

BOOK REVIEW

Cork Oak Woodlands on the Edge: Ecology, Adaptive Management, and Restoration

James Aronson, João S. Pereira and Juli G. Pausas, editors. 2009. Society for Ecological Restoration International. Island Press, Washington—Covelo—London, 352 pages, \$80 (hardcover) \$40 (paperback), ISBN 978-1-59726-479-2 (pbk., alk. paper).

What kind of a tree is the cork oak (*Quercus suber* L.)? One of the world's most extraordinary trees, as the editors have made clear in the introduction of this new book. The physical properties of its bark—the cork—and the tree's incredible capacity for recovery when the cork is properly extracted have a lot to do with this audacious statement. The use and sale of cork creates important economic activity and a considerable amount of rural employment. Furthermore, the most productive cork oak woodlands form an important part of the most environmentally rich forest formations of the Mediterranean basin, which are among the richest and most threatened reservoirs of plant and animal life on Earth. An interesting and rich cultural heritage has also formed around the cork oak woodlands.

A lot of authors have focused their attention on cork oak woodlands for their high economic, ecological, social, and cultural values. The Portuguese researcher Joaquim Vieira Natividade laid the foundations for the modern management of cork oak woodlands in 1950 with his work *Subericultura*, showing an advanced ecosystemic approach. Since then, much has been written about diverse and varied aspects of cork oak woodlands, from basic concepts regarding their biology and genetics to

theoretical developments concerning their economy, as well as forest improvement and management. The editors of this book have prepared an interesting complementary bibliography that already contains more than 1,100 references and can be accessed and updated online. This number could surely be increased with many more contributions in other languages such as Portuguese, Spanish, and French, some based on presentations that have been given in various meetings held in the European and North African countries that are home to cork oak woodlands. With this in mind, we may now ask: is it necessary to write another book on this topic? What does this book contribute to the already extensive amount of works written on cork oak woodlands?

This book is the result of the CREOAK research project funded by the European Commission Research Framework Programme from 2002 to 2006. Researchers and engineers from almost all countries with cork oak woodlands participated in this project, with a wide range of fields of specialization, from ecophysiology to economics. The objective of CREOAK was to tackle, with a holistic and interdisciplinary approach, the scientific and management obstacles impeding the restoration, natural regeneration, and integrated management of cork oak woodlands. The book is intended to provide a synthesis of the different areas of knowledge regarding the ecology, biogeography, and genetics of cork oak, as well as ecological restoration, active management, and socioeconomy of cork oak woodlands and their agro-silvo-pastoral systems. The editors, James Aronson, João S. Pereira, and Juli G. Pausas, possess a wide range of experience in ecological restoration, ecophysiology, and general ecology of cork oak woodlands. A total of 68 authors, researchers, managers, and NGO members from all of the countries that are home to cork oak

woodlands came together to prepare the book. This effort means that at first glance, the book is appealing to all those interested in cork oak management, both for those looking for an introduction to the subject and those wishing to consolidate their knowledge. How well does the book correspond to these expectations?

The book is divided into five parts with a total of 20 chapters. It also contains 10 site profiles, a collection of color photos, and a glossary of terms. The first part consists of five chapters and gives a general description of the tree and its woodlands. It is not a static botanical description of the species, but rather gives an ecological interpretation of different aspects related to the tree, its use, and its disturbances. After the synthesis of the knowledge of the genetic origin of the species, a thorough description is given on one of the main cultural forms in which cork oak woodlands are found, the open stands called *dehesas* in Spain and *montados* in Portugal. This section includes a thorough description of the tree's multiple uses and evolution through history. It also relates the causes of decline and over-exploitation of the ecosystem. Perhaps, a dasometric analysis would have assisted in the objective classification of the different cork oak grove systems. It is particularly interesting that a differentiation is made throughout the book between open woodlands and dense forests. The first part concludes with a description of how cork is used as an industrial material, with a brief economic history of the sector. A more extensive bibliographic reference is lacking, one that would provide more information to readers interested in cork quality and yield.

The second part of the book is perhaps the most innovative, as it lays out the scientific bases for restoration and management of cork oak woodlands. The environment in which

cork oak grows presents a number of limiting factors: poor soils, summer droughts, presence of different pests and diseases, herbivorous animals, etc. The five chapters of this part give detailed analyses of the influence that each one of these factors has on the development of cork oak woodlands: drought, mycorrhizae, soil properties, pests and diseases, and natural regeneration. It is very interesting to see how the authors propose coping with these limiting and restrictive factors, rather than fighting against them or representing them in a negative sense. The information provided in these chapters is enriched with several case studies on particular cork oak woodlands, whose results may be used in reference to forests with similar characteristics. This part of the book would be complete if a chapter had been added about the tree's growth and production that would deal with the unsolved problem regarding the age of the cork oak, among other things.

The shortest section of the book is the third part, which is dedicated to restoration in practice and includes only two chapters that deal with nursery and reforestation techniques. The authors make clear the need to optimize seedling production in order to improve the qualitative and economic aspects of reforestation. The section referring to the selection of germplasm could be enhanced with some cartographic information on the various regions of provenance, or at least with a reference to the sources where such information may be found. There is also no reference made to the forest reproductive material from selected stands, in accordance with European regulations. The second chapter of this part deals with cork oak reforestation. It reviews the different field techniques for improving cork oak establishment, although it overlooks important quantitative aspects such as plantation density and the

development of the plants in the years following planting or direct seeding. The reader may miss the practical application part of much of the scientific basis described in the first and second parts of the book to the ecological restoration of cork oaks. Incidentally, although it is mentioned in many parts of the book, there is no section specifically dealing with active management. Two chapters dedicated to silviculture and management planning at forest scale, including silvopastoral plans, would complete the information on the adaptive and ecosystemic management of cork oak woodlands. But it is only this third part of the book that leaves the reader in want of more information.

The fourth part of the book is much more complete. Focusing on economic analysis, it adopts a total economic value approach that considers both the monetary and non-monetary values of cork oak systems. Apart from the ecological similarities between the north and south shores of the Mediterranean, the socioeconomic conditions on both are very different. The rural population of countries in the south of Europe is dwindling, whereas in the Maghreb countries, the direct impact of the rural population on cork oak woodlands is much greater. Therefore, the presentation of studies related to the economic analysis of different cork oak silvopastoral systems in Spain, Portugal, and Tunisia is highly appropriate, given that the demands of those societies are very different. As such, the reader of the first three chapters of this part will have a well-rounded view of the different economic scenarios in which cork oak woodlands are found, as well as their private and social benefits. A fourth chapter completes this part of the book with a description of the international trading of cork, an aspect that helps readers understand the importance of the cork industry and how it depends

on the conservation of cork oak woodlands.

Another innovative and daring part of the book is the fifth and last. It begins with an interesting proposal for ecoregional planning that would connect economic, environmental, and social interests at a landscape scale. It is a pity that this proposal has not been completed in another part of the book with the description of management plans at forest scale. The book continues with two chapters about climatic change and modeling the vulnerability of cork oak woodlands. Addressing these topics is essential in a context of global change and may help in the implementation of adaptive management of cork oak woodlands. The last chapter of the book summarizes the main challenges that the cork oak woodlands are facing. The authors bravely propose strategies for a viable future, while always bearing in mind the uncertainty surrounding the situation.

The book is rounded out with the description of 10 site profiles drawn up by local experts. Ten different cork oak woodlands located in several European and North African countries are described, using a common framework for each one of them. This is an excellent initiative that helps the reader understand the different forest systems, but some brief cartographic information and a summary of the dasometric and silvicultural characteristics would have enhanced the information provided. There are also a total of 16 color plates that serve as a valuable addition to the black-and-white photographs distributed throughout the text. The plates providing cartographic information should have a more reader-friendly format. The glossary at the end helps to clarify the meaning of many scientific terms that appear in the text, although it does not include the many local terms that reflect rural know-how about cork oak woodlands.

In short, this is a useful book that provides a complete synthesis of new and old knowledge concerning cork oak woodlands, presented with an enriching multidisciplinary approach focusing on ecological restoration. The book is suitable for both researchers and forest

managers, those looking into the subject for the first time and experienced readers. For future publications, I recommend dealing with the subject of active, adaptive, and ecosystemic management in greater detail, but this book does suggest new lines of research and management and urge

readers to ask themselves new questions about cork oak woodlands.

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