# INTRODUCTION TO TROPICAL ECOLOGY

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## Contents



## Summary

Ecology is the science that studies the distribution and abundance of organisms and the interactions between them and their natural environment. The environment usually includes the biotic and physical conditions in which the organism live in. The incredible biodiversity in the tropics can be translated into a myriad of biotic interactions that make this region of the planet one of the most exciting habitats to study Ecology. This section of the *Encyclopedia* is a comprehensive review of the study of *Tropical Ecology*. A series of chapters analyze the origin and maintenance of the tropics; the diversity of tropical communities and ecosystems; and the structure, composition and dynamics of two major forest ecosystems. Another group of chapters present a detailed description and analysis of biotic interactions. Finally two chapters on Conservation Biology discuss the importance of tropical ecosystems in global carbon cycle and the major threats to the destruction of the tropics.



## 1. Introduction

The term Ecology from the Greek oîkos, "house" and logia, “study of” is the science that studies the distribution and abundance of organisms and the interactions between them and their natural environment. The environment usually includes the biotic and physical conditions in which the organism live in. Although the formal study of Ecology initiated last century after the first publication in the subject by the Danish botanist, Eugenius Warming (founder of Ecology), many naturalists including Aristotle, Theophrastus, Carl Linnaeus, Alexander von Humboldt, Alfred Wallace, Charles Darwin among others, all contributed to the foundation of Ecology. Several of them

including Warming were inspired by the incredible diversity they experienced in the tropics. Such biodiversity is translated into an incredible diversity of biotic interactions that make the tropics one of the most exciting habitats to study Ecology. Our knowledge on Tropical Ecology is in its infancy with less than 50 years of scientific ecological studies. Few scientific publications were produced during the first decade but such rate of publications has increased almost exponentially over the last twenty years due to the training of new tropical ecologists worldwide. In addition, an important contribution is now coming from a generation tropical ecologists that has been incorporated into Universities in tropical countries and that are doing active research. Most work has concentrated on tropical rainforests but it is slowly changing to other tropical communities. Ecology is conducted at different levels that include organisms, populations, communities and ecosystems; and different spatial scales that may consider a specific habitat, a region, the spatial distribution of a species, an entire ecosystem or the planet as a whole. We are beginning to understand some basic ecological aspects of tropical systems but we are still very ignorant on other basic aspects related to natural history of most organisms, the ecology of populations of species, the interactions between species, the functioning of ecosystems, etc. Finally a crucial issue that requires special attention in order to continue any studies of tropical ecology is related to the conservation of these ecosystems. Although major efforts have been made by the Conservation community over the last 30 years, deforestation rates, forest fragmentation, high impact tourism are among the major threats to the disappearance of the last remnants of tropical forests around the world. Therefore parallel to the study of these important ecosystems we need to get involve in effective global and regional conservation efforts to preserve the last areas of the most diverse ecosystems of the planet.

The following section is a comprehensive review of the study of *Tropical Ecology*. A series of chapters analyze the origin and maintenance of the tropics; the diversity of tropical communities and ecosystems; and the structure, composition and dynamics of two major forest ecosystems. Another group of chapters present a detailed description and analysis of biotic interactions. Finally two chapters on Conservation Biology discuss the importance of tropical ecosystems in global carbon cycle and the major threats to the destruction of the tropics.

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**Biographical Sketches**

**Mauricio Quesada** was born in San Jose, Costa Rica. He obtained his B. S. in Biology at the Department of Biology, Universidad de Costa Rica, and M.Sc. and Ph.D. in Ecology at the Department of Biology, The Pennsylvania State University, USA. Dr. Quesada has conducted research on pollination and plant reproductive systems, plant genetics, tree ecophysiology and conservation biology. He has conducted research at La Selva Biological Station and Palo Verde Biological Station, Organization for Tropical Studies, OTS, Costa Rica. He served as Co-Director of Palo Verde Biological Station, Organization for Tropical Studies, OTS, Costa Rica and as Invited Professor at the Department of Biology, University of Costa Rica. He also served as a Research Professor at the Chamela Biological Station, Institute of Biology and Institute of Ecology, Universidad Nacional Autónoma de México. He is currently a Research Professor at the Centro de Investigaciones en Ecosistemas, Universidad Nacional Autónoma de México. In 2007 he was the president of the "Linking Tropical Biology with Human Dimensions" meeting held in Morelia, Mexico, the annual meeting of Association for Tropical Biology and Conservation (ATBC) He has been a member of the board of ATBC and of the editorial board of *Biotropica* since 2004. He has conducted studies in the evolution and genetics of plant reproductive systems. He is currently interested in the effects of forest fragmentation on pollinators, plant reproductive systems and the genetic structure of tropical trees of the dry forest. He is also developing research on the effects of transgenic plants on its wild relatives. He is particularly interested in conservation of tropical dry forests. Finally, he is interested in the relationship between plant functional groups under succession and remote sensing. He has more than 65 publications in international peer review journals and book chapters and edited a book. He has participated in more than 80 international meetings.

**Kleber Del Claro** is a biologist with doctorate in Ecology by State University of Campinas (Unicamp) in Brazil. Since 1992 is a teacher at Federal University of Uberlândia (UFU), where between 2003 and 2007 was the coordinator of the graduate program in Ecology. Kleber is the coordinator of the international cooperation agreement between UFU and the University of Missouri, St. Louis (UMSL), USA. He is a researcher from the Brazilian Council of Research, Science and Technology (CNPq) since 1996. At UFU and other Brazilian universities he was instructor of several master and doctoral thesis in ecology and animal behavior developed in the tropics. His scientific history, books and publications are available in: www.leci.ib.ufu.br. In 2005 he was the president of the "Frontiers in Tropical Biology and Conservation" meeting, settled in Brazil (Uberlândia), the annual meeting of Association for Tropical Biology and Conservation (ATBC) and supported by the Brazilian Society of Ethology (SBEt, now President for the second time).