

# Preface

The effects of human activities are everywhere evident on a wide portion of our planet. More particularly, some geographical areas are strongly characterized by a pervasive and age-old presence of *Homo sapiens*. Together with the modifying agents of natural origin (properly called the *disturbances*), our species has heavily shaped the landscape and natural ecosystems through historical and recent processes characterized by different modes, extent and intensity. The anthropogenic processes that interfere with the structure and dynamics of the *components* and the *environmental systems*<sup>1</sup> have been defined as *threats*.

The processes of threat are noticeable, directly or indirectly, even in *sites* and *areas*<sup>2</sup> of great natural interest (e.g., protected areas, Natura 2000 sites, oases of environmental associations). Consequently, those who manage these areas must necessarily obtain information on the anthropic system in all its complexity, gathering data about the presence, location, extent and intensity of works, infrastructures, and human activities as well as the possible threats triggered by these processes. A thorough analysis of the impacts on the environmental components that constitute the primary value of the sites under management must be carried out.

Practitioners and professionals working in the management of these areas give a series of goals and develop specific strategies and actions aimed at the conservation of certain *targets* or components of the environment that have been identified by the scientific community and the regulatory policy to have a specific value. The strategies pursued in these sites may be conducted in an ordinary way by the

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<sup>1</sup>In the land use science, the *environmental component* is any biological or ecological unit that characterizes an *environmental system*. Individuals belonging to a given population, the populations of certain species within certain ecological communities (biocenoses), the biotic communities inside certain ecosystems, ecosystems placed in landscapes are examples of environmental components that structure hierarchically superior systems.

<sup>2</sup>In the text we will refer to the terms of *site* or *territorial area* to indicate, in a heterogeneous way, discrete portions of territory (respectively of limited or wider extension), which are taken by a team of experts as unit of evaluation, management, planning, design or conservation (private properties, public areas, fragments of habitat, areas with different protection scheme, etc.).

continuous and constant engagement of local institutions. Consultation from external professionals can be integrated to provide advice in the development and management of specific projects and the plans of management.

Both technicians from local institutions and external professionals need to frame the complex regional (eco)system applying a variety of conceptual and operational approaches able to understand the phenomena that occur on the site. However, the understanding of the structure and dynamics of a territorial system requires the knowledge of both the components that make up the biological diversity and all those factors and threat processes posed by human activities. The analysis of the relationships with the environmental components should be performed considering the past, present, and future threats. This wealth of knowledge, together with the analysis and comparative evaluation, is essential. It allows to check the status of conservation of the ecological components and the extent of pressures and impacts on them.

Despite this, most of the tools of conservation (e.g., plans and projects) are still mainly concentrated, at least in our country, on the acquisition of in-depth quantitative and qualitative data of the natural components, with no research and analysis effort on the assessment of the role and effects of the threat processes impacting on the local environmental components. Even when the processes of threat are mentioned, they are introduced in a non-standardized and confused terminology. In addition, the time and space courses of the individual threat events (i.e., their extent, intensity and mode of action, including the impact to the different environmental components identified as priority targets) are not even approximately quantified, measured, or compared in most of the cases. An approximate analysis of pressures and impacts of human activities on the site under investigation may have important consequences in defining strategies for the management and conservation as well as in the verification of effectiveness of plans and projects and in initiating monitoring processes and adaptive management.

Just as a response to these shortcomings, a specific field of conservation biology and wildlife management (defined as *threat analysis*) has caught on in the last few years and now constitutes an important step in the programs implemented by many international organizations (among these, The Nature Conservancy and the World Wide Fund for Nature). This approach to conservation is used in the situations of uncertainty, criticality, and urgency that typically characterize most of the management and conservation contexts (Burgman 2005). This is the case of those sites where many anthropogenic events cause immediate and short-term impacts on environmental components. Despite other analyses have already been established in the past (e.g., the Environmental Impact Assessment), with this new approach, operational tools are provided for a rapid quantification of the events, allowing, through consultations among experts (*expert-based approach*), a comparison and prioritization of threats. All these procedures will allow, once the priorities are defined, to prepare the subsequent steps based on the application of more analytical approaches and priority threat-oriented methods.

The *ecology of disturbance* and the *threat analysis* are disciplines that have recently developed a strong theoretical foundation based on a solid and extensive

literature. This book will therefore acts as an introductory document to these issues, providing schematic concepts and approaches useful to work on sites and areas that are impacted by the transforming action of humans.

This volume is addressed to the conservation and environmental practitioners and, more generally, to all who work in the environmental sector. They will find hints and tips for choosing methods and approaches when there are conflicts between the natural components and human activities. All sites subject to management strategies and conservation, with particular reference to protected areas, are privileged areas where the constant presence of operators can monitor and predict the pressure and impact of anthropogenic threats.

The book is also addressed to the students of applied ecology, ecosystem management, land use planning, and environmental impact assessment. In fact, it discusses a number of topics covered in the programs of many university courses related to disciplinary arenas of basic ecology and ecology of disturbance, the latter constituting a field of great interest because of its implications and repercussions in applied land use science.

On such a basis, this book aims to provide some conceptual frameworks useful in operative conditions of all those working in human-made landscapes. In particular, the following topics will be addressed: the issues related to the standard nomenclature of threats, the definition of the causal relationships between the anthropogenic events and environmental components identified as targets of conservation, the fast quantification of threats, and the identification of those regarded as priority. The text is also accompanied by an interesting contribution of Prof. Franco Pedrotti who, from different perspectives, deal with the issues related to the concepts of disturbance, threat, stress, pressure, and impact in vegetation science.

This work will not deal with specific aspects relating to the characterization of individual threats. For this topic, we encourage to read the highly available literature in this field that describes each anthropogenic threat through specific tools, approaches, metrics, and indicators. Finally, this book will not discuss issues about natural disasters, as such events (natural or anthropogenic) affect our species as main target, and therefore, are the subject of other specific disciplines (Table 1).

**Table 1** Events on sites of conservation concern. Topic, origin, categories of impacted targets, disciplinary arenas, sciences, main seminal references and location in this book are reported

Topic	Origin	Categories of impacted targets	Arenas	Science	Main (seminal) references	Location in the book
Disturbances	Natural origin	Natural components (secondarily, anthropogenic ones)	Disturbance ecology	Ecology	Pickett and White (1985), Sousa (1984)	Chapters 1–7
Threats	Anthropogenic origin	Natural components	Threat analysis	Conservation biology, wildlife management	Salafsky et al. (2002, 2003, 2008)	Chapters 8–12

(continued)

**Table 1** (continued)

Topic	Origin	Categories of impacted targets	Arenas	Science	Main (seminal) references	Location in the book
Disasters, calamities	Natural/anthropogenic origin	Man (secondarily, natural components)	Science of catastrophes, risk analysis	Applied geology, urban security	Alexander (2001)	–

The volume is divided into two parts. The first focuses on the theoretical and disciplinary framework of the ecology of disturbance. The second is devoted to the analysis of anthropogenic threats. The latter, in particular, refers to the most recent approaches that, through the use of a conventional nomenclature, allow a *coarse-grained* quantification and objective assessment of threat impact on different environmental components. Such approach facilitates the comparison between hierarchically different events and, therefore, helps in the definition of priorities for strategies of management and conservation.

The management of the territory and the establishment of actions for the conservation of particular targets or the elimination/mitigation of certain anthropogenic threats requires an interdisciplinary approach, often accomplished by a heterogeneous group of professionals. This book is addressed (and dedicated) to the new generation of *conservation practitioners*, that is, the applied ecologists coming from different cultural backgrounds (naturalists, biologists, forest rangers, agronomists, doctors in environmental sciences, planners, engineers, environmental economists, sociologists, psychologists, historians, anthropologists, geographers). These must necessarily collaborate to identify and compare regional critical issues inside complex ecological systems and to promote effective actions. In addition to a rigorous analytical approach, it is necessary that these professionals adopt, with humility, a holistic and transversal vision in order to interpret the complex relationships between the natural world and the human sphere. All this is synthesized below with a quote by Kroll (2007), published on a major magazine of natural resource management (the *Journal of Wildlife Management*), with which we introduce the reading of this book.

We cannot continue to produce researchers who focus on narrow, isolated questions, maintains the belief that successful natural resource management is dependent solely on rigorous scientific inputs and possess neither the motivation not the ability to address complicated problems and work collaboratively with other professionals to identify feasible solutions.

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