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PART I

Cork Oak Trees and Woodlands

In the first part of this book we set the scene as the first step in showing why, when, where, and how to better manage and restore natural and socioecological cork oak systems. These five chapters will give the reader insight into the origins of these systems as we review the main characteristics and origins of the tree and the systems in which it grows and prevails. Oaks live much longer than human beings. Therefore, each human generation inherits a series of landscapes whose origin and history may be lost at any turn in the trajectory of human societies. For example, the rapid urbanization of the late twentieth century changed the public perception of woodlands and the management of forests and agroforestry systems.

In Chapter 1 we address key questions about the tree, such as how it is equipped to survive the hot, dry summers of the Mediterranean climate and what may be the ecological importance of a thick, corky bark in such an environment. The trees we see today result from a long process of reiteration and ongoing adaptation of a genetic blueprint that determines form and function. The environment modulates the final result. For several millennia, people have also had a hand in selecting and modifying the result. It is a three-way process, involving plants, environment, and people, in which survival is a key point. The physiological and morphological characteristics of cork oak discussed in this chapter are essential to our understanding of adaptability and its limits. Note that in Parts II and III we further explore how cork oak copes with adversity (i.e., biotic and abiotic stresses) and review and compare available techniques for restoration and management presented in other parts of the book. Reproduction is left for these more specialized parts of the book (see Chapter 10).

In addition to knowing something about the cork oak tree—form and function—it is important to trace its phylogenetic origins. In Chapter 2, using a panoply of techniques, the authors present the biogeographic structure of the genetic variation of cork oak. We know today that individuals from the western and eastern parts of the Iberian Peninsula geographic range are genetically distinct. Different populations also differ in the likelihood of occurrence of cytoplasmic *introgression* by the evergreen holm oak, as revealed by the occurrence of *ilex–coccifera* DNA lineages in cork oak. This has ramifications for managers and restorationists, as will be discussed later in the book. Intriguingly, the role of introgression in the evolutionary history of cork oak is still unknown.

Cork oak woodlands have been remarkable components of Mediterranean landscapes for centuries. This is a result not only of the longevity and size of the trees but also of their usefulness to humans: from cork and firewood to a framework tree for agroforestry and silvopastoral systems. In the absence of human influence, in many cases, these woodlands would tend to be multispecies forests, mixed with other evergreen and deciduous oaks and pines. Especially important are the Iberian *montado* or *dehesa* and related land use systems in Italy, France, and North Africa, which are described in detail in Chapter 3 in a broad bioregional and historical fashion that has not been previously attempted to the best of our knowledge.

In Chapter 4 the history of the *montado* or *dehesa* is discussed at a finer resolution, based on a case study in a specific region, Evora, in southern Portugal. Clearly, Holocene history and humans have left a layered imprint on the structure and functioning of agroforestry systems, such as the *montados* or *dehesas*: How did they arise; in which socioeconomic contexts were they formed; and how did management practices change over time? All these factors condition contemporary ecosystem function and stability.

Finally, in Chapter 5, the unique physical and chemical properties that make cork an outstanding material for industry and as wine bottle stoppers are described, together with the corresponding biological and physical explanations. After characterizing cork as a material, the authors explain how it emerged as a major asset in regional economies in the past. Indeed, most cork oak woodlands would not exist if not for the economic value of cork. Used and traded for centuries, today it is the second most important nontimber forest product in the western Mediterranean. Chapter 16, in Part IV, is devoted to the cork industry and trade today and the prospects for the future.

After reading these chapters, which provide baseline knowledge of the cork oak tree and pertinent woodland systems, the reader will be ready to dig

further into the conflicts, constraints, and options available so as to better understand the ancient woodlands that are now in a risky transition, all around the western Mediterranean, moving toward a very uncertain future.

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