.3. Practical exercises.

Day 4: Application of case studies and conservation strategies

Module 13: African case studies.

13.1. Presentation of articles: Individual activity.

13.2. Discussion.

Module 14: Conclusions and reflections.

Content	Día	Horas
Day 1: Introduction to ecological models and key concepts	Wednesday 23	8
Day 2: Data management and quality in ecology	Thursday 24	8
Day 3: Ecological models in R	Friday 25	8
Day 4: Application of case studies and conservation strategies	Monday 28	6
	Total hours	**30**

Dra. Alejandra Soto-Werschitz. She has over 10 years of experience in research, teaching, university outreach, and public science communication across Mexico, Venezuela, and Brazil. She has been recognized for her distinguished academic career, contributions to science communication projects, and as a member of the National System of Researchers (SNI) by CONAHCYT-Mexico. She holds a Bachelor's degree in Biology from the National Autonomous University of Mexico (1994), a Master of Science in Wildlife Management from the Institute of Ecology AC, Mexico (2000), and a Ph.D. in Applied Ecology with a focus on fragmented ecosystems and agroecosystems from the Federal University of Lavras, Brazil. Currently, she is a member of the Academic Group of Ecology and Faunal Diversity at the University of Querétaro, Mexico, as a Scientist-Extension Specialist. Her projects cover areas such as ecology, animal ecology, biodiversity conservation, climate change, occupancy models, reproductive animal behavior, and the impacts of human intervention, fragmentation, and habitat loss on mammal diversity in different ecosystems. Her work has established strong connections between public universities, civil society, government and non-governmental organizations, and communities, all for the benefit of wildlife conservation.