



Kent Academic Repository

Maria, Cifre Sabater (2020) *Changing forests in a changing mediterranean island: forests, fires and heritagisation of the landscape in Serra de Tramuntana, Mallorca*. Doctor of Philosophy (PhD) thesis, University of Kent,.

Downloaded from

<https://kar.kent.ac.uk/84840/> The University of Kent's Academic Repository KAR

The version of record is available from

This document version

Other

DOI for this version

Licence for this version

CC BY (Attribution)

Additional information

Versions of research works

Versions of Record

If this version is the version of record, it is the same as the published version available on the publisher's web site. Cite as the published version.

Author Accepted Manuscripts

If this document is identified as the Author Accepted Manuscript it is the version after peer review but before type setting, copy editing or publisher branding. Cite as Surname, Initial. (Year) 'Title of article'. To be published in *Title of Journal*, Volume and issue numbers [peer-reviewed accepted version]. Available at: DOI or URL (Accessed: date).

Enquiries

If you have questions about this document contact ResearchSupport@kent.ac.uk. Please include the URL of the record in KAR. If you believe that your, or a third party's rights have been compromised through this document please see our [Take Down policy](https://www.kent.ac.uk/guides/kar-the-kent-academic-repository#policies) (available from <https://www.kent.ac.uk/guides/kar-the-kent-academic-repository#policies>).

**CHANGING FORESTS IN A CHANGING
MEDITERRANEAN ISLAND: FORESTS, FIRES AND
HERITAGISATION OF THE LANDSCAPE IN SERRA DE
TRAMUNTANA, MALLORCA**

MARIA CIFRE SABATER
SCHOOL OF ANTHROPOLOGY AND CONSERVATION
UNIVERSITY OF KENT

Supervisors: Dr Miguel Alexiades, Dr Joseph Tzanopoulos and Dr Alan Bicker.

Thesis submitted in total fulfilment of the requirements
for the degree of doctor of philosophy.

November 2019.

*Al meu papà
i a en Martí.*

*Viuu a través dels que vos estimen.
Per sempre.*

Project funded by the Kent's 50th Anniversary Scholarship (University of Kent)

Word count: 99,149

I declare that this thesis is the result of my own fieldwork and reflection except
where stated otherwise.

Maria Cifre Sabater, November 2019

Abstract

This research aims to study the social, historical and environmental dynamics around forests fires in Serra de Tramuntana, a protected area and UNESCO World Heritage Site in the island of Mallorca, in the Spanish state. From the second half of the twentieth century, and like in other Mediterranean rural areas, Serra de Tramuntana entered into a process of de-agriculturalisation, which led to the abandonment of many cultivated, pasture and forest lands. Moreover, in 2007, Serra de Tramuntana was conferred the status of Natural Site (*Paratge Natural*), resulting in the implementation of new land-use regulations and prohibitions which often conflict with local people's land-uses and agroforestry management practices. Due to the changes in land-use and management, the landscape of Serra de Tramuntana has transformed by increased woodland and accumulated dead and living forest biomass. This combination of factors, together with the hot and dry summers, have enhanced an upsurge of large forest fires. In 2013, the largest forest fire ever recorded in the Balearic Islands burned 2,400 hectares of Serra de Tramuntana. Large forest fires, particularly from the 2013 fire, have galvanised public, media, scientific and governmental attention, highlighting the diversity and conflict of perspectives between a wide range of social actors. They have also become a focus for social conflict, and a locus for broader processes of social contestation, negotiation and cooperation linked to environmental change, to land-use and environmental management of the protected area.

Combining an analysis of ethnographic, historical and geographical data, this research project aims to understand the social, historical and environmental dimensions of forest fires in Serra de Tramuntana. My research seeks to understand (1) the varying social perspectives about the factors that today contribute to the incidence of large forest fires in Serra de Tramuntana and the possible management solutions for this issue; and (2) how the presence of fire reflects the convergence of multiple social perspectives and actions associated with the use and management of the protected area.

Acknowledgements

I would like to express my heartfelt gratitude to all those who have made the writing of this doctoral thesis possible. In particular I would like to thank my supervisors Dr Miguel Alexiades, Dr Joseph Tzanolopoulos and Dr Alan Bicker for their support and their confidence in my work.

It has been an immense honour and my great fortune to be able to work with Miguel Alexiades, to whom I shall be eternally grateful for all the time and attention he has dedicated to guiding and correcting my research. His expertise and commitment as both a lecturer and a supervisor; his ability to offer constructive and encouraging criticism; as well as support and sensitivity in all the difficult family situations I have had to face during the course of this project, have shown me his excellence, both professional and personal.

This thesis would not have been possible either without the love, caring, support, the countless pieces of advice and academic expertise, as well as the help provided during my fieldwork by Dr Tina Sabater. My deepest thanks for this, and for everything, mum.

My deepest thanks must go to my father Jandro Cifre. His confidence, his love, his unconditional encouragement and his enthusiasm for each and every one of my projects are gifts I shall carry in my heart forever. This work is also yours.

To my partner Jaume Mesquida, from whom I have received encouragement, affection, laughs, help and attentions which have given me the strength to face the difficult moments of the last three years. I love you.

I consider myself to be most fortunate to have in my life so many people who have accompanied me throughout this journey, advising me, understanding my absences, listening to my endless stories of forests and fires, putting up with all my nerves and fears and who have always shown so much pride in my accomplishments. I am referring to Marta, Tòfol, Sarah, Ferri, Jordi, Aina, Mar, Alba, Lua and Corujo; to Martí, Mària, Jelen, Bernat, Violeta, Rai, Manel, Rafita, Jaume and Diego; to Núria, Amanda, Júlia, Aina, Sònia, Marta, Mar and Helen; to Bernat; to Maria Bouza, Kepa, Josu, Borja, Stef and Marta; to Iñaki; to the Haus Frauen, Graciela, Marteta, Maria and Chari; to the Sabater-Malondra and the Jiménez-Cifre families; to my cousin Jaume to make up my ineptitude with the computer world; and last but not least to Cora. You are all my great and most valued treasure.

I would also like to extend my thanks to all the villagers of Valldemossa and Estellencs and the staff of the Ministry of the Environment who, during the time dedicated to fieldwork, invited me into their homes, offices and lives; to all those who let me into their personal space, whether it were the warmth of the hearth in winter or paddling in the sea under the heat of the August sun; to those who let me work in their vegetable gardens, orchards and forests; and also to all those who shared with me their knowledge, their experiences, their fears, their concerns and their hopes. I would particularly like to thank Francisco, Mariona Ràfols, and the Son Brondo and Son Fortuny families. Thanks also go to the director of the Fundació March Library, Fausto Roldán and all the other staff members, who helped me so much while I was doing literature research.

I would also like to thank all those who made me feel at home despite being in the cold and cloudy England. Special thanks must go to all my fellow master's and Ph.D. colleagues: Dr Joonas Plaan, Dr Bela Barata, Jennie Harvey, Dr Kay E. Lewis-Jones, Rachelle Ellena, Boana Visser, Dr Viola Schreer, Dr Wim Peumans-van der Valk, Dr Jan van der Valk, Dr Amber Abrams, Dr Johanna Neufuss and Ellie Gray. Thanks also to Dr Raj Puri for welcoming me to the School of Anthropology and Conservation in 2012 and for supervising my MA Dissertation; for the always indispensable and invaluable support given by Nicola Kerry-Yoxall and the rest of members of the administrative staff; to all the MA Environmental Anthropology lecturers in 2012-2013, who introduced me to and transmitted their passion for Environmental Anthropology; to Matt Hodges for the research recommendations he has given me throughout the project; to Dr Daniela Peluso, Dr Mike Polotrak, Professor Dimitrios Theodossopoulos, Dr Andrew Sanchez and the other faculty members and students who guided me and/or accompanied me during my experience as a Graduate Teacher Assistant. This thesis would also not have been possible without the support of the University of Kent who funded it through their 50th Anniversary Scholarship.

I would also like to express my gratitude to my colleagues in the 'Environmental Anthropology Network' – Dr Beatriz Santamarina, Dr José Cortés-Vázquez, Dr Oriol Beltrán, Dr Victoria Quintero, Professor Joan Frigolé, Dr Ismael Vaccaro, Dr J. M. Valcuende, among many others – to whom I owe a debt of gratitude for their research work in the study of protected and heritagised natural areas since, without their contributions, some of the study topics included in this work could not have been addressed. I also consider myself in debt to Professor Esteban Ruíz-Ballesteros for the

opportunity I was afforded for a research stay at the Pablo de Olavide University (Sevilla), and to Professor Onofre Rullan for my research stay at the University of the Balearic Islands. I am grateful to Dr Andreu Ramis for inviting me various years to present my work in the seminars on 'Heritage and Territory' which are part of the 'Heritage Master: Research and Management' in the University of the Balearic Islands, as well as inviting me as a guest-speaker to the 'Popular and Traditional Culture of the Balearic Islands Conference' in 2017. The anthropologists of the islands are also in his debt for his tireless work of giving prominence to the new generations of researchers and potentiating their work. I would also like to thank Toni Lozano for helping me to understand the complex technical regulatory aspects of the heritagisation processes in Mallorca. I likewise wish to extend my thanks to Tramuntana XXI, whose work in favour of social consensus regarding a wide diversity of socio-environmental conflicts in Serra de Tramuntana is most necessary and valuable. Lastly, I would like to thank Susan Hooper and Martin Davies for their contribution in checking and correcting my writing in English.

Content

Abstract.....	2
Acknowledgements	3
Content.....	6
List of figures	9
Chapter 1. Introduction.....	15
Forest fires: a local and a global concern.....	15
Forests, fires and people in Serra de Tramuntana and beyond: overview and theoretical approach.....	16
Aims and objectives of the thesis.....	40
Conducting fieldwork in Serra de Tramuntana.....	44
Thesis outline	56
Figures	58
Chapter 2. An environmental history of Mallorca.....	70
Preface. Socio-environmental transformations in Son Fortuny (Estellencs).....	70
Introduction	71
Mallorca's landscape transformations prior and subsequent to the first human settlement.....	76
Urbanisation and deforestation during the Roman period (123BC-425).....	80
The 'dark period' (425-902AD): depopulation and afforestation.....	81
Development of agriculture and emergence of villages in the mountains during the Islamic period (tenth to thirteenth centuries).....	82
The creation of large rural estates and intensification of some mountainous crops after the Catalan Christian conquest (thirteenth – eighteen centuries).....	85
Displacement of Mediterranean trade to the Atlantic after the Conquest of America (from the second half of the fifteenth century).....	89
The nineteenth century: the demise and fragmentation of the noble estates.....	92
The origin of Mallorca's tourism in the search for picturesque landscapes by the 'romantic travellers' (end of the nineteenth - beginning of twentieth centuries) ...	94
The growth of mass tourism and the progressive abandonment of agroforestry subsistence practices (1950s, 1960s and 1970s)	97
From the socio-environmental impacts of tourism and construction industries to the emergence of regional environmentalism and the creation of the first regional protected areas (mid-twentieth - beginning of twenty-first centuries)	99

The intensification of tourist and recreational land-uses and the privatisation of protected areas following the 2008's crisis.....	103
Conclusion.....	105
Figures.....	108
Chapter 3. The heritagisation of Serra de Tramuntana: the socio-environmental dynamics of a cultural landscape in flux	115
Preface. The marjades: when the abandoned is re-discovered as heritage.....	115
Introduction	116
The resignification of the <i>marjades</i> as objects of contemplation for the recreational industry.....	124
Maintenance costs, tourism overcrowding and fire: some of the social tensions arising from the heritagisation of the cultural landscape of Serra de Tramuntana.....	129
Fire and the heritagisation of Serra de Tramuntana: a complex and heterogeneous relationship.....	137
Conclusion.....	142
Figures.....	146
Chapter 4. The conservation of Serra de Tramuntana: history, social dynamics and conflict.....	150
Introduction	150
Anthropology and the study of natural protected areas	153
The social dynamics around protected area management in Serra de Tramuntana: disputes and agreement around goats, beetles, buildings and fires	156
Conclusions	170
Figures.....	175
Chapter 5. The forests and their management in Serra de Tramuntana: historical dynamics and social perspectives	177
Preface: Talking about forests	178
Introduction	179
Talking about forests in Serra de Tramuntana: the new residents of Serra de Tramuntana (foreigners, property owners and city dwellers).....	180
Talking about forests in Serra de Tramuntana: the environmental managers and technicians of Serra de Tramuntana	182
Talking about forests in Serra de Tramuntana: villagers and 'local' perspectives	187
Conclusions	195

Figures	198
Chapter 6. Fire as a disaster: social perspectives, socio-environmental impacts, policy and environmental management implications	202
Introduction	202
Fire on Earth.....	204
Wildfires in the Mediterranean: a recent history	206
Forest fires: socio-environmental impacts and prospects in Serra de Tramuntana and beyond.....	208
Forest Fires: the impacts of demographic and settlement dynamics	213
Large forest fires: policy, management and environmental aspects.....	218
Conclusions	224
Figures	226
Chapter 7. Managing fire with fire: changing perspectives on some aspects of the management of the protected area, including the incorporation of anthropogenic fire as an environmental management strategy.....	236
Introduction	236
“Fires are put out in winter”: changes in policy after the large forest fire of Andratx-Estellencs in 2013	239
Fighting fire with fire: fire-management policies and the institutionalisation of fire control.....	248
<i>Ongoing changes of discourse: the distinction between ‘bad fire’ and ‘good fire’</i>	251
Conclusions	259
Chapter 8. Conclusions.....	262
Bibliography.....	268
Appendix.....	308

List of figures

- Figure 1.1: Percentage of change in forest area in Portugal (Pt), France (Fr), Spain (Es), Italy (It) and Greece (He) between 1961 and 1991. Source: Moreira et al. (2012: 4).
- Figure 1.2: Main forest types of Mallorca and Cabrera today, including forests formed by pines (pins, *Pinus halepensis*), holm-oaks (alzines, *Quercus ilex*) and wild olive-trees (ullastres, *Olea europea*). Source: Own elaboration based on the data of the fourth national forest inventory of the Balearic Islands (2012).
- Figure 1.3: Distribution of forest types in Mallorca and Cabrera (Serra de Tramuntana marked by the black ellipsis), including pine forests (in yellow), mixed pine, holm-oak, and wild olive forests (in purple), and holm-oak forests (in green). Source: Cuarto Inventario Nacional Forestal (2012, 12-3).
- Figure 1.4: Bar chart showing the extension – in hectares – that the three current main forest types of Serra de Tramuntana have experienced in Mallorca as a whole between 1970 and 2010. Source: Own elaboration based on the data of First and the Fourth National Forest Inventory of the Balearic Islands (1971; 2012).
- Figure 1.5: Figure 1.5: Changes in cover (thousands of hectares) of forests (dark green), and shrubland and pasturelands (light green) over the four national forest inventories (1971; 1998; 2008; 2012). Source: Fourth national forest inventory (2012, 10).
- Figure 1.6: Accumulated dead wood of most common tree species in the forests of the Balearic Islands. Source: Fourth national forest inventory (2012, 34).
- Figure 1.7: Mind-map of the main research findings about what causes large forest fires nowadays. The blue asterisks indicate the factors that are most locally-situated, so they may not be extrapolated to other contexts of study beyond Mallorca. In yellow, I indicate whether something has a greater impact on the ignition of fires and/or on their spread.
- Figure 1.8: Location of the 2013 Andratx-Estellencs fire and burned area (in dark and clear garnet). Andratx can be found at the bottom of the image and Estellencs at the top to the right. Source: Balearic Islands Government.
- Figure 1.9: Aerial photo of the largest forest fire ever recorded of the Balearic Islands that affected Andratx and Estellencs in 2013. Source: Xarxa Forestal.
- Figure 1.10: Aerial photo of a burned area in Andratx by the large forest fire of 2013. Photo: Gutiérrez, L. published in El País (2013).

- Figure 1.11: Aerial photo of a helicopter fighting a large fire in Gran Canaria in August 2019. Photo: Medina, Á. published in *El País* (2013).
- Figure 1.12: Photo of a member of Mallorca Firefighters trying to douse the flames during the large forest fire of Andratx-Estellencs in July 2013. Photo: EFE, published in *El País* (2013).
- Figure 1.13: Global growth of protected areas. Source: *The World Database of Protected areas* (2005 in Brockington *et al.* 2008; West *et al.* 2006)
- Figure 1.14: The Balearic Islands within the Mediterranean Sea. Source: www.google.es/maps (last consulted on 20.10.2019).
- Figure 1.15: Serra de Tramuntana Natural Site (in pink) within the island of Mallorca. Source: web.conselldemallorca.cat (last consulted on 20.10.2019).
- Figure 1.16: Estellencs (in orange) and Valldemossa (in blue) within Mallorca. Source: web.conselldemallorca.cat (last consulted on 20.10.2019).
- Figure 1.17: Municipality of Estellencs, including some of its large rural estates. Source: web.conselldemallorca.cat (last consulted on 20.10.2019).
- Figure 1.18: Municipality of Valldemossa, including some of its large rural estates. Source: web.conselldemallorca.cat (last consulted on 20.10.2019).
- Figure 1.19: Sequence of aerial photographs of the village of Valldemossa, showing its urbanisation from 1956 to 1995. Source: Alomar, G. (in Cifre, 2013: 38).
- Figure 1.20: Organisational chart of some of the institutional departments with which I worked during fieldwork, realised with the kind help of Xarxa Forestal. This is an adaptation of the original image - which is part of my field diary - since I did not want to show the names of some of the respondents that were included in the original version. Source: adapted from field-diary.
- Figure 1.21: Francisco in a large rural estate that he used to manage. According to him, the estate was abandoned more than twenty years ago until a foreign resident bought it in 2018 to turn it into a rural hotel. Photo: Maria Cifre.
- Figure 1.22: During fieldwork, I periodically travelled the same path followed by the 2013 fire from Andratx to Estellencs. In the picture, taken in November 2015, I am analysing the burned landscape standing on the terrace of a house severely affected by the fire. Photo: Marta Marimon.
- Figure 2.1: From bottom to top: a managed olive grove on a flat land; managed olive trees on marjades; unmanaged olive trees on marjades, where pines and other

undergrowth have grown; a dense forest with a predominance of pines and holm-oaks. Photo: Maria Cifre.

Figure 2.2: Archaeological site of a Talaiot in Son Fornés (central Mallorca), dating from between 900 and 123 BC. Source: Museu Arqueològic de Son Fornés (Montuiri).

Figure 2.3: Archaeological site of the Necropolis of Son Real in Santa Margalida (north Mallorca) from the end of the Talaiòtic (around 123 BC). Source: commons.wikimedia.org (last consulted on 5.09.2019).

Figure 2.4: Cartographic map of the Mediterranean, North Africa and Europe dating from 1375. Source: “Atles Català” by Cresques Abraham, kept at the Bibliothèque Nationale de France, extracted from gallika.bnf.fr (last consulted on 5.09.2019).

Figure 2.5: Detail of the cartographic map of 1375 indicating the Crown of Aragon with a red and yellow stripes flag and the island of Mallorca with the same pattern. Source: “Atles Català” by Cresques Abraham, kept at the Bibliothèque Nationale de France, extracted from gallika.bnf.fr (last consulted on 5.09.2019).

Figure 2.6: Detail of the altarpiece ‘Sant Jordi i el drac’ showing the harbour of Palma in the second half of the fifteen century. Source: altarpiece from 1468-1470 by Pere Niçard, kept in the Museu Diocesà de Mallorca, photographed by Tina Sabater.

Figure 2.7: Proportion of working population employed in agriculture in the Balearic Islands from 1955 to 1981. Source: Barceló (1985).

Figure 2.8: Map of Mallorca showing the growth of urbanised areas from 1956 to 2000. Source: Murray et al. (2005, p. 13).

Figure 2.9: Bar chart showing the evolution of urbanised land, quarries, golf courses, railroad network (all in light orange), and road system (in dark orange) from 1956 to 2015; indicated in square kilometres. Source: Blázquez and Murray (2010, p. 92).

Figure 2.10: To the left, poster from 1979 as a part of the campaign to protect Sa Dragonera. To the right, poster from around 1984 when the urbanisation of Sa Dragonera was prohibited, and the social campaign start to focus on the claims to declare it Natural Park. Source: archives of the National Labour Confederation (CNT) of Palma.

Figure 3.1: The village of Estellencs and its surroundings. From the village to the top of the mountains, dense areas of forest predominate. Between the village and the sea (to the right of the image) there are some managed terraced olive groves, and many former agricultural lands. Photo: Maria Cifre.

Figure 3.2: Son Matge and patchwork surroundings. Note the managed marjades with young cultivated cherries (foreground), terraced olive groves combined holm-oak forest (left) and unmanaged marjades overgrown with pine (rear right, behind house). Photo: Maria Cifre.

Figure 3.3: abandoned marjades, forest and scattered rural estates near to the entrance of the village of Valldemossa. Photo: Maria Cifre.

Figure 3.4: From the main road to the dark green holm-oak forest (to the left), there are mostly managed terraced olive groves, and a few light green areas of unmanaged olive groves overgrown with pines. From the main road to the cliffs (to the right), there are managed agricultural and silviculture lands. Photo: Maria Cifre.

Figure 3.5: Unmanaged marjades in a holm-oak forest of Valldemossa. Photo: Maria Cifre.

Figure 3.6: Advertising campaign announcing the designation of Serra de Tramuntana as a World Heritage Site. Source: <http://www.serradetramuntana.net/ca/> (last consulted on 26.06.2019).

Figure 4.1: A tree trunk damaged by a goat. Photo: Luís Núñez, extracted from caib.es/sites/sanitatforestal (last consulted on 06.09.2019).

Figure 4.2: Holes bored on a log by the larvae of the Capricorn beetle. Photo: Luís Núñez, from caib.es/sites/sanitatforestal (last consulted on 06.09.2019).

Figure 4.3: A house that was demolished since it was built without a license in Andratx, in an area categorised as Natural Site of the Serra de Tramuntana and Natural Areas of Special Interest (ANEI). Photo: Agency of Defense of the Territory of Mallorca (Agència de Defensa del Territori de Mallorca).

Figure 4.4: One of the two bungalows that, together with a swimming pool, were demolished since they were built without a license in Fornalutx (Serra de Tramuntana), in an area categorised as Natural Site of the Serra de Tramuntana, Natural Areas of Special Interest (ANEI), and Picturesque Landscape. Photo: Agency of Defense of the Territory of Mallorca (Agència de Defensa del Territori de Mallorca).

Figure 4.5: A house located in the Natural Site of Serra de Tramuntana whose surroundings had been burned by a forest fire the night before I took this photo. Photo: Maria Cifre.

Figure 5.1: Andreu felling a pine among holm-oaks. Photo: Maria Cifre.

Figure 5.2: A holm-oak forest without undergrowth and pines. Both at the right and at the left of the photo there are flat surfaces delimited by stones forming a circle, what indicates that this is the place where charcoal was burned (*sitja*). Today, some villagers cut down trees – especially pine trees, but also holm oaks – in this area without a license to sell as firewood. Photo: Maria Cifre.

Figure 5.3: Aerial photo of Valldemossa, 1956. Note the low density and the reduced extent of local forests, mostly delimited by terraced olive groves. Source: Alomar, G. (in Cifre, 2013: 38).

Figure 5.4: Area of forest immediately adjacent to boundary where fire was extinguished in July 2018. The steep topography, dense undergrowth and accumulation of dead biomass made the job of controlling the fire extremely difficult. Photo: Maria Cifre.

Figure 6.1: Number of fires between 1960 and 2010 in various regions of the Mediterranean (Portugal, Spain, Greece, Morocco and Turkey) and Europe. Source: Pausas et al. (2008: 714) modified from Pausas (2004).

Figure 6.2: Photo taken soon after the IBANAT terrestrial brigades stopped the spread of a forest fire in this area. That fire burned five hectares of Estellencs in 2018 and forced the evacuation of 150 villagers. Photo: Maria Cifre.

Figure 6.3: A landscape carpeted in white ash showing the black trunks of trees and burned vegetation, which contrasts with the green landscape in the background, which the fire did not reach. This picture was taken only a few hours after a forest fire burned 8.6 hectares in Cala Tuent (Escorca) in November 2016. Photo: Maria Cifre.

Figure 6.4: Forest of pines and Phoenician juniper (*savina*) burned in the fire of Sa Canova (Artà), which in August 2016 destroyed 2.3 hectares. I took this photo when the fire had not been extinguished yet. Photo: Maria Cifre.

Figure 6.5: Vegetation cover on a slope affected by the Andratx-Estellencs fire, less than half a year after the fire. Photo: Xarxa Forestal.

Figure 6.6: Vegetation cover on a slope affected by the Andratx-Estellencs fire, more than five years after the fire. Photo: Xarxa Forestal.

Figure 6.7: Area burned by the large forest fire of Andratx-Estellencs in 2013, one year later. On the right, an area of green pine that did not burn. On the left, an area of blackened and scorched pine forest, in which vegetation has already begun to appear. Photo: Maria Cifre.

Figure 6.8: Post-fire landscape, one year after the large Andratx-Estellencs forest fire of 2013. The black lines on the mountainside are barriers against soil erosion, made with the burnt pine trunks from the same area. Photo: Maria Cifre.

Figure 6.9: The inside of one of the houses that were burned in the fire of Andratx-Estellencs in 2013, just one year after the fire. Photo: Maria Cifre.

Figure 6.10: Aerial view of the town of Paradise, California, reduced to ashes by the Camp Fire in November 2018. Photo: Noah Berger (AP photo), published on Sputniknews.com.

Figure 6.11: While the house and its immediate surroundings were not burned thanks to the action of the IBANAT brigades, the forest areas were completely burned by the forest fire that in 2016 burned 8.6 hectares of Cala Tuent. Photo: T. Reiner, extracted from El Pais.

Figure 6.12: The owner of the farm (wearing a red t-shirt) helps the IBANAT brigade to secure the perimeter of the house, which was saved from the fire that the night had burned 8.6 hectares of forest in Cala Tuent. Photo: Maria Cifre.

Figure 6.13: A house almost completely surrounded by a dense forest mass in Valldemossa. Photo: Maria Cifre.

Figure 6.14: Aeroplane putting out fire in Andratx in the 2013's fire. Source: Sepulveda, A. published in the newspaper *Última Hora* (2013).

Figure 6.15: Satellite image of the Andratx-Estellencs fire in 2013. Source: Mallorcadiario.com (last consulted on 16.08.2019).

Chapter 1. Introduction

Forest fires: a local and a global concern

In 2013, the largest forest fire ever to be recorded in the Balearic Islands burnt more than 2,400 hectares of Andratx and Estellencs (see Figures 1.1, 1.2 and 1.3), to the south of the Serra de Tramuntana Natural Site (*Paratge Natural*)¹ in Mallorca, declared World Heritage Site by UNESCO in 2011. Since this large forest fire² of 2013 in particular, forest fires have galvanised public opinion, the media and the government of Mallorca, evidencing the existence of a diversity of perspectives and practices among a wide range of people regarding the management of the forests and forest fires within the island. Thus, in the aftermath of the fire, whereas others demanded that the regional authorities should acquire more technology, human resources and material means such as helicopters and drones in order to rapidly identify and suppress any ignited fire, others argued that the main problem was how *dirty* ('bruts') the forests were – that is, the accumulation of both live and dead biomass currently existing in the forests – mainly due to the state of abandonment suffered by most of the agroforestry lands in Serra de Tramuntana since the second half of the twentieth century, and the ever-increasing number of visitors to the mountain area (e.g. Magro 2013; Amorós 2013).³

However, the ever-increasing incidence of large forest fires recorded over the last decades – fuelled by climate change on a global scale (Flannigan *et al.*, 2000; 2006, 2009;

¹ The Law 5/2005 of 26 May classified the protected areas of the Balearic Islands in six different classifications: Natural Parks (*Parcs Naturals*), Natural Reservoirs (*Reserves Naturals*), Natural Monuments (*Monuments Naturals*), National Park (*Parc Nacional*), Places of scientific interest and microreserves (*Llocs d'interès científic i microreserves*) and Serra de Tramuntana as a Natural Site (*Paratge Natural*). According to the 11th Article of this Law, a Natural Site is defined as “relatively large natural spaces, in which there is a coexistence of agricultural, livestock or fishing activities, agricultural transformation and activities of other economic sectors that make conservation compatible with its sustainable development, forming a place of great ecocultural interest that makes necessary its conservation. The declaration of a Natural Site aims to preserve the whole complex and, at the same time, make possible the harmonic development of the affected populations and the improvement of their living conditions, not compatible with other uses that are alien to these purposes.”

² Sometimes referred to as ‘megafires’ or ‘wildfires’, ‘large forest fires’ are those fires affecting more than 500 hectares (PFIB, 2013, p. 49), and/or “those fire events that cause catastrophic damages in terms of human casualties, economic losses, or both” (San-Miguel-Ayán *et al.*, 2013, p. 11).

³ This is evidenced in several regional news stories from 2013 (e.g. Magro 2013; Amorós 2013), and supported by all ethnographic data of Valldemossa from previous research (Cifre, 2013).

Glikson and Groves, 2016) –, is not limited exclusively to Mallorca, but can be observed in other areas on the Iberian Peninsula, as in the case of Galicia and Portugal; in other European-Mediterranean countries, such as Greece, France and Italy; and in many other places worldwide, such as California, Australia, Amazonia and Indonesia (Simmons *et al.*, 2004; Murdiyarso and Lebel, 2006; Birot, 2009; Moreno *et al.*, 2014; Koutsias *et al.*, 2016). The amount and variety of catastrophic consequences produced by these fires – which have affected vast expanses of natural areas, representing an elevated risk to human lives and which have caused severe and costly damage to private property and infrastructure – have meant that these large fires have become a matter of global concern. Moreover, it is essential to point out that the issue of forest fires is a complex question intertwining, condensing and revealing a whole series of socio-environmental processes such as, for instance, the changes in land-use and landscape transformation (Sande Silva *et al.*, 2010; Keeley *et al.*, 2012; Roos *et al.*, 2016). Finally, it is worth noting that no previous anthropological work has carefully looked into fire in the Spanish state, despite fire control and management have by far the largest public budget allocated among the rest of environmental issues.⁴

The main aim of this research is understanding, through the study case of Serra de Tramuntana Natural Site (Mallorca), the variety of socio-environmental factors underpinning the causes of large and destructive forest fires; and, secondly, to examine people's responses, visions and relations with forest fires and anthropogenic fire in the contexts of conservation policies, tourist development and heritage formation in the protected area.

Forests, fires and people in Serra de Tramuntana and beyond: overview and theoretical approach

Fire: a key element of the social and environmental history

Fire has existed worldwide since soon after the first terrestrial plants appeared more than 400 million years ago (Bowman *et al.*, 2009, p. 481). The presence of large forest fires on a practically global scale (San-Miguel-Ayanz *et al.*, 2013, p. 11) has played a pivotal role in the dynamics of plant adaptations and the distribution of ecosystems on

⁴ According to BOE 161/2018 of 4 July, p. 66621-67354.

Earth (Pausas and Keeley, 2009, p. 593). Moreover, the ability to ignite, manage and/or put out fire acquired by humans two millions years ago – ‘anthropogenic fire’ – (Pyne, 2012, p. 8) has had a profound impact on many terrestrial landscapes (Pyne, 1998, p. 65; Miller and Davidson-Hunt, 2010) and shaped the history of humanity in numerous and diverse ways (Pausas and Keeley, 2009, p. 597). In the words of Scott (2017, pp. 38, 40, 42), anthropogenic fire is a “landscape architect . . . a deliberate disturbance ecology in which hominids create, over time, a mosaic of biodiversity and a distribution of desirable resources more to their liking” while, at the same time, “we are a fire-adapted species: pyrophyte. We have adapted our habits, diet, and body to the characteristics of fire, and having done so, we are chained, as it were, to its care and feeding. . . . It is no exaggeration to say that we are utterly dependent on fire. It has in a real sense domesticated us.”

The Mediterranean landscapes are among the most fire-prone landscapes on Earth, partly due to their low rainfall, high summer temperatures and highly fire-prone vegetation (Enright and Fontaine, 2014, p. 34). Furthermore, anthropogenic fire has had an extensive history in Mediterranean rural areas as an agricultural, silvicultural, forestry and livestock breeding tool (Ganteaume *et al.*, 2013). Thus, fire is an intrinsic element of both the environmental and human history in Mediterranean rural areas, as in many other regions worldwide (Naveh, 1989; Bowman *et al.*, 2009; Keeley *et al.*, 2012).

Nonetheless, it is only since the early 1970s that forest fires have occurred more frequently and over larger areas worldwide (Bowman *et al.*, 2009; Salvati and Ranalli, 2015, p. 1), as for instance has been evidenced in the recent history of fire regimes in Indonesia (Murdiyarso and Lebel, 2006); Amazonia (Barreto *et al.*, 2006); in areas with a Mediterranean climate and vegetation such as California (Keeley and Syphard, 2017) and Australia (Enright and Fontaine, 2014); and many Mediterranean European rural areas (Pausas and Fernández, 2012). Indeed, among the European countries, Spain, France, Portugal, Greece and Italy have been the most affected by fires from 1980 to 2009, with an average of nearly 0.5 million hectares burned each year (San-Miguel-Ayanz *et al.*, 2012). In the Spanish state, statistical data reveal that there was a significant upward trend in the number of fires between 1961 and 2010, although the surface area burned fell markedly when fire-extinguishing equipment was introduced and increased from the

mid-1990s (Cubo *et al.*, 2012, p. 11).⁵ Over the same period, the frequency in the number of large forest fires shows a more irregular behaviour (*ibid.*, pp. 23–27), although large forest fires – despite representing a small fraction of the total number of fires – tend to be responsible for a large proportion of the total area consumed by fire.⁶ For instance, in the Balearic Islands, only nine large forest fires – such as the one that burned more than 2,400 hectares of Serra de Tramuntana in 2013 (Conselleria d’Agricultura Medi Ambient i Territori and Tecnosylva, 2015, pp. 141-142) – have burned half of the total area affected by fires over the last 25 years (Domènech, 2015, p. 490).

Fire events are also becoming increasingly catastrophic in terms of human casualties, economic losses and burnt areas (San-Miguel-Ayanz *et al.*, 2013), even if, as some authors suggest, the available data does not support the claim that fires have been more frequent on a global scale since the second half of the last century (Doerr and Santín, 2016). There are various factors that are increasingly – although not yet consensually – being pointed to as key contributors to the severity of the devastating damages caused by fires. One, for example, relates to the shifting dynamics of settlement in around areas close to or within forest areas, the so-called ‘wildland-urban interface’ (WUI) (Radeloff *et al.*, 2005; Syphard *et al.*, 2007; Galiana *et al.*, 2011); Second, the rise of global temperatures (Krawchuk *et al.*, 2009). Another one is the growth of dense forests and shrublands in formerly managed agroforestry lands (Pausas and Fernández, 2012; Gill *et al.*, 2013); there are others (Flannigan *et al.*, 2000; Pausas and Keeley, 2009; Castellnou *et al.*, 2010).

The increasing incidence of wildfires with catastrophic consequences has aroused intense media, public and academic interest around the world. A very recent example was the international media attention given to the Camp Fire, which in November 2018 burned around 62,000 hectares in California, killed 86 people, and reduced an entire town to ashes, making it the most destructive and deadly fire in California since records have been kept (California Department of Forestry and Fire Protection, 2018).

The coverage of these large forest fires by the media often includes spectacular images of helicopters and small planes crossing dense columns of smoke, and firefighters facing large tongues of fire (see Figures 1.4 and 1.5). This media spectacle, the sizeable

⁵ For a graph of the evolution of the number of fires and affected areas in the Spanish State in the period 1961-2010, see Appendix 1.

⁶ For instance, in 2013, the year of the large forest fire of Andratx-Estellencs, though large forest fires within the Spanish territory represented only a 1.16% of the total number of fires, they were in fact responsible for 33% of the total burnt area (European Commission *et al.*, 2014, p. 54).

risk to human lives and infrastructures, and the communication strategies of some institutions during such catastrophic events has disseminated the idea among policy-makers and the public that all fires are disasters that must be avoided, either through fire exclusion policies – such as the regulation of the use of anthropogenic fire – or through highly expensive fire suppression policies – such as the firefighting strategy of rapid detection and extinction (Pausas *et al.*, 2008, p. 713; Bowman *et al.*, 2011, p. 5). Paradoxically, current research is increasingly considering these fire suppression policies as a factor that might actually favour the incidence of large forest fires that are beyond the capacity of extinction and have catastrophic consequences, since they contribute to a greater accumulation and continuity of living and dead biomass (Agee and Skinner, 2005; Costa *et al.*, 2011; Moritz *et al.*, 2014; Scott *et al.*, 2016).

In Serra de Tramuntana, the accumulation of biomass is directly associated to the abandonment of many agroforestry lands that followed the progressive and profound change in local people's means of livelihoods since the second half of the last century, according to which tourism and the associated construction industries became far more prevalent than agriculture, forestry, fishing and intra-island trade (Cifre, 2013), and to the migration of a large percentage of the rural population to tourist centres (Barceló, 1985, p. 49). Consequently, Serra de Tramuntana initiated a process of afforestation, in which forests became denser – particularly through the growth of pines and undergrowth in holm-oak forests – and expanded over former cultivated lands – especially with the growth of pines in terraced olive groves (PFIB, 2013). In this context, many herds of goats were abandoned in the mountains and started to reproduce massively, while many other insect forest plagues started growing uncontrollably as local people's forestry practices stopped. On the other hand, Serra de Tramuntana became a centre of attraction for tourists and new foreign residents – as was also the case of many other Spanish and Mediterranean European protected areas (Kousis, 2004; Santamarina, 2008b; Valcuende *et al.*, 2011; Cortés-Vázquez, 2012), which is generating diverse socio-environmental dynamics that impact the risk and the management of forest fires.

Nonetheless, the study of fire has largely focused on developing fire behaviour prediction models (e.g. Roethermel, 1983; Chuvieco and Congalton, 1989; Saglam *et al.*, 2008; Vilar *et al.*, 2016), and understanding its ecological dimension – including, for instance, analyses of the effects of fire on plant adaptations, on the distribution of tree species and on soil aggregation (e.g. Minnich, 1983; Naveh, 1989; Abrams, 1992; Certini, 2005; Ferreira *et al.*, 2008; Santín and Doerr, 2016; Pausas *et al.*, 2018). Nonetheless, the

recognition of the long common trajectory between the history of fire, of the Earth and of humanity, has encouraged some authors to begin to make the study of fire more complex by incorporating its social and environmental spheres, among whom Stephen J. Pyne stands out (e.g. 1998, 2001, 2009, 2012, 2016). In this respect, this thesis draws on research that increasingly incorporates both the social and environmental dimensions of fire, in particular case studies that analyse the impact on fire regimes of changes in land-use and land-cover (LULC) (e.g. Moreira *et al.*, 2001; Bielsa *et al.*, 2005; Mouillot *et al.*, 2005; Castellnou *et al.*, 2007; Tonini *et al.*, 2018) and, more recently to a significant extent, the impact on fire regimes of firefighting suppression policies (Xofis, 2006; Sande Silva *et al.*, 2010; Costa *et al.*, 2011; Gill *et al.*, 2013; Moritz *et al.*, 2014; Struzik, 2017). Nevertheless, it is worth noting that, although the causes of fire ignition have been and continue to be an important object of study and discussion (Vayda, 2006; Syphard *et al.*, 2007, 2017; Vanni ere *et al.*, 2008; Rodrigues *et al.*, 2016), I only approach this issue indirectly – as, for instance, when identifying that many people associate an increase of recreational land-uses to a greater risk of fire ignition. I pay much more attention to exploring some of the socio-environmental factors that nowadays contribute to the spread of forest fires in Serra de Tramuntana. There are various reasons that justify this decision. Firstly, although fires were already a problem when the local people managed the lands of Serra de Tramuntana, it appears from ethnographic data that the great difference with the current situation is the capacity of fires to spread over abandoned lands. Subsequently, most of the discussions around the issue of large forest fires in Serra de Tramuntana today and the possible management solutions revolve around the socio-environmental factors that contribute to their spread. Secondly, as I have already pointed out, the afforestation processes that facilitate a greater availability of fuel for fires to spread fast, intensively and become uncontrollable by firefighting means is a dynamic common to many Mediterranean rural areas, thus its study is of interest and relevant beyond the context of Mallorca. Moreover, when collecting and analysing ethnographic data I realised that the accounts of the spread of fires were directly or indirectly related to other broader historical, social and environmental issues that became part of my research interests, such as social perspectives on environmental change and the management of Serra de Tramuntana as a UNESCO World Heritage Site, among others. Finally, one of the latest contributions of the anthropological study of fire and the broader socio-environmental dynamics in which it is inscribed – such as those evolving around the use and management of a protected area – enriched with the

theoretical framework of the ‘new ecologies’, helps to overcome the dichotomy nature/culture. The focus on moving beyond the nature/culture divide, considered “the key foundation of modernist epistemology” (Descola and Pálsson, 1996, p. 12), encourages us to challenge other dichotomisations and pushes us to adopt a more integrative approach, such as the incorporation of both the social and the natural in the study of environmental change (Scoones, 1999, p. 497).

Fire is inherent to the history of both the Earth and of humanity; it appears on Earth long before humanity, and becomes a fundamental anthropogenic tool in the very early times of humanity. Fire is extremely polyvalent and ambivalent, and acquires a great diversity of forms and expressions. Fire includes both the fire created by lightning, and that created by humans to produce charcoal, to promote the creation of fresh pasturelands or to cook, to name but a few. Fire has a great power of socio-environmental transformation; it is both a modeller of landscapes and a trigger for complex social dynamics. In fire, nature and culture become one; they are both integrated as elementary constitutive elements of what fire is. Thus, the study of fire through the perspective of environmental anthropology challenges the understanding of nature and culture as separate and dualistic spheres of life. The study of fire evidences how the dichotomy nature/culture loses meaning, how both nature and culture ‘achieve a historical legitimacy that turns nature into part of our culture, and traditional culture into part of our natural roots’ (Vaccaro and Beltran, 2017, p. 268)

The forests of Serra de Tramuntana and beyond: an historical and contemporary perspective

According to the Fourth National Forest Inventory (2012, p. 9), the Balearic Islands are currently estimated to have 186,000 hectares of forests, a 36% of its total surface.⁷ In turn, Mallorca and Cabrera⁸ have around 120,000 hectares of forests, the

⁷ The data used to make all the calculations in this introductory section are mainly extracted from the national forest inventories that have been published on a periodic basis from 1970 (1971; 1998; 2008; 2012). In this section, moreover, I am considering as ‘forests’ what the national forest inventories refer as to ‘wooded forested territory’ (monte arbolado total), which are the areas with a canopy cover (*fracción de cabida cubierta*) equal to or greater than 10% (*Cuarto Inventario Forestal Nacional. Illes Balears*, 2012, p. 9). The canopy cover is, according to the dictionary of the Spanish Engineering Academy (2012), the ‘proportion of the surface of the ground covered by the vertical projection of the tree crowns’. Therefore, I am not considering what the national forest inventories refers to as ‘forest surface’ (*superficie forestal*): areas of shrubland without trees or with a low level of trees covering the 44% (220,78634 hectares) of the territory of the Balearic Islands (*Cuarto Inventario Forestal Nacional: Illes Balears*, 2012, p. 10).

most common of which are pine (*pins*, *Pinus halepensis*) forests; followed by mixed communities of pines, holm-oaks (*alzines*, *Quercus ilex*) and wild olive-trees (*ullastres*, *Olea europea*); holm-oak forests; and wild olive-tree forests (see Figure 5.3).⁹ With regards to the undergrowth, the garigue¹⁰ is the main formation, covering 161,000 hectares of the Balearic Islands (ibid.).

Since the second half of the twentieth century, the landscape of Serra de Tramuntana has experienced significant transformations (see Chapters 2, 3 and 5). Nevertheless, we still lack of a comprehensive study to unravel the present landscape configuration of the mountain area and how it has been transformed over the last seven decades – namely, by looking at the conversions of some land cover types to others or at the spatial pattern changes in vegetation structure and succession. Even so, a preliminary analysis¹¹ estimates that the most forests in Serra de Tramuntana today are formed by pines, followed by mixed formations of pines, holm-oaks, and finally holm-oaks (Santana 2018a; 2018b. See Figure 5.4).¹²

Until a comprehensive study of historical changes in mountainous forests is carried out, the four national forest inventories in the Balearic Islands (1971; 1998; 2008;

⁸ In the national forest inventories the data of Mallorca – with 364,000 hectares – are recorded along with those of Cabrera – which only has a surface area of 1,600 hectares of surface.

⁹ In Mallorca and Cabrera there are 47,900 hectares of pine woods; 30,300 hectares of mixed formations of pines, holm-oaks and wild olive trees; 26,200 hectares of wild olive trees communities; and 11,200 hectares of holm-oak communities (*Cuarto Inventario Forestal Nacional. Illes Balears*, 2012, pp. 14, 20, 18).

¹⁰ A garigue is an area of Mediterranean xerophilous shrubland on calcareous soils, that is usually so dense that it is hard to penetrate (Real Academia de Ingeniería, 2012). In the Balearic Islands, the garigue is made up of calcicole and thermophilic bushes (*Cuarto Inventario Forestal Nacional: Illes Balears*, 2012). Calcicole shrubs usually grow on calcareous substrates, while thermophile shrubs are those adapted to high temperatures (Real Academia de Ingeniería, 2012). In Serra de Tramuntana, the most common shrub species – those which presence is equal or more than 40% – under pines are mastic (*mata*, *Pistacia lentiscus*), mock privet (*aladern*, *Phillyrea angustifolia*), brier (*xiprell*, *Erica multiflora*), and grey-leaved cistus (*estepa lanca*, *Cistus albidus*) (*Cuarto Inventario Forestal Nacional: Illes Balears*, 2012, pp. 14-27). Under mixed formations of pines, holm-oaks and wild olive trees, the garigue has mastic, grey-leaved cistus, and Montpellier cistus (*estepa llimonenca*, *Cistus monspeliensis*); under holm-oak communities, the most common shrubs are mastic and Mediterranean smilax (*aritia*, *Smilax aspera*) (ibid.).

¹¹ This preliminary study by the forestry technician Joan Santana was recently published by the association Tramuntana XXI in a manual aiming to promote an active management of the mountainous area (Alomar *et al.*, 2018).

¹² According to Santana (2018a; 2018b), there are 24,200 hectares of pine forests, 15,000 hectares of mixed forests of pines and holm-oaks, and 9,000 hectares of holm-oak forests in Serra de Tramuntana –which has a total surface of 30,750 hectares.

2012)¹³ provide some useful insights. In general terms, between 1970 and 2010, the forests¹⁴ of the Balearic Islands have increased by 73%.¹⁵ The extension of the three most common forest types in Serra de Tramuntana today has also greatly changed in this period: pine forests have increased by more than 30%; the holm-oak forests have decreased by almost 20%; and pines have grown within holm-oak forests, which has led to the development of a mixed forest type that was not significantly present in the mountainous area in 1970 (See Figure 5.5). Apart from the transformations in forested areas, croplands (*cultius*) have suffered a decrease of 7%,¹⁶ while pasturelands (*pastures*) and shrublands¹⁷ (*matorral*) suffered a significant shrinkage¹⁸ of almost 50% during 1970-2010. Although the regional Forestry Plan states that forests – particularly those with a predominance of pines – have replaced croplands, pasturelands, shrublands and terraced olive groves (PFIB, 2013, p. 47), there is not sufficient data available to ascertain with any degree of accuracy what precise percentage of croplands and pasturelands has turned

¹³ There is no data specific to Mallorca and Cabrera in the first forest national forest inventory, so I could only calculate the difference in the percentages of forest types using data on the Balearic Islands as a whole. Nevertheless, because there is a considerable difference in the presence of forest types in each of the islands – for instance, pines are present in greater numbers in Eivissa, while today holm-oak forests are present only in Mallorca, Cabrera and Menorca – thus the development of further research is pivotal.

¹⁴ Again, for these calculations I have used as a leading parameter the ‘wooded forested territory’ (*monte arbolado total*), since the ‘forest surface’ (*superficie forestal*) does not reflect the process of afforestation that Serra de Tramuntana has been experiencing over the last four decades inventories (*Cuarto Inventario Forestal Nacional: Illes Balears*, 2012). As can be seen in Figure 5.6, while the forest surface has only increased by around 20% between the first and the fourth inventories – and even actually diminished by 1% between the third and the fourth – it is the wooded forestry territory which maintains a significant positive tendency of growth – an increase of 42% between the first and the fourth national forest inventories (*ibid.*, p. 10).

¹⁵ According to the correspondent forest inventories (1971, p. 18; 2012, p. 10) in 1970 there were 107,400 hectares of forests in the Balearic Islands, while by 2010 they had increased to 185,700 hectares. Over the last decade, forests have increased by 7,500 hectares, although most of their expansion was registered between 1998 and 2008 (a 56%, from 122,500 hectares to 182,500 hectares). Nowadays there are 67 million adult trees, 33 million more than in 1970 (PFIB 2013, p. 40).

¹⁶ In the Balearic Islands, in 1970 there were 284,700 hectares of cropland (1971, p. 18), while by 2010 it had dropped to 242,250 hectares (*Cuarto Inventario Forestal Nacional. Illes Balears*, 2012, pp. 8-10).

¹⁷ In the national Forest Inventory (2012, p. 9), pasturelands and shrublands are all included in the same category: forest surface without trees (*monte desarbolado*) – which is defined as any forest area with a canopy cover of between 5 and 9%.

¹⁸ In the Balearic Islands, in 1971 there were 69,200 hectares. of shrublands and pasturelands (1971, p. 18), while by 2010 it had dropped to 35,100 hectares (2012, pp. 8-10).

into shrublands and what shrublands have turned into forests.¹⁹ Further research also needs to address how these transitions and rates of change have occurred specifically in Serra de Tramuntana.

The forests of Serra de Tramuntana are also denser now than they were four decades ago, as evidenced in the national forest inventories (1971; 1998; 2008; 2012) through the parameters of volume with bark²⁰ (*volumen amb escorça*) and volume of accumulated dead wood (*justa morta*).²¹ The 4 million cubic metres of volume with bark of the forests of the Balearic Islands in 1970 increased to 9 million in 2010. Nowadays, the forests of Mallorca and Cabrera have 6.3 million cubic metres of wood volume with bark, most of which are concentrated in pine forests and in mixed formations of pines, holm-oaks and wild olive trees (see Figure 5.7). In the Balearic Islands, pine forests and mixed communities of pines, holm-oaks and wild olive trees have the greatest volumes of accumulated dead wood, while holm-oak forests have the smallest amount.²² If we examine the parameters by tree species, pines have the largest volume of dead wood in the Balearic Islands: 75% of the total volume of dead wood corresponds to pine trees, which is a 60% more than holm-oaks (see Figure 5.7).

To sum up, despite the need for further research into the landscape transformations occurring in Serra de Tramuntana, there is enough data to assert that its forests today are more extensive than in the 1970s. Forests have grown on abandoned croplands, pasturelands and terraced olive groves – greatly contributing to the generation of a less fragmented and more homogeneous landscape. Nowadays, pine woods triple in area the holm-oak forests, while mixed formations of pines, holm-oaks and wild olive trees double the area of the holm-oak forests. Moreover, today's forests are denser than in the 1970s, mainly due to the increase in the number and volume of trees, to the

¹⁹ Although the first national forest inventory provides data on the croplands located in territories at an altitude of between 400 and 800 meters, which in the Balearic Islands only exist in Serra de Tramuntana, the rest of the national forest inventories do not include this specification, so I cannot therefore formulate comparative estimates.

²⁰ The 'volume with bark' is the total volume of the trunk of a tree, including its bark (Real Academia de Ingeniería, 2012).

²¹ The 'volume of accumulated dead wood' is the volume of the deadwood of both big and small trees, the branches, and of the stump (*Cuarto Inventario Forestal Nacional: Illes Balears*, 2012, p. 33).

²² While mixed formations of pines, holm-oaks and wild olive trees have 7 cubic metres of dead wood per hectare, pine forests have 5.6 and holm-oak forests only have 4.5. According to fourth Forest Inventory (2012, pp. 19, 15) in mixed forests of pines, holm-oaks and wild olive trees, two thirds of the dead wood comes from fallen large trees – 3.47 cubic meters per hectare – while in pine woods the proportion rises to half – 3.75 cubic meters per hectare. In holm-oak forests, more than a third of the dead wood is from standing dead trees and almost a quarter is from fallen large trees – 1.75 and 1.02 cubic meters per hectare respectively (*ibid.*, p. 21).

accumulation of standing and lying deadwood, and to the development of undergrowth. Again, pines have been key factors in this shift to denser forests: they concentrate almost three quarters of the total amount of deadwood of the Balearic Islands, and they accumulate far more deadwood than the rest of tree species.

The history of conservation in Serra de Tramuntana

The National Park Act (Ley de Parques Nacionales de España) of 1916 was the first conservation law to be passed by the Spanish state to regulate, forest use throughout the whole of the state.²³ When the Spanish Constitution (Constitución Española)²⁴ was passed in 1978 along with the Statutes of Autonomy (Estatutos de Autonomía),²⁵ a large part of the competence for forest use was transferred to the autonomous authorities, allowing the different territories to decide to precisely apply these restrictions.

Throughout the 1980s, several pioneering laws attempted to limit the massive expansion of unregulated tourist development in Mallorca and the Balearic Islands (Socías, 2000, p. 303). Among these, the Law of Zoning and Protecting Natural Areas of Special Interest²⁶ granted local authorities powers to intervene to protect natural or wooded areas threatened by urbanisation projects (PFIB, 2013, p. 52). Despite these legal measures to regulate and restrict tourism urban development, from 1982 to 1992 the amount of tourist and residential accommodation available in the Balearic Islands rose by 44% (Rullan-Salamanca, 2007, p. 27). This is why, at the end of the 1980s, the the regional environmentalist organisation GOB started its anti-urbanisation campaign ‘Prou d’Urbanitzacions’ (Enough Residential Developments), which culminated in a massive demonstration in 1990 for proper legal framework to protect natural areas from spiralling urbanisation (ibid.). In direct response to the demands of environmentalist groups and some political parties, in 1991 the Parliament of the Balearic Islands – but

²³ According to Law 343/1916 of 8 December, p. 575.

²⁴ According to BOE 311/1978 of 29 December, p. 29313-29424.

²⁵ According to Organic Law 2/1983 of 25 February (BOE, 51, 1 March 1983, pp. 5776-5783).

²⁶ According to Law 1/1984 of 14 March.

without the support of the Balearic government²⁷ – passed a new law regulating urban development and conservation of protected areas (LEN, Llei d’Espais Naturals i de Règim Urbanístic de les Àrees d’Especial Protecció de les Illes Balears).²⁸ This law, hereafter referred to as LEN, aimed to protect areas of high natural and scenic value from urbanisation through zoning territory according to different land-use regulations: Natural Areas of Special Interest (ANEI, Àrees Naturals d’Especial Interès), Rural Areas of Landscape Interest (ARIP, Àrees Rurals d’Interès Paisatgístic) and Areas of Settlement within Landscape of Interest (AAPI, Àrees d’Assentament en Paisatge d’Interès).²⁹ Despite all these measures, the environmental organisations GOB and ADENA-WWF (Associació per a la Defensa de la Natura-World Wildlife Fund) publicly denounced the LEN for failing to protect many parts of Serra de Tramuntana from urbanisation, particularly given that the ARIP category still allowed the construction of up to 30 houses per square kilometre (Avella, 1992, p. 7). In line with this, in 1992, GOB and ADENA-WWF launched a campaign to declare Serra de Tramuntana a natural park (Plataforma a Favor del Parc Natural de Serra de Tramuntana). In a brochure published in 1992, the two environmentalist organisations called for the immediate creation of a protected area that would cover the whole mountainous area and thus forestall new urbanising developments. In 2007, after a long and convoluted public and political debate,³⁰ 63,000 hectares of Serra de Tramuntana were awarded the status of ‘Natural Site’ (*Paratge Natural*) (Consorci Serra de Tramuntana Patrimoni de la Humanitat, 2013).³¹

²⁷ According to the Organic Law 1/2007 of 28 February, amending the Estatuto de Autonomía de las Illes Balears – which regulates the institutions of the Autonomous Community of the Balearic Islands – “the regional institutional system is composed of the Parliament, the Government, the President of the Autonomous Community and the Island Councils of Mallorca, Menorca, Ibiza and Formentera”. According to the Organic Law, the parliament maintains the representation of the people of the Balearic Islands, and its functions are to exercise the legislative power, approve the budgets of the Autonomous Community, and control the action of the government. The government of the Autonomous Community exercises the executive power and is a collegiate body composed of *consellers* (ministers in the regional government). Its president, the highest officeholder in the Autonomous Community and of the Spanish state in the Balearic Islands, is elected by the Parliament from among its members. In that period, there were opposition political parties, the Popular Party being in government, openly opposed to the creation of natural areas that restricted agricultural uses.

²⁸ According to the Law 1/1991 of 30 January.

²⁹ According to the Law 1/1991 of 30 January. For a map of the zoning implemented by this law, see Appendix 5.

³⁰ Despite the relevance of understanding the social dynamics that led to the declaration of Serra de Tramuntana as a protected area, I have not gone further into this topic because there is almost nothing published about it and I have not gathered enough ethnographic data to deal with it properly. I address it in subsequent research.

³¹ According to the Law 5/2005 of 26 May.

The passing in 2007 of the master zoning plan, the ‘Pla d’Ordenació dels Recursos Naturals de la Serra de Tramuntana’ – hereafter referred to as PORN (2007)³² – provided a broad framework of regulations and guideless for zoning due to stricter imposition of land-use restrictions.³³

Nevertheless, there are multiple and overlapping regional, national and supranational legal frameworks that apply to Serra de Tramuntana, some of which preceded the LEN in 1991 and the Natural Site declaration of 2007. For instance, the entire area was declared a ‘Picturesque Site’ in 1972.³⁴ Following the 1985’s national Law on Cultural Heritage (Llei de Patrimoni), numerous parts of Serra de Tramuntana were declared an ‘Asset of Cultural Interest’ (BIC, ‘Bé d’Interés Cultural’).³⁵ In 1992 Serra de Tramuntana joined the European Natura 2000 network,³⁶ and with it, a zoning³⁷ system with areas designated for bird conservation (ZEPA, Zones d’Especial Protecció d’Aus) or to reflect various kinds of social, cultural and historic importance (LIC, Llocs d’Interès Comunitari). Another decree of 2001 conferred a special status of protection to many holm oak forests in Serra de Tramuntana.³⁸ In 2001 and 2003, the Balearic Government declared two specific areas of Serra de Tramuntana as Natural Monuments.³⁹ Then, in 2004, with the Territorial Plan of Mallorca (Pla Territorial de Mallorca) a new system of zoning overlapped with that already in existence and awarded

³² The PORN (2007) is a compulsory management plan that covers matters such as the protection and conservation of fauna, flora, ecosystems, natural resources, and landscape. It also regulates forestry, agricultural and livestock activities.

³³ The 63,000 hectares which comprised the Natural Site of Serra de Tramuntana, were demarcated by PORN into Exclusion Zones (1,880 hectares), Limited Use Zones (31,600 hectares), Compatible Use Zones (25,700 hectares), and General Use Zones (3,900 hectares) (PORN, 2007).

³⁴ According to the Decree 984/1972 of 19 April.

³⁵ According to the Law 16/1985 of 25 June. For a map of the zoning of BIC, see Appendix 7.

³⁶ This bears witness to the role that the European Union has played in the territories of the Spanish state since the latter’s incorporation in 1985. The European Union passed the Birds Directive (according to the Council Directive 79/409/EEC on the conservation of wild birds) and the Habitats Directive (according to the Council Directive 92/43/EEC on the conservation of natural habitats and wild fauna and flora), which together form the Natura 2000 network (Gaston *et al.*, 2008).

³⁷ According to the Directive 92/43/EEC of 21 May. The network Natura 2000 also includes the Areas of Special Conservation (ZEC, Zones d’Especial Conservació), but none of them is located in Serra de Tramuntana. For a map of the zoning of ZEC, ZEPA and LIC, see Appendix 8.

³⁸ According to the Decree 130/2001 of 23 November. For a map of the zoning of the protected holm oak forests, see Appendix 9.

³⁹ The Natural Monument of Ses Fonts Ufanes, according to the Decree 111/2001 of 31 August, and the Natural Monument of Torrent de Pareis, Gorg Blau and Lluc according to the Decree 53/2003 of 16 May.

special protection status to 99% of Serra de Tramuntana (Centro del Patrimonio Mundial, 2014, p. 4).⁴⁰ Finally, the La Trapa Nature Reserve, a property belonging to GOB since 1980 at the western end of the mountain chain, joined the European Network of Private Nature Reserves (EUREL).

From an idealised 'pristine' nature to the creation of the first protected areas

The understanding of nature and culture as different and separable realities, a dichotomy central to the entire project of modernity and the Enlightenment, led to a concept of a natural landscape that, in order to be safeguarded, had to be protected from the devastating power of humankind (Hirsch, 1995; Anderson and Berglund, 2003; Brockington and Schmidt-Soltau, 2004; Ingold, 2011; Valcuende *et al.*, 2011; Smith, 2016). This idealisation of pristine nature, conceptually and physically separated from human society, underlies the discourse associated with the emergence of the very first protected area in 1872 – the national park of Yellowstone in the United States of America (Adams and Hutton 2007, p. 153), followed by, in 1890, Yosemite National Park (Runte, 1987). The quest for a “lost paradise,” in which landscape served to fuse identity and patriotic/nationalist values (Runte, 1977), is what, in line with Santamarina *et al.* (2014, p. 87), characterises this first period in the history of nature conservation.⁴¹

According to Nash (1970), the United States of America leading role in creating national parks reveals the interrelationship between four factors: the recognition of wilderness as an essential aesthetic and ethical identity trait of evolving American nationalism; a democratic tradition that favoured the creation of land for public use and ownership; the existence of vast areas of undeveloped land; and the country's enormous wealth, which allowed it to preserve unexploited areas for non-utilitarian purposes. Nash (1970, p. 65) emphasises that the creation of national parks in America evolved not only out of the search for a visible culture and a distinct national identity through landscape,

⁴⁰ The Natural Areas with a High Protection Level (AANP, Àrees Naturals d'Alt Nivell de Protecció) and Rural Areas of Scenic Interest-Forests (ARIP-B, Àrees Rurals d'Interés Paisatgístic-Boscós). Other less restrictive categories established by the Territorial Plan of Mallorca are: Areas of Agricultural Interest-Olive groves (AIA-O, Àrees de Interés Agrícola-Olivares), Areas of settlement in Landscapes of Interest (AAPI, Àrees de Asentamiento en Paisaje de Interés) and Areas of Urban or Developable Land (ASU, Àrees de suelo urbano o urbanizable) (Consell Insular de Mallorca, 2004). For a map of this zoning, see Appendix 10.

⁴¹ Following Santamarina *et al.* (2014), the first period ranges from the late nineteenth to the early twentieth centuries; the second period extends throughout the second half of the twentieth; and the last period covers the last two decades.

but also out of the willingness to reconvert areas with non-exploitable natural resources into sites for outdoor recreation. The conservation model of Yellowstone expanded with the creation of further national parks in the Canadian Rockies between 1885 and 1911, namely the Banff, Glacier, Jasper, Yoho and Waterton Lakes National Parks (MacEachern, 2011, p. 27). The creation of these early national parks initiated a process of international expansion for the policy of protecting the natural heritage (Mulero, 2002; Nash, 1970; Solé and Bretón, 1986 in Santamarina *et al.* 2014, p. 89).

The concern for protecting nature took a different course in Europe, where pioneering conservation initiatives were fostered by a variety of other interrelated factors: the philanthropic environmentalism and aristocratic protectionism of the nineteenth century; the naturalist movement of the early twentieth century; the environmental concerns following the degradation caused by industrialism; the development of the disciplines of ecology, biology and geography; the proliferation of mountaineering, alpine clubs and hiking societies; and the literary and artistic discovery of landscape (Bramwell, 1989, Riechmann and Fernández, 1994; Vincent, 1992; Santamarina *et al.* 2014, pp. 89–90). Nevertheless, the link between industrialism and conservation was not homogeneous in Europe, as there are some significant differences in how industrialism affected different countries and regions.

The Industrial Revolution began in Great Britain owing to the confluence of a series of socio-environmental factors: the Agricultural Revolution it had already experienced, among other issues, enabled intensive crop and livestock farming to produce sufficient food and raw materials – such as wool – for manufacturing production, while the existing surplus of agricultural produce favoured the development of commercial activity (Azagra *et al.*, 1999, pp. 97–118). Both domestic and foreign trade were favoured by the building of commercial maritime ports and the construction of canals as well as a complex internal communication network (*ibid.*, p. 100). The existence of large coal and iron deposits was able to satisfy the enormous demand for energy required by the industrial processes and would provide the raw materials for the iron industry (*ibid.*, p. 100). London's population concentration favoured the development of manufacturing industries which underwent a process of mechanisation through the large-scale incorporation of technology, large machinery and energy. Owing to the urban impact of the Industrial Revolution and the fact that the land in Britain had been extremely fragmented – since, during the Agricultural Revolution, common land had been expropriated and the great estates had been split up (the so-called 'enclosures') and

leased to the wealthier farmers for the development of intensive crop and livestock farming (Patriquin, 2004) – , at the end of the nineteenth century there remained a very limited amount of wildland to protect, so that the first National Parks actually included farms, houses and even whole villages (Nash, 1970, p. 733). In England, the threats to the landscape of the Lake District promoted the foundation in 1895 of the National Trust for Places of Historic Interest or Natural Beauty (Jenkins 1994 in Smith, 2016, p. 21). The main concern of the Trust’s founders was to preserve common land of natural beauty as recreational areas to ensure the physical and cultural health and well-being of urban populations (Weideger 1994; Crouch 1963: 18 in Smith 2016, p. 21).⁴²

The pioneering industrialisation process in Great Britain, followed by France, Germany and Belgium during the nineteenth century, was much slower in other European countries, as was the case in Spain, Italy, Russia, Scandinavia central Europe and the Balkans (Palafox *et al.*, 1999, pp. 139–149). In Spain, the rugged terrain hindered the development of internal commercial communications systems, exacerbated by the lack of sufficient mineral resources, such as coal, to generate the energy required for industrial development (*ibid.*, pp. 150-156). With the exception of the expansion of modern industry in Catalonia, particularly in the cotton textile sector, and later on in the Basque Country, even at the end of the nineteenth century Spain was still very much an agricultural area (*ibid.*, pp. 150-175). Unlike Britain, in Spain there were still many extensive areas of land that had been neither split up nor urbanised, partly due to the preservation of large estate ownership structures; of common land where extensive crop and livestock farming was carried out; and the preservation of the legal system (La Mesta) under which the transhumant cattle herders had the right to carry on moving their cattle along the traditional migration routes (*ibid.*). The existence of these extensive areas of undivided and unurbanised land would later favour the creation of protected natural areas.

In 1916 the Spanish state passed one of Europe’s first laws to create protected areas (Ley de Creación de Parques Nacionales) (Santamarina, 2009, p. 314). Its conservation model was formed in response to various concerns – a Romantic ideal, the willingness to protect forests and species, scenic-artistic criteria, and the philosophic perspective underlying the ‘reconquest of nature’ (Santamarina 2005; 2008, p. 30).

⁴² Although its original purpose was to preserve public lands on behalf of the public, the National Trust became primarily a major advocate for the preservation of country houses owned by the English elite as part of the national heritage (Smith, 2016, p. 22).

Shortly after, in 1918, the first two National Parks of the Spanish state were established: the Montaña de Covadonga and the Ordesa National Parks. They became iconic examples of how nature and landscape could become common heritage, countryside and nature acting as a lens for refracting the past into the present, closely linked to the Spanish national identity; the landscape was thereby understood as a material and symbolic expression of the history of human groups – in short, a condenser of memory, collective identity, patriotism and religion (García 2013, p. 411-412).

In 1971, the Spanish government created the Institute for the Conservation of Nature (Instituto para la Conservación de la Naturaleza)⁴³ – hereafter referred to as ICONA – which made the first national inventory of outstanding landscapes (ICONA, 1975). In the late 1980s and the 1990s, aiming to adapt to European norms and distance itself from policies exploiting natural resources which were introduced during the early Franco dictatorship, the number of protected areas in the Spanish state saw exponential growth (Mulero, 2002). At the end of the 1980s, the central government transferred many powers to the autonomous (regional) governments, leading to the creation of numerous protected areas embracing a wide variety of norms and levels of protection, and distributed unevenly within Spain's borders (Santamarina 2005; Beltran and Santamarina 2016, p.8). According to EUROPARC-Spain's *Yearbook 2017* (2017, pp. 30–31), there are almost two thousand protected areas⁴⁴ covering slightly more than seven million hectares, i.e. 13% of the country's total area. Of these, around 6,500,000 hectares are on land and 500,000 at sea. If in 1994 there were 465 protected areas in the Spanish state (EUROPARC-España, 2008, p. 15), the number has quadrupled in little more than two decades. Another significant fact is that protected areas usually correspond to depressed rural areas that have benefited from the European Union's LEADER⁴⁵ programmes for rural development (Tolón and Lastra, 2000, p. 10).

The growth of natural protected areas and international natural protected areas networks

⁴³ According to the Decree-Law 17/1971 of 28 October.

⁴⁴ The 1,958 protected areas of the Spanish state include 15 national parks, 151 natural parks, 290 nature reserves, 346 natural monuments, 57 protected landscapes, 1 marine protected area, and 1,098 other protective elements created by the autonomous governments – such as Mallorca's Natural Site (*Paratge Natural*) of Serra de Tramuntana – (EUROPARC-España, 2017, pp. 30–31).

⁴⁵ Liaison entre actions de développement de l'économie rurale (LEADER).

The growth of the environmental movement, the social resistance to urbanisation and the proliferation of legally enforced conservation measures, trends that have become visible in Serra de Tramuntana since the 1970s – have a clear analogy on a global level. From the second half of the last century the conceptualisation of nature as something to be respected and protected became consolidated and reinforced the emergence of environmentalisms and conservation policies (Carrier and West, 2009). Environmentalism, from this point of view, is the “concern that the environment should be protected, particularly from the harmful effects of human activities” (Milton, 1996, p. 27). In the 1960s and the 1970s many ecological disasters and an emerging global environmental crisis became increasingly visible in public, political and academic circles and were accompanied by the creation of a variety of conservation institutions, agents and measures, including new environmentalist movements (Santamarina *et al.*, 2014, p. 88, 90-91). As argued by Bramwell (1989, pp. 211–212), the blossoming of environmentalist movements in the early 1970s can be attributed to the emergence on a global scale of concerns regarding the availability of finite resources – especially after the oil crisis of 1973, combined with biological and ‘green’ arguments. The 1980s and the 1990s witnessed growing administration of environmental management at a national level, a rapid proliferation of local, national and international environmental nongovernmental organisations (NGOs) and transnational institutions striving for a global formula for governing the environment (Brosius, 1999, p. 277).

It is also during the period between 1950 to the 1970s that the emergence of protected areas became globally significant (see Figure 1.6), reaching a peak between 1985 and 1995 (West *et al.*, 2006, p. 252). By 2014, protected areas covered 14% of the world's land and inland water areas, and 3.4% of the world's oceans (Juffe-Bignoli *et al.*, 2014, p. 7).⁴⁶ This growth of protected areas at a global level from the 1970s is directly linked to the rise from the 1970s of neoliberalism as a globally dominant ideology, which had a direct impact on environmental conservation by making it compatible with the circulation of capital (Neves and Igoe, 2012, p. 164; Fletcher *et al.*, 2014, p. 4). This tendency was also closely linked to and enhanced by the tertialisation⁴⁷ of economies (Beltran *et al.*, 2008; Frigolé, 2012) and the processes of capitalist commodification, such

⁴⁶ Analyses on the extent of protected areas around the globe vary depending on the system of measurement. Here, the percentage given comes from the annual report of Protected Planet. See: www.protectedplanet.net (last consulted on 20.05.2015).

⁴⁷ The ‘tertialisation’ of the economy mainly refers to the transformation of the economic by which there is a substantial increase in the service sector.

as nature-based tourism (Brockington *et al.*, 2008). As has been widely theorised, neoliberal conservation is the latest phase of a long and close relationship between conservation and capitalism (Brockington *et al.*, 2008; Brockington and Duffy 2011; Fletcher *et al.*, 2014). This union has involved many forms of hybrid administration, such as private for-profit companies managing protected areas, conservation-business partnerships, and the promotion of ecotourism in an attempt to achieve regional and local prosperity, economic growth and biodiversity conservation (Igoe and Brockington, 2007, p. 433).

The exponential increase in the number of protected areas worldwide went hand in hand with the creation of many different national and supranational bodies dedicated to the conservation of natural spaces and resources. In Europe, a clear example of this would be the creation by the Union for the Conservation of Nature (IUCN)⁴⁸ of the Commission on National Parks and Protected Areas (currently called World Commission on Protected Areas – WCPA), which in 1994 published the Guidelines for Protected Area Management Categories, which set out a classification system⁴⁹ for the management of protected areas (Phillips, 2004). On a global level we should highlight the role played by the UN Environment World Conservation Monitoring Centre (UNEP-WCMC)⁵⁰ in informing the public about the existence of these protected areas, creating, together with the IUCN the most complete global database of protected marine and terrestrial protected areas.⁵¹ In Spain, in 1993 EUROPARC-España (Miembro de la Federación EUROPARC) was created,⁵² and a part of its tasks that should be highlighted is the elaboration of annual reports starting in 1999, listing the number, typology and geographical distribution of protected areas in Spain as well as monitoring the management and contribution to conservation of the country's natural heritage, biodiversity and landscapes (EUROPARC-España, 2018).

Environmental anthropology and the study of the social, historical and environmental dimensions of fire

⁴⁸ For further information see: www.iucn.org (last consulted on 26.03.2020).

⁴⁹ For a list of the IUCN's classification of protected areas according to their management objectives, see: www.iucn.org/theme/protected-areas/about/protected-area-categories (last consulted on 16.06.2019).

⁵⁰ For further information see: www.unep-wcmc.org (last consulted on 16.06.2019).

⁵¹ For further information see: protectedplanet.net (last consulted on 16.06.2019).

⁵² For further information see: www.europarc.org (last consulted on 16.06.2019).

I consider that the best way to examine the profound interconnections between the historic, social, and environmental dimensions of fire is to theoretically frame it within environmental anthropology, and it is precisely within this arena that I position the contribution of my research. There are many key themes within the studies of environmental anthropology that are central to this thesis, as for instance the politics involved in the use and management of natural resources, or the perceptions and knowledge on landscapes and landscape transformations with a special emphasis on the local communities' views, among other research topics (Dove and Carpenter, 2008). Environmental anthropology has indeed experienced many developments, some of which are acknowledged in this thesis. For instance, many environmental anthropology studies have adopted a more diachronic perspective by incorporating the historical antecedents and have acknowledged that communities are no longer understood as self-enclosed, but are seen immersed in larger global systems (*ibid.*). Throughout the whole thesis I have adopted this perspective, incorporating the methodological and theoretical contributions of the 'new ecologies' (Biersack, 1999) as I shall explain below. The integration of the social and the natural sciences in a transdisciplinary approach is another direction that the studies of environmental-human relationships are taking (Moran and Lopez, 2016) and an approach that I have adopted in each and every one of the objects of study of this thesis. Recent reviews in environmental anthropology (e.g. Kopnina and Shoreman-Ouimet, 2017) point out that current studies emphasise how multiple and complex the cultural responses to global and local environmental changes are, especially in light of the rapidity of the changes taking place in relation to global warming. Other recent debates and theoretical debates in environmental anthropology include the ontological turn, the idea that anthropologists study a multiplicity of actual worlds instead of a multiplicity of belief systems (e.g. Rival, 1998; Descola, 2005; Kohn, 2013, 2015). In this regard, although both fire and forests are a powerful analytical tool to put into dialogue with this literature,⁵³ in this thesis I have not embraced this theoretical framework, though it is something that I plan to do in subsequent research.

Furthermore, the anthropology of conservation is, within environmental anthropology studies, of particular relevance to this thesis. Anthropological studies of

⁵³ Throughout the thesis, the reader might recognise some aspects that could be interpreted as the agency of fire, as for instance when I explain that the Andratx-Estellencs fire of 2013 was a kind of fire that itself generates the environmental conditions to make available a fuel of high flammability that benefits its spread (see Chapter 6).

conservation policies and practices have contributed to a profound understanding of protected areas and its multiple impacts on environmental-human relationships among a huge variety of stakeholders (e.g. West *et al.*, 2006; Igoe and Brockington, 2007; Valcuende *et al.*, 2011; Cortés-Vázquez *et al.*, 2014). This extensive body of literature, especially prominent in the context of the Spanish State in the last two decades (Beltran and Santamarina, 2016), has enriched the theoretical base of the ethnographic work I am presenting here. For instance, the analysis of the implementation of land-use regulations and their socio-environmental impacts (e.g. Beltran *et al.*, 2008) have been of great value when analysing the variety of attitudes toward the management of local forests and some of the conflicts derived from the restrictions on local people's agroforestry uses imposed by multi-level conservation policies in Serra de Tramuntana. Moreover, the ever-increasing literature on heritagisation processes in the Spanish State (Santamarina, 2009; Frigolé, 2014; Santamarina *et al.*, 2014; Cortés-Vázquez, 2018) have become key to understand the particularities of how these processes have been activated in Serra de Tramuntana. Indeed, the particularities of my research area have allowed me to study some less-explored issues within the anthropological studies of conservation, such as when I suggest that some dynamics of agreement and negotiation that take place between some stakeholders move us away from the generalised idea that local communities and institutional agents are actors with antagonistic perspectives and practices. Nevertheless, my greatest contribution to the understanding of human-environmental relationships is the focus on the study of fire and human responses to fire, a theme that for the time being has not gained enough attention within anthropological studies, despite the greatest part of the budget for environmental matters of the Spanish State being dedicated to the extinction of forest fires.

As I have pointed out above, the 'new ecologies' have enriched my theoretical approach throughout the whole thesis. Historical ecology is an interdisciplinary research program involved in understanding the interactive relationship between societies and environments through space and time, and the consequences of these relationships enable us to better comprehend the formation of past and contemporary cultures and landscapes (e.g. Crumley, 1994, 1998, 2007; Balée, 1995, 1998; Redman, 1999; Balée and Erickson, 2006). Drawing from a great variety of concepts, theories, issues and merging evidences from a broad spectrum of disciplines, historical ecology becomes an inherently integrative and holistic research program (Crumley *et al.*, 2017; Eriksson *et al.*, 2018, p. 145) that allows the generation of multiple, inclusive, and flexible narratives of human-

environmental relationships (Crumley *et al.*, 2017). In the words of Balée (1998, pp. 13–14), one of the key contributions of historical ecology is that it “reveals the dialectical process that unfolds the changes in the relationship between humans and their surrounding environment throughout history, focusing on the interpretation and dialogue between nature and culture.” Challenging the classic ‘adaptationist’ assumptions associated with cultural ecology (e.g. Steward, 1955) and cultural materialism (e.g. Harris, 1968), according to which cultures are composed of a set of learned behaviours and beliefs whose primary function is to adjust humans to their environments (Lett, 1987), historical ecology considers human agency as a transformative force of the environment (Eriksson *et al.*, 2018). Hence, it also challenges the widespread concern in classic ecology that human practices are always destructive to nature, a view that misconstrues human agency as the basis of some environmental disturbance which, at some degree of intensity, might even be the very key to sustaining diversity (Balée, 2006, p. 81). This would be the case, for instance, of the ‘mosaic landscape’, which is a landscape in flux created by humans who, as creative agents, shape conditions and foster landscape heterogeneity through the combination of temporally and spatially variable disturbances (Eriksson *et al.*, 2018, pp. 150–151). Human agency thus, is an expression of intentionality in resource management (Balée 2003 in Balée and Erickson, 2006, p. 3). Under the postulates of historical ecology, environmental transformations are historically contingent and the result of both structural environmental processes and human agency, thus the environment is understood as both the setting and product of human interactions (Scoones, 1999, p. 479). Following from this, one of the contributions of this thesis is to contribute to the understanding of the environmental history of Mallorca, with a special emphasis on the transformations that have occurred in the forests of Serra de Tramuntana alongside the diversity of cultures that have inhabited the island.

In line with Crumley (2007, p. 17), landscapes allow the integrative study of changing human-environmental dynamics and of both human activity and the physical environment, since they record both the role of humans in transforming the environment and the role of natural events in shaping humans’ choice and actions. In this sense, although landscapes situate human behaviour and agency in the environment (Balée, 2006, p. 75), and are the spatial manifestation of the relationship between humans and the environment (Marquadt and Crumley 1987 in Crumley, 2007, p. 17), landscapes are also “active agents in the constitution of these relations and their reproduction and transformation over time” (Eriksson *et al.*, 2018, p. 148). Landscapes become “the

reflection of the interaction between people and their natural environment over space and time” (Rössler, 2009, p. 303). Thus, landscapes are not only a commonly used unit of analysis in many academic disciplines and a term commonly used by the general public, but also the physical retainers of cultural understandings about the world and of intentional and unintentional human practices and actions (Crumley 2007, p. 16). Landscapes become the vehicle to study interdisciplinary topics, such as conflicts over the land and its resources, or the construction of social identities (Steward and Strathern, 2003). In this thesis, I take into consideration all of these, for instance, when I use the landscape of dry-stone terraces in Serra de Tramuntana as a key unit of analysis in order to delve into the variety of attitudes, perspectives and practices that different actors have towards them and the use and management of the protected area.

Moreover, in line with the premises of the ‘new ecologies’, objects are invested with meaning through significations, discourses and other practices but, at the same time, have an extralinguistic material reality (Biersack, 2006, p. 14, 28). Symbolic ecology has shown how the symbolic and the material are not dichotomous, as for instance is evidenced if considering ‘place’ as both a material and a discursive construction, as a reality materially constructed but also the product of social relations and human imagination throughout history (Biersack 1999b in Santamarina, 2008a, pp. 166–169). These statements are highly relevant to this study, particularly as I am interested in studying how a variety of groups of people have different ways of understandings of the landscape of Serra de Tramuntana, of the local forests, their transformation and management, of forest fires and of anthropogenic fire. In this sense, symbolic ecology “acknowledges the nexus between symbolic and material factors, recognising reality as invested with meaning and discursively produced through signifying practices” (Biersack, 2006, p. 4). Since the emergence of political ecology in the 1970s, many studies have investigated the way in which different accounts and perspectives are connected to social relations and material transformations in landscapes over time (Davis, 2015, p. 266). Therefore, landscapes are not only created by the relationship between non-biological and biological processes and agents, but are also shaped and reshaped by the knowledge, experience, and practice of individuals and groups (Eriksson *et al.*, 2018, p. 148). Political ecology research helps us to understand the material impacts of environmental politics and action, and the interconnection of global political and economic processes with local processes of environmental change (e.g. Greenberg and Park, 1994; Page, 2003; Biersack, 2006; Hirsch, 2010; Fairhead *et al.*, 2012; Vaccaro *et al.*, 2013). Hence, through the study

of landscapes and landscape transformations, historical, symbolic and political ecology provides possibilities for “an understanding of how practices, undertaken by individuals connected by networks such as social and political structures and knowledge systems, shape landscapes and are in turn shaped by these self-same landscapes” (Nyerges 1997; Balée 2006 in Erikson *et al.* 2018: 149).

Another theoretical background relevant to this research is that of ‘environmentality’ which, in the words of Agrawal (2005, p. 8), “stands for an approach to studying environmental politics that takes seriously the conceptual building blocks of power/knowledges, institutions, and subjectivities.” Indeed, several specific topics of research in this thesis involve the analysis of the development and transformation of diverse environmental subjectivities and their associated environmental practices and beliefs. For instance, I will identify some patterned responses among informants about what constitutes a forest to them, which in turn will provide the background to understand the conflicting perspectives on how the forests should be managed in order to safeguard them from large forest fires. Moreover, in this thesis I am interested in how and under what conditions a variety of local actors relate to the landscape of dry-stone terraces, including the impacts of the subsidies offered by the Consortium Serra de Tramuntana World Heritage Site to promote their preservation. In my view, such analyses are key, since attitudes, practices, narratives and environmental representations are often formed by environmental imaginaries and thus, by “long-standing notions of what particular types of landscape should look like and how they should be used” (Davis, 2015, p. 266). Furthermore, I will look at some of the existent struggles over the use and management of resources that, as I will suggest, are linked to the variety – and often conflicting – perspectives on which are the appropriate goals of environmental management according to a variety of environmental subject positions. Indeed, following Carrier and West (2013, p.1), environmentalisms are not only ways of thinking in terms of cultural understandings, but also ‘the intersections of these understandings with the world and people in it, which is to say, with ways of identifying and evaluating the natural surroundings’, which, in turn, entail ways of acting and organising. As a contribution to the field of environmentality, in this thesis I suggest that the interactions between the diversity of environmental subjectivities that coexist within both local and institutional contexts of Serra de Tramuntana, are characterised by dynamics of tension, negotiation and agreement, which in turn lie behind the present struggles to perform

significant preventive forest fire management strategies, such as the use of anthropogenic fire to reduce the density and continuity of the forest mass.

In the process of heritagisation of the cultural landscape of Serra de Tramuntana I recognise some aspects that other environmental anthropologists have identified thanks to their ethnographic work in other areas of the Spanish state. For instance, I will suggest that the heritagisation process has served to intensify the tourist use of Serra de Tramuntana, turning mountain landscapes into commodities for the consumption of tourists and urban populations, as Vaccaro and Beltran (2007; 2008a, 2008b, 2009) suggested in their ethnographic work in the Catalan Pyrenees, and Santamarina and Bodí in the Valencian Serra (Santamarina and Bodí, 2013). On the other hand, while in other contexts of the Iberian Peninsula, the wilder and less anthropic appearance of the landscape resulting from the process of abandonment and afforestation since the middle of the twentieth century has been crucial in the processes of redefinition and revalorisation of the lands brought about by their heritagisation, thus favouring a ‘naturalisation’ of the setting (Ruiz-Ballesteros *et al.*, 2009; Cortés-Vázquez, Quintero and Valcuende, 2011; Ruiz-Ballesteros and Caceres-Feria, 2016), the case of Serra de Tramuntana, contrastingly, shows how the customary anthropogenic management by local people can also serve as a basis for the heritagisation of associated landscapes. In this respect, the UNESCO report (2011, p. 215) considers the anthropogenic management of these lands of pivotal importance because it helps to counteract the ‘unfavourable’ and ‘harsh’ character of the environment of Serra de Tramuntana, and the dry-stone terraces (*marjades*) as a witness of the continuous and ‘harmonious’ interaction between nature and humans over the centuries.

The upsurge of large and destructive forest fires in the last decades, the starting point of this thesis, has been documented by a large number of studies across the world, from the Iberian Peninsula – especially in Portugal and Galicia – in diverse European-Mediterranean r like Italy, France and Greece, and in other parts of the globe such as Indonesia, Australia and California (Simmons *et al.*, 2004; Murdiyarso and Lebel, 2006; Birot, 2009; Moreno *et al.*, 2014; Koutsias *et al.*, 2016). It is also remarkable that many studies have evidenced that anthropogenic fire is a long-standing strategy to manage landscapes – for instance, converting forests into croplands – and to potentiate certain natural resources – such as fresh pastures – in the whole Mediterranean area (Pyne, 2009), and can be found in many other parts of the world, such as in Australia (Bird *et al.*, 2005), California (Anderson, 1999) and the Amazonia (Posey, 1985). Over the last

years a growing number of scholars have been critically reviewing the most prevalent fire-management strategy, which is the rapid identification and suppression of any uncontrolled fire (e.g. Moreno *et al.*, 2014a; Calkin *et al.*, 2015; Swetnam *et al.*, 2016). In this regard, I suggest that these policies, in the long term, contribute to the accumulation of dead and living biomass, which in turn is one of the main drivers of fire spread, thus of the increased risk of large forest fires. Moreover, the ethnographic study case that I present here also contributes to a better understanding of why the current use of anthropogenic fire – both by local communities and institutional agents – is not significant, even though it is incorporated in the management plans of the Natural Site (Forestry Plan 2013; Fires Plan 2015). Nevertheless, I consider that the most novel contribution of this thesis is providing an answer to the current upsurge of large forest fires that interconnects many socio-environmental factors (see Figure 1.7), which could indeed resonate beyond Serra de Tramuntana, complementing the knowledge we have already acquired with the study of fire elsewhere (e.g. Lloret *et al.*, 2002; Ferreira *et al.*, 2008; Pausas *et al.*, 2008; Moreira *et al.*, 2011; Shakesby, 2011; Salvati and Ranalli, 2015).⁵⁴

Aims and objectives of the thesis

My aim in this thesis, broadly, is to understand the variety of socio-environmental factors underpinning the causes of large and destructive forest fires in Serra de Tramuntana Natural Site (Mallorca), and to examine people's responses, visions and relations with forest fires and anthropogenic fire in the contexts of conservation policies, tourism development and heritage formation in the protected area. I focus mostly on the social dimensions of environmental change and forest fires, aspects that are covered by a much smaller subset of literature on fire in the Mediterranean (Mavsar *et al.*, 2012; San-Miguel-Ayanz).⁵⁵ My hope is that a focus on the different and often contradictory perspectives and practices of a variety of social actors regarding forest management in a protected area, particularly relating to the prevention and management

⁵⁴ For example, in Spain alone between 2013 and 2016 there were 61 fires which consumed an area greater than 500 hectares (Alameda and Liñán, 2017), while in 2017 there was a wave of fires that affected 13 protected areas in the northwest of the Iberian peninsula (ABC, 2017).

⁵⁵ In the Balearic islands there exists only one precedent for ethnographic fieldwork to be used as a methodological basis for the study of forest fires (Sureda *et al.*, 1997). Nevertheless, this work is contextualised in the Artà mountains, in the north-eastern part of the island, whose socio-environmental reality differs significantly from that of Serra de Tramuntana, for which reason the research results set out in this chapter present a totally unique and unprecedented case study.

of forest fires will help to increase our knowledge of the social sphere of fire, a perspective which has been much less studied and that is central to this research project. To achieve these research objectives, I structured the thesis' results into six main chapters, which complement the introductory and conclusion chapters.

In chapter two, I draw on the collection and analysis of a wide range of sources from several academic disciplines, to explore how the landscape of Mallorca, including Serra de Tramuntana, has been transformed throughout history alongside the diversity of cultures that have inhabited the island. Moreover, in this chapter I explore how the different elements of today's landscape in Serra de Tramuntana were incorporated and emerged at different points in the social and the environmental history of Mallorca. With this account I hope to provide the reader with the background knowledge to better understand present struggles associated with the use and environmental management of the protected area and to contribute to a more detailed understanding of the role that fire plays within environmental-human relationships in Serra de Tramuntana.

In chapter three, I am interested in exploring some of the socio-environmental dynamics involved in the process of heritagisation of the landscape in Serra de Tramuntana, using the dry-stone terraces (*marjades*) as a case study. More specifically, I examine a) the (re)signification of the *marjades* in light of the current dedication of the mountain area to recreational land-uses; b) some of the socio-environmental repercussions generated by the increasing overcrowding of recreational land-uses in Serra de Tramuntana; and c) the complex and heterogeneous relationship existing between the process of heritagisation of the cultural landscape of Serra de Tramuntana and the incidence and management of forest fires. I suggest that the heritagisation process in Serra de Tramuntana has promoted the resignification of the *marjades* as a landscape element whose main value is scenic and whose current primary function is the recreational development of Serra de Tramuntana. Moreover, I identify some related social tensions: on one hand, the unequal distribution of the subsidies granted by the Serra de Tramuntana World Heritage Site Consortium promotes tensions among stakeholders. On the other hand, the ever-increasing devotion of Serra de Tramuntana as a recreational area is generating tensions among many land-owners and agriculturalists that perform a role as landscape managers but who are not economically advantaged as the big tour operators from outside Serra de Tramuntana. Nevertheless, the most novel contribution of this chapter comes from putting the heritagisation process into dialogue with fire. In this sense, I suggest that the heritagisation process has a complex and

heterogeneous role and material impacts in relation to forest fires. This is, while the promotion of heritage tourism increments the number of visitors to Serra de Tramuntana, thus increasing the risk of fire ignition, the recovery of abandoned terraced lands – thanks to the subsidies granted by heritagising agents – has the potential to prevent large forest fires, since managed terraced lands create forest mass discontinuities that reduce the spread of any ignited fire.

In chapter four, I focus on the social dynamics of dispute, tension and agreement among a wide variety of people around three specific contexts: feral goats, great Capricorn beetles, and the prohibition of construction in many areas of Serra de Tramuntana. I propose that the perspectives and attitudes of local people and some institutional actors, which usually are presented as antagonist and in conflict of interests (West *et al.*, 2006), can converge and be characterised by agreement and collaborative relationships. We will also see how the land-use restrictions applied to the protected area can become a factor contributing to more large forest fires and, thus, intensifying tensions and fuelling resistance towards the protected area.

In chapter five, I am interested in investigating the coexistence of a diversity of interactions and perspectives on a range of matters relating to forests and forests transformations among a variety of groups of people. More specifically, I look at some of the most common perspectives about the role that the local people's agroforestry practices played on the local forests until the second half of the last century, and about the process of afforestation that followed the process of land abandonment from that period. Exploring the confluence and conflict of these perspectives is a crucial initial step to understanding the lack of preventive forest management strategies, which is, as I suggest in this thesis, one of the key factors that contribute to the current increasing incidence of large and destructive forest fires. I suggest that forest fires should also be understood as condensers, that is the way through which many broader conflicts associated with the use and management of the protected area are expressed.

In chapter six, I turn my attention to some of the social perspectives about the socio-environmental impacts and management implications of today's forest fires in Serra de Tramuntana. More specifically, I examine a) the diversity of perspectives about the socio-environmental impacts of forest fires according to different groups of social actors; b) how the present demographic and settlement dynamics in the protected area impact on the occurrence and management of large forest fires; and c) how forest and forest fires management policies, strategies and practices impact on the incidence of

large forest fires. In examining the diverse perspectives of a wide range of social groups upon whom, according to their own perspectives, the main consequences of forest fires devolve, this chapter addresses the complexity, ambivalence and versatility that characterises the category of 'fire'. Moreover, in this chapter I suggest that the present demographic and settlement dynamics in forest areas and the policies for suppressing forest fires of recent decades are factors that contribute to the increasing risk of large forest fires in Serra de Tramuntana.

In chapter seven, I am interested in exploring how the incidence of large forest fires is currently impacting on the environmental management of the Natural Site in relation to the prevention and management of forest fires. More specifically, I examine a) how the incidence of large forest fires, such as the 2013 fire in Andratx and Estellencs, is nowadays challenging and impacting on the environmental management policies that regulate the use of the protected area and their application by institutional actors; b) the diversity and conflict of perspectives on the use of anthropogenic fire by local people and institutional actors as an environmental management tool to manage the accumulation of biomass; c) the impact of those conflicting points of view among the different institutions on the use of anthropogenic fire as a strategy for the prevention and extinction of large forest fires. In this chapter, I will suggest that nowadays there is an ongoing process of re-signification of fire, according to which controlled fire used as a tool for environmental management as well as fuel management is positively evaluated and distinguished from the uncontrolled and destructive forest fires. Nevertheless, as I will suggest, this process is not accompanied by an increase in preventive actions that could include, among other strategies, the use of anthropogenic fire to reduce the continuity and density of biomass. In Serra de Tramuntana, I propose this is mainly due to internal discrepancies within the institutional context involved in the environmental management of the protected area. Indeed, I will further suggest that the risk of large forest fires is bringing the positions of some institutional sectors closer to that of the local population.

Overall, the main contributions of this thesis are, first, the identification of the wide range of social, political and historical factors that, interconnected with environmental aspects, explain why and how large forest fires occur in Serra de Tramuntana, including the abandonment of local people's agroforestry practices, the fire-suppression policies, and present settlement dynamics, among many others. At the

end of this chapter (see Figure 1.7), I include a comprehensive yet synthesised mind map of these factors.

Second, I show fire to be a multidimensional, ambivalent and polyvalent element, intrinsic to environmental and social history, which condenses and reflects broad processes of conflict, negotiation and agreement among a variety of people in the contexts of conservation policies, forest management, heritage formation and tourist development at the Natural Site.

Conducting fieldwork in Serra de Tramuntana

The Balearic Islands is a Mediterranean archipelago that consists of Mallorca, Eivissa (Ibiza), Menorca, Formentera and Cabrera (see Figure 1.7). Serra de Tramuntana as a geographic unit is defined by the mountain area located on the northwest coast of Mallorca (see Figure 1.8). The Natural Site of Serra de Tramuntana includes wholly or partially 20 municipalities.⁵⁶ In its territory, there are municipalities with populations of more than 50,000 inhabitants, such as Calvià, and very small villages with populations of 250 inhabitants, such as Escorca.

During my period of fieldwork (July 2015 - December 2016), I carried out fieldwork in Estellencs and Valldemossa (see Figure 1.9) – two villages and municipalities of Serra de Tramuntana – as well as within the setting of the regional environmental management institutions. The two municipalities were selected based on a variety of conditions, such as having previously carried out relevant fieldwork – in the case of Valldemossa – and the contrast between the two municipalities in terms of the combination of private and public land; the inclusion of their agroforestry lands in the diverse land-type categories according to the legislation regulating land-use and land-management practices; the degree and dynamics of urbanisation, such as the predominance of first or/and secondary residences; and the demographic profiles. Moreover, the history of incidence of forest fires varies considerably between the two municipalities: while Estellencs has a high risk of fire due to its proximity to the fire-prone area of Andratx, and its territory was severely affected by the large forest fire of 2013, there have been no large forest fires in Valldemossa for nearly four decades.

⁵⁶ The 20 municipalities that are part of the mountain area are: Alaró, Andratx, Banyalbufar, Bunyola, Calvià, Campanet, Deià, Escorca, Esporles, Estellencs, Fornalutx, Lloseta, Mancor de la Vall, Palma, Pollença, Puigpunyent, Santa Maria, Selva, Sóller and Valldemossa.

Estellencs

Estellencs was one of the municipalities most affected by the large forest fire that in July 2013 burned 2,400 hectares of Serra de Tramuntana (Conselleria d'Agricultura Medi Ambient i Territori and Tecnosylva, 2015, p. 142). This municipality has a high fire risk due to its proximity to Andratx (see Figure 1.1), which has the highest incidence of forest fires in Serra de Tramuntana. Despite the administrative limits between the municipalities of Andratx and Estellencs, both areas are connected by an almost continuous forest mass.

The municipality of Estellencs (see Figure 1.10) covers an area of slightly more than 1,300 hectares, of which sixty comprise a publically-owned rural estate (Sa Coma den Vidal). Almost all of its territory (99.7%) is subject to some type of protection regime. Except for the urban centre, it is all located within the Natural Site of Serra de Tramuntana.⁵⁷ Almost 800 hectares are part of the European Natura 2000 network⁵⁸ because of its social, cultural and historical importance (LIC, Llocs d'Interès Comunitari). Since the passing of the 1991 law regulating urban development and conservation of protected areas (LEN, Llei d'Espais Naturals i de Règim Urbanístic de les Àrees d'Espacial Protecció de les Illes Balears),⁵⁹ more than 700 hectares are Natural Areas with a High Protection Level (AANP, Àrees Naturals d'Alt Nivell de Protecció); more than 430 are Natural Areas of Special Interest (ANEI, Àrees Naturals d'Espacial Interès); and almost 200 hectares are Rural Areas of Landscape Interest (ARIP, Àrees Rurals d'Interès Paisatgístic) and Rural Areas of Landscape and Forest Interest (ARIP-B, Àrees Rurals d'Interès Paisatgístic-Bosc).

According to the data collected in 2018 by the Institute of Statistics of the Balearic Islands (IBESTAT, Institut d'Estadística de les Illes Balears),⁶⁰ Estellencs has only 0.5% of urban land and has no residential urban complexes. Nevertheless, since the 1950s, the village and its small harbour have expanded with new constructions, and nowadays there many houses scattered in its forest land, most of them, apparently secondary residences. At the present time there is no available data on the predominant

⁵⁷ According to the Decree 19/2007 of 16 March.

⁵⁸ According to the Decree 130/2001 of 23 November.

⁵⁹ According to the Law 1/1991 of 30 January.

⁶⁰ See ibestat.caib.es/ibestat/estadistiques/municipi-xifres/07063/Valldemossa (last consulted on 11.06.2019)

types of residence, but, according to Salvà (1978, p. 164), in the late 1970s Estellencs continued to be the residence of its ‘traditional population’, although this may well have been impacted by more recent demographic and settlement dynamics, such as by the presence of a new foreign resident population. Also according to IBESTAT, Estellencs has slightly more than 300 inhabitants, of which around 21% are foreign nationals. The majority of foreign residents are from other countries in the European Union (a 75.5%), while there is no other subgroup with a significant representation. The average age of residents in Estellencs is 49, of which 27% are 65 or older.

Valldemossa

Although previous ethnographic research would suggest that many of the inhabitants of Valldemossa are extremely concerned about the risk of suffering forest fires in the municipality (Cifre, 2013), there have been no large forest fires in the last four decades. The municipality of Valldemossa (see Figure 1.11) covers an area of almost 4,300 hectares, of which 580 belong to a publicly-owned large rural estate (Son Moragues). Most of its territory (more than 92%) is subject to some type of protection regime. Except for the urban centre, it all forms a part of the Natural Site of Serra de Tramuntana.⁶¹ More than 2,300 hectares are Natural Areas with a High Protection Level (AANP). Because of its inclusion in the European Natura 2000 network, more than 1,600 hectares are areas designated for bird conservation (ZEPA, Zones d’Especial Protecció d’Aus) and more than 200 hectares are areas of social, cultural and historical importance (LIC). Almost 1,000 hectares are Rural Areas of Landscape Interest (ARIP) and Rural Areas of Landscape-Forests (ARIP-B), while more than 650 hectares are Natural Areas of Special Interest (ANEI).

Dating back to the 1950s, the village of Valldemossa was one of the first population centres in Serra de Tramuntana to experience an early building boom (Cifre, 2013: 37). As can be observed in aerial photographs (see Figure 1.12), the village kept expanding throughout the urbanisation process of 1960-1970-1980 (Salvà and Binimelis, 1993). The first residential complex (*urbanitzacion*) was constructed in the late 1950s (Es

⁶¹ According to the Decree 19/2007 of 16 March.

Verger), although four more were built during the 1970s (*Son Gual, Son Ferrandell, George Sand, and Chopin* residential areas) (Salvà, 1978, pp. 164–166). Apart from the village of Valldemossa and the residential urban complexes, there is also a small fishing harbour called *Sa Marina*. From the 1950s onwards, more houses were constructed in this coastal area with the purpose of creating secondary residences for some of the villagers of Valldemossa (ibid.).

Valldemossa was one of the first villages in Serra de Tramuntana to be connected to the city of Palma by road. This easy accessibility promoted the arrival of the first summer residents (*veraneantes*) (Cifre, 2013: 57) and the emergence of the secondary residence phenomenon. In addition, due to its proximity to the city of Palma, Valldemossa became a *poble dormitori*, that is a village of first residence for those who daily commuted to the city for work (Salvà, 1978: 168). According to the 2018 data collected by IBESTAT,⁶² Valldemossa has almost 2,000 inhabitants, of which around 15% are foreign nationals. The majority of foreign residents come from other countries in the European Union (a 50%) and from Latin America (21%). The average age of residents of Valldemossa is 45, of which 21% are 65 or older.

Groups of actors

The groups of people who in one way or another use and/or manage Serra de Tramuntana influence and are influenced by local, regional, state and international contexts. Each group has its own history of emergence and development, its present-day demography and distribution over the territory. Although in this section I do not intend to explain all the characteristics in depth, nor try to include all the groups who play a part in my research, I shall briefly introduce the groups with a greater presence in it: the *pagesia*, land-owners, foreign residents, and members of government environmental institutions.

According to Alcover and Moll (1979), a *pagesa* or *pagès*⁶³ is a person whose livelihood depends on cultivating the land, a person who lives in the countryside or a

⁶² See ibestat.caib.es/ibestat/estadistiques/municipi-xifres/07063/Valldemossa (last consulted on 11.06.2019)

⁶³ *Pagesa/pagès* refers to a single person (*pagesa* is the feminine form and *pagès* is the masculine form), *pagesos* is the plural name of *pagès*, and *pagesia* is the condition of being a *pages* and/or the general term to define the whole group of *pagesos*.

synonym of the adjective ‘rustic’. Certainly, the *pagesia* (literally, ‘peasantry’) is a group that has played a key role in the history of Balearic rural estates (*possessions*) (Solà *et al.*, 2010) and a social category forming one of the main professions in Mallorca in years gone by (Llabrés and Vallespir, 1983). Nevertheless, there are heterogeneities within the broad category of *pagesia*, which include internal variations of class and socio-cultural connotations that emerged throughout history from a differential access to the tenancy, exploitation and acquisition of rural estates (Moll and Suau, 1979). Despite the difficult task of defining *pagesia*, it is undeniable that they are key actors in the socio-environmental history of Mallorca and an expression of past and present rural life, inherently attached to Mallorca’s culture and language, the *mallorquí*.⁶⁴ Because of their extensive and deep knowledge of the region where they belong, rooted in their experiential background, *pagesos* afford a unique perspective on the dialectical and close relationship between local population and their surroundings. Through fieldwork I realised that nowadays a *pagès* usually refers to a ‘farmer’, someone who carries out or makes his livelihood from growing crops in fields. Nevertheless, I took into consideration self-identification as a basis for any kind of categorisation that would contribute to the unravelling of social patterns behind the diverse objects of study, combined with other aspects I contemplated such as their access to land and natural resources, the periodicity in which they do farming, or the weight that such activities have in their way of life. Finally, it is important to note that throughout the thesis I rarely refer to a respondent as *pagès*, but I use more specific subcategories, as for instance ‘former charcoal-burner’ or ‘farmer’. Moreover, absolutely all the elderly residents of Valldemossa and Estellencs⁶⁵ that participated in this research could be considered *pagesos*, as they all lived from agroforestry practices when they were younger and they possess a vast amount of knowledge and experience in the past rural life of Serra de Tramuntana.

Land-owners are certainly key actors, especially considering that 93% of Serra de Tramuntana is privately owned (PFIB, 2013, p. 18). There is very little published data on the main characteristics of land-owners, as for instance their nationalities and countries of origin, and whether their residence is seasonal or permanent throughout the year.

⁶⁴ *Mallorquí* is a dialect of Catalan. Each island has its own Catalan dialect, although there are also internal linguistic differences on each island.

⁶⁵ The only exception would be those older villagers who do not identify themselves as peasants since their main source of livelihood was fishing.

From ethnographic data, I identified some internal differences within this large and heterogeneous group (Cifre, 2017a, p. 65): 1) owners of small rural estates, many of them children of wealthy *pagesos* who had previously been tenants of rural estates; 2) urban population – usually inhabitants of the city of Palma – who own small properties used as secondary residence; 3) owners who inherited small or large rural estates and converted them into rural hotels; 4) foreign owners who normally reside in other countries and only visit their properties for short periods of time; and 5) owners of rural estates with large extensions of forested land, some of which have promoted the emergence of entities such as Tramuntana XXI.⁶⁶

Foreign residents make up 16.5% of the total population of Mallorca, while in Serra de Tramuntana this varies from 10% to 70% depending on the municipality, according to the 2018 data collected by IBESTAT.⁶⁷ Significant migration processes into the Balearic Islands began in the 1960s and 1970s concomitantly to the development of tourism⁶⁸ (Barceló, 1985, p. 49; Waldren, 2000). Nevertheless, the particularities of the history of touristic, urban and economic developments in each municipality of Serra de Tramuntana need to be considered in order to understand the way the area is dealt with from a demographic perspective. Some, like Sóller, Andratx, Calvià, and Pollença developed as tourist and industrial centres during the second half of the twentieth century (Salvà, 1978, p. 164), increasing the demand for workers. Nowadays, although the nationalities of foreign residents in most of Serra de Tramuntana are predominantly German and British, some municipalities like Sóller, Andratx, Calvià and Pollença have a large proportion of Latin American, Moroccan and Romanian nationals (IBESTAT). Unfortunately there is no comprehensive data on the economic activities of foreigners,⁶⁹ though the largest economic activity regionally is the hotel and catering sector (ibid). According to Salvà (2002: 135-134), there are distinct sub-groups of foreign residents depending on their reasons for migration, among which there are 1) people from Africa, Latin America, Asia and Eastern Europe who migrated for motives of work; 2) people from Northern Europe who migrated with residential and leisure motivations; and 3)

⁶⁶ See iniciativesxxi.com (last consulted on 12.06.2019).

⁶⁷ See ibestat.caib.es (last consulted on 12.06.2019).

⁶⁸ According to IBESTAT, from 1960 to 1965 the percentage of migrant population of the total population suddenly rose from 1.4% to 13.3%, and increased to 16% in 1970.

⁶⁹ IBESTAT has statistics on the diversification of economic activities at a municipal level, which however do not disaggregate different nationalities' backgrounds.

executives and specialists in tourism and leisure services dedicated to business for the new foreign residents and tourists.

Finally, the last group of people to be introduced are the members of government environmental institutions. This is also a highly heterogeneous group, in which a diversity of backgrounds, views on environmental management and an overlapping of its functions is extensive. Therefore, I consider it is more practical to make a very brief introduction only to the main departments and institutional sectors whose members have formed a part of this research (see Figure 1.13). The Ministry of Agriculture, Environment and Territory (Conselleria d'Agricultura, Medi Ambient i Territori, hereafter abbreviated to Ministry of Environment), which directly depends on the regional Government of the Balearic Islands (Govern de les Illes Balears), regulates regional territorial policies, environmental management policies, and the public transport sector. The Natural Areas Service (Servei d'Espais Naturals) administratively manages all the protected areas of the Balearic Islands. The Forest Management Service (Servei de Gestió Forestal, hereafter abbreviated to Forest Service) is the main institutional body that develops the technical plans for any forest or forest fire management. The Forest Health Service (Servei de Salut Forestal) elaborates strategies to control insect plagues in local forests, among many other functions. The environmental agents (*agents de mediambient*) from the Ministry of Environment grant or deny permissions for all those legally regulated land-uses and land management practices, while they are also those who fine the authors of any unauthorised use or management practice in agroforestry lands – reason why they are often called by others and even by themselves ‘the environmental police’. The Ministry of Environment is the body responsible for IBANAT (Institut Balear de la Natura), the public service in charge of implementing the technical plans developed by the Forest Service, and it is dedicated to “the prevention and extinction of forest fires, forest management and conservation and management of protected natural areas, public estates, recreational areas, shelters and camping areas in the Balearic Islands.”⁷⁰ Xarxa Forestal, which does not depend on any specific department but collaborates with all the above mentioned entities, is an institutional network dedicated to “raise awareness of the value and importance of forests and promote a culture of forest fire risk.”⁷¹ There is also the General Directorate of Emergencies and Interior

⁷⁰ See www.caib.es/sacmicrofront/home.do?mkey=M34&lang=ca (last consulted on 12.06.2019).

⁷¹ See www.caib.es/sites/xarxaforestal/ca/presentacio-19160/ (last consulted on 12.06.2019).

(Direcció General d'Emergències i Interior, hereafter abbreviated to Directorate of Emergencies), which depends on the Ministry of Finance and Public Administrations (Conselleria d'Hisenda i Administracions Públiques), which is responsible for the coordination of firefighting tasks when a fire affects or puts at risk any urbanised land, among many other functions. The Directorate of Emergencies also coordinates with the Firefighters of Mallorca (Bombers de Mallorca) and the Firefighters of Palma (Bombers de Palma), who participate in the extinction of fires in urban areas.

Certainly, Serra de Tramuntana has an intense and complex social history that today brings together a wide range of actors from many different backgrounds. At this point, it is essential to emphasise that there is frequently a great deal of overlapping between social categories, even considered individually. For example, I conducted three interviews with a resident originally from Andalusia who purchased a large rural estate ten years ago in Valldemossa and who self-identifies as *pagès* because he grows organic cherries, although he does it as a hobby rather than as a source of income. Other examples are a large part of the members of IBANAT that I interviewed, who are part of an institutional body but who often are originally and/or live in villages of Serra de Tramuntana. In the perspectives and attitudes of these people there is often a convergence of influences from the academic disciplines they studied such as biology or ecology and, in turn, from the knowledge they inherited from their parents on traditional agroforestry practices.

Methodology

Between July 2015 and December 2016 I alternated my residence and field work between Estellencs, Valldemossa and Palma – where there are the offices of both government institutions and of environmental groups, as well as most libraries and archives. Throughout fieldwork I combined various nonprobabilistic sampling methods (Bernard, 1940, pp. 186–209): purposive or judgment sampling, convenience and snowball sampling. Nonetheless, the starting point in terms of sampling was slightly different in each context.

Having grown up in Mallorca, and specifically having spent long periods of time in Valldemossa,⁷² I had familiarity with the research area and facilitated a personal network of contacts in the early stages of fieldwork. That network includes Francisco,⁷³ an old man well known and respected in the village. Not only is he what could be considered almost my grandfather, but also the owner of my house in Valldemossa and the farmer who every day – with the only exception of Sundays – works in his vegetable plot. Certainly, he has been a key and highly knowledgeable informant, as well as someone who has introduced me to other specialised people in a wide variety of relevant aspects for my research (see Figure 1.14). Thus, from those I already knew, the informant network was extended, mainly through snowball sampling – as when villagers introduced me to some of their neighbours – and purposive sampling – as for example, when looking for former charcoal-burners – although also through convenience sampling during the months I lived immersed in the daily life of the village – as when getting my supplies from the Sunday local market, or chatting with older women at the small fishing port while their grandchildren played in the sea.

The starting point in Estellencs was slightly different, as I had only two contacts that I had not even met previously. The first day I arrived and settled into my house, right in the middle of the village, I went to the local council to introduce myself and to ask to be put into contact with people who could be relevant to the research. This is how I got to interview the mayor, the councillor for the environment and several of their relatives who owned businesses and rural estates in the municipality. From the very beginning, I also started to go to the bars where local people socialise, and to walk around the town, especially in the hours of less heat, when it is easier to engage in informal conversation from the narrow roads with the villagers who work in their family plots or simply hang out (*prenent la fresca*) outside their houses. Thus, convenience

⁷² Born and raised in Mallorca, some would venture to say that I am one of those ‘native’ anthropologists that conduct ‘anthropology at home’. In agreement with Narayan (2007, p. 676), the dichotomy ‘native’ and ‘non-native’ is invalid since the relations with the people within the study context are multiple, heterogeneous and fluctuating, while there are so many factors that influence such relations – such as gender and age – which in turn determine the many specific identifications of each individual. Moreover, the assumption that the so called ‘native’ anthropologists are insiders who hold the authentic perspective on the community they study disregards their own complex backgrounds (ibid., p. 677). Although being a native speaker and having an a priori understanding of cultural patterns – which I do have to a large extent – prevent misunderstandings (Stephenson and Greer, 1981, p. 125), it also means that I may miss important data by taking them for granted (Jackson, 1987, p. 11).

⁷³ Francisco is the only real name, as the rest of names of the thesis are pseudonyms I attributed to the informants for the sake of maintaining their anonymity.

sampling had much more weight in the beginning of field work in Estellencs than in Valldemossa. Nevertheless, in the two localities I combined purposive, convenience and snowball sampling to meet people with whom I would conduct semi-structured interviews; who would offer to guide me on foot to show me around the town; to invite me to some of their daily activities, such as potato picking in the very early morning; and who would invite me to their homes to have lunch or spend the afternoon.

My access to the institutional context and to the environmental entities was significantly different from that of Valldemossa and Estellencs. Although I had previously interviewed some people from the environmental organisation GOB and from the Ministry of Environment as a part of my MA dissertation project, I also began to send emails in order get into contact with people from various departments that I thought convenient to leadership at the Forest Health Service, the Directorate of Emergencies or the General Directorate of Natural Spaces and Biodiversity (Direcció General d'Espais Naturals i Biodiversitat), to name but a few. Thus, most of the sampling methods that I used to develop a research network within the institutional context were mainly based on purposive sampling.

Throughout my fieldwork I used many different research techniques for the collection of ethnographic data and relevant literature. In order to identify and analyse the numerous varying perspectives on the specific study topics as a whole, I gathered the narratives of a variety of groups of people through a series of informal and/or semi-structured interviews (Bernard, 1940, pp. 210–250) – a total of a hundred and seven semi-structured interviews.⁷⁴ I also collected the life history of three key informants: in Valldemossa, from the *pagès* Francisco and from Margalida, the former charcoal-burner; in Estellencs, from Jaume, the owner and former manager of a large rural estate.

I also carried out participant observation in a variety of contexts. In Valldemossa and Estellencs, I worked with local agriculturalists in their private vegetable gardens (*borts*), as for instance when pruning hundreds of tomato plants, digging up potatoes and picking beans. One day I also joined a team of workers of a private forest management company who had to fell many pines and some holm-oaks from a rural estate in Valldemossa. I also attended several conferences and participated in subsequent debates, of which I would highlight the First Meeting of Municipal Managers for the Prevention

⁷⁴ As well as these eighty-six interviews, I was able to make use of another forty-nine that I had conducted during the fieldwork for my MA dissertation, owing to the overlapping of topics included in both sets of questions.

of Forest Fires (Primer Encuentro de responsables municipales para la prevención de Incendios Forestales, Palma 2015), attended by representatives of all local, regional and national entities that in one way or another participate in the management of forest fires in the Balearic Islands. Also, I would highlight the talk ‘Goats in the forests of Mallorca, problem or opportunity?’ (‘Cabres als boscos de Mallorca, problema o oportunitat?’), Palma 2017) by Oriol Domènech, coauthor of Mayol *et al.* (2017), attended by academics, environmental managers from regional government institutions, agriculturalists and representatives of hunting associations, among others. Another well worthwhile event was the talk ‘Help us save the holm-oak forests’ (‘Ajuda’ns a salvar els alzinars’, Palma 2018) given by Sandra Closa from the Forest Health Service, after which some environmental managers, biologists from the university, owners of small and larger lands and forestry technicians, among others, discussed the issue of the great Capricorn beetle on Mallorcan holm-oaks from their respective and differential perspectives. Finally, I would also highlight the attendance at various events organised by the association Tramuntana XXI, each of which dealt with a number of issues relevant to this research such as the overcrowding of recreational and tourist land-uses in Serra de Tramuntana, or the difficulties currently existing in Serra de Tramuntana to develop an agroforestry activity that contributes to the reversal of the state of abandonment of most lands.

Between 2015 and 2019 I also had the opportunity to observe first hand three forest fires when they had not yet been extinguished, or just after they were extinguished. On these occasions I observed from as close as possible the firefighting work of IBANAT brigade members and firefighters, and the coordination work of forestry technicians and environmental agents from the temporary control centres created for each forest fire. Apart from observing their activity I got as close as possible to the fires to try to understand, among many other aspects, which areas and land-cover type had burned more than others. In all these fire events I also informally interviewed some of those working in the suppression of the fires during their rest periods and those whose houses and/or lands had been affected by the fires. Thus, during these three fire events I gathered data from observation and informal interviews, while I also seized the opportunity to visually document it with pictures and videos. Fire ecology data, mostly

gathered from the Fires Plan (2015) and the statistics published by the Forest Service⁷⁵ complemented this ethnographic data.

Since the beginning of this project I have put a lot of effort into training my eye to be able to observe the landscape of Serra de Tramuntana in order to identify the socio-environmental transformations they contain and make visible. During many long walks and drives I slowly learned how to distinguish from a distance and from up close many relevant things, among which there are: the delimitation of the local forests in a recent past; the abandoned and managed terraced olive groves; the vales where birds were hunted; the bushes with goat or sheep bite marks; and the specific management practices that have been made in holm-oak forests, to name but a few. I also attempted to get a better understanding of the behaviour of fire and the changes in post-fire landscapes by periodically travelling the same path followed by the 2013 fire from Andratx to Estellencs (see Figure 1.15). I complemented all these observations with geographical and historical data obtained from diverse sources. For example, I used the publicly available fire reports published by IBANAT since 1970, and the Geographic Information Systems (GIS) records published by such government agencies as Service of Forest Management and Land Protection (Servei de Gestio Forestal i Proteccio del Sol),⁷⁶ and the Service of Territorial Information of the Balearic Islands (Servei d'Informació Territorial de les Illes Balears).⁷⁷

To develop the environmental history from earlier historical records, especially during the last three months of fieldwork (October-December 2016) I collected a great number and wide diversity of secondary sources – including literature specific to disciplines such as palaeontology, archaeology, art history, geography, and anthropology, among others – from the archives of the Fundació March and the Arxiu Regne de Mallorca, from the libraries of several different faculties of the Universitat de les Illes Balears and of the Centre de Recursos d'Educació Ambiental, a centre specialised in environmental studies. When analysing all the collected secondary sources, I triangulated some of the data and asked for feedback on parts of my analysis from several different specialists in the socio-environmental history of Mallorca. I also got useful feedback

⁷⁵ See http://www.caib.es/sites/xarxaforestal/es/1/estadastica_de_incendios/?mcont=97660 (last consulted on 15.05.2020).

⁷⁶ See www.caib.es/sacmicrofront/home.do?mkey=M10022309120411063560&lang=ca (last consulted on 13.06.2019).

⁷⁷ See www.caib.es/sacmicrofront/index.do?lang=ca&mkey=M140328093040113262355 (last consulted on 13.06.2019).

when I participated in seminars where I could present part of the results of the thesis during the writing-up process (Cifre, 2017a, 2017b).

In terms of research ethics, I have always subscribed to the general ethical principles that guide any anthropological research, such as the Ethical Guidelines for good research practice of the Association of Social Anthropologists of the UK (2011).⁷⁸ Since any fieldwork dealing with social tensions has a need of special emphasis on respecting and assuring the anonymity of the people with whom you work, all the names of individuals that have been included in the thesis are pseudonyms – except in the case of Francisco, who expressly requested that his real name be included. In the field, I always introduced myself and informed all the respondents about the research aims of the project and the potential uses to which it would be put in the future. Before each interview I asked permission to record the interviews, assuring my commitment to be the only person that would have access to both the recording and transcription, and offered the possibility of stopping the audio recording and note taking at any time during the interview.

Thesis outline

Apart from the Introduction and Conclusion chapters (Chapters 1 and 8), the main body of this thesis consists of six chapters. In the next chapter (Chapter 2), I construct an account of the environmental history of Mallorca, making use of a huge number and variety of sources and focussing on Serra de Tramuntana as much as the available data permit. Chapter 3 examines some of the socio-environmental dynamics generated and/or intensified by the process of heritagisation of the cultural landscape of Serra de Tramuntana, which in 2011 received recognition as World Heritage Site by UNESCO. With a combination of literature analysis and ethnographic research, I explore the resignification of the dry-stone terraces (*marjades*), some of the conflicts generated by the ever-increasing number of people who visit Serra de Tramuntana for recreational purposes and, finally, I look at the relationship between the process of heritagisation and the incidence of forest fires today. In Chapter 4 I explore the set of practices, institutions and norms that constitute the history of conservation in Serra de Tramuntana, to then place this historical account into its broader context of

⁷⁸ See www.theasa.org/ethics/index.html (last consulted on 13.06.2019).

conservation and management of natural protected areas. In the second part of the chapter, I use three ethnographic case studies in order to explore the dynamics of tension, negotiation and agreement that nowadays exist between a great variety of actors regarding the use and management of the Serra de Tramuntana Natural Site. In Chapter 5 I examine the current state of the forests of Serra de Tramuntana and their transformation from the second half of the twentieth century, placing this within the more global historical context of de-agrarisation and afforestation processes. In the second part of this chapter, I explore the variety of social perspectives regarding various aspects of forests and forests fires, including the present and past estate of these forests, their use and management by local people, and the relationship between all the above with the incidence of forests fires. In Chapter 6 I provide an overview of the global and historical context of incidence of large forest fires, devoting special attention to the incidence of these catastrophic fires with the socio-environmental changes that Serra de Tramuntana, like many other Mediterranean areas, have experienced from the second half of the twentieth century. After providing this overview, through an ethnographic-driven approach I look at the diversity of social perspectives on the socio-environmental impacts of forest fires in Serra de Tramuntana; as well as how the current incidence and management of forest fires is impacted by settlement and demographic dynamics and by fire suppression policies. In Chapter 7 I explore how the incidence of large forest fires, such as the Andratx-Estellencs fire of 2013, is currently affecting the perspectives, strategies, policies and practices of environmental management in the protected area, especially in relation to the prevention and extinction of forest fires.

Figures

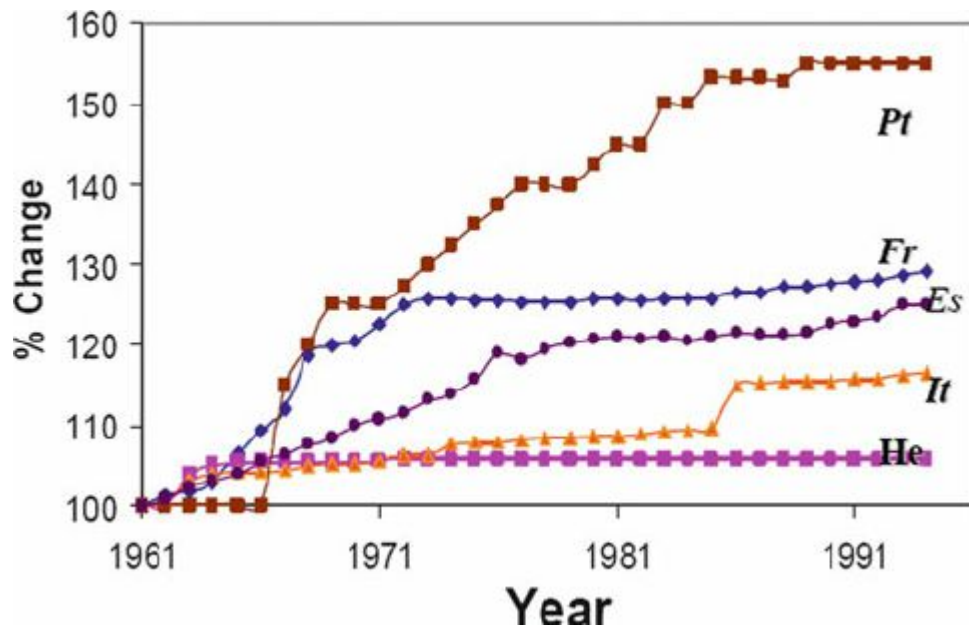


Figure 1.1: Percentage of change in forest area in Portugal (Pt), France (Fr), Spain (Es), Italy (It) and Greece (He) between 1961 and 1991.
Source: Moreira et al. (2012: 4).

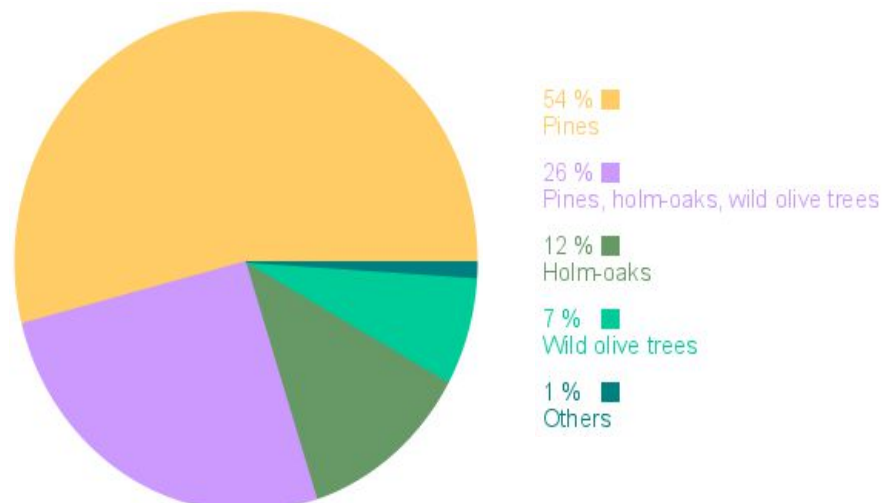


Figure 1.2: Main forest types of Mallorca and Cabrera today, including forests formed by pines (*pins*, *Pinus halepensis*), holm-oaks (*alzines*, *Quercus ilex*) and wild olive-trees (*ullastres*, *Olea europea*).
Source: Own elaboration based on the data of the fourth national forest inventory of the Balearic Islands (2012).

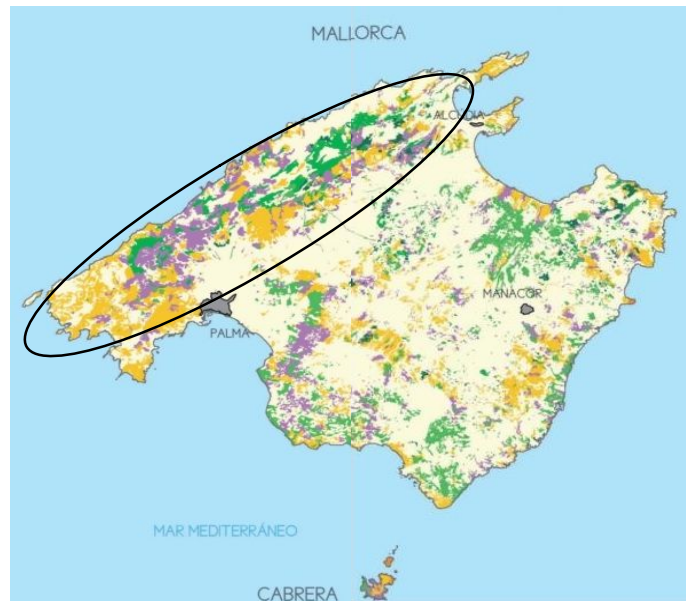


Figure 1.3: Distribution of forest types in Mallorca and Cabrera (Serra de Tramuntana marked by the black ellipsis), including pine forests (in yellow), mixed pine, holm-oak, and wild olive forests (in purple), and holm-oak forests (in green).
Source: Cuarto Inventario Nacional Forestal (2012, 12-3).

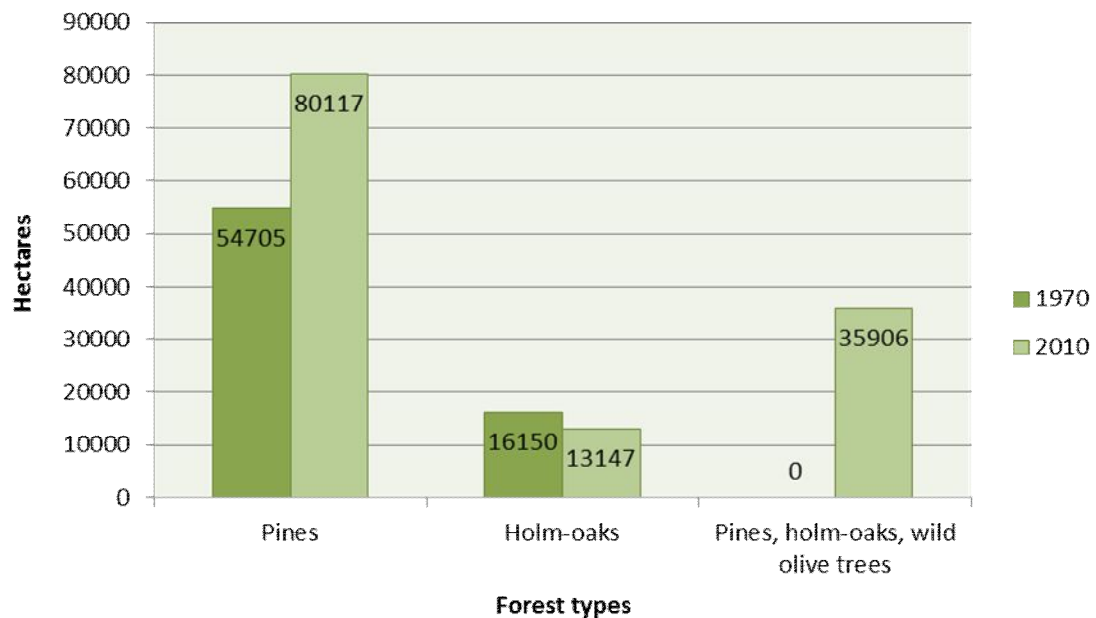


Figure 1.4: Bar chart showing the extension – in hectares – that the three current main forest types of Serra de Tramuntana have experienced in Mallorca as a whole between 1970 and 2010.
Source: Own elaboration based on the data of First and the Fourth National Forest Inventory of the Balearic Islands (1971; 2012).

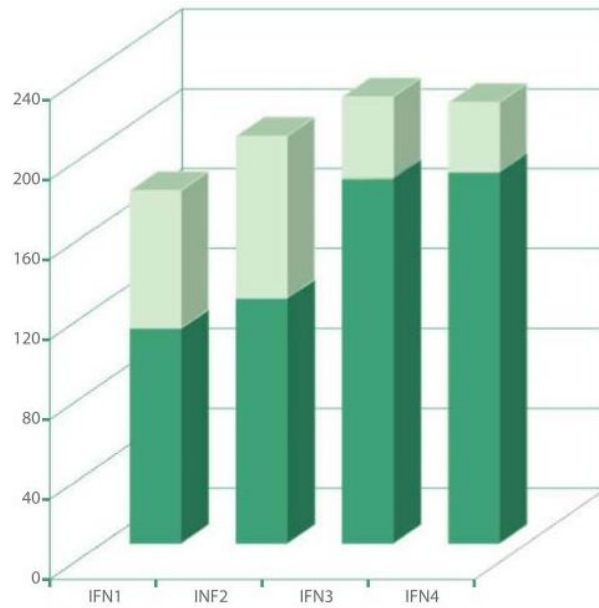


Figure 1.5: Changes in cover (thousands of hectares) of forests (dark green), and shrubland and pasturelands (light green) over the four national forest inventories (1971; 1998; 2008; 2012).
Source: Fourth national forest inventory (2012, 10).

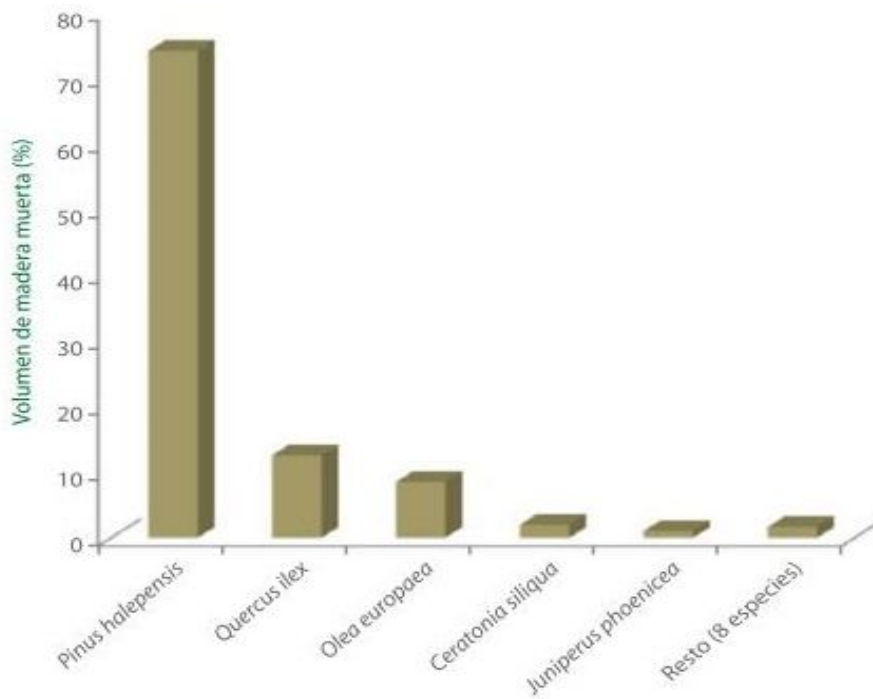
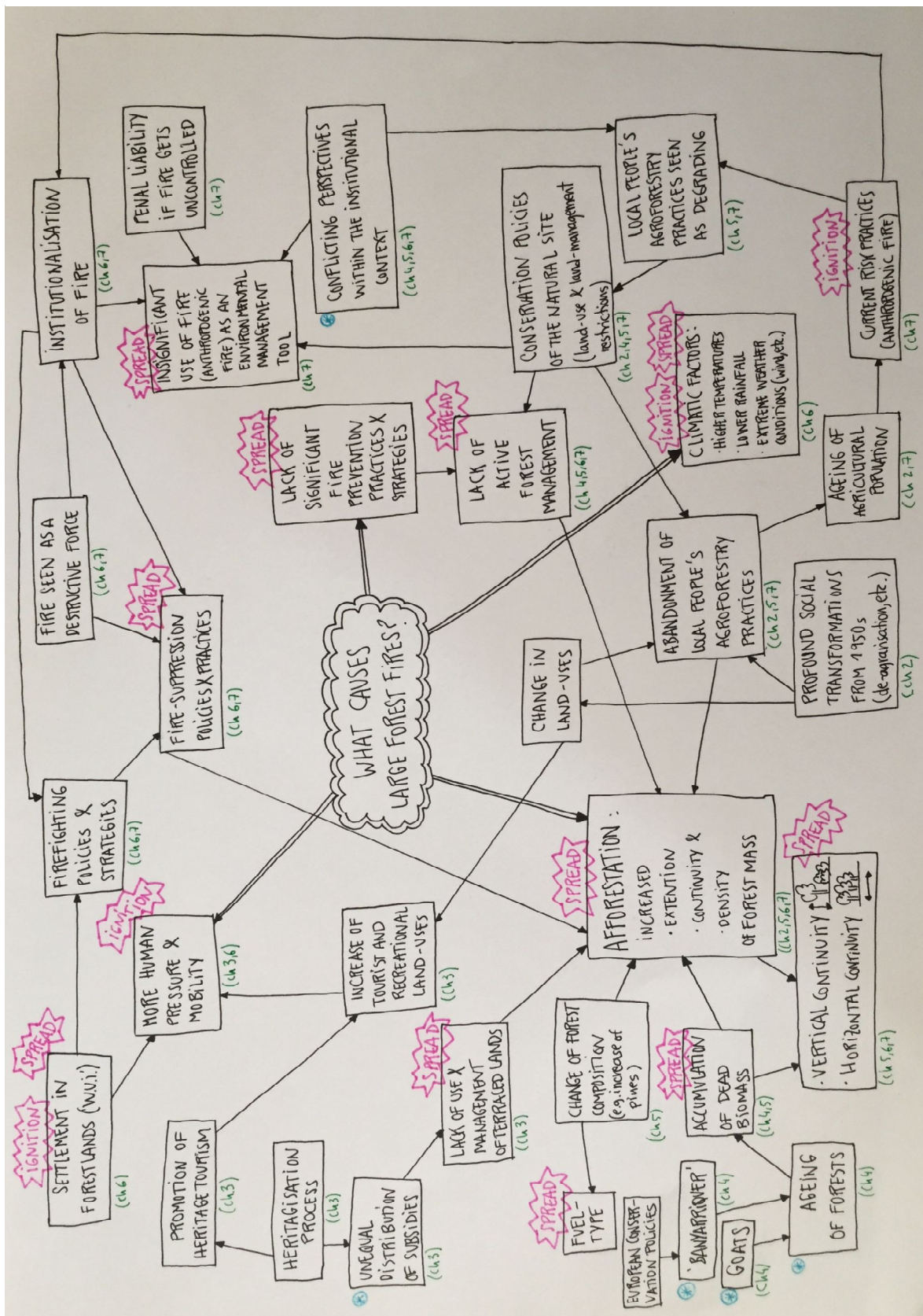


Figure 1.6: Accumulated dead wood of most common tree species in the forests of the Balearic Islands.
Source: Fourth national forest inventory (2012, 34).

Figure 1.7: Mind-map of the main research findings about what causes large forest fires nowadays.

The blue asterisks indicate the factors that are most locally-situated, so they may not be extrapolated to other contexts of study beyond Mallorca. In yellow, I indicate whether something has a greater impact on the ignition of fires and/or on their spread.



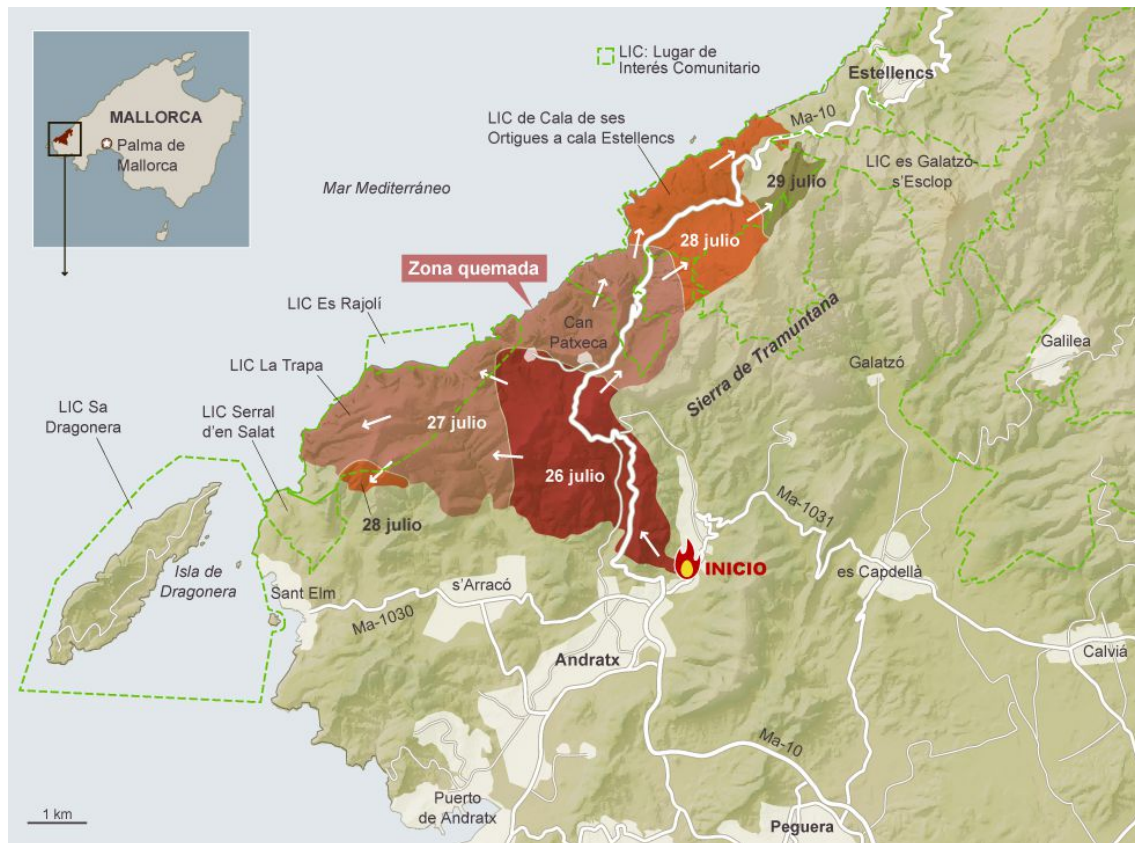


Figure 1.8: Location of the 2013 Andratx-Estellencs fire and burned area (in dark and clear garnet). Andratx can be found at the bottom of the image and Estellencs at the top to the right. Source: Balearic Islands Government.



Figure 1.9: Aerial photo of the largest forest fire ever recorded of the Balearic Islands that affected Andratx and Estellencs in 2013. Source: Xarxa Forestal.



Figure 1.10: Aerial photo of a burned area in Andratx by the large forest fire of 2013.
Photo: Gutiérrez, L. published in El País (2013).



Figure 1.11: Aerial photo of a helicopter fighting a large fire in Gran Canaria in August 2019.
Photo: Medina, Á. published in El País (2013).



Figure 1.12: Photo of a member of Mallorca Firefighters trying to douse the flames during the large forest fire of Andratx-Estellencs in July 2013.
 Photo: EFE, published in El País (2013).

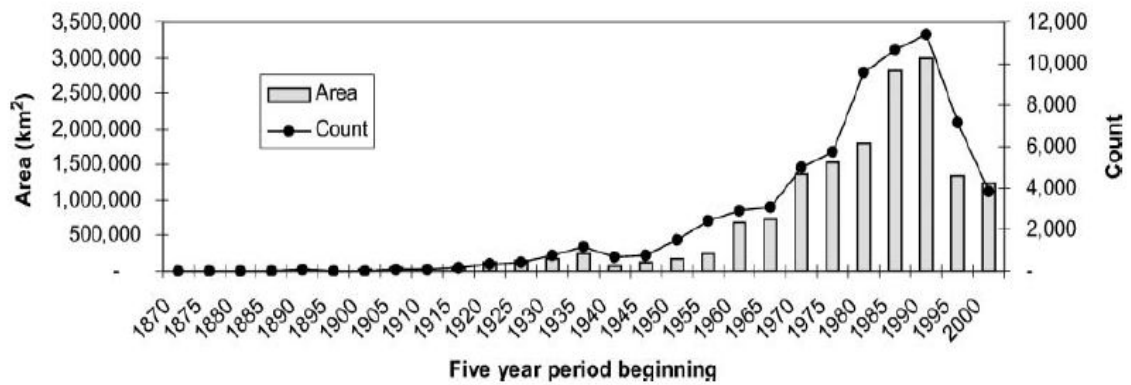


Figure 1.13: Global growth of protected areas.
 Source: The World Database of Protected areas (2005 in Brockington *et al.* 2008; West *et al.* 2006)



Figure 1.14: The Balearic Islands within the Mediterranean Sea.
 Source: www.google.es/maps (last consulted on 20.10.2019)



Figure 1.15: Serra de Tramuntana Natural Site (in pink) within the island of Mallorca.
 Source: web.conselldemallorca.cat (last consulted on 20.10.2019).



Figure 1.16: Estellencs (in orange) and Valldemossa (in blue) within Mallorca.
 Source: web.conselldemallorca.cat (last consulted on 20.10.2019).

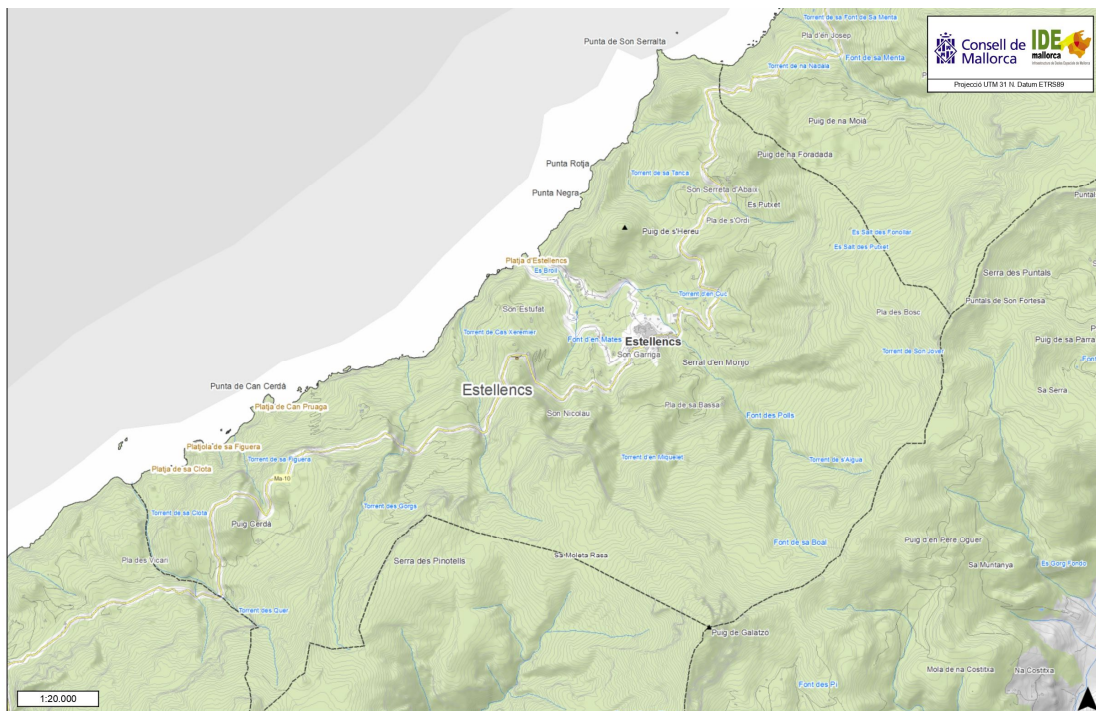


Figure 1.17: Municipality of Estellencs, including some of its large rural estates.
 Source: web.conselldemallorca.cat (last consulted on 20.10.2019).

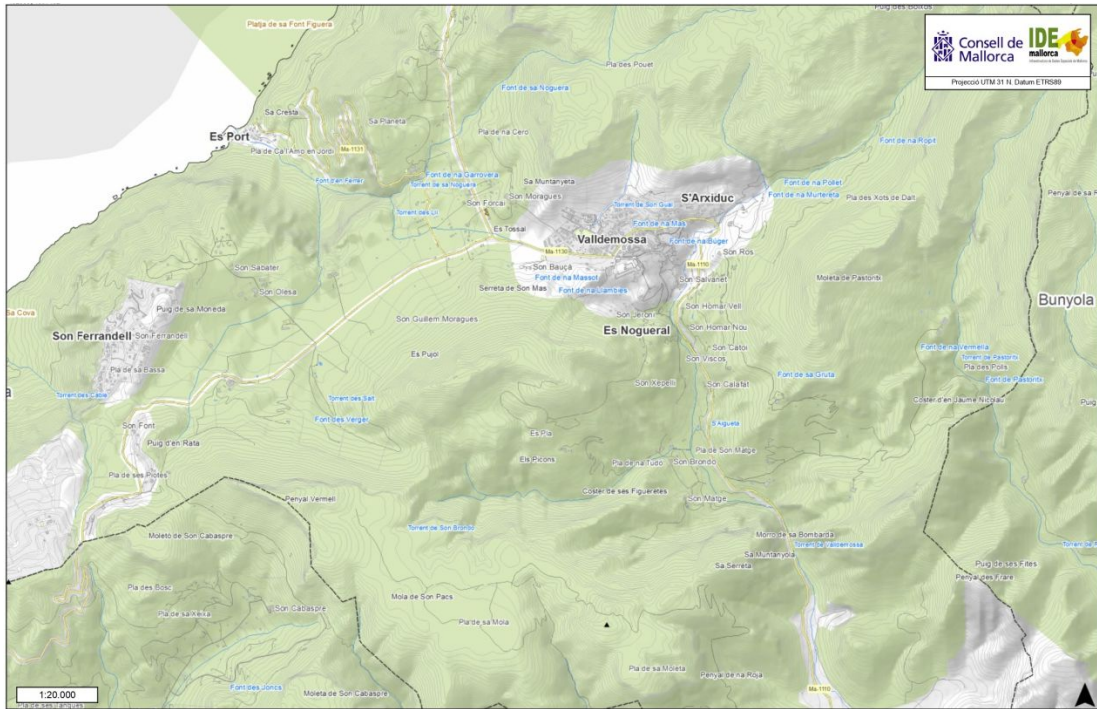


Figure 1.18: Municipality of Valldemossa, including some of its large rural estates.
 Source: web.conselldemallorca.cat (last consulted on 20.10.2019).

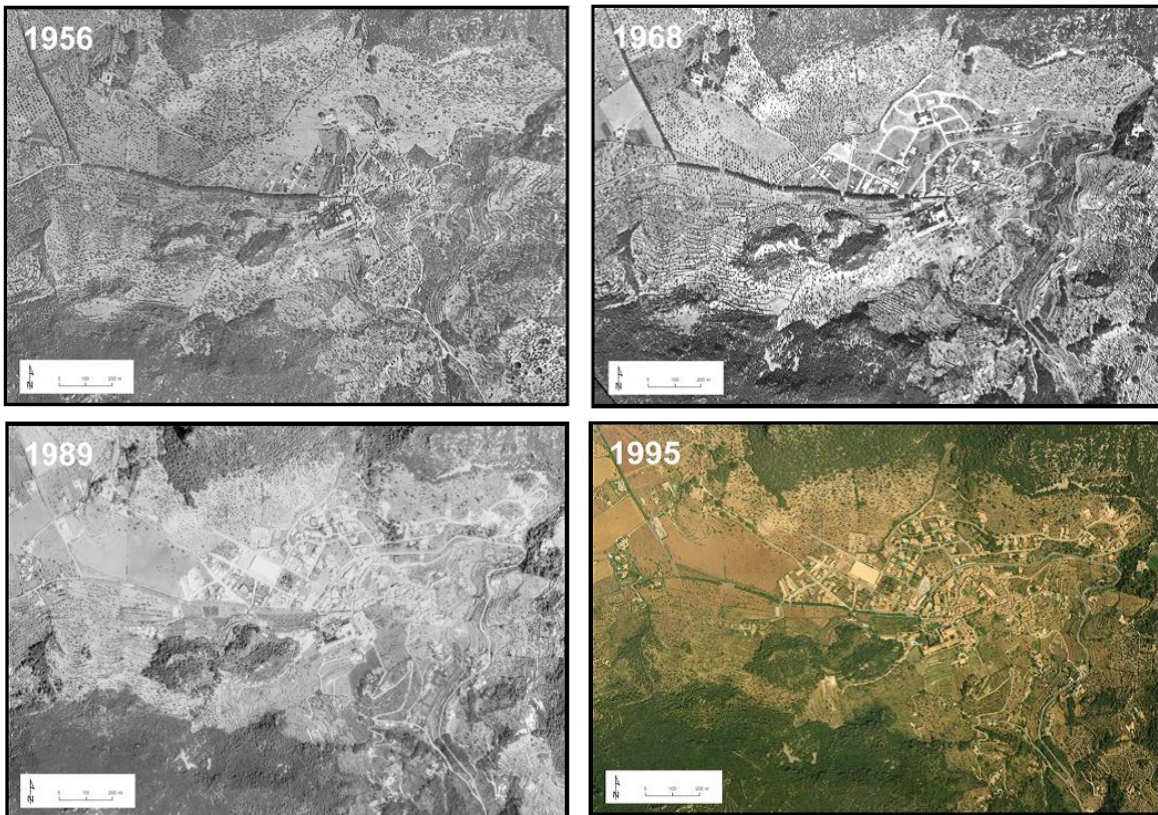


Figure 1.19: Sequence of aerial photographs of the village of Valldemossa, showing its urbanisation from 1956 to 1995.
 Source: Alomar, G. (in Cifre, 2013: 38)

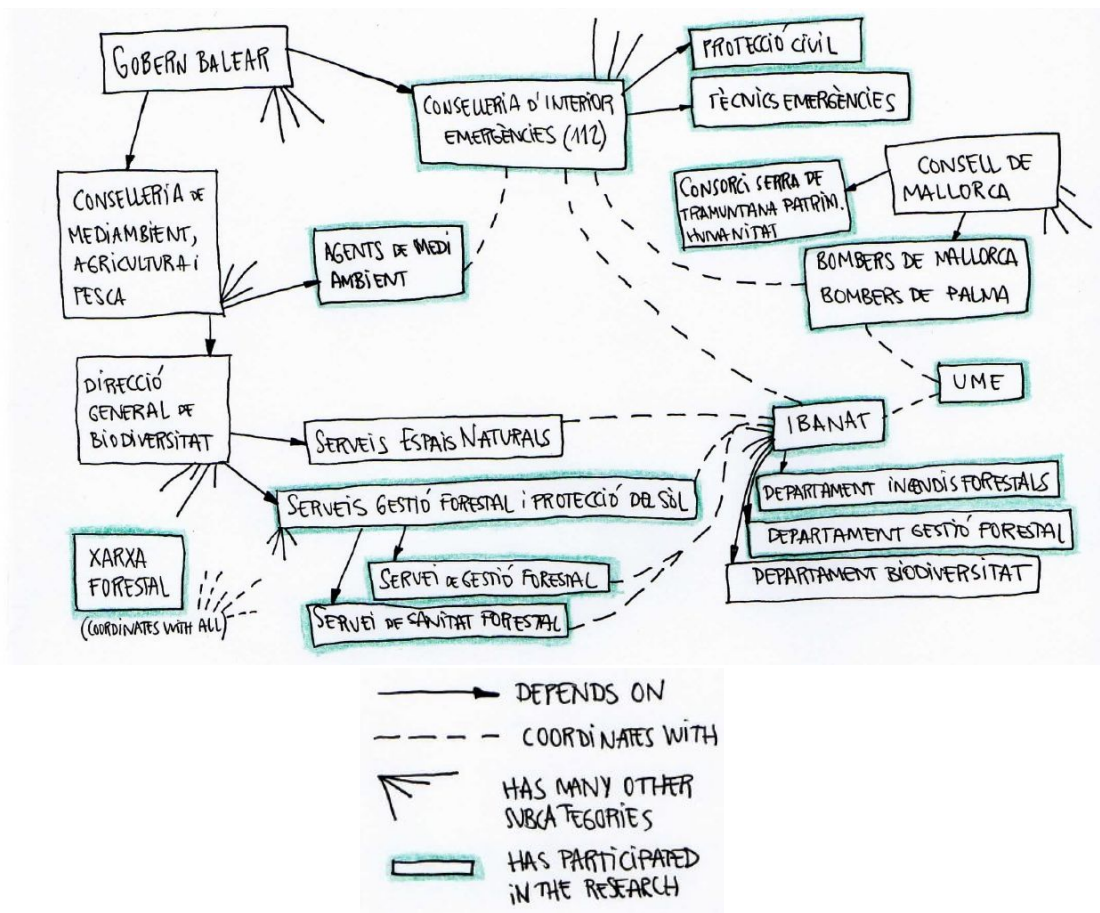


Figure 1.20: Organisational chart of some of the institutional departments with which I worked during fieldwork, realised with the kind help of Xarxa Forestal. This is an adaptation of the original image - which is part of my field diary - since I did not want to show the names of some of the respondents that were included in the original version.

Source: adapted from field-diary.



Figure 1.21: Francisco in a large rural estate that he used to manage. According to him, the estate was abandoned more than twenty years ago until a foreign resident bought it in 2018 to turn it into a rural hotel.
Photo: Maria Cifre.



Figure 1.22: During fieldwork, I periodically travelled the same path followed by the 2013 fire from Andratx to Estellencs. In the picture, taken in November 2015, I am analysing the burned landscape standing on the terrace of a house severely affected by the fire.
Photo: Marta Marimon.

Chapter 2. An environmental history of Mallorca

Preface. Socio-environmental transformations in Son Fortuny (Estellencs)

My visits to the large rural estate Son Fortuny (Estellencs) always followed the same pattern. Early in the morning, I would walk up the mountain track to reach the houses in Son Fortuny, leaving the village and the sea behind. All along the way, the track is surrounded by dry-stone terraces (*marjades*) planted with olive trees (*oliveres*) and sheep eating any plants that attempt to grow. Even though there are young pines (*pinotells*) among the olive trees, in many areas they have been cut down, evidencing active agroforestry management. To the right of the path, the *marjades* lead to a forest (*bosc*) on the slopes of the Galatzó mountain, creating a gradual transition between the terraced olive groves, the holm-oak forest and the non-forested top of the mountain. To the left, more *marjades* run down towards a tilled area of about one hectare. The track ends at the houses, where barking dogs always announce my arrival and Biel, the owner and former manager of the rural estate, comes out to meet me.

Biel is a real expert on the mountains of Estellencs and Andratx, where he has always lived. Like his father, he worked for many years managing some large and very important rural estates in both places. Although he has great knowledge and first-hand experience in many forest practices, like bird-hunting (*caça de tords*) or collecting firewood and wild mushrooms, his biggest passion is working in his vegetable garden (*hort*). Tending the garden, he argues, is what keeps him in good health at 93 years-old and, as he often repeats, gives him 'a way to release the sadness and anger caused by how much everything has changed', feelings which he says prevent him from sleeping well.

Before walking back down to the village, we usually spend some time together in silence, leaning against the stone wall in front the house, gazing at the surrounding landscape. From there we can see down below the carefully tended vegetable garden that leads to abandoned terraced olive groves. There, the ground is completely covered by undergrowth, pines (*pins*) growing among the olive trees and wild olive trees (*ullastrés*), and many collapsed *marjades*. In the highest mountain areas and to the left, looking towards the Galatzó mountainside, the proportion of pines gets lower until the landscape changes to that of a dense forest of holm-oaks.

After some time, both of us deep in our own thoughts, I tried to understand what the distribution of trees and plants revealed about past and present land-uses, and then Biel would tell me how accurate my thoughts were. For instance, I guessed that the olive groves were being gradually abandoned depending on the accessibility of the *marjades*, ranging from the higher to the lower terraces, as far as the large garden at the bottom, this being the reason why there was a greater density of pines in the highest terraced olive groves (see Figure 2.1). If the olive groves had been actively managed, like the ones by the side of the path, no pines would have been allowed to grow. Because the most distant area to the left, opposite the Galatzó, is particularly full of pines and with no apparent sign of any holm-oaks, I suggested to Biel that those lands might have been restricted to the extraction of pine wood. He explained how, in the past, any level sections in the slopes would be used to plant non-irrigated crops, such as cereals. Again, the least accessible agricultural lands were the first to be abandoned, so that nowadays they have been transformed into dense pine woods. It's when we look at the landscape of Son Fortuny that Biel complains most bitterly about how much and how fast everyday

life in Serra de Tramuntana has changed. One day, he finished our conversation saying: ‘To me, looking at this [amount of pines] is one of the saddest things I have ever seen. Before, these lands used to be full of beautiful olive trees, carefully tended dry-stone terraces, hundreds of people gardening, hunting or grazing their goats, sheep and pigs in the forest. People were always singing while they worked, you could hear them from here. But now, only hikers and tourists pass through here. Now, [there is] only silence and pines; nothing else.’

Introduction

With the opening account I hope to have illustrated to the reader the kinds and extent of socio-environmental changes that have unfolded in the mountains of Serra de Tramuntana over the past decades. Although the abandonment of agroforestry customs and the resulting afforestation dating from the second half of the twentieth century currently represent the most significant and visible environmental transformation processes, a deeper analytical look at the environmental history of Mallorca from the perspective of the ‘new ecologies’ (Biersack, 2006) – in particular that of historical ecology, as I will present in the following section – focusing on Serra de Tramuntana as much as available data will permit, enables us to understand how the elements of the present social and environmental landscape of Serra de Tramuntana have been incorporated and transformed over the centuries. My analysis draws on a wide range of secondary sources from a range of disciplines, including history, palaeontology, archaeology, anthropology, art history, architecture, geography, forest science, biology, ecology, and landscape ecology, among others. By combining and analysing a variety of sources with an interdisciplinary perspective, I hope to elucidate how the landscape of Mallorca is historically contingent while, at the same time, reflects and materialises the dialectical relationship between human societies and the environment throughout the ages. Indeed, the islands of the Mediterranean Basin – where many civilisations have coexisted, coalesced and often clashed throughout history – are considered particularly advantageous contexts wherein to study the political nature of landscapes (Vogiatzakis *et al.*, 2008, p. 100). Previously, Gil *et al.* (2008) studied how the landscape of Mallorca has been transformed throughout history. Nevertheless, the consideration and analysis of new sources of information and the updating of knowledge generated in on-going debates offered in this chapter contribute to existing knowledge as to how the current landscape of Mallorca – and particularly that of Serra de Tramuntana – are a reflection of

the human societies that have inhabited the island over the ages and their dialectical relationship with the environment.

As we will see throughout the chapter, over the centuries, anthropogenic fire has helped human societies to convert forestlands into croplands and pasturelands, to burn charcoal, and to burn the wood of the trees to make utensils and tools from iron, ceramics, or glass, to name but a few uses of fire, while large fires have been an agent of disturbance and change in the vegetation. In other words, fire has been as vital to the history of human societies inhabiting Mallorca, as it has to the environmental history of the island. In order to explore the social, historical and environmental dimensions of fire in Serra de Tramuntana, the main focus of my research (see chapter 1), we need to first understand the broader process of landscape transformation, the aim of this chapter. Specifically, I will try to clarify how such historical landscape transformations reflect the dialectical relationship between social, political and cultural processes and such attributes of the landscape as land-use, distribution and extension of different kinds of vegetation and forests. This is of particular importance if, as I show in the following chapters, various groups of people hold diverse and even conflicting perspectives of the recent environmental history (see chapter 5) and the kinds of land-use and management strategies that should be fostered in the heritagised protected area (see chapters 3 and 4), all of which, as I show throughout the thesis, influence the variety and sometimes conflicting perspectives about the factors currently contributing to the incidence of large forest fires in Serra de Tramuntana and how to manage them.

For the sake of clarity, and given the complex social history of Mallorca, I have divided the account into a series of sections, each describing a particular historical period, and summarising some of the key historical socio-environmental transformations and underlying factors. I begin the chapter with a synthesis of the ongoing academic debates that exist around the arrival of the first human settlers and their impact on Pleistocene landscape transformations. Then, I explore the first critical processes of deforestation and urbanisation during the Roman period (123BC-425), and the period of depopulation and afforestation the island experienced with the arrival of Vandals and Byzantines after the fall of the Roman Empire (425-902). Later, I explore some of the major socio-environmental transformations that occurred on the island, and especially in Serra de Tramuntana, during the Islamic period (tenth to thirteenth centuries). Among those, I highlight the new land-use and land-management customs that were introduced to the island with the arrival of the new inhabitants – such as the use of dry-stone

construction techniques to create terraced cultivable land and a complex irrigation system – which in turn facilitated the emergence of the first villages in the mountains. The conquest of the island by Catalanian Christians in 1229 brought with it a series of substantial socio-environmental changes: the territory began to be organised on the basis of large rural estates (*possessions*) which, over the centuries, would also end up becoming the foundations on which the agroforestry land-uses and a great part of the social life of the Mallorcan population were built.

Like in other parts of the Mediterranean, the colonisation of the Americas and the emergence of the Atlantic as the major site for global trade and commerce beginning in the sixteenth century had a series of cascading effects visible at a local level, which by the seventeenth century in Serra de Tramuntana included a shift in land-use from grazing sheep to cultivating olives. By the nineteenth century the large rural estates became progressively fragmented as the social class of the landowners and the type of crops grown became more diverse. The arrival of the first foreign visitors at this time also meant the beginning of an incorporation of the contemplative perspective of the landscape. The subsequent development of the mass tourism industry from the mid-twentieth century accompanied and enabled major transformations, such as shifts in local livelihoods, urbanisation and environmental problems which, in the midst of larger global changes, contributed to the creation of the first natural protected areas and the first environmental movements and regulations in the 1970s, the influence of which has increased to this day. I finish this chapter by looking at how the regional government promoted a substantial increase in tourist and recreational land-uses of protected areas as well as privatising their management following the global crisis of 2008. Before returning to this historical analysis I would like to present a more careful theoretical overview of the landscape as a locus for social, historical and political processes, most clearly signalled by the emergence of the so-called 'new ecologies' after the 1990s.

Landscapes within the perspective of the 'new ecologies'

My approach to human-environmental relationships is fully aligned with the theoretical framework provided by historical ecology, political ecology and symbolic ecology, also referred to as the 'new ecologies' (Biersack, 1999). The 'new ecologies' challenge the premises of previously prevailing approaches to the study of human-environmental relationships – such as cultural materialism (e.g. Harris, 1968) and cultural

ecology (e.g. Steward, 1955) – which considered that the primary function of cultures is to adapt to a natural environment, thus adopting a dichotomist perspective according to which nature and culture exist as distinct and independent realities (Lett, 1987). Historical ecology is an interdisciplinary research programme focused on studying the complex and dialectical relationships between human societies and the environment over the ages, and how these relationships are reflected in the formation of cultures and landscapes (e.g. Crumley, 1994, 1998, 2007; Balée, 1995, 1998; Redman, 1999; Balée and Erickson, 2006). Historical ecology identifies and highlights how the environment is historically produced through the historically contingent, interactive and dialectical relationship between humans and their environment since “in the course of reshaping nature, society gradually reshapes itself” (Biersack, 1999, p. 9). Political ecology, in turn, is a field of study concerned with the interactions between the diverse understandings of nature, the impacts and the politics of environmental action (Adams and Hutton, 2007, p. 147). Political ecology emphasises, among many aspects, the nexus and mutually-conditioning relationship between material and symbolic factors; the reciprocal impacts of cultures and nature; and the articulation of local-global dynamics (Biersack, 2006, pp. 4–5). Symbolic ecology focuses on questioning how nature is differently understood and signified according to a variety of actors, and has become a key field in the studies of landscape and landscape transformations, and the historical and social construction of nature in history (Biersack, 1999, p. 9). The close interrelation between the three study perspectives adds even more value to the use of the integrative approach of the ‘new ecologies’. From the perspective of the ‘new ecologies’, there is a nature that exists externally and independently of human activity, one that existed prior to humans and which no longer exists – what Biersack (2006) conceptualised as the ‘first nature’. At the same time, however, there is also a nature that is produced by conceptualisations, discourses and human activity – referred to as ‘second nature’⁷⁹ by Biersack, in a sense similar to what Escobar (1999) conceptualises as ‘after nature’. Nevertheless, the second nature does not override the first nature, but is, rather, the ‘interface’ between on the one side first nature and on the other, culture, history and power (Biersack, 2006, p. 28).

⁷⁹ Although ‘second nature’ is a term proposed by Marx and Engels, my understanding of it is aligned with the broader meaning developed by Biersack (2006, pp. 14–28), which includes not only human activity but also how nature is constructed through human discourses and conceptualisations.

Landscapes are a vehicle by which to understand many socio-environmental themes that are tied to historical processes; a concept that by giving emphasis to politics, economics and cultural meanings, brings together ‘symbolist’ and ‘materialist’ perspectives in anthropology (Steward and Strathern, 2003, p. 10). The anthropological study of landscape has produced a recent though extensive amount of work from diverse theoretical frameworks that have stressed that it is a cultural and polysemous concept and has focused on rather heterogeneous aspects of landscapes (Rössler, 2009, p. 298). Although landscape is a polysemous concept, my own use of the concept when creating the narrative of the environmental history of Mallorca included in this chapter is aligned with how the ‘new ecologies’ have approached, understood and developed it. From this perspective, landscapes condense and materialise the multidimensional and dialectical relationship between society and nature throughout history; they record and reveal both unintentional and intentional human acts impacting on the environment and also how natural events shape human choice of action, they “allow us to follow changes in the interaction of humans with their environment over some specified amount of time” (Crumley, 2007, p. 17). Indeed, the study of the dialectical relationship between human societies and the environment reflects how human agency is an intentional resource management force that transforms the environment (Balée and Erickson, 2006; Eriksson *et al.*, 2018). In this sense, it becomes pivotal to examine landscapes, understood as “the reflection of the interaction between people and their natural environment over space and time”, since they “provide a framework within which nature is conceived not as the opposite of, but as the counterpart to, human agency in shaping landscapes” (Rössler, 2009, p. 303). This understanding of landscapes has allowed historical ecology to strongly dispute the notion of the existence of a ‘pristine’ nature (Balée, 2006). In this endeavour, the understanding of fire as an intrinsic part of both environmental and human history became pivotal: the use of anthropogenic fire has been acknowledged as a very long-standing strategy by which to promote the heterogeneity and richness of natural resources in highly varied contexts throughout the world, as for instance by indigenous groups in the tropical forests of the Brazilian Amazon (Posey, 1985), in the Australian deserts (Bird *et al.*, 2005), in the temperate ecosystems of California (Anderson, 1999) and the Mediterranean (Pyne, 2009).

Thus, the construction of environmental histories with a focus on landscape transformations over time helps to unravel the complex processes of interaction between environmental and social change (Scoones, 1999, p. 490). In this sense, in the following

sections the reader will find accounts of, for instance, how cereal crises contributed to the social conflicts between the peasantry and the urban elites in the sixteenth century; and how the arrival of settlers from the East in the tenth century – bringing with them their expertise on environmental management – enabled the development of agriculture in the mountains, thus allowing the first significant settlement of Serra de Tramuntana. In all cases, landscapes are both a part of the equation and a retainer of socio-environmental changes throughout history, thus becoming a powerful unit of analysis. Moreover, in Balée’s (2006, p. 76) words, from the perspective of historical ecology, “kinds of societies defined by various socio-economic, political, and cultural criteria impact landscapes in dissimilar ways.” In this sense, landscape transformations are also an expression of a shifting social power, evidencing the inseparability of history and politics (Crumley 1987 in 2007, p. 19).

Mallorca’s landscape transformations prior and subsequent to the first human settlement

Permanent and stable human occupation of the islands first occurred in the Copper Age or Chalcolithic – midway through the third millennium BC (2500/2300 cal BC) – according to the prevailing theory to be held since the end of the twentieth century regarding prehistoric chronology in the Balearic Islands (Guerrero, 1997; Alcover *et al.*, 2001; Calvo and Guerrero, 2002; Micó, 2006). Currently, the interpretation given to what had previously been considered as permanent occupation⁸⁰ towards the end of the fifth millennium BC (Waldren and Kopper 1967; Rosselló-Bordoy 1972;

⁸⁰ The paradigm shift regarding the first Balearic settlements is supported by various points. As Calvo *et al.* synthesise (2002), the ‘V’ shaped cuts found on numerous *Myotragus* skeletons were interpreted by Waldren (1982) and widely accepted as evidence of the domestication of this prehistoric animal and, consequently, as proof of a permanent settlement midway through the fifth millennium BC. However, the author continues, subsequent studies (Pérez and Nadal, 2000) showed that the cuts were made *post mortem*, which refuted the hypothesis of a domestication process during that period (*ibid.*, pp. 160–161).

Pericot 1975; Fernández and Waldren 1979; Yll *et al.*, 1997) were signs of the presence⁸¹ of groups of humans who came by sea⁸² to hunt and gather food, occurrences which might well have had a substantial impact on the environment, such as the extinction of mammals dating from the island's Pleistocene era, for example, the *Myotragus balearicus*⁸³ (Bover and Alcover 2003; 2008).

According to the analysis of pollen counts in s'Albufera⁸⁴ – in the north of the island – around 4000 BC⁸⁵ there was an abrupt transformation of the landscape: the *Olea* (olive tree) and the *Pinus* (pine) took the place of the *Juniperus* (juniper tree), the *Ephedra* and the *Buxus* (boxwood), while the *Quercus perennifolios* (evergreen oak) – like the holm-oak – began to predominate over deciduous trees (Burjachs *et al.*, 1994, 2016; Yll *et al.*, 1995; Picornell *et al.*, 2010). Since currently available data indicate that the human population did not settle in any permanent manner until later on, some authors argue that these transformations in the landscape were not of anthropic origin, but were in fact caused by sudden climate changes taking place globally together with the occurrence of large forest fires (Carrion *et al.*, 2010; Burjachs and Expósito, 2015; Burjachs *et al.*, 2016). Nevertheless, it is important to take into account that at the present time it is well

⁸¹ The argument put forward by Trias *et al.* (2002) that the presence of these groups of Palaeolithic hunter-gatherers was sporadic, is currently unanimously accepted by the Balearic Islands scientific community. One of the bases supporting this hypothesis is the lack of discovery of any characteristic cultural remains – such as the bone industry or architectural remains – together with the animal or vegetable species introduced by humans on the island during this period (*ibid.*). Conversely, Alcover *et al.* (2001, pp. 46–50) consider that there is a lack of solid evidence to support the existence of these sporadic visits, and even question the co-existence of the *Myotragus* with Pleistocene hunters, apart from the already ruled out domestication hypothesis. Clearly, further research needs to be carried out to bring answers to these on-going debates.

⁸² According to Calvo *et al.* (2002, pp. 162–163), this can be deduced from the proximity of the islands to the Iberian Peninsula, the existence of steady favourable currents and winds from the Holocene period onwards and, in particular, the discovery of boat remains, the oldest dating from 6.500 BC.

⁸³ As shown by Calvo *et al.* (2002, p. 166) and Burjachs *et al.* (2016, p. 853), more evidence is still required to specify the extent of human impact on the extinction of the *Myotragus balearicus*. However, there is a considerable amount of evidence of a chronological correlation between the arrival of Palaeolithic hunters to an area and the extinction of its megafauna in many different parts of the world, as in the case of Australia, America and the Pacific Islands (Wallach, 2005, p. 24).

⁸⁴ The s'Albufera (Mallorca) pollen chart is included in Appendix 2.

⁸⁵ In the Balearic Islands, Paleo-environmental studies are fairly limited and any archaeological evidence is relatively recent in comparison with other Mediterranean island territories (Burjachs *et al.*, 2016, p. 2). However, as is synthesised by Carrion *et al.* (2010, pp. 459–460) there is sufficient documentation showing that during the Late Glacial Period (12.750–9.550 BC) precipitation and temperature levels reached their lowest ever values, tundra and steppe prairies overran the north of Europe, and the forests (of mainly *Pinus*, *Juniperus*, *Betula* (birch) and subsequently *Quercus*) spread to regions in southern Europe.

established that Palaeolithic settlers would have started forest fires as a means of obtaining greater resources, as is suggested by many studies carried out in different parts of the world, such as Andorra (Riera and Turu, 2011, pp. 203–204) and New Zealand (Perry *et al.*, 2012). So, similarly to other cases, as for example Australia, where there remains a certain level of uncertainty as to whether the fires which allegedly brought about changes in vegetation – together with the climatic factor – were in fact anthropic in origin (Scott *et al.*, 2014, pp. 171–173), in Mallorca further research is needed in order to determine with greater precision the anthropic effects on the environmental changes occurring during the Neolithic period.

According to the data currently available, we consider that the first human settlements took place in the Balearic Islands during the Copper Age or Chalcolithic⁸⁶ – from BC – (Calvo *et al.*, 2002). In line with this dating, the Balearic Islands were the last island group in the Mediterranean to be settled permanently (Burjachs *et al.*, 2016, p. 849). During this period Mallorca registered a significant and abrupt landscape transformation: the taxa *Poaceae* (cereals) and *Juglans* (walnut trees) increased – which suggests their cultivation by the chalcolithic peoples – the *Corylus* (hazelnut), *Alnus* (alder) and *Fagus* (beech) were to disappear and the deciduous *Quercus* (oaks) continued to decrease in number (Burjachs *et al.*, 1994, p. 206).⁸⁷ In this case, there is a total consensus of perspective on the theory that these transformations were brought about by settlements of chalcolithic communities arriving from the mainland, which were firmly established by between 2300 and 2100 BC (Lewthwaite, 1985). The anthropogenic impact on the decrease in arboreal species during this period might have been caused by the mastery of techniques requiring the use of wood – such as copper smelting and decorated ceramics (Pericot, 1975) – together with their dedication to agriculture and itinerant and domestic livestock farming – including oxen, goats and sheep – (Calvo and Guerrero, 2002; Calvo *et al.*, 2002). It was also during this period that there appear the

⁸⁶ Chalcolithic is the name given to the prehistoric period at the beginning of the Metal Age, characterised by the use of copper. For more information specifically about Mallorca, see Pericot (1975, pp. 34–52) and Calvo *et al.* (2002).

⁸⁷ The s'Albufera (Mallorca) pollen chart is included in Appendix 2.

first signs of human presence in what is now Valldemossa (Waldren, 1987).⁸⁸ The chalcolithic period came to an end at some time between 1800 and 1650 BC,⁸⁹ although some of its distinctive features lasted some time longer, as is shown by the survival of their population (Calvo and Guerrero, 2002, p. 183).

The final stage in the Balearic prehistoric period, coinciding with the Iron Age⁹⁰ is called the Talayotic Period (between 900 and 123 BC),⁹¹ a name derived from the characteristic cyclopean towers⁹² of the villages (*talaiots*, see Figures 2.2 and 2.3) (Tarradell, 1962; Guerrero *et al.*, 2002). On the island, the Talayotic settlements were more numerous in the east and in the plains, although in Serra de Tramuntana there were also villages surrounded by a wall, with *talaiots* either on the wall or inside it (Rosselló-Bordoy, 1972).⁹³ Recently a cave was discovered within the present day Estellencs containing the skeletal remains of 200 different people dating from this period

⁸⁸ The site of Son Matge in Valldemossa, the largest known village of that period, was excavated and studied by Waldren (1987) together with that of Son Gallard, in the neighbouring village of Deià. Son Matge comprised circular huts built on stone plinths, rocky shelters and caves, while Son Gallard was a temporary shepherd's hut (*ibid.*). Later studies support the temporary nature of human habitation on both sites, since the existence of layers of charcoal and ash were witnesses to the occasional use of fire for the creation of pastures (Picornell *et al.*, 2010, pp. 318–320). In any case, these data would serve to demonstrate the existence of a significant amount of livestock farming in Serra de Tramuntana.

⁸⁹ The end of the Chalcolithic period in Mallorca can be established based on the dates of the last dolmens built on the island together with the first cyclopean naviform constructions typical of later Talayotic societies (see below), and funeral constructions dug into the rock suggesting the significant introduction of tin (Calvo and Guerrero, 2002).

⁹⁰ The final periods of the Talayotic era coincide with the Phoenician and Greek colonisation of the Mediterranean, at the same time as the protohistoric period during which the Roman conquest of Mallorca took place (Tarradell, 1962). Regarding the presence of other Mediterranean civilisations in the Balearics, 654BC saw the founding of Ebusus, the Punic colony in Ibiza and Formentera (Costa and Fernández, 1995). As for the Carthaginians, they did not found any colonies in Mallorca and Menorca, although the establishment of a Punic factory of a commercial nature in the southeast part of Mallorca (on the Na Guardis islot) helped to expand the maritime trade relationships of the Talayotic settlers (Guerrero *et al.*, 2002).

⁹¹ While the end of the Talayotic period is calculated based on the well-established date of the Roman invasion (123BC), the beginning of the Talayotic period – like the end and co-existence with Chalcolithic societies – are still a matter of debate. Guerrero *et al.* (2002) review this debate and suggest that the beginning of the Talayotic period occurred around 900 BC.

⁹² According to Pericot (1975, pp. 57–78), a cyclopean construction is one made using large stones without any type of mortar. This type of megalithic construction became popular in many Mediterranean areas, like Greece or Sardinia (Alimen and Steve, 1970, pp. 55–94), and in both Menorca and Mallorca they were developed to a significant extent acquiring a distinctive character compared to other areas of the Mediterranean.

⁹³ Almallutx, in Escorca, Son Canal in Sóller and Son Ferrandell-Oleza – referred to above as Son Matge – in Valldemossa (Rosselló-Bordoy, 1972).

(Jiménez, 2019).⁹⁴ During this period, archaeological analyses and literary sources document the growing of cereals and vines (Blanes *et al.*, 1990), while the olive tree, grafted onto the wild olive, could have been a Punic contribution (Pericot, 1975). Agriculture, livestock farming and the exploitation of maritime resources represented the main means of livelihood (Cerdá, 1973). The first demographic estimates date from this period,⁹⁵ from which we can deduce that Mallorca had a population of between 20,000 and 30,000 (Pericot, 1975). Owing to the clear increase in Mediterranean maritime trade – particularly Phoenician – and the demographic growth, Gil *et al.* (2008, pp. 88-89) infer that this would no doubt have been due to an increased exploitation of the land, including a progressive deforestation in order to increase the area of farmland. The manufacture of bronze and iron tools (Guerrero *et al.*, 2002) would also have involved a certain degree of forest exploitation, since wood was necessary for the smelting process.

So, the prehistoric social groups inhabiting the island – whether intermittently or on a permanent basis – had a significant impact on landscape transformations of the time. For example, cereal crops and the olive were introduced; some species of trees were reduced drastically in number, certainly due to, among other causes, the use of fire, farming activities and the exploitation of wood necessary for the production of ceramics, copper and iron.

Urbanisation and deforestation during the Roman period (123BC-425)

With their incorporation into the Roman republic, the Balearic Islands first became part of history in the ancient era, as defined by the knowledge of writing. For reasons that are still a matter of controversy (see Morgan, 1969; Arribas, 1983; Zucca, 1998), the Romans invaded the Balearic Islands in 123 BC, initiating a slow process of Romanisation with great and varied impacts, among which stands out the step from a purely oral culture to a literary one, the process of urbanisation, and the founding of the first cities (Blanes *et al.*, 1990; García and Sánchez, 2000).⁹⁶ Nevertheless, archaeological

⁹⁴ The archaeologist Javier Aramburu is currently making an inventory of these remains, together with others of the Islamic era, for which reason these data are still waiting for publication. However, the discovery was made public in April 2019 (Jiménez, 2019).

⁹⁵ These conclusions are based on the data offered by Roman authors on the slingers – Balearic mercenaries who took part in the wars between Rome and Carthage – and on the supposition that the majority of able-bodied males would have emigrated (Pericot, 1975).

⁹⁶ In Mallorca: Palma, Pollentia, Bocchoris, and the as yet unknown Guium and Tuccis. In Eivissa, Ebussus, on top of the earlier Punic one (Blanes *et al.*, 1990; García and Sánchez, 2000).

studies in sites of Talayotic compounds, sanctuaries and necropolis have revealed that the Roman culture coexisted in the rural world with the pre-Roman traditions at least until well into the second century BC (Tarradell, 1983; Orfila *et al.*, 1996).⁹⁷

In the Mallorca of the Romans there was an important process of deforestation, which Gil *et al.* (2008, pp. 92) consider occurred because of the growth in area of crop and pasturelands, as well as to cover the needs of naval construction, mining and pottery, all of which responded to the demands of an increasing population and maritime trade. As regards farming production, more cereal crops were planted – favoured through the lack of an efficient irrigation system – and grapevines – a crop especially for export – while the exploitation of olive trees was possibly of little importance (*ibid.*, pp. 92–93). The increase in the number of croplands became possible through the creation of a network of tracks on the flatlands, for which they followed a grid system,⁹⁸ which was especially useful for land parcelling and distribution (Rosselló and Verger, 1974; Orfila *et al.*, 1996).

Thus, the Romanisation of Mallorca was responsible for the highest level of deforestation since the arrival of human beings on the island, in particular due to an increased agricultural use of the land – especially those of rainfed crops such as grapes and cereals due to the absence of irrigation systems – the creation of pasturelands throughout the island, and the development of the naval, mining and pottery industries.

The 'dark period' (425-902AD): depopulation and afforestation

The centuries between the fall of the Roman Empire and Islamic era (the fifth to the tenth century) are considered the 'dark ages' in the history of Mallorca, owing to the lack of archaeological finds and documentation (Rosselló-Bordoy, 1973; Amengual and Cau, 2005). We know that in the fifth century the Balearic Islands were under the political control of the Vandals, that the Christian religion was fully established, and that in 539 the islands were occupied by the Byzantines – who already controlled the east

⁹⁷ This is the case of archaeological sites in Serra de Tramuntana, such as Es Creuer and Ses Mosqueres in Banyalbufar (Orfila *et al.*, 1996) and Son Mas in Valldemossa, whose excavation gave up materials dating back to the third century BC (Waldren *et al.*, 1989). In other cases, the villages would be abandoned through migration from the mountains to the flatlands, as is the case of Almallutx, which ceased to exist in the first century BC (Fernández, 1983) and was not occupied again until the Islamic era.

⁹⁸ That is, in Mallorca a network of tracks over the flatland area of the island was built, following the layout of Roman Camps and towns in which the streets formed right angles (*cardus* and *decumanus*), which could also be used for land division (Orfila *et al.*, 1996).

coastal region of mainland Spain (Xamena and Riera, 1986, pp. 29–30). During these centuries, we can presume that there would have been a sharp drop in population (Rosselló-Bordoy, 1968), which would in turn cause the decline of the cities, a new process of afforestation and the development of small scale agriculture (Gil *et al.*, 2008, pp. 92–94). In the sixth century, however, there exists evidence of the establishment of close trade links with the north of Africa (Palol, 1967).⁹⁹ In fact, the Balearic Islands were already important ports of call in control and trade in the western Mediterranean, a strategic position in this sea – the element which conceptually and topographically unifies the Mediterranean, and one of the most distinctive environmental elements in Mediterranean history (Purcell and Horden, 2000) – which would determine its later historical path.

Thus, we can see how the fall of the Roman Empire had important consequences on a local level: the island suffered a significant depopulation and ceased to form part of the Roman trade routes, which we can presume would have brought about a process of abandonment of agroforestry lands and triggered the subsequent process of afforestation. With the arrival of the Vandals and later the Byzantines, Mallorca regained its strategic position in the trade routes between the east and the Iberian Peninsula, although little is actually known about life on the island during those centuries.

Development of agriculture and emergence of villages in the mountains during the Islamic period (tenth to thirteenth centuries)

Between 902 and 1235AD, the Balearic Islands formed part of al-Andalus.¹⁰⁰ Based on available sources,¹⁰¹ we know that at the beginning of the occupation and

⁹⁹ Which can be inferred from the architectural and decorative characteristics of the early Christian basilicas in Mallorca and Menorca, which represent the most important material witnesses of the period (Palol, 1967).

¹⁰⁰ Al-Andalus were the lands under Muslim control in the Roman and Visigoth Hispania, which began in 711 and ended in 1492 with the conquest of Granada (Cahen, 1972).

¹⁰¹ Although most of the material remains of the Muslim period were destroyed during the Christian conquest of 1229, there still exist some Arab historical sources and inscriptions, documentation and Roman chronicles – made as a result of the Pisano-Catalonian *razzia* of 1114 and after the feudal conquest of 1229-1231 – and the data gathered from archaeological digs (Campaner, 1881; Rosselló-Bordoy, 1968; Busquets, 1978; Kirchner, 1997).

islamisation of the Balearic Islands the city of Madina Mayurqa¹⁰² was founded on the site of the old Roman Palma (Rosselló-Bordoy, 1968). Now having become the power centre of the islands, the city had a port which was the base for extensive privateering activities along the Mediterranean coastlines and, in due course, intensive naval and merchant traffic, dedicated in particular to the transport and distribution of merchandise (Busquets, 1978).

The Mallorcan territory was divided into twelve districts, six of which comprised the area of Serra de Tramuntana,¹⁰³ including the present-day municipalities of Valldemossa¹⁰⁴ and Estellencs.¹⁰⁵ Beyond the area of Madina Mayurqa, society during the Islamic period was basically rural and more or less independent of state apparatus, with a status and territorial organisation undergoing no changes from the very beginning of the islands' islamisation (Riera, 2004, p. 441). According to Guichard (1979, p. 45), the

¹⁰² The texts available (Liber Maiolichinus, according to interpretation of Rosselló-Bordoy, 1973) speak of three fortified enclosures with six main gates connected to the centre by streets radiating outwards, sixteen mosques, five baths and other amenities. This process of urbanisation could have been carried out with the channelling of water from a natural spring located eight kilometres outside the city, in the south of Serra de Tramuntana. The road network and the walled enclosures followed the layout of the irrigation ditch and its branches (Riera, 1993). Two of the gates opened onto roads directly connected to villages in the south of Serra de Tramuntana, such as Valldemossa, Bunyola, Puigpunyent and Esporles. Madina Mayurqa grew in size until the Almoravide period (Rosselló-Bordoy, 1968). As regards the population of Madina Mayurqa, the James I Chronicle (Crónica de Jaume I, a history of thirteenth century conquests written by the king himself) mentions some 50,000 inhabitants, although historians estimate that this figure would have included refugees from the south-western area of the island, escaping from the Catalan assault (ibid.). There were two main migratory periods: that which followed 902, when emigrants of Berber extraction manage to land on the island, and a second during the Almoravide period, both coming from the east of the peninsula or the western part of al-Andalus (ibid.). The former was composed of family clans and tribal groups, with previously established positions and relationships which dictated the way they occupied the lands (Riera, 2004, pp. 429–450).

¹⁰³ Serra de Tramuntana covered the districts of *Isburlas*, *Musuh_Bunyula*, *Sulyar*, *Al-yibal* and *Bullansa*, and part of the district of *Al-abwaz al-madina* (Rosselló-Bordoy, 2007).

¹⁰⁴ According to the Catalanian codex of Repartiment – a document detailing the division of the lands among those taking part in the conquest of Mallorca – the present-day village of Valldemossa belonged to the district of Musuh_Bunyula and comprised the mosque's Alcarería (identified with the village), Alpatoris (a present-day estate in Pastoritx) and Alfaitx (today a part of S'Estret) (Rosselló-Bordoy, 2007). The name 'Valldemossa' comes from the Latin 'Vallis de Mossa', which means 'the valley of Mossa', this being the name of the most powerful person in the valley (Trias *at al.*, 1996, p. 15). However, Mut and Rosselló had considered that Muço refers to the name of one of the *adjzâ'o* or administrative divisions of the island and has no relation to the name of any person (Mut and Rosselló-Bordoy, 1993, p. 106). In any case, it would be place name made up of a mixture of the Arab and Catalan terms referring to the village's position among the mountains (Albertí and Rosselló, 1999).

¹⁰⁵ Estellencs is named as the only population centre in the district of *Al-abwaz al-madina*. The town of Andratx formed part of the same district although, as it was considerably greater in extension, it comprised fourteen *alqueríes* (farms), one of them with the name of the present-day village (Rosselló-Bordoy, 2007).

settlements were divided up into *alquerías* – lands with agricultural and residential areas exploited by free country dwellers – and *rafals* – smaller private holdings. According to the conclusions of hydraulic archaeology, the rural population was mostly distributed in the valleys, composing of one or several *alquerías* depending on their size, laid out according to a previously planned irrigation system (Kirchner 1997).¹⁰⁶ In the eleventh century, livestock farming was of special importance: they bred and farmed pastures for mules, sheep, oxen, cows and horses, though goats might have been few in number (Rosselló-Bordoy, 1968; Soto, 1984). It should be pointed out that the farmers renting the land paid in money and not in kind, which meant that they were free to choose their crops, as opposed to what would occur later on under a feudal regime (Riera, 2019).

Up to the Islamic period, agriculture in Serra de Tramuntana had not undergone any significant development, presumably owing to the mountains' rugged orography. However, the knowledge and practices of agricultural and water management, which the Almohads¹⁰⁷ in particular had brought with them to the island favoured the agricultural and demographic development of the area. Among the improvements in the agricultural production introduced by the Almohads, I should highlight the building of dry-stone terraces (*marjades*) in order to create areas of arable land (Dameto, 1841; Carbonero, 1984) and the irrigation system, both of which allowed the introduction of irrigation crops – such as cotton and vegetables – as well as fruit trees such as the fig (Barceló 1975 in Gil *et al.*, 2008, p. 97). During the Islamic period, the forests were an object of intense exploitation, in particular through the production of carbon and the export trade of pine timber to the shipyards of al-Andalus and the north of Africa, as was the case of Almeria, Tunis and El Cairo (Gil *et al.*, 2008, pp. 99–102). From my point of view, the documented production of pottery, which requires wood fuel, would certainly have been included in these processes. In high mountainous areas no irrigation systems were introduced, since the population groups who were unable to settle in the valleys were

¹⁰⁶These also regulated the positioning of the plots of land, in order to ensure an equitable share of water. In cases where there existed a reduced area of irrigable land, water was stored in aljibes (*anjubs* or *basses*), as has been documented (Kirchner, 1997) in Serra de Tramuntana, specifically in Alaró and Buñola (Kirchner, 1997 in Riera, 2004, p. 439).

¹⁰⁷ In line with Rosselló-Bordoy (1986), four separate periods can be distinguished in the history of Islam on the islands, corresponding to the internal political development and that of al-Andalus as a whole: 1) the eighth and ninth centuries, a period of armed raids until its conquest and incorporation into the emirate of Cordoba in 902; 2) the tenth century, the period of the Cordoban caliphate; 3) 1010-1116, a period defined by the disintegration of the caliphate and the annexing of the islands to the Taifa state of Denia; and 4) Almoravide and Almohad periods, beginning in 1116 and ending with the Catalanian conquest (1231 Mallorca and Menorca, 1235 Ibiza).

dedicated to livestock farming and forestry-related activities (Argemí, 1999). As can be deduced from the prevailing customs in al-Andalus, these pasturelands (*ajz'a*) would have consisted of common lands (Barceló, 1984).

Thus, it is during the Islamic period that the dry-stone terraces (*marjades*) appear (see chapter 3), elements which will have an enormous social repercussion – among these, demographics and land-use – will shape a mountainous landscape which began its decline less than a century ago, and which is still visible today.

The creation of large rural estates and intensification of some mountainous crops after the Catalan Christian conquest (thirteenth – eighteenth centuries)

1229 saw the start of the Christian conquest of the Balearic Islands, led by James I the *Conqueridor*, king of the Crown of Aragon.¹⁰⁸ The occupation of the land and the process of colonisation led to an elevated number of deaths among the Andalusí population,¹⁰⁹ as well as the complete substitution of a society, religion and culture by another. The surviving population who were unable to escape to the north of Africa were enslaved, thus intensifying the major role played by the slave system in Mallorca during the late Middle Ages (Santamaría, 1990; Mas, 2005).

Under the new structure of the territory in the Christian Mallorca, the ecclesiastical dividing up into parishes brought together the scattered population from the rural areas (*part forana*) and established the bases for the future creation of the villages and municipal divisions. The ownership of the lands, studied through the *Llibre del Repartiment de Mallorca*,¹¹⁰ was shared among the great feudal lords – both secular and ecclesiastical – who had taken part in the Conquest (Soto, 1984, 1991). The valleys of

¹⁰⁸ Following the death of James I, in 1279 the islands, together with some other mainland territories, became established as a kingdom, in 1285 as a totally separate kingdom, while in 1343 they were again absorbed by the Crown of Aragon, until the unification of the territories of the old Hispania (1479-1496) (Campaner, 1881). The independent legal system created from the thirteenth century, together with the feudal system typical of the Middle Ages, continued to exist until 1715 (Bonfil, 2004; Deyà and Casanovas, 2004).

¹⁰⁹ A large proportion of the rural Andalusí population – at least 3,000 men of arms and a further 15,000 civilians – took refuge in Serra de Tramuntana for several years (Mas, 2004, p. 32). The largest and longest lasting population centre was the old Talayotic village of Almallutx, an Almohad site which is still under excavation (Albulafia, 1996; Deyà, 2019). Of late, the use of the cave in Estellencs between 1229 and 1231 has also been documented (Jiménez, 2019).

¹¹⁰ El *Llibre del Repartiment de Mallorca* was a property or cadastral register created following the conquest of Mallorca, and it is considered a unique document which can enable us to see the new administrative divisions on the island, as well as the distribution of the lands during the Islamic period (Próspero, 1856; Soto, 1984).

Valldemossa,¹¹¹ Bunyola and Esporles went to Nuño Sanç, count of Rossellón, while the so-called Partida de Ponent – together with Andratx, Estellencs¹¹² and the enclaves – were conceded to the bishop of Barcelona (Cateura, 1997, pp. 30–42; Rosselló-Bordoy, 2007). Owing to the need for repopulation, the successive arrivals of settlers favoured further fragmentation of the Mallorcan territory (Quadrado, 1847). This sharing out of the lands and the obligations established among the new landowners, using a pyramid structure, brought the feudal system to Mallorca (Santamaría, 1981; Jover and Soto, 2002).¹¹³

During the fourteenth century, and up to the first third of the fifteenth century, there existed numerous common forest areas¹¹⁴ used by the population as grazing lands and places from which to get firewood and charcoal, a situation that coexisted with processes of land parcelling by the better placed farmers who in fact retained effective control of the land (Jover, 2004a). The period of prosperity which lasted until the fall of the Kingdom of Mallorca (1343) was a time of demographic growth,¹¹⁵ of the intensity of farming activity and maritime trade¹¹⁶ and coincided with the period of creation of the Ciutat de Mallorca¹¹⁷ (Durliat, 1964). The new Christian city was raised in a very short period of time using royal construction programs, the building of the great conventual works and the five urban parishes (Barceló and Rosselló-Bordoy 2006; Sabater 2010).

¹¹¹ We know that the first document in which Valldemossa was called a village (*vila*) dates from 1231 and that the old *alqueríes* (farms) outside the village enclave were still in use (Albertí and Rosselló, 1999).

¹¹² Estellencs first appears documented as Stellencs in 1234; since the conquest some families such as the Fortunys and Serraltas stand out, having been the owners of most of the lands until quite recently (According to BOIB of 11 February 2006).

¹¹³ According to Rosselló-Bordoy (2007), the ownership and exploitation of the lands resembled the emphyteusis or leasehold system: the settlers were the owners of the land and were entitled to sell it or bequeath it, but at the same time were subject to a series of rights corresponding to the lord, including the obligation to pay him an annual rent. The lords – that is those who had obtained the properties through the conquest covenant – retained direct control, while the new inhabitants had effective control. Even today in Mallorca, there are some properties (lands and houses) subject to a system of taxation of medieval origin (*ibid.*, p. 16).

¹¹⁴ The Commune of Valldemossa appears in documents in the thirteenth century, under the name of *garriga comuna* (Albertí and Rosselló, 1999, pp. 30–31).

¹¹⁵ As regards the demographics, the calculations are approximate since the tax records represent the only source of information (Sevillano, 1974b; Mas, 2004).

¹¹⁶ During the thirteenth, fourteenth and fifteenth centuries, Mallorca was distinguished by a policy of commercial expansion in the Mediterranean through the port of the Ciutat de Mallorca, a key centre for the distribution and redistribution of merchandise due to its strategic position in the routes to Africa and the Atlantic (Abulafia, 1996).

¹¹⁷ Ciutat de Mallorca was the name of the old Medina Mayurqa from the Catalonean conquest until the eighteenth century, when it recovered the name of Palma, the name given to the original Roman city (Campaner, 1881).

This important and rapid architectural activity involved the use of local timber such as pine, walnut and poplar – for scaffolding, frames, doors and other secondary elements – since the basic construction material was stone – and for the manufacture of glass, so essential in Gothic buildings (Durliat, 1964; Garriga, 2016, pp. 606–621). Moreover, the intense production of glass during the second decade of the fourteenth century was followed by a ban on production in 1330 through a lack of timber (Durliat, 1964, p. 276). In addition, naval construction, dependent on timber as its prime material, was one of the most important economic activities in the port of Ciutat de Mallorca (Sevillano, 1974b). I understand that this set of circumstances, together with the limitation of forest areas for use as crop and pasturelands, was what would have caused the forests to be highly exploited, even though this was still insufficient to supply the needs mentioned above.¹¹⁸

After the reintegration of the Kingdom of Mallorca into the Crown of Aragon in 1343 (see Figures 2.4 and 2.5) there followed periods of economic and demographic decline (Durliat, 1964; Abulafia, 1996; Cateura, 2005). The political and economic crisis was exacerbated by the consequences of the Black Death (1346), periods of drought and agricultural deficits, especially of cereals (Jover, 2004a), which forced the importation of cereals from other parts of the Crown of Aragon through the port of Ciutat de Mallorca –i.e. today’s Palma – (see Figure 2.6). At that time, a third of the population of Mallorca lived in the city, while 20% of the rural inhabitants lived in Serra de Tramuntana,¹¹⁹ since the infrastructure inherited from the Andalusí people favoured farming activities (ibid.). According to Albertí and Rosselló (1999, pp. 51–53), between the thirteenth and sixteenth centuries Valldemossa continued with thriving and varied crops destined for the local population, mostly of winter cereals (wheat, oats and barley), vegetables, vineyards inherited from the Islamic period and olives. Between the thirteenth and sixteenth centuries, olive cultivation, rare in previous times, was concentrated in three

¹¹⁸ The lack of local timber was compensated for by that imported from mainland areas – Valencia and Tortosa – and pine from Ibiza (Gil *et al.*, 2008; Garriga, 2016).

¹¹⁹ According to data furnished by Sevillano Colom (1974), during times of demographic crisis Valldemossa would have approximately 700 inhabitants, Andratx 500, while there are no data on Estellencs.

centres in Serra de Tramuntana: Bunyola, Esporles and Valldemossa (*ibid.*, p. 52).¹²⁰

Throughout the second half of the fifteenth century, the tax burden increased in particular on the landowning urban aristocracy, which brought about a change in an economic policy which led to the return of effective land control to direct control, and consequently the concentration of lands and a drastic decrease in the old system of land parcelling (Urgell, 2000). The new model composed of large estates, which would bring about the renting out and privatisation of the common lands (Jover, 1997, 2004a), would be consolidated in the seventeenth century in the Balearic Islands (Jover, 2003; Salvà, 2003). On these large estates, the most important activity was transhumance sheep farming, as a consequence of wool trading in the area of the Mediterranean in which Mallorca played an extremely active part (Deyà, 1998; Jover, 2004a). This migratory grazing system led to the predominance of moorlands, scrubland (*garrigues*) and holm-oak forests in the valleys and mountains of Serra de Tramuntana, given the landowners' interest in having grazing lands all year round (Jover, 1997, 2004a). At this time, the use of fire to create fresh grass was increased, which might well have favoured the change of landscape in the high mountainous areas to one of rocky peaks devoid of vegetation (Jover, 2004, p. 423). What is certain is that the production of local timber continued to be insufficient, as is evidenced by the ban introduced at that time on the exportation of timber to Venice, Nice, Naples and Cagliari and Flanders (Vaquer, 2001, p. 143; Garriga, 2016, pp. 611–612). At the same time, the croplands in the flatter areas of Mallorca were dedicated to the production of cereals, while in Serra de Tramuntana the presence of the olive tree began to be widespread,¹²¹ together with the carob tree, grapevines and vegetables (López, 1990; Jover, 2004a).

Thus, the Catalonian Christian conquest of 1229 had dramatic socio-environmental consequences for the island. Among others, the most determining consequence was that the whole Islamic population, their culture, along with their ways of using and managing the land were totally substituted by those of the new settlers. The

¹²⁰ 1399 saw the founding of the Cartuja de Valldemossa, which would eventually comprise a large expanse of properties: lands with vines, orchards and scrubland (*garrigues*) next to the palace, water rights over the Na Mas spring, and all the royal tithes of wheat, oats, barley, vegetables, oil and wine in Valldemossa and Deià (Murray *et al.*, 1992, p. 194; Albertí and Rosselló, 1999).

¹²¹ From the fourteenth to the seventeenth century, there was an increase in the number of olive groves in the mountainous areas. The 100 hectares of olive groves in existence in the thirteenth century rose to almost 26,000 in 1860, which suggests that this increase was one of the most important factors in the transformation of the Mallorcan mountainous landscape (Barceló 1975 in Gil *et al.*, 2008, p. 97).

land was privatised and fell into the hands of the church and Catalan-Aragonese nobility; a system of feudal social structure was imposed; agroforestry and livestock farming use revolved around rural estates (*possessions*), and the production of resources was influenced by the commercial interests of the new maritime trade routes of the Crown of Aragon.

Displacement of Mediterranean trade to the Atlantic after the Conquest of America (from the second half of the fifteenth century)

With the start of the modern era, fixed unanimously by historians in 1492, the date of the European discovery of America, Mallorca began to lose its role as economic and social crossroads of the Mediterranean. The sixteenth century, a century of the reign of the first Habsburgs (Charles V and Philip II) and the formation of the Spanish Empire, was a century of decline for the Crown of Aragon, in particular in the Balearic Islands. In Mallorca, the uprisings confronting Ciutat de Mallorca with the *part forana* which had started in the second half of the fifteenth century because of the tax burden, culminated in the so-called Germanías (1521-1523) (Santamaría, 1978; Bernat, 2004).¹²² In addition, the territories belonging to the Crown of Aragon – including the Balearic Islands – played no part in the maritime trade routes opened after 1492 which displaced the commercial importance of the Mediterranean to the Atlantic (Juan, 1991). Another added factor were the frequent raids of pirates from the north of Africa, which would lead to the fortification of the Balearic Islands by means of a system of walls and defence towers built during the seventeenth century (Habsburg, 1996). Through all this, Mallorca entered into a period of introversion, far from the strong commercial position it had held in general terms, in previous centuries – when the centre of maritime trade was the Mediterranean Sea and not the Atlantic Ocean – the reason why three quarters of the population were concentrated in rural areas (Juan, 1976; Jover, 2004a). Despite the lack of data on the state of the forests in the sixteenth century, Gil et al. (2008, p. 115) draw

¹²² Between 1521 and 1523 the distribution of taxes favoured the high nobility and other groups of the more privileged citizens; moreover, the larger farming estates – by now in the hands of the town dwellers – paid no taxes or were not liable for taxation in the municipality where they resided (Santamaría, 1978; Bernat, 2004). Les Germanías, a failed and repressed social movement, can be interpreted within the context of other similar processes of social conflicts throughout Europe in response to a hierarchical society of medieval origin (*ibid.*). With no documentation on Estellencs, Albertí and Rosselló (1999, p. 167) furnish documentation about the sacking that the Valldemossa peasants carried out on the estate of the noble Nicolau Cotoner.

the conclusion that the demographic fall and the decline in trade and economic activities which until then had been key, such as naval construction with pine and oak, would have brought with it less intensive forestry exploitation.

At the beginning of the seventeenth century, the large *possessiones*¹²³ converted their agroforestry activities, mainly due to a cereal crisis which would affect the first third of the century (Jover, 2004a, p. 412) and to the decline in wool production which would lead to a reduction in sheep farming as well as the growing of flax and hemp (Deyà, 1998). The response on a local level to the new situation posed by the changing interests of maritime trade was the intensive planting of olive trees – or the grafting onto wild olive trees – in Serra de Tramuntana and the production of olive oil for export (Jover, 2004a, p. 415). Serra de Tramuntana, formerly pastureland for transhumance sheep farming transformed its landscape when the agrosilvopastoral *possessiones* were turned into large olive exploitations.¹²⁴ It was during this time that the olives were introduced in a significant way in Serra de Tramuntana, thus becoming one of the key elements shaping the cultural landscape of the mountains today.

During the seventeenth and eighteenth¹²⁵ centuries, according to Jover (2004a, p. 399), there continued to be a development in the social dynamics generated by the implementation of the system of large estates, the *possessiones* in Mallorca, which had begun in the sixteenth century, in particular alter the result of the Germanías: a part of the nobility and the urban elite (the *senyors*) consolidated their accumulation of properties, lands and wealth through their recovery of a large part of their use rights ('dominium utile'),¹²⁶ while most of the farmers were deprived of any direct control of the land. While some tenants and farmers managed to survive, holding on to the use

¹²³ In line with Salvà (2003, p. 100), these *possessiones* had an average area of 3,000 hectares, equivalent to 400 *quarterades*, the unit of measurement generally used in Mallorca.

¹²⁴ The eighteenth century and the beginning of the nineteenth were of great economic importance in Estellencs, due to the development of mountainous agriculture specialising in oil production (According to BOIB of 11 February 2006).

¹²⁵ The eighteenth century appears determined by the absolute monarchy of the Borbons. Following the War of Succession, (1701-1715), in which the House of Borbon succeeded the Habsburg dynasty, the diverse territories belonging to the Crown of Aragon started to lose their traditional governing bodies and changed to a new situation defined by centralism and the absolutist concept of the monarchy's power. The new political and territorial organisation was legislated under the so-called Decretos de Nueva Planta (Deyà and Casanovas, 2004, pp. 11–22).

¹²⁶ As Jover (2004a, pp. 398–401) explains, a basic institution for the accumulation and concentration of property was the escrow and the right of the firstborn, according to which the property was tied to a specific intestate succession, with no possibility of property segregation. The rise in rents obtained from the farm properties, promoted by the Decreto de Nueva Planta (1715), came to represent 80% of the urban aristocracy's income (Suau 1991 in *ibid.*, p. 399).

rights of small farms, most of the impoverished farming community – women in particular – took the place of the slave workforce and became members of the island proletariat (Jover, 2003).

Thus, from the sixteenth century onwards, the large rural estates (*possessions*) are consolidated as the greatest integrating element in the area of Serra de Tramuntana (Moll and Suau, 1979). A *possessió* is “a traditional system of territory organisation, the creator of rural landscape which articulates property functions, social organisation, economic production, housing and symbolic representation. . . . It is a model, a pattern, a *constructo* of tradition. [It] helps to explain a specific way to understand the space, the time and the social order” (Ramis, 2012, pp. 401, 408). Las *possessions* concentrated most work opportunities for the local peasantry (Canyellas, 1997, p. 21), especially during the months in intense agricultural activity, such as during the olive picking season (Salvà, 1992, p. 80). Each *possessió* had several different types of land: in irrigated lands were the vegetable gardens; *hortos*); the rainfed crops – such as the olives and carobs – were concentrated in non-irrigable areas (*secans*), often around the edges of the arable land afforded by the dry-stone terraces (*marjades*); forests (*boscós*) where forestry activities were carried out, such as timber extraction and the production of charcoal and lime; and pasturelands (*pastures*) in the higher reaches of the mountains (Cifre, 2013, pp. 20–24).

As regards foreign trade, the Port of Palma was set up to trade directly with American ports in 1778 (Sevillano, 1974a), although there are earlier records of the presence of Mallorcan traders in Cadiz and other mainland ports (Manera, 1990; Vaquer, 2001). If we add to this the aforementioned oil exports they had taken charge of from 1720-1730 onwards, we can say that in the eighteenth century the old body of traders began a process of recovery which had been lost from around the middle of the sixteenth century (Manera, 1988, p. 84). This fact was a key factor in the processes of change in land regime taking place in Serra de Tramuntana, especially from the second half of the nineteenth century.

Thus, in the second half of the fifteenth century and during the sixteenth century, Mallorca initiates a decline: the colonisation of America means that Mallorca loses its privileged position in the main maritime trading routes, the conflicts between the peasantry and the nobility and urban elite exacerbates the already existent social stratification, and cereal production undergoes a serious crisis, among many other socio-environmental factors. So therefore, in particular from the seventeenth century, land-use in Mallorca is reconfigured, highlighting the fact that Serra de Tramuntana changed its

commitment from sheep farming to that of oil production. It is during this time, therefore, when the mountainous landscape characterised by its olive tree terraces is formed, a landscape, which, despite its decline, is still visible today (see chapter 3).

The nineteenth century: the demise and fragmentation of the noble estates

The social context of the nineteenth century in Mallorca, as in mainland and European territories, was to a large extent determined by the crisis of the Old Regime, the arrival of the cultural and ideological movement of the Age of Enlightenment and political fluctuations (Tuñón, 1960).¹²⁷ During the first forty years of the nineteenth century, a population increase was recorded (Fullana and Morey, 2004, p. 117–131).¹²⁸ Until halfway through the nineteenth century Mallorca maintained a property structure in which a reduced number of nobles owned the vast majority of lands, while a large number of small landowners of peasant or bourgeois origin (*mercaders*) monopolised a small area, usually around urban centres (ibid.). During this time, the Mendizábal Disentailment occurred, the name given to a long process (1836-1846) which was an attempt to modernise the farming world and create new landowners, though in actual fact it was intended as a way of putting the public tax system in order (Tuñón, 1960, p. 114–122) through ecclesiastical patrimony.¹²⁹ Disentailment in Mallorca particularly affected urban assets in Palma city, since the rural area sold comprised a mere 0.37% of the total of the island, with a large number of buyers concentrated in small rural estates (Ferragut, 1974).¹³⁰ Coinciding with the disentailment process, land deregulation laws came into effect, aimed at putting an end to escrows in modern times, so favouring property mobility – inheritance, sales – and their incorporation in the market, regulatory provisions which at this time had little real effect on land ownership (ibid.). During the

¹²⁷ Following the Peninsular War or the War of Independence (1808-1814) the first constitution was brought into effect (1815) although throughout the century there were successive periods of liberal and conservative government, bringing with them repercussions in modernisation and immobilism (Tuñón, 1960).

¹²⁸ The population of the island rose from 140,000 inhabitants at the end of the eighteenth century to 175,000 (Fullana and Morey, 2004, pp. 117–131).

¹²⁹ In Mallorca, according to data furnished by Llompart, of the 43 convents in existence in 1836, 33 were closed. Their property passed into the hands of the Authorities, the parishes created in the centres of population which had increased in size passed into private hands through a system of auctions (Murray *et al.*, 1992: 5-16).

¹³⁰ In respect to Serra de Tramuntana, the only data available are for three disentaileed convents belonging to the religious orders of the Franciscans (*Observants*) of Sóller, to the Preachers (*Predicadors*) of Pollença and the Carthusians (*Cartoixants*) of Valldemossa, a religious order which was definitively suppressed in 1846 (Ferragut, 1974).

first half of the nineteenth century, the main crops were still the olive in Serra de Tramuntana and cereal in *Es Pla* (see Moll, 1991, p. 31). The olive continued to be a widely extended crop for the production of low cost olive oil which could be used as a currency of exchange for deficit products, such as cereals (Fullana and Morey, 2004, pp. 139–157).

From the second half of the nineteenth century, the decline¹³¹ of the urban nobility led to the start of an important process of fragmentation of their large estates (Trias, 1980, p. 56).¹³² The merchant and farming sectors who had rented the *possessions* in the eighteenth and beginning of the nineteenth centuries (Moll and Suau, 1979, p. 144), started to buy them from the second half of the nineteenth century (Salvà, 1992, p. 81).¹³³ So therefore, from that time, control over agricultural production passed out of the hands of the urban aristocracy to those of the merchant bourgeoisie and the higher classes of the farming community (Salvà, 1983, p. 178).

As a result of these processes, at the end of the nineteenth century, in Serra de Tramuntana small properties in the most productive farmland were combined – mainly in the lower stretches of the valleys and on the plains – with large estates composed mostly of forests (Salvà, 2003, p. 102). The olive, the main crop in Serra de Tramuntana for centuries, lost importance¹³⁴ through the expansion of other crops such as cereals.¹³⁵ At the end of the century, the vineyards in the flat areas of Mallorca were favourably affected by the 1879 phylloxera crisis in France although, a decade later, the arrival of this plague on the island provoked an important agricultural crisis which gave rise to a

¹³¹ Favoured, among other factors, by the economic impact resulting from the phylloxera invasion, by the industrial and commercial evolution most beneficial to the middle classes (Trias, 1980, p. 56).

¹³² Singularly, this process of land fragmentation was of less importance in Valldemossa, since Archduke Ludwig Salvator of Austria had purchased the largest *possessions* precisely in order to prevent this from happening, so that the system of large estates survived to a significant degree in the municipality (Trias, 1980, p. 56).

¹³³ The merchants tended to purchase the larger estates, while the farmers of higher socio-economic status – the tenants in the *possessions* during the eighteenth century and the beginning of the nineteenth, who had gained control of the means of production, any surplus in crop production and the channels of commercialisation (Moll and Suau, 1979, pp. 145, 160) – tended to buy up smaller lands resulting from the fragmentation of the large rural estates (Salvà, 1983, p. 178).

¹³⁴ For instance, the specialisation in the production of olive oil in Estellencs – as evidenced by the existence of fifteen oil presses (*tafones*) in 1830 – began its decline coinciding with a falling demographic and economic tendency (According to BOIB of 11 February 2006).

¹³⁵ According to Salvà (2003, p. 101) in 1860, almost 50% of the lands in Serra de Tramuntana were composed of forest areas devoted to sheep grazing and – to a lesser extent – pig grazing, and 35% were croplands. Of the croplands, nearly 50% were olive trees, over 25% cereals, over 10% carobs and only 2.5% irrigated crops – such as vegetables.

wave of emigration among the farm working community (Cela, 1979, pp. 35–37). The second part of the nineteenth century was when the population most increased in numbers (Fullana and Morey, 2004, pp. 117–131) – as a result of the economic recovery and improvements in health and health care – an increase at a higher rate in rural areas in respect to the capital, provoking the beginning of a rural exodus to the city and abroad (Santana, 2004).¹³⁶

So, therefore, throughout the nineteenth century the large estates of Serra de Tramuntana were broken up, a part of the local farming population gained access to the ownership of small estates, and some crops – such as the grapevine – were more widely farmed leading to a fall in the commitment of the mountains to the production of olive oil.

The origin of Mallorca's tourism in the search for picturesque landscapes by the 'romantic travellers' (end of the nineteenth - beginning of twentieth centuries)

Romanticism¹³⁷ arrived in Mallorca some time between 1830 and 1860 via the literary and artistic works of European, Spanish and Catalan travellers and naturalists. Fascinated by Andalusia and Spain's Mediterranean coastline, many of them visited or lived on the island from that period onwards (Villalonga, 1989). The establishment of a regular steamboat connection between Palma and Barcelona in 1837 stimulated the arrival of visitors with scientific, military, political and artistic objectives, further spurred by feelings of adventure and curiosity typical of the romantic spirit (Barceló and Frontera, 2000, p. 17). The natural inclination of these 'romantic travellers' (Ramis, 2012, p. 403) to describe and reproduce (via lithography) the picturesque landscapes, medieval architecture, monuments, ruins and rural costumes of the Balearic islands, contributed to the creation of a stereotyped and nostalgic image of Mallorca, celebrating its 'naïve rusticity' and the 'primitive ingenuousness' of the island's inhabitants (Villalonga 1989, pp. 343, 356). The finest engravings are to be found in the books of Jean-Joseph

¹³⁶ Among the inhabitants of Valldemossa, Uruguay was the most popular destination for emigration (Amengual and Fiol, 2003, p. 13).

¹³⁷ According to Isaiah Berlin (2013, p. 19), Romanticism is the greatest and most transformative movement of thought, morality, art, consciousness, politics, actions, attitude and aesthetics in the Western world. Developing around the late eighteenth and early nineteenth centuries, in opposition to the attitudes and values of the Enlightenment and inspired by the French Revolution, Romanticism celebrated individual experience, the faculty of imagination and a profound sense of spiritual reality (Day, 1996, p. 3).

Buenaventure Laurens (*Souvenirs d'un voyage d'art à l'île de Majorque*), Charles W. Wood (*Letters from Majorca*), Gaston Vuillier (*Les îles oubliées*) and above all Ludwig Salvator (*Die Balearen*) (Mayol and Rayó, 1998, p. 142). In the works of these travellers, the landscape is contemplated from a poetic point of view, and is considered an epitome of exalted naturalism (Trias *et al.*, 1996, pp. 110–114). Although these travellers were not the first foreign visitors to study the Balearic Islands,¹³⁸ the literature and illustrations that they produced disseminated a romantic image of Mallorca around the world. These texts still help to maintain a stereotyped image of Mallorca (Ramis, 2012, p. 403) which attracts tourists on a truly massive scale (Cifre, 2013, p. 60), and which have been added to the intangible heritage of Serra de Tramuntana by the UNESCO's World Heritage List.¹³⁹

The mountainous and rural landscapes of Serra de Tramuntana also drew the attention of local, national and international painters, who produced numerous works with a strong *costumbrismo* (i.e. local customs and types) and nostalgic content, as is the case with Antoni Ribes, Ricard Anckermann and Bartomeu Ferrà (Ramis, 2012, p. 403). Indeed, Serra de Tramuntana – and Valldemossa in particular – was one of the regions most visited by these poets, writers, painters, musicians, and travellers,¹⁴⁰ whose ranks

¹³⁸ According to Barceló (1879), the first catalogue of the flora of the Balearic Islands was published in 1712 by the Catalan botanist Juan Salvador (1683-1725). Many others followed, such as Jorge Cleghorn, who lived in Menorca in 1744-1749; Pedro Cusson who travelled around Mallorca and Menorca in 1753-1754; and Antonio Richard who developed a detailed Balearic plant catalogue from his trip to the islands in 1760-1761 (*ibid.*). In 1787, José Vargas Ponce publishes the first modern description of the Balearic Islands (Barceló and Frontera, 2000, p. 17). Other relevant publications are, as Villalonga (1989, pp. 343–346) notes, a detailed report of the islands' geography, climatology, and agricultural features published by André Grasset de Saint-Sauveur in 1807 and the work written around 1807 by Gaspar Melchor de Jovellanos when he was jailed in the Castle of Bellver. Afterward, various French naturalists published studies of the Balearic flora and fauna, as for instance Delaroché in 1826 and J. Cambessèdes, also in 1826 (*ibid.*). In Serra de Tramuntana the botanist and geographer Heinrich Moritz Willkomm wrote the *Index plantarum vascularium quas in itinere vere 1873 suscepto in insulis Balearion* (1876) after exploring the rural estate of Miramar (Valldemossa) and the Galatzó mountain (Estellencs), drawing particular attention to the vegetable gardens, olive groves, vegetation in the rocky landscape, orchids of ornamental gardens, forests of holm oak and wild olive, cereal crops at the top of the mountains, and the spiny scrub at high altitudes where he first found the latterly extinct Balearic Islands box or *boj balear* (*Buxus balearica*) (Davesa and Viera, 2001, pp. 174–182).

¹³⁹ “[The] intangible heritage [of Serra de Tramuntana] takes different forms: . . . 4) Artistic expression, demonstrated by numerous artists and travellers who drew inspiration from the mountainous landscape” (UNESCO, 2011, p. 39).

¹⁴⁰ This list includes some of the travellers who published literary and/or artistic work, the so-called ‘romantic travellers’ (Ramis, 2012) but do not include the huge number of public figures who visited Serra de Tramuntana throughout the nineteenth and early twentieth centuries. Indeed, the range of public figures who internationally promoted Mallorca as a travelling destination includes aristocracy, royalty, diplomats, politicians, and military personalities (see Barceló and Frontera, 2000, pp. 16–20).

include such eminent figures as Georges Sand, Carlos Dembowski, Joan Cortada i Sala, Julio Cortázar, Miguel de Unamuno, José Martínez Ruíz (known as Azorín), Rubén Darío, Margaret O'Brien, Frédéric Chopin, and Jorge Luis Borges (ibid.).

The most influential traveller who resided in Mallorca during the second half of the nineteenth century was the Archduke Ludwig Salvator of Austria, known locally as El Arxiduc Lluís Salvador. His greatest book, *Die Balearen* (Habsburg, 1891) was the first ethnographic study and most extensive work on the Balearic Islands ever published. The Archduke also played an active role in the promotion of tourism in Mallorca, not only because he personally invited illustrious figures of his day – family members, politicians, artists, nobility and royalty – but also because he wrote some shorter books¹⁴¹ for an organisation specifically created in 1905 to promote Mallorca's tourist industry, the Foment del Turisme (Tourist Board).

The dissemination of books and articles by these 'romantic travellers' motivated the arrival of a growing tide of visitors from the beginning of twentieth century onwards, which stimulated in turn the construction of the first touristic infrastructures (Barceló and Frontera, 2000, p. 16). The Foment del Turisme, together with the private business sector, developed advertising campaigns and published tourist guides with an aim to consolidating Mallorca as a tourist destination and mitigating the economic crisis in which the Spanish state was immersed from around 1890 (ibid., p. 20-22). This combined public and private drive towards tourism bore fruit over the following decades: between 1930 and 1935 the number of tourists staying in Mallorcan hotels doubled from around 20,000 to 40,000, and the number of visiting cruise passengers dramatically increased from almost 16,000 to more than 50,000 (ibid., p. 23). The tourist boom of the 1920s and early 1930s was cut short, however, by the Spanish Civil War (1936-1939), followed immediately by the Second World War (1939-1945) (Murray *et al.*, 2017, p. 5).

Thus, the contemplation of the landscape, a vehicular axis of the current initiatives of use and management of Serra de Tramuntana (see chapter 3), finds its regional historical reference in the arrival of the so-called 'romantic travellers' from the nineteenth century.

¹⁴¹ *Lo que sé de Miramar* (1911) and *Lo que algunos quisieran saber* (1909) (in Barceló and Frontera, 2000, p. 18).

The growth of mass tourism and the progressive abandonment of agroforestry subsistence practices (1950s, 1960s and 1970s)

The successful tourism of the 1930s was interrupted by the Spanish Civil War, the Second World War, and the partial blockade that isolated Spain from the advanced capitalist countries after the close of World War II (Murray *et al.*, 2017, p. 5). Although in the forties tourism was still not a key aspect of the political economy of Franco's dictatorship (Esteve and Fuentes, 2000), Mallorca remained a tourist destination for Spanish tourists¹⁴² who made use of part of the existing tourist infrastructure (Pérez, 2003, p. 22). The depressed state of international tourism continued until 1951, when the United Nations ended the international isolation of Franco's dictatorship (Barceló and Frontera, 2000, p. 25). From the 1950s onwards, several political and economic national reforms¹⁴³ facilitated Spain's passage into modernity via the developing tourist industry (Blázquez and Murray, 2010). In fact, from the adoption of a liberalising agenda in the 1950s, tourism became central to the entry of foreign capital and currency, an essential element in sustaining the dictatorship economically (Murray *et al.* 2017, p. 6). The regained positive outlook ushered in by tourism was enhanced by the global expansion of touristic mobility thanks to the creation of commercial flights after World War II (Ceballos, 1996) and the beginning of paid leave (Blázquez and Murray, 2010, p. 72). The charter flight phenomenon, in particular, confounded the seaside tourist industry in many parts of northern Europe, channelling it to the Spanish state, first and foremost. By 1960¹⁴⁴ Mallorca had consolidated its position as a leading tourist destination, with visitor numbers quadrupling from 1950 (Llinàs 2006, p. 7).¹⁴⁵ This significant

¹⁴² Of the 55,000 tourists who came to Mallorca in 1945, only 691 were foreign (Llinàs, 2006, p. 6).

¹⁴³ The approval of the Stabilisation and Liberalisation Plan in 1959 opened Spain to international markets and foreign capital with the incorporation of numerous monetary, industrial, commercial and labour reforms (Murray *et al.* 2017, p. 6). As analysed by Blázquez and Murray (2010, p. 72), this plan raised interest rates, contained public debt, devalued the Spanish currency (*peseta*), and opened the door to foreign investment. As the authors continue, in 1977, after Franco's death, the Moncloa Pacts (*Pactos de la Moncloa*) led directly to industrial reconversion and generalised subsidies for unemployment, pensions, and public health, preparing Spain for entry into the European Economic Community. The subsequent incorporation of Spain to NATO in 1981 and the European Union in 1985 liberalised the circulation of people, services – such as the air transport – and capital (especially with the Schengen Agreement of 1985 and the Maastricht Treaty of 1992), and increased Spain's competitiveness by strengthening temporal contracts, labour mobility and reducing the cost of dismissal (*ibid.*, p. 72).

¹⁴⁴ While many tourists and foreign residents in Ibiza (Eivissa) were drawn there by the hippy movement, this factor was not significant in Mallorca (Salvà, 1985, pp. 24–25; Pérez, 2003, p. 23).

¹⁴⁵ From around 98,000 visitors in 1950 to 400,000 in 1960 (Llinàs 2006, p. 7).

development is what Rullan (1998, 2007) termed the first real boom in the history of tourism in Mallorca.¹⁴⁶

With the arrival of mass tourism, the city of Palma, some coastal areas and a handful of towns in Serra de Tramuntana – above all Sóller, Andratx, Calvià and Pollença – developed rapidly as touristic centres (Salvà, 1978, p. 164). Many of the island's inland and mountainous villages became depopulated as inhabitants moved to the capital or coastal zones (Rullan, 2007, p. 8), a demographic pattern common to many other parts of the Mediterranean in recent decades (Ganteaume *et al.*, 2013, p. 652). From the second half of the twentieth century, the cities and touristic centres of the Balearic Islands experienced a huge rise in population partly as a result of the rural exodus, but also due to the migration of many mainland Spaniards who moved to Mallorca because of various work opportunities that accompanied the rise of mass tourism (Salvà, 2002, p. 133).

Thus from the second half of the twentieth century, the livelihood of the local population of Valldemossa and Estellencs saw a gradual shift away from agriculture, livestock and woodland industries to a major dependence on the service sector (Salvà, 1979; 1989; 1998). Statistical data from the Balearic Islands show that between 1955 and 1981 the percentage of the working population employed in agriculture fell from 40% to 15% (see Figure 2.7), while the service sector witnessed an increase from 23% to 55%, and the construction sector rose from 7% to 13% (Alenyar, 1984, p. 11). Between 1965 to 1991, the working population that was dedicated to agriculture in Mallorca descended from 50% to 10% (Barceló and Frontera, 2000, p. 33). In the Balearic Islands, many authors have adopted the expression 'tourist monoculture' (*monocultiu turístic*) to refer to the almost total economic dependence on tourism (e.g. Picornell 1990, p. 46; Benítez and Ginard 1994, p. 117). Indeed, from the second half of the last century, rural livelihoods in many parts of southern Europe have shifted away from agriculture, livestock, fishery and forestry towards tourism and construction, converting rural areas

¹⁴⁶ The categorisation of the history of tourism in Mallorca until the twenty-first century that Onofre Rullan proposed in 1998 has been widely accepted by most academics studying this region (e.g. Pérez, 2003; Murray *et al.*, 2005; Dubon, 2012). According to Rullan (1998), the first boom lasted from approximately 1950 with the global economic growth after the Second World War up to the petroleum crisis of 1973; the second boom began with the neoliberal economic restructuring in the 1970s and continued up to the Gulf War in 1994; and the third boom lasted from 1994 to the beginning of twenty-first century. A contrasting phase in the history of tourism and its territorial planning may emerge from the neoliberal reforms following the economic crises of 2008, an analysis that Blázquez and other academics have incorporated into their most recent publications (e.g. Artigues *et al.*, 2014; Blázquez *et al.*, 2015; Murray *et al.*, 2017).

into recreational sites for urban populations and international tourists (Kousis, 2004; Selwyn, 2004; Frigolé, 2006; Santamarina, 2008, 2009; Valcuende *et al.*, 2011; Cortés-Vázquez, 2012).

So, from the second half of the twentieth century, the local population of Serra de Tramuntana progressively puts an end to their dependence on the labour supply required by the rural estates (*possessions*), becoming dependent on the developing tourist industry and the associated construction industry. This would in turn lead to the abandonment of a large number of agroforestry lands and subsequently would trigger a process of afforestation still continuing at the present time (see chapter 5).

From the socio-environmental impacts of tourism and construction industries to the emergence of regional environmentalism and the creation of the first regional protected areas (mid-twentieth - beginning of twenty-first centuries)

The visible environmental consequences of the mass tourism on Mallorca's

In 1956, the enactment of the Law on Land Use and Urban Planning (Llei sobre règim del sòl i ordenació urbana) altered the guidelines for zoning and construction, allowing many agricultural and rural tracts to be urbanised for tourist and residential purposes,¹⁴⁷ thus promoting the start of an 'uncontrolled growth in tourism' (Salvà 2003, p. 107-108). The lack of planning and regulations contributed to the rapid and uncontrolled urbanisation of many ecologically valuable areas (Sociás, 2000, p. 304) As Artigues and Rullán (1990, p. 240) – among many others – suggest, the Balearic Islands became a paradigmatic case in both the Spanish state and the Mediterranean basin in terms of the intensity and amount of territory affected by tourism-driven urbanisation. This occurred to such a degree that the term 'Balearisation' (*balearització* in Catalan) is widely used to define the devastation and ruination of the coastline due to intensive, excessive and uncontrolled urbanising linked to mass tourism (Blázquez *et al.* 2011, p. 12).

In addition to these extensive residential developments which led to a dramatic change in rural landscapes, the upsurge in mass tourism brought overuse of water and energy resources, pollution of air and water, and an unmanageable accumulation of waste

¹⁴⁷ Between 1956 and 1973, the urban area in the Balearic Islands doubled from 56.55 km² to 119.5 km² (Rullán, 2007, pp. 21–22).

(e.g. Artigues and Rullan, 1990; Picornell, 1990; Avellà, 1998; Mayol and Rayó, 1998; Garcia, 2008). Indeed, because of the seasonality of mass tourism, many infrastructures had to be built oversized in order to satisfy the greater demands on resources during summer (Andreu *et al.*, 2003). Among infrastructures from the 1950s onwards which have had an huge environmental impact are the Son Sant Joan Airport (1960); the first highway which connected Palma with the new airport (1963-68); three power stations (1955, 1962 and 1968); treatment plants of solid urban waste (active from 1997); desalination and water treatment plants; the enlargement of many marinas; the creation of several quarries; and the conversion of many rural areas into golf courses (Salvà and Binimelis, 1993; Benítez and Ginard, 1994; Pérez, 2003; Blázquez and Murray, 2010).

In Serra de Tramuntana there were fewer urban developments than in other coastal areas of Mallorca, due to a combination of various factors, such as the absence of extensive beaches, the difficulty of access due to the mountainous terrain, and the predominance of large private properties (Benítez and Ginard, 1994, p. 116).¹⁴⁸ As summarised by Salvà (2003), before the enactment of the Law on Land Use and Urban Planning in 1956, there were two main types of new urban developments. On the one hand, numerous agricultural lands within large rural estates were parcelled up and urbanised to lay out residential complexes and developments (*urbanitzacions*), primary and secondary homes for foreigners or people from Palma, usually with high purchasing power. The 1960s brought the widespread transformation of agriculturally based rural areas to leisure-based urbanised land-use. In Serra de Tramuntana, the urbanisation process affected mostly the coastal areas in the municipalities of Sóller, Calvià, Alcúdia, Pollença and Andratx, although it also occurred in some inland villages, such as the new residential development of Es Verger at Valldemossa (Salvà 2003, p. 107-108). Nevertheless, it was in the 1970s that urbanisation on the outskirts of inland villages affected almost all the municipalities in Serra de Tramuntana (Salvà and Binimelis, 1993, p. 74),¹⁴⁹ leading to the emergence of residential complexes such as the ‘George Sand’ in Valldemossa (Salvà 1998; 2003, p. 108; see also Figures 2.8 and 2.9).

¹⁴⁸ In 1987, properties of more than 100 hectares occupied more than 66% of Serra de Tramuntana’s territory (Salvà, 1992, p. 81).

¹⁴⁹ From 1973 to 1999, the conversion to urbanised areas was regulated through the Partial Urban Zoning Plans (Plans Parcials d’Ordenació Urbana) and the Regional Zoning Plan of the Balearic Islands (Plan Provincial de Ordenación de Baleares). However, several residential developments were built without due legal permits (Salvà 1978, pp. 165–166).

Various historic processes coalesced and led the way to protecting Serra de Tramuntana. As Mayol and Rayó (1998) suggest, a fundamental factor for the development of a social awareness about the need to defend and protect the natural heritage of the islands was the scientific knowledge about the Balearic islands that built up from the first botanical inventories and studies published during the nineteenth and early twentieth centuries,¹⁵⁰ to the work done by a variety of organisations¹⁵¹ which emerged in the 1950s, 1960s and 1970s (*ibid.* p. 141). It was in this context of social mobilisation that the environmentalist organisation GOB (Grup Balear d'Ornitologia i Defensa de la Naturalesa, i.e. Balearic Group for Ornithology and the Defence of Nature) was founded (Rayó, 2004). The GOB has played a key role within the environmentalist movement in the Balearic Islands, not only because it is the islands' oldest and most influential environmental organisation,¹⁵² but also because since its foundation it has actively addressed a variety of issues,¹⁵³ such as the threat to various species, the destruction of ecosystems, the degradation of landscapes, the depletion of resources, and the generation of waste and pollution (Avellà, 1998, p. 82).

¹⁵⁰ Mayol and Rayó (1998, p. 141) highlight the work of the already mentioned botanist, entomologist, ornithologist and palaeontologist who visited the islands in the eighteenth, nineteenth and early twentieth century; while from the twentieth century, the authors highlight the contributions of Garcías Font (1885-1976), Massutí Alçamora (1902-1950); Tato Cumming (1918-89), Darder Pericàs (1894-1944) and Guillermo Colom (1900-94).

¹⁵¹ Such as the Natural History Society of the Balearic Islands (Societat d'Història Natural de les Balears) in 1954; the Balearic Cultural Society (Obra Cultural Balear, OCB) in 1962; and the creation of a degree in biology and the Department of Geography at the University of the Balearic Islands (Universitat de les Illes Balears) in 1978 (Mayol and Rayó, 1998, p. 141). Other environmentalist groups which emerged in the 1970s but did not last long are, among many others: the Association for the Defence of Nature (Asociación para la Defensa de la Naturaleza) in 1972; the Hiking Group of Mallorca (Grup excursionista de Mallorca) in 1973; the anarchist collective Land and Freedom (Terra i Llibertat) in 1977; the Ecological Destruction Complaints Group (Grup de Denúncia Contra la Destrucció Ecològica) in 1977; and the anarchist group Kroak created in 1977 from the National Labour Confederation (CNT) of Palma (García, 2017, pp. 42–43).

¹⁵² According to their official website, the GOB (2018), funded in 1973, is also one of the largest environmental organisations in the Spanish state. The social impact of the GOB is widely acknowledged, as evidenced in the media and in many academic publications (e.g. García, 2017, p. 40).

¹⁵³ According to the GOB (2018), its main aims is “the improvement of environmental conditions in the Balearic Islands in order to achieve ecological and social sustainability.” Their specific objectives are: 1) “the conservation of natural areas and both iconic and threatened species among the flora and fauna”; 2) “the preservation of the land, the landscape, and the natural resources as the heart of the islands' future sustainable economic development”; and 3) “the environmental education and awareness of society *vis-à-vis* the natural values of the Balearic Islands, their fragility, and sustainable patterns of development.”

As it happened, in the 1970s when the socio-environmental impact of mass tourism and urbanisation sparked widespread concern among Mallorcans (Ripoll, 2000, pp. 45–46), the widely diverging interests of environmentalist organisations, the tourism industry, the Balearic government and the political parties of the opposition prevented them all from reaching a consensus (Picornell 1990, p. 43; Blázquez and Murray 2010). Public and media debates arose, for instance, over mounting problems of water supply (Artigues and Rullan, 1990, p. 240), contamination of underground aquifers and the increased accumulation of solid and liquid waste (Pérez, 2003). It was, however, the urbanisation of natural areas which gave the greatest boost in the 1970s to the newly born regional environmentalist associations (Blázquez and Murray, 2010, p. 101). With various groups organising endless social campaigns for the protection of specific natural areas,¹⁵⁴ the 1970s saw a growing consensus on the need to limit and regulate tourism and urbanisation while protecting natural habitats. The hard-fought campaign against the urbanisation and touristification of Sa Dragonera was one of the most important social mobilisations aimed at safeguarding a natural environment in Mallorcan history (see Figure 2.10). Indeed, the ‘assault’ and occupation of the islet for almost twenty days in 1977 is widely considered the “foundational event of the environmental social movement in the Balearic Islands” (Rullán 2010, p. 405). The campaign lasted until 1995 when Sa Dragonera was finally declared a Natural Park (García 2017, p. 117). Since the naming of Cabrera as a National Park until the present time, twelve more protected spaces have been created, among which is the Natural Site of Serra de Tramuntana.¹⁵⁵ Nowadays, there are almost 80,000 terrestrial hectares that are catalogued as Natural Protected Area, which is a 16% of the total surface of the Balearic Islands (*Cuarto Inventario Forestal Nacional: Illes Balears*, 2012, p. 42).

So, therefore, since the 1970s a series of legislative initiatives have come into force which, through their aim of conserving certain natural spaces on the island, have

¹⁵⁴ In the book *Salvem la Dragonera*, García (2017) summarises some of them: in 1972, the Society of Natural History of the Balearic Islands and the OCB organised Mallorca’s first environmental campaign, aiming to protect Cabrera, an archipelago at that time owned by the Spanish Army that was due be privatised and urbanised. In 1975, the GOB and the OCB revealed that the electric company GESA was pouring contaminated ashes into the s’Albufera wetlands. In 1976, there was a campaign against the construction of a petroleum dock that would have reclaimed land from the sea off the coast of Palma, and another one against the urbanisation and construction of outdoor quarries in Cala Mondragó (*ibid.*, p. 40).

¹⁵⁵ For a complete list of the protected areas of the Balearic Islands, see www.caib.es/sites/espaisnaturalsprotegits (last consulted 20.06.2019).

restricted agroforestry use and management in Serra de Tramuntana, a process which culminated in the establishment of Serra de Tramuntana as a Natural Site in 2007.

The intensification of tourist and recreational land-uses and the privatisation of protected areas following the 2008's crisis

In 1997 the Government of the Balearic Islands announced the creation of the Balearic Institute of Nature (Institut Balear de la Natura)¹⁵⁶ – hereafter referred to IBANAT – a public company responsible for carrying out various kinds of forestry work for both the public and the private sector. In 2006, the management of the protected areas of the Balearic Islands was also handed over to a public company, the newly created Espais de Natura Balear.¹⁵⁷ In 2008 the regional governmental bodies presented a failed candidacy for Serra de Tramuntana to be included in the list of UNESCO World Heritage Sites in 2009 (Efe, 2008), a title it would finally achieve in 2011.

In 2013, a highly polemical¹⁵⁸ article was published in a national newspaper under the title ‘The Balearic Islands proceed with their plan to privatise natural parks’ (Manresa, 2013). As the article explained, the Balearic Minister of Agriculture, Environment and Territory at the time, Biel Companys, was aiming to decrease the public costs of managing protected areas and to encourage their touristic exploitation. Indeed, in 2009, the budget allocated to the management of the protected areas of the Balearic Islands was almost half that of the previous year, and almost thirteen times less than that from two years before (GOB, 2012). To achieve this, the Balearic government set about merging the various public companies and administration teams involved in managing protected areas, which led to the dismissal of numerous specialists, rangers, and educators – leaving only six professionals to manage the entire Serra de Tramuntana

¹⁵⁶ According to the Decree 69/1997 of 21 May.

¹⁵⁷ According to the Decree 71/2006 of 28 July.

¹⁵⁸ This statement of Biel Companys to the newspaper provoked an avalanche of reactions in social media, and public statements from many social and academic backgrounds, as for example from the Department of Biology of the University of the Balearic Islands, the Association of Graduates in Environmental Sciences of the Balearic Islands, the College of Geographers of the Balearic Islands, College of Forest Engineers of the Balearic Islands, GOB, and ‘Stop Cuts to Natural Parks’ (Prou Retallades als Parcs Naturals). To see their various manifestos, see the blog of the last-named group (prouretalladesalsparcs.wordpress.com, last consulted on 21.02.2018).

Natural Site.¹⁵⁹ The Balearic government's policy of cuts to environmental management was denounced by GOB on several occasions.¹⁶⁰ In fact, in 2011 the GOB contacted the Secretariat of the UNESCO World Heritage Committee warning that the cuts to environmental and territorial infrastructure by the Balearic government would have a huge negative impact on the landscape of Serra de Tramuntana, which was awarded World Heritage Site status that same year (GOB, 2011).

This process of privatisation and severe public cuts in the management of the protected areas of the Balearic Islands, specially affecting Serra de Tramuntana due to its greater area, is directly linked to wider processes of the latest stage in neoliberal conservation following the economic crisis of 2008. As Cortés-Vázquez et al. (2014, p. 1) argue, the privatisation of managing protected areas and the new adjustments between what is private, public, and communal are legitimated and justified by the European economic and political crisis of the last decade, closely linked in turn to a global socio-environmental crisis. At a global level, these crises are reflected, for instance, in the present unprecedented scale of biodiversity and forest loss, climate change and ocean acidification (Büscher and Arsel, 2012, p. 129). In the case of the Spanish state, the economic crisis of 2008 manifested in a large number of sweeping reforms whereby the State has attempted to privatise a variety of public sectors, such as education, health services, pensions, labour relationships, and the environment (and the prison system, I would add) (ibid., p. 5).

Apart from the financial cuts, the finance minister, Biel Companys, announced in the aforementioned polemical article, the promotion of ecotourism became a complementary strategy “of efficiency” in the management of protected areas in the Balearic Islands (Manresa, 2013). Later that same year, Biel Companys presented a new website for the protected areas of the Balearic Islands under the headline “Discover the natural wonders of the Balearic Islands” (Conselleria d’Agricultura Medi Ambient i

¹⁵⁹ The public company Espais de Natura Balear was absorbed by IBANAT in 2013 (According to the Decree 23/2013 of 24 May). Although the cuts were not published in the Official Bulletin of the Balearic Islands (BOIB), after the large forest fire in Andratx-Estellencs of July 2013, the president of the Works Council of IBANAT declared in several news items in the media that seven people had been dismissed from IBANAT, and another 32 after Espais de Natura Balear had been wound up, while many retired employees were not replaced with new ones (Ara Balears, 2013).

¹⁶⁰ Between 2012 and 2013, IBANAT's budget was reduced by 13,25% (from around 12,000,000 to 10,000,000 euros), eight retired workers were not replaced, and seven others were dismissed – in addition to the 32 dismissals (i.e. forced redundancies) of the defunct Espais de Natura Balear (Ara Balears, 2013).

Territori, 2013). Directly after this announcement, GOB warned that using the autonomous region's protected areas as marketable commodities to attract new visitors, while the management capacity was falling due to continual cuts in the budget, could put at risk the environmental quality of those areas (GOB, 2013). As a response to the government website, it seems, GOB published in 2014 the brochure *Ecotourism in Mallorca* (2014), explaining the 'good practices' of ecotourism in the protected areas of the Balearic Islands. Nevertheless, GOB (2014, p. 34) highlighted that the infrastructures, the material and human resources channelled to Serra de Tramuntana were insufficient and disproportionate to its size – the largest protected area in the Balearic Islands with around 63,000 hectares – the high level of public use it sustains, and the importance of its flora, fauna, scenic and ethnological features.

So, after the crisis that began in 2008, the Government of the Balearic Islands initiated a process of privatisation of the management of the protected areas – among them, the Natural Site of Serra de Tramuntana – together with a process of promotion of the protected areas as spaces for the development of tourism activities. It is in this context that the UNESCO candidacy to declare Serra de Tramuntana a World Heritage Site, a title achieved in 2011 in the category of cultural landscape. The increase in tourism and recreational use, combined with the lack of agroforestry management in the mountain area, would give rise to a series of social tensions which will be explored in the following chapter.

Conclusion

A review of the socio-environmental history of Serra de Tramuntana affords a better understanding of how the elements that nowadays make up the social and environmental landscape of these mountains have been formed and shaped throughout the ages.

Fire has played a key transformative role throughout Mallorca's history. Its influence, whether of anthropic origin or caused by lightning, is evident in the significant changes in vegetation taking place around 4000 BC, associated with the spread of agriculture and in the creation of pasturelands, especially at times of more intensive livestock farming activities, as for example during the Roman era, or in the Islamic period during the sixteenth century, when the wool trade was of great importance in the Mediterranean trade routes. Fire also appeared as an essential element for the production

of commodities which defined significant cultural changes over the ages, such as the production of ceramics, glass, iron coal and lime amongst others. Thus, anthropogenic fire appears as a constant throughout the socio-environmental history of Mallorca, closely linked to agricultural, forest and livestock farming uses.

As we have been able to see throughout this chapter, the afforestation process that Serra de Tramuntana has been undergoing over the last seventy years (see chapter 5) should be looked at within a longer time-space context characterised by the alternating periods of afforestation and deforestation taking place in Mallorca throughout the ages. Since Neolithic groups began to settle in Mallorca – halfway through the third millennium BC – we have evidence of the decrease in the forest area, doubtlessly brought about by the need to extend the area of arable land for a growing population. The existence of the local forests permitted the development of different industries including shipbuilding, of great importance since Roman times (123BC-425), and one the main activities carried out in the port of Ciutat de Mallorca (our modern-day Palma) following the Catalanian Christian conquest in the thirteenth century. During these periods, we can presume that the expanse and density of the forests would have been considerably less than those of periods of a lower rate of agroforestry activity, whether through processes of the island's depopulation – as was the case following the fall of the Roman Empire and the arrival of the Vandals in 425 – , when, at the beginning of the fourteenth century, the Black Death , droughts and agricultural shortages caused high mortality among the local population, or when from 1950 onwards a large amount of agroforestry land was abandoned owing to the combination of various factors in multiple scales of analysis, among which stands out the development of an international tertiary economy.

Olive growing, a key element in Serra de Tramuntana's present-day landscape, despite its decline over the last seventy years, was probably introduced into the islands through Punic trade in the Mediterranean during the Talayotic period, although the peak in the crop's production was reached in the seventeenth century when olive oil was the island's main export. Naturally, the development of this crop in the mountains would not have been so feasible if during the Islamic period (tenth-thirteenth centuries) the population had not introduced its dry-stone building techniques to terrace the steep mountain sides of Serra de Tramuntana. In fact, thanks to this Arab legacy which permitted the development of farming activity in the mountain lands, the first population

centres could be established, centres which would be the origin of many Mallorcan towns and villages, as in the case of Valldemossa.

Lastly, we should highlight the continued existence of the majority of the great rural estates created after the Catalanian Christian conquest (1229), a pivotal element since the sixteenth century of both the environmental landscape – the combination of pastures, forests, terraces and irrigated orchards and vegetable plots – and the social landscape – the social stratification among the urban elite, the *pagesos*, tenants of the rural estates and the farm labourers, among others. These large estates were combined with smaller rural properties – initially purchased by merchants and *pagesos* forming part of the tenant class in periods of fragmentation of the large estates during the nineteenth century – with houses located on forest land, built during the 1950s mainly as second residences. Serra de Tramuntana's dedication to recreational and tourist use and the resignification of elements of its cultural landscape to elements for contemplation (see chapter 3), have a clear historic precedent in the arrival of the 'romantic travellers' on the island at the end of the eighteenth and beginning of the nineteenth century.

Figures



Figure 2.1: From bottom to top: a managed olive grove on a flat land; managed olive trees on *marjades*; unmanaged olive trees on *marjades*, where pines and other undergrowth have grown; a dense forest with a predominance of pines and holm-oaks.

Photo: Maria Cifre.



Figure 2.2: Archaeological site of a Talaiot in Son Fornés (central Mallorca), dating from between 900 and 123 BC.

Source: Museu Arqueològic de Son Fornés (Montuiri).



Figure 2.3: Archaeological site of the Necropolis of Son Real in Santa Margalida (north Mallorca) from the end of the Talaiòtic (around 123 BC).
Source: commons.wikimedia.org (last consulted on 5.09.2019).

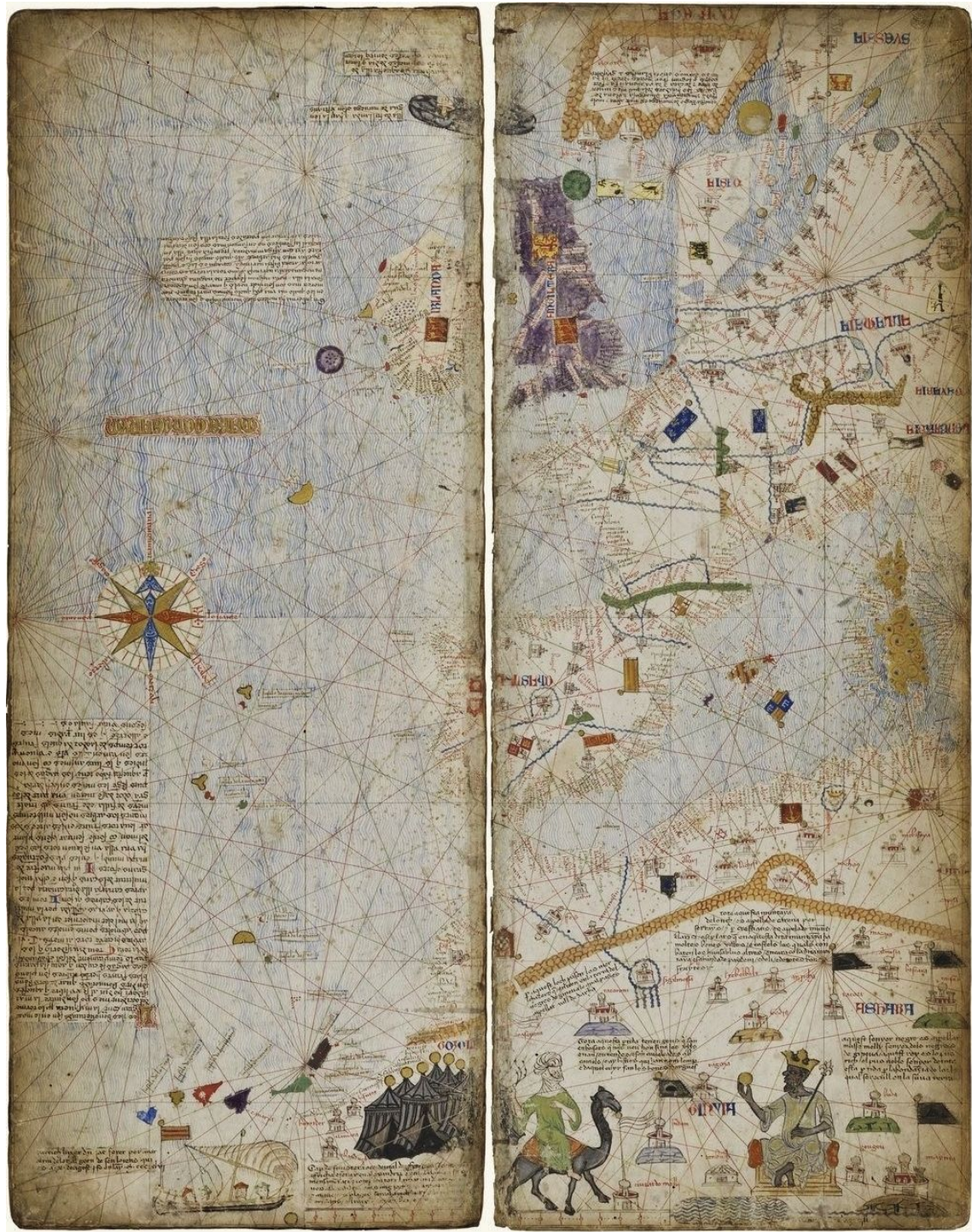


Figure 2.4: Cartographic map of the Mediterranean, North Africa and Europe dating from 1375. Source: “Atlas Català” by Cresques Abraham, kept at the Bibliothèque Nationale de France, extracted from gallika.bnf.fr (last consulted on 5.09.2019).



Figure 2.5: Detail of the cartographic map of 1375 indicating the Crown of Aragon with a red and yellow stripes flag and the island of Mallorca with the same pattern.

Source: “Atlas Català” by Cresques Abraham, kept at the Bibliothèque Nationale de France, extracted from gallika.bnf.fr (last consulted on 5.09.2019).



Figure 2.6: Detail of the altarpiece 'Sant Jordi i el drac' showing the harbour of Palma in the second half of the fifteenth century.

Source: altarpiece from 1468-1470 by Pere Niçard, kept in the Museu Diocesà de Mallorca, photographed by Tina Sabater.

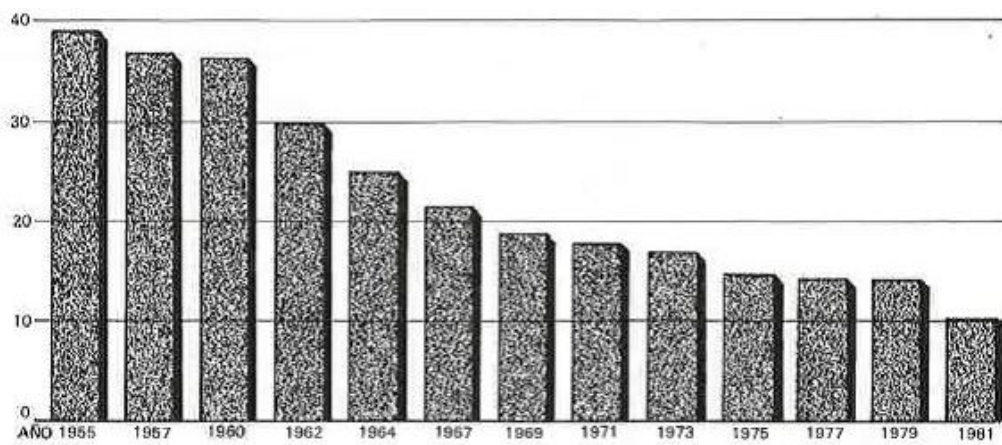


Figure 2.7: Proportion of working population employed in agriculture in the Balearic Islands from 1955 to 1981.

Source: Barceló (1985).

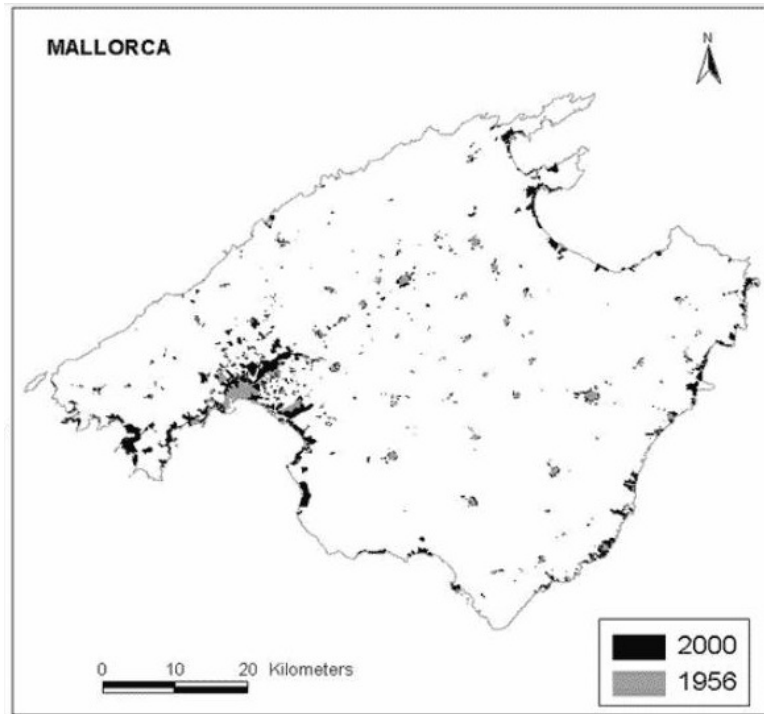


Figure 2.8: Map of Mallorca showing the growth of urbanised areas from 1956 to 2000.

Source: Murray, Rullan and Blázquez-Salom (2005, p. 13).

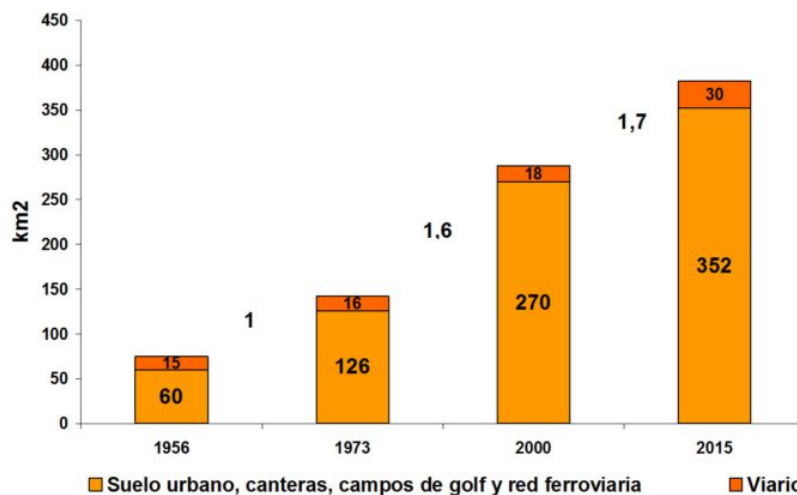


Figure 2.9: Bar chart showing the evolution of urbanised land, quarries, golf courses, railroad network (all in light orange), and road system (in dark orange) from 1956 to 2015; indicated in square kilometres.

Source: Blázquez-Salom and Murray (2010, p. 92).



Figure 2.10: To the left, poster from 1979 as a part of the campaign to protect Sa Dragonera. To the right, poster from around 1984 when the urbanisation of Sa Dragonera was prohibited, and the social campaign started to focus on the claims to declare it Natural Park. Source: archives of the National Labour Confederation (CNT) of Palma.

Chapter 3. The heritagisation of Serra de Tramuntana: the socio-environmental dynamics of a cultural landscape in flux

Preface. The *marjades*: when the abandoned is re-discovered as heritage

One of the things that most distinguishes the landscape of Serra de Tramuntana from the flat lands of Mallorca is the large number of dry-stone terraces (*marjades*) forming steps down the mountainside. Introduced in the tenth century by the Andalusians (*Andalusíes*)¹⁶¹ and intensively planted with olive trees during the seventeenth century (see chapter 2), the *marjades* have played a key role in the development agriculture in the mountains, and ultimately in the designation of the cultural landscape of Serra de Tramuntana as a UNESCO World Heritage Site in 2011.

On my way to Estellencs, once passing through Esporles – the first mountain village you reach when you are driving from Palma – I begin to see *marjades* cultivated with olive trees, almonds and some carob. But it is, after navigating some of the sharp bends on the narrow road connecting Esporles to Banyalbufar – the last village before arriving in Estellencs – where the view becomes absolutely breathtaking. As far as the eye can see, whether at the lower altitude of the mountains, at the cliffs that face the sea or at the higher elevations where the forests begin, countless kilometres of *marjades* terrace the slopes. Most of these terraces, previously planted with tomato crops, are nowadays completely abandoned, although quite a few are still planted with tomatoes or grape vines. Once I leave behind Banyalbufar and get closer to Estellencs, most terraces are no longer visible because pines and shrubs have grown and cover most of the slopes. Once arriving in Estellencs, the same landscape of dense vegetation surrounds the urban centre, extending all the way from the holm-oak forests at higher altitudes down to the sea (see Figure 3.1). However, not all the *marjades* are abandoned. On the sides of the road, before reaching the village, there are recently repaired dry-stone walls cultivated with old olive groves that have been pruned. Moreover, surrounding some of the big estates outside the villages, there are managed terraced olive groves clear of any pines or shrubs. As I could see during my daily walks during sunset from my house in the centre of the village to the sea, in the lower parts of Estellencs one also sees *marjades* with sheep and donkeys foraging the shrubs. Closer to the scattered houses there are a few vegetable gardens, but also many more abandoned terraced lands with large irrigation ponds (*safareijos*), suggesting they had once been cultivated.

Valldemossa has a higher number of apparently managed *marjades* than Estellencs. When going to Valldemossa from the capital, Palma, the views from the road change completely after passing through *s'Estret*,¹⁶² where the flat fields of almond trees give way to steep rocky slopes, *marjades*, and dense wooded areas. On the left side of the road, a sign indicates the entrance to the organic farm of Son Morro, where Rubén grows cherries. Further back there are the estates of Son Matge and Son Brondo, surrounded by some managed terraced olive groves and many unmanaged ones that have been

¹⁶¹ *Andalusíes* were the inhabitants of Al-Andalus, more commonly – and inaccurately – referred to as Moors (see chapter 2).

¹⁶² *S'Estret*, a steep mountain pass, is one most iconic geographic features of Valldemossa and the 'natural access' to the village coming from Palma (Font in Amengual and Fiol, 2003, p. 9).

extensively overrun by pines (see Figure 3.2). Following the road to the entrance of the village, there are a lot of apparently unmanaged *marjades*, combined with dense forests and scattered houses, some of which have a small deforested area surrounding them (see Figure 3.3). After passing through the village, the road continues to the northern slopes of the mountains facing the sea. This area has most of the flat land of the municipality, thus it is the place where the tractors can access the land, facilitating the development of agriculture. Moreover, this is the area where many terraced olive groves have been recovered from afforestation and the *marjades* have been repaired, such as on the estates of Son Bauçà and Son Ferrandell (see Figure 3.4).

Introduction

I hope that the opening vignette helps transport the reader to the landscape of Estellencs and Valldemossa. It also exemplifies a critically important dimension of the landscape of Serra de Tramuntana: the fact that a great number of dry-stone terraces (*marjades*) – a key landscape element in the heritagisation of Serra de Tramuntana – are currently unmanaged and in a state of decay (see Figure 3.5), even if many others are not. In the dynamic cultural landscape of Serra de Tramuntana, we can detect complex and diverse processes of change, abandonment, revitalisation, and transformation, a dynamic with which this chapter wishes to engage. The results of the research set out in this chapter derive from and are built around the *marjades* as a case study, a specific element, of the heritagised cultural landscape of Serra de Tramuntana. As introduced above, *marjades* are dry-stone terraces that are usually planted with olive trees, the reason why I shall refer to the *marjades* also as ‘terraced olive groves’. More specifically, this chapter aims to explore the socio-environmental dynamics involved in the process of heritagisation of the landscape in Serra de Tramuntana. Moreover, since the use and management of the *marjades* have a direct impact on the prevention and management of forest fires, the chapter touches on another important question of this thesis: how fire reflects the confluence of many and varied social perspectives and actions associated with the use and management of the protected area (see chapter 1). In this respect, and in regard to the other chapters, it should be pointed out that the abandonment of the Serra de Tramuntana agroforestry lands (see chapter 2) has led the afforestation of many of the terraced olive groves and has consequently made the forest mass in these mountains more extensive, continuous and dense (see chapter 5). This predominant state of abandonment and the afforestation dynamics do not only underlie some of the social tensions surrounding the environmental management of the protected area (see Chapters 4 and 5) but also make it considerably easier for fires to spread, thus giving rise to an

elevated risk of the area being affected by large forest fires such as that which took place Andratx-Estellencs in 2013 (see Chapters 6 and 7).

In line with the theoretical contributions of a large number of anthropological studies of protected natural and heritage areas in the Spanish state, I agree with the conceptualisation of heritage – which I define more carefully below – as a dynamic element, the essential meaning of which is constructed and reconstructed through the dynamics of negotiation, conflict and agreement among a large variety of people, this being the reason why I refer to this heritage creation as ‘heritagisation processes’ (Hernández and Ruiz-Ballesteros, 2005; Quintero *et al.*, 2008; Santamarina *et al.*, 2014). The geographical context discussed in this chapter presents a new, to date unexamined, context for anthropological analysis. In addition, the particular characteristics of Serra de Tramuntana which differentiate this case study from others offer the opportunity to contribute to the amount of general knowledge surrounding the heritagisation processes in protected areas. In this respect, as a notable example, the heritage rationale applied to forests, mainly uninhabited mountains and reservoirs, has led to the idealisation of nature considered as wild and untouched (Vaccaro and Beltran, 2014, p. 82), by selecting elements from the environment and ‘naturalising’ them, and even going so far as to entail restrictions, bans and control of agroforestry, fishing and tourist activities (Cortés-Vázquez *et al.*, 2011). The context of Serra de Tramuntana, however, allows us to address the manner in which the heritagisation processes promote the resignification of visibly anthropised landscapes, an issue which has to date attracted much less research. In this case, as will be explored in this chapter, the heritage discourse celebrates the anthropic management of the land carried out by the local population through their agroforestry activities in the terraced areas, for which reason heritagisation agents – such as the Serra de Tramuntana World Heritage Site Consortium, hereby referred to as Consortium – are currently offering subsidies as a means of fostering the agroforestry activities sustaining the heritagised area, despite a notable lack of success, as I will argue below. This favourable discourse to the environmental management on the part of the local population, however, co-exists alongside other policies regulating the use and management of the forest in the protected area which restrict, regulate or ban and subordinate these practices to the technical control lying in the hands of members of the Ministry of the Environment (see chapters 4 and 5). My hope is that this chapter’s greatest theoretical contribution, however, will be in exploring the complex and heterogeneous ways in which the heritagisation processes relate to the incidence and

management of forest fires, another previously unstudied topic in Mallorca. This final contribution also offers potential practical applications, since it can help in the development of heritage conservation practices and strategies in protected areas which would take into account the risk entailed by the ever increasing occurrence of large forest fires such as the one that affected Andratx and Estellens in 2013.

I now conclude my introduction by summarising some of the most relevant aspects in our existing knowledge of the heritagisation processes – placing special emphasis on the theoretical contributions offered by anthropologists in their studies of natural protected and heritagised natural areas in the Spanish state. In the first part of the chapter I shall explore the resignification of the *marjades* – a key element in the development of agriculture in the mountains and the recent heritagisation process – in the light of the increasing overcrowding of the recreational use of the protected area. I am interested in studying this resignification of the *marjades* since it allows me to address some of the social tensions generated and/or intensified by the heritagisation of the landscape of Serra de Tramuntana and its conversion into a commodity for the benefit of the tourism and recreational¹⁶³ industries. More specifically, I will explore those social dynamics linked to the costs of repairing the fallen *marjades* and of recovering afforested olive groves, to the environmental degradation and the increased risk of fire ignition caused by the ever-increasing massive arrival of visitors to the protected area. I shall finish this chapter by showing the complex and heterogeneous relationship existing between the process of heritagisation of the cultural landscape of Serra de Tramuntana and the incidence and management of forest fires, due to the fact that the recovery of abandoned and afforested *marjades* promoted by heritagising agents – either for agricultural purposes or to foster tourist land-uses – hinders the spread of forest fires and works as a measure of self-protection for residential areas, thus facilitating the work of the firefighters.

¹⁶³ Serra de Tramuntana has witnessed an increase in the number of tourists coming from outside Mallorca as well as the local population of Mallorca (not only from the capital, Palma, but also from other towns and villages on the island) going to the mountains to do sport, to spend the day and carry out other recreational activities. Although these tourist activities are recreational, I do not consider that the recreational practices of the local population are actually touristic. Therefore, at least within the study context I am of the opinion that it would be more appropriate to talk of ‘recreational and tourist land-uses’. However, having made this distinction, I shall hereafter refer to both dynamics as ‘tourist land-uses/industry’ so that the chapter can be read as easily and efficiently as possible.

‘Heritage’ – or ‘patrimony’ – is not an intrinsic reality, but a reified metacultural artefact, since there can be no heritage until somebody starts to preserve, remember, reclaim, enhance or celebrate something (Kirshenblatt-Gimblett, 2004). As Roigé and Frigolé (2014, p. 12) suggest, the term ‘patrimonialisation’ is a neologism that has been used especially in French (*patrimonialisation*) and Spanish (*patrimonialización*) literature. In English literature the term ‘patrimony’ is used much less frequently and refers to the legal rights or properties inherited from parents, and it also refers to the analogy between family and nation and between private and public cultural property; while the term ‘heritage’ refers to the cultural characteristics of a particular society, including property, traditions and languages of the past that still exist, and which have historical significance (ibid., p. 12, 28). The concept of heritage has nowadays extended to include the “entirety of what anthropologists call material-culture structures, sites, artefacts and to immaterial cultural manifestations now elaborated as intangible heritage” (Anheier *et al.*, 2011 in González, 2014a, p. 360). In this thesis I use the term ‘heritagisation’, because of these conceptual differences and since it is the term that seems to prevail in the literature on heritagisation processes of protected areas published in English (e.g. Hodges, 2001, 2009; Boissevain and Selwyn, 2004; Harrison and Hitchcock, 2005; Macdonald, 2013; Santamarina and Beltran, 2016; Cortés-Vázquez *et al.*, 2017).

As stated by Smith (2016, p. 11), although there is ‘no such thing as heritage’, there is what she calls an ‘authorised heritage discourse’ which is reliant on the power and knowledge claims of aesthetic and technical experts and which undermines alternative constructions of heritage. This discourse not only constitutes and validates, but also reflects the manner in which we talk about heritage and the way we put the idea of heritage into practice – the management and conservation of heritage by a diversity of experts, leisure and economic practices, and/or the cultural practices of meaning and identity making (ibid., p. 13). In this respect, a supranational body with extensive power to articulate their heritage discourse and which has become a key international instrument for the recognition of natural and cultural heritage on a universal scale is the Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention), established in 1972 by the United Nations Educational, Scientific and Cultural Organization (UNESCO). Thus, the UNESCO is one of the ‘heritagising agents’ who construct and reconstruct the various meanings of heritage

(Santamarina and Beltran, 2016, p. 398). Heritage is indeed a polysemous concept that can entail diverse assumptions and practices, which can generate and increase dynamics of dispute and tension among a variety of groups of people who debate what should be preserved, remembered, represented, documented or erased (González, 2014, p. 360). In academia, 'heritage' is also a contested and debated concept. For instance, Harvey (2008 in *ibid.*) defines heritage as the construction of a sense of future destiny based on retrospective resources and memory; to Hall (1999 in *ibid.*) it involves the preservation of sites, arts and culture for prosperity; while to Smith (2006 in *ibid.*), heritage is a present-centred discourse and phenomenon.

With the number of heritage areas growing in Europe and the United States since the beginning of the twenty first century – spreading in particular over protected areas where recreational economic activities are gaining weight (González and Vázquez, 2014, p. 33) – scholarly interest in heritage sites has intensified, something that Heinich (2009, p. 15) calls 'heritage inflation'. In the Spanish state, the exponential increase of protected and heritagised natural areas over the last decade has motivated the development of an important body of ethnographic research – especially by environmental anthropologists – highlighting the multiple and complex dimensions of these territorial policies of appropriation, regulation and commodification of nature (Beltran and Santamarina, 2016, p. 85). My approach to heritage is largely in line with the theoretical contributions of these anthropological works, according to which heritage is a dynamic element in a constant state of definition, and so I adopt the understanding of heritage construction as a process (Hernández and Ruiz-Ballesteros, 2005; Beltran *et al.*, 2008). The acknowledgment of this processual essence highlights the context of interaction between individuals and groups of actors who construct and reconstruct the diverse meanings of heritage, a process that may involve social dynamics of negotiation and conflict, as for instance Quintero *et al.* (2008, p. 67) documented in the heritagisation of cisterns (*aljibes*) in the Andalusian natural park of Cabo de Gata-Níjar. Indeed, material and symbolic conflicts emerge when diverse and often conflicting understandings of 'nature' and 'heritage' coexist within groups of people with asymmetric power relations (Beltran *et al.*, 2008, p. 14; Santamarina, 2009). Moreover, the various groups of people who interact and define heritage and heritage practices usually have differing perspectives, ways of talking about heritage, and mutually intelligible forms of knowledge, despite the fact that they are not always antagonists (Beltran *et al.*, 2008, p. 17-19). These dynamics of social tension might be generated by the unbalanced participation of practices and discourses

between a variety of stakeholders within the dynamic, open to dialogue and transformation processes of heritagisation (Santamarina *et al.*, 2008, p. 208), as I evidence in this chapter through the analysis of the central role played by the Consortium in determining which landscape elements should be considered heritage and who are the actors who are to benefit from the subsidies favouring the preservation of the heritagised elements. Thus, the understanding of heritage as ‘an emergent material and immaterial construction process’ opens new ontoepistemological bridges between the varied expertise and practices of the many different agents involved in the arena of heritage (González, 2014, p. 359), as is the case in Serra de Tramuntana with local people; new foreign residents and urban dwellers; tourists; tourism and nature sports companies; souvenir shops and other local business; the technicians, politicians, academics and other people working in the Consortium and in the departments of the Ministry of the Environment involved in the management of the protected area; among others. Thus, I contend that heritage is a contested category, a political construct in which there are disciplinary procedures that bestow legitimacy to the selection, ranking, definition, and categorisation of what may or may not deserve to be considered heritage and the criteria behind it (Santamarina and Beltran, 2016, pp. 397–398).

Moreover, I consider that the heritagisation of the protected area of Serra de Tramuntana – as in other mountain areas such as the Catalan Pyrenees (Vaccaro and Beltrán, 2007; 2008a, 2008b, 2009) and the Valencian Serra (Santamarina and Bodí, 2013) –has intensified the integration of this economically marginal area into the global market as a commodity for the consumption of tourists and urban populations, in the still increasing context of the tertialisation of local economies (Beltran *et al.*, 2008; Vaccaro and Beltran, 2010). Indeed, in line with González and Vázquez (2014, p. 41), I would also endorse the creation of heritage sites as a highly suitable instrument for the reinvention and articulation of territories towards post-productivist economies orientated towards tourism, entertainment and leisure land-uses. When studying the process of resignification of the dry-stone terraces (*marjades*) in Serra de Tramuntana, it becomes essential to understand the cultural and political production by which natural-cultural elements representing a certain identity are selected and resignified and are given new values according to new social uses; a political ‘process of heritage activation’ (Prats, 2005, p. 18; 2006, p. 72) which is activated by production agents (experts, researchers, cultural technicians), by some representations of political power (governments) or by the civil society (Roigé and Frigolé, 2014, p. 12). Indeed, the heritagisation of natural

protected areas promotes their consideration as a shared legacy and reinforces the role of the State and other heritagising agents as legitimate managers who aim not only to preserve their biodiversity, but also to promote a landscape corresponding to a certain cultural image of nature and a landscape that accommodates tourist and leisure land-uses (see Santamarina, 2008, p. 97; Beltran and Vaccaro, 2010, p. 101). Nevertheless, as González (2015) points out, in the last phase of neoliberalism, heritage production is less bound to the State and more ‘dispersed’ in society.

Thus, I also see heritagisation processes in line with Frigolé (2014a, pp. 31–32) when he argues that these processes involve a material and symbolic production, in which nature and cultural elements may vary in their importance and status: the new expositive role that makes the heritage visible and visitable is superimposed on its initial, primary and immediate role. In many study contexts, the heritagising initiatives of landscape elements foster a shift from their value of direct use by the local population to intrinsic and contemplative values for non-local people (Valdéz (ed.), 2004; Vaccaro and Beltran, 2017, p. 256). According to Beltran and Vaccaro (2010, p. 101), the heritagisation of natural protected areas implies that the physical environment is commodified as it is turned into an object of contemplative and entertainment consumption and acquires market value. Thus, the consumption of heritage in protected areas by tourism and leisure industries increases the commodification of the territory and its natural resources, turning landscapes into inert objects of contemplation, as I suggest in this chapter regarding the heritagisation of the terraced olive groves, and as previously argued by, for instance, Ruiz-Ballesteros et al. (2009, p. 154) in their study of the heritagisation of mining landscapes in Riotinto (Huelva). My research findings on the resignification of *marjades* are also largely in line with Frigolé and Del Mármol (2009, p. 13) when arguing that the incorporation of actors from the global to the local reality in the Catalan Pyrenees – such as tourists and new foreign residents – has led to local people increasingly valuing the scenery in the surrounding countryside and the standards of beauty according to the outsiders’ interpretations of the ‘traditional’ and the ‘authentic’. Indeed, as Cortés-Vázquez (2012) argues in his work in Cabo de Gata-Níjar (Andalucía), the tourist’s expectations of enjoyment, relaxation and landscape contemplation entail new significations of the territory and of natural resources that become integrated into local people’s discourses and valuations of the environment.

Moreover, from my point of view, the heritagisation of Serra de Tramuntana transmits a ‘frozen’ image of its landscape to its visitors, a process that can be

conceptualised as the ‘musealisation’ of nature (Vaccaro and Beltran, 2017, pp. 266–267). Indeed, the UNESCO report (2011, p. 36) states that ‘whilst many traditional activities that have conserved the landscape have gradually been abandoned over time, the agricultural environment, population and associated customs and treatment of the land are still maintained in many of the valleys here, so it may be considered a ‘living landscape’. Despite the lack of available quantitative data on the present state of abandonment of the terraced olive groves in Serra de Tramuntana,¹⁶⁴ the descriptive narratives and the qualitative data gathered in this chapter might serve to refute the above-mentioned perspective of a ‘living landscape’. From this, one can see that certain actors with decision power on the heritagisation process construct and disseminate certain identities and conceptions of the past and of locality, which lie at the core of the social and political dimensions of the heritagisation processes (Frigolé and Roigé, 2006; Frigolé, 2014b). As Kirshenblat-Gimblett (2014, p. 58-59) argues, “Heritage interventions attempt to slow the rate of change.”

In this chapter I will also show that heritage management policies and practices and the promotion of heritage tourism generate numerous diverse material impacts, as well as social dynamics of tension among different people who experience these impacts in contrasting ways. This heterogeneity of impacts and social perspectives is also reflected in other ethnographic research. For instance, Pérez and Parra (2004) stress that the arrival of tourists and investors attracted by the heritagisation processes, strengthens local economies through the generation of work opportunities – especially in the service sector. In addition, Beltrán (2008, p. 144) identifies how the heritagisation of the Pallars Sobirà (Pirineu Català) has favoured the diversification and deseasonalisation of the tourist offer and has fostered land speculation, as well as, Beltrán and Vaccaro (2010, p. 100) add, generating areas of social agreement among environmental groups and ski resort developers aimed at boosting tourist activities. In other cases, such as that of the Andalusian Sierra Morena Parks, tourist attraction entailed by heritagisation leads to the creation of socio-environmental problems owing to the increasing overcrowding of tourist land-uses (e.g. Hernández, 2008).

¹⁶⁴ Between 1956 and 1979 the amount of terraced olive groves in Serra de Tramuntana decreased by up to 25% (Grimalt *et al.*, 1992, p. 24).

The resignification of the *marjades* as objects of contemplation for the recreational industry

The UNESCO report (2011) on the Serra de Tramuntana candidacy as World Heritage Site highlights the value given to the landscape made up of dry-stone terraces (*marjades*), walls and other dry-stone constructions, mountain tracks, and the irrigation system. According to the report, the *marjades* play a key environmental role since they retain the soil and allow the development of agriculture on the mountain. Moreover, as the report adds, the anthropogenic management of these lands is of pivotal importance since it helps to counteract the ‘unfavourable’ and ‘harsh’ character of the environment of Serra de Tramuntana. This favourable perspective of local people’s customary management of the terraced lands is clearly manifested in the report (2011, p. 215):

The cultural landscape of the Serra [de Tramuntana] is made up of tracks, terraces, walls and traditional constructions in dry stone, a mark left by humans who in this case have not destroyed nature, but integrated with it harmoniously.

Nevertheless, the UNESCO report (2011, p. 198) places major emphasis on the contribution the *marjades* make to the creation of a scenic cultural landscape in Serra de Tramuntana, a perspective which, as the report goes on to say, was first featured and extended internationally through the literary and artistic work produced by the numerous academics, cultured travellers, intellectuals and artists who visited the island from the end of the eighteenth century – referred to in the previous chapter as the ‘romantic travellers’. According to the report (2011, p. 215), these early visitors are the “first people sensitive to its values and concerned with its conservation” and “the first who played a role in forging a tourist image of the cultural landscape of Serra de Tramuntana built up of the combination of its cultural, natural, scenic and emotional values.” In this sense, the report (2011, p. 257) also gives emphasis to the existence of more than 3,500 hectares categorised as Rural Areas of Landscape Interest (ARIP, Àrees Rurals d’Interès Paisatgístic), which account for over 11% of Serra de Tramuntana. Thus, the report attributes a pivotal aesthetic value to the *marjades* since they greatly contribute to the creation of a beautiful and scenic landscape in the mountain area.

These scenic values of the cultural landscape are exploited by the heritagising agents to promote the recreational use of Serra de Tramuntana, as is evidenced in various advertising campaigns in which the *marjades* represent the main tourist attraction.

For instance, in 2011, an advertising campaign was launched depicting a landscape of sea and *marjades*, some of them planted with vegetables and cereals, and announcing the nomination of Serra de Tramuntana as a World Heritage Site (see Figure 3.6). In addition, the Consortium has published many different books and tourist booklets (e.g. Consorci Serra de Tramuntana Patrimoni Mundial, 2013), and Serra de Tramuntana is also advertised as a tourist attraction on the Council of Mallorca's webpage¹⁶⁵ and at the Balearic Islands Strategic Tourist Agency.¹⁶⁶ In line with Kirshenblatt-Gimblett (2001, p. 46), heritage and tourism are two inextricably interconnected industries: while heritage turns places into tourist destinations, tourism makes heritage economically viable. The Consortium, has indeed promoted all these leisure and sporting land-uses, as evidenced in some tourist brochures it has published (see Appendix 3).

From the contributions of other studies, we now understand that the increasing demand for heritage and natural protected areas by the recreational industry and urban populations has promoted the revaluation, resignification and commodification of territories: rural and mountainous landscapes are largely no longer understood as areas of extraction and transformation of natural resources, but as areas of contemplation, tranquillity, enjoyment, leisure and outdoor sports (Vaccaro 2006, 374). In this sense, I agree with González and Vázquez (2014, p. 43) when they argue that the creation of heritage sites re-evaluates cultural landscapes and fosters the transformation of economically marginal areas into places of leisure and tourism with marketing strategies that generate brand images endowing the symbolic value of the territory itself and its cultural assets with a distinct identity. In this sense, I consider that Serra de Tramuntana is, similarly to other heritagised areas of the Spanish state, an economically marginal area in comparison to other coastal and urban areas of Mallorca,¹⁶⁷ where the process of heritagisation of its cultural landscape has contributed to its commodification as an

¹⁶⁵ See www.infomallorca.net (last consulted on 26.06.2019).

¹⁶⁶ See www.illesbalears.travel/article/ca/mallorca/descobreix-la-serra-de-tramuntana-patrimoni-de-la-humanitat (last consulted on 26.06.2019).

¹⁶⁷ Before the irruption of mass tourism in Mallorca from the second half of the twentieth century, the main population centres and productive areas were located in the inland territories, while the coastal and mountain areas were significantly less populated and considered marginal areas dedicated to extensive agriculture (Benítez and Ginard, 1994, p. 115). The development of the tourism industry, however, revalorised the tourist coastal areas and triggered an economic and demographic declivity of inland areas (Picornell, 1990, p. 43). If the development of the service sector acquired a pivotal role in the local economies and coastal and urban centres, the opposite occurred in the mountains, which entered a process of depopulation and land abandonment (Salvà and Socias, 1985).

object of contemplation and, subsequently, to its entry into the global tourist industry. Thus, the heritagisation process of the cultural landscape of Serra de Tramuntana has fostered the resignification of the *marjades* – which have been transformed from elements whose main value lay in their agricultural and soil retaining roles into elements mainly valued for their scenic and ornamental aspect – and that such resignification has been exploited in order to boost the recreational industry in the mountain area. So as to better understand whether such resignification is common to other fields and groups of people, I shall explore the value placed on the *marjades* by the population of Valldemossa and Estellencs and the reasons for their desire to repair them and maintain them in a good condition.

'Because tourists like to see marjades': the resignification of marjades by local people

Almost all the villagers from Estellencs and Valldemossa I interviewed or interacted with during my fieldwork made special mention of the *marjades* when asked about what they considered unique to Serra de Tramuntana. Repeatedly in their narratives, they made mention of the fact that the *marjades* are of great importance because of their ethnological value, since they reflect, condense and make visible the set of knowledges and customary practices of many people who worked daily in the mountains of Serra de Tramuntana. Furthermore, to many local people, the *marjades* are considered an indispensable element in the farming of non-irrigated tree and plant crops, such as olive trees and cereals, in the mountainous area. This is possible because the *marjades* terrace the slopes creating strips of flat land, decreasing runoff and maximising uptake by the soil and water table. The *marjades* also carry out the vital task of soil retention, thus preventing the landslides that are very common in Serra de Tramuntana – especially between Estellencs and Andratx. For instance, this pivotal role of the *marjades* was emphasised by Bernat – an elderly villager from Valldemossa who repaired a few *marjades* he owns some years ago – and by Gabriel, a villager who is an expert on the history of Valldemossa:

The *marjades* were built in order to contain the soil when it rains, and also to cultivate, whether it be vineyard, olive trees or fruit trees. If you don't make *marjades*, the soil goes away. And you cannot plant anything on a steep slope!

Here there's a huge job from two specific aspects, very clear to me. One is all the levelling up of the mountains, the *marjades*. It's something that we lack the perspective to see, but it's a herculean job. And there's a job that goes unnoticed . . . that is all the work of water drainage. . . . The *marjades* and water drainage is what allow us to be here.¹⁶⁸

Once I had explored the reason why the *marjades* of Serra de Tramuntana are important to many villagers from Valldemossa and Estellencs, I wondered if these villagers considered that more *marjades* should be repaired and maintained, and their possible motives for doing so. The ethnographic data I gathered in this respect suggest that, although many villagers value the *marjades* because they materialise local people's customary knowledge and practices, because they allow the development of agriculture in steep terrains and prevent landslides, the reasons why these same people consider that the *marjades* should be kept in good condition is in fact to prevent large forest fires and to attract tourists.

Thus, the first reason as to why many villagers argue that the *marjades* should be conserved and the olive groves should be actively managed to avert their afforestation is to prevent large forest fires. As I explore in more detail in subsequent chapters, in their view, agroforestry lands under active management are *clean (netes)* areas – i.e. with a small amount, density and continuity of biomass –, thus making it more difficult for a fire to spread (see chapters 4 and 5). This view is increasingly shared by individuals within certain institutions, for example members of the IBANAT brigades, forestry technicians and other fire extinction bodies, such as firefighters (see chapter 6).

In relation to the second reason, and using the words of the *marjades* builder from Valldemossa, Tòfol, *marjades* should be repaired and maintained “Because of tourism; [because] tourists like to see *marjades*.” This view was widely shared by most respondents in Valldemossa and Estellencs, and it is also supported by some regional literature of economic studies (e.g. Riera, 2002). Another example of these narratives comes from Rubén, who is originally from Andalusia but more than ten years ago bought some land in Valldemossa where he cultivates organic cherries as a hobby:

Here [in Serra de Tramuntana] it coincides that we've both forest and agricultural areas, and this is the height of beauty in a landscape. So

¹⁶⁸ According to Gabriel, the *marjades* and the irrigation system “allow us to be here” because the first prevents landslides in the valleys surrounding Valldemossa, and the latter prevents the flat parts of Valldemossa (the north face of the mountains; see Figure 3.4) from flooding.

anyone who comes here will say “How beautiful this is!” It’s important to safeguard *marjades* for the tourists. Tourism is our gold mine, the only one we have. . . . What does Valldemossa have? [It has] tourists. Is the only thing that it [Valldemossa] has: tourists. . . . [The future of agriculture in Valldemossa] is non-existent, so what we’ve to do is keep everything in a beautiful state as a tourist attraction, which is the hand that feeds us. . . . Tourists come to Valldemossa because it’s beautiful; it’s a very beautiful village, but above all, [because of] the surroundings. [It]’s the combination of the two that’s beautiful, the mixture in the landscape. Sure, and this is what is sold and what we’ve to keep selling.

This relationship between heritage and tourism was made explicit in the narratives of most respondents from Valldemossa and Estellencs, some of which found that the scenery of the landscape formed by *marjades* and green forests is what mostly attracts tourism in Serra de Tramuntana. On the other hand, the majority of these respondents argued that the tourist attraction has grown with the international publicity that UNESCO has given to the cultural landscape of Serra de Tramuntana after inscribing it in their list of World Heritage Sites, which some appreciated because it affords greater economic benefits for the inhabitants who in one way or another live from tourism.¹⁶⁹ Moreover, some owners of souvenir shops and hotels I interviewed added that because of the designation as a UNESCO World Heritage Site, Serra de Tramuntana has become positioned globally as a ‘brand’, attracting the arrival of more international tourists.¹⁷⁰

In conclusion, I consider that the heritagisation process of the cultural landscape of Serra de Tramuntana has favoured the resignification of the *marjades* as a landscape element whose greatest value is scenic and whose main function is the recreational development of Serra de Tramuntana. In this respect, a large number of the local inhabitants I interviewed value the *marjades* as the visible result of the accumulation of

¹⁶⁹ During the fieldwork I carried out in Valldemossa in 2019 for a research project in which I took part on the Capacity of the Tourist Load in the Historic Centres of Palma and Valldemossa, enabled me to recognise that there exist extremely polarised views as to the impact of tourism among the population of Valldemossa. According to the study’s conclusions, while the villagers whose families benefit directly from the local tourism since they own some business in the village (such as bars, souvenir shops, ice cream parlours and baker’s shops) consider that tourism benefits the village and should therefore continue to grow, the villagers with no connection to the local businesses think that tourism brings with too many social and environmental issues and that the limits for welcoming tourists to the area have been passed (Gómez *et al.*, 2018).

¹⁷⁰ In fact, the owner of a rural hotel I interviewed, told me that since Serra de Tramuntana has figured in the list of UNESCO World Heritage Sites, tourists no longer talk about ‘visiting Mallorca’, but of visiting ‘Serra de Tramuntana’, an expression he rarely heard before.

knowledge and customs of their ancestors living in the area of Valldemossa and Estellencs; for enabling the agricultural development of steep, non-irrigated land; and for its role of soil retention. Even so, according to these same people, the main reason why the *marjades* should be maintained in good condition is to prevent large forest fires and to attract tourists and other visitors. Thus, I consider that the Serra de Tramuntana cultural landscape heritagisation process has fostered the resignification of the *marjades* as objects of contemplation and as recreational areas for the benefit of the recreational industry. However, the rapid growth of recreational use favoured by the heritagisation process – and which has served to market the scenic image of lands full of *marjades* – has generated and/or fostered a series of social tension dynamics among diverse groups of stakeholders who in one way or another play a part in the use and management of Serra de Tramuntana, a question I shall be addressing in the following section.

Maintenance costs, tourism overcrowding and fire: some of the social tensions arising from the heritagisation of the cultural landscape of Serra de Tramuntana

Social tensions regarding the overcrowding of recreational land-uses in the heritagised area

As I explored in the previous section, the heritagisation of the landscape of Serra de Tramuntana contributes to the arrival of an ever-growing number of visitors to the area. In this section, I explore how this circumstance is itself giving rise to some dynamics of tensions among local people, especially among landowners and agriculturalists.

First of all, parts of Serra de Tramuntana are witnessing a dramatic increase of sporting uses such as abseiling, hiking, canyoning, climbing, cycling, paragliding and the organisation of popular running races¹⁷¹ over the mountain tracks or cycle races along the local roads.¹⁷² According to ethnographic data, such activities are generating tensions among a large number of people, including the public authorities and both local and

¹⁷¹ One of the most popular is the ‘Tramuntana Travessa Cursa per Muntanya Mallorca’ (TTCMM). In its second edition – on November 30th and December 1st 2018 – 680 participants ran all the way through Serra de Tramuntana from Andratx in the south, to Pollença in the north. For further information see: www.tramuntanatravessa.org (last consulted on 28.01.2019).

¹⁷² One of the most popular and oldest cycling events (the 2019 edition would be the 28th) held in Serra de Tramuntana is the ‘Challenge Ciclista Mallorca’, which attracts over 150 professional teams of cyclists from all over the world. For further information see: www.vueltamallorca.com (last consulted on 28.01.2019).

foreign companies in charge of organising sporting events¹⁷³ on the one hand and, on the other hand, the owners of the land through which the mountain trails run, the local residents who find access to their villages restricted during large sporting events, and environmental associations and departments of the Ministry of the Environment who point out the danger posed by such a massive use of the mountains to the protection of the natural and ethnological heritage.

In fact, the socio-environmental dynamics generated by the growth of recreational uses in Serra de Tramuntana have begun to feature in public debates with huge media impact (e.g. Vinyas, 2016; Gelabert, 2018) and are becoming progressively more obvious: from damage to the natural heritage – such as the visible widening of the forest tracks in Valldemossa, or the accumulation of plastic littering the sides of the road in Estellencs – to severe tensions and conflicts generated after many private landowners restricted access to the mountain trails.¹⁷⁴ Although I shall not carry out an in-depth analysis, it is worth mentioning that according to several owners of estates in Serra de Tramuntana I interviewed, the intensification of recreational and recreational uses over the last decade is generating two main problems for them. First, an increase in the cost of managing their estates, as they have to repair the *marjades* damaged by the hikers or round up sheep which escaped when hikers leave the gates open. Secondly, an invasion of their privacy, when tourists trespass on their lands to help themselves to their crops, or when large groups of people even go as far as to enter private homes without permission. In this context, Bruno Entrecanales (2016), the owner of several large estates

¹⁷³ Nature tourism – promoted over the last two decades more or less, by, among others, the tourism deseasonalisation policies in the Balearic Islands – seems to be becoming popular as a budding business opportunity, as is evidenced by the ever-growing proliferation of companies specialising in the offer of hiking or cycle routes over the tracks and roads of Serra de Tramuntana. Some examples of this trend are the companies Get Your Guide and Backroads; for more information see: www.getyourguide.es and www.backroads.com (last consulted on 29.01.2019).

¹⁷⁴ For many years now, this question has been at the centre of tense debates among a great variety of actors – hiking groups, the authorities, private administrators and landowners, among others – although this situation escalated during the drafting and has increased even more since the recent publication of the ‘Ley de Caminos Públicos y Rutas Senderistas de Mallorca y Menorca’ (Law 13/2018, of 28 December). Owing to the complexity of the issue, to the lack of comprehensive studies and its socio-environmental relevance, this issue would require further research.

in Valldemossa and a founding member of Tramuntana XXI,¹⁷⁵ published an article on the organisation's webpage raising various key questions:

The number of users, local and foreign hikers, sportspeople of all varieties, curious or casual visitors has undergone an unstoppable increase, invading public and private routes alike, and with no awareness of when there are rights and when there is tolerance. The tourism industry, with the support of the authorities, has engaged in selling something that does not belong to it, escalating the conflict between landowners and users, hindering a process of organisation and regulation, harming the environment and negatively affecting the experience of the users they most wanted to favour. . . . In summary, [the landowner in Serra de Tramuntana is worried about] the cost effectiveness of his property or minimising maintenance costs, carrying out the agricultural, livestock and forestry activities for which he/she is responsible; and respect for his/her rights of ownership, without the obligation of personally suffering the impact of public use, both economic and of privacy.

Thus the overcrowding of recreational use brought about by the heritagisation of the Serra de Tramuntana cultural landscape has generated and/or intensified environmental problems – such as erosion and an increase in the amount of litter in the busiest areas – along with dynamics of tension and conflict among groups of people whose interests in land-use clash – as for instance in the case of hikers and landowners.

'The gardeners of the hoteliers': social tensions regarding the costs of maintaining the 'marjades' in good condition

During fieldwork, many villagers said they feel angry and frustrated by the state of deterioration in which many *marjades* are nowadays found. If, as I explored in the previous section, the *marjades* should be protected largely in order to attract tourists according to many villagers from Valldemossa and Estellencs, I wondered if tourism would contribute in any way to the conservation of *marjades* and other heritagised landscape elements. Villagers like Roig, who lives in Valldemossa but owns a large rural estate in another mountain municipality, aware of the role that the landscape plays in attracting tourism, argued that if the landscape brings more tourism to Serra de

¹⁷⁵ Tramuntana XXI is a non-profit organisation composed of various actors – among who are owners of large estates, academics and members of IBANAT. Part of the organisation's aims, set out on their webpage, is to “centralise and create spaces where all private individuals and organisations interested in collaborating in a sustainable future for Serra de Tramuntana can meet and talk.” For further information see: www.iniciativesxxi.com (last consulted on 29.01.2019).

Tramuntana, and if tourism is the main source of livelihood for many neighbours, family and friends, this landscape should be taken care of:

[One day] I said to my wife: “Why don’t we get a positive return from this [the fact that tourists find Serra de Tramuntana very beautiful]?” Because if they think it’s beautiful, imagine if this was taken care of properly. [Imagine if] the holm-oak forests were *clean* [i.e. without accumulation of dead and living biomass]; if the gates were mended properly; if you see that there’s respect for the ‘Serra de Tramuntana brand’, which already exists.

After researching this issue, I came to the conclusion that there is no strategy or regulatory system of any kind to significantly redistribute the earnings from tourism among those who have to maintain the landscape of terraced olive groves that attracts tourism. Even so, many villagers from Valldemossa and Estellencs who are not involved in any kind of agriculture, silviculture or forestry practice expected that the status given to Serra de Tramuntana as a World Heritage Site by the UNESCO should be accompanied by a significantly greater budget allocated to the repair and maintenance of the *marjades*. Instead, the status of World Heritage Site does not imply any direct intervention or management by the UNESCO and/or its advisory bodies, nor the imposition of a regulatory body to oversee the safeguarding of the heritagised site (Bianchi and Boniface, 2002, p. 80). Nowadays, the only economic assistance¹⁷⁶ available to support the maintenance of *marjades* and the management of olive groves in them are the subsidies that the Serra de Tramuntana World Heritage Site Consortium has been granting since 2014. Throughout the whole heritagisation process, the Consortium – especially through the granting of the subsidies –, determines what elements of the cultural landscape are eligible to be considered and safeguarded as common heritage and also who are the private individuals, entities, and/or institutions who should benefit from the adjudication of subsidies, and thus will have more economic means to repair and maintain those heritagised elements. In this sense, the Consortium is a ‘heritagising agent’ (Montenegro, 2010; Santamarina and Beltran, 2016) with a great power of influence in decision-making processes concerning the conservation of the cultural landscape of Serra de Tramuntana.

¹⁷⁶ In 2012, the Agricultural and Fisheries Guarantee Fund of the Balearic Islands (FOGAIBA) co-financed with the European Agricultural Fund for Rural Development (FEADER) and the General State Administration an offer of subsidies to fix *marjades* and other dry-stone walls (According to BOIB of 17 May 2012).

Subsidies have been granted on four occasions and there have been variations in the social and institutional actors who could benefit, the total budget available,¹⁷⁷ and the type of management practices receiving subsidies. In 2014, the first year of subsidies and the first offer of funding after the large forest fire of Andratx-Estellencs in 2013, most of the allocated budget went to the recovery of olive groves from afforested areas – which entailed pine felling, elimination of scrubland ‘combustible vegetation’ and pruning – and the repair of ethnologic elements – mainly from the Islamic irrigation system.¹⁷⁸ In 2015, the recovery of olive groves from afforested areas and the repair of elements from the irrigation system had similar weight, although there was a new category of subsidies only available to local councils for forest management practices.¹⁷⁹ The subsidies of 2016, destined exclusively for local councils, went mostly to the recovery of architectural and ethnologic elements such as roofs, cobbled streets and elements of the irrigation system.¹⁸⁰ In 2017, apart from the repair of architectonic and ethnologic elements, and the recovery of olive groves from afforested areas, the most significant change was the incorporation of a substantial percentage of the subsidies earmarked for the repair and maintenance of *marjades* with traditional techniques and local stones.¹⁸¹ Therefore, even if some elements have been included repeatedly in the four occasions when subsidies have been offered, others have been excluded or incorporated.

On the other hand, several villagers from Valldemossa and Estellencs suggested the existence of an unequal power balance in the ability to benefit from the subsidy of the Consortium. Firstly, many argued that they do not have the budget to pay in advance the cost of the subsidised projects and, secondly, they stated that almost the entire budget of the subsidies goes to the owners of large estates and foreign owners who hire lawyers with the knowledge and the means to anticipate other requests. In order to triangulate this data, I analysed the results of the subsidies on offer since 2014 on an

¹⁷⁷ In 2014, the subsidy was 1,000,000€, of which 800,000€ was for private individuals and 200,000€ for private companies. In 2015, the subsidy was 800,000€, of which 250,000€ was for private individuals, 150,000€ for private companies, and 400,000€ for local councils. In 2016, the subsidy was 500,000€, all of which was for local councils. In 2017, the subsidy was 560,000€, of which 330,000€ was for private individuals and non-profit entities, and 230,000€ for local councils.

¹⁷⁸ According to BOIB of 13 November 2014.

¹⁷⁹ According to BOIB of 31 October 2015.

¹⁸⁰ According to BOIB of 28 April 2016.

¹⁸¹ According to BOIB of 3 October 2017.

annual basis.¹⁸² Among those benefiting, I recognised some individuals and private companies directly related to large properties from Valldemossa, to large and upmarket real estate rental companies and also to some well-known international hotel companies. Moreover, although there are many private individuals about whom I was unable to discover any information as to whether they were owners of large or small estates, I identified some patterns that suggest that there are no mechanisms to avoid the concentration of the subsidies granted in certain social sectors. For instance, there are many landowners who benefited from subsidies of different categories in the same period, resulting in a few landowners receiving more than one subsidy in the same year. Secondly, there are cases in which there are apparently close family members who receive a subsidy, which again might result in duplicate subsidies for the same rural estates in the same year. I even identified one case from Valldemossa in which two private companies – owned by the same large rural estate owner – each received a subsidy in the same year. Finally, I noticed that many landowners and private companies receive subsidies year after year.¹⁸³ Taking all the above into consideration, it is plausible to state that the system used to adjudicate the subsidies of the Consortium does not ensure an equitable distribution among all stakeholders. Rather, the data suggest that much of the money available ends up in the hands of the owners of large rural estates – many of them foreign residents.

Thus, the budget allocated to repair and conserve these heritagised elements of the subsidies given by the Consortium is far from sufficient if we consider the vast number of *marjades* that are in a state of deterioration in the mountain range as a whole, while, in addition, many local people have difficult access. Bearing this in mind, I asked landowners and villagers who carry out any kind of agriculture, silviculture or forestry practices in what ways the heritagisation of the cultural landscape of Serra de Tramuntana contributed to its conservation. Broadly speaking, I got the kind of answers that can be exemplified with the words of Rubén, the landowner who cultivates organic cherry trees in Valldemossa:

There haven't been any significant consequences [to the status conferred to Serra de Tramuntana as a World Heritage Site]. They put

¹⁸² According to BOIB of 13 November 2014; BOIB of 31 October 2015; BOIB of 1 November 2016; and BOIB of 3 October 2017.

¹⁸³ With the exception of 2014, in which only local councils could benefit from the subsidy offer.

a sign there, but I don't notice anything. Everything has been the same. We're here and it would appear that we are more protected, and this is OK, but nobody has come from the Government and told me "Sir, we have come to repair that *marjada* that is worth so much, and since it's in the first line of sight [from the road], and since we're in a tourist area, we're going to help you repair it." No, I haven't seen anything [like this].

According to these villagers, although the declaration of the Serra de Tramuntana cultural landscape as a World Heritage Site has not brought with it any significant aid to the farmers and landowners for the management and maintenance of the landscape, it has indeed been of economic benefit to certain social groups, which, according to ethnographic data, is generating social tension. These tensions could be synthesised by what Àngel – an elderly agriculturalist from Valldemossa – said while we were dragging the heavy nets stuffed with the olives that he had previously picked from the trees: "We are the gardeners of the hoteliers." Indeed, I had already heard this exact phrase quite a few times during fieldwork and, although I still do not know how these exact words became a local catchphrase, I understood some of the issues on which it is based, which I consider relevant to synthesise below.

As I myself was able to witness every day during the summer season in Valldemossa, there are numerous coaches coming from the locations with the highest densities of tourist hotels on the island, as is the case of Magaluf and s'Arenal. These tourists come to the village in large groups only for a few hours. By 6pm, the masses of tourists have left, and there only remain a few in hired cars, the cycle tourists (*cicloturistes*), and a few guests at the small local rural hotels. Therefore, although the visits of tourists – especially in Valldemossa, but also in Estellencs where cycle tourism is increasingly growing – bring economic benefit to local food and drinks facilities, souvenir shops and clothing stores, and to the few small rural hotels, the highest benefit goes to the hotels outside Serra de Tramuntana where the tourists stay. Thus, as synthesised in the words of the aforementioned Gabriel, the landscape itself does not get anything in return for the work of attracting tourism that it represents:

This is something that has been discussed many times in Mallorca: . . . how to find the way to return all the [economic] benefit that this landscape generates to the landscape itself; so that we [the villagers] can keep maintaining the machine in motion. One of the most typical postcards of Mallorca is the *marjades*. Maintaining this postcard image costs money, a lot of money, and it's mainly paid for by a handful of

landowners and farmers. Somehow there has to be a way to get that part of the money generated [through the tourism industry] thanks to the *marjades* and the landscape that we have here, to return [to Serra de Tramuntana], because it's literally falling to pieces.

These landowners and agriculturalists, aware that despite forming a part in the recreational industry as landscape managers, they do not in return receive any significant economic compensation that would help with the expensive management of the local landscape, criticise that those who most benefit from their work are the big hotel companies. Rubén's account on this issue continued:

The hotelier has his hotels full thanks to us, the farmers who are keeping the landscape beautiful, the mountains – always more beautiful than the flatland – and what now is a World Heritage Site. [We] haven't noticed any difference, the help is still zero. Those of us who've estates in Serra de Tramuntana, above all those of us who are on the front line [that is, of sight from roads and villages], those that are always seen by the tourists, should be better taken care of because we're the ones who generate tourism. . . . The tourists come along the road to Valldemossa, and they look at the first or second line, as they can't see the third one because the mountain is in the way. And those of us who are on the front line, we have to dig into our pockets to find money to repair the *marjades*. Of course, the hoteliers don't participate in this, they participate by paying their taxes, but they should also participate by saying: "OK, let's maintain those farms [and] the beautiful *marjades*."

Thus, apart from the protests regarding the lack of government economic help, many farmers and owners of both small and large properties complained to me that they have to bear with all the costs of maintaining the landscape that attracts tourism, without getting any benefit in return. In this respect, local farmers and forest managers are, in the words of Quim, a private forestry technician who works in Serra de Tramuntana, "always out of the picture." Therefore, and to sum up, the heritagisation of the cultural landscape of Serra de Tramuntana circulates internationally a 'picture' of its most scenic features and attracts the arrival of tourists but, at the same time, generates social tensions as long as the farmers and landowners who maintain this landscape do not get any economic help to conserve the heritagised cultural landscape. They are thus, to use their words: "the gardeners of the hoteliers."

Fire and the heritagisation of Serra de Tramuntana: a complex and heterogeneous relationship

The Serra de Tramuntana cultural landscape heritagisation process generates and/or fosters a series of dynamics of social tension, most of which relate to the dramatic growth of recreational uses in the mountains, particularly since its inclusion in the UNESCO World Heritage Site list. In the previous section I explored tensions relating to the conflict of interests between different land-uses, to the environmental deterioration along the busiest routes, as well as around the cost of repairing and maintaining the *marjades*. There is an additional source of social tensions related to the ever-increasing recreational use of the mountains that has so far gone unnoticed by the media, but which was evident when analysing the ethnographic data: the fact that many people at a local and institutional level associate this increase with the ever-rising risk of forest fires. The logic behind it is basically that the higher the number of people travelling over the mountain tracks and roads, the greater the probability of the outbreak of fire through anthropic causes. As Rubén, the owner of the land in Valldemossa where he grows organic cherries put it:

Because it's a Natural Site and on top of that it's now a World Heritage Site, there's more tourism, more human pressure on the mountain. In the end all this means that there's more risk of forest fires, because there are more people wandering around the mountainside, who through carelessness or whatever can start a fire.

In line with this perspective, the Fires Plan (2015, pp. 84–85, 204) indicates that the hiking routes in forested areas, recreational and hiking shelters – most of which to be found in Mallorca are situated in Serra de Tramuntana – represent a source of risk due to the fact that they are located in forestland and through the type of activities carried out there – such as barbecues. Since a significant percentage of fires originate in areas with a higher concentration of recreational use, these can be qualified as ‘elements of anthropic risk’ (ibid., pp. 127–128). In fact, according to Ganteaume et al. (2013, p. 652), the main factors in the outbreak of forest fires in Mediterranean countries have been associated with the increase in people’s movements and the number of visitors to the forests caused by the development and expansion of their recreational use. The problems generated by the increased risk of a fire outbreak which many local and institutional actors I interviewed ascribed to the promotion of the recreational use of Serra de Tramuntana, is

further exacerbated by the increased ease with which fires can spread through, among other factors, the process of afforestation of abandoned lands (see chapters 4 and 5) and the dynamics of settlement in forest areas (see chapter 6).

Thus, based on ethnographic research and supported by the contributions offered by all literature specifically related to fire, I would suggest that the growth in recreational use generated by the nomination of Serra de Tramuntana as a World Heritage Site brings with it a greater risk of fire. However, as I shall explore below, I also argue that this represents a complex and heterogeneous issue, since the heritagisation of the Serra de Tramuntana cultural landscape may also potentially serve to impede the spread of forest fires, thus reducing the probabilities of experiencing extensive forest fires such as that of Andratx-Estellencs in 2013. In order for the reader to more fully understand this last proposition, it is necessary to point out that the afforestation of abandoned terraced olive groves favours the rapid and intense spread of any fire, thus ultimately increasing the risk of large forest fires (see chapters 5, 6 and 7) while, at the same time, intensifying the tensions between a variety of actors regarding the environmental management of the protected area (see chapters 4 and 5). On the other hand, the management of terraced land – that is the repair and maintenance of the *marjades* and the deforestation of the abandoned olive groves – generates areas of lower biomass density and continuity, affecting the incidence of forest fires in Serra de Tramuntana, in at least three different ways. Firstly, since the roads and mountain tracks normally used by tourists and islanders represent high fire risk areas, the managed olive groves, which therefore have low to no fuel loads, situated in the surrounding areas substantially reduce the possibilities of any ignition source becoming an actual fire. Secondly, the olive-grove terraces surrounding dwellings serve as a safety perimeter protecting such constructions in case of fire, which would in turn help the fire-fighting forces to focus their efforts on the main points of fire propagation instead of having to protect private property (see chapter 6). Thirdly, the deforestation of a terraced olive grove generates breaks in the forest mass, which helps to prevent a fire from spreading – particularly in the case of steep forest areas where the gradient of the mountainsides fosters the speed and intensity with which a fire can burn – and makes the work of the land-based fire-fighting teams safer (see chapter 7).

Recapping, having managed terraced land is a valuable strategy to hinder the propagation of fire, thus preventing the incidence of large forest fires. However, as I

have explored in previous sections in this chapter, the recovery of abandoned terraced olive groves is extremely expensive, the subsidies offered by the Consortium are totally insufficient for the amount of terraced land in the mountain area, and the subsidies are not distributed in an equitable fashion among the diverse groups of people. Despite the mass of difficulties and impediments to maintain and manage these lands at the present time, it is worth noting that, as shown in the descriptive narrative that introduces this chapter, although most *marjades* in Serra de Tramuntana are nowadays abandoned and afforested, Valldemossa and Estellencs have areas where the dry-stone walls of the terraces are maintained and the olive trees managed. Thus, given the above mentioned importance of the management of the olive groves in the prevention of forest fires, I consider that it is also of importance to identify the role that *marjades* play in the landscape of Serra de Tramuntana today: where the managed terraced olive groves tend to be, those responsible for this management and some of their motivations behind it.¹⁸⁴ After analysing all the collected data, I discerned four main types of managed olive groves in maintained *marjades*, those from: 1) large properties inherited by local people; 2) medium and large properties bought by foreign residents; 3) rural hotels; and 4) small and medium properties owned by local people.

In the first group, there are a few local owners who inherited large rural estates (*possessions*) – like Son Fortuny in Estellencs and Pastoritx in Valldemossa – and who today still maintain some of their old land-use. Son Fortuny is the only rural estate in Estellencs whose owners and their three sons still live from agriculture, silviculture, livestock and forestry. Pastoritx, in turn, has an agreement with an olive oil company from another municipality of Serra de Tramuntana for the exploitation of its olive terraces.

In the second group, there are foreign owners who, attracted by the beauty of the landscape of Serra de Tramuntana, in recent years have purchased large rural estates as secondary residences, like Es Collet in Estellencs and Son Moragues in Valldemossa. Despite the particularities of each case, most of these owners only live for a part of the year on the rural estates. These foreign owners invest a lot of money in repairing *marjades*, recovering olive groves from afforested terraces, and planting new olive groves. According to some of the young villagers working on these estates that I interviewed

¹⁸⁴ Whenever I could directly contact and interview the landowners I did so, and when the owners were unavailable, I interviewed the estate managers and/or the people at work repairing the *marjades* and on the agricultural lands of those properties.

both in Estellencs and Valldemossa, foreign owners have the purchasing power to enable them to hire professional *marjades* makers and agriculturalists that most local people lack. For instance, Tòfol, the only current *marjades* maker (*marger*) from Valldemossa, explained to me that, although a few of these owners do actually make olive-oil for their own consumption, in most cases foreign owners or managers of large properties hire him because they want “beautiful areas of *marjades* for the enjoyment of the owners and their guests when they come to visit Valldemossa during summer.” Jordi, a young agriculturalist who works managing the olive groves and gardens of a foreign owner in Estellencs, explained to me that at that time they were restoring an afforested olive-grove that the owner had renamed ‘the Olive Grove Garden’ (*el Jardí de l’Olivar*). To me, this is an example of a dynamic that seems to be increasingly common in Valldemossa and Estellencs: the change in land-use of terraced olive groves, from lands used by local people to produce primary goods such as olive-oil, to nice tidy gardens used by new foreign residents for recreational purposes. Moreover, as a pattern in each of these large estates, a first priority for the landowners is to restore the terraced olive groves that are closest and, above all, more visible from the houses. This is also explained by Xim, coordinator of the environmental agents who grant and refuse permits to recover olive groves from afforested areas:

The properties have been changing hands in recent years towards a type of European owner, or from the [Iberian] peninsula, [and] large company owners. Of course, their objectives [when recovering terraced olive groves] are landscaping. They begin with the landscape around the houses, and as they have money or motivation – and if they don’t get bored with the area – they make more improvements towards [the forest], but the forest is the last. First they [manage] the *marjades*, the olive groves and such, [but] the forest, they rarely manage it.

In the third group, there are the owners and managers of rural hotels and agrotourisms – like S’Olivar in Estellencs and Hostal Mirabò in Valldemossa – who invest part of the earnings of the business in repairing the *marjades* and managing the olive groves that are most visible and accessible from the houses where the tourists stay. Some of them collect some olives and make olive oil for their own consumption. Nevertheless, most owners of these rural hotels I interviewed argued that they repair the *marjades* most visible from the hotels because, as they all agreed, one of the key motivations for tourists to stay in Serra de Tramuntana is the contemplation of a ‘nice’

and ‘pretty’ landscape of terraced olive groves. This was explained by Bartomeu, the owner of a small rural hotel in Valldemossa:

Here we’ve the problem of the olive grove that’s being swallowed up by pines. Every year we try to get rid of some of them, this year we’ll make an effort to leave it more or less *clean*, because [the pines] kill off [the olive trees]. It’s a shame because we try to protect the olive trees, but it’s so expensive. Nowadays we do it for aesthetics; because getting economic benefit from it is impossible. It’s too expensive. Maybe if there’s money left from the hotel, we invest it in maintaining the olive groves, which we haven’t done so far, but we’re going to start doing it for romanticism, for nothing [of economic benefit]. We, the Mallorcans, like it. We have learnt to love the olive groves we have. But the foreigners, who spend three and a half days here on average, see four olive trees, and that’s enough for them. At the beginning I thought that they would’ve the same experience as I’ve, but they only have time to see the sights and take a little walk, and with these they have already had the experience.

Among the fourth group of people who manage terraced olive groves, there are numerous villagers who own a house with a small adjoining piece of land. Having a close look at the valleys of Estellencs and Valldemossa, I could observe that a large proportion of houses with land have small areas of managed olive trees surrounding the houses. Many of their owners repair a few *marjades* themselves, as I could often see for myself. Many other of this type of owners, as Joan – a young farmer from Valldemossa – explained to me, do not harvest olives but they hire him to till the land so that “it looks minimally decent” and to protect their homes in case of fire – by eliminating the continuity and density of dead and living biomass around the houses. Some of the villagers make olive oil from their own olive trees, taking the olives to mills in other villages, since Estellencs and Valldemossa no longer have any. Almost all the villagers who own or rent a house in Serra de Tramuntana with whom I spoke say they would like to repair all their crumbling *marjades* and recover the olive groves from the afforested terraces, but that the economic cost is too high. This narrative is repeated over and over, as exemplified through the words of Cesar, a villager from Estellencs who owns a house with a small piece of land on the outskirts of the village, and who worked repairing and making *marjades* before he moved to the construction industry:

If villagers own a small *marjada*, they cultivate a little bit for themselves. If they’ve larger terrains, they’ve two or three *clean marjades*, and the rest is *dirty* [meaning, *marjades* where pines and

undergrowth have grown]. . . . I've fought hard to live here. I've a house with a 35-year mortgage. I cannot bear to see that here we don't do anything; that everything is always *dirty*; that if something falls down it's left down; that it's easier to say "it's on the ground" than repairing it. This is partly because we've no money; I've no money for this. And this is a problem that most people have: each house has the first two *marjades* managed, and the rest is abandoned because they cannot afford [to maintain] it. In the past people would do it themselves. I can do it myself because I'm young, but when I get older, if I've to pay someone, I cannot do it. . . . Some foreign residents repair more *marjades* [than local villagers]. They can afford it and they like it. Tidy *marjades* are beautiful.

To sum up, although the landscape of Valldemossa and Estellencs is characterised by the abundance of terraced olive groves in total disuse, with olive groves being increasingly afforested and the dry-stone walls in a state of degradation, I have come across four main groups of actors who tend to manage *marjades* of olive groves. Broadly speaking, the terraced olive groves are normally situated in the vicinity of the houses. The main motives behind this active management are for agriculture; to favour their contemplative and recreational use for residents, tourists and other visitors; and as a self-protection strategy for dwellings in the event of forest fire.

Conclusion

Through the exploration of the specific study case of the *marjades*, in this chapter I have examined some of the socio-environmental dynamics of the heritagisation process of the cultural landscape of Serra de Tramuntana, some of which are linked to the intensification of recreational land-uses and the increased risk of fire in the mountain area.

As I have examined throughout this chapter, the diversity of ways in which heritage is conceptualised, spoken of and utilised by a numerous and diverse group of people on a local and a supra-local scale, evidences that heritage is a dynamic and polysemous element. Based on all these heterogeneous perspectives and uses, the heritagised elements – in the case under study here, the *marjades* – are being constructed and reconstructed through social dynamics of negotiation and agreement. In this sense, the *marjades* are currently undergoing a resignification process which, as I have previously suggested, is being fostered by the heritagisation process. While the *marjades* were once vital for agricultural development in the mountains and to prevent landslides since their

introduction to the island in the Islamic period, between the tenth and thirteenth century, their importance currently lies in their aesthetic value and their uses are contemplative rather than agricultural. The scenic image of the Serra de Tramuntana cultural landscape typically made up of *marjades* and olive trees represents, in fact, the cornerstone in the heritagisation process which has also been exploited by heritagising agents – such as the Serra de Tramuntana World Heritage Site Consortium, the Balearic Government and local councils – to promote recreational activities in the mountains. This resignification process is also evident in the narratives of many Valldemossa and Estellencs villagers when speaking of the motives for which the *marjades* – particularly those that can be seen from the villages, tracks and roads frequented by tourists – should be maintained in a good condition. In this respect, although a considerable percentage of the local community value the *marjades* for their material legacy of knowledge and customs passed down by their ancestors, for their agricultural and soil retention purposes, according to these very same people, the *marjades* should be well maintained so they can be contemplated by the tourists visiting Serra de Tramuntana.

The study of this heritagisation process has allowed me to address some of the tensions generated and/or fostered by the Serra de Tramuntana cultural landscape heritagisation process. In this respect, the inclusion of the Serra de Tramuntana cultural landscape in the UNESCO World Heritage List has made use of the international dissemination of the image of a landscape featuring the typical *marjades* in order to promote the recreational uses of the mountain area. The mass arrival of tourists and other visitors to Serra de Tramuntana, favoured by this heritagisation process, is generating a series of socio-environmental dynamics, such as for instance the deterioration of the mountain tracks, the accumulation of litter and the generation of social tensions primarily involving the owners of lands with the routes most commonly frequented by the tourists. These tensions are further exacerbated by the fact that the cost of repairs and maintenance of the *marjades* falls almost exclusively to the landowners, despite the fact that the lands they own are being used by an ever-increasing number of tourists and visitors, and the views of their land are a common pool resource. The only assistance existing for the conservation of the heritagised elements are the subsidies that have been awarded by the Serra de Tramuntana World Heritage Site Consortium annually since 2014. Through the study of the offer and granting of these subsidies I have evidenced that this body represents one of the heritagising agents with the greatest power of decision as to what elements are to be considered common

heritage – and therefore deserve to be conserved – as well as which individuals or bodies should benefit from the economic assistance. These subsidies, moreover, are not awarded in such a way that would assure their equitable distribution among the diverse groups of actors owning lands: the foreign owners and those with the highest purchasing power are those most favoured, while the owners of smaller properties tend to benefit to a much lesser extent. Thus the Serra de Tramuntana cultural landscape heritagisation process has generated and/or intensified a series of social tensions – such as those surrounding the environmental degradation, the conflict of interests between owners and users, and the costs of repairs and maintenance of the *marjades* – associated with the mass arrival of tourists and visitors.

Lastly, at the end of the chapter I explored the relationship between the heritagisation process and the forest fires. In line with my argumentation, I consider that this relationship is complex and heterogeneous. That is, on the one hand, because the Serra de Tramuntana cultural landscape heritagisation process promotes a substantial growth in the recreational use of the mountain area, the risk of fire ignition is increased, particularly in the most frequented areas such as roads, mountain tracks and recreational areas. In other words, the heritagisation process increases the risk of the occurrence of forest fires. However, on the other hand, I also argue that this same heritagisation process contributes to the prevention of large forest fires. This is mainly due to the fact that some of the annual subsidies awarded by the Serra de Tramuntana World Heritage Site Consortium go towards fostering the recovery of terraced olive groves, which generates areas of low density biomass. By creating breaks of biomass which acts as fuel for the fires in forest areas, these managed areas of *marjades* impede and can even check the spread of fire. On the sides of roads and recreational areas, managed *marjades* can prevent an ignition source – such as for instance, a cigarette end thrown to the side of a mountain road – from becoming the starting point of a serious fire. Moreover, the managed *marjades* around houses and other buildings create areas of protection and make the work of the firefighters easier. In this sense, the management of any terraced olive groves prevents the occurrence of large forest fires, either if terraced olive groves are managed by local people or foreign people, either in small or large properties, and either to develop agriculture or to promote recreational land-uses. Finally, I argued in this chapter that, although the contribution of the heritagisation process to the prevention and management of forest fires is currently not of particular significance – both through

the disproportionality of the budget available for the subsidies in relation to the huge number of *marjades* that require repair and maintenance work, and the difficulties experienced by certain groups of people to be able to benefit from these subsidies – it has the potential to do so. In this respect, I consider that the actors, organisms and institutions with the greatest implication in the heritagising process – such as the Consortium, the Balear Government, the local councils and other supra-local bodies – should introduce the ever-increasing risk of extensive forest fires as a basic criterion when drawing up plans for the management of the Serra de Tramuntana cultural landscape. For instance, as I suggested in a previous publication (Cifre, 2017), when allocating subsidies for the recovery of afforested terraced olive groves and the repair of dry-stone terraces, the Consortium could give priority to those terraces olive groves that are located in the ‘Strategic Areas of High Risk of Forest Fire’, which according to the Fires Plan (2015) are areas where, due to their orographic conditions and type of vegetation, among other criteria, a fire would have a high probability of spreading rapidly and with great intensity.

Figures



Figure 3.1: The village of Estellencs and its surroundings. From the village to the top of the mountains, dense areas of forest predominate. Between the village and the sea (to the right of the image) there are some managed terraced olive groves, and many former agricultural lands.

Photo: Maria Cifre.



Figure 3.2: Son Matge and patchwork surroundings. Note the managed *marjades* with young cultivated cherries (foreground), terraced olive groves combined holm-oak forest (left) and unmanaged *marjades* overgrown with pine (rear right, behind house).
Photo: Maria Cifre.



Figure 3.3: abandoned *marjades*, forest and scattered rural estates near to the entrance of the village of Valldemossa.
Photo: Maria Cifre.



Figure 3.4: From the main road to the dark green holm-oak forest (to the left), there are mostly managed terraced olive groves, and a few light green areas of unmanaged olive groves overgrown with pines. From the main road to the cliffs (to the right), there are managed agricultural and silviculture lands.

Photo: Maria Cifre.



Figure 3.5: Unmanaged *marjades* in a holm-oak forest of Valldemossa.

Photo: Maria Cifre.



Figure 3.6: Advertising campaign announcing the designation of Serra de Tramuntana as a World Heritage Site.

Source: <http://www.serradetrabantana.net/ca/> (last consulted on 26.06.2019).

Chapter 4. The conservation of Serra de Tramuntana: history, social dynamics and conflict

“Goats are evil; they always know how to screw you. They get into your garden and the best there is, [that] is what they will eat” (Jaume, farmer and rural estate owner, Estellencs, July 2015).

“Everyone complains about the goats, but I love goats. I was very sad when the forest was burned [in the 2013 fire] because these years I hardly ever see any goats by the road going to work to Andratx. The other day I saw an adult male (*boc*) and I was over the moon. Of course, I’m not a peasant, so the goats don’t bother me. To me they’re not a problem; honestly, I like goats.” (Cati, urbanite, Estellencs, April 2016).

“I agree with protecting a certain number of goats in some places. But . . . the priority has to be the ecosystem, and evaluate the issue based on biological and naturalist criteria.” (Rafel, environmental agent, January 2016).

“If young [holm-oaks] don’t grow it’s because goats eat them, meanwhile the great Capricorn beetles (*banyarriquer*) kill the old ones, so we will end up without any holm-oaks!” (Margalida, former charcoal-burner, Valldemossa, November 2015)

Introduction

I hope that the compilation of short quotes above from people belonging to very different social groups will situate the reader in one important aspect of the social context of the Serra de Tramuntana Natural Site (*Paratge Natural*): the coexistence of differing and even clashing perceptions regarding many aspects of the environmental management of the protected area. Goats, specifically, and feral goats, especially, form a particularly contentious topic.

The main aim of this chapter is to examine the dynamics of conflict, tension and agreement existing among a wide variety of social actors regarding the environmental management of the Serra de Tramuntana Natural Site, in the context of the history, institutions and practices associated with conservation and the management of natural protected areas. I specifically seek to examine these dynamics within the larger, yet also more specific, context of fire and the underlying broader processes of tension,

negotiation and agreement and social response relating to the different ways of understanding the environmental management of the protected area. In this way the chapter contributes to two of the overarching aims of the thesis: 1) to examine the diverse perspectives regarding the causes of large forest fires in Serra de Tramuntana; and 2) to explore how the presence of fire in turn reflects the convergence of multiple social processes associated with the use and management of the protected area (see chapter 1). In this respect, and with regard to the other chapters, I should highlight the fact that the abandonment of practices associated with traditional agro-silvo-pastoral management systems by the local population of Serra de Tramuntana during the second half of the twentieth century has led to the afforestation of the landscape (see chapter 2), particularly in those terraced olive groves which since their abandonment no longer break up the forest mass (see chapter 3). Therefore, at the present time, in Serra de Tramuntana there is a forest mass that is constantly growing in size, density and continuity (see chapter 5), which in turn fosters the rapid and intense propagation of forest fires (see chapters 6 and 7). Thus, the lack of active forest management and the restrictions of use imposed on the local population by conservation policies and figures – such as the Natural Site – generate and/or foster dynamics of conflict and tension among the diverse groups of social actors who, in one way or another, use and/or manage Serra de Tramuntana.

In line with the theoretical contribution offered by numerous anthropological studies on natural protected areas, it has become clear to me that their creation implies the incorporation of new ways of thinking and acting with regard to the manner in which people interact, use and understand their environment, evidencing that natural protected areas represent contexts of biological diversity as well as of social interaction and reproduction (West and Brockington, 2006). In Spain, interest in the ethnographic study of protected areas and conservation policies has been growing ever stronger within the field of anthropology and even more specifically within that of environmental anthropology (Beltran and Santamarina, 2016, p. 85). Despite the large number of articles, theses, monographs and other publications dedicated to the study of protected areas in the Spanish state, these works focus basically on certain study areas, such as Andalusia, Catalonia, the Canaries and Valencia, while considerably fewer studies have been made of other parts of Spain (*ibid.*, pp. 89, 91, 100). In light of the need to extend the ethnographic study of these questions to other parts of the country, this chapter presents a case study within a previously unstudied context. Admittedly, Serra de

Tramuntana has been the subject of numerous studies, including those focusing on regional planning regulations introduced by diverse conservation policies since the 1970s (e.g. Rullan, 2007), as well as an extensive amount of literature in the fields of biology, ecology and geography (e.g. Ballester, 1991; Avella, 1992; Gelabert *et al.*, 1992; Mayol, 1998; Rita, 1998; Rosselló, 2014). Nevertheless, as yet there have been no anthropological works published regarding the conservation policies and figures in the Serra de Tramuntana Natural Site. Therefore, not only does this chapter help to enable people to learn more about Serra de Tramuntana from the transversal perspective characteristic of environmental anthropology, but it also contributes to the deepening of the understanding of Spanish natural protected areas. More specifically, I consider that the Serra de Tramuntana natural site is, in a similar way to other protected areas, a context with a convergence of many and diverse social actors with differing ways of speaking about and interacting with the environment (West *et al.*, 2006). Nevertheless, through the study of the problems posed by the feral goats, the great Capricorn beetle and the building restrictions, I will suggest that these social dynamics can be also characterised by agreement and confluence of perspectives.

On the other hand, as the example of the great Capricorn beetle will illustrate, certain conservation policies established by supralocal bodies – as is the case of the protection afforded to this beetle by European organisms – can actually have a profoundly negative effect on conservation interests at a local level – like the conservation of the local holm-oaks – generating dynamics of conflict and social tension on a local level regarding the environmental management of the Natural Site. Lastly, in this chapter I hope to increase the understanding of the relationship between the restriction policies imposed in Serra de Tramuntana – such as the building ban in force in many areas – and the incidence of forest fires. Just as there are numerous studies of the impact of fire on biodiversity conservation (e.g. Altangerel and Kull, 2013; Driscoll *et al.*, 2015; Davies *et al.*, 2016; Alcasena *et al.*, 2019) and on the impact of fire suppression conservation policies on the incidence of forest fires (e.g. Birot, 2009; Moreira *et al.*, 2011; Keeley *et al.*, 2012) (see chapters 6 and 7), there is still a need to study in greater depth our knowledge regarding the diverse ways in which the restrictions of use imposed in protected areas affect the incidence of large forest fires. In this respect, the contribution offered by this present chapter to this field of knowledge can hopefully help to design or redesign environmental management strategies in Mediterranean protected areas – as well as all those areas which have undergone similar processes of rural

abandonment and afforestation – in the light of the ever-increasing risk of experiencing large forest fires.

The chapter is divided into two main parts. First, I seek to put the history of conservation – as a set of practices, institutions and norms – in Serra de Tramuntana (see chapter 1) into a larger theoretical context through an engagement with the anthropological literature on natural protected areas, with a particular focus on the Spanish state and the Mediterranean. In the second part of the chapter, I try to build and connect these two levels of analysis – the particular history of conservation in Serra de Tramuntana within the larger history of conservation in Mediterranean areas of the Spanish state and anthropological questions around natural protected areas, through the analysis of three specific case studies: 1) the problems caused by the population of feral goats; 2) the problems generated by the great Capricorn beetle population; and 3) the connection which many people establish between the land-use restrictions in force in the Natural Site, such as the building ban, and the incidence of forest fires. The analysis of these questions also enables the reader to be introduced to the diversity of social perspectives currently existing concerning the recent environmental history of Mallorca (see chapter 5), on the consequences and ways of managing forest fires (see chapter 6) and on the use of anthropogenic fire as a tool to reduce the density and continuity of the forest biomass (see chapter 7). Therefore, bearing in mind that some social tensions where fire is the core element of discourse underlie broader processes of social tension and agreement processes associated with the use and management of the protected area, this chapter is another way of approaching the study of the social, historical and environmental spheres of fire.

Anthropology and the study of natural protected areas

The critical study of conservation in protected areas from the academic discipline of anthropology has contributed to the understanding of how protected areas incorporate new ways of thinking, viewing and acting in the world that impact on how people use, interact and understand their surroundings (West and Brockington, 2006). From this perspective, protected areas introduce ‘changes in the environment in relation to incentives, knowledge, institutions, decision-making and behaviour’ (Lemos and Agrawal, 2006, p. 298). Anthropological interest in protected areas has evidenced how protected areas further alter already dynamic societies, economies and landscapes

through direct and indirect dynamics, such as land-use regulations or the long-term ecological, social and economic impacts of the new land-uses (Holmes and Brockington, 2013). In protected areas, emerging socio-environmental conflicts need to be considered in the context of diverse environmental governance¹⁸⁵ regimes, from the historical engagement of local people with their surroundings, to global political and economic contexts of conservation (ibid.). In line with Escobar (1998), although dominant development and conservation discourses redefine local understandings and customs, institutional discourses and knowledge-power dynamics are contested, resisted, subverted or even recreated by other social actors. In turn, asymmetric power relations between social actors involved in decision-making processes within protected areas can often lead to the emergence of social conflicts (West *et al.*, 2006).

Contemporary criticism to conservation, largely enriched with the exploration of the social impacts of protected areas, have gained interest and concern among researchers and conservationists since the 1990s, and more case studies have contributed to the development of a theoretical debate that began at the beginning of the new millennium (Brockington *et al.* 2008; Holmes and Brockington, 2013). Anthropological research on protected areas has emphasised their complex and heterogeneous essence (West *et al.*, 2006), and documented both costs and benefits to local ways of livelihood (Coad *et al.*, 2008). To the present day, some of the social impacts of protected areas that have been identified are changes in land access and use (Agrawal and Ostrom, 2001; Igoe, 2004), in local people's perception, valuation and practices in their surroundings (West and Carrier, 2004), in property rights (Frigolé, 2012), criminalisation of local people's land-uses (Freeman, 2007), marginalisation and disempowerment of rural groups (Anderson and Berglund, 2003; Roe *et al.*, 2013) land damage (Fairhead *et al.*, 2012), evictions (Brockington and Igoe, 2006), and human displacements (Agrawal and Redford, 2009).

In the Spanish state, the amount of anthropological research on natural protected areas has grown over the last ten years, especially in the field of environmental anthropology.¹⁸⁶ The main focus of interest of this body of literature has been the processes by which new land-uses have been implemented, who are the social actors

¹⁸⁵ Environmental governance, as defined by Lemos and Agrawal (2006, p. 298) is 'the set of regulatory processes, mechanisms and organizations through which political actors, including the state, communities, businesses and NGOs, influence environmental actions and outcomes'.

¹⁸⁶ For a recent review of the state of the Anthropology of Conservation in the Spanish State, see Beltrán and Santamarina (2016).

involved, their asymmetric power relations, and the social-ecological impacts of the new regulations (Beltran *et al.*, 2008, p. 13). Moreover, case studies in the Pyrenees, Valencia and Andalusia (e.g. Vaccaro and Beltran 2007; Santamarina and Bodí 2013; Cortés-Vázquez 2012) have built a comprehensive understanding of the intrinsic links of the heritalisation of nature – also called processes of heritagisation (Hernández and Ruíz, 2005) (see chapter 3) – with the creation of protected areas, and related socio-environmental conflicts.

The Natural Site Serra de Tramuntana is a rural area which, similarly to others, such as Cabo de Gata-Níjar in Andalusia (Valcuende *et al.*, 2011), has changed from being a rural area dedicated to the agroforestry and pastoral land-uses of its local population to a recreational site for urban populations and global tourists (see chapters 2 and 3). In line with Beltran *et al.* (2008), the implementation of new management policies and land-use restrictions in rural areas of the Mediterranean where, until recently, natural resources were intensively used and managed by the local population, impact social actors in different ways, thus the resulting conflicts should be read in not only environmental but also political terms. In the Pyrenean Mountains, Vaccaro and Beltran (2017) argue that these processes of territorialisation¹⁸⁷ have had severe impacts on ecology, regional economy, territorial and property laws, and local people's identity. As the authors add, social conflicts over the use of natural resources emerged from the political and economic tensions between rural and urban areas, as well as between rural population, the state and private companies who manage the protected area (*ibid.*). For instance, in the natural park of Sierra Calderona in Valencia, the implementation of land-use restrictions conflict with local people's knowledge and practices (Santamarina and Bodí, 2013). In this sense, Santamarina (2009) argue that a common pattern behind social conflicts in protected areas is the greater importance that conservation policies give to technical and scientific expertise, and the legitimation of excluding local understandings and practices; an exclusion based on both material and symbolic appropriations (Santamarina, 2008). In protected areas, the legitimation or criminalisation of some land-uses, the re-significations of 'nature' and natural resources and the appearance of new social actors alter the balance of the existing power relations (Valcuende *et al.*, 2011, p. 11). Certainly, protected areas are contexts of both biological

¹⁸⁷ Territorialisation is 'the creation and maintenance of spatialized zones within which certain practices are permitted based on the explicit or implicit allocation of rights, controls, and authority' (Peluso, 2005, p. 2).

diversity and social interactions and reproduction (West and Brockington, 2006, pp. 609–623).

So in the first two parts of this chapter I have detailed the conservation history of Serra de Tramuntana and have framed it within a broader context of analysis and contemporary criticism towards conservation, constructed from anthropology studies. So far, I have explored how the combination of conservation practices, scientifically validated and implemented institutionally and legislatively, have numerous social and historical aspects. Within the context of the meeting point of all the socio-environmental aspects that define and constitute such conservation practices there emerge numerous and diverse groups of social actors. So in the third and final part of this chapter I draw on various specific case studies in order to take a closer look at the social dynamics of conflict, dispute, negotiation, agreement and confluence emerging in Serra de Tramuntana regarding the management of the Natural Site.

The social dynamics around protected area management in Serra de Tramuntana: disputes and agreement around goats, beetles, buildings and fires

“The goat is the enemy of the forests of Tramuntana”: agreements and tensions between groups of social actors regarding the impact of feral goats on local forests

Up to the second half of the twentieth century, local livestock herders (*pastors*) used to take their herds of goats to pastures, usually to the higher slopes of the mountains of Serra de Tramuntana. When livestock husbandry practices became economically unviable, however, numerous herds of goats were abandoned in the mountains and over the years became feral goats. Since the goat population then ceased to be under the control of goat herders – who, for instance, used to sell most of their kids to butchers – the number of goats rose dramatically. Some preliminary studies estimated a population of 20,000 feral goats in Serra de Tramuntana at the beginning of the twenty-first century; a population that would consume an average of between 17,500 and 40,000 metric tons of food per year (Mayol *et al.*, 2017, pp. 7–8).¹⁸⁸ The goat population also spread rapidly throughout the whole mountainous area, since the dry-stone walls that separated private properties were not sufficiently high so as to prevent

¹⁸⁸ According to the calculation that each day each goat can consume between 2.4 and 6 kilograms of vegetable matter (Mayol *et al.*, 2017, pp. 7–8).

them from roaming at will. Because the pasturelands were also rather abandoned and uncared for – thus, there were no more controlled fires to promote the growth of reeds – the feral goats started to colonise the forests, where they could feed from the undergrowth, grazing off young plants and shrubs, saplings, and the lower tree branches. According to Mayol et al. (2017), the goats have a devastating impact on plant biodiversity, animal populations, and the landscape of Serra de Tramuntana. Among the most grievous, the authors highlight that the goats consume a great variety of plant species, many of them endemic to Mallorca; rip the bark off trees (see Figure 4.1); devour all the buds from trees and shrubs; destroy the undergrowth and the saplings; reduce the resources of other herbivores – thus, limiting the population of, for instance, wild rabbits –; impede the regeneration of burnt areas; and leave areas of passage without vegetation (ibid., p. 20). Moreover, as pointed out by GOB (2011), today's population of wild goats poses many other social problems among which are the unfeasibility and exorbitant cost of conservation programmes such as post-fire tree reforestation or the damage that a deteriorated landscape can cause to the tourism industry.

The increasing number of goats and the visibility of their environmental impact has given rise to many political, media¹⁸⁹ and academic debates, some of which have resulted in the organisation of conferences, public debates, and the publication of academic papers and books (e.g. Pafilis *et al.*, 2013; Mancilla-Leyton, 2014; Leidy *et al.*, 2015; Mayol, 2015). The ongoing debates involve a large number and variety of social actors, such as hunters associations, animal rights collectives, landowners, local councils, environmentalist organisations,¹⁹⁰ political parties, cross-disciplinary academics, and institutional environmental managers from different departments, among others. Even though I will not delve deeply into the problems posed by the feral goats in Serra de Tramuntana – since this would require and deserve an entire research project – providing a glimpse of the main topics under discussion might help to elucidate the

¹⁸⁹ The heterogeneity of perspectives regarding this issue is also evident in some newspaper headlines, such as 'The wild goats 'devour' Serra de Tramuntana' (Serra, 2017), 'Pests, goats and droughts: the "cocktail" that threatens the holm-oak forest of Mallorca' (Oñate, 2019), 'Goats: between the problem and the opportunity' (Oñate, 2018), 'In defence of the goats of es Vedrà' (Marí, 2019).

¹⁹⁰ It should be noted that, according to one of its founding partners, the environmentalist organisation GOB campaigned for the denomination of the goats as a protected species in the Balearic Islands in the 1970s. The ecological damage that goats are causing today, however, has motivated a shift in their positioning towards being in favour of the regulation of this species (Grup Balear d'Ornitologia i Defensa de la Naturalesa 2016).

dynamics of confluence and divergence among a variety of social actors in the protected area with regards to the problematics surrounding feral goats.

One common debate focuses on discussing whether there actually is or is not such a thing as a Mallorcan wild goat¹⁹¹ (*cabra fina*) which would merit an added conservation value as a autochthonous wild species and whose adult males (*boc balear*) would represent the only large mammal hunting trophy in existence in the Balearic Islands. According to ethnographic data, those people associated with the hunting of goats are those most in favour of making such a distinction and thus facilitating greater synergetic activity in Serra de Tramuntana. Moreover, environmental groups, members of the IBANAT brigade, experts from the Ministry of the Environment and the majority of the inhabitants of Valldemossa and Estellencs with a connection to the world of agroforestry whom I interviewed coincided in arguing that hunting was not a viable strategy by which to reduce the population of feral goats, since such an activity depends essentially on the existence of numerous adult specimens.

Another common social debate centres on the determination of the exact number of goats there should actually be in Serra de Tramuntana. Many of the local inhabitants – especially the older members of the community and those carrying out or who have carried out in the past some form of agroforestry, together with the members of the IBANAT brigade – were in favour of the total eradication of the feral goat population in Serra de Tramuntana, since they considered the goats to be the worst possible enemy of the survival of the local forests. In agreement with most forestry technicians, environmental groups and other members of the Ministry of the Environment interviewed, many villagers argued that the ever-growing feral goat population is one of the main problems in the conservation of local forests as they impede the growth of the young saplings. In the words of Pau, an environmental agent:

The problem isn't the goat but their overpopulation, and the lack of control of these goats. They [the goats] cause the elimination of any tree sprout, of seeds; they cause physical damage to trees because they

¹⁹¹ Some authors, like Seguí et al. (2005) and Leidy et al. (2015) argue that the so-called Mallorcan wild goat (*Capra aegagrus* [hircus] ssp.) descends from the first goats introduced into Mallorca (*Capra* sp.), first documented between 2,300 and 2,050 BC. In the perspective of the authors, this goat breed would be phenotypically different to the feral goats which have evolved from the population of domestic goats (*Capra hircus*) that were abandoned around the 1960s (Vives and Baraza, 2010). However, others like Mayol et al. (2017) argue that all the goats of Mallorca are part of the same species (*Capra hircus* L.), since the differences are only a matter of domestic varieties – thus they would not have distinctive Latin denominations.

peel the bark from the trunks, producing wounds that last throughout the whole life of the tree; and the elimination of leaves for as high as they can reach. In the past, there used to be agricultural and livestock farming. When the shepherds gathered their lambs, they also took in the goats, and the population was kept under control. When the management of the farms is abandoned, herding also disappears and [now] the goats live as they wish, with no control. If this is not remedied or if a fire doesn't burn everything first, we will be left with no forest.

Nevertheless, many of these institutional actors only supported the temporary eradication of the goats in areas where there had recently been a forest fire, since their presence seriously compromises the capacity for regeneration of vegetation after the fire. In the remaining areas, where there have been no recent fires, these institutional actors were in favour of a reduction in the goat population, based on the number of goats which a hectare of forest could support without compromising the natural regeneration of trees, bushes and other plants. A third and final position, a more minority one though still supported by members of animalistic groups and some foreign residents and town dwellers (*urbanitas*) of Valldemossa and Estellencs whom I also interviewed, claim that the goats do not have a negative effect on the forests of Serra de Tramuntana, and that therefore there is no reason to propose any such control of the feral goat population.

A third major debate addresses the method that could and should be used in order to eliminate or reduce the number of goats. The immense majority of institutional actors interviewed by me supported the use of shotguns as the most efficient and economic method.¹⁹² Some inhabitants of Valldemossa and Estellencs, some members of the IBANAT brigades and of the Associació de Caçadors de Cabres amb Llaç¹⁹³ favoured the use of the traditional method of rope and dogs (*llaç i cans*) by which the animal is not killed but captured and in this way the abandonment of cartridge cases, shells and other hunting-generated waste can be avoided. Finally, representatives of the GOB and some villagers of Valldemossa and Estellencs only support capture followed by sterilisation or castration as being the method which most reduces the suffering inflicted on the animals.

¹⁹² In 2016, the Ministry of the Environment ordered most of the goats on the Es Vedrà islet (Ibiza) to be shot and killed, since they were endangering the survival of protected endemic plant species. This action triggered social mobilisation and an official complaint lodged by several animalistic groups and provoked social debate with considerable media cover and political repercussions (e.g. Colmenero, 2016, 2018; Europa Press, 2016; Galvín, 2019).

¹⁹³ For information about the association and to see videos of this kind of goat hunting, go to web page: www.cabriticans.cat (last consulted 16.04.2019).

Ultimately, and together with all the afore-mentioned dynamics of tension and confluence of perspectives among groups of social actors, the vast majority of those interviewed agreed that the population of feral goats is contributing to the ageing of the forests of Serra de Tramuntana, as the young trees are unable to grow and replace the old trees. Some people, especially villagers, members of the IBANAT brigades, and forestry technicians, emphasised that if only the mature trees predominate, and thus forests are ageing, there are an increasing number of dead trees accumulating in the forests and, subsequently, there is a greater density and continuity of dead biomass facilitating the spread of any ignited fire.

In conclusion, in the Natural Site (*Paratge Natural*) there is a disparity of groups of social actors from significantly diverse backgrounds, knowledge and ways of doing things. These range from new foreign and urban residents, to older farmers, environmentalist groups, hunting associations, animal welfare organisations and institutional agents, and they all interact, leading to the introduction of dynamics of social tension and agreement with regard to specific aspects of the environmental management of the protected area, as is the case of the growing population of feral goats. The presence of a large number of feral goats in Serra de Tramuntana, apart from intensifying both the tensions and agreements among these numerous groups of social actors, is having an extremely negative impact on local forests: they prevent the young trees, shrubs and plants from growing, increasing the ageing of local forests and, subsequently, contributing to the build-up of dead biomass that works as highly flammable fuel for fires.

¿Why do they have to protect it?: social tensions regarding the affection of the great Capricorn beetle, a European protected species

If many people in Serra de Tramuntana consider that the regeneration of its forests is compromised by the feral goats that eat the young trees, they further argue that this problem is exacerbated by the effect of the great Capricorn beetle (*banyarriquer*, *Cerambyx cerdo*). The great Capricorn beetle is a coleopteran beetle of large dimensions¹⁹⁴

¹⁹⁴ The females measure up to 55 mm, while the males measure up to 50 mm (Núñez, 2002, p. 4).

that bores into the tree trunk¹⁹⁵ thus causing significant damage to at least 74% of holm-oaks in Mallorca (Conselleria de Medi Ambient Agricultura i Pesca, 2017).

Until the second half of the last century, local people – particularly charcoal-burners – kept diseases and plagues under control through their constant labour of pruning, felling and burning old or sick trees, and those affected by plagues. All the older locals who worked, managed or owned forestland I talked to described in great detail how they used to look for piles of sawdust and small holes in the trunks to identify which trees were affected by these beetles (see Figure 4.2). Such trees would be felled and burnt as soon as possible in order to prevent the beetles from colonising new trunks. However, the constant task of control of the beetle population implicit in these forestry practices – particularly in charcoal burning – came to an end when local people ceased to manage the forests. Thus, most villagers that I interviewed from Valldemossa and Estellencs – especially the older people, and farmers – stated that local people’s agroforestry practices is what kept forest plagues under control, an argument with which many interviewed forestry technicians, firefighters, members of IBANAT and of the Forest Health Service were also in agreement. In the words of a member of the Forest Health Department:

The holm-oak forests were used by the charcoal-burners, by whole families burning charcoal with a [system of land] rotation by which they made use of the wood to sell while controlling certain phytosanitary problems.

Nevertheless, some environmental agents, like Rafel, argued against this perspective, stating that this beetle performs a pivotal ecological function in the holm-oak forests:¹⁹⁶

¹⁹⁵ As explained by Núñez (2002), the degrading effect is mainly caused by the feeding of larvae, which weaken the holm-oak trunks. The females deposit the eggs in the bark of trunks and branches. The larvae that hatch from the eggs feed on the outside of the trunk, and when they are slightly larger, they enter the heartwood – the inner part of the trunk. For two or three years the larva feeds on the wood of the holm-oak, forming elliptical galleries until it is transformed into an adult beetle (*ibid.*). These galleries also facilitate the entrance of humidity and, therefore, of fungi that can rot the interior of the tree (Sánchez-Osorio *et al.*, 2005). The great Capricorn beetle usually affects the very old, the sick, weak or dying trees, and those with pruning wounds, although because the population has grown so substantially, it is also affecting healthy young holm-oaks (Núñez, 2002, p. 4).

The great Capricorn beetle (*banyarriquer*) has a very important ecological role in holm-oak forests. They promote the decomposition of weak trees . . . that is their job: they get rid of the odd holm-oak here and there, and they turn the weak trees into fertiliser hummus. It's fantastic. Certainly the *banyarriquers* aren't a plague, but [they are] forest managers.

This perspective was a minority view within the institutional context I approached during fieldwork. Apart from these few environmental agents, the rest of informants stressed that local forests are ageing due to the combined effects of the great Capricorn beetles and the feral goats: while the former cause the death of large numbers of old, weak and even younger trees, the latter prevent the growth of any saplings (see Margalida's quote at the beginning of this chapter). Again, since most forest areas are completely unmanaged, there is nobody to burn or remove the dead wood from the forests and this significantly contributes to the development of a dense and continuous forest mass that allows any fire to spread fast and out of control.

The current threat that the great Capricorn beetle represents for the health of the oak forests of Serra de Tramuntana also has to deal with the fact that this beetle is a 'species of Community interest' according to the International Union for Conservation of Nature (IUCN)¹⁹⁷ and to the Habitats Directive;¹⁹⁸ and is classified as a 'wild species under a special protection regime' on the List of Natural Heritage and Biodiversity.¹⁹⁹ Indeed, while in northern Europe the great Capricorn beetle is considered vulnerable and in need of urgent conservation measures, in the Mediterranean region – including Spain, France and Italy – it is increasingly considered a plague due to the significant weakening and deterioration it is causing to holm-oaks and cork-oaks (Austrich, 2016). Many villagers of Valldemossa and Estellencs are in total disagreement with the fact that European conservation frameworks are protecting a beetle that is highly damaging to the

¹⁹⁶ According to these environmental agents, the great Capricorn beetles use their olfactory sensors to identify and select the weak, ill and dead trees to colonise. Consequently, to these environmental agents, the beetles will greatly contribute to a faster decomposition of the dead wood, which will remain in the forests as fertiliser hummus. However, this argument could be contrasted with the results of a recent publication (Núñez, 2002) and with what the Forest Health Service argued during a talk I attended in the spring of 2018, where it was said that while great Capricorn beetles usually affects the very old, the sick, weak or dying trees, and those with pruning wounds, but because the population has grown so substantially, nowadays it is also affecting healthy young holm-oaks.

¹⁹⁷ According to the Annex II of the Directive 97/62/CE.

¹⁹⁸ According to the directive 92/43/CEE of May 21, 1992.

¹⁹⁹ According to the Law 42/2007 of 13 December, modified by the Law 33/2015 of 21 of September.

local forests. During fieldwork I collected many confrontational narratives about to this circumstance, as it is the case of the following one by Ignasi – the bird hunter from Valldemossa – and Quim – a private forester –:

I cannot understand why they've to protect it, because it's devouring the holm-oaks. Why the hell do we have to protect the *banyarriquer*? What do I care about these bugs if they're eating my forests? Is this what we really have to protect? Because I prefer to protect the holm-oak than the bugs eating them!

The *banyarriquer* is a problem at a Mallorcan level, because it's affecting the holm-oaks; [it] causes a loss of health of the trees, [the trees] suffer when they're affected. It's also a problem that it's protected at a European level. Here, however, it's clear that the European legislation is mistaken, it doesn't account for the effect that [the *banyarriquer*] can have in Mallorca, for the particularities of each territory.

Clearly, in my opinion, this supports the words of Novellino (2003, p. 172) when he states that conservationists' tendency to consider regional environmental problems as global and to activate internationally concerted management solutions has the result of ideologically disempowering local communities.²⁰⁰ However, the case of Serra de Tramuntana has the particularity that the regional institutions responsible for putting into practice the policies and management strategies of the protected area are, in this instance, in agreement with local people, against the protection of the great Capricorn beetle that has been implemented at a European level. Indeed, the Ministry of Environment – more specifically, the Forest Health Service – has long been requesting a temporary elimination of the Balearic Islands from the protection afforded to the great Capricorn beetle (Núñez 2002, 12). After years of studies presenting evidence that in Mallorca the great Capricorn beetle is a plague requiring urgent control, and trying to force its recognition and declaration as such, in 2015, two new autonomous legislative bills²⁰¹ gave exceptional authorisation to invalidate the prohibition of the Law of the Patrimony and the Biodiversity in several municipalities of Mallorca.²⁰² Since 2002, the General Directorate for Biodiversity has developed various strategies to reduce the beetle population: among others, the felling of the affected trees in order to eliminate the

²⁰⁰ In the case studied by Novellino (2003), it is about the native peoples on Palawan Island.

²⁰¹ The Decree 49/2015 of 22 May which approved the Management Plan Natura 200 of Serra de Tramuntana; and the Decree 11/2015 of 20 of March which approved the Forestry Plan of the Balearic Islands.

²⁰² According to BOIB of 15 September 2016.

larvae; the insertion of chemical products into any cracks or crevices; repopulation with young and strong holm-oaks where there is no natural regeneration; and recommendations to forest owners by forestry technicians. Nevertheless, none of these activities and control methods has turned out to be at all efficient, because of both the difficulties in identifying all the larvae and the high costs involved (Núñez 2002, p. 15). More recently, the Forest Health Service and private owners have used traps to capture the beetles (Conselleria de Medi Ambient Agricultura i Pesca, 2017), although these are also expensive and still inefficient, according to some villagers from Valldemossa and other areas of Mallorca²⁰³ who explained to me that they have tried these methods.

Ultimately, the problem of the *banyarriquer* in the holm-oaks in Serra de Tramuntana can serve to show that there are conflicts of interests between conservation initiatives at different levels, thus, that top-down policies may fail to recognise situated conflicts. In this instance, while on a European level the great Capricorn beetle is protected; on a regional level conservation interests prioritise the protection of the holm-oaks. Moreover, the presence of large numbers of great Capricorn beetles in Serra de Tramuntana is severely deteriorating the health of local forests, since the beetle causes the death of many holm-oaks, thus also contributing to the increasing density and continuity of dead biomass that facilitates the speed and intensity with which any fire can spread.

“A protected forest is an abandoned forest; and then ... it’s a burnt forest”: social tensions regarding the building restrictions in the protected area

The set of land-use and land-management restrictions that are implemented in many parts of Serra de Tramuntana generate tensions among the inhabitants – especially land-owners and farmers – of Valldemossa and Estellencs and the regional environmental institutions. This was expressed by many informants, as for instance by Quim, a private environmental consultant who works in Serra de Tramuntana:

The fact that it’s a protected area especially affects the private farms. The ecosystems should be valued, at the same time that you give tools to the owners so that they can maintain it, and that’s precisely the

²⁰³ This was raised by many people in the debate that followed a talk given by the head of the Forest Health Service about the present threats to the health of Mallorcan holm-oak forests, which I also attended at the beginning of 2018.

difficult part when you make it a Natural Site. Doing office work and [creating] laws is very easy. . . It's easy to make a map and say 'this is an area of maximum protection' but you affect the people, you're really not doing them any favours, so people frown on all the protectionist perspective.

The ban on building was one of the first land-use restrictions that were implemented by conservation laws in Serra de Tramuntana from the 1970s (see chapter 2). Indeed, many inhabitants of Valldemossa and Estellencs, members of the IBANAT and of environmentalist NGOs – like the GOB – and institutional organisms I worked with during fieldwork, positively value the ban on building in many parts of Serra de Tramuntana. To them, this restriction has permitted the conservation of the natural and landscape heritage, protecting it from the building boom suffered in Mallorca especially from the 1950s (see chapter 2). In the words of Xisco – an elderly villager of Estellencs – and Vicens – a member of an IBANAT brigade and villager of Valldemossa:

It's like this: if they start building houses, this will be like 'House central' (*Son Caseta*)! Because if they'd allowed house building here, it would be awful.

[Serra de Tramuntana] is more protected because there was a time in which it was in danger [through] the question of speculation, the 'building boom'. And fortunately I believe that most towns were able to deal with this issue. Here in Valldemossa we had the question of the golf [course they wanted to build in the town], which if it had gone ahead, would have been a totally different town. [It would have had] an enormous impact.

Despite building restrictions in Serra de Tramuntana, some environmental agents told me that there are a vast number of illegal constructions – as was the case in Andratx (see Figure 4.3).²⁰⁴ Unauthorised buildings in protected areas are identified, reported and, where appropriate, demolished by order of the Agency of Defence of the Territory of Mallorca (Agència de Defensa del Territori de Mallorca) (see Figure 4.4). In many other cases, these environmental agents had refused authorisation to owners asking for permission to carry out reforms because the ecological and landscape impact would have been so great. In the words of Xim, the environmental agent coordinator:

²⁰⁴ According to some environmental agents and forestry technicians, the 2013 Andratx-Estellencs forest fire revealed numerous houses which had been constructed illegally, hidden among the dense mass of the pine forests.

There's an important problem with larger properties over building restrictions, which causes direct confrontation with us. We've had problems here, because the landowners want an island within an island. As they're big, they think that their needs are greater than [the needs of] the protected natural spaces. That if they need a swimming pool, or a small heliport, or sculptures in the oak wood, or coconut palms [they can have it]. . . . Then, of course, it's true that there're some landowners who have been well advised and try to be respectful, but they want the building regulations to allow them to do more than what's actually allowed. This is a delicate subject. There are tensions, fines, and more tensions.

As Xim comments, the ban on building in many parts of Serra de Tramuntana is one of the land-use restrictions of the protected area generating most tension among the inhabitants – especially land-owners and farmers – of Valldemossa and Estellencs and the environmental agents and the rest of institutional agents involved in the granting or refusal of building permits.²⁰⁵ Indeed, many local people interviewed harshly criticise the figure of the Natural Site mainly owing to building restrictions. For landowners, the building ban and restrictions on agroforestry uses in some parts of their property – particularly in forested lands classified as ANEI (Natural Area of Special Interest)²⁰⁶ – significantly increases the probabilities of these lands ceasing to be actively managed. This was the argument put forward by, for example, the owner of a rural hotel in Valldemossa, Bartomeu:

The part of the forest that wasn't olive grove in the 1960s, is still forest, it's...s ANEI, and the part with olive groves is ARIP (Rural Areas of Landscape Interest). There's a track up here that separates them; from the track upwards is ANEI and from the track down is ARIP. Well, in the ANEI part you can't do absolutely anything. This week we'll find out if we can do anything in ARIP, because we want to improve a part of the hotel that's collapsed here at the back, but that's probably the most we'd be able to do. The part at the top is ANEI, you can't do anything there, however much land you have. All that part is forest. We wouldn't mind at all if it belonged to the Community, we would give it to them if it could be managed like that. It doesn't give us any work because it's abandoned, but we don't get anything out of it either.

²⁰⁵ For example, if the land where they want to carry out the work or the reforms forms part of the area classified as Asset of Cultural Interest (Bien de Interés Cultural, BIC), the work permit also has to be authorised by the Council of Mallorca Heritage Technical Commission (Comisión Técnica de Patrimonio del Consell de Mallorca).

²⁰⁶ Serra de Tramuntana has 29% of its territory – almost 9,000 hectares – classified as ANEI, where all agroforestry activities are banned (UNESCO, 2011, p. 257).

In addition, most farmers – some of them also landowners – and many inhabitants of Valldemossa and Estellencs stressed that the building restrictions make it even harder to carry agroforestry practices – already in itself complicated in Serra de Tramuntana due to its economic unviability and due to the inaccessibility and rugged orography – since it is forbidden to build any kind of infrastructure which might, for instance, provide somewhere to store tools and farming machinery. The view of all the farmers I interviewed was clearly synthesised by the farmer and landowner Rubén, who narrated:

Building is necessary. If you don't build on farms in the country, it gets abandoned. The owner has no reason to go there. There has to be some kind of monitoring system: "OK you can do that, but you can't build on a thousand-metre plot." Fair enough. But for example in Valldemossa, going up towards the town, on the right, you can't build anything at all. . . . I understand that a protected land has to be protected, [because] you shouldn't be building 1,500 sheds. . . . But the government [says] "listen, you can't do anything here because it's a protected landscape." And what does a protected landscape mean? That I can't do anything because the government's stopping me? That's the way it is. So I get mad and I abandon it. And it's dangerous having a property that's abandoned.

The reason why Rubén stated that it is dangerous to have an abandoned property is basically because to him, like to most local people I interviewed, a fire has more chances to occur in an abandoned property. The logic behind this is that introduced in the previous chapter: the abandonment of agroforestry lands leads to a fuel build-up, turning Serra de Tramuntana into one huge, dense and continuous mass of combustible material. This means that, should a fire start, the ability and speed with which the fire could spread would be incredibly high. Thus, for many villagers of Valldemossa and Estellencs, the regulations and restrictions for land-use implemented by the conservation policies overlapping in the Serra de Tramuntana Natural Site – such as those regarding building permits – contribute greatly to an increase in fire risk. This is evident, for instance, in the narrative of Joan – a young agriculturalist from Valldemossa – and of Xisco – an elderly villager from Estellencs –:

In the past, people who had a small piece of land built something to keep a tractor, and now with [land-use restrictions], things have changed a lot. If they catch you, [you have] problems. You've got to ask for permits, and you normally don't get them because you're in a

protected area. And what happens? That [the] person who would have taken care of this piece of land to cultivate, they say ‘If I can’t do anything, or have anything for my comfort; if I’ve to carry all [the agricultural tools and machinery], I’ll leave and look for something in the [centre of the] village. I give up.’ We’re not talking about building a house, but a 20-square-metre shed. Before, you could do it, but now that it’s protected and all that stuff, it’s difficult. Many people hire me once a year to do a bit of work with the tractor, so that it doesn’t look abandoned, because it’s sad and dangerous to have it abandoned, because of the fire.

[With the figure of Natural Site] what you get is fire. [You get] fire and fire. One day all this [land behind us] might burn. If it’s protected, it’s abandoned, and then it gets burned.

Some institutional actors – especially those involved in forest fire management, like forestry technician and members of IBANAT – were in agreement with this perspective, an issue which is explored in greater depth in chapters 6 and 7. This was exemplified in the case of Txema, a forestry engineer working for IBANAT in the forest fire department. He said:

I have a lot of contact with the rural community, so I’m familiar with the issue. . . . Today nobody goes there for firewood, nor makes any money from the mountain, and from Serra de Tramuntana, even less. I think that the protection of Serra de Tramuntana, for the average landowner – that is, the farmer, who was the one who actually *cleaned* [the forest] [i.e. to reduce the continuity and density of living and dead biomass] – it’s been practically useless, and in fact it’s meant more expense than profit. When the farmer says “Look, I’ve got a little house by the sea, so I’ll turn it into a small hotel and at least make some money” they can’t, because there’s a building ban. Then they abandon it, and that’s when you really do have more possibilities of having forest fires. Since it’s been abandoned, there’s more and more flammable material and the forest fires are getting larger and larger.

For many local people, this presents an important contradiction: if the aim of the conservation policies is to protect a territory, these same policies should not be increasing the fire risk in Serra de Tramuntana, as the words of the landowner Rubén continued narrating:

The protected areas are totally unprotected. Like Andratx, which is a super-protected area of pinewoods and bushes and a totally untended land. But [we must] prevent any driver smoking a cigarette from throwing away the cigarette end and setting fire to it all, because it

hasn't been looked after for the last twenty years. . . . The philosophy of protection is very nice, but I think we have to be more practical. I think that here in Mallorca we have to be nice but practical. Having impenetrable forest lands, no. In the rain forests of Brazil, that's OK. But it doesn't work here in Mallorca; here everything is much dryer. Because a protected forest is an abandoned one: then [someone throws away] a cigarette end, and it's a burnt forest. . . . When a place is protected, it should actually be protected, but protecting actually means that it's practically impossible to even set foot on the farm. You can't do anything; you can't build anything, not even a little tool shed. How am I going to work there [to reduce the accumulated biomass to prevent forest fires], if I don't have the necessary tools, because I'm not allowed to have them, because I can't have a shed for the tractor? And what's the Government [of the Balearic Islands] going to do? Are they going to send people there to *clean* the owner's woodland? I'm pretty sure the owner would say "yes, yes, go to my farm, prune my trees so that it's all protected and protected properly." But no. The word protection is just a word, not an action. So you go and protect it if you can afford to.

Another clear example of this line of argument is the story of the owner of a house in Cala Tuent (Escorca) whom I was able to interview the very morning after his land had been razed by a fire. He told me that he owned other pieces of land located in woodland classified as ANEI where he was not doing anything to deal with the dense mass of undergrowth, nor the dead and fallen trees building up there. According to him, as he is unable to build a little house where he and his family could go to have lunch at the weekend, to him it is much less feasible to carry out any kind of agroforestry management work "not even to protect it a bit from fire, because I know I wouldn't get anything out of it." While asking him some questions, right after the members of the IBANAT brigades left his home, we were staring at the burnt area that surrounded us and the house, at all the ash, and the blackened centenary olive trees (see Figure 4.5), and in a tone of indignation he concluded: "A protected forest is an abandoned forest; then . . . it's a burnt forest. And the proof of that is all around you."

So, many inhabitants of Valldemossa and Estellencs – especially the landowners and those involved in the agroforestry world – consider that in order to protect Serra de Tramuntana from forest fires, the area should be under active management. Although criticism on the restrictions of use in the Natural Site have come mainly from the local population, the view of the need to activate agroforestry uses to reduce the risk of large forest fires also extended to some forestry technicians members of the IBANAT brigades. So, at the same time that many of these same people criticised the promotion

and subsequent overcrowding of tourist and recreational land-uses of the Natural Site (see chapter 3), they also stressed the fact that the protection bodies should increase the budget destined for the activation of agroforestry uses in the mountain area. These were the opinions expressed by, for example, Ignasi – a hunter from Valldemossa – and Juanjo – a member of the IBANAT brigade:

[For Serra de Tramuntana to be made a Natural Site] was purely and simply a political and publicity matter. In my opinion it hasn't meant anything else. . . . Productive stuff for the forest, in Valldemossa I haven't seen a sign of anything. I haven't seen any guy from the Ministry [of the Environment] come here to look after the forests for us. . . . I want to be given concrete facts: "Look, we've been to the farm in Bunyola and we've started to *clean* and now we're coming over here." I can see than the IBANAT people are doing [work] but they only work along the edges of the road (see chapter 7). And I don't think that's a bad idea, because that helps to prevent fires and such. I think it's a good idea, but not only by the side of the roads; we've got to go to the top of the ridge to *clean*, and for the whole forest to grow because it's dying of old age and through the goats, so that everything up there doesn't burn.

I'm in favour [of Serra de Tramuntana being a Natural Site]. There's a very important protection, and it's a unique place. [But] on an institutional level there hasn't been any increase in the number of people working in [Serra de] Tramuntana. There's been the declaration and that's it. I see it just as conserved as it was before. Or even worse. The fact of it being made a protected site has had negative consequences. It's caused a lot of inaction. The landowners want to do things and very often they can't because they don't let them. Serra de Tramuntana should be called 'Unprotected Area'.

Therefore, the set of conservation policies and practices that nowadays exist in the Serra de Tramuntana Natural Site generate and/or intensify a set of social dynamics of tension, conflict, negotiation and agreement among a great variety of groups of social actors who use and/or manage the mountain area.

Conclusions

In the first part of this chapter I have framed the Serra de Tramuntana's conservation history within a broader context of analysis and contemporary criticism constructed thanks to numerous anthropological studies. Thus, I have demonstrated the manner in which conservation, based on a body of scientifically validated affirmations,

principles and assumptions, is implemented institutionally and legislatively at a transnational level (European Union), national (the Spanish state) and subnational (Balear Government, local councils) all of which are interconnected. In the second part of the chapter I have explored the social dynamics of conflict, dispute, agreement, negotiation and confluence emerging from a context of the meeting point between the environmental, cultural, political and institutional factors making up Serra de Tramuntana's conservation history. To this end, I have examined various specific case studies: the problems provoked by the feral goats and the great Capricorn beetle, as well as the connection between building restrictions with an increased fire risk.

The existence of diverse social debates surrounding the issue of the feral goats in the local forests and the possible management solutions suggests that in line with the conclusions reached by many anthropological studies of protected natural areas and conservation policies (e.g. Lemos and Agrawal, 2006; West *et al.*, 2006), in the Serra de Tramuntana Natural Site (*Paratge Natural*) there exists a confluence of social actors with very diverse backgrounds, ways of understanding and interacting with the environment. For instance, there exists an enormous contrast of perspectives between new foreign and urbanite residents in Valldemossa and Estellencs – many of them ignorant of the transformation undergone by the mountain landscape over the last decades (see chapter 5) – who are in disagreement with any form of management of the feral goat population since they consider that these have no negative effect on the local forests; while many of their neighbours – particularly the older inhabitants and those most involved in the agroforestry world – are of the opinion that the goats represent one of the major causes of the deterioration through ageing of the local forests, for which reason they consider that they should be totally exterminated. Moreover, the perspectives of these actors are dynamic, as has been shown by the positioning of the GOB, who now defends the need to reduce the goat population despite the fact that in the 1970s they supported their status as a protected species. Lastly, I have suggested that there are social debates characterised by dynamics of agreement: both farmers and environmental groups together with members of regional governmental institutions – groups of social actors who tend to disagree on many matters regarding the management of the protected area – coincide in the argument that hunting these goats does not represent an appropriate management solution to the problem, since hunting depends specifically on the need for the existence of a large population of the animal to be hunted.

In fact, this co-existence of dynamics of agreement and disagreement among the social actors who in one way or another play a role in the use and management of the protected area appears in a transversal manner in each and every one of the issues addressed in this chapter. For instance, I have posited that most local and institutional actors coincide on certain issues: in that there is an overpopulation of the great Capricorn beetle which is killing Serra de Tramuntana's holm oaks; that one of the impacts of the local population's abandonment of agroforestry practices has been that the insect plagues affecting the forests have got completely out of control; and that the protection of the local holm oaks should take precedence over that of the great Capricorn beetle. In addition, through the specific study of some of the socio-environmental problems generated by the great Capricorn beetle, I have shown just how the interactions at multiple levels of governmental environmental bodies can be conflictive, as is the case of international organisms such as the International Union for Conservation of Nature and the Balear Ministry of the Environment. Thus, when analysing the specific issue of the great Capricorn beetle in the Natural Site Serra de Tramuntana, I find it essential to consider the associated social-environmental dynamics in the context of various environmental governance regimes, from the local people's customary forest management, to conservation policies implemented by the regional Government, to global political and economic contexts of conservation (Holmes and Brockington, 2013)

In line with the ideas set out in this chapter, I consider along with Holmes and Brockington (2013), that the creation of the Serra de Tramuntana Natural Site and the implementation of diverse protection figures has altered an already dynamic society. In this respect, although the agroforestry practices of Serra de Tramuntana's local population were abandoned in the second half of the twentieth century (see chapter 2), I consider that the introduction of conservation policies by which land-use and environmental management practices are restricted, regulated and subordinated to technical control, also escalate the process of abandonment of many agroforestry lands in the Natural Site. So despite the fact that the protected area of Serra de Tramuntana has not brought about any changes in property rights (Frigolé, 2012), nor evictions (Brockington and Igoe, 2006), nor compulsory human displacement (Agrawal and Redford, 2009), I do consider that it represents an ethnographic case evidencing that conservation policies actually criminalise certain agroforestry practices on the part of the local population (Freeman, 2007), calling into question their knowledge, their

understanding of their environment (Santamarina and Bodí, 2013). Thus, the present study of the Serra de Tramuntana Natural Site reflects just how the implementation of conservation policies implies the incorporation of certain actors into the local reality who, supported by centralised bureaucracy, technical expertise and the imposition of land-use categories, have greater power to impact on decision-taking processes (West *et al.*, 2006).

The tensions existing between local and institutional actors run especially high in regard to the restrictions on land-use and management implemented by the successive conservation policies imposed in Serra de Tramuntana, overlapping one another since the 1970s. So, despite the fact that absolutely everyone I interviewed considered that the abandonment of many agroforestry lands in the Natural Site came as a consequence of the economic unfeasibility of the agroforestry practices carried out by the local population up to the second half of the last century, the majority of the inhabitants of Valldemossa and Estellencs I interviewed argued that the land-use restrictions imposed by conservation policies escalated this abandonment, in particular in ANEI classified zones. According to many landowners and farmers, this would be the case of building restrictions since they make it significantly more difficult to manage agroforestry lands currently abandoned through the introduction of certain land-use regulations, such as in the case of reforms on country estates for their conversion into rural hotels or for agriculture. In this respect, the granting or refusal of planning permission only serve to heighten the tensions existing between environmental agents and estate owners: while, on the one hand the environmental agents accuse the landowners of attempting to prioritise their needs and luxuries over the welfare of the Natural Site, on the other the landowners accuse the agents (as direct representatives of the environmental management institutions) of interventionism in their properties and inaction in the face of the need for activate agroforestry management policies that would protect Serra de Tramuntana from the dangers of fire. So, therefore, although for many inhabitants of Valldemossa and Estellencs the protection categories activated in Serra de Tramuntana since the 1970s have prevented the mountains from being harmed by intensive urbanisation processes that have indeed taken place on other parts of the island, the impossibility of building certain kinds of buildings – like sheds to store tools and farming machinery, or reforms to convert old farmhouses and rural hotels – has had the negative effect of favouring its abandonment. Consequently, to them, these land-use restrictions are actually increasing the risk of large fires, thus endangering the safeguarding of the

natural heritage of Serra de Tramuntana.

Therefore, most of the inhabitants of Valldemossa and Estellencs and members of the IBANAT brigades that I interviewed concurred in arguing that in order to protect Serra de Tramuntana – from the fire risk, as well as both from the devastating effect of the feral goats and the Great Capricorn beetle – agroforestry uses should be encouraged. Nevertheless, most environmental agents, many forestry technicians and other members of the Ministry of the Environment I interviewed appeared reluctant to reintroduce the agroforestry customs practised by the local population until midway through the last century, something I explore in the following chapter. Even so, faced with the affliction of large fires like that of 2013 in Andratx and Estellencs, some institutional actors are currently changing their perspectives and are gradually becoming more willing to reduce restrictions on agroforestry management uses and practices in the Natural Site (see chapters 6 and 7).

Figures



Figure 4.1: A tree trunk damaged by a goat.
Photo: Luís Núñez, extracted from caib.es/sites/sanitatforestal (last consulted on 06.09.2019).



Figure 4.2: Holes bored on a log by the larvae of the Capricorn beetle.
Photo: Luís Núñez, from caib.es/sites/sanitatforestal (last consulted on 06.09.2019).

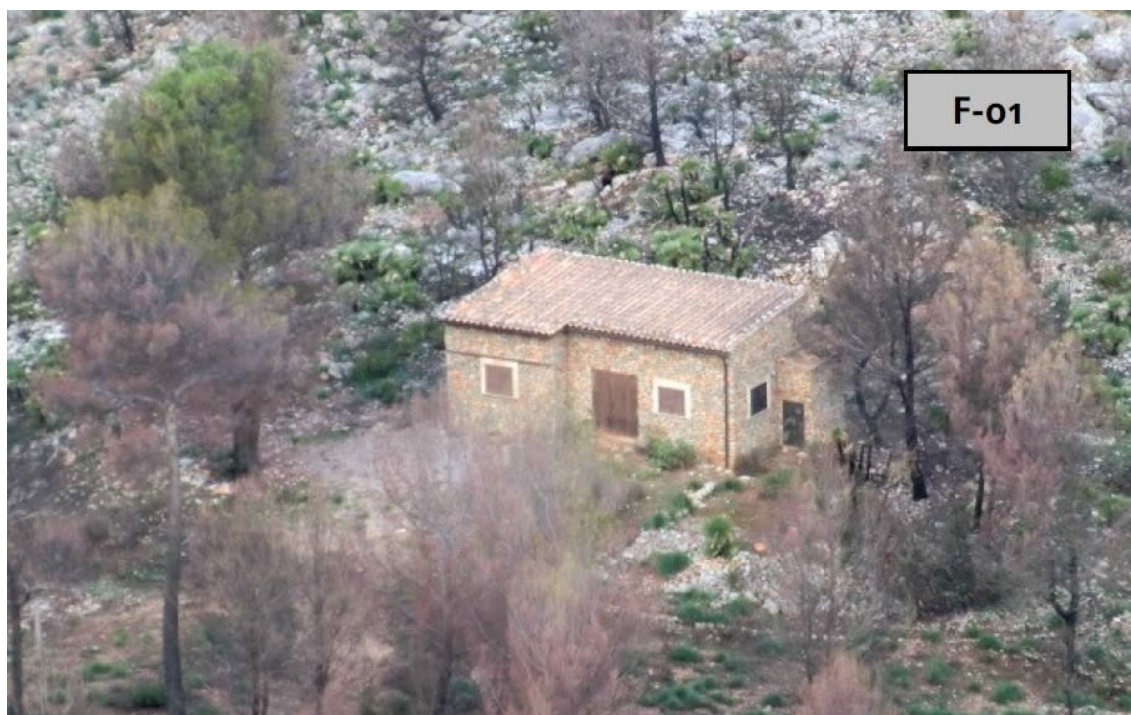


Figure 4.3: A house that was demolished since it was built without a license in Andratx, in an area categorised as Natural Site of the Serra de Tramuntana and Natural Areas of Special Interest (ANEI).

Photo: Agency of Defense of the Territory of Mallorca (Agència de Defensa del Territori de Mallorca).



Figure 4.4: One of the two bungalows that, together with a swimming pool, were demolished since they were built without a license in Fornalutx (Serra de Tramuntana), in an area categorised as Natural Site of the Serra de Tramuntana, Natural Areas of Special Interest (ANEI), and Picturesque Landscape.

Photo: Agency of Defense of the Territory of Mallorca (Agència de Defensa del Territori de Mallorca).



Figure 4.5: A house located in the Natural Site of Serra de Tramuntana whose surroundings had been burned by a forest fire the night before I took this photo.

Photo: Maria Cifre.

Chapter 5. The forests and their management in Serra de Tramuntana: historical dynamics and social perspectives

Preface: Talking about forests

One afternoon in the summer of 2014, I went for a walk from my house in Valldemossa and stopped to talk to a neighbour I had seen working in his vegetable garden some days earlier. During our conversation, he explained that a few months before he had been felling some trees in the small forest behind us. To his astonishment, the police appeared, saying that a neighbour had called them to report that someone was “destroying a forest.” However, according to this young farmer, the partial clearance of the forest was the only way he could prevent the forest and the houses of the neighbourhood from being burnt by the spread of a forest fire, which he assured me would happen soon. “If there is a fire, with the forests as *dirty* (*bruts*) as they are, the fire will cross Serra de Tramuntana from end to end, destroying everything in its path”, he affirmed. So, while to the farmer the selective tree felling was saving the forests from ending up burnt, the same forest management practice had a totally opposite meaning for his neighbours, who claimed that it was destroying the forest.

On another occasion, during a cold and damp morning at the end of December 2015, I went to Son Amoixa, one of the rural estates in Valldemossa that I had frequently visited for this study. Nowadays, it is the residential home of the owners and a rural hotel for visitors, although until the end of the nineteenth century it was the summer residence for the owners and home for some of the villagers who worked producing vegetables, olive oil, charcoal and dairy products or lamb, goat meat and pork. That day I was going to join a team of workers of a private forest management company in the task of *cleaning* (i.e. clearing) a part of the forest, namely – in the words of Miguel, the landowner – of felling the pines that had grown along the edges of the forest path and in the clearings among the holm-oaks (see Figure 5.1), and removing the dead and fallen trees from the forest. When I arrived at 7am, I found a group of about ten men kitted out with helmets and gloves, some of them on tractors, dragging pine trunks of varying sizes and thickness, while others went on foot carrying the branches. Andreu, the owner of the forestry company that had been hired, much to my regret, did not let me use any heavy machinery for safety reasons, so my work that day was limited to climbing through the forest to get the already cut branches and light dead trunks and drag them down to the bonfires and piles of tree trunks on the forest track.²⁰⁷ After four hours of exhausting work we stopped, and while having a snack with Andreu, he said that, because the forests that most often get burnt by forest fires in Serra de Tramuntana are areas of pine “here there are no such things as the so-called ‘forest fires’, because what burns, are not forests.” The key point that Andreu was trying to make is that he does not consider wooded areas with a predominance of pine as forests, but only the holm-oak areas where local people had been working until some decades ago.

Finally, six months later, I heard the opposite argument to that held by Andreu in the premises of the Ministry of Environment, Agriculture and Fisheries. While waiting for an appointment with some technicians of the Forest Management Service, I started

²⁰⁷ The trunks that could be sold were piled up, while the rest of unusable wood was burned in the bonfires, in order to reduce the volume of biomass accumulated in the forest.

talking to Marta, a worker from Xarxa Forestal whom I had already interviewed twice. When I mentioned that many people in Estellencs claim that there are more fires nowadays than when local people managed the forests of Serra de Tramuntana, she responded “It is normal for them to say that there were no forest fires before . . . because there were no forests either!” With this sarcastic comment, Marta was suggesting that the anthropic pressure of wood extraction and charcoal burning carried out by local people created monospecies holm-oak areas with such a low density of trees and shrubs that, to her view, they could not really be considered forests.

Introduction

The above ethnographic vignettes illustrate the extent to which ‘forest’ is a complex, polysemous and ambivalent category, as well as the diverse – even conflicting – perspectives, ways of understanding and interacting that different actors have regarding forests in Serra de Tramuntana. My aim in this chapter is to explore such diversity of perspectives on a range of matters relating to forests and, ultimately, on forest fires and fires, more generally: what actually constitutes a forest, their current state, and the changes that have unfolded in recent historical memory in terms of their use and management, as well as the relationship between each of these aspects and peoples interpretation regarding the incidence and type of forest fires? In doing so I hope to clarify not only the extent to which different perceptions of forests are articulated and patterned but, importantly, how these perceptions re-emerge and shape the multiple social dynamics associated with the use and management of the protected area. By clarifying the different ways in which people think and talk about forests, how and why they have changed and how this relates to fire, I hope to illuminate some of the underlying narratives and conflicts surrounding the causes and necessary responses to destructive fires that are appearing to become more prevalent. While there exists a substantial literature – regionally as well as globally – on the relationship between forest fires and historical changes in land-use, or indeed on the impacts of ongoing changes in fire regimes, most of these studies focus on the environmental aspects such as the impact of fire on soil erosion, tree distribution and processes of plant adaptation (e.g. Mataix-Solera and Doerr, 2004; De las Heras *et al.*, 2012; Vallejo *et al.*, 2012).

In this chapter I will first frame the historical transformation of forests in Serra de Tramuntana associated with land abandonment and afforestation (see chapter 1) in a larger context – mostly Mediterranean, but with a brief overview of how these local and regional trends fit within larger global trends. The rest of the chapter – which is divided

in three more specific sections – is largely ethnographic, and is based on the testimonies collected from a wide range of people over my entire stay in Serra de Tramuntana, including arable and livestock farmers (former and present-day), charcoal-makers, landowners, including estate owners and managers, forestry technicians, senior and junior environmental officers and managers, firefighters, hunters, IBANAT's brigade members as well as a range of government workers, including heads of services and other members of the departments of Forest Health, of Environmental Quality Service, of Forest Management and Soil Protection, of Emergencies, and of Forest Fires.

Despite the enormous variability of responses I found that there is a clear tendency in terms of how individual narratives are socially patterned, in terms of the extent to which certain elements or themes recur within and differ between certain groups of stakeholders. For the sake of convenience I have organised the account by focusing on three major groups of people which I found exhibit a degree of internal coherence while disagreeing with other broad sectors of Serra de Tramuntana society: recent residents (notably those who have arrived from other parts of the Spanish state or Europe), officials, biologists and technocrats (broadly engaged with the state and non-state apparatus of governance and management of Serra de Tramuntana and the natural protected areas) and long-time local residents associated, directly or indirectly, with the rural economy of Serra de Tramuntana. In this chapter, I will conclude that forest fires are condensers and the way to express many broader conflicts associated with the use and management of the protected area.

Talking about forests in Serra de Tramuntana: the new residents of Serra de Tramuntana (foreigners, property owners and city dwellers)

Many of the foreign and new city dwellers who own or rent a house in Valldemossa or Estellencs as a primary or secondary residence generally share the same perspectives on the way they talk about the forest of Serra de Tramuntana. In these narratives, emphasis is placed on the visually perceptible features, the aesthetics and the scenic quality of the landscape; as for instance when they described those forests by stressing “the contrast of the green of the trees with the blue of the sky” or “the variety of shapes, volumes and colours.”

Moreover, to some of them, the lack of an active forest management – evident to them through, for example, the density of trees and shrubs – evokes a desired sense of wilderness, enhances a sense of isolation they claim to experience when they are in these forests and becomes a defining trait of what nature is; a similar perspective that Cortés-Vázquez (2014, p. 9) identified among the ex-urban inhabitants of Cabo de Gata in Andalucía. For instance, Leo, a resident of Valldemossa since 2004 who is originally from Germany expressed:

I came to this place and I felt surrounded by its magic. It can be felt. . . . The air is good, the weather is good, and nature is all around us. Here I'm closer to nature, to the natural world. . . . Going to the mountain is emotion, is intuition. . . . Nature is abundant; it's wild, abandoned, and grey.

So, these foreign and city dwellers also emphasised their appreciation for dense forests because they associate it with 'green' and 'natural'. In the words of Leo: "to me it's wilder when there is so much undergrowth that you cannot even get inside." Indeed, following this desire for isolation and immersion in nature, these villagers tend to prefer living in houses adjoining or completely surrounded by forest (see Chapter 6).²⁰⁸

Another distinctive aspect of most of these narratives is that they lack the perspective of recent environmental transformations in the region, probably because many of them did not come to Valldemossa and Estellencs until the 1960s, so they therefore ignore what the fragmented agricultural landscape looked like before the 1950s. Nevertheless, some of these foreign residents talked about past forests, explicitly referring to the descriptions of the landscape given by the 'romantic travellers' (Ramis, 2012) who visited Mallorca at the end of the nineteenth and beginning of the twentieth centuries (see Chapter 2). They even incorporated in their narratives sentences like "As Georges Sand wrote in her book", "As Arxiduc-Lluís Salvador described." The influence of the romantic perspective could also be noted when these new residents adopt a nostalgic view that wants to distance itself from what they understand as civilization and get closer to the wild, as for instance when Leo went on to say:

²⁰⁸ The current increase in the number of houses located well inside or within the margins of forest masses – what is referred to as the 'urban-forest interface' of 'wildland-urban interface' (WUI) in the literature body on forest fires (Allen *et al.*, 2001, p. 135; Bond and Mercer, 2014, p. 9) – raises a series of challenges and added difficulties in the prevention and extinction of forest fires.

To me, [a forest is] freedom, is life. . . . The forest, the mountains . . . I like the wild life, where you find a life of peace . . . not civilised. [A] forest [is] the possibility of disconnecting from civilisation; the most accessible natural space for the wildest part of my life, the most natural, the untamed, [what is] not necessary for civilisation, where you do things just for yourself . . . [where] you lose yourself, you lose track of time.

In a similar way, other foreign residents and city dwellers who reside in Valldemossa and Estellencs described the local forests as “beautiful and exotic”, “strange and romantic”; as a way to “escape from civilisation.” From my perspective, these narratives are influenced by the romantic perspective that lies behind all the literary, poetic and pictographic work produced by the first foreign travellers who visited and temporarily resided in Serra de Tramuntana in the beginning of the nineteenth century (see Chapter 2).

Talking about forests in Serra de Tramuntana: the environmental managers and technicians of Serra de Tramuntana

A second discourse that I have identified within the defining and descriptive narratives about the forests of Serra de Tramuntana is shared by many environmental agents, members and technicians from various departments of the Ministry of the Environment. Two illustrative narratives are those of Mireia, a member of Xarxa Forestal and of Francesc, an environmental agent, who said:

A forest is defined by the combination of diversity of trees, lianas and undergrowth. Apart from biodiverse, a forest has to have certain degree of density; a close distance between the tree canopies.

For a forest to be a forest, diversity is needed, but with very well distributed formations. It depends on the height and orientation: holm-oak is the optimal forest; pine forests on sunny slopes or more degraded and eroded areas. And shrubs; a forests needs shrubs; shrubs are indispensable to the functioning of the forest ecosystem.

When these stakeholders define and describe the forests of Serra de Tramuntana they refer to their biotic and abiotic elements. In these narratives there are many binomial terms and scientific biological and ecological explanations about the combination of vegetal species in different geographical areas and altitudes of the Serra

de Tramuntana mountains. To them, a variety of trees and the presence of undergrowth represent the necessary elements of a healthy forest.

Attitudes to local and traditional management practices

After asking these environmental agents, members and technicians from different departments of the Ministry of the Environment to define the forests of Serra de Tramuntana, I then explored their perspective regarding the former state of the local forests and about the role that the agroforestry practices of the local people played in it up to the second half of the past century. To them, prior to the 1950s, the forests of Serra de Tramuntana were in an extremely degraded state due to the forestry and livestock husbandry subsistence practices carried out by local people. More specifically, these institutional actors stressed that charcoal burning weakened the holm-oaks. The logic behind this argument is that most of the holm-oaks did not reproduce sexually through seeds due to the carbon burning, but as they were pruned from their base they reproduced asexually through regrowth. To them, this would have been the reason why today there are 200 or 300 hundred-year-old holm-oaks with trunks only 40 years old, something which these actors consider a situation that even today weakens the forests and makes them susceptible to insect plagues (see Chapter 4). In the words of Pau, an environmental agent:

[The need for] products such as vegetable charcoal, plaster, and other things that were extracted from the forests . . . has made the current structure of the forest a bit unstable in the case of the holm-oaks. Over a long period of time the forests have a certain weakness due to the charcoal burning carried out for many years. It [makes the forests] have a certain structure and be sensitive to certain disturbances like the great Capricon beetle that can affect them a lot.

If criticism towards past local people's former agroforestry practices is particularly harsh when referring to the reduction in the number of trees to burned to make charcoal, harsh criticism is also extensive to the pig and sheep husbandry in holm-oak forests that decreased the density of the undergrowth, as expressed by the environmental agent Rafel:

The forestry practice during the last 100 years has been truly disastrous. If you now go to a young holm-oak forest or to one that's

currently regenerating, you'll see that it was only near the *sitges*²⁰⁹ that they left any holm-oaks to give some shade, they cleared the area of everything, they left nothing, and that's how they really made it. . . . The ecosystem has weakened, and it has weakened because of one thing above all: because of this tradition, these bad practices that have been carried out for many years in the forests of Mallorca, that have been badly mistreated because they have been overexploited with charcoal burning and with pigs.

Even more, because of the combined impact of grazing and the carbon burning in decreasing the amount of trees and undergrowth, many environmental agents, members and technicians from different departments of the Ministry of the Environment argue that the continual intervention of the local population turned the forests of Serra de Tramuntana into mere tree plantations. This was expressed by, for instance, the environmental agent Albert and by Marta, a member of the Xarxa Forestal:

When you talk about forests . . . here the holm-oak areas aren't really forests, but tree plantations almost without undergrowth because of the old tradition of [herding] pigs. And [these lands had] a very low tree density because of the charcoal burning. As I said... they had tree plantations but no forests.

If you see an aerial photo from 50 years ago, it's horrible (see Figure 5.9). The environment was completely destroyed. The mountains were bare, and you could only see tree plantations, what ironically they [the villagers] call forests (*bosc*). This is unacceptable. . . . A land with only holm-oaks, in which humans prevent the existence of undergrowth, isn't a forest, but a tree plantation.

This discourse which holds that the exploitation of forest resources by local people had dramatic negative impacts on the forests of Serra de Tramuntana is reproduced and reinforced by a large amount of regional literature, especially that published by regional environmental institutions (e.g. Llabrés 1997, pp. 34-35; Gil *et al.*, 2008, p. 18; Rosselló 2014). For instance, in the book 'Trees and forests of the Balearic Islands' (Mayol, 2011, p. 5), edited by the Government of the Balearic Islands during the International Year of Forests by the United Nations in 2011, the Minister of Agriculture, Environment and Territory at that time wrote: "We must bear in mind that forests are more than groups of trees: without wildlife, without shrubs and undergrowth grasses,

²⁰⁹ A *sitja* (in plural, *sitges*) is a rounded stone platform used as surface on which to make and burn the mounds of wood needed to burn charcoal.

without fungi and without so many other organisms, we may have tree plantations, but not forests.”

Lastly, on asking these environmental agents, technicians and the members of several different departments of the Ministry of the Environment about the apparently²¹⁰ lower incidence of large forest fires during the first half of the last century, when their management was in the hands of the local population, I received replies that could be exemplified in the words of Marta, a Xarxa Forestal worker: “Before they might not have had large forest fires, but neither did they have forests.” That is to say, in the view of these groups of actors, the density and diversity of tree species takes precedence over the lower incidence of forest fires as a criterion for the environmental management of Serra de Tramuntana. Below, I explore their perspective regarding the current state of the local forests.

Attitudes towards agricultural abandonment and afforestation

Many environmental agents, technicians and members of diverse departments of the Ministry of the Environment shared a similar perspective about the present estate of the local forests, especially in light of the afforestation process that Serra de Tramuntana has experienced since the abandonment of local people’s agroforestry practices from the 1950s. To them, the abandonment of many agroforestry lands in Serra de Tramuntana from the 1950s has been an opportunity for the local forests to recover from the subsistence practices of the local people, which they find highly degrading, as I previously explored. To them, the forests have become “more natural and less anthropogenic,” as the environmental agent Xim specified. Another example of such perspective is that of Ernest, a forestry engineer in the Environmental Quality Service:

I arrived in Mallorca in 1982, and I’ve noticed that the green mantle has been getting more and more continuous. . . . [We’re witnessing] a tendency to more natural forests; and I’m seeing it! More natural in the sense that they are less intervened, less touched, less exploited.

²¹⁰ The great majority of those interviewed coincided in pointing out that while fires had indeed occurred during the first half of the last century, none of them had spread enough to affect wide expanses of forest land. I have unfortunately been unable to triangulate data registering forest fires since any such records began to be made in the early 1970s (Conselleria d’Agricultura Medi Ambient i Territori and Tecnosylva, 2015). In further research other methodologies could be put into practice, such as for instance a search of regional newspaper archives.

So, many of these institutional agents consider highly positive the increase in extension of the forests of Serra de Tramuntana through the afforestation of former crop and pasturelands and the olive grove terraces (see Chapter 3), and the increasing density of the forests. This idea can be also found in regional literature, as is the case of the book ‘Trees and Forests in the Balearic Islands’ (Mayol, 2011, p. 3), in which the Ministry of Agriculture, Environment and Territory stated:

The Balearic Islands are experiencing a positive historic moment for their forest ecosystems, since the pressure caused by the use of lumber and firewood has decreased. The clearest proof of this is the increase in the area and number of tree shown by successive forest inventories.

Moreover, many of these institutional actors emphasised that the conversion of croplands into dense forests and the change from single-species holm-oak forests to mixed formations of pines, holm-oaks and undergrowth shrubs are positive transformations since these processes also bring about an increase in biodiversity. In the words of Carles, a forestry technician:

I like a landscape of holm-oaks, and although I also really liked what Andratx was like before the forest fire, [since] pine forests allow much more varied undergrowth, which gives an added value: the density, the diversity.

Lastly, it should be pointed out that a small group of environmental agents I interviewed argued that the increase in biomass density affords a higher degree of protection to the local forests from forest fires. In their opinion, this is because a high density of trees and undergrowth create conditions of shade and humidity that hinder the ignition and spread of forest fires. In fact, contrary to other views, these environmental agents consider that the elimination of shrubs and tree canopy through which sunlight can penetrate makes way for an initial stage of the appearance of highly inflammable plants (*plantes piròfites*), like the reed (*canya*, *Arundo donax*). It is for this reason that for these environmental agents breaking the continuity of the forest mass and reducing its density is a totally misguided strategy which in no way helps in the prevention of forest fires. I do not know to what extent this line of argument is shared by other environmental agents and other departments of the Ministry of the Environment to which I had no access during the course of the study. Considering that every environmental agent, on an individual level, has the power to grant or refuse

permits for tree felling, undergrowth reduction, burns and other forest management practices in a specific area, I would suggest that this matter should certainly require further research.

Talking about forests in Serra de Tramuntana: villagers and ‘local’ perspectives

A third major perspective towards the forests of Serra de Tramuntana is shared by almost all the villagers of Valldemossa and Estellencs and the members of the IBANAT brigades who I interviewed or interacted with during fieldwork. When defining and describing the local forests, these people usually emphasise the close and interactive relationship that local people have had with the forests and agricultural lands of their villages until the second half of the twentieth century. This was expressed for instance by Francisco, an elderly farmer of Valldemossa who used to manage the orchards and vegetable plots of many rural estates:

[A forest is] where charcoal-burners lived producing charcoal that they would later sell, and where I went to collect holm-oak wood to burn in the fire at home.

Among the people who share this perspective, it should be mentioned that all the older villagers from Valldemossa and Estellencs who worked, managed or owned forestland who I informally or formally interviewed have a rather particular way of defining and talking about the forests of Serra de Tramuntana. The narratives of the elders are particularly abundant in personal past experiences, detailed anecdotes, and emotive expressions. To them, a forest (*bosc*) is by definition a managed area of holm-oak where people obtained the necessary resources for their livelihoods through animal husbandry and forestry practices such as hunting wild birds, wood extraction, charcoal burning and gathering of edible goods – basically wild green asparagus, mushrooms and snails. To this generation of local villagers, the absolute predominance of holm-oaks is the criterion to consider an area with trees a forest or not (see Figure 5.8), as evidenced in the words of Antònia, an elderly woman from Estellencs who worked in the orchards and vegetable plots of Son Fortuny:

By forest (*bosc*) we mean the holm-oaks. [It is] where we used to collect acorns. . . . Now, there are still some areas of forests – which are holm-oaks – but the pines are eating away at it all. . . . [What has

grown now] is not a forest, but a pine wood (*pinar*). And, don't you see that there is *pinar* everywhere around us? [Pointing to the window, from which we see abandoned terraced olive groves where a lot of pines and undergrowth have grown.] It's everywhere around us!!

In line with this, they do not talk about the regrowth forests – nowadays found in abandoned croplands, pasturelands and terraced olive groves; where pines predominate, where there is dense undergrowth, but where holm-oaks are not significantly present – as forests. Instead, they all use the term 'pine woods' (*pinars*).

Attitudes towards past forest-oriented practices

To many villagers of Valldemossa and Estellencs and members of the IBANAT brigades, but also to some forest technicians and firefighters, the local people maintained the forests in a healthy state and safe from fires through their agroforestry practices until the second half of the twentieth century. In the words of Carlos, an IBANAT forestry technician:

In the past, [local people] looked for the means to heat, to cook, based on charcoal; these were basically supplied by the forests. I'd define that as an integration of humans [with nature] through sustainably exploiting the forest system. People extracted resources from the forests, and at the same time the forests benefited from the care of the villagers.

To these informants, the charcoal burners were the key forest managers in Serra de Tramuntana, for which reason they hold that the charcoal-burners were 'the first conservationists' in Serra de Tramuntana, a sentence I heard many times during fieldwork. The logic behind this statement is that charcoal-burners were those who mainly prevented large forest fires and those who favoured the substitution of the old and ill trees by healthy ones, as I further explore below.

The testimonial narratives of the four former charcoal-burners I met during fieldwork have a great ethnographic value²¹¹ in order to understand the forest management in Serra de Tramuntana until the 1950s. Among them, Margalida, having

²¹¹ Not only because charcoal-burners were the ones who played a major role in managing the local forests, but because today the vast majority of charcoal-burners have already passed away. While in Estellencs I could not find any former charcoal-burners, in Valldemossa I had the opportunity to interview three.

lived and burned charcoal up to the age of 14 in the local forests of Valldemossa is, of the four, the one with the most detailed memories:

The day we've a fire – God willing I won't have to see it – it will be a disaster, because there's both the past and present-day wood: the reeds, the gorse, everything. All that's from today.²¹² Dead pines, rotten trees. And before, because we *cleaned* it, this didn't happen.

Like Margalida, many other villagers of Estellencs and Valldemossa and members of the IBANAT brigades commonly use the expression *cleaning* the forest to basically refer to selective tree felling, reduction of the undergrowth and elimination of the accumulated dead wood. Charcoal-burners were the ones who mostly performed this function through the exploitation of the forest resources in a given area following a rotation system. This rotation system was based on the division of the forest owned by a rural estate into smaller areas (*ranxos*), which delimited the area where a family could make charcoal during a summer season. In spring, a forester (*garriguer*) marked the trees that could be used to make charcoal. These foresters were hired directly by the land-owners,²¹³ thus these private foresters defended the interests of the owners, ensuring the long-term maintenance of their forests incomes. Following the rotation system, the same *ranxo* could not be used in two consecutive years. In the following year, the family would move and work in the adjacent *ranxo*, and so on, until the whole set of *ranxos* was completed. Jaume, an elder villager who owns a rural estate in Estellencs explained the system to me: “We needed ten years to get to the five *ranxos* we had.” The charcoal-burners' rotation system, intended to avoid the overexploitation of a forest area and to ensure a continuing supply of wood over the years, was also a forest fire management strategy. This is because, in the event of such a fire, the lack of dense and continuous biomass in recently exploited *ranxos* would hinder the spread of any ignited fire, thus

²¹² By “all that's from today” Margalida refers to the vegetation that they used to remove and burn to keep the forests ‘clean’. Because nowadays this vegetation has grown a lot, she considers it as “new” vegetation.

²¹³ Despite the deals between land-owners, rural estate managers and charcoal makers always depended on the particularities of each deal, the ethnographic data from Valldemossa and Estellencs suggests that there were some common trends. Most commonly, daily workers (*jornalers*) and permanent workers (*missatges*) were hired by the farm managers, who used to benefit from the surplus of the annual harvests. The land-owners, in turn, were interested in avoiding any overexploitation of their forests, since these lands were one of their main sources of income because they directly benefited from the sale of charcoal – again, something that was not so common in the case of agricultural products.

giving more time to the villagers to fight it, or even for the fire to die out of its own accord, as Jaume continued narrating:

If any part of the mountain was burning, [we would immediately say]: ‘*Uep!* Run and tell so-and-so’ [We would warn] the people working there, those who knew the area. And we could rest assured that if the fire reached the *ranxo* that had been worked that year, it would stop because the fire had no sufficient *dirtyness* to keep burning.

Something that is probably unknown to the general public²¹⁴ is that some charcoal-burners used to carry out work specifically aimed at reducing the risk of forest fires. For example, as Margalida explained, during the summer, she and her family burned charcoal from the holm-oaks, whereas in the winter they would spend their time *cleaning* the area of pine woods on the mountainside from Valldemossa as far as Sa Marina, the local fishing harbour. According to Margalida, although the benefits of selling charcoal from pine trees were much lower, maintaining a low density of the trees and undergrowth in this area was an intentional management strategy for the prevention of large forest fires:

We used to *clean* everything really well so that it wouldn’t catch fire in the summer. That was the system. In summer we used to work in the part where there were holm-oaks, because that doesn’t burn. Ok, it can burn because there are reeds, but [a fire in a holm-oak forest] it is easy to put out. But where there are pine trees, going down towards the harbour for instance, if there’s a fire there, then there’s no stopping it. So in winter, we used to ‘clean’ all that area [of pines], so we wouldn’t have to worry that in the summer it would all get burnt by a fire.

As she carried on explaining, her family, like the rest of the other families of charcoal burners of the village, used to spend all day felling and pruning the selected trees to burn charcoal and making woodpiles (*fogueres*) with the discarded wood that could not be used to make charcoal, usually shrubs in the undergrowth. Then, each night they burned all these woodpiles. Only some reeds were stored to feed the goats, chickens and other animals that lived with Margalida and her family.

²¹⁴ I suggest this because only the charcoal-burners were aware of this and I have not found any written record of it at least yet.

We burned all the reeds and the shrubs. We made a bonfire and burned it all. Well, with the trunks and the thickest wood we also made charcoal during the winter, but the fundamental aim was to clean to prevent it from burning. This way we wouldn't have to worry in summer.

Apart from the important work of fire prevention, according to many villagers of Valldemossa and Estellencs, members of IBANAT and some forestry technicians, the combination of charcoal burning and the pig grazing in the local forests favoured the health of holm-oak forests. This is because, on the one hand, with selective felling, the charcoal-burners favoured the replacement of old, sick or plague-stricken holm-oaks with young holm-oaks. At the same time, pig grazing in the local forests favoured the growth of new holm-oaks since by digging into the earth with their snouts, they buried the acorns they hadn't eaten. So, according to the arguments held by all these groups of people, the forest management carried out by the local population of Valldemossa and Estellencs favoured the forests' natural regeneration, reproduced the kind of forests they needed and, at the same time, it protected them from pests and fires.

Attitudes towards agricultural abandonment and afforestation

When, during the second half of the twentieth century, the subsistence practices of the local people progressively disappeared, most agroforestry lands were abandoned (see Chapter 2), as the forestry technician Carles expressed:

What has happened with the [tourism] boom is abandonment, a loss of habitats, a lack of management. Before Serra de Tramuntana had management and now [has] lack of management.

For many villagers of Valldemossa and Estellencs, members of the IBANAT brigades, some forestry technicians and firefighters, this was the beginning of a process of deterioration of the local forests that still continues today. In the words of Pep, a former owner of a large rural state of Valldemossa:

In the past, forests were *clean*, but when the charcoal-burners left, it all [our forest] got *dirty*. Holm-oaks grew but no-one was felling the old ones. That was the beginning of the end.

The association of cause and effect between these processes of abandonment and the deterioration of the Serra de Tramuntana forests was widely shared by these groups of actors. In fact, on various occasions they used the same argument: “abandonment is killing our forests”, a perspective I shall examine below.

According to these groups of people, the abandonment of many agroforestry lands presents two main threats. The first would be the ageing of the forests. That is, due to the lack of selective tree felling, the healthy young holm-oaks are not taking over from the sick and older trees, but instead have to compete with them for the resources of soil and water. Moreover, the progressive ageing of the local forests would be compounded by the combined impact of the populations of feral goats and great Capricorn beetles, something I already examined in the previous chapter.

The second major reason why the vast majority of villagers of Valldemossa and Estellencs, IBANAT’s brigades members and a some forest technicians whom I interviewed argue that the local forests have entered a process of degradation following their abandonment is that their present *dirty* state facilitates the rapid and intense spread of large fires (see Figure 5.10). By *dirtyness* they refer to the abundant, dense and continuous biomass accumulating in local forests, because of the increasing presence of pines, of the development of dense undergrowth and of the build-up of living and dead wood.²¹⁵ This was expressed, for instance, in the words of Toni, a young farmer from Estellencs; of Tòfol, a young villager of Valldemossa who works building dry-stone terraces; of Francisco, the elder farmer from Valldemossa; and of the forest technician Carles:

Today’s forests are generally very bad; they’re very *dirty*, aren’t they? In fact, all this summer, with my colleagues we’ve been saying that [forests] have become a tinder box. . . . There’re places, as for example the hillside that goes up from [the fishing harbour of Valldemossa] Sa Marina... it’s a time bomb! The day that there’s a fire down there, nobody will be able to stop it because it’s so *dirty*. Fires feed off *dirtyness*.

[What makes the forest fires spread so quickly nowadays is] basically the lack of management, [which] is causing a biomass build-up. The

²¹⁵ While collecting and analysing ethnographic data, I realised that, according to these people, there would be two main types of *dirty* forests: on the one hand, all the regrowth pine forests that have substituted abandoned croplands, pasturelands and terraced olive groves and, on the other hand, the former holm-oak forests that have been converted into mixed formations of pines, holm-oaks and wild olive trees. In the two types of dirty forests, there is a high presence of reed.

fact is that the vegetation, the surface area is growing, and the amount of biomass that this generates is increasing. . . . There is biomass that is accumulating year after year, and this biomass inevitably becomes flammable material ready to burn.

What makes the fires more dangerous is the *dirtiness* lying under the trees, that piles up underneath. The forests are *dirty*, the dry branches fall off, the leaves and the little plants that grow underneath. In those times, the forests were really *clean*, they let the animals loose there and if there was anything sick, dead or dry they would take it away or burn it, so that the forest wouldn't catch fire. When it's *clean* underneath there's not so much risk of fire. If it's cultivated, no [there isn't so much risk]. Fire comes from the abandonment. . . . Before, of course we had fires but they were put out quickly. They never gathered any strength. [Nowadays] the day that there is a fire in Valldemossa, it's going to be huge, with all the *dirtiness* that there is... It's the greatest danger that we have. If the *marjades* are left abandoned the forest spreads, but the fire will burn it all.

On the other hand, there is one specific element that fosters many of the most concerned narratives, especially among local people, about the relationship between environmental change, forest abandonment and fire hazard: the pines. To almost all the villagers I interviewed and interacted with during fieldwork, the presence of pines is not desirable and even of concern. This was evident, for instance, in the conclusive statement of the young farmer from Valldemossa Joan at the end of a long interview: "Here in Valldemossa we don't like pines, we really don't." I am not going to go into the diversity of social perspectives around pines in Serra de Tramuntana and the complex socio-environmental dynamics around this issue in any greater depth, as this would require and deserve a further research project. Nevertheless, I am going to synthesise the key aspects that, from my point of view, explain why so many people associate pines – in turn, the most visible factor of change in the local landscape (see chapter 1) – with the increase of forest fires in Serra de Tramuntana.

Firstly, as I have just explored, a large number of the local population of Valldemossa and Estellencs, as well as members of the IBANAT brigade consider that the biomass build-up that began with the abandonment of the local population's agroforestry customs is what causes fires to spread with greater ease. Furthermore, they accuse the pine of being the tree which most contributes to the creation of a dense, homogeneous, and almost uninterrupted layer of canopy mass. Moreover, they argue that pines favour the development of almost impenetrable undergrowth, especially in

comparison to holm-oaks,²¹⁶ for which reason many villagers claim that not only ‘are’ pines *dirtiness* but also that pines ‘create’ *dirtiness*. Moreover, according to many local people, if the fire reaches the pine cones, they catch fire and are shot off the trees. If this happens, they say, a fire spreads more quickly and unpredictably from hillside to hillside, regardless of whether there were discontinuities between the two forest masses, like firebreaks or motorways as explained by Bernat, a private forester:

The issue of the fires in Valldemossa is delicate, because the forests have more pines than holm-oaks. It’s difficult for there to be a fire in a holm-oak forest. But in contrast, in a pine forest, it’s as if there was gasoline: the needles, the pine cones flying from one pine to another as pressurised. Fires in pine forests are terrible. . . . Pines also have this resin, a flammable liquid that when a fire is lit it produces sparks and smells. [It’s] impressive, the whistling sound [that] pine cones [make when] they explode and shoot from one place to another.

Although I am not going to go into this issue in any greater depth at this point, it is worth mentioning that this association between the growing presence of pines and the increase in fire risk is strongly disputed by some departments of the Ministry of Environment, particularly by the Xarxa Forestal. Part of their job is, to use Marta’s words, to put an end to the widespread ‘pine myths’, including “to make local people understand that pines do not increase the number of forest fires”, as she explained to me. The disparagement for pines felt by a large percentage of the Mallorcan rural population and the polarisation of perspectives between many villagers and institutional actors is echoed in regional literature (Sureda *et al.*, 1997, 2011; Gil *et al.*, 2008; Berbiela, 2015). Since none of the studies have been carried out using anthropological methodology and from an analytical perspective, I hope to contribute to building up an understanding of this complex issue with further research.

What is evident to me based on the ethnographic data I collected in Valldemossa and Estellencs is that for many of its villagers, pines play a very important role in increasing the risk of fire. In fact, this was explicitly mentioned in the most concerned narratives that I collected among villagers and members of the IBANAT brigades about

²¹⁶ According to the Fourth National Forest Inventory (2012, p. 34), in the Balearic Islands pine woods have 60% more dead wood than holm-oaks. Moreover, many members of IBANAT, forest technicians and firefighters stressed that due to the proximity between pine canopies and between the undergrowth and the lower branches of pine trees, pine woods tend to have great horizontal and vertical continuity, which accelerates and intensifies the spread of fire, thus hindering its extinction.

the future of the forests of Serra de Tramuntana: “pines everywhere and then, everything reduced to ashes”, “more pines and more fire”, “dirtiness and fire”, “dead trees and burned forests”, “fire, everything burned”, “fire from one side of the mountains to the other” and, probably the most illustrative claim, “the future is fire”.

Conclusions

In this chapter we have seen how there exist many different and occasionally conflicting perspectives in regard to exactly what a forest is and how it should be managed, particularly in relation to the prevention of large forest fires. The new residents, both of foreign origin – in this case, from countries in northern Europe – and from cities, greatly share a way of talking about the forests. In their narratives, not only is there a notable sensitivity and appreciation for the aesthetic values of the forests, but also for their significance as spaces close to nature and symbolically distanced from civilisation. It is for this reason that these people see positive value in the absence of anthropic management, evidenced particularly in the density of the undergrowth. Another feature of the new residents is that when talking about the Serra de Tramuntana forests of the past they make no mention of the fragmented agricultural landscape that predominated until the second half of the twentieth century, but instead talked about the landscapes described or illustrated by the Europeans who visited or lived for a short time in Serra de Tramuntana at the beginning of the twentieth century (see Chapter 2).

Many environmental agents, technicians, and members of diverse departments of the Ministry of the Environment to a large extent share their way of talking about the forests: for them, the diversity and density of both tree and shrub species are essential elements for the classification of a wooded area as forest. In their view, the forest management carried out by the local population, with practices such as charcoal burning or sheep and pig grazing in the holm-oak forests, was highly degrading, since it weakened the holm-oaks, eliminated the variety of tree species and reduced the number of trees and shrubs, so that they tended to create spaces monopolised by holm-oaks and devoid of undergrowth. On the other hand, many villagers from Valldemossa and Estellencs, members of the IBANAT brigade, and some forestry technicians argue the local population’s agroforestry management practices are what maintained the forests in an optimum state of health – for instance, by controlling pests and fostering the substitution of old and diseased trees with young ones – and safe from forest fires.

In Serra de Tramuntana, the abandonment of the local population's agroforestry customs in the second half of the twentieth century and the afforestation dynamic that this generated also gave rise to many diverse and conflicting social perspectives. For environmental agents and other members of the Ministry of the Environment, this abandonment can be understood as a chance for the forests to recover from the degrading anthropic actions on the part of the local population and return to a state that they consider more natural. More specifically, they value in a positive way the conversion of old farmland to forest land, the transformation of areas of holm-oaks into forests with a mixture of holm-oaks, pines and wild olives, and the growth of thick undergrowth in many areas. On the other hand, for many villagers and members of the IBANAT brigades, such a process is understood as the main reason why the local forests entered a process of deterioration which is still continuing at the present time. More precisely, they argue, the Serra de Tramuntana holm-oak forests have aged through the lack of selective felling carried out by the charcoal-burners, and the work favouring the sprouting of new holm-oaks from the acorns that the pigs buried with their snouts – and to all of this should be added the impact of the combined population of feral goats and the great Capricorn beetle (see Chapter 4).

Moreover, in this chapter we have also seen how some of the most conflicting narratives, especially those with fire at the centre of the discourse, reveal a whole series of social tensions directly related to this diversity of perspectives regarding the state of the forests, their recent transformations and the local population's forestry management practices. This is the case, for instance, of the environmental agents and other institutional actors, who define forests mainly through their level of biodiversity, who position themselves firmly against the local population's forest fire prevention strategies despite the fact that they were apparently successful in preventing large forest fires, since these involved a reduction in the number, density and variety of tree and shrub species. A totally different view is that of many villagers, members of the IBANAT brigade, forestry technicians and firefighters. For them, the management of the continuity and density of the biomass carried out by the charcoal-burners represented a kind of forest management that favoured the conservation of the forests, since it protected them from forest fires. This contrast of perspectives is also evident in their narratives regarding the charcoal-burners: while the environmental agents consider that the charcoal-burners represent one of the greatest threats to the conservation of the local forests, many villagers, members of IBANAT and forestry technicians regard the charcoal-burners as

Serra de Tramuntana's 'first conservationists' since they actively managed the forests and prevented any large forest fires. We can see, therefore, the complex nature of the definition of 'forest': for some it is the result of human non-interference, while for others it is precisely the product of human action. Some consider that in order to have forests there need to be pines and wild olives mixed with holm-oaks. For others, the appearance of pines among the holm-oaks – one of the greatest and most visible factors of change in the recent environmental history of Serra de Tramuntana – is a sign of forest deterioration since it is indicative of a lack of anthropic management, as well as constituting a greater fire risk. In this respect, a large number of the local population, members of IBANAT, forestry technicians and firefighters sustain that the existing density and continuity of the Serra de Tramuntana forest mass should be reduced, a point of view on which some sectors at an institutional level of the Natural Site's (*Paratge natural*) environmental management differ substantially: for them, a greater density and humidity represent the preferential fire prevention strategy.

Lastly, I consider that it should be pointed out that, although we have acquired a deeper and wider knowledge regarding the global issue raised by deforestation processes (e.g. Foley *et al.*, 2011; Hansen *et al.*, 2013), we are less knowledgeable about the socio-environmental conflicts which afforestation processes can generate on both a local and global level, a question I address in this and the following chapter. So therefore, on exploring the diverse and on occasions totally conflicting perspectives on forest management as well as the management of forest fires, this chapter aims to offer an anthropological view with respect to the socio-environmental conflicts currently being caused by the aforementioned processes of afforestation in Serra de Tramuntana.

Figures



Figure 5.1: Andreu felling a pine among holm-oaks.
Photo: Maria Cifre.



Figure 5.2: A holm-oak forest without undergrowth and pines. Both at the right and at the left of the photo there are flat surfaces delimited by stones forming a circle, what indicates that this is the place where charcoal was burned (*sijja*). Today, some villagers cut down trees – especially pine trees, but also holm oaks – in this area without a license to sell as firewood.
Photo: Maria Cifre,

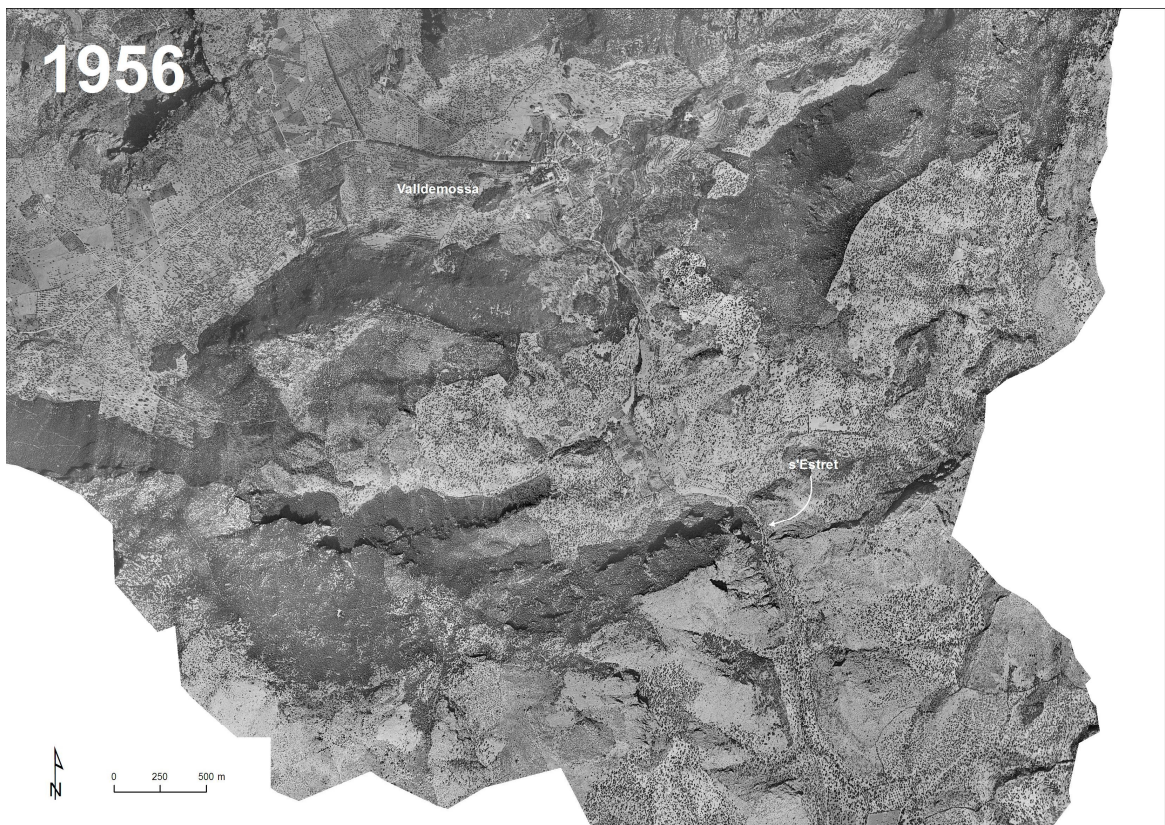


Figure 5.3: Aerial photo of Valldemossa, 1956. Note the low density and the reduced extent of local forests, mostly delimited by terraced olive groves.

Source: Alomar, G. (in Cifre, 2013: 38)



Figure 5.4: Area of forest immediately adjacent to boundary where fire was extinguished in July 2018. The steep topography, dense undergrowth and accumulation of dead biomass made the job of controlling the fire extremely difficult.

Photo: Maria Cifre

Chapter 6. Fire as a disaster: social perspectives, socio-environmental impacts, policy and environmental management implications

“Fire is the worst threat we have in Serra de Tramuntana. It’s scary.”
(Bartomeu, owner of a rural hotel in Valldemossa)

“Fire is an environmental disaster. A disaster like in Andratx a few years ago” (Joan, young farmer from Valldemossa)

“Fire is destruction” (Cati, city dweller living in Estellencs)

“Fire isn’t regenerative as some [people] state. Fire burns the soil, deteriorates its quality. Fire must be avoided.” (Xim, environmental manager)

Introduction

I hope that the compilation of short quotes above from people belonging to different social groups will introduce to the reader to the widely shared perspective according to which fire is destructive and a disaster to avoid by all means. In 2013, the largest and most destructive fire ever recorded in the Balearic Islands burned more than 2,400 hectares in the southern part of the mountain area, reduced 120 houses to ashes, and led to the evacuation of 700 inhabitants from Estellencs. This chapter is concerned with the large destructive fires that have so caught the attention of the public and the media in recent years and which lie at the centre of many of the disagreements, disputes and tensions between different groups of people, and especially between many of the local inhabitants and environmental managers. Clearly, neither the emergence of forest fires as a particular kind of ‘natural’ disaster nor the conflicts regarding their origin and management – as well as the role of fire in forest management and conservation more generally – are unique to Serra de Tramuntana. As previewed in the preceding chapters, the post-war abandonment of local agroforestry practices – and, as we will see in the next chapter, their associated fire management practices – led to a subsequent afforestation of these mountains. This process of afforestation and, especially of build-up of dead and alive forest biomass, is clearly an important factor relating to the incidence of large forest fires in Mallorca, a process noted in other parts of the Iberian peninsula, including Catalonia, Valencia, Galicia (Piñol *et al.*, 1998; Rigolot and Rego in

Birot, 2009; Pausas and Fernández, 2012) and Portugal (Moreira *et al.*, 2001), as well in the Mediterranean (San-Miguel-Ayanz *et al.*, 2012; Ganteaume and Jappiot, 2013; Ganteaume *et al.*, 2013; Salvati and Ranalli, 2015) (see Figure 5.2), or, indeed in parts of the United States (Keeley *et al.*, 1999; Vale, 2002, p. 2002; Howard, 2014, p. 15).

The chapter is guided by three complementary research questions: 1) what are the main socio-environmental consequences of large forest fires according to the different social groups most directly affected by them? ; 2) how do current demographic and settlement dynamics within the protected area of ST affect the incidence and control of large forest fires?; and 3) how do forest and forest fire management policies, strategies and practices affect the incidence of large forest fires? Before exploring these questions through an ethnographic-driven approach, I seek to put fire in a larger, global and historical context. I then provide an overview of broad historical trends with regards to the incidence of fires in the Mediterranean, linking these to the kinds of socio-environmental changes that I have already introduced in previous chapters and with a particular focus on the period after the 1970s, when such changes accelerate and become increasingly prevalent and, importantly, when official policies regarding the management and suppression of fires become consolidated.

Having placed fires in a larger regional, historical and institutional context, the second half of the chapter begins to unpack social responses in Serra de Tramuntana to some of these changes, examining the different perspectives and the consequent social tensions and points of conflict between different people. Exploring the range of social perspectives vis-à-vis forest fires and forest management, as well as some of the social dynamics and practices that have contributed to the rising incidence of large forest fires is critical if we are to better understand ongoing changes to the environmental management strategies of the Nature Site, something I will further explore in the following chapter.

In examining the diverse points of view of a wide range of social groups upon whom, according to their own perspective, the main consequences of forest fires devolve, I intend to address and reduce the complexity, ambivalence and versatility that characterises the category of ‘fire’. The results of research into this issue, together with the results obtained by analysing settlement dynamics as a factor which increases the risk of large forest fires, are intended to contribute to our understanding of social and historical aspects of forest fires. My discussion is framed within ongoing debates and

shifting attitudes and policies and strategies relating to the prevention and suppression of fire (e.g. Moreno *et al.*, 2014a; Calkin *et al.*, 2015; Swetnam *et al.*, 2016).

Fire on Earth

Fire has occurred on Earth since shortly after the first terrestrial plants appeared 420 million years ago (Bowman *et al.*, 2009, p. 481; Pyne, 2012, p. 7), and has since played an important role in the distribution of ecosystems and in the origins of plant adaptations, well before humans emerged (Pausas and Keeley, 2009, p. 593). Extreme fire events such as large forest fires²¹⁷ are common and frequent on an almost global scale (San-Miguel-Ayanz *et al.*, 2013, p. 11). Nevertheless, it is 'anthropogenic fire' – fire ignited, managed and/or put out by humans – that has had a major impact on the planet's natural history since the Pleistocene (Pyne 1998, p. 64). Indeed, due to its spatial extension and temporal persistence, anthropogenic fire is recognised as one of the major human activities affecting the environment (Vale, 2002). The long-standing relationship between fire and humans has been manifested in numerous forms throughout history.²¹⁸ Two million years ago, the genus *Homo* gained the ability to maintain and eventually start fires (Pyne, 2012, p. 8). Human control of fire had a profound impact on the earth, as terrestrial landscapes began to co-evolve with humans amidst a range of new anthropogenic fire regimes (Pyne 1998, p. 65).²¹⁹ Anthropogenic fire encouraged much of the world's vegetation and animals to be pyrophyte – meaning fire-adapted (Scott 2017, p. 38-40). Bearing in mind that humans made the resources of subsistence more concentrated, abundant, and predictable after learning how to use fire, anthropogenic fire might be considered “a deliberate disturbance ecology in which hominids create, over time, a mosaic of biodiversity and a distribution of desirable resources more to their

²¹⁷ 'Large forest fires', also called 'megafires', are “those fire events that cause catastrophic damages in terms of human casualties, economic losses, or both” (San-Miguel-Ayanz *et al.*, 2013, p. 11). They also refer to “any adverse effects of unplanned fires, as events or regimes, on a wide range of environmental, social, and economic assets”, usually called 'wildfires' (Gill *et al.*, 2013, p. 438). In many fire literature, 'large forest fires' or 'large fires' refer to those fires that affect more than 500 hectares (e.g. European Commission *et al.*, 2014; Jiménez *et al.*, 2017).

²¹⁸ Bowman *et al.* (2009, p. 489) categorise human use and response to fire as 'domestic fire', 'foraging fire', 'agricultural fire', 'industrial fire', 'mechanised firefighting' and 'satellite fire monitoring'. Although their understanding of fire is constrained by their analysis limited to a global scale, their categorisation illustrates the variety of forms that human relation to fire can acquire.

²¹⁹ The fire regime is “the type of fire, mean and variance in fire frequency, intensity, severity, season, and areal extent of a burn in an ecosystem” (Bond, 2013, p. 435).

liking” (ibid., p. 40). If fire became a device to remake whole landscapes,²²⁰ it had at the same time a huge impact on the history of humankind, facilitating the dispersal and colonisation of humans from Africa to colder environments and giving rise to one of the most crucial features of humankind, cooking (Pausas and Keeley, 2009, p. 597).²²¹ Nevertheless, the dating of the first uses of controlled fire is still hotly contested²²² and, as Bowman et al. (2011, p. 1) suggest, our understanding of the complex relationship between humans and fire in the past, present and future is still rudimentary.

Fire has been an intrinsic feature of the Mediterranean landscape, as of most forest ecosystems, since late Devonian times (Dubar *et al.*, 1995; Mataix-Solera *et al.*, 2011; Pausas and Fernández, 2012, p. 215; Salvati and Ranalli, 2015). From an ecological perspective, the Mediterranean is an area at high risk of fire due to high temperatures, low annual levels of precipitation and fire-prone vegetation (San-Miguel-Ayanz *et al.*, 2013, p. 12; Enright and Fontaine, 2014, p. 34). Indeed, in Europe, the countries most affected by forest fires are those bordering the Mediterranean (Pereira *et al.*, 2014).²²³ On the other hand, fire has been long used as a management tool in agriculture, silviculture, forestry and livestock breeding in many rural localities of the Mediterranean (Frazão-Moreira *et al.*, 2009; Moreira *et al.*, 2009; Ganteaume *et al.*, 2013). The combination of a fire-prone environment and the long-standing anthropogenic use of fire mean that, to quote Pyne (2009, pp. 11-12), “the landscapes of the Mediterranean burn . . . Together, nature and culture have ensured that the Mediterranean endures as a *flamma aeterna* (an eternal flame).”

²²⁰ Fire has long been used to clear ground for human settlements, to hunt, to facilitate travel, to regenerate food resources for both livestock and humans, to kill vermin, and even for purposes of warfare among tribes (Pausas and Keeley, 2009, p. 597).

²²¹ As Scott summarises, cooking chemically disassembles the raw food, facilitating the digestive process, denaturing protein, and gelatinising starch. Consequently, cooking with fire allowed humans to consume a far wider range of foods, such as plants with thorns, fibrous foods and hard seeds, and to extract their nutrients more effectively. After millions of years of cooking, the use of fire has had huge genetic and physiological effects, such as the reduction in size of gut and teeth (Scott, 2017, pp. 40-42).

²²² Among the diversity of opinions on where and when the first human uses of fire occurred, some authors suggest that it was in Kenya and Ethiopia about 1.5 million years ago (James, 1989), while others suggest Israel about 0.8 million years ago (Goren-Inbar *et al.*, 2004), or also Israel about 400,000 years ago (Karkanis *et al.*, 2007).

²²³ As registered in the Burned Areas Perimeters (BAP) dataset of the European Forest Fire Information System (EFFIS), Spain, Greece, Portugal, France, and Italy account for 78% of the total burnt area and 84% of the total number of European fires in the 2000-2013 period (González *et al.*, 2017, p. 146).

Wildfires in the Mediterranean: a recent history

Although wildfires have been a fact of forested areas throughout recorded history, the number of major outbreaks has increased significantly on an almost global scale since the middle of the twentieth century,²²⁴ particularly in areas with a Mediterranean climate and vegetation²²⁵ and above all in the Mediterranean itself (see Figure 6.1).²²⁶ In the European territories adjoining that sea various studies have shown an increase in both the number of large forest fires and in their destructive repercussions on human and animal life, on ecological reserves, and on private property and infrastructure (Lloret *et al.*, 2002; Ferreira *et al.*, 2008; Pausas *et al.*, 2008; Moreira *et al.*, 2011; Shakesby, 2011; Salvati and Ranalli, 2015).²²⁷

As recent studies in several Mediterranean countries suggest, and as explored in the previous chapter, these changes in fire regimes may well be linked to the increase in the size, continuity and density of forests following the abandonment of lands which were formerly devoted to agroforestry (Pausas, 2004; Mouillot *et al.*, 2005; Vega and Chuvieco, 2006; Birot, 2009; Pausas and Paula, 2012) and the ever more arid climate, marked by an increase in surface temperatures and longer periods without rain (Piñol *et al.*, 1998; Camia and Amatulli 2009; Fernandes 2013). In point of fact, extreme climatic conditions of intense heat, drought and strong winds were registered in the enormous fires that raged over the period 2003–2005 in Portugal, Spain and southern France (Trigo *et al.*, 2006 in Camia and Amatulli, 2009, p. 71), as well as in the fires of 2007 in southern Italy and Greece (Williams *et al.*, 2011; Xanthopoulos *et al.*, 2012). Despite attempts to determine whether climatic conditions are more influential in spreading fire than fuel loads (Moreira *et al.*, 2011; Enright and Fontaine, 2014; Rodrigues, Jiménez and

²²⁴ As in the case of the fires in the 1990s in Indonesia (Dennis *et al.*, 2005; Vayda, 2006) and Sumatra (Chokkalingam *et al.*, 2006), and in the forests of the Brazilian Amazon in early 2000 (Barreto *et al.*, 2006).

²²⁵ Such as Australia (Enright and Fontaine, 2014; Eriksen and Head, 2014), California (Keeley, 2010; Keeley and Syphard, 2017) and the central region of Chile (Montenegro *et al.*, 2004).

²²⁶ Namely Portugal, Greece, Italy, Spain and southern France (San-Miguel-Ayanz *et al.*, 2012; Ganteaume *et al.*, 2013; 2013).

²²⁷ For example, in Spain alone between 2013 and 2016 there were 61 fires which consumed an area greater than 500 hectares (Alameda and Liñán, 2017), while in 2017 there was a wave of fires that affected 13 protected areas in the northwest of the Iberian peninsula (ABC, 2017).

de la Riva, 2016),²²⁸ I agree with authors who suggest that they are interrelated factors,²²⁹ interacting with others such as topography, pattern of landscape and factors of a social nature such as land-use and environmental management policies (Pausas and Keeley, 2009, p. 593; Pausas and Fernández, 2012, p. 216; Moreno and Chuvieco, 2013, p. A; Moreno *et al.*, 2014b). Whatever the truth of the matter, there is broad consensus that the greater aridity caused by climate change is aggravating the outbreak of large forest fires (Pausas, 2004; Birot, 2009, p. 14; Moreira *et al.*, 2011, p. 2389; Enright and Fontaine, 2014, p. 36; Abatzoglou and Williams, 2016; Sousa-Silva *et al.*, 2018). Although it is impossible to accurately predict the pattern of future fires and despite the complex, non-linear relationship between climatic factors, vegetation, humans and other disturbances (Flannigan *et al.*, 2009, p. 483), it is estimated that global warming will have an even greater direct and indirect impact on fire regimes, especially in lands with a Mediterranean climate and vegetation.²³⁰ This impact might manifest itself, for example, in changing seasonal patterns of rainfall, temperature and wind; in longer forest fire seasons (Pausas and Fernández, 2012, p. 216; Bond, 2013, p. 436; San-Miguel-Ayanz *et al.*, 2013, p. 21); in changes to the makeup of ecosystems (González *et al.*, 2017); and in increased numbers of fires caused by lightning (see Moreira *et al.*, 2011, pp. 2392-2393).

In the Balearic Islands, according to the statistical data collected in the Fires Plan ('Plan Contra Incendios', 2015), the incidence of forest fires and the area of burned land have gone up and down between 1970 and 2012.²³¹ According to the Forestry Plan

²²⁸ The weighting of each factor depends on the geography of the area. For example, fire in coniferous and eucalyptus forests and in scrubland is more severe after long, dry and hot spells; while pasture burns more extensively after unusually wet years (Bond, 2013, p. 441). Global warming, in fact, can affect fire regimes in very different ways. For example, according to Bradstock (2010, p. 154), in parts of Australia dominated by grasslands, climate change can cause a decrease in the frequency of fires and in the size of the area burned.

²²⁹ For example, extreme weather conditions affect the moisture levels of vegetation which provides the fuel (Camia and Amatulli, 2009, p. 71).

²³⁰ Whether by changing the seasonal patterns of precipitation, temperature and wind, causing a longer duration of the fire season (Pausas and Fernández, 2012, p. 216; Bond, 2013, p. 436; San-Miguel-Ayanz *et al.*, 2013, p. 21), by altering the composition of ecosystems (González *et al.*, 2017), or by fostering increased numbers of fires caused by lightning (see Moreira *et al.*, 2011, pp. 2392-93).

²³¹ From the data gathered in the Fires Plan (2015, p. 43) the following can be extracted: 1) between 1970–1979 and 1980–1989 the number of fires doubled (from 683 to 1,299), although the burned surface was halved (from 28,445 to 16,557 hectares); 2) between 1990–1999 and 2000–2009 the number of fires remained more or less stable (from 1,242 to 1,275), although the burned area was reduced drastically by three quarters (from 15,356 to 3,480 hectares); 3) in the period 2010–2012 alone the burned surface was greater than the total recorded for 2000–2009 (from 3,480 to 5,627 hectares). Note that the large fire of 2013 in Andratx-Estellencs is not included in these statistics.

(2013, p. 49), large forest fires – i.e. those burning more than 500 hectares – have been responsible for burning the larger part of the total annual burned area in the Balearic Islands, despite being only a smaller number in the total of forest fires. Among them, the fire that burned the most hectares in the entire Spanish state in 2013 (European Commission *et al.*, 2014, p. 54) and the largest forest fire ever recorded in the Balearic Islands, consumed more than 2,400 hectares of Andratx and Estellencs (Conselleria d’Agricultura Medi Ambient i Territori and Tecnosylva, 2015, pp. 141-142), leading to the evacuation of 700 residents in Estellencs (Manresa, 2013a). It also affected La Trapa, a natural area owned by GOB, whose young pine forest had already burned down in 1994 due to another large fire (Manresa, 2013b). In 2018, a forest fire again affected Estellencs (see Figure 6.2), burning more than five hectares and forcing 150 people to evacuate. Although this 2013 fire is the only large forest fire that has occurred in Serra de Tramuntana since records are kept, the Andratx-Estellencs fire has indeed galvanised the media, the public opinion and the government of Mallorca.

Forest fires: socio-environmental impacts and prospects in Serra de Tramuntana and beyond

Fire is a phenomenon which arises from a wide range of social and environmental factors interacting and intersecting. As the ethnographic quotes at the beginning of this chapter showed, fire is generally perceived on a symbolic level as destructive. As pointed out throughout this chapter, the wide-ranging, complex and ambivalent perspectives of various sectors of society regarding forest fires shape the way policies and strategies have evolved for dealing with them. In this section, I shall attempt to unravel this complexity by analysing, in particular, the various perspectives regarding the main consequences of forest fires from a range of social groups involved.

For the majority of those interviewed in Valldemossa, Estellencs and within the regional environmental institutional context, the main consequence of forest fires is the destruction of the landscape. They constantly reiterate the devastation that a post-fire landscape signifies for them: “[The fire] with regard to the landscape is devastating; it’s a lunar landscape,” said Carles, a forestry technician at IBANAT. Sebas, a Civil Defence volunteer in Valldemossa, added, “It’s horrific; two days after the Andratx fire was extinguished I went to the area and [there was] a blackness that was creepy. It was sad.” Among the descriptions of post-fire landscapes (see Figures 6.3 and 6.4), references to

the predominant colour changes were common, such as “Going from a beautiful green to a hell” (Francesc, environmental agent); “[The landscape] goes from being green and alive to being dead, black, without a forest” (Joan, young farmer from Valldemossa); “It’s a total change; you lose relief, colours, tonalities, the mountain becomes black” (Marta, member of Xarxa Forestal); “It’s desolate, the land turns grey and black” (Cati, resident of holiday home in Estellencs); “The first month [following the Andratx-Estellencs fire] it was a lunar landscape, with whole forests of burnees. A gloomy, deathlike feeling” (Hector, resident of Estellencs evacuated during the 2013 fire).

The vast majority of these observations, however, emphasise that the regeneration of vegetation makes the impact of forest fires on landscapes a temporary affair (see Figures 6.5, 6.6 and 6.7). For example, Toni, a farmer from Estellencs, commented, “Fire may devastate . . . but then everything grows back.” Likewise Xisco, an elderly resident of Estellencs, pointed out that “The fire *cleanses* (i.e. clears), burns everything, but afterwards it regenerates. Now for example in Andratx, there are no pines and flowers are everywhere.” Similarly Oriol, a foreign resident of Estellencs, had this to say: “The fire only destroys at the beginning, but it also creates an opening for other things to appear. It regenerates things when it works out right.” Indeed, most interviewed institutional actors shared this point of view, as it is the case with environmental agent Pau and Txema, a forestry technician at IBANAT:

The first years there’s this utter blackness, you see dead trees still standing which later come down, but after five or six years you can already see that the vegetation has remained.

From the point of view of environmental impact it’s clear; for a while, the landscape is covered with ash and its ecological quality is lost . . . but it’s a matter of time scale, provided there’s no recurring fire.

In fact, some studies, such as the one conducted by Romme et al. (2011, p. 1196) twenty years after the great fire of 1988 in Yellowstone, suggest that many ecosystems recover and even benefit from the devastation of forest fires, especially if there is subsequent forest management. On the other hand, recurring fires may well compromise the capacity of the burned area to recover, although this depends on a variety of factors, such as the regenerative responses of each plant species (Pausas, 1999; Montenegro *et al.*, 2004; Mouillot *et al.*, 2005; Moreira *et al.*, 2011) and the changes in land-use that affect ecological processes (Foster, 1992; Duguay and Vallejo, 2008; Santín and Doerr, 2016).

Some of the personal reports, especially those by the inhabitants of Estellencs and Valldemossa, about the devastation of the landscape caused by forest fires had a strong emotional element and referred to the loss of a landscape in which they felt deeply rooted. For example, Margalida, a charcoal-burner from Valldemossa told me of the pain she felt seeing the area around her husband's house going up in flames in the fishing harbour Sa Marina fire of 1983: "when it comes to a place you love . . . it hurts you to see it like that." A similar perspective was held by Tòfol, a Valldemossa builder of stone terraces, when talking about the forest fire of Andratx:

The landscape changed as radically as day from night [with the fire], as if there'd been a devastation. All of a sudden, around Andratx and Estellencs, I saw everything in grey. It's as if they've taken away a piece of you, because you'll never set eyes on that [forest] again for the rest of your life. It's absolutely terrible.

Many people argued, moreover, that the destruction of the landscape could lead to economic problems if it went on to have an impact on the number of tourists drawn to Serra de Tramuntana by its scenery. In this sense, Bartomeu – owner of the rural hostel at Valldemossa who manages the olive groves that are visible to the tourists (see Chapter 3) – stated that the main impact of the fires was "the landscape, touristically speaking." Other people also emphasised the impact that forest fires could have on visitor numbers, as it is the case of the Civil Defence volunteer in Valldemossa Sebas, and a technician at Emergency Services:

If the forest around us here in Valldemossa were to catch fire, it wouldn't seem like the same town. Because the image it gives to tourism . . . would be affected; it wouldn't have the same charm anymore.

We make a living out of a landscape . . . because we have here sea and mountains, and [a fire] changes the entire landscape . . . If our locality ends up becoming unsafe due to forest fires, the tourists will go elsewhere.

Indeed, faced with the fear that the impact on the landscape of the 2013 fire would affect tourist numbers in August, the villagers of Estellencs organised a

demonstration²³² and campaigned through social networks so that, in the words of Maties, “people could see that the town remained just the same after the fire and the tourists would come.”

A significantly different view regarding the impact of forest fires on the landscape was held by a number of foreigners and urbanites who vacation in houses in the area affected by the Andratx-Estellencs fire of 2013. These people said that they liked the unimpeded views they now had from their houses after the fire had burned down the dense stands of pines which formerly surrounded them. As explained by Emma, who travels each summer with her husband from France to an Estellencs house whose surroundings were burned in the fire, “It’s a shame that the forest has burned down; but the place looks better, as we can now see the sea, there’s also more sun in the house and we have a much wider view.” For his part, Cristian, a new resident of Andratx originally from the capital Palma, told me while showing me the farm he owns in the area devastated by the 2013 fire:

The landscape has improved. Before, it was all pines and more pines. Two months after the fire, all the reeds were in flower; some gorgeous golden flowers. The mountain became velvety. I hadn’t seen that before! And the sea . . . Now I can see the sea from my house! What I can see now I couldn’t see before. The farmland has opened up, as before you could see neither the mountain nor the sea, only pines. Now when the sun sets the rocks reflect the light. It’s a strange, beautiful feeling that I hadn’t seen before. [And] all of this is thanks to fire.

Some residents of Valldemossa and Estellencs also appreciated the fact that the 2013 fire brought to light part of the landscape’s agricultural heritage hidden beneath the

²³² According to a local newspaper (Bastida, 2013), the protesters demanded that the Andratx-Estellencs road should be re-opened after it had been cut off for a fortnight. As one of the organisers of the event narrated to the journalist, “Estellencs without tourism is a dead municipality, a ghost town and the ruin of the local people who have devoted most of their working lives to the service sector. The fire has taken out one lung, and now the authorities through their passivity want to finish knocking us off completely” (ibid.). Another resident added, “Our town can be reached from Andratx or Esporles. 85% of vehicles get here via a road which is at present still closed to traffic. Of the 2,500 plus cars that used to pass through each day, not one does so now. We have no desire to become a ghost town” (ibid.). Finally, a representative of the Association of Audiovisual Producers of the Balearic Islands (APAIB), asked the Government to draw up an urgent plan for reforestation, as “the maintenance of the landscape of Serra de Tramuntana is essential for the tourist industry and for the economy in general” (ibid.).

dense mass of pines that had grown in recent decades. For example, Vicens – an inhabitant of Valldemossa and member of an IBANAT brigade – explained:

The landscape has changed a lot [after the fire]. Before, when you went to Andratx you'd see a dark, thick forest, and hardly knew what lay beneath it. Now you go along and can see dry-stone terraces (*marjades*) we didn't even know existed. [The fire of] Andratx-Estellencs has taught us something of what we had before: farmed areas and *marjades*, that not everything was forest.

However, Rubén – an environmental technician working on hiking projects on the Dry Stone Route (Ruta de Pedra en Sec)²³³ – explained that although the fire makes it possible to visualise this anthropogenic landscape, the fire is been devastating for the *marjades* as “the stone is now burnt and so they degrade quickly.”

After the impact on the landscape, the second consequence of forest fires that most of those interviewed mentioned was the erosion of the soil, an especially serious problem in Serra de Tramuntana due to its very steep and rocky slopes. Retaining the soil here after it rains is much more difficult because the plant and tree roots which once held it in place have withered. Some forestry technicians and environmental agents also remarked that the extent of soil erosion and loss of organic matter partly depends on the recurrence of fires and the intensity at which they burn. Indeed, as numerous studies on a global scale suggest, large fires can be very erosive for soils²³⁴ although most medium and low-intensity fires²³⁵ do not have significant geomorphological effects (Ferreira *et al.*, 2008; Shakesby 2011; Scott *et al.*, 2014, pp. 15-18). For this reason, preventing soil erosion is one of the Ministry of Environment's chief priorities following forest fires, as explained by forestry technician Albert with regard to the 2013 fire:

²³³ The Dry Stone Route (Ruta de Pedra en Sec) or GR-221 is a long-distance trail (301 km once it is properly set up) which crosses Serra de Tramuntana from Andratx in the south to Cape Formentor in the north. The main tourist and recreational attraction of the route is the large number of dry stone buildings that can be seen along its way. For more information, see Sastre *et al.* (2014).

²³⁴ Among the most prominent side-effects of forest fire on the ground, Scott *et al.* (2014, p. 157) emphasise that large fires can fracture and destroy rocks, affect the capacity of rainwater to enter into the soil, and expose mineral-rich soils to desiccation due to the destruction of low-lying vegetation.

²³⁵ Fire intensity is, according to Xofis (2006, pp. 20-21), “the rate at which a fire produces thermal energy and how hot it is, being expressed in terms of heat (calories) or power (watts) (Brown and Davis, 1973). The significance of fire intensity as a component of fire behaviour arises from the fact that it is the heat energy produced which causes adjacent fuels to be heated and to burn, thus releasing more heat and propagating the fire (Johnson, 1992).”

[Once the pines that might harm people or infrastructures and those that might be a source of pest proliferation had been removed] we identified the areas which, because of their slope, were deemed vital for action, as otherwise the soil there would disappear with the first rains. . . . We said “Here we laid down the retaining bands [of trees]. There, we won’t remove any timber, but retain it; making structures to prevent erosion” (see Figure 6.8). In flatter areas we can remove the pines and [burned] vegetation. Thus the general idea was to either remove or leave, depending on whether there was a risk of erosion.

The third destructive result of forest fires mentioned by others – particularly fire-fighting coordinators – was the risk to people and private property. This was how Àlvar, a forestry technician at IBANAT, expressed it:

Above all on account of the presence of humans in residential developments and the like, [fire] is a problem. No longer is it just the mountainside that gets burnt. Increasingly we’ve to take into account the number of people that are out there in the wilds. [The forest] can be regenerated, but when there are people involved it’s more complex, and the pressure [to extinguish it] is greater.

The risk and damage from fires on people and infrastructures not only is increasing, but it is increasingly impacting the forest and fire management strategies and policies in Serra de Tramuntana, as I explore in the following section.

Forest Fires: the impacts of demographic and settlement dynamics

Serra de Tramuntana has increasingly become a place in which urban populations pursue their leisure activities (Salvà i Tomàs, 2000) (see Chapter 3). In fact, the growing number of houses and residential developments devoted to second residences in rural and mountainous areas – in spite of the risk of fires – is part of a trend shared by many rural areas right across the Spanish state (Montiel and Herrero, 2010; Moreno *et al.*, 2014; Jiménez *et al.*, 2017) and all around the Mediterranean (Lampin-Maillet *et al.*, 2010; Galiana *et al.*, 2011), as well as further afield in countries like Australia (Bond and Mercer, 2014) and the United States (Stewart *et al.*, 2003, p. 6). Numerous studies, especially in the last decade, have shown how this growing residential population in the vicinity and even within forested areas – usually called ‘urban-forest interface’ or ‘wildland-urban

interface' (WUI)²³⁶ – is attracting significant attention around the globe.²³⁷ For instance, in the United States it has reached the stage that since the 1980s urban-forest interface zones have been the main factor affecting forestry policies (Theobald and Romme, 2007, p. 340).

Urban-forest interface areas generate a particular set of problems with regard to the incidence and management of forest fires, some of which I have identified as present in Serra de Tramuntana. First of all, urban-forest interface areas are important sources of ignition (Rego *et al.*, 2010, p. 220). A clear example of this is the fire that burned more than 2,400 hectares in 2013, which originated when a resident threw the remaining embers from a barbecue into an area adjoining a forest in Andratx (Fueris and Mora, 2013). The parallel with other parts of the world is clear. In California, for example, it has been established that most fires are caused by humans in some way, and that they are concentrated near infrastructures such as residential areas and roads (Syphard *et al.*, 2007), especially along the coast of California, matching the state's rapid growth in population during the twentieth century (Keeley *et al.*, 2012, p. 118). Similarly, in southern Europe during the summer, there has been an increase in fires in recreational and urbanised forest areas (San-Miguel-Ayanz *et al.*, 2012, pp. 21-22).

A second problem of urban-forest interface areas with regard to forest fires is the high risk they pose to human lives and property (Moreira *et al.*, 2011). As explained by Albert:

[Forest fires cause] problems for society. Every year we have more and more people living scattered across rural areas, creating a real problem of personal danger to them. Fires wouldn't have such enormous repercussions if there weren't people living in the forests

²³⁶ In much of the literature, the area of interface between rural and urban areas is referred to as 'peri-urban regions' (Bond and Mercer, 2014, p. 9); which Blanchi *et al.* (2004 in *ibid.*, p. 7) defined as "an area of interface between urban and rural areas containing a unique set of characteristics and functions." Nevertheless, 'peri-urban regions' usually refers to areas surrounding cities that contain a variety of both rural and urban land-uses (Allen *et al.*, 2001, p. 135). A more comprehensive and widely used term is 'Wildland-Urban Interface' (WUI) (e.g. Gill, 1979; Theobald and Romme, 2007; Hammer *et al.*, 2009; Galiana *et al.*, 2011; Darques, 2015), which refers to both the areas surrounding cities as well as the construction of secondary residences in rural areas (San-Miguel-Ayanz *et al.*, 2012, p. 22; 2013, p. 12). I here use the term as 'urban-forest interface', the one most commonly used in this field of study, as also in regional literature and legislation (e.g. PFIB, 2013; Bernat, 2015).

²³⁷ In Canada and the United States, especially after the large fires of 1985 (Davis, 1990); in Australia after the fires of 2003, 2007 and 2009 (Enright and Fontaine, 2014, p. 34); and in Europe after the severe fires that affected France, Portugal, Spain and Greece between 2003 and 2009 (Lampin-Maillet *et al.*, 2010, p. 71).

who are in danger on a daily basis, especially at times of high risk of fire.

In this sense, the Andratx-Estellencs fire of 2013 represented a watershed for the Balearic Islands, as 120 houses were burnt to the ground (Conselleria de Medi Ambient Agricultura i Pesca, 2018) (see Figure 6.9), many built illegally it would appear, hidden beneath the dense cover of pine forest that stood prior to the fire, according to the majority of environmental agents interviewed (see Chapter 3). In recent years, human losses²³⁸ and the socioeconomic and ecological repercussions of large fires are growing, even in territories with a long history of forest fires – such as Canada²³⁹ and California²⁴⁰ – which Nauslar et al. (2018) have associated with the recent expansion of urban-forest interface areas.

The third and final problem generated by urban-forest interface areas that I have identified in Serra de Tramuntana cropped up in the stories of all the members of institutional bodies that are involved in forest fires management who I interviewed.²⁴¹ Although there are few studies that tackle this issue (e.g. Castellnou *et al.*, 2010, p. 121), the ethnographic data suggests that urban-forest interface zones which are without

²³⁸ These fatalities are not caused only because the fire physically reaches people, but also by the inhalation of smoke. As Johnston et al. (2012, p. 695) recount, the smoke of ‘landscape fires’ – encompassing illegal forest fires, wildfires, peat fires, tropical deforestation fires, grass fires and agricultural burning – cause the death of 260,000 to 600,000 people each year.

²³⁹ The McMurray fire in 2016 burned 1,500,000 acres, destroyed around 2,4000 homes, forced 88,000 people to flee and caused economic losses of about C\$9 (Mahmoud and Chulahwat, 2018, p. 9315).

²⁴⁰ At the end of 2017, two large fires in North Bay and Southern California resulted in the deaths of 46 people and the loss of thousands of buildings (Nauslar *et al.*, 2018). However, according to the California Department of Forestry and Fire Protection (Cal Fire 2018), the 2018 fire season – in which 8,527 fires were recorded which burnt up a total area of 766,439 hectares – was one of the most destructive since records began. In November 2018, during another wave of large fires, the Camp Fire killed 86 people, being the deadliest and most destructive fire in California’s history (see Figure 6.10), as well as one with the most fatalities in American and global history (*ibid.*). Satellite images comparing the landscape of Paradise before and after its destruction by the 2018 Camp Fire can be found in Tilley and Leslie (*ibid.*).

²⁴¹ This was also evident during the “Initial Meeting of Municipal Officials for the Prevention of Forest Fires” which I attended on July 30, 2015, especially during the debate after David Caballero’s talk, “The danger of forest fires is real: risk in the urban-forest interface.”

measures of self-protection²⁴² prevent the effective putting out of forest fires. This is because, as many institutional actors explained to me, whenever a fire breaks out all extinguishing efforts must focus first of all on areas where there is a danger to people's safety; secondly, on areas where there may be damage to effects and property; and only thirdly and finally, on forested areas that are alight (see Figure 6.11 and 6.12). In other words, if a forest fire approaches a residential area, all human resources and extinguishing materials have to focus on safeguarding houses and residential developments – even if they have been totally evacuated – instead of trying to stop the fire spreading throughout the forest. This was explained by Carles, the forestry technician in charge of coordinating the IBANAT brigades, and by firefighter Juanjo:

Forest dwellings are a real problem. . . . This is what we saw in Andratx. My exhausted brigades were trying to save houses and meanwhile the fire was growing elsewhere, rampaging through the forest.

In Andratx one of the problems was when the fire hit Sa Coma Fresca and Coma Calenta, two residential developments. You have to give priority to the inhabited areas because that's where there is danger for people. You send whatever is necessary to protect the inhabited areas, and you don't have the resources to control the forested zones. You must give priority to lives and property.

As we see here, the fact that a large proportion of the houses and forest developments in Serra de Tramuntana lack self-protection measures makes the task of extinguishing even more difficult, as explained by many environmental workers and forestry technicians such as Txema:

In Serra de Tramuntana everyone wants to have their little house on top of a hill, with the pine forest reaching the windows, and all but coming inside the house (see Figure 6.13). They spend a million and a half euros on the building, and not as much as a thousand or two to have the immediate surroundings *cleaned* (i.e. cleared) of pines. When the fire is heading towards the house, I, as manager of the

²⁴² According to article 11 of Decree 125/2007 of October 5, “there must be a strip 25 metres wide separating built-up areas from the forest, free of scrub and vegetation that could spread a fire in the forested area”; “Any built-up or urbanised area should properly have two alternative access roads. When a second road is not available, the single access road must end in a circular area, with radius 12.50 m.”; and “In areas at high risk of forest fires, the aforementioned built-up areas must have at least one external hydrant of a standard suitable for effective use by the fire-fighting services” (ibid., p. 10).

[extinguishing] process, have little choice but to direct all resources towards the house. As a result, as long as I cannot direct them towards the fire, it grows bigger and bigger.

Houses without self-protection measures are often second homes only inhabited a few weeks every year. In many other cases, as mentioned by Txema, the owners make no effort to control the biomass,²⁴³ wishing to maintain the density of the forest surrounding their houses. And, despite the fact that some of the local town-dwellers and foreign residents in Andratx and Estellencs appreciated the open views to the sea after the 2013 fire (as indicated earlier in this chapter), the new residents that come from other countries or from cities tend to seek and surround themselves with a dense, unbroken mass of forest which they associate with what is wild and natural (see Chapter 5), which is what probably led them to acquire homes in the most inaccessible parts of the mountains and as deep as they could go into Serra de Tramuntana forests. In the words of environmental officers Sebastià and Xisco:

[Owners of forest dwellings] want density and isolation, not management and security.

Today I was near Bunyola,²⁴⁴ where there's a house which stands at one of the crucial points, so that if a fire comes, this house will be the 'snack' (*berenar*) . . . In Andratx, in Ibiza, the [urban-forest] interface is incredible. People aren't sensitised, they love to have the pines brushing by their window, they feel isolated in nature and that's what they love, it's what they're seeking. But they aren't aware of the risks involved.

In view of this, certain forestry technicians and environmental officers raised the possibility that many owners of woodland residences are failing to control the vegetation

²⁴³ As self-protection measures are currently optional, the Forestry Plan (2013, pp. 49, 79-81) proposes the creation of a law that would establish the compulsory nature of having them in residential developments and buildings bordering or surrounded by forested areas, as well as securing the legal responsibilities to ensure their application. A legal precedent to this proposed measure was passed by the Generalitat de Catalunya in 2003 (according to Law 5/2003 of April 22).

²⁴⁴ Bunyola is a municipality in Serra de Tramuntana of more than 6,000 inhabitants, bordering the municipality of Valldemossa, among others. For more information see www.ajbunyola.net (last consulted on 01.16.2019)

surrounding their homes because, coming from northern Europe²⁴⁵ – where forest fires are less frequent – their perception of the risks is considerably lower.

The same issue has surfaced in places such as Australia and the western United States, where attempts to limit the construction of houses surrounded by flammable vegetation have had little political support, partly because they run up against the interests of former urbanites who, attracted by green foliage and motivated by new lifestyles unavailable in the city, acquire properties in areas of urban-forest interface (Scott *et al.*, 2014, p. 177). The impact that these neo-rural populations have had on socio-environmental processes in protected natural areas²⁴⁶ over recent decades is manifold and diverse, and my attention is here focused on their role in the outbreak and management of forest fires. Thus, not only does population migration to fire-prone areas add challenges and complexity to forest management and forest fires, but the increasing expansion of the urban-forest interface in many parts of the world makes it vitally important to consider the risks involved in living in places susceptible to wildfire (Carroll and Paveglio, 2016, p. 48).

Large forest fires: policy, management and environmental aspects

Fire as a disaster: large forest fires and the policy of suppression

The aforementioned risks to human life and material properties, together with the institutionalisation of fire control²⁴⁷ and the spectacle offered by the media of

²⁴⁵ For example, among the accounts of residents forced to evacuate their houses rapidly before the advancing Andratx-Estellencs fire and picked up by a national newspaper are those of a couple from the United Kingdom and their German neighbour, whose houses were partially burned (Abril, 2013).

²⁴⁶ To take one example, in the Cabo de Gata-Níjar Natural Park, as examined by Cortés-Vázquez (2014), the daily practices and the ‘natural life-style’ of the neo-rural populations play a key role in the dynamics of dispute over exploitation and preservation of natural resources in the protected area.

²⁴⁷ With the institutionalisation of forest fire control, the State has become the sole protagonist which, by law, can and should be responsible for dealing with forest fires. As indicated by the Fires Plan (2015), only authorised institutional agents can participate in firefighting tasks, and they alone can sanction or prohibit the use of anthropogenic fires by the local population. The predominant use of technology to understand and explain forest fires (see Figure 6.16) is one of the political consequences of their institutionalisation (Scott *et al.*, 2014, p. 187), leading to “a longer trajectory of increasing technocratic control over territory, resources and populations by the state” (Harwell 2000, p. 325).

agencies fighting uncontrolled fires and satellite images of fire smoke²⁴⁸ (see Figures 6.14 and 6.15), has spread the idea among the public and policy-makers that all fires are ‘disasters’ to avoid by all means (Pausas *et al.*, 2008, p. 713; Bowman *et al.*, 2011, p. 5). In order to understand how this social conceptualisation of fires as disasters to avoid by all means has influenced the management of forest fires I explore the management aspects and the forest fire suppression policies²⁴⁹ that have prevailed over the last decades. For this, I shall also try to make a clear distinction between the dramatic events of large forest fires and other fires which are more regular but of smaller size and intensity.

After the large Andratx-Estellencs fire of 2013, several media outlets published articles in which unions (such as those linked to the IBANAT workers’ committee), professional associations (e.g. the Colegio de Biólogos), environmental groups (e.g. GOB), and other collectives and individuals criticised the budget cuts to campaigns of fire prevention (Domblás, 2013; Noticiasmallorca, 2013; Pinya, 2013; Press, 2013).²⁵⁰ Even so, according to Domenech (2015, p. 488), the capacity to extinguish fires in the Balearic Islands has increased dramatically in recent decades thanks largely to the expansion and consolidation of the inter-island surveillance and fire extinguishing system. What is more, as pointed out by most of the interviewees involved in putting out fires and by some experts in the field (e.g. Hernández, 2013), the Balearic Islands is the Spanish autonomous community with the largest resources for putting out forest fires.²⁵¹

²⁴⁸ An example of these catastrophic events was reported by a newspaper which covered the Andratx-Estellencs fire of 2013, according to which “the flames turned first of all into a forest volcano, a giant cloud of smoke that could be seen from the centre of Mallorca, and immediately afterwards into out-of-control fronts of fire. During the last two days, with high temperatures and very low humidity on Mallorca, giant columns of smoke by day and an orange sky at night provided a dramatic backdrop to the area. Many distressed neighbours wept for the loss” (Manresa, 2013c).

²⁴⁹ The fire suppression management strategy implies the immediate extinction of any low-intensity fires (Pyne, 1998, p. 60).

²⁵⁰ Despite these cuts, the prevailing tendency is to increase budgets aimed at strengthening the means and technology of detection and extinguishing forest fires, as Raddi (2000) documents in the case of Catalonia. An example is the announcement by Catalonia’s interior minister of cuts in the winter campaign devoted to preventing forest fires in order to prioritise aerial methods of putting out fires during the summer (El País, 2013).

²⁵¹ According to the Forestry Service (Govern de les Illes Balears, 2018), Mallorca currently has three Ground-Filled Aerial Water Bombers (each with a tank of 3,100-litre capacity), one Medium Twin-turbine Helicopter (1,600 litres), three Single-turbine Light Helicopters (900 litres), one Coordination and Observation Plane; four land fire brigades, two helicopter brigades, four fire engines; thirteen points of fixed surveillance, four of mobile surveillance, and one of aerial surveillance; as well as a wide range of technological equipment, such as the monitoring system of land and air resources by GPS and other technological communication systems, meteorological prediction and simulation of forest fires.

One of the indicators commonly used (e.g. PFIB 2013, p. 80) to assess the effectiveness of these resources for extinguishing fires is that the number of *conatos* – fires affecting an area of less than one hectare – tripled in Mallorca between 1990 and 2010 (Conselleria d’Agricultura Medi Ambient i Territori and Tecnosylva, 2015, p. 54).²⁵² In other words, the resources in the Balearic Islands for suppressing fires succeeded in extinguishing the majority of outbreaks with great rapidity, demonstrating an exceptional ability to limit the burnt area in most cases (Castellnou *et al.*, 2010, pp. 121-122). To properly understand this, we must bear in mind that for several decades the majority of fire management strategies have been based on policies of fire suppression²⁵³ aimed at the rapid detection of any source of unauthorised fire and its immediate extinction, attacking it directly in most cases.²⁵⁴ As specified by forestry technician and extinguishing coordinator Carles, “Our goal is to put out the fire as quickly as possible.”

In spite of the well-documented rapidity of Balearic firefighting when it comes to extinguishing fires, there is one particular statistic published in the Forestry Plan (2013, p. 49) which needs underlining, as intimated in the introduction of this chapter: a minority of fires – 1% of the total – called ‘large forest fires’²⁵⁵ have burned up most of the area affected by *conatos* and other small fires – in fact, around 77%.²⁵⁶ In other words, just nine large fires in the Balearic Islands have been responsible for half the burned area of forest in the last 25 years (Domènech, 2015, p. 490).²⁵⁷ Many members of IBANAT, forest technicians and firefighters raised this issue, like Carles, who coordinated the firefighting teams one day during the Andratx-Estellencs fire:

I’m not so worried personally about the number of fires – although that too – because in the end you’ll have the fire that’ll produce all the

²⁵² According to the Fires Plan (2015, p. 54), between 1990 and 2010 443 fires and 1,544 *conatos* – i.e. fires affecting less than one acre – were recorded in Mallorca and Cabrera.

²⁵³ The fire suppression policies of the Spanish state as a strategy for extinguishing fires is similar to the “conventional restrictive regulatory approach” adopted by most Mediterranean regions in Europe (Lázaro and Montiel, 2010).

²⁵⁴ In this context, ‘direct attack techniques’ means fire extinguishing strategies based on the use of water and the support of aerial means (Sande *et al.*, 2010, p. 178).

²⁵⁵ In this context, the term ‘large forest fire’ is not only defined as a fire that burnt more than 500 hectares, but also as “one that maintains in a sufficiently regular way a speed, intensity and/or length of flame that exceeds the capacity of the extinguishing system and thus provides scant opportunities for putting it out” (Costa *et al.*, 2011, p. 13).

²⁵⁶ Domenech (2015, p. 488) makes similar calculations: of the 3,081 fires that have occurred in recent years, only the 32 largest – those exceeding 100 hectares – have affected 75% of the total burned area in this period.

²⁵⁷ Those which took place in 1990, 1992, 1994, 1999, 2011 and 2013 (Domènech, 2015, p. 490).

problems. Like in Andratx and then in Cala Mesquida²⁵⁸ . . . those two fires burned up more than all [fires of] the previous five years.

Again, this dynamic in fire regimes extends well beyond Serra de Tramuntana, with similar percentages being recorded in other Mediterranean parts of Europe.²⁵⁹ In fact, the incidence of forest fires affecting large areas and causing considerable ecological damage at great economic cost is a growing problem right across Europe's Mediterranean regions, as shown by exceptional fire seasons in recent years (Moreira *et al.*, 2011, p. 2392).²⁶⁰ These types of giant fire are also becoming more frequent in many other parts of the world, such as California (Nauslar, Abatzoglou and Marsh, 2018), Australia (Howitt, 2014), Southeast Asia (Murdiyarsa and Lebel, 2006), and the intertropic zone (Cochrane, 2009).

The increasing number of large forest fires affecting many parts of the globe has generated a series of media, political and academic debates in which there is a growing consensus that the strategies of immediate extinction by means of direct attack are inefficient or inadequate when, under certain conditions – meteorological, topographic and/or due to the abundance of fuel (Fernandes 2009; Moreira *et al.*, 2009) – the fire's behaviour becomes extreme (Castellnou *et al.*, 2010, pp. 121-122; Montiel *et al.*, 2010, p. 178). That is to say, although the costs of extinguishing forest fires are greater than ever, the fires in major cases are increasingly intense, have faster propagation rates and affect larger areas (Sande Silva *et al.*, 2010, p. 189; Calkin *et al.*, 2015; Westerling, 2016; Westerling *et al.*, 2016; Keeley and Syphard, 2017). In the Balearic Islands, this became clear in the 2013 forest fire, which was completely out of control for several days and not extinguished for 18 days, despite the deployment and coordination of all the Balearic fire and emergency resources and the support of national ones,²⁶¹ including 29 aircraft

²⁵⁸ One week after the 2013 Andratx-Estellencs fire, another in the northeast of Mallorca (Cala Mesquida-Cala Torta) burned down 480 hectares, 95% of which was made up of canes and fan palms, and the remainder of young pine forest (Ollés, 2013).

²⁵⁹ Between 1980 and 2006, less than 3% of fires consumed 75–80% of the total annual burned area in Spain, Portugal, France, Italy and Greece (San-Miguel-Ayanz and Camia 2009, p. 15).

²⁶⁰ Europe's largest forest fires were recorded in Portugal in 2003 and 2005; in the southeast of France in 2003; in Spain in 2006 and 2009; and in Greece in 2000, 2007 and 2009 (Castellnou *et al.*, 2010).

²⁶¹ Including all regional extinguishing and emergency equipment – such as IBANAT, the Mallorca Fire Brigade, Civil Protection, the 112 Emergency Service, the Red Cross, SAMU061, Maritime Rescue, the local Police, the Mallorcan government's Department of Roads, local councils and the Civil Guard; plus the support of state media such as the UME (Military Emergency Unit) and the BRIF (Reinforcement Brigades in Forest Fires) (Efe, 2013; Cifre Sabater, 2017).

and 800 operatives on the ground. According to several forest technicians in charge of coordinating the diverse firefighting means, the fire of 2013 was of a type that feeds itself. In other words, under certain conditions of aridity, heat and wind, the fire can generate internal environmental conditions that dry the available vegetation as it spreads, thus generating a fuel of higher flammability which increases both the severity of the fire and the extent of the burned area (Bond, 2013, p. 436). Such was the inability to control the fire of Andratx-Estellencs that, according to several coordinators responsible for human, ground and aerial extinction whom I interviewed, the fire would very likely have continued to spread, devastating Estellencs, Banyalbufar, Valldemossa and the rest of Serra de Tramuntana had it not been for a change in wind which directed it towards the sea. The fire of 2013 graphically demonstrated that nowadays there are fires beyond our capacity to control, whose propagation depends on certain meteorological conditions, fuel availability and topography. This is what one fireman, Eloi, had to say:

This type of fire will come along sooner or later. After the Andratx fire, another will break out, and then another . . . Day D, hour H, with conditions C, we'll have it again. Either from someone throwing away a cigarette butt, or due to a pyromaniac causing it deliberately. Because it's no longer a question of having plenty of planes and helicopters . . . When the conditions are right, you get the big fire.

Recently, the fire suppression policies have been signalled as a factor which contributed to the incidence of large out-of-control fires, as I shall examine now.

The fire paradox: fire suppression policies contribute to the risk of large forest fires

The large forest fire of Andratx-Estellencs in 2013 raised another issue that in fire management literature is known as the 'fire paradox' (Minnich, 1983),²⁶² which I introduce using the words of Eloi and Bernat, who acted as managers and extinguishing coordinators over different days of the Andratx-Estellencs fire:

Large fires are something we have and will continue to have, and we need to be more and more prepared for them. Have you heard about the paradox of extinction? The better you are at putting them out, the more fires you'll get. Because every time there's a fire you go "I'll stop

²⁶² Despite the 'fire paradox', being first raised by Minnich in 1983 – also called 'wildfire paradox' (Arno and Brown 1991 in Calkin *et al.*, 2015, p. 2) – it is not until today that this issue has received more attention.

it!” And [later] there’s another, of course, [because] the fuel hasn’t been burned up. . . . in Andratx we won’t have any large fires again for thirty or forty years because everything’s already been burned, and the fuel will be growing little by little. We’ve been suppressing all these small fires for many years, and we now have so much fuel that it’ll burn in all directions.

Not now [i.e. there aren’t more fires than before], but they’re bigger. The paradox of forest fires, we call it. As we get more efficient at suppressing small [fires], the more likely it is that there’ll be a major one, because of the fuel accumulation [in the forests of Serra de Tramuntana].

In other words, as argued by many of those who work in regional forest fire management, and according to a mounting body of literature (e.g. Piñol *et al.*, 1998; Xofis 2006; Costa *et al.*, 2011), the strategy of extinguishing all small fires as quickly as possible is contributing to a dense and continuous accumulation of fuel which, unmanaged, facilitates uncontrollable wildfires and constitutes a severe threat to lives, ecological reserves, properties and infrastructures. In the state, this paradox was raised by official bodies for the first time in 2002 in the Forestry Plan of Spain (2002, p. 88), which stated:

The degree of efficiency achieved by fire extinguishing authorities, reinforced and improved technically to a considerable extent in the past ten years, can be rated as high . . . This efficiency has allowed the impact of fire to be limited, paradoxically favouring the risk of new fires which spread due to the accumulation of fuels.

This analysis is also supported by a range of case studies from other parts of the Spanish state and Mediterranean Europe, according to which the incidence of large forest fires since the late 1990s is related to the implementation of all-out extinguishing policies and the absence of fire in previous years (see Moreira *et al.*, 2011, p. 2392).²⁶³ Thus, the paradox of fire suggests that effectiveness in reducing fires of low and medium intensity favours the incidence of high-intensity ones (Castellnou *et al.*, 2007; Sande Silva *et al.*, 2010).

²⁶³ For example, after the implementation of successful extinguishing policies in Greece between 2001 and 2006, the fires that occurred in 2007 were the worst recorded to date, burning between 20,000 and 30,000 hectares (Moreira *et al.*, 2011, p. 2393), as some had warned (e.g. Xanthopoulos 2007). In the Balearic Islands, while the period 2000–2009 is considered a ‘fabulous decade’ as there were few forest fires, between 2010 and 2013 there was a dramatic change, due mainly to the outbreak of large forest fires affecting areas greater than 500 hectares (PFIB, 2013, p. 44).

Conclusions

In this chapter we have seen the complexity, diversity and ambivalence that marks the category of 'fire', and how a range of different perspectives have affected forest fire management strategies and policies in the Serra de Tramuntana Nature Site. In attempting to address this complexity, I have first of all examined the main socio-environmental consequences of forest fires in the Serra de Tramuntana according to a variety of social groups. The majority of people interviewed, both residents of Valldemossa and Estellencs as well as members of emergency and institutional services, placed the destruction of the landscape as the main consequence of forest fires. However, most of these individuals also argued that despite the initial devastation which scars the post-fire landscapes black and grey, fire stimulates the regeneration of plants and shrubs in agroforestry lands through which it has passed. In this respect, when fires are not repeated, ash and other components that remain in situ act afterwards as fertilisers so that the plants and shrubs that have been burned reappears even more vigorously than before. With regard to the temporal factor in these changes to the landscape, this is also for many decisive: just as the devastating effect of forest fire is simultaneous with the rate at which it spreads, it takes long years, decades even, for its traces to become less visible, especially in forested areas. As a result, for some inhabitants of Valldemossa and Estellencs, the outbreak of a large forest fire entails the loss of the landscape they had interacted with up until then. Moreover, for many villagers, the lengthy recovery of 'green' (i.e. forested) areas has a major effect on the tourist industry, namely economic losses for those who benefit from tourists visiting the Serra de Tramuntana, drawn there by its landscape of dense forests. The second most commonly cited consequence of forest fires in Serra de Tramuntana was soil erosion, a particularly serious problem for the steep and rugged territories of these mountains. Finally, the third most mentioned consequence was the risk to people and material goods, an issue of increasing concern to the emergency and institutional services involved in fire management, especially with the growing trend for residential housing in areas contiguous to or surrounded by forests, commonly called in the institutional context as areas of urban-forest interface.

The increase in the number of homes located within or adjacent to forested areas is now being incorporated as a determining factor in forest management strategies and policies, as shown in the United States (Theobald and Romme, 2007, p. 340). However, based on ethnographic data, I suggest the problems generated by building homes on

forested lands is an unresolved issue in terms of dealing with forest fires in Serra de Tramuntana. Evidence is provided by the Andratx-Estellencs fire, where in order to safeguard homes and other infrastructures, human and material resources were unable to focus on putting out the fire in the forested areas where it spread with intensity and speed. Currently, the main preventive strategy for safeguarding homes at the urban-forest interface is that owners adopt self-protection measures, including the removal of biomass all around the dwelling. However, according to current demographic trends, foreigners are those who generally own these homes as a second residence. As examined in the previous chapter, their interest in surrounding themselves with dense vegetation to provide a sense of isolation in nature, far from civilisation in the wilds, discourages such owners from carrying out the tasks of self-protection against fires. On the contrary, they promote greater continuity and density of the forest biomass surrounding their homes. In this respect, I suggest that the increasing trend right across the world to reside in isolated dwellings in forested areas increases the need to take the greater risk of forest fires as a fundamental criterion in environmental management strategies and policies in protected areas, an issue that I explore in greater depth in the next chapter.

The increasing incidence of large forest fires – such as the Andratx-Estellencs fire of 2013 – with serious socio-environmental repercussions is one of the factors that reinforce the general perception of forest fires as a catastrophe to be avoided at all costs. Following this premise, forest fire management strategies of recent decades have focused on the rapid detection and suppression of any outbreak using direct methods, that is, water and airborne resources. In the Balearic Islands, these strategies have had considerable success in drastically reducing the number of hectares affected by the majority of fires. However, as I have pointed out, we should bear in mind that such strategies are not effective in containing large fires which, despite being a very small minority (only 1% of the total), have been responsible for most of the hectares affected by forest fires in the Balearic Islands. The existence of such fires, which rage beyond any capacity to extinguish them, reinforces the urgent need to review current strategies and policies for forest fire suppression, an issue raised around the world by academics who have been discussing the so-called ‘fire paradox’ (Minnich, 1983), a term which has now gained widespread acceptance. According to the fire paradox, the rapid extinction of fires in recent decades has contributed to a greater density and continuous expanse of fuel, which increases the risk of large forest fires breaking out which cannot be extinguished. In the context of Serra de Tramuntana I have shown that for many

members of Balearic emergency and institutional services that take part in firefighting practices, the fire of Andratx-Estellencs in 2013 raised that issue. Based on the analysis of statistical data for fires in the Balearic Islands as well as ethnographic data, I suggest in this chapter that the present case study shows that the rapid suppression of small fires promotes the outbreak of other, larger ones, which spread with great speed and intensity and, consequently, lie beyond any capacity to control and extinguish them using customary methods. In addition, I consider that the specific social, historical and environmental characteristics of Serra de Tramuntana which differentiate this case study from others provide an opportunity to contribute to the ongoing debate with a specific analysis. That is, although some critics of forest fire suppression policies consider them to be the main factor behind biomass accumulation – as was the case in Southern California according to Minnich (1983) – I would suggest that the growing density and continuity of the forest mass which leads eventually to large forest fires is caused, above all, by the abandonment of agroforestry practices during the second half of the twentieth century (see Chapters 2 and 5), including the abandonment of terraced olive groves (see Chapter 3). I therefore suggest that the policies for suppressing forest fires of recent decades is a factor which, alongside the restrictions of use imposed by the protected area's conservation policies (see Chapter 4), have intensified that accumulation in Serra de Tramuntana of a dense and continuous forest mass that causes fires to spread faster and more intensely, thus becoming more difficult to control and, ultimately, having greater socio-environmental repercussions.

Figures

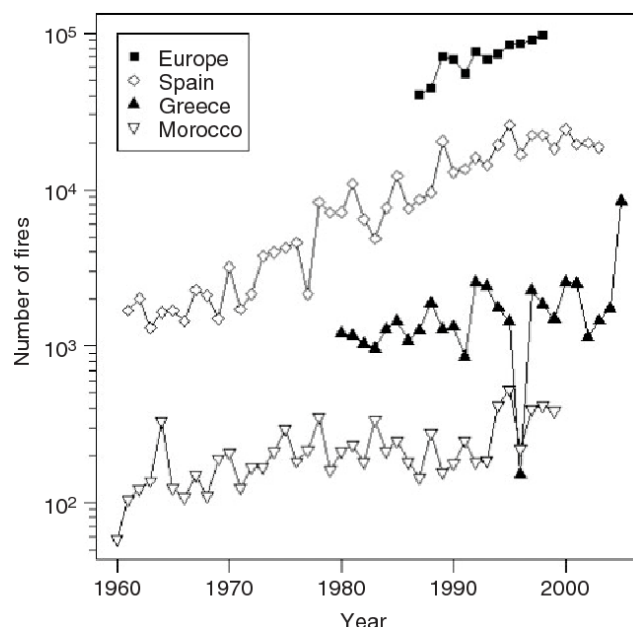


Figure 6.1: Number of fires between 1960 and 2010 in various regions of the Mediterranean (Portugal, Spain, Greece, Morocco and Turkey) and Europe. Source: Pausas et al. (2008: 714) modified from Pausas (2004).



Figure 6.2: Photo taken soon after the IBANAT terrestrial brigades stopped the spread of a forest fire in this area. That fire burned five hectares of Estellencs in 2018 and forced the evacuation of 150 villagers.

Photo: Maria Cifre.



Figure 6.3: A landscape carpeted in white ash showing the black trunks of trees and burned vegetation, which contrasts with the green landscape in the background, which the fire did not reach. This picture was taken only a few hours after a forest fire burned 8.6 hectares in Cala Tuent (Escorca) in November 2016.

Photo: Maria Cifre.



Figure 6.4: Forest of pines and *Phoenician juniper (savina)* burned in the fire of Sa Canova (Artà), which in August 2016 destroyed 2.3 hectares. I took this photo when the fire had not been extinguished yet.

Photo: Maria Cifre.



Figure 6.5: Vegetation cover on a slope affected by the Andratx-Estellencs fire, less than half a year after the fire.
Photo: Xarxa Forestal.



Figure 6.6: Vegetation cover on a slope affected by the Andratx-Estellencs fire, more than five years after the fire.
Photo: Xarxa Forestal.



Figure 6.7: Area burned by the large forest fire of Andratx-Estellencs in 2013, one year later. On the right, an area of green pine that did not burn. On the left, an area of blackened and scorched pine forest, in which vegetation has already begun to appear.

Photo: Maria Cifre.



Figure 6.8: Post-fire landscape, one year after the large Andratx-Estellencs forest fire of 2013. The black lines on the mountainside are barriers against soil erosion, made with the burnt pine trunks from the same area.

Photo: Maria Cifre.



Figure 6.9: The inside of one of the houses that were burned in the fire of Andratx-Estellencs in 2013, just one year after the fire.
Photo: Maria Cifre.



Figure 6.10: Aerial view of the town of Paradise, California, reduced to ashes by the Camp Fire in November 2018.
Photo: Noah Berger (AP photo), published on Sputniknews.com.



Figure 6.11: While the house and its immediate surroundings were not burned thanks to the action of the IBANAT brigades, the forest areas were completely burned by the forest fire that in 2016 burned 8.6 hectares of Cala Tuent.
Photo: T. Reiner, extracted from El Pais.



Figure 6.12: The owner of the farm (wearing a red t-shirt) helps the IBANAT brigade to secure the perimeter of the house, which was saved from the fire that had burned 8.6 hectares of forest in Cala Tuent.
Photo: Maria Cifre



Figure 6.13: A house almost completely surrounded by a dense forest mass in Valldemossa.
Photo: Maria Cifre.



Figure 6.14: Aeroplane putting out fire in Andratx in the 2013's fire.
Source: Sepulveda, A. published in the newspaper Última Hora (2013).



Figure 6.15: Satellite image of the Andratx-Estellencs fire in 2013.
Source: Mallorcadiario.com (last consulted on 16.08.2019)

Chapter 7. Managing fire with fire: changing perspectives on some aspects of the management of the protected area, including the incorporation of anthropogenic fire as an environmental management strategy

“Fire is a problem if it gets out of control, but it’s also a tool.” (Gaspar, young farmer from Estellencs).

“Fire is both a friend and an enemy. It’s an environmental disaster, but it can also be used to clean.” (Joan, a young farmer from Valldemossa)

“Fire isn’t a problem; not when it’s under control and at the right time. Fire is destructive if you’re not on top of it; forest fires would be just that.” (Sebas, local inhabitant and Valldemossa Civil Defence Civil volunteer).

“Fire is a natural element. It’s only a problem when human beings appear on the scene, [who are] the main cause of fires. [There are] people supporting burns, but for me fire is never a tool. Fire is a loss of biodiversity, soil loss. [It’s] loss, never gain.” (Francesc, environmental agent).

“Fire is something that travels a certain distance and destroys everything in its path. The trouble is that there are controlled fires, which are good. And the problem with fire, in my opinion, isn’t the fire itself, [but] when it gets out of control. Fire is neutral, but it’s a double-edged sword: when it’s uncontrollable it can destroy vegetation and burn people, and kill; and when it’s under control it’s just one more forestry tool for us [in IBANAT].” (Lluc, member of IBANAT Department of Forest Fires).

“Fire isn’t a problem as long as it’s being used as a land management tool and in a controlled manner. It only becomes a problem when it’s out of control. Fire should not be regarded as a negative element for either the ecosystem or land management. Fire that is controlled and used as a management tool isn’t a problem.” (Álvar, IBANAT forestry technician).

Introduction

In this chapter I will examine the possible impacts of the incidence of large forest fires such as that of Andratx-Estellencs in 2013 on forest fire prevention and

management policies and practices, as well as the current role of anthropogenic fire as a biomass management tool, in both forest fire prevention and extinction strategies.

In the Mediterranean, the use of burns by the local population ceased to be common practice halfway through the twentieth century coinciding with the abandonment of agroforestry land, a development exacerbated by legislative changes at the end of the century banning to a large extent fire usage in agroforestry practices (see Keeley *et al.*, 2012, p. 354). In Serra de Tramuntana, the local population used fire as a part of their agroforestry customs, so that its use was widespread up to the abandonment of these practices during the second half of the twentieth century. Depending on the context involving its specific uses, fire was given different names and functions and was used by different groups of actors. Anthropogenic fires most commonly used in Serra de Tramuntana were given the name of *formiguers*,²⁶⁴ used in farmland as a fertilisation and phytosanitary method; the controlled burns²⁶⁵ (*cremes* or *socarrats*) for the creation of

²⁶⁴ To make a *formiguer* you piled up bundles of shrub wood and small tree branches gathered from the local forests, and then placing two or three bigger pieces of tree trunk on top of each pile. The pile was covered with clods of earth (*terrossos*) taken from the place where the *formiguer* was being made and finally it was all covered – except for a hole at the bottom of the pile and another smaller hole at the top – with a layer of earth. The lower hole allowed the introduction of the ignition source – normally a long dry piece of cane – and the hole at the top allowed oxygen to circulate, thus keeping the firewood burning. After several hours of slow burning, all that was left were ashes and the burnt clods, which were then broken up into small pieces and scattered around the farmland to provide fertiliser nutrients. Besides that, the clods having been burnt, any insect larvae and propagules that might have been in the soil would have been killed, thus contributing to the control of both insect infestation and undergrowth.

²⁶⁵ The controlled burn (*crema*) consists of a low intensity fire in which all the vegetation in a certain area is burned, with the exception of trees, for which reason it is a type of the so-called ‘surface fire’. According to old herders, these burns were planned in different ways based on the type of vegetation, wind direction and the slope of the land. First of all you started the fire from a safe place which could easily be evacuated should it be necessary. Helped by the wind direction and/or slope of the land, the fire would slowly progress until it reached an area with no available fuel – normally a stone wall or an area of land without vegetation – where it would die out of its own accord. A few weeks later, the vegetation – normally reeds – would again sprout up, at which point the herder would be able to take his goats or sheep to graze in the tender, new pastures.

tender, fresh pastures in the highest parts of the mountains; the bonfires²⁶⁶ (*crema a fogueres*) for the clearance of unusable agroforestry waste material, as a phytosanitary method in forest land, and as a fire prevention strategy; and backfires²⁶⁷ (*contrafocs*) as a method of forest fire extinction.

With the local population's abandonment of these subsistence agroforestry practices, these fire usages gradually disappeared, a process escalated by the restrictions of use implemented by the diverse conservation bodies and policies converging in the protected area. Such dynamics are common in many rural areas worldwide. For example, as established by Mathews (2005, p. 796) in the case of Mexico, the use of fire by the local population is frequently seen by the State as consistently destructive and, therefore, in need of control, regulation and elimination. The existence of discussions regarding the use of fire by the local population has evidenced the tensions in changing cultural and political contexts, in which biodiversity values often implemented by governmental agencies have sidelined rural communities dependent – or who until recently depended – on agroforestry activities (Altangerel and Kull 2013: 5). The use of fire on the part of

²⁶⁶ The 'controlled burns' are the type of anthropogenic fire still most in use nowadays. These burns are generally carried out in cropland, private plots of land, fruit orchards, terraces and forest areas in both large and small properties. At the present time, members of the IBANAT brigade make use of this kind of fire to get rid of agroforestry waste after pruning by mechanised means in certain areas so as to create expanses of land with a low fuel density, much like a firebreak. In order to carry out these burns, heaps of organic material are piled up at a prudent distance from any trees that might be harmed by the heat given out by the fire (*fogor*), for which reason it is often done close to a dry wall. The largest and driest pieces of wood are placed in the centre, and then any other bits of organic waste material such as branches, leaves and canes are piled up on top. Once the fire has been lit, the remaining damp, organic material that will burn more slowly is thrown on to the top and centre part of the fire little by little.

²⁶⁷ Backfires were the main strategy used in former years by the local population of Serra de Tramuntana as a means of putting out forest fires. In fact, for most people I interviewed in Valldemossa and Estellencs, "you fight fire with fire" (*aturar el foc amb foc*). Nowadays, only institutional agents are allowed to make backfires, and always with the authorisation of all firefighting coordination departments. A backfire is normally a surface fire – thus it does not affect the tree canopy – created intentionally during a forest fire to meet the forest fire head on, so as to change the direction of the fire's convection column as desired to stop the spread of the fire or to facilitate the firefighting work (Gunn, 2000, p. 30).

institutional agents has given rise to the appearance of new forms of anthropogenic fire, as for instance the prescribed burn²⁶⁸ (*crema prescrita*).

In this chapter I shall first of all explore the impact of the Andratx-Estellencs fire on many groups of stakeholders taking part in extinction tasks during that great forest fire as well as management strategies and practices – that is, prevention and extinction – carried out by the departments of which they form a part. So I shall explore the diverse strategies which are currently under consideration for the reduction of the continuity and density of the build-up of living and dead biomass in Serra de Tramuntana, as well as their current feasibility, taking into account diverse socio-economic factors, such as implementation costs or their effect on protected species. I shall then examine in greater depth the role placed by fire within this framework, which will enable me to analyse some social dynamics currently arising within the institutional context itself.

“Fires are put out in winter”: changes in policy after the large forest fire of Andratx-Estellencs in 2013

“Fires are put out in winter” is one of the phrases most frequently repeated during my interviews with private forest managers, firefighters, members of the Emergency Service, of IBANAT and of the Forestry Service. They are also words frequently quoted by both regional and at times also national media, particularly after a forest fire has occurred (e.g. Niño, 2012; Ara Balears, 2013; González, 2013; Magro, 2013). The message implicit in this phrase is that the best way in which to avoid the incidence of large forest fires in summer – when the weather is more extreme and conducive to fire – is to carry out prevention work during the winter. In the words of Quim, a private forest manager:

²⁶⁸ The prescribed burn, in a similar way to the controlled burn, is a low intensity fire which slowly burns all the build-up of fuel on the surface of a certain area of land. As a preventive measure, the prescribed fire creates breaks in the forest mass impeding the spread of a fire. When used along the sides of tracks and roads to reduce the possibilities of a fire being started, it consists of a type of prescribed fire called a ‘widening burn’ (*crema d'eixamplament*). During a fire, the prescribed burn never comes into head on contact with the fire – as in the case of a backfire – but get rid of any fuel in a certain area through which the fire could be predicted to spread, so as to stop or slow its ability to propagate. Moreover, in the case of a surface fire, the prescribed burn eliminates any undergrowth, thus creating a vertical break making it much more difficult for the fire to spread to the trees and in this way preventing a canopy fire, which is much more difficult to control and extinguish.

Here in Mallorca we can see that there's a very good, very active management of the actual forest fires. I mean, a lot of money is spent on acting as quickly as possible when a fire breaks out, [on] having bases for the helicopters to drop water faster. We spend a vast amount of money on IBANAT staff to deal with bouts of fire. Everything involved in putting out the fire once it's broken out is very well organised, and I'm not the only person to think in this way, but it is in fact a widely held view. What is missing nowadays? [What is missing is] the other part, the management to prevent fires from happening. We cannot have some guy throwing away a load of stuff left over from a barbecue and burning half the mountains [like what happened in Andratx]. There must be clearings, management, safety zones. The management strategy in place before fires really does need to be reviewed.

However – as I explored in greater detail in the previous chapter – media impact and the social and political importance of the forest fires have led to the budgets for the management of forest fires being centred on a rapid and efficient deployment of many different means of extinction, instead of promoting preventive measures in the management of the biomass and protection of the urban-forest interface (PFIB, 2013, p. 49). This situation is extensive to the whole of the Spanish state, where public funds earmarked for extinction purposes increase year by year, despite already being the territory with most means of aerial extinction per hectare of forest in the world (Hernández, 2013).

As ethnographic data suggest, this prevalence of extinction strategies over those of prevention may also have been favoured by the positioning of some institutional sectors opposed to the development of policies of active agroforestry management (see Chapter 5). For example, a part of the body of environmental agents and some departments of the Ministry of the Environment – such as Species and Biodiversity Protection – usually make use of the regulatory administrative processes in which they are involved to try to limit the preventive management of forest fires to creating and maintaining firebreaks, thus impeding the development of practices that would imply greater interference in the actual forests (a question that will be explored in greater depth further on in this same chapter). This positioning was defended by, for example, the environmental agent Francesc:

In my opinion, [the forests have to be] interfered as little as possible, because I don't agree with the argument [people make] on the subject of fires that the forest is *dirty*. Too much damage is caused around

here with the excuse of fire prevention. A part of that is all right, but others not only claim that the forest is *dirty*, but take advantage of it to carry out policies of fuel reduction that from my point of view in fact degrade the forest.

As was pointed out by many institutional actors from various departments of the Ministry of Environment, until very recently this was also the majority perspective among many IBANAT brigade members and technicians, Civil Protection volunteers, forestry technicians from the Ministry of the Environment, the Department of Emergencies and the Mallorcan Fire Brigade. However, as others pointed out, the Andratx-Estellencs fire marked a sea change in our way of understanding forest management for many members of these institutions. Some of them, like the forestry technician Albert, stressed the fact that the 2013 fire had made them seriously consider the urgency and importance of managing the continuity and density of the fuel build-up, either making use of the means at the Ministry of the Environment's disposal – as for instance, making the IBANAT brigades conduct forest management during the winter – or by being more liberal in the granting of permits allowing the local population to actively manage their lands within the area demarcated by the Natural Site (*Paratge Natural*):²⁶⁹

For us, the members of the Forestry Service, [the 2013 Andratx-Estellencs fire] has been a real turning point. We've realised that all the conservation work carried out... You can try to force the people with the idea that 'you have to conserve, not cut down [trees], not touch, not burn'. But what we have realised is that there is nothing further from conservation than abandonment. It's one of the things that have become clearest after this fire. In order to conserve you need to take action. In many areas it won't be necessary to do anything, they can be left alone, but there are other areas where it is necessary to take action. . . . A mosaic situation is what we need. That is, to have areas of dense vegetation and then clearings, and then carry on with another homogeneous area [of forest] here. This will stop the fire getting stronger. . . . I think that the Andratx fire has been very useful to take the step from what is purely and simply a matter of forest

²⁶⁹ According to Article 43 of the Serra de Tramuntana Natural Resource Development Plan (2007, p. 8), passed by Decree 19/2007 on March 16: 'Felling, uprooting or any other action that might cause the disablement of arboreal specimens of forest species with a diameter equal to or in excess of 10 centimetres, would require an administrative permit from the forestry service which, in all cases, will consider land protection, biodiversity conservation, the enhancement of the mass and the sustainable use of natural resources' and 'modification of plant cover, understood as that which might affect natural forest shrub-like vegetation of scrubland or grass would require an administrative permit from the forestry service.'

management, to actual landscape management. What that means is that instead of managing the forest we have to manage the landscape, on a comprehensive scale. This has actually been set out in our handbooks for the last seven years,²⁷⁰ but it's true that the Andratx fire has really brought it home to us. The [2013] fire has had an enormous impact. In the end, it's up to the politicians, who are the ones who take the decision to grant permits or not. But on a technical level we really have realised that we need to be more permissive. It isn't a matter of handing out permits willy-nilly – neither now nor before – but there must be some more freedom, because we can't carry on like this. We know that with the model we've had up to now, we know that every so often everything is going to burn, because that's the way it is. So we have to do something to make it [the landscape] more resistant, so we don't have fires that are getting more and more virulent. Because what we have now are periods of small fires, but then we have a large one that burns up everything. It's a matter of trying to always have small fires. And we'll be able to do that when the landscape is more resistant to the phenomenon of fire. We probably already had this idea before but the Andratx fire was a real wake-up call.

So, therefore, in summary, for many institutional actors, the large 2013 fire was an opportunity to see first-hand that if there is a high level of unbroken and dense forest mass and under certain conditions of dryness, heat and wind, not even with all the means of extinction at our disposal will we be able to stop a fire from spreading. For this reason, some institutional sectors connected to Serra de Tramuntana forest management are currently in a process of a change of perspective by which, in order to favour nature conservation in Serra de Tramuntana, restrictions of use and non-interference in the local forests must be replaced by more active forest management strategies. According to ethnographic data, I would suggest that the incidence of large forest fires is bringing about an actual change in the environmental management practices of the protected area. In this respect, as some farmers, private forest managers, landowners, IBANAT brigade members and forestry technicians have pointed out, since the large 2013 fire, there has been an increase in the number of both requests and granting of permits for selective tree felling, particularly if it is a case of creating a firebreak. As I was told by Vicens, an IBANAT brigade member and inhabitant of Valldemossa, and Joan, a farmer from Estellencs:

²⁷⁰ Albert, like other forestry technicians, mentioned specifically the newsletters and operations related to forest and forest fire management carried out by Catalan institutions, as for example the Centre de Recerca Ecològica i Aplicacions Forestals (CREAF) o la Universitat de Lleida. In this case Manuel was referring to the pamphlet *La Prevenció de los Grandes Incendios Forestales adaptada al Incendio Tipo* (Costa *et al.*, 2011).

I think that this fire opened everybody's eyes a bit. I know that around the area of Andratx, the firebreak thing was more or less a taboo; you could only [cut back on] a bit of undergrowth, [but] the trees you couldn't touch, because there were a lot of landowners who didn't want that, they said that it was a crime to get rid of trees to reduce the forest mass, that they could be fined. . . . I think it really depends on the environmental agent who comes to see you and on the area. It's true that some environmental agents are becoming more and more in favour of getting rid of more [forest] mass, when it's a question of a firebreak. I've seen a bit of an evolution [since the Andratx fire]. Before that, some of them would just refuse to budge on the matter, but now more and more they say "it's better to have 20 metres on both sides [of the tracks and roads] reduced to ashes,²⁷¹ to prevent a fire jumping across, or for it to stop right here."

They should consider giving the landowners *carte blanche*; and they're doing just that, you know! The forest rangers [now called environmental agents] are doing things differently from what they did ten or even five years ago When I started in this job, four years ago, I remember that when we went to get firewood for our home, we used to call the ranger and he would say: "you can do some felling but I have to come and mark [the trees you can cut down]." The last time I called he asked me "what do you have to cut down?" and I said "pines", [to which he answered:] "OK, cut down a hundred, and when you've cut down a hundred, you call me again and I'll give you permission to cut down another hundred." So, I think that things have really changed since the Andratx fire. When it's a question of holm-oaks, it's another matter, but with pines, things have indeed changed.

Bearing in mind that many inhabitants of Valldemossa and Estellencs consider that the main cause of the spread of the fires is the *dirty* state of the forests – that is, the accumulation of live and dead biomass, especially from pines, that exists in the forests due to their abandonment – (see Chapters 3, 4 and 5), I would suggest that the incidence of large forest fires is bringing about a rapprochement of positions among many local and institutional actors relating to the environmental management of the Natural Site.

However, many other people – particularly environmental agents, those in charge of refusing or granting permits to local people's forestry practices – deny that there has been any significant change in the regional forestry policy since the 2013 fire. For this reason further research would be required that would allow us to increase and triangulate

²⁷¹ Vicens is referring to the wider areas created by the reduction of biomass by the side of tracks and roads in order to reduce the risks of fires starting and to impede the spread of a fire.

ethnographical data on this matter.²⁷² Nevertheless, the need to manage the fuel build-up in Serra de Tramuntana, is certainly a vital issue for much of the local population and currently also becoming a priority for the institutional bodies responsible for forest management and the management of forest fires.

The management of accumulated dead and living biomass in Serra de Tramuntana

Regarding the need to manage the accumulated biomass, the vast majority of those interviewed underlined the enormous difficulties that exist at the present time for this task to be successfully carried out. In order to better understand this question, I shall go on to analyse some of the strategies for the reduction in biomass currently under consideration in Serra de Tramuntana.

According to many inhabitants of Valldemossa and Estellencs, members of the IBANAT brigade, private forest managers and some forestry technicians, one of these strategies to reduce the continuity and density of forest biomass in Serra de Tramuntana would be the recovery of agroforestry uses.²⁷³ However, many agroforestry practices are currently restricted by the regulations for such uses established by the various conservation figures and laws governing in the Natural Site (see Chapter 4), in particular in forest areas categorised as Natural Areas of Special Interest (Àreas Naturales de Especial Interès, ANEI).²⁷⁴ In addition, charcoal burning, hunting, sales of timber, oil production, animal husbandry and the other agroforestry practices carried out in Serra de Tramuntana ceased to be economically viable halfway through the last century (see Chapter 2). The sale of timber is not currently a viable strategy owing to the low market

²⁷² Indeed, many farmers, landowners, private forest management companies, IBANAT brigade members and forestry technicians claimed that there exists a lack of unified criteria among environmental agents when it comes to granting felling permits. Supporting this idea, the Forestry Plan (2013, p. 71) states that “the staff in the Balearic forestry administration all agree on the existence of discrepancies in criteria and a lack of adequate coordination between the administrations and bodies involved.”

²⁷³ Several case studies, as for example that carried out by Tàbara et al. (2003, p. 249) in Catalonia, suggest that the ‘reactive paradigm’ which has ignored the crucial role played by long-term prevention and through which economic resources have been invested in extinction, has failed, which is the reason why the authors support the emergent ‘preventive paradigm’. According to this paradigm, it is vital to promote the socio-economic development of abandoned rural areas with a high fire risk, through processes of decision making and implementation in which local population play a key role (ibid., pp. 256–258).

²⁷⁴ For example, in exclusion areas, there was a ban on farming, animal husbandry and hunting; while the use of fire and forest exploitation required an administrative permit (According to Decree 19/2007 of 16 March).

price of timber and the high cost of production, especially considering that the rugged landscape and the lack of well-maintained forest trails make any mechanisation of the extraction process difficult or even impossible. In order for the sale of timber to be economically viable under these conditions, extensive non-selective pruning would have to be carried out on both pines and holm-oaks – since the market price of oak is considerably higher than that of pine – which would infringe the regulations established in the Serra de Tramuntana Natural Resource Development Plan (Plan de Ordenación de Recursos Naturales de Serra de Tramuntana, PORN). Moreover, widespread pruning would involve the felling of large areas of forest and the dragging of trees to roads from which they could be transported, the authorisation of which would be extremely difficult due to the ecological damage it would provoke. Although not on a widespread scale, this seems to have already occurred in some parts of Serra de Tramuntana, as I was told by the environmental agent Francesc:

I feel extremely concerned about the exploitation of biomass set out in the [Forestry] Plan. Because companies cannot make a large investment, it wouldn't be worth their while if they don't cut it all down; that's as plain as day. I've seen that very thing happening here! Places where they've wreaked total havoc because the lumberman needed to get the maximum [economic benefits from the sale of timber].

Moreover, existing regional, national and international public funding, such as for example the subsidies for the recovery of olives awarded by the Serra de Tramuntana World Heritage Site Consortium, are few and far between and in most cases do not reach many smaller landowners (see Chapter 3). In this respect, the 2013 Forestry Plan suggests that the economic cost effectiveness of forest property should be improved and boosted – although it fails to establish the mechanisms for this to be carried out – without this having a negative effect on the ecological values of Serra de Tramuntana (PFIB, 2013, p. 90).

A second strategy for the reduction of the fuel build-up thus preventing forest fires in Serra de Tramuntana is the exploitation of biomass to generate electricity. Not only is this strategy being considered by a large number of people, but is one of the main strategies put forward by the Forestry Plan (2013), by several state experts in forest and fire management (Gómez *et al.*, 2010; Soliño *et al.*, 2010; Malico *et al.*, 2016), and is a key

line of forest management in the guidelines provided by the European Union.²⁷⁵ However, the exploitation of biomass to generate energy faces the same problems as timber exploitation, as I was told by Bernat, a member of the Emergency Department:

For it to be economically viable there would have to be a lot of tree felling in Serra de Tramuntana. The Mallorcan society would never accept the indiscriminate pruning of a single acre of forest, nor the sight of heavy machinery inside the forests. The public administration chiefs know this, and would never dare to do such a thing.

A third strategy is the creation and maintenance of enclosed areas where the density of biomass would be reduced, as is the case of firebreaks and safety areas by the sides of tracks and roads. This is currently the main management practice carried out by IBANAT brigades during the winter months. As several Forest Service and IBANAT forestry technicians pointed out, some departments in the Ministry of the Environment do not look kindly on this policy, either because they do not consider it to be effective in fire management, for its impact on the landscape, or the possible effect on protected endemic plant species. Faced with these arguments, the IBANAT's forestry technician Carles – who coordinates the work of the IBANAT members during forest fires – stresses the importance of having ‘safety zones’²⁷⁶ such as managed agricultural lands or firebreaks:

As managers of emergencies and forest fires, we've to look for opportunities to have safety zones within the forest. . . . Areas with less fuel, because in the end, fire feeds off this material. . . . Having these safety zones, such as firebreaks, allows you to penetrate into the forests and to work from a safe place. . . . When we make ‘lines of defence’ – firebreaks or back-up strips of cleared ground – we try to make the landscape factor compatible with the safety factor. It's not about making firebreaks totally cleared of all vegetation, as in the past; because you realise that fires can spread from secondary sources and can spread to one kilometre away and in that case there is no firebreak that works. . . . [For that reason] in the forestry world, there are schools of thought that speak of auxiliary firebreaks as outdated infrastructures; that are not necessary. I think they are necessary. As

²⁷⁵ This proposal forms a part of the international recommendations and requirements established by the Paneuropean Process ‘Forest Europe’, with Spanish participation (PFIB, 2013, p. 7). Specifically, the exploitation of biomass to generate electricity in the prevention of forest fires was adopted in the Fifth Ministerial Conference on the Protection of Forest in Europe, held in 2007. For further information, see: foresteurope.org/ministerial-commitments/ (last consulted on 18.01.2019).

²⁷⁶ Which are, to use his words, areas with low density of ‘combustible material.’

fire coordinator I know I have a safety line, so I can confidently send a brigade there because I know they will work safely. I'm not trying to stop a fire, because the fire can jump [the firebreak]. What I want is for my people to work safely.

So therefore, although the creation of strips of land with a lower density and continuity of biomass make the work of land-based means of fire extinction both easier and safer, these clearings are not effective to stop the spread of high intensity fires or of fires affecting the forest canopy – particularly in steep mountain areas – since these fires can create secondary points at a considerable distance, even jumping roads or firebreaks.

Lastly, a fourth strategy in the management of fuel build-up for the prevention of forest fires under consideration in Serra de Tramuntana is the use of anthropogenic fire. As will be explored in greater detail further on, owing to the current impracticality of the previously mentioned strategies – whether because of their ecological, landscape or economic costs – the use of fire as a strategy for prevention or even extinction is gradually gaining support in the Balearic Islands, as well as in other areas of the Mediterranean (Fernandes, 2013, p. 175; Fernandes *et al.*, 2013), of Europe (Lázaro and Montiel, 2010; Moritz *et al.*, 2014) and of the United States, in particular in areas of urban-forest interface (Agee and Skinner, 2005; Theobald and Romme, 2007; Calkin *et al.*, 2015). In fact, despite the intentionality of controlling and excluding fire – through policies of immediate extinction and restrictions on the use of anthropogenic fire – throughout history the use of controlled fire has been one of the most common and successful strategies in the prevention and containment of large forest fires (Pyne, 1998, pp. 65–66). In Serra de Tramuntana, the use of fire as a strategy for the prevention and extinction of large forest fires was common among the local population of Valldemossa and Estellencs. However, since the 1970s, with the introduction of different laws regulating the environmental use and management of Serra de Tramuntana (see Chapter 4), the use of fire by the local population has been severely restricted and subordinated to the control of institutional actors. At the present time, although technical fire – that is fire used by institutional body technicians – is becoming more and more recommended or even incorporated in the Fires Plan (Plan General Contra Incendios de las Islas Baleares, 2015), its use is still extremely limited, a question I shall explore below.

Fighting fire with fire: fire-management policies and the institutionalisation of fire control

Many members of the regional environmental management institutions share the perspective that the use of fire by the local population – particularly when used to create fresh grazing lands – is an extremely degrading practice for the forests. This perspective is also reflected in the Forestry Plan (2013, p. 39, 47):

For many years, even still to some extent at the end of the nineteenth and first half of the twentieth centuries, pasture and cropland gradually grew in extension in the mountain areas, through the repeated use of fire, until the forested area was reduced to a bare minimum. . . . Fire defines decisively, as both a natural element and as a cultural tool, the landscape of the island's natural spaces. The conversion of more and more of the area to scrubland and the degradation of the plant cover by recurring fires²⁷⁷ (bare of reeds) are witnesses to the severe impact that fire can have on extensive forested areas.

Another strong argument against the use of fire by the local population – as well as being considered ecologically degrading – is that it increases the risk of fire. As is argued by some forestry technicians, environmental agents and even some of the younger farmers, the ever-growing density of the forest mass together with demographic tendencies towards the ageing of the active farming population, are increasing the danger for the use of fire as an environmental management tool to get out of control and end up causing a forest fire.²⁷⁸ Bernat – a forestry technician for the Emergency Department – pointed out that because of this issue a large numbers of burn permits are turned down:

In [the Ministry of the] Environment they are trying to refuse permits to farmers who are not able to do it well, who can no longer control things, because there has been a very serious issue. We used to have 30 or 40 years-old farmers who went up and down the mountain, and kept the fires perfectly under control. Not now. Now the average farmer in Serra de Tramuntana is 75 or 80 years-old, and they are no longer able to move around the mountain as they did in the past. And

²⁷⁷ In this case, the term 'fires' also refers to controlled burns used by livestock farmers to create grazing lands.

²⁷⁸ According to the Fires Plan (2015, pp. 45–46), of the 1,500 fires recorded in the Balearic Islands between 1970 and 2012, a large proportion were started by causes classified as 'negligence' and what stands out especially is that 15% of the total were caused by burns on farmlands, 11% by forestry work, and 7.5% by burns to create pasture.

now there is also a greater accumulation of fuel, which wasn't there before.

According to the Forestry Plan (2013, p. 47), a common cause of fire is the “systematic use of fire to get rid of agricultural waste, grass and scrub to gain, *clean* or renew crop, grazing and hunting lands”, since “the culture of fire is deeply embedded in the rural Mediterranean population.” Worldwide, the use of fire is, together with deliberate actions – such as arson and pyromania – the two main causes of the breakout of the majority of fires (Chas-Amil *et al.*, 2015, p. 164). For this reason, many authors have argued that the use of fire by the local population is too risky unless it is carried out following the regulations and ‘good practice’ established by local legislation (Lázaro and Montiel, 2010, p. 139; Montiel and Herrero, 2010, p. 45). In the study case of Serra de Tramuntana, this matter was officially dealt with in 2013 in a first group of restrictions and regulations.²⁷⁹ In 2007, the same year in which the Serra de Tramuntana Natural Resource Development Plan came into force (PORN, 2007) a further decree was passed which was more comprehensive and specific and which still currently regulates the use of fire and all activities liable to increase the risk of forest fire.²⁸⁰ According to this decree, it became banned, unless there is a specific authorisation from the General Department of Biodiversity:²⁸¹ the use of fire in forested areas²⁸² at any time; the

²⁷⁹ In 2003, the Spanish Government granted the Autonomous Communities the power to regulate activities that might generate a risk of forest fires, including the limitation or ban on traffic through the mountain areas (According to article 44.3 of Law 43/2003 of 21 November, of Mountains). This same law established as an administrative infringement ‘the use of fire in the mountains and adjoining areas in conditions, periods, places or for non-authorized purposes’ (According to article 67 of Law 43/2003 of 21 November, of Mountains; modified by Law 10/2006 of 28 April).

²⁸⁰ According to Decree 125/2007 October 5, which sets out regulations on the use of fire and controls certain activities liable to elevate the risk of forest fires. For a summary table of regulations dictating the use of fire for the burning of agricultural waste see Appendix 11.

²⁸¹ In the case of a permit for the burning of agricultural waste, notification must also be given to the Balearic Islands Emergency Services (SEIB), and the burn must be carried out on days and times established according to the criteria of an environmental agent.

²⁸² According to article 5 of this Decree, ‘It shall be considered forest land . . . any land in which grow arboreal, shrub-like, bush or herbaceous forest species, whether spontaneously or as a result of sowing or planting, which fulfil or could fulfil environmental, protective, productive, cultural, landscape or recreational purposes’ as well as any abandoned farmland which might have acquired unequivocal signs of a forested condition, among others.

elimination of forest waste in lands adjoining forests during the periods of fire risk;²⁸³ and the burning of pasture and stubble on farmland during periods of fire risk.

Because of all those points set out above, in the view of many environmental agents, IBANAT forestry technicians, members of the Forestry Service and of other departments that I interviewed, the members of the Ministry of the Environment with pertinent technical expertise should be the only ones authorised to use fire. In this case, it would be what is commonly called ‘technical fire’.²⁸⁴ An example of this view is that of Eloi, a firefighter who has worked at IBANAT as a forestry engineer for 15 years:

Fire has been used, though sometimes very badly, as for example in Artà. But it’s a tool, and it’s gaining ground in Europe and the Mediterranean as one more tool in forest management. However, this should always be under the control of the public institutions, and should always be a technical fire.

Thus, there are many diverse socio-environmental issues influencing the conflicting positions of many actors on the use of fire by the local population in Serra de Tramuntana. Among such issues, those that stand out most are the risks of fire caused by the ageing of the active farming population and the high risk of a fire spreading due to the density of biomass in scrub and forest lands; and the view on the environmental history of Serra de Tramuntana according to which the conversion of forests to pasture is understood as a matter of environmental degradation.²⁸⁵ This view, according to which the use of fire by the local population is a negative practice for their environment, is currently the basis for legislation regulating the use of anthropogenic fire and is dependent on the approval and control of environmental agents. This view, together with the legislative framework, places institutional actors with technical expertise as the

²⁸³ Between May 1 and October 15 – subject to modifications by the Ministry for the Environment depending on the varying weather conditions in different years – as established in article 3 of Decree 125/2007 of October 5.

²⁸⁴ Although ‘technical fire’ is not mentioned in either the Fires Plan or the Forestry Plan, this was the term used by the vast majority of members within the regional environmental management context whom I interviewed. According to Albert, a forestry service technician, technical fire is what is used exclusively by institutional agents, and what is planned and executed following highly technical expertise.

²⁸⁵ Processes of afforestation and deforestation have alternated throughout Mallorca’s environmental history (see Chapter 2). The transformations in the landscape occurring over the last century are those giving rise to the greatest diversity of perspectives amongst those interviewed (see Chapter 5).

only ones legitimately entitled to make use of anthropogenic fire, a view expressed by the majority of those interviewed at the Ministry of the Environment.

Ongoing changes of discourse: the distinction between 'bad fire' and 'good fire'

Although the use of fire by the local population is considered degrading by some institutional actors and its use has been restricted by law, there are currently some institutional sectors – such as many forestry technicians and members of the IBANAT brigade whom I interviewed – who defend the use of fire in a controlled manner as a tool in the management of biomass due to the variety of advantages it currently offers. In their view, the burning of agricultural waste is much faster and less complicated than the mechanical extraction and shredding of the biomass. In the words of the forestry technicians Carles, Txema and Albert: “In two days we can do what it would take a brigade a whole week”; “It [fire] is an efficient, economical tool, it offers a lot of advantages; for a low cost it offers high efficiency, you can burn a lot of hectares”; “To create a clearing [in the forest mass], with firebreaks it costs 3,000€ per hectare, with fire it costs 500€. So, let’s do it with fire.”

In the second place, many of these argued that the use of fire can reactivate agroforestry use, as expressed by Albert respecting the repeated use of burns to boost livestock farming activities:

[Fire] is useful in a controlled manner and as a tool used sensibly, for the regeneration of grazing lands; so for agroforestry management. To manage the rural area through the use of fire to regenerate grazing lands and, therefore, to help to generate another activity: livestock farming.

The reactivation of some of the abandoned agroforestry uses, however, can come into conflict with the restrictions on the use of fire, for which reason some forestry technicians suggested the need for the environmental agents to be more permissive when it came to granting permits for the use of fire, as Albert went on to say:

What happens is that you often say, here what we have to get is a reduction of biomass, which is fuel. But shredding the wood [instead

of burning it] creates some environmental problems,²⁸⁶ but above all it's the expense. If you have to shred, but it's totally unfeasible for you to do so, then you leave it, and then we get into a spiral of abandonment. Sometimes you have to make evaluations and you have to say, look, I would rather they burned to reduce expenses, but at least they did this, instead of by law having to tell them 'from now on you can't burn' if this means they don't do anything. What I mean is that if we want to maintain a landscape that would prevent forest fires, we have to be more permissive.

Another argument used particularly by forestry technicians and members of the IBANAT brigade in support of the use of fire – specifically, controlled burns to create pasturelands – is that to control and take part in burns is an opportunity for members of IBANAT and other institutional agents to acquire experience and training to carry out mandated burns²⁸⁷ and to make firebreaks.²⁸⁸ This is what I was told by Txema and Carles, both IBANAT forestry technicians:

[These periodic burns] are a tool in winter management; as well as allowing you to feel more confident when learning to deal with fire.

²⁸⁶ Albert is referring to the fact that by shredding wood without removing the sawdust created in the process, the larvae that might be living in the trees would be scattered all over the place, thus promoting the spread of forest plagues.

²⁸⁷ In the Fires Plan (2015, p. 190) prescribed burning is defined as 'that carried out based on a technical plan, prescriptively, and which analyses the amount of fuel, topography and weather conditions, so as to reasonably predict the behaviour of the fire within physical parameters (speed, strength, flame height) in such a way that its consequences might correspond to sustainable management with compatible objectives from an ecological perspective'. According to ethnographical data, prescribed burning – in a similar way to that of periodic burns to create grazing lands – is a low intensity fire which slowly burns all the accumulated fuel in a specific area. However, some of its functions are more similar to those of controlled burning: as a preventive measure, prescribed burning creates clearings in the forest mass hindering the spread of fire. When it is used alongside roads and tracks to reduce the risk of a fire outbreak – something quite common in areas of motorised traffic – it is a specific kind of prescribed burning called 'expansion burning' (*crema d'eixamplament*). During the tasks of fire extinction, prescribed burning creates zones from which the teams of firefighters can work in a safe and efficient manner. During a fire, prescribed burning will never come up against a fire head on – as in the case of a firebreak – but will eliminate any combustible material from areas over which the fire can previously have been predicted to spread. In this way, prescribed burning can protect forests, human life and property if used in areas threatened by the advance of a fire. Moreover, in the case of a surface fire, prescribed burning eliminates undergrowth, thus creating a vertical discontinuance which helps to stop the fire from spreading to the forest canopy – that is to stop the fire from becoming a canopy fire, which is much more difficult to control by means of direct extinction (see Chapter 5).

²⁸⁸ A firebreak is 'a fire intentionally set along the inner edge of a control line in order to consume the fuel in the path of a forest fire, or to change the direction of the fire's convection column' (Gunn, 2000, p. 30).

Working with fire gives you really good training for when you have to deal with fires in the summer, which is when the conditions are more difficult. As a tool, [I am] totally in favour. Then let's get together and do what's best in everybody's interests, we take advantage of the opportunity to gain expertise in the management of technical fire, of training, and they get the land cleared of vegetation.

To a large extent owing to the need to manage the fuel build-up in Serra de Tramuntana and the advantages afforded by the use of fire, a new discourse on fire is currently being articulated according to which it is necessary to distinguish between 'good fire' – controlled fire used as a tool for environmental management as well as fuel management – from 'bad fire' – which gets out of control and represents a risk for the population, vegetation and property. In the words of the forestry technician Albert, considering this change in paradigm:

[For] us up till now – and the same thing has also happened in Catalonia and the rest of Spain – for many years the watchword has been 'not 1 fire in the forest'²⁸⁹ (see Figure 6.1), [telling the people] 'don't use fire'. And now the trend is towards saying: there is fire that is good fire and it's often indispensable. And people get thoroughly confused because they think it's a total contradiction in terms. There are environmental agents who are totally opposed [to the change] because they say that up till now we've been telling farmers 'don't burn, don't burn' and now, you're going to give him a permit or even have the authorities going to burn the land? But it isn't a contradiction. And sometimes it's really difficult [to understand]. We are still carrying on with the thing of 'Not 1 fire in the forest',²⁹⁰ because we think it's still necessary to say that, as we've been shown by the fires that have been started by barbecues. ... but the idea that there should never be fire in the forest, I think has its days numbered and will change more and more. It's complicated, but at a communication and awareness level we're trying to make the distinction between good and bad fire.

This dynamic is analysed by Pyne (2016), who suggests that over the last few years we have been witnesses to a change in the way of understanding what fire actually is. In the past, the analysis of fire reduced it to a physicochemical problem of oxygen reaction and heat transference; to an exogenous force which impacted landscapes; a

²⁸⁹ In 2018, Xarxa Natural made a spot for the 'awareness campaign' for the prevention of forest fires in the Balearic Islands during summer. You can watch it in: www.youtube.com/watch?v=u2x1YLPx4yU (last consulted on 2019.08.12).

²⁹⁰ Indeed, in the summer of 2019 I saw in the surroundings of Palma many large panels that advertised this campaign.

political and practical challenge which had to be controlled, suppressed and finally extinguished by firefighting units. However, the author goes on to say, over the last decades fire has come to be understood more as an inherent, fundamental and inevitable ecological process in the Earth System (ibid., p. 1). Over the last few years, with the increase in large forest fires affecting both urban areas and *preserved wildlands* – with the consequent socio-environmental losses, various state conservation agencies (as in the case of the Balearic Islands Forestry Service) concentrate a great deal of effort on distinguishing the fire of the large forest fires – ‘bad’ fire – from the fire that can reduce the accumulation of unmanageable fuel – ‘good’ fire. As Pyne (2016, p. 6) concludes, this represents a global project of intellectual consequences, since fire is changing from being a principle inscribed in mythology, religion and natural philosophy, to an applied central field in forest management.

Although there are many different ways of understanding fire and the anthropogenic use of fire which at times come into conflict, with the passing of the Forestry Plan (2013) and the Fires Plan (Plan Contra Incendios, 2015), the use of fire is incorporated into the Ministry of the Environment model of environmental management.²⁹¹

Anthropogenic fire: constrictions to the use of fire and polarisation of perspectives within the institutional setting

In light of the fact that the Forestry Plan and the Fires Plan suggest that the Ministry of the Environment should carry out burns, I attempted to witness one of these during fieldwork. Nevertheless, at least in the 2014-2015 and 2015-2016 winters, none were actually carried out. Because of this, I started to include questions in the interviews I was doing to institutional agents about the fact that those fires were not carried out, despite being included in the Forestry Plan and the Fires Plan. Indeed, many agreed with

²⁹¹ These two documents set out general guidelines the specific actions to be taken in the matter of fire defence, including the use of technical fire. However, the legal framework allowing the authorised use of technical fire is established in the Ley de Montes (Mountain Law) paragraph 28 of Law 10/2006 of April 28, which modifies article 43 of Law 43/2003), according to which ‘The manager or technician responsible for tasks of extinction should be considered a public authority official and will be able to . . . order, whenever necessary even without the consent of the respective owners the entry of teams and means into forest and farming estates, transit along private tracks, the opening of breaches in walls or fences, the use of water, the creation of emergency firebreaks and pre-emptive burning through the creation of firebreaks, in areas which might reasonably be considered as liable to be consumed by the fire.

the situation I was exposing to them, like Txema, an IBANAT forestry technician: “Legally, it can be done. However, we don’t do it very often.” According to ethnographic data, controlled burns are often carried out by the IBANAT brigades during winter, although this is not the case of prescribed burns and backfires. One of the reasons that seem to make the use of technical fire more difficult to put into practice is that the person signing the authorisation would have to accept any criminal liability that might be incurred should the fire get out of control²⁹² as Txema explained:

You have to know how to manage fire, and it has to be done legally, but here that’s scary. Really scary! . . . Some burns have been carried out, we did them in certain places, but it’s very difficult for that to happen, because the bosses are absolutely terrified on the subject of burns. But we’re never going to learn anything like this, not to make backfires or anything else!

Nevertheless, ethnographic data suggest that the determining factor is the diversity of perspectives and the internal tensions existing within the regional institutional environmental management framework. In the words of Carles, an IBANAT forestry technician:

As an autonomous community we’ve become very specialised at directly attacking the fire with water and we do this very well, but we’ve got much less expertise with technical fire. . . . Now, as the Forestry Plan that was passed last year sets out, it’s a necessary work tool. Burns form a part of our management model [However,] there are some technicians who don’t agree, [there are] a lot of different opinions. There’s a legal framework to work in, but nothing’s been put into effect. There are people who don’t believe [in fire as a management tool].

Among the institutional actors interviewed, the environmental agents and members of the Department of Biodiversity were those most opposed to the use of fire as an environmental management tool, mainly due to the fact that, according to them, the use of fire causes losses in biodiversity, erodes the soil and creates a fire risk, as the narratives of Ernest from the Environmental Quality Service and the environmental agent Tomeu illustrate:

²⁹² While losing control of an agricultural fire is regarded as negligence, a prescribed burn or an uncontrolled firebreak would be considered a deliberately provoked fire, since it would have been started intentionally. In the western legal system, this is called a *chain of agency* (Scott *et al.*, 2014, p. 265).

[Fire] isn't a good tool because it involves biodiversity loss. . . . At the present time I see it [fire] more as a destructive element than a management element; as an element of risk – since it can get out of control – and of destruction more than as an element of conservation or management. On this matter my view is closer to that of a conservationist than to my formation as a forestry technician.

Using fire is barbaric. You lose soil, you erode it, and in Serra de Tramuntana we can't allow that.

As I explored in Chapter 5, for some individuals within the institutional setting, the practices of biomass reduction are opposed to their environmental management priorities of the protected area, as might be the limitation of anthropic activity as a strategy for safeguarding its biodiversity. This perspective was indeed extended to the use of fire as a tool for the prevention and management of forest fires. This can be seen, for example, in the narrative of Francesc, an environmental agent:

If there's a fire, what is needed is to have more means of extinction, and for these to be more efficient. In IBANAT they've wanted to use fire to *clean* [fuel]; and it's been done, I've been there, at firebreak strips. And they've had a whale of a time! This argument [of reducing biomass density] has been used again and again; here I've had complaints and other stuff to do with these burns. An example: La Victoria,²⁹³ [which is] a mountain of public use, protected and such. Well [the IBANAT brigades carried out] a treatment of the vegetation that was so aggressive and heavy-handed, that I was scared. And in the Forestry Service here, with all the hype about fires, they don't take a blind bit of notice of the parameters [of] whether it's LIC or ZEPA.²⁹⁴ They only look at 'the density has to be X'. I talked to them about the subject of protected flora, that they weren't taking it into consideration. . . . It's OK [the reduction of biomass] if it's only done in strips [firebreaks]; I've nothing to say about that. But they say that they're applying criteria of 'general interest', and I don't agree. I think that there's a higher interest [than forest fires prevention] which is the protection of species and especially habitats. Because they never take the conservation factor into consideration; not in the least! Biodiversity criteria in a protected area should go ahead of any decision regarding forest fires.

²⁹³ La Victoria, with a protected area of 1,198 hectares under the category of Natural Areas of Special Interest and belonging to the Council of Alcúdia (to the north of Serra de Tramuntana, is the largest public estate in Mallorca. For further information see: caib.es/sites/espaisnaturalsprotegits (last consulted on 18.01.2019).

²⁹⁴ The LIC are Lugares de Interés Comunitario (Places of Community Interest) and the ZEPA are Zonas de Especial Protección de Aves (Special Protected Areas of Birds); both of which categories form part of the Red Natura 2000, applied in Serra de Tramuntana by Regulation 92/43/EEC de 21 de mayo.

The polarisation and tension of perspectives that there seem to be between some forestry technicians and environmental agents was clearly expressed in the words of Vicens, a member of the IBANAT brigade, with many years of experience in the creation of firebreak strips:

The technical work of IBANAT and that of the Ministry [of the Environment] means that they often clash with one another, [because] they each have their own points of view. In a firebreak, maybe a [forestry] technician would say 'I'd get rid of this mass of trees; about twenty metres.' And the environmental agents say 'no, leave some [trees]'. . . But the thing is that the day that we have a fire, you're left without the bird's nest and without the holm-oak. That's what we [members of the IBANAT brigade] say, the clash that there is. An agent tells you 'you can't cut that down' or 'there have to be shrubs' and you start clearing up a bit. Then an IBANAT technician comes: 'this isn't a garden, it's a firebreak, don't you get it? Because you may totally raze these metres of forest, but along here, you'll stop the fire from spreading'. That is, you may have to sacrifice 2,000 [trees], but you'll save 40,000 from burning.

This heterogeneity of perspectives does not seem to be exclusively limited to some forestry technicians and environmental agents, but tensions are also heightened when it comes to agreeing on the stance to be taken among the different departments of the Ministry of the Environment. For example, while IBANAT and the Forestry Service are trying to promote the use of fire by institutional agents – that is, the use of technical fire – some environmental agents and members of the Directorate General of Natural Spaces and Biodiversity – who authorise or refuse permission for technical fire – seem to have some significant reservations on the matter. This idea was suggested by the Forestry Service technician Albert, as well as the IBANAT forestry technicians Carles and Txema:

In our house [the Forestry Service] there are different points of view; between us and other departments such as Planning or Species Protection.²⁹⁵ I don't mean that they're in the wrong and we aren't, but that on different aspects we have a different view. Because when there were technicians from here who went [to the Andratx-Estellencs fire]

²⁹⁵ Albert is talking about the Planning Service for the Natural Environment (Servicio de Planificación al Medio Natural) and the Species Protection Service (Servicio de Planificación al Medio Natural y al Servicio de Protección de Especies), both of which are part of the General Directorate of Natural Spaces and Biodiversity (Dirección General de Espacios Naturales y Biodiversidad).

to put it out, and they found some absolutely incredible flames, well that makes you change your perception of what the conservation of these spaces should be about. And what we're trying to do is for these experiences to be turned into changes in the ways of doing things, because if we carry on doing the same as 10 years ago, we know that in 2020 we'll have another [fire like the one in] Andratx, or in 2023 or 2025.

[In order for IBANAT to execute fuel management actions] agreement has to be reached on priorities and criteria among members of the Ministry [of the Environment]. [If in order to make a firebreak] the best course of action is to carry out a prescribed burn, the administrative machinery is set in motion: that if you've got the right permit, if it's a protected area, if it's a Xarxa Natura area... wow! There are conflicts. It turns out that if there are any *garballó* (fan palms)²⁹⁶ – which isn't really a listed or vulnerable species, but is in the decree of endangered species – then there are all kinds of problems. Then there's always a real 'tug-of-war' and a lot of effort has to go into convincing them.

Everything has to go through Species [Protection Service], just in case there might be some tiny little flower! [The] Species [Protection Service] has even actually gone as far as to tell me how I have to dig, how I have to make the ignition pattern. No, sorry, I'll be the one to decide that. Let's see, doesn't Canadair²⁹⁷ drop salt water? And isn't salt water really, really bad for pines and the like? But what do you prefer, for there to be a bloody awful fire or for Canadair to make drops during the fire? It's the same with everything. . . . I'm totally pissed off with the whole subject. It's all stayed exactly the same with the extinction system, with everything. People almost got left [in the Antrax-Estellencs fire], I pulled out one brigade in the nick of time; [but] nothing's changed. We made a firebreak that saved I don't know how much money, and everything's stayed exactly the same with [the refusal of permits to make] the firebreaks. With everything. I'm really mad.

Thus, although the Forestry Plan (2013) and the Fires Plan (2015) have incorporated the use of fire by authorised institutional agents as a key strategy for fire prevention – with controlled burns and prescribed burns – and extinction – with prescribed burns and backfires – the reality of the situation is that these are not carried out to any significant extent. As ethnographic data suggest, this would be due to fear of penal liability that might be incurred in the case of burns getting out of control and

²⁹⁶ ? El *garballó* (chamaerops, *Chamaerops humilis*) is a small palm tree traditionally used to make brooms, baskets and ropes (Gil *et al.*, 2008, p. 25).

²⁹⁷ According to the Forestry Service, the Balearic Islands have at their disposal a Canadair plane with a discharge capacity of 5,500 litres of water (Govern de les Illes Balears, 2018).

causing a fire, together with the conflicting perspectives among diverse departments of the Ministry of the Environment.

In this respect, I have seen that the institutional actors in favour of the use of technical fire are those for whom the Andratx-Estellencs fire brought to light the need for a reduction in biomass continuity and density as maximum priority for the conservation of the Serra de Tramuntana forests (see Chapters 5 and 6). This would be the case mainly among IBANAT brigade members and forestry technicians. On the other hand, the institutional agents opposed to the use of technical fire are those who consider that biomass build-up management as a fire prevention measure reduces biodiversity in the Serra de Tramuntana forests, and is therefore a strategy against nature conservation in the Natural Site. This would be the case of many environmental agents and other members of the Ministry of the Environment such as the Directorate General of Natural Spaces and Biodiversity.

Conclusions

The strategies, policies and substantial budgets allocated to forest fire management over the last decades in the Balearic Islands – as well as many other parts of the globe – have focused on creating fire-fighting teams specialising in the rapid extinction of any fire. However, prevention strategies and practices, based mainly on the reduction of biomass continuity and density, are few and far between. As ethnographic data suggest, the positions taken against active forest management by some sectors within institutional circles, such as for instance a large percentage of the body of environmental agents (see Chapter 5), has contributed to the fact that in Serra de Tramuntana fire extinction strategies take precedence over those of prevention. Until the Andratx-Estellencs fire in 2013, this was the perspective predominating among the vast majority of institutional bodies working on environmental and fire management in Serra de Tramuntana. This catastrophic event produced a profound change of perspective in many institutional actors, particularly in departments associated with forest fire management, such as IBANAT and the Forestry Service. For these, conservation strategies carried out in Serra de Tramuntana to date, based on restrictions of use and non-interference in many forest areas must change and give way to policies of active forest management that would reduce the biomass load and continuity acting as fuel for forest fires. With this, I would suggest that the current elevated risk of experiencing large

forest fires is bringing the positions of some institutional sectors closer to that of the local population with regard to the environmental management of the protected area, particularly regarding the reduction of the living and dead biomass build-up, what the local population call *dirtiness* (see Chapters 3, 4 and 5).

However, the environmental management practices in Serra de Tramuntana currently developed or planned are, for one reason or another, generally impracticable. Firstly, reactivation of agroforestry practices in Serra de Tramuntana in the present day is economically infeasible. Moreover, many of these practices clash with the various regional, state and international laws regulating the way the Natural Site can be used. A second fuel management strategy is the use of biomass to generate electricity, although the environmental and landscape damage that would be created in order for this to be economically feasible are currently socially unacceptable. A third strategy, which is at the present time being put into practice by IBANAT during the winter months, is the creation and maintenance of strips of land with a lower fuel load, such as for example the safety strips along the sides of the mountain tracks or the firebreaks. Although these strips act as safety areas for the teams of fire fighters while they are engaged in putting out a fire, they are not in fact an effective means of preventing the spread of large forest fires. So therefore, due to the ineffectiveness of these strategies, there is a recent change within the institutional and academic context according to which more and more consideration is being to the use of anthropogenic fire as an environmental management tool.

The current debate regarding the use of fire as an environmental management tool has brought to light a series of social dynamics of conflict and tension among many diverse actors. On the one hand, the local population's use of fire as an intrinsic part of their agroforestry customs is being harshly stigmatised as a degrading practice. In this respect, and with the backing of the majority discourse which holds fire as a disaster to be avoided, some decades ago the use of anthropogenic fire was regulated and banned through the institutionalisation of fire control – that is, fire restricted exclusively to its use by authorised institutional agents – and through the introduction of conservation policies such as the Serra de Tramuntana Natural Resources Ordinance Plan (Plan de Ordenación de Recursos Naturales de Serra de Tramuntana – PORN, 2007), passed with the creation of the Natural Site. The greater extension, density and continuity of the forest mass, together with the ageing of the active farming population – factors which would currently increase the possibility that an anthropogenic fire might turn into a

forest fire – are arguments that have reinforced positions averse to the local population's use of fire. For these reasons, there is a widespread perception among environmental agents and other technicians that the only kind of fire that should be used as an environmental management tool is technical fire – that is to say, fire used exclusively by institutional agents. Moreover, some of these environmental agents argue that anthropogenic fire should be restricted to agricultural lands, excluding all forest areas.

In contrast to the position held by many environmental agents and other members of the Ministry of the Environment, many forestry technicians are in favour of the use of fire by the local population, and institutional agents in particular, as a tool to reduce the fuel build-up in Serra de Tramuntana. In their opinion, the use of anthropogenic fire is a more economically feasible strategy than the extraction and subsequent shredding or utilisation of biomass, can potentially help to reactivate agroforestry customs and is also a way for the IBANAT brigades to learn from the local population how to better understand how fire behaves and to manage it more effectively. This is why, in some institutional sectors, attempts are being made to deconstruct the discourse promoting the symbolic connotation of fire as a disaster and catastrophe that has been fostered by the institutions themselves over the last decades. In this respect, they are attempting to encourage a change of discourse distinguishing 'good fire' from out of control 'bad fire'. As a result of these social dynamics, since 2013 technical fire was incorporated as part of the management model to be followed as a fire prevention strategy under the guidelines of the Forestry Plan (2013) and Fires Plan (2015).

Despite such changes in autonomous forestry management policies, at the present time the use of technical fire is not being implemented to any significant extent. According to ethnographic data, this is due to, in the first place, the reluctance to accept penal responsibility incurred should an anthropogenic fire get out of hand and end up causing a forest fire. Second, it is also due to the fact that the necessary administrative permits needed in order to carry out burns are generally blocked by the conflicting perspectives that exist among the institutional bodies in charge of forest and fire management and those entities responsible for biodiversity and protected species management.

Chapter 8. Conclusions

In 2013, the largest forest fire ever recorded in Serra de Tramuntana Natural Site (Mallorca) brought to light the existence of a wide diversity of perspectives regarding forest management as well as the management of forest fires in the protected area held by locals, visitors, and officials tasked with managing forests, stopping forest fires and conserving biodiversity. Indeed, the dramatic increase in the number of large forest fires with catastrophic consequence on a global scale, especially in areas with a Mediterranean climate and vegetation (Simmons *et al.*, 2004; Murdiyarso and Lebel, 2006; Birot, 2009; Moreno *et al.*, 2014; Koutsias *et al.*, 2016), highlights the importance and urgency of gaining a deeper understanding of fire. Attempting to deepen the understanding of the complexity of this global problematic, this thesis has had two different yet complementary main aims: first, to explore the diversity of socio-environmental factors underpinning the causes of large forest fires in Serra de Tramuntana Natural Site (Mallorca); and second, to examine the responses, visions and relations with forest fires and anthropogenic fire among a variety of actors. In order to achieve these research aims, throughout the thesis I have explored the interaction and confluence of the diverse socio-environmental dynamics within the contexts of Mallorca's environmental history; the Serra de Tramuntana cultural landscape heritagisation process; the Natural Site's nature conservation policies; the visions and attitudes around local forests, their transformation, their use and management; and the perspectives on destructive large forest fires and anthropogenic fire as an environmental management tool.

With regard to Mallorca's environmental history, investigation carried out from the analytical perspective of the 'new ecologies' (Biersack, 1999) has allowed me to demonstrate how the present day social and environmental landscape is composed of elements that have been incorporated and transformed over the centuries. So we have been able to see how a wide diversity of social groups have inhabited the islands over the ages, each of them with their own individual way of connecting and interacting with their surroundings. With the reconstruction of Mallorca's environmental history, I have attempted to evidence the dialogue between the distribution and extension of different kinds of vegetation and forests with the more cultural, political, economic, symbolic aspects, the interests, land uses, perspectives and ways of doing things of each of these groups from the first arrival of human beings on the islands towards the end of the fifth millennium BC up to the present day.

In order to study the Serra de Tramuntana cultural landscape heritagisation process, listed as UNESCO World Heritage Site in 2009, I developed a case study on its dry-stone terraces (*marjades*). As I have suggested, the heritagisation process has favoured and intensified the resignification process taking place in the Serra de Tramuntana cultural landscape that began with the local population's progressive abandonment of their subsistence agroforestry customs and an increase in the recreational use of the mountain area from the second half of the twentieth century. More specifically, I have suggested that the *marjades*, well maintained by the local population to allow farming in the mountain area until the start of the abandonment of their agroforestry lands, today have been transformed into an essential part of the landscape for the creation of a scenic image that would attract more tourists to Serra de Tramuntana. On the other hand, the mass arrival of visitors to Serra de Tramuntana, increased even more by the heritagisation process, is giving rise to some socio-environmental problems, among which I have highlighted the risk of fire, the deterioration of the mountain tracks, the increasing amount of litter and the dynamics of tension especially among the landowners, who must bear practically all the costs of the environmental management, maintenance and repairs of the *marjades*. To this end, the only existing financial assistance comes in the form of the subsidies granted annually since 2014 by the Serra de Tramuntana World Heritage Site Consortium. However, after an analysis of the different offers I have suggested that the landowners of smaller estates tend to benefit to a much lesser extent than foreign owners and the owners of the larger estates, a fact that is known and understood by both groups, and which leads to tensions among them. Lastly, I have pointed out that the relationship between the heritagisation process and the forest fires is complex and heterogeneous. That is, while the growth in the recreational use of the mountain area does increase the probabilities of fire ignition, the deforestation of the *marjades* promoted by the Consortium's subsidies, also leads to the creation of breaks in the forest mass impeding the spread of fire. Taking all the above into account, I have suggested that the risk of forest fires should be incorporated as a vital criterion when granting any financial aid allocated to the conservation of the heritagised cultural landscape.

With regard to the study of nature conservation in Serra de Tramuntana, I have shown how all the many conservation policies, practices and figures – scientifically validated and implemented through a series of regulatory and institutional means on a transnational, national and subnational level – generate tensions, disputes, negotiations

and agreements among diverse groups of actors. Offering a unique case study, framing it within a broader context of analysis and contemporary criticism of conservation from anthropological studies based on three specific ethnographic cases, I have studied some of these social dynamics. Thus, through the analysis of ethnographic data, in this chapter I proposed that the perspectives and attitudes of local people and some institutional actors, which tend to be presented as antagonist and in a continuous state of tension (West et al., 2006), can converge and be characterised by relationships of collaboration and agreement of perspectives. Moreover, in this chapter I presented why the land-use restrictions that apply to the protected area can become a factor that contributes to more frequent large forest fires and, subsequently, be a source of tension and disagreement towards the Natural Site.

In relation to the current state of the forests of Serra de Tramuntana, I have highlighted that its main transformations since the middle of the last century are framed in the broader context of de-agriculture and afforestation that have experienced in many rural areas of the Mediterranean. Also, I proposed that these processes of socio-environmental change and the role played by the local people's agroforestry practices generate a plurality of perspectives among the diversity of groups of actors. In this respect, the new residents and many environmental agents value the lack of anthropic management and the subsequent increase in density and continuity of the forest mass. For the former, this transports them to the natural world, bringing them closer to the kind of nature with which they wish to surround themselves; a nature that symbolically they consider wild and untamed. For the latter, the lack of anthropic action promotes biodiversity and safeguards the conservation of nature from human interference considered as degrading, in this case, specifically from the local population's agroforestry customs. Moreover, in the opinion of these environmental agents and other actors, any action that might reduce the number, continuity, density and variety of tree and shrub species not only reduces the local forests' biodiversity, but also creates optimal conditions for the growth of pyrophytic plants species thus generating a greater fire risk. On the other hand, a large part of the local population, members of IBANAT and some forestry technicians, are of the opinion that the local forests are anthropic areas in which a lack of active management also implies a process of degradation characterised by the progressive ageing of the arboreal communities, through their increasing vulnerability to insect infestation, and through the biomass build-up, a greater fire risk. Therefore, I suggested, first of all, that some of the most acute tensions – in this instance between

institutional agents and the local population – with forest fires at their centre of discourse are based on the many diverse ways of understanding the forests, forest transformations and forest management in Serra de Tramuntana. Thus, I argued that fires condense, and are a way to express, broader processes of conflict, negotiation and agreement surrounding the environmental management of the protected area. Secondly, I also suggested that the positions against the reduction of biomass of some institutional actors with decision-making power over the regulation of agroforestry activities in the protected area is one of the factors that contributes to the present general lack of forest management practices aimed at preventing large forest fires.

In this thesis, I have suggested that despite forest fires being generally regarded as destructive, the category of ‘fire’ is complex, ambivalent and versatile. In this sense, most of the interviewed considered that the main consequence of forest fires is the destruction of the landscape. Despite this impact being regarded as temporal – as informants acknowledged that fire also stimulates the regeneration of plants and shrubs –, many local people stressed the economic losses that a large fire could bring as it would decrease the arrival of tourists who would visit Serra de Tramuntana attracted by its landscape. Nevertheless, some foreign residents expressed their preference for post-fire landscapes, since the views from their homes are more expanded in the absence of pinewoods that usually surround the houses. The risk to people and material goods – the second major impact of forest fires according to ethnographic data – is increasingly concerned with the emergency and institutional actors involved in firefighting. Indeed, I have also identified that the current demographic tendency to settle on land located within or adjacent to forested areas in Serra de Tramuntana are, together with the elimination of fire as the main strategy in forest fire management, a contributory factor to the incidence of large forest fires which escape the capacity of control and extinction currently available by human and material means.

Nevertheless, I have argued that the incidence of large forest fires with catastrophic consequences is currently giving rise to a process of change in conservation strategies, policies and practices in the Serra de Tramuntana Natural Site. More specifically, I have explored how the great 2013 Andratx-Estellencs forest fire has been key to some institutional sectors adopting policies of forest fuel management – that is the reduction in the continuity and density of living and dead biomass – as a priority for nature conservation in the Natural Site. The current infeasibility of the majority of proposals under consideration in Serra de Tramuntana for the management of the

biomass build-up is leading to greater consideration being given to the use of anthropogenic fire. However, the perspective coming from institutional circles over the last decades is that fire is in fact prejudicial for nature conservation in Serra de Tramuntana. This is evidenced, for instance, by the ban on certain uses of fire in many agroforestry lands, and always subject to control by authorised technicians – the so-called ‘fire institutionalisation’. So, attempts are being made at some departments of the Ministry of the Environment to promote a resignification process of fire in which destructive, uncontrolled, recurring fire – the ‘bad fire’ – should be distinguished from controlled fire, used as a valid environmental management tool – the ‘good fire’. Nevertheless, there exist clashing perspectives within the institutional context between those who defend the necessity and urgency for active environmental management in the face of the high fire risk and those continuing to consider that anthropic management is a threat to nature conservation in Serra de Tramuntana. Therefore, as a final note to these conclusions, it should be pointed out that despite the existence of these discrepancies within the environmental management regional institutional framework, I would suggest that the current incidence of large forest fires with catastrophic effects such as that of Andratx-Estellencs in 2013, is gradually reconciling the positions – frequently in conflict, as I have explored in previous chapters – of many local inhabitants and institutional environmental management bodies regarding the environmental management of the Serra de Tramuntana Natural Site.

To conclude, I consider that the main original contribution of thesis to the discipline of environmental anthropology is to offer a better understanding of environmental-human relationships through the study of the causes of fire and human responses to fire. Specifically, I suggest that the main causes of the upsurge of large forest fires in the last decades are, apart from the climatic factors, the afforestation of rural areas, the lack of significant preventions strategies – such as active forest management practices – and the increased human pressure and mobility in natural areas. Each of these factors, in turn, are explained by the complex interaction of social, political, economic and environmental aspects (see Figure 1.7).

This thesis also addresses ongoing debates around the environmental management of protected areas in relation to fires, such as the existing debates on fire suppression policies and prescribed burns. My research suggests that the prevalent institutional firefighting policies and strategies have become a factor that contributes to the increased risk of fire, while anthropogenic fire has become a highly valuable

management tool to reduce the continuity and density of the forest biomass, especially in light of the variety of problematics that agroforestry land-uses of the mountain area face nowadays.

Nevertheless, there is a need for future research both locally and globally oriented, which could address the following research questions. What role has the incorporation of Serra de Tramuntana into the Natura 2000 network played in the subsequent designation as Natural Site? What was the role of local inhabitants in the designation of Serra de Tramuntana as a Natural Site? How has the granting of tree felling authorisations changed after the Andratx-Estellencs fire of 2013? What is the role of the CAP policy in the development of agriculture in Serra de Tramuntana throughout the last decades? Would a more equal distribution of the subsidies given by the Consortium have a significant impact on the recovery of abandoned terraced olive groves? To what extent is the interpretation of local people's agroforestry practices as degrading, influenced by the intensification of production in the 1940s and 1950s, marked by the post-war crisis context? What are the impacts of the institutionalisation of fire on the knowledge and use of fire held by local communities? How can local people's customary knowledge on the use of anthropogenic fire and the management of uncontrolled fires help to build more effective strategies for the prevention and control of large forest fires? What are the medium and long-term repercussions of the shift in the institutional discourse on the distinction between 'good fire' and 'bad fire'? What role can anthropologists play in improving existing environmental policies in light of the complex set of socio-environmental factors that explain the upsurge of large forest fires?

If we do not manage the environment in which we live, with land-uses and environmental management tools and strategies that reduce the continuity and density of the forests (for example, with the reactivation of mountain agroforestry and the use of anthropogenic fire), the main manager of the protected area will be the uncontrolled and destructive large forest fires.

Bibliography

- Abatzoglou, J. T. and Williams, A. P. (2016) 'Impact of anthropogenic climate change on wildfire across western US forests', *Proceedings of the National Academy of Sciences*, 113(42), pp. 117700–11775.
- ABC (2017) 'Estos son los 13 espacios protegidos afectados por la ola de incendios en el norte de España', *ABC*.
- Abrams, M. D. (1992) 'Fire and the Development of Oak Forests', *BioScience*, 42(5), pp. 346–353.
- Abril, G. (2013) 'Rescoldos en el paraíso', *El País*.
- Abulafia, D. (1996) *Un emporio mediterráneo. El reino catalán de Mallorca*. Barcelona: Editorial Omega.
- Adams, W. M. and Hutton, J. (2007) 'People, Parks and Poverty: Political Ecology and Biodiversity Conservation', *Conservation and Society*, 5(2), pp. 147–183.
- Agee, J. K. and Skinner, C. N. (2005) 'Basic principles of forest fuel reduction treatments', *Forest Ecology and Management*, 211(1–2), pp. 83–96.
- Agrawal, A. (2005) *Environmentality. Technologies of Government and the Making of Subjects*. Durham: Duke University Press.
- Agrawal, A. and Ostrom, E. (2001) 'Collective Action, Property Rights and Decentralization in Resource Use in India and Nepal', *Politics & Society*, 29(4), pp. 485–514.
- Agrawal, A. and Redford, K. (2009) 'Conservation and displacement: An overview', *Conservation and Society*, 7(1), pp. 1–10.
- Alameda, D. and Liñán, J. M. A. (2017) 'Los mayores incendios forestales en España en los últimos años', *El País*.
- Albertí Albertí, J. and Rosselló Vaquer, R. (1999) *Història de Valldemossa (1230-1516)*. Palma: Obra Cultural Balear a Valldemossa, Documenta Balear.
- Albulafia, D. (1996) *Un emporio mediterráneo. El reino catalán de Mallorca*. Barcelona: Editorial Omega.
- Alcasena, F. J. *et al.* (2019) 'Towards a comprehensive wildfire management strategy for Mediterranean areas: Framework development and implementation in Catalonia, Spain', *Journal of Environmental Management*, 231(1), pp. 303–320.
- Alcover, A. M. and Moll, F. (1979) *Diccionari català-valencià-balear*. Palma: Editorial Moll.
- Alcover, J. A. *et al.* (2001) 'Bases per al coneixement del contacte entre els primers

- colonitzadors humans i la naturalesa de les Balears', *Endins*, 24, pp. 5–57.
- Alenyar i Fuster, M. (1984) *Introducció a l'economia de les Balears*. Palma: Sa Nostra. Caixa de Balears.
- Alimen, M. H. and Steve, M. J. (1970) *Historia Universal Siglo XXI. Prehistoria*. 1979th edn. Madrid: Siglo XX de España Editores.
- Allen, T. F. H. *et al.* (2001) 'Dagnet Ecology - "Just the Facts, Ma'am": The Privilege of Science in a Postmodern World', *BioScience*, 51(6), p. 475.
- Alomar Garau, G. *et al.* (2018) 'Manual de gestió rural de la Serra de Tramuntana', in *Manual de gestió rural de la Serra de Tramuntana*. Palma: Tramuntana XXI.
- Altangerel, K. and Kull, C. A. (2013) 'The Prescribed Burning Debate in Australia: Conflicts and Compabilities', *Environmental Planning and Management*, 56(1), pp. 103–120.
- Amengual, B. and Fiol, G. (2003) *Valldemossa, Imatges d'ahir*. Palma: Miquel Font.
- Amengual, J. and Cau, M. A. (2005) 'Antiquitat tardana a les Illes Balears', in Tugores-Truyol, F. (ed.) *El món romà a les Illes Balears*. Barcelona: Fundació La Caixa, pp. 180–235.
- Amorós, M. (2013) 'Nos hemos despertado del paraíso', *El Mundo Balears*.
- Anderson, D. G. and Berglund, E. (eds) (2003) *Ethnographies of conservation. Environmentalism and the distribution of privilege*. New York and Oxford: Berghahn Books.
- Anderson, M. K. (1999) 'The Fire, Pruning, and Coppice Management of Temperate Ecosystems for Basketry Material by California Indian Tribes', *Human Ecology*, 27(1), pp. 79–113.
- Andreu, N. *et al.* (2003) 'El quart boom? Tendències de consum de recursos naturals a les Illes Balears', *Revista de Geografia*, 2, pp. 61–77.
- Ara Balears (2013) 'Els treballadors de l'Ibanat reclamen més prevenció', *Ara Balears*.
- Argemí, M. (1999) *A les vores dels torrents: una prospecció dels assentaments pagesos andalusins de Pollença*. Pollença: Ajuntament de Pollença.
- Arribas, A. (1983) *La romanització de les Illes Balears*. Palma: Universitat de les Illes Balears.
- Artigues, A. A. and Rullan-Salamanca, O. (1990) 'Turismo, ordenación del territorio e infraestructuras', in *Balears: economía de las Comunidades Autónomas*. Madrid: Fundación fondo para la investigación económica y social de las Cajas de Ahorros Confederadas, pp. 240–245.
- Artigues Bonet, A. A., Blázquez Salom, M. and Yrigoy, I. (2014) 'La planificació territorial i la reconversió de zones turístiques madures a les Illes Balears en

- l'actual crisi', in *Anuari del Turisme de les Illes Balears*. Palma: Fundació Gadeso, pp. 135–146.
- ASA (Association of Social Anthropologists of the UK and Commonwealth) (2011) *Ethical Guidelines for good research practice*. Available at: www.theasa.org/ethics/guidelines.shtml (Accessed: 20 August 2019).
- Austrich, A. (2016) 'Cerambyx cerdo L., ¿vulnerable o plaga?', *Cuadernos de la Sociedad Española de Ciencias Forestales*, 43, pp. 235–248.
- Avellà, F. (1998) 'Línees d'actuació de l'associacionisme ambientalista de les Balears', in *El medi ambient a les illes Balears: Qui és qui?: actes, Can Tàpera, Palma 27-29 novembre 1997*. Palma: Sa Nostra, pp. 82–88.
- Avella, X. (1992) 'La Serra de Tramuntana, Parc Natural'. Palma: GOB, ADENA/WWF.
- Balée, W. (1995) *Footprints of the Forest*. New York: Columbia University Press.
- Balée, W. (1998) 'Historical Ecology: Premises and Postulated', in Balée, W. (ed.) *Advances in Historical Ecology*. New York: Columbia University Press, pp. 13–29.
- Balée, W. (2006) 'The Research Program of Historical Ecology', *Annual Review of Anthropology*, 35, pp. 75–98.
- Balée, W. and Erickson, C. (2006) 'Time, Complexity and Historical Ecology', in Balée, W. and Erickson, C. (eds) *Time and Complexity in Historical Ecology: Studies in the Neotropical Lowlands*. New York: Columbia University Press, pp. 1–17.
- Ballester, A. (1991) *La Serra de Tramuntana. Didàctica per a l'estudi de la comarca*. Palma: Consell Insular de Mallorca.
- Barbero, M. *et al.* (1990) 'Changes and disturbances of forest ecosystems caused by human activities in the western part of the Mediterranean Basin', *Vegetatio*, 87(2), pp. 151–173.
- Barceló, B. (1985) 'La Población Agrária en las Baleares', *El Campo*, 100, pp. 49–54.
- Barceló Crespí, M. and Rosselló-Bordoy, G. (2006) *La ciudad de Mallorca*. Palma: Lleonard Muntaner Ed.
- Barceló, F. (1879) (1879-1881) *Flora de las Islas Baleares: Seguida de un diccionario de los nombres baleares, castellanos y botánicos de las plantas espontáneas y de las cultivadas*. Palma: Pedro José Gelabert.
- Barceló i Pons, B. and Frontera i Pascual, G. (2000) 'Història del Turisme a les Illes Balears', in *Welcome! Un segle de turisme a les Illes Balears*. Palma: Fundació La Caixa, pp. 15–48.
- Barceló, M. (1984) *Sobre Mayurqa*. Palma: Museu de Mallorca.

- Barceló, M. *et al.* (1986) *Les aigües cercades. Els ganüt(s) de l'illa de Mallorca*. Palma: Institut d'Estudis Baleàrics.
- Barreto, P. *et al.* (2006) *Human pressure on the Brazilian amazon forests*. Belém (Brasil): World Resources Institute.
- Bastida, J. (2013) 'Unos 300 vecinos se manifiestan para evitar que Estellencs sea un pueblo fantasma', *Última Hora*.
- Beltran, O. (2008) 'Els comunals al Pallars Sobirà. Els usos tradicionals de la muntanya en el marc dels espais naturals protegits', *Revista d'etnologia de Catalunya*, 33, pp. 142–149.
- Beltran, O., Pascual, J. J. and Vaccaro, I. (2008) 'Introducción. Espacios naturales protegidos, política y cultura', in Beltran, O., Pascual, J. J., and Vaccaro, I. (eds) *Patrimonialización de la Naturaleza. El Marco Social de la Políticas Ambientales*. Donostia: Ankulegi Antropologia Elkartea, pp. 11–26.
- Beltran, O. and Santamarina, B. (2016) 'Antropología de la Conservación en España. Balance y perspectivas', *Revista de Antropología Social*, 25(1), pp. 85–109.
- Beltran, O. and Vaccaro, I. (2010) 'From scenic beauty to biodiversity. The patrimonialization of nature in the Pallars Sobirà (Catalan Pyrenees)', in Roigé, X. and Frigolé, J. (eds) *Constructing Cultural and Natural Heritage. Parks, museums and rural heritage*. Institut Català de Recerca en Patrimoni Cultural, pp. 91–104.
- Bender, B. (1993) 'Introduction. Landscape - Meaning and Action', in Bender, B. (ed.) *Landscape-politics and perspectives*. Oxford and Providence: Berg Books, pp. 1–17.
- Benítez, J. and Ginard, A. (1994) 'El turisme i les seves implicacions socials, territorials i econòmiques a les Illes Balears', in *Turisme, Societat i Economia a les Illes Balears*. Palma, pp. 111–118.
- Berbiela Mingot, L. (2015) 'La puesta en valor de los pinos y los pinares de Mallorca: Una necesidad ambiental y un reto social', *Monografies de la Societat d'Historia Natural de les Balears*, 2015-Janua(20), pp. 467–485.
- Berlin, I. (2013) *The Roots of Romanticism*. Princetown: Princeton University Press.
- Bernard, H. R. (1940) *Research methods in anthropology: Qualitative and quantitative approaches*. 2006th edn. Lanham, MD: Altamira Press.
- Bernat, A. L. (2015) 'Comunicar, informar, experimentar i sensibilitzar en favor dels espais forestals... 14 anys de Xarxa Forestal', in *Llibre verd de protecció d'espècies a les Balears*. Palma: Govern de les Illes Balears. Conselleria d'Agricultura, Medi Ambient i Territori, pp. 519–526.

- Bernat, M. (2004) 'Les Germanies', in Belenguier, E. (ed.) *Historia de les Illes Balears*. Barcelona: Edicions 62, pp. 285–337.
- Bianchi, R. and Boniface, P. (2002) 'Editorial: The politics of World Heritage', *International Journal of Heritage Studies*, 8(2), pp. 79–80.
- Bielsa, I., Pons, X. and Bunce, B. (2005) 'Agricultural abandonment in the north eastern Iberian Peninsula: the use of basic landscape metrics to support planning', *Journal of Environmental Planning and Management*, 48, pp. 85–102.
- Biersack, A. (1999) 'Introduction: From the "New Ecology" to the New Ecologies', *American Anthropologist*, 101(1), pp. 5–18.
- Biersack, A. (2006) 'Reimagining political ecology: culture/power/history/nature', in Biersack, A. and Greenberg, J. B. (eds) *Reimagining political ecology*. Durham: Duke University Press, pp. 3–42.
- Bird, D. W., Bird, R. B. and Parker, C. H. (2005) 'Aboriginal Burning Regimes and Hunting Strategies in Australia's Western Desert', *Human Ecology*, 33(4), pp. 443–464.
- Birot, Y. (2009a) 'Forest Fires at a Glance: Facts, Figures and Trends in the EU', in Birot, Y. (ed.) *Living with Wildfires: What Science Can Tell Us A Contribution to the Science-Policy Dialogue*. Joensuu: European Forest Institute, pp. 11–18.
- Birot, Y. (ed.) (2009b) *Living with Wildfires: What Science Can Tell Us A Contribution to the Science-Policy Dialogue*. Joensuu: European Forest Institute.
- Blanes, C. et al. (1990) *Les Illes a les fonts clàssiques*. Palma: Miquel Font Editor.
- Blázquez, M., Murray, I. and Artigues, A. A. (2011) 'La balearización global. El capital turístico en la minoración e instrumentación del Estado', *Investigaciones turísticas*, 2, pp. 1–28.
- Blázquez Salom, M., Artigues Bonet, A. A. and Yrigoy Cadena, I. (2015) 'Crisis y planificación territorial turística neoliberal en las Islas Baleares', *Investigaciones turísticas*, n° 9, pp. 24–49.
- Blázquez Salom, M. and Murray, I. (2010) 'Una geohistoria de la turistización de las islas Baleares', *El periplo sustentable*, 18, pp. 69–118.
- Boissevain, J. and Selwyn, T. (eds) (2004) *Contesting the Foreshore: Tourism, Society and Politics on the Coast*. Amsterdam: Amsterdam University Press.
- Bond, T. and Mercer, D. (2014) 'Subdivision Policy and Planning for Bushfire Defence: A Natural Hazard Mitigation Strategy for Residential Peri-Urban Regions in Victoria, Australia', *Geographical Research*, 52(1), pp. 6–22.

- Bond, W. J. (2013) 'Ecological Effects of Fires', *Encyclopedia of Biodiversity*, 3, pp. 435–442.
- Bonfil Batalla, G. (2004) 'Pensar nuestra cultura', *Dialogos de acción, primera etapa*, pp. 117–134.
- Bover, P. and Alcover, J. A. (2003) 'Understanding Late Quaternary extinctions: The case of *Myotragus balearicus* (Bate, 1909)', *Journal of Biogeography*, 30(5), pp. 771–781.
- Bover, P. and Alcover, J. A. (2008) 'Extinction of the autochthonous small mammals of Mallorca (Gymnesic Islands, Western Mediterranean) and its ecological consequences', *Journal of Biogeography*, 35(6), pp. 1112–1122.
- Bowen, M. E. *et al.* (2007) 'Regrowth forests on abandoned agricultural land: A review of their habitat values for recovering forest fauna', *Biological Conservation*, 140(3–4), pp. 273–296.
- Bowman, D. *et al.* (2009) 'Fire in the Earth system', *Science*, 324(5926), pp. 481–4.
- Bowman, D. *et al.* (2011) 'The human dimension of fire regimes on Earth', *Journal of Biogeography*, 38, pp. 2223–2236.
- Bradstock, R. a. (2010) 'A biogeographic model of fire regimes in Australia: current and future implications', *Global Ecology and Biogeography*, 19(2), pp. 145–158.
- Bramwell, A. (1989) *Ecology in the 20th Century: A History*. New Haven and London: Yale University Press.
- Brockington, D. and Duffy, R. (2011) 'Introduction Capitalism and Conservation: The Production and Reproduction of Biodiversity Conservation', in Brockington, D. and Duffy, R. (eds) *Capitalism and Conservation*. Malden, Oxford and Chichester: John Wiley & Sons, pp. 1–16.
- Brockington, D. and Igoe, J. (2006) 'Eviction for Conservation: A Global Overview', *Conservation and Society*, 4(3), pp. 424–470.
- Brockington, D., Rosaleen, D. and Igoe, J. (2008) *Nature Unbound: Conservation, Capitalism and the Future of Protected Areas*. London: Earthscan.
- Brockington, D. and Schmidt-Soltau, K. (2004) 'The social and environmental impacts of wilderness and development', *Oryx*, 38(02), pp. 140–142.
- Brosius, J. P. (1999) 'Analyses and Interventions: Anthropological Engagements with Environmentalism', *Current Anthropology*, 40(3), pp. 277–310.
- Burjachs Casas, F. *et al.* (1994) 'Dinámica de la vegetación durante el Holoceno en la isla de Mallorca', in Mateu, I. *et al.* (eds) *Trabajos de Palinología básica y aplicada*. València: Universitat de València, pp. 199–210.

- Burjachs Casas, F. *et al.* (2016) ‘Overview of environmental changes and human colonization in the Balearic Islands (Western Mediterranean) and their impacts on vegetation composition during the Holocene’, *Journal of Archaeological Science: Reports*.
- Burjachs Casas, F. and Expósito, I. (2015) ‘Charcoal and pollen analysis: Examples of Holocene fire dynamics in Mediterranean Iberian Peninsula’, *Catena*, 135, pp. 340–349.
- Büscher, B. and Arsel, M. (2012) ‘Introduction: Neoliberal conservation, uneven geographical development and the dynamics of contemporary capitalism’, *Tijdschrift voor Economische en Sociale Geografie*, 103(2), pp. 129–135.
- Busquets Mulet, J. (1978) ‘Mallorca musulmana’, in Mascaró Pasarius, J. (ed.) *Historia de Mallorca*. Palma: Vicente Colom ed., pp. 161–226.
- Cahen, C. (1972) ‘El Islam: desde los orígenes hasta el comienzo del Imperio otomano’, *Historia Universal Siglo XXI. Vol. 14. Siglo XX de España* Editores.
- California Department of Forestry and Fire Protection (2018) *Statistics & Events: Incident Information*. Available at: [ww.fire.ca.gov/stats-events/](http://www.fire.ca.gov/stats-events/) (Accessed: 16 January 2019).
- Calkin, D. E., Thompson, M. P. and Finney, M. a (2015) ‘Negative consequences of positive feedbacks in US wildfire management’, *Forest Ecosystems*, 2(1), pp. 1–10.
- Calvo, M. and Guerrero Ayuso, V. M. (2002) *Los inicios de la metalúrgia en Baleares. El Calcolítico*. Palma: El Tall.
- Calvo Trias, M., Guerrero Ayuso, V. M. and Salvà Simonet, B. (2002) ‘Los orígenes del poblamiento balear. Una discusión no acabada’, *Complutum*, 13, pp. 159–191.
- Camia, A. and Amatulli, G. (2009) ‘Weather Factors and Fire Danger in the Mediterranean’, in Chuvieco, E. (ed.) *Earth Observation of Wildland Fires in Mediterranean Ecosystems*. Berlin, Heidelberg: Springer, pp. 71–82.
- Campaner, A. (1881) *Cronicon Majoricense*. 1884th edn. Palma: Ajuntament de Palma.
- Canyellas, N. (1997) *El paisatge de l'Arxiduc*. Palma: Institut d'Estudis Balearics.
- Carbonero, M. A. (1984) ‘Orígen i morfologia de les terrasses i cultius a Mallorca’, *Bolletí de la Societat Arqueològia Lul·liana (BSAL)*, 40, pp. 91–100.
- Carrier, J. G. and West, P. (eds) (2009) *Virtualism, governance and practice: vision and execution in environmental conservation*. New York: Berghahn.
- Carrión, J. S. *et al.* (2010) ‘Expected trends and surprises in the Lateglacial and Holocene vegetation history of the Iberian Peninsula and Balearic Islands’, *Review of*

- Palaeobotany and Palynology*, 162(3), pp. 458–475.
- Carroll, M. and Paveglio, T. (2016) ‘Using community archetypes to better understand differential community adaptation to wildfire risk’, *Philosophical Transactions of the Royal Society B: Biological Sciences*, 371(1696), pp. 1–7.
- Castellnou, M. *et al.* (2010) ‘Wildfire Scenarios: Learning from Experience’, in Sande Silva, J. *et al.* (eds) *Towards Integrated Fire Management- Outcomes of the European Project Fire Paradox*. Joensuu: European Forest Institute Research Report, pp. 121–133.
- Castellnou, M., Nebot, E. and Miralles, M. (2007) ‘El papel del fuego en la gestión del paisaje’, in *Proceedings of the 4th International Wildland Fire Conference*. Sevilla, pp. 13–17.
- Cateura Bennàsser, P. (1997) *Mallorca en el segle XIII*. Palma: El Tall.
- Cateura Bennàsser, P. (2005) *El Regne de Mallorca al segle XIV*. Palma: El Tall.
- Ceballos, H. (1996) *Tourism, ecotourism, and protected areas: The state of nature-based tourism around the world and guidelines for its development*. Gland: International Union for Conservation of Nature (IUCN).
- Cela Conde, C. J. (1979) *Capitalismo y Campesinado en la Isla de Mallorca*. Madrid: Siglo XIX.
- Centro del Patrimonio Mundial (2014) *Informe periódico - Sección II -Paisaje cultural de la Serra de Tramuntana*. Available at: www.serradetrามuntana.net (Accessed: 27 May 2016).
- Cerdá, D. (1973) ‘Economía antigua de Mallorca’, in Mascaró Pasarius, J. (ed.) *Historia de Mallorca*. Palma: V. Colom Roselló, pp. 417–448.
- Certini, G. (2005) ‘Effects of fire on properties of forest soils: a review’, *Oecologia*, 143(1), pp. 1–10.
- Chas-Amil, M. L. *et al.* (2015) ‘Human-ignited wildfire patterns and responses to policy shifts’, *Applied Geography*, 56, pp. 164–176.
- Chokkalingam, U. *et al.* (2006) ‘Community fire use, resource change, and livelihood impacts: The downward spiral in the wetlands of southern Sumatra’, *Mitigation and Adaptation Strategies for Global Change*, 12(1), pp. 75–100.
- Chuvieco, E. and Congalton, R. G. (1989) ‘Application of Remote Sensing and Geographic Information Systems to Forest Fire Hazard Mapping’, 159, pp. 147–159.
- Cifre Sabater, M. (2013) *Beautiful Olives on the Ground. Local perceptions of environment-human relations in Valldemossa, Serra de Tramuntana, Mallorca (unpublished)*. University of

Kent.

- Cifre Sabater, M. (2017a) 'Patrimonialització de la naturalesa. Aportacions des de l'Antropologia Ambiental', in Ramis, A. (ed.) *II Jornades de Cultura Popular i Tradicional de les Illes Balears*. Eivissa: Consell d'Eivissa, Departament d'Educació, Patrimoni, Cultura, Esports i Juventut, pp. 53–69.
- Cifre Sabater, M. (2017b) 'Perspectivas conflictivas sobre gestión forestal en la prevención de incendios forestales. Serra de Tramuntana (Mallorca)', in *XIV Congrés d'Antropologia. Antropologues en transformació: sentits, compromisos i utopies*. València: F.A.A.E.E., p. 24.
- Coad, L. *et al.* (2008) *The Costs and Benefits of Forest Protected Areas for Local Livelihoods: a review of the current literature (working paper)*. Cambridge: UNEP World Conservation Monitoring Centre.
- Cochrane, M. A. (2009) *Tropical fire ecology. Climate Change, Land Use, and Ecosystem Dynamics*. Berlin, Heidelberg and New York: Springer-Praxis Books in Environmental Sciences.
- Colmenero, R. F. (2016) 'Francotiradores para exterminar a las cabras de un islote de Ibiza', *El Mundo Balears*.
- Colmenero, R. F. (2018) 'El Pacte se divide por 16 cabras de Es Vedrà', *Ara Balears*.
- Consell Insular de Mallorca (2004) *Pla Territorial Insular de Mallorca. Memòria*. Available at: www.conselldemallorca.cat (Accessed: 20 June 2019).
- Conselleria d'Agricultura Medi Ambient i Territori (2013) *Balears Natura, Descobreix les meravelles naturals de les Illes Balears*. Available at: Ca.balearsnatura.com (Accessed: 21 February 2018).
- Conselleria d'Agricultura Medi Ambient i Territori and Tecnosylva (2015) 'IV Plan General de Defensa Contra Incendios Forestales de las Islas Baleares'. Palma: Govern de les Illes Balears.
- Conselleria de Medi Ambient Agricultura i Pesca (2017) 'El Govern intensifica la lluita contra el banyarriquer de les alzines a Mallorca'. Palma: Govern de les Illes Balears.
- Conselleria de Medi Ambient Agricultura i Pesca (2018) *Andratx: Cinc anys després del gran incendi forestal de 2013*. Available at: www.caib.es (Accessed: 18 August 2019).
- Consorci Serra de Tramuntana Patrimoni de la Humanitat (2013) *Paratge Natural de la Serra de Tramuntana*. Available at: www.serradetramuntana.net (Accessed: 20 February 2018).

- Consorci Serra de Tramuntana Patrimoni Mundial (2013) *Serra de Tramuntana Patrimoni Mundial. Fullató turístic*. Available at: www.serradetramuntana.net (Accessed: 18 August 2019).
- Cortés-Vázquez, J. A. (2012) *Naturalezas en conflicto: Conservación ambiental y enfrentamiento social en el Parque Natural Cabo de Gata-Níjar*. Alzira: Germania Editorial.
- Cortés-Vázquez, J. A. (2014a) 'A natural life: neo-rurals and the power of everyday practices in protected areas', *Journal of Political Ecology*, 21(1), pp. 493–515.
- Cortés-Vázquez, J. A. (2014b) *Protected Areas, Conservation Stakeholders and the 'Naturalisation' of Southern Europe*. Galway, Ireland.
- Cortés-Vázquez, J. A., Jiménez-Esquinas, G. and Sánchez-Carretero, C. (2017) 'Heritage and participatory governance: an analysis of political strategies and social fractures in Spain', *Anthropology Today*, 33(1), pp. 15–18.
- Cortés-Vázquez, J. A., Quintero, V. and Valcuende, J. M. (2011) 'La naturaleza como patrimonio: Una categoría en disputa en el Parque Natural Cabo de Gata-Níjar', in Escalera, J. (ed.) *Consumir naturaleza: Productos turísticos y espacios protegidos en Andalucía*. Sevilla: Acongaua, pp. 23–48.
- Cortés-Vázquez, J. A., Valcuende, J. M. and Alexiades, M. N. (2014) 'Espacios protegidos en una Europa en crisis: contexto para una antropología del eco-neoliberalismo', in Prat, J. (ed.) *Periferias, Fronteras y Diálogos*. Tarragona: Universitat Rovira i Virgili, pp. 1–16.
- Costa, B. and Fernández, J. H. (1995) 'La arqueología fenicio-púnica en Ibiza: reflexiones sobre noventa años de investigaciones (1903-1993)', in *I Fenici: ieri, oggi, domani. Ricerche, scoperte, progetti*. Roma: Accademia Nazionale dei Lincei - Consiglio Nazionale delle Ricerche, pp. 375–394.
- Costa, P. et al. (2011) *La Prevenció dels Grans Incendis Forestals adaptada a l'Incendi Típus*. Barcelona: Unitat Tècnica del GRAF.
- Crumley, C. L. (1994) *Historical Ecology: Cultural Knowledge and Changing Landscapes*. Santa Fe: School of American Research Press.
- Crumley, C. L. (1998) 'Foreword', in Balée, W. (ed.) *Advances in Historical Ecology*. New York: Columbia University Press, pp. ix–xiv.
- Crumley, C. L. (2007) 'Historical Ecology: Integrated Thinking at Multiple Temporal and Spatial Scales', in *The world system and the Earth system: global socioenvironmental change and sustainability since the Neolithic*. Walnut Creek, CA: Left Coast Press, pp. 15–28.
- Crumley, C. L., Lennartsson, T. and Westin, A. (eds) (2017) *Issues and Concepts in Historical*

- Ecology*. Cambridge: Cambridge University Press.
- Crumley, C. L., Westin, A. and Lennartsson, T. (2017) 'Is There a Future for the Past?', in Crumley, C. L., Lennartsson, T., and Westin, A. (eds) *Issues and Concepts in Historical Ecology*. Cambridge: Cambridge University Press, pp. 1–9.
- Cuarto Inventario Forestal Nacional: Illes Balears* (2012). Madrid: Organismo Autónomo Parques Naturales.
- Cubo María, J. E. *et al.* (2012) *Los Incendios Forestales en España*. Edited by E. Enríquez-Alcalde and L. del Moral-Vargas. Madrid: Ministerio de Agricultura, Alimentación y Medio Ambiente, Secretaría General Técnica, Centro de Publicaciones.
- Dameto, J. (1841) *Historia general del Reino de Mallorca escrita por los cronistas Juan Dameto, Vicente Mut y Geronimo Alemany*. Palma: Imprenta Nacional de Juan Guasp y Pascual.
- Darques, R. (2015) 'Mediterranean cities under fire. A critical approach to the wildland-urban interface', *Applied Geography*, 59, pp. 10–21.
- Davesa, J. A. and Viera, M. del C. (2001) *Viajes de un botánico sajón por la Península Ibérica. Heinrich Moritz Willkomm (1821-1895)*. Cáceres: Servicio de Publicaciones Universidad de Extremadura.
- Davies, G. M. *et al.* (2016) 'The role of fire in UK peatland and moorland management: the need for informed, unbiased debate', *Philosophical Transactions of the Royal Society B: Biological Sciences*, 371(1696), p. 20150342.
- Davis, D. K. (2015) 'Historical approaches to political ecology', in Perreault, T., Bridge, G., and McCarthy, J. (eds) *The Routledge Handbook of Political Ecology*. Oxon and New York: Routledge, pp. 263–275.
- Davis, J. B. (1990) 'The wildland-urban interface: paradise or battleground?', *Journal of Forestry*, 88(1), pp. 26–31.
- Day, A. (1996) *Romanticism*. 2012th edn. Oxon: Routledge.
- Dennis, R. a. *et al.* (2005) 'Fire, People and Pixels: Linking Social Science and Remote Sensing to Understand Underlying Causes and Impacts of Fires in Indonesia', *Human Ecology*, 33(4), pp. 465–504.
- Descola, P. and Pálsson, G. (eds) (1996) *Nature and Society: Anthropological perspectives*. London: Routledge.
- Deyà Bauzá, M. J. (1998) *La manufactura de la llana a la Mallorca moderna (segles XVI-XVII)*. Palma: El Tall.

- Deyà Bauzá, M. J. and Casanovas, M. A. (2004) 'El segle XVIII', in Belenguier, E. (ed.) *Historia de les Illes Balears*. Barcelona: Edicions 62, pp. 11–41.
- Deyà Miró, J. (2019) 'Almallutx i la Resistència Andalusina', in *Seminari: Els Darrers Andalusins de Mayurqa*. Palma: Departament de Ciències Històriques i Teories de les Arts, Universitat de les Illes Balears.
- Doerr, S. H. and Santín, C. (2016) 'Global trends in wildfire and its impacts: perceptions versus realities in a changing world', *Philosophical Transactions of the Royal Society B: Biological Sciences*, 371(1696), pp. 281–329.
- Domblás, N. (2013) 'El Govern y la oposición polemizan sobre los ajustes en medio ambiente tras el incendio', *Última Hora*.
- Domènech, O. (2015) 'Incendis forestals a les Illes Balears: 25 anys de dades estadístiques per a la defensa integrada i la conservació del patrimoni natural', in Servei de Protecció d'Espècies (ed.) *Llibre Verd de Protecció d'Espècies a les Balears*. Palma: Govern de les Illes Balears, pp. 487–494.
- Dove, M. R. and Carpenter, C. (eds) (2008) *Environmental anthropology: a historical reader*. Oxford: Blackwell.
- Driscoll, D. A. *et al.* (2015) 'Resolving future fire management conflicts using multicriteria decision making', *Conservation Biology*, 30(1), pp. 196–205.
- Dubar, M., Ivaldi, J. and Thimon, M. (1995) 'Mio-pliocene fire sequences in the valensole basin (Southern France) – paleoclimatic and paleogeographic interpretation', *Comptes Rendus De L'Academie Des Sciences Serie, I*(320), pp. 873–879.
- Dubon Pretus, M. L. (2012) 'Ordenación y gestión del territorio en Baleares', *Revista de la Cátedra Unesco sobre Desarrollo Sostenible de la Universidad del País Vasco*, 3, pp. 27–36.
- Duguy, B. and Vallejo, V. R. (2008) 'Land-use and fire history effects on post-fire vegetation dynamics in eastern Spain', *Journal of Vegetation Science*, 19, pp. 97–108.
- Durliat, M. (1964) *L'Art en el Regne de Mallorca*. Palma: Editorial Moll.
- Efe (2008) 'La Serra de Tramuntana no será candidata a Patrimonio de la Humanidad', *El Mundo Balears*.
- Efe (2013) 'Extinguido el incendio de la Serra de Tramuntana tras 18 días', *Última Hora*.
- Enright, N. J. and Fontaine, J. B. (2014) 'Climate Change and the Management of Fire-Prone Vegetation in Southwest and Southeast Australia', *Geographical Research*, 52(1), pp. 34–44.
- Entrecanales, B. (2016) *Destil·lat del punt de vista d'un propietari de la Serra, Iniciatives XXI*. Available at: iniciativesxxi.com/ca/ (Accessed: 6 February 2019).

- Eriksen, C. and Head, L. (2014) 'Geographical Fire Research in Australia: Review and Prospects', *Geographical Research*, 52(1), pp. 1–5.
- Eriksson, O. *et al.* (2018) 'Concepts for Integrated Research in Historical Ecology', in Crumley, C. L., Lennartsson, T., and Westin, A. (eds) *Essays in Historical Ecology: Is there a Future for the Past?* Cambridge: Cambridge University Press, pp. 145–181.
- Escobar, A. (1998) 'Whose Knowledge, Whose nature? Biodiversity, Conservation, and the Political Ecology of Social Movements', *Journal of Political Ecology*, 5, pp. 53–82.
- Escobar, A. (1999) 'After Nature: Steps to an Antiessentialist Political Ecology', *Current Anthropology*, 40(1), pp. 1–30.
- Esteve, R. and Fuentes, R. (2000) *Economía, historia e instituciones del turismo en España*. Madrid: Pirámide.
- Europa Press (2016) '500 personas se manifiestan en Ibiza contra la matanza de cabras en Es Vedrà', *El Mundo Baleares*.
- EUROPARC-España (2008) *Anuario EUROPARC - España del estado de los espacios naturales protegidos 2007*. Madrid: Ed. Fernando González Bernáldez.
- EUROPARC-España (2017) *Anuario 2016 del estado de las áreas protegidas en España*. Madrid: Ed. Fernando González Bernáldez.
- EUROPARC-España (2018) *Anuario 2018 del estado de las áreas protegidas en España*. Madrid: Ed. Fernando González Bernáldez.
- European Commission, Joint Research Centre and Institute for Environment and Sustainability (2014) *Forest Fires in Europe, Middle East and North Africa 2013. Joint report of JRC and Directorate-General Environment*. Luxembourg.
- Fairhead, J., Leach, M. and Scoones, I. (2012) 'Green Grabbing: a new appropriation of nature?', *The Journal of Peasant Studies*, 39(2), pp. 237–261.
- Fernandes, P. M. (2009) 'Combining forest structure data and fuel modelling to classify fire hazard in Portugal', *Annals of Forest Science/Forestry*, 66(4), pp. 415–424.
- Fernandes, P. M. (2013) 'Fire-smart management of forest landscapes in the Mediterranean basin under global change', *Landscape and Urban Planning*, 110(1), pp. 175–182.
- Fernandes, P. M. *et al.* (2013) 'Prescribed burning in southern Europe: Developing fire management in a dynamic landscape', *Frontiers in Ecology and the Environment*, 11(s1), pp. e4–e14.
- Fernández Miranda, M. (1983) 'Yacimientos talayóticos para el estudio de la

- romanización en la isla de Mallorca', in *Symposium de Arqueología. Pollentia y la Romanización de las Baleares (Alcúdia 1977)*. Palma: Ayuntamiento de Alcúdia, pp. 93–121.
- Fernández Miranda, M. and Waldren, W. H. (1979) 'Periodificación cultural y cronología absoluta en la Prehistoria de Mallorca', *Trabajos de Prehistoria*, 36, pp. 349–377.
- Ferragut, J. (1974) 'La desamortización de Mendizábal en Mallorca (1836-1846)', *Trabajos de Geografía*, 21, pp. 148–164.
- Ferreira, A. *et al.* (2008) 'Soil and water degradation processes in burned areas: lessons learned from a nested approach', *Catena*, 74, pp. 273–285.
- Figueiredo, J. and Pereira, H. M. (2011) 'Regime shifts in a socio-ecological model of farmland abandonment', *Landscape Ecology*, 26(5), pp. 737–749.
- Flannigan, M. D. *et al.* (2006) 'Forest Fires and Climate Change in the 21st Century', *Mitigation and Adaptation Strategies for Global Change*, 11, pp. 847–859.
- Flannigan, M. D. *et al.* (2009) 'Implications of changing climate for global wildland fire', *International Journal of Wildland Fire*, 18(5), pp. 483–507.
- Flannigan, M. D., Stocks, B. J. J. and Wotton, B. M. M. (2000) 'Climate Change and Forest Fires', *The Science of the Total Environment*, pp. 221–229.
- Fletcher, R., Dressler, W. and Büscher, B. (2014) 'Introduction. Nature™ Inc.: The New Frontiers of Environmental Conservation', in Büscher, B., Dressler, W., and Fletcher, R. (eds) *Nature™ Inc.: Environmental Conservation in the Neoliberal Age*. Tuscon: The University of Arizona Press, pp. 3–24.
- Foley, J. A. *et al.* (2011) 'Solutions for a cultivated planet Jonathan', *Nature*, 478(7369), pp. 337–342.
- Foster, D. R. (1992) 'Land-use history (1730–1990) and vegetation dynamics in central New England', *Journal of Ecology*, 80, pp. 753–771.
- Frazão-Moreira, A., Carvalho, A. M. and Martins, M. E. (2009) 'Local ecological knowledge also 'comes from books': Cultural change, landscape transformation and conservation of biodiversity in two protected areas in Portugal', *Anthropological Notebooks*, 15(1), pp. 27–36.
- Freeman, L. (2007) 'Why are some people powerful?', in Astuti, R., Parry, J., and Stafford, C. (eds) *Questions of Anthropology*. London: Bloomsbury Publishing, pp. 281–306.
- Frigolé, J. (2006) 'Introducción. Globalización y Transformaciones Sociales, Económicas y Culturales en áreas de Montaña', in Frigolé, J. and Xavier Roigé (eds)

- Globalización y Localidad: Perspectiva Etnográfica*. Barcelona: Publicacions i Edicions de la Universitat de Barcelona, pp. 7–15.
- Frigolé, J. (2012) ‘Cosmologías, patrimonialización y eco-símbolos en el Pirineo catalán en un contexto global’, *Revista de Antropología Social*, 21, pp. 173–196.
- Frigolé, J. (2014a) ‘Patrimonialización y mercantilización de lo auténtico, dos estrategias básicas en una economía terciaria’, in Roigé, X., Del Marmol, C., and Frigolé, J. (eds) *Construyendo el patrimonio cultural y natural. Parques, museos y patrimonio rural*. Alzira: Germania Editorial, pp. 31–46.
- Frigolé, J. (2014b) ‘Retóricas de la autenticidad en el capitalismo avanzado’, *Éndoxa: Series Filosóficas*, (33), pp. 37–60.
- Frigolé, J. and Del Marmol, C. (2009) ‘La localización de discursos globales: patrimonio cultural, naturaleza y autenticidad en los Pirineos catalanes’, *Quaderns-e de l’ICA*. Barcelona, 14/b, pp. 1–18.
- Frigolé, J. and Roigé, X. (eds) (2006) ‘Globalización y producción de localidad en un valle del Alt Urgell: modelo interpretativo y síntesis etnográfica’, in *Globalización y Localidad: Perspectiva Etnográfica*. Barcelona: Publicacions i Edicions de la Universitat de Barcelona.
- Fueris, E. and Mora, J. (2013) ‘Detenido por echar al campo las brasas causantes del incendio’, *El Mundo, Baleares*.
- Fullana Puigserver, P. and Morey Tous, A. (2004) ‘El triomf del liberalisme centralista’, in Edicions 62 (ed.) *Història de les Illes Balears*. Barcelona, pp. 77–160.
- Galiana-Martin, L., Herrero, G. and Solana, J. (2011) ‘A Wildland–Urban Interface Typology for Forest Fire Risk Management in Mediterranean Areas’, *Landscape Research*, 36(2), pp. 151–171.
- Galvín, A. (2019) ‘La Justicia ampara la orden de matar a las cabras que amenazan la flora de un islote de Baleares’, *Eldiario.es*.
- Ganteaume, A. *et al.* (2013) ‘A review of the main driving factors of forest fire ignition over Europe’, *Environmental management*, 51(3), pp. 651–62.
- Ganteaume, A. and Jappiot, M. (2013) ‘What causes large fires in Southern France’, *Forest Ecology and Management*, 294.
- García Álvarez, J. (2013) ‘Paisaje, memoria histórica e identidad nacional en los inicios de la política de conservación de la naturaleza en España: de Covadonga a San Juan de la Peña’, *Hispania*, 73(244), pp. 409–438.
- García Munar, P. J. (2017) *Salvem Sa Dragonera. Història dels Ecologismes a Mallorca*. Palma:

Illa Edicions.

- García, P. J. (2008) *Dragonera pes dragons! Història de la lluita ecologista per salvar Sa Dragonera (1974-1995)*. Palma: El Moixet Demagog.
- García Riaza, E. and Sánchez de León, M. L. (2000) *Roma y la municipalización de las Baleares*. Palma: Universitat de les Illes Balears.
- Garriga, M. C. (2016) *La imatgeria Medieval Mallorquina (1229-1520) (unpublished)*. Universitat de les Illes Balears.
- Gaston, K. J. *et al.* (2008) 'Protected areas in Europe: Principle and practice', *Annals of the New York Academy of Sciences*, 1134, pp. 97–119.
- Gee, A. and Anguiano, D. (2018) 'Last day in Paradise: the untold story of how a fire swallowed a town', *The Guardian*.
- Gelabert, B., Sabat, F. and Rodriguez-Perea, A. (1992) 'A structural outline of the Serra de Tramuntana of Mallorca (Balearic Islands)', *Tectonophysics*, 203(1–4), pp. 167–183.
- Gelabert, M. (2018) 'La llei de camins posarà ordre a la massificació de la Serra', *Diari Jornada*.
- Gil Sánchez, L., Valdés, C. M. and Díaz-Fernández, P. (2008) *La Transformación Histórica del Paisaje Forestal en las Islas Baleares*. Madrid: Ministerio de Medioambiente.
- Gill, A. M. (1979) 'Fire in the Australian landscape', *Landscape Planning*, 6(3–4), pp. 343–357.
- Gill, A. M., Stephens, S. L. and Cary, G. J. (2013) 'The worldwide "wildfire" problem', *Ecological Applications*, 23(2), pp. 438–454.
- Glikson, A. Y. and Groves, C. (2016) *Climate, Fire and Human Evolution*. New York, Dordrecht and London: Springer International Publishing Switzerland.
- GOB (2011a) *El GOB alerta la UNESCO de la possible desprotecció de la Serra de Tramuntana*. Available at: www.gobmallorca.com (Accessed: 21 February 2018).
- GOB (2011b) *El GOB reclama als nous responsables de medi ambient de Consell i Govern que abordin convenientment la problemàtica ambiental de les cabres orades als espais forestals*. Available at: www.gobmallorca.com (Accessed: 26 March 2009).
- GOB (2012) *El Govern posa "en perill d'extinció" els espais naturals protegits de les Balears*. Available at: www.gobmallorca.com (Accessed: 21 February 2018).
- GOB (2013) *És positiu promocionar els espais protegits, però irresponsable fer-ho quan a la vegada s'elimina capacitat gestora*. Available at: www.gobmallorca.com (Accessed: 21 February 2018).

- GOB (2018) *Grup d'Ornitologia i Defensa de la Naturalesa*. Available at: www.gobmallorca.com (Accessed: 19 February 2018).
- Gómez, A. *et al.* (2010) 'The potential for electricity generation from crop and forestry residues in Spain', *Biomass and Bioenergy*, 34(5), pp. 703–719.
- Gómez, M., Cifre Sabater, M. and Suárez, J. (2018) *Capacitat de càrrega. Estudi al centre històric de Palma i Valldemossa*. Palma: Fundació Iniciatives del Mediterrani.
- González Márquez, F. (2013) 'Incendios, ¿tenemos respuestas?', *El País*.
- González, P. A. (2014) 'From a Given to a Construct: Heritage as a commons', *Cultural Studies*, 28(3), pp. 359–390.
- González, P. A. (2015) 'Conceptualizing Cultural Heritage as a Common', in Biehl, P. H. *et al.* (eds) *Identity and Heritage*. Cham: Springer, pp. 27–35.
- González, P. A. and Vázquez, A. M. (2014) 'Between planning and heritage: Cultural parks and national heritage areas', *European Spatial Research and Policy*, 21(2), pp. 33–46.
- González Pereira, M. *et al.* (2017) 'Fire on the Hills: An Environmental History of Fires and Fire Policy in Mediterranean-Type Ecosystems', in Vaz, E., Joanaz de Melo, C., and Costa Pinto, L. (eds) *Environmental History in the Making. Environmental History*. Cham: Springer, pp. 145–169.
- Goren-Inbar, N. *et al.* (2004) 'Evidence of hominin control of fire at Greshet Benot Ya'aqov', *Science*, 304, pp. 725–727.
- Govern de les Illes Balears (2018) *Servei de Gestió Forestal i Protecció del Sòl*. Available at: www.caib.es/sites/xarxaforestal/ca/portada-19585/ (Accessed: 16 January 2019).
- Greenberg, J. B. and Park, T. K. (1994) 'Political Ecology', *Journal of Political Ecology*, 1, pp. 1–12.
- Grimalt Gelabert, M., Blázquez Salom, M. and Rodríguez Gomila, R. (1992) 'Physical factors, distribution and present land-use of terraces in the Tramuntana Mountain Range', *Pirineos*, 139, pp. 15–25.
- Grup Balear d'Ornitologia i Defensa de la Naturalesa (2016) *La població de cabres assilvestrades és un dels greus problemes ecològics de les Balears*.
- Guerrero Ayuso, V. M. (1997) *El pensamiento científico en la prehistoria balear: Fuentes bibliográficas para el estudio de la prehistoria balear*. Palma: El Tall.
- Guerrero Ayuso, V. M., Calvo, M. and Salvá, B. (2002) 'La cultura talayótica. Una sociedad de la Edad del Hierro en la periferia de la colonización fenicia',

- Complutum*, 13, pp. 221–258.
- Guichard, P. (1979) ‘La société rurale valencienne à l’époque musulmane’, *Estudis d’història agrària*, (3), pp. 41–52.
- Gunn, S. W. A. (2000) ‘Terminology of burns and fire disasters’, in Masellis, M. and Gunn, S. W. A. (eds) *The Management of Burns and Fire Disasters: Perspectives 2000*. Dordrecht, Boston and London: Kluwer Academic Publishers, pp. 26–32.
- Habsburg, L. S. (1891) *Las Baleares descritas por la palabra y el dibujo (Die Balearen)*. Palma: José J. de Olañeta.
- Habsburg, L. S. (1996) *Torres y Atalayas de Mallorca*. Palma: José J. de Olañeta ed.
- Hammer, R. B., Stewart, S. I. and Radeloff, V. C. (2009) ‘Demographic Trends, the Wildland-Urban Interface, and Wildfire Management’, *Society & Natural Resources*, 22, pp. 777–782.
- Hansen, M. C. *et al.* (2013) ‘High-resolution global maps of 21st-century forest cover change’, *Science*, 342(6160), pp. 850–853.
- Harris, M. (1968) *The rise of anthropological theory: A history of theories of culture*. New York: Crowell.
- Harrison, D. and Hitchcock, M. (eds) (2005) *The politics of world heritage: Negotiating tourism and conservation*. Bristol: Channel View Publications.
- Harwell, E. (2000) ‘Remote Sensibilities: Discourses of Technology and the Making of Indonesia’s Natural Disaster’, *Development and Change*, 31(1), pp. 307–340.
- Heinich, N. (2009) *La fabrique du patrimoine: de la cathédrale à la petite cuillère*. Paris: Maison des Sciences de l’Homme.
- Hernández, A. G. (2013) ‘“Pastorear” los incendios forestales’, *El País*.
- Hernández, E. (2008) ‘De parques naturales a parques urbanos. Turismo y patrimonialización del territorio en áreas protegidas’, in Beltran, O., Pascual, J. J., and Vaccaro, I. (eds) *Patrimonialización de la Naturaleza. El Marco Social de la Políticas Ambientales*. Donosti: Ankulegi Antropologia Elkarte, pp. 83–96.
- Hernández, M. and Ruíz, E. (2005) ‘Apropiación patrimonial en contextos mineros en Andalucía’, *Revista de Dialectología y Tradiciones Populares*, 60(2), pp. 103–127.
- Hernández Ramírez, M. and Ruiz-Ballesteros, E. (2005) ‘Apropiación patrimonial en contextos mineros de Andalucía’, *Revista de Dialectología y Tradiciones Populares*, 60(2), pp. 103–127.
- Hirsch, E. (1995) ‘Introduction - Landscape: Between Place and Space’, in *The Anthropology of Landscape. Perspectives on Place and Space*. Oxford and New York:

- Oxford University Press, pp. 1–30.
- Hirsch, E. (2010) 'Property and Persons: New Forms and Contests in the Era of Neoliberalism', *Annual Review of Anthropology*, 39(1), pp. 347–360.
- Hodges, M. (2001) 'Food, Time and Heritage Tourism in Languedoc, France', *History and Anthropology*, 12(2), pp. 179–212.
- Hodges, M. (2009) 'Disciplining Memory: Heritage Tourism and the Temporalisation of the Built Environment in Rural France', *International Journal of Heritage Studies*, 15(1), pp. 76–99.
- Holmes, G. and Brockington, D. (2013) 'Protected Areas - What People Say about Well-Being', in Roe, D. et al. (eds) *Biodiversity Conservation and Poverty Alleviation: Exploring the Evidence for a Link*. Oxford, Chichester and Hoboken: John Wiley & Sons, pp. 160–172.
- Howard, P. (2014) *Flammable Planet: Wildfires and the Social Cost of Carbon*. New York: NYU Law School Institute for Policy Integrity.
- Howitt, R. (2014) 'Coexisting with Fire? A Commentary on the Scale Politics of Adaptation', *Geographical Research*, 52(1), pp. 61–64.
- Igoe, J. (2004) *Conservation and globalization: A study of national parks and indigenous communities from East Africa to South Dakota*. Belmont, California: Thomson-Wadsworth.
- Igoe, J. and Brockington, D. (2007) 'Neoliberal Conservation: A Brief Introduction', *Conservation and Society*, 5(4), pp. 432–449.
- Ingold, T. (2011) *Being Alive: Essays on Movement, Knowledge and Description, Social Anthropology*. Oxon and New York: Routledge.
- Instituto para la Conservación de la Naturaleza - ICONA (1975) *Inventario Nacional de Paisajes Sobresalientes, Monografías*. Madrid: Ministerio de Agricultura, Servicio de Publicaciones Agrarias.
- Jackson, A. (1987) 'Reflections on Ethnography at Home and the ASA', in Jackson, A. (ed.) *Anthropology at Home*. London: Tavistock Publications Ltd.
- James, S. R. (1989) 'Hominid use of fire in the Lower and Middle Pleistocene', *Current Anthropology*, 30(1), pp. 1–26.
- Jiménez-Ruano, A., Mimbbrero, M. R. and de la Riva Fernández, J. (2017) 'Understanding wildfires in mainland Spain. A comprehensive analysis of fire regime features in a climate-human context', *Applied Geography*, 89(October), pp. 100–111.
- Jiménez, N. (2019) 'Devuelven un tesoro de las épocas talayótica y árabe en Estellencs',

Última Hora.

- Johnston, F. H. *et al.* (2012) 'Estimated global mortality attributable to smoke from landscape fires', *Environmental Health Perspectives*, 120(5), pp. 695–701.
- Jover Avellà, G. (1997) *Societat rural i desenvolupament econòmic a Mallorca. Feudalisme, latifundi i pagesia, 1500-1800*. Barcelona: Publicacions Universitat de Barcelona.
- Jover Avellà, G. (2003) 'Les possessions Mallorquines: una modalitat d'organització de l'espai agrari i de l'explotació del treball', in Congost, R., Jover, G., and Biagioli, G. (eds) *L'organització de l'espai rural: masos, possessions, poderi*. Girona: CCG Edicions - Universitat de Girona, pp. 127–238.
- Jover Avellà, G. (2004a) 'El món rural en els segles XVI i XVII. Societat rural i creixement agrari a Mallorca: 1500-1750', in Belenguier, E. (ed.) *Història de les Illes Balears*. Barcelona: Edicions 62, pp. 393–424.
- Jover Avellà, G. (2004b) 'La depressió baixmedieval als camps mallorquins: la crisi de la pagesia benestant i la formació de l'aristocràcia terratinent: 1350-1500', in Belenguier, E. (ed.) *Història de les Illes Balears*. Barcelona: Edicions 62, pp. 155–178.
- Jover Avellà, G. and Soto, R. (2002) 'Colonización Feudal y Organización del Territorio. Mallorca, 1230-1350', *Revista de Història Econòmica*, (3), pp. 439–477.
- Juan Vidal, J. (1976) 'Las crisis agrarias y la sociedad en mallorca durante la Edad Moderna', *Mayurqa*, (16), pp. 87–113.
- Juan Vidal, J. (1991) *Mallorca en tiempos del descubrimiento de América*. Palma: El Tall.
- Juffe-Bignoli, D. *et al.* (2014) *Protected Planet Report 2014*. Cambridge, UK.
- Karkanas, P. *et al.* (2007) 'Evidence for habitual use of fire at the end of the Lower Paleolithic: Site-formation processes at Qesem Cave, Israel', *Journal of Human Evolution*, 53(2), pp. 197–212.
- Keeley, J. E. (2010) 'Fire on California landscapes', *Fremontia*, 38(2–3), pp. 2–6.
- Keeley, J. E. *et al.* (2012) *Fire in Mediterranean Ecosystems: Ecology, Evolution and Management*. New York: Cambridge University Press.
- Keeley, J. E., Fotheringham, C. J. and Morais, M. (1999) 'Reexamining Fire Suppression Impacts on Brushland Fire Regimes', 284(5421), pp. 1829–1832.
- Keeley, J. E. and Syphard, A. D. (2017) 'Different historical fire-climate patterns in California', *International Journal of Wildland Fire*, 26(4), pp. 253–268.
- Kirchner, H. (1997) *La construcció de l'espai pagès a Mayurqa: les valls de Bunyola, Orient, Coanegra i Alaró*. Palma: Universitat de les Illes Balears.
- Kirshenblatt-Gimblett, B. (2001) 'La cultura de les destinacions: teoritzar el patrimoni',

- Revista d'etnologia de Catalunya*, (19), pp. 44–61.
- Kirshenblatt-Gimblett, B. (2004) 'Intangible heritage as metacultural production', *Museum International*, 66(1–4), pp. 163–174.
- Kousis, M. (2004) 'Marine and Coastal Issues in Local Environmental Conflict: Greece, Spain, and Portugal', in Boissevain, J. and Selwyn, T. (eds) *Contesting the Foreshore: Tourism, Society and Politics on the Coast*. Amsterdam: Amsterdam University Press, pp. 205–232.
- Koutsias, N. *et al.* (2016) 'Fire occurrence zoning from local to global scale in the European Mediterranean basin: Implications for multi-scale fire management and policy', *IForest: Biogeosciences and Forestry*, 9, pp. 195–204.
- Krawchuk, M. A. *et al.* (2009) 'Global Pyrogeography: the Current and Future Distribution of Wildfire', *PLoS ONE*, 4(4), p. e5102.
- Lampin-Maillet, C. *et al.* (2010) 'Wildland Urban Interfaces, Fire Behaviour and Vulnerability: Characterization, Mapping and Assessment', in Sande Silva, J. *et al.* (eds) *Towards Integrated Fire Management - Outcomes of the European Project Fire Paradox*. Joensuu: European Forest Institute Research Report, pp. 71–92.
- De las Heras, J. *et al.* (2012) 'Post-Fire Management of Serotinous Pine Forests', in Moreira, F. *et al.* (eds) *Post-Fire Management and Restoration of Southern European Forests*. London and New York: Springer, pp. 121–151.
- Lázaro, A. and Montiel, C. (2010) 'Overview of Prescribed Burning Policies and Practices in Europe and Other Countries', in Sande Silva, J. *et al.* (eds) *Towards Integrated Fire Management - Outcomes of the European Project Fire Paradox*. Joensuu: European Forest Institute Research Report, pp. 137–150.
- Leidy, R. S. *et al.* (2015) 'Comparative study of trophic behaviour and herd structure in wild and feral goats living in a mediterranean island: Management implications', *Applied Animal Behaviour Science*, 165, pp. 81–87.
- Lemos, M. C. and Agrawal, A. (2006) 'Environmental Governance', *Annual Review of Environment and Resources*, 31(1), pp. 297–325.
- Lett, J. W. (1987) 'The Concept of Culture', in *The human enterprise: A critical introduction to anthropological theory*. Boulder: Westview Press, pp. 54–59.
- Lewthwaite, J. G. (1985) 'Social Factors and Economic Change in Balearic Prehistory 3.000-1.000 B.C.', in Barker, G. and Gamble, C. (eds) *Beyond Domestication n Prehistoric Europe*. London: Academic Press, pp. 205–231.
- Llabrés Bernat, A. (1997) *El paisatge a les Balears*. Palma: Conselleria de Medi Ambient,

Ordenació del Territori i Litoral, Govern Balear.

- Llabrés, J. and Vallespir, J. (1983) *Els nostres arts i oficis d'antany IV*. Ciutat de Mallorca: Museu Arqueològic La Porciúncula.
- Llinàs, M. S. (2006) *El turisme a les Balears (1950-2005)*. Palma: Edicions Documenta Balear.
- Lloret, F. *et al.* (2002) 'Wildfires and landscape patterns in the Eastern Iberian Peninsula', *Landscape Ecology*, 17, pp. 745–759.
- López Bonet, J. F. (1990) *La riquesa de Mallorca al s. XIV: Evolució i tendències econòmiques*. Palma: Consell Insular de Mallorca.
- Macdonald, S. (2013) *Memorylands: heritage and identity in Europe today*. London and New York: Routledge.
- MacEachern, A. (2011) 'M.B. Williams and the Early Years of Parks Canada', in Campbell, C. E. (ed.) *A century of parks canada. 1911-2011*. Calgary: University of Calgary Press, pp. 21–52.
- Magro, A. (2013) 'El monte es gasolina', *Diario de Mallorca*.
- Mahmoud, H. and Chulahwat, A. (2018) 'Unraveling the Complexity of Wildland Urban Interface Fires', *Scientific Reports*. Springer US, 8(1), p. 9315.
- Malico, I. *et al.* (2016) 'Biomass residues for energy production and habitat preservation. Case study in a montado area in Southwestern Europe', *Journal of Cleaner Production*, 112, pp. 3676–3683.
- Mancilla-Leyton, J. M. (2014) 'El papel de la cabra doméstica (*Capra hircus* L.) en la estructura y conservación del Monte Mediterráneo', *Ecosistemas*, 23(2), pp. 158–161.
- Manera, C. (1988) *Comerç i capital mercantil a Mallorca 1720-1800*. Palma: Consell Insular de Mallorca.
- Manera, C. (1990) 'Resistir i créixer. Canvi econòmic i classes socials a la Mallorca del segle XVIII', *Randa*, 26, pp. 7–83.
- Manresa, A. (2013) 'Balears avanza en su plan para privatizar los parques naturales', *El País*.
- Manresa, A. (2013a) 'El fuego de Mallorca obliga a desalojar a 700 residentes', *El País*.
- Manresa, A. (2013b) 'El incendio en Mallorca deja un paisaje abrasado de 35 kilómetros', *El País*.
- Manresa, A. (2013c) 'Un fuego arrasa un enclave protegido por la UNESCO en Mallorca', *El País*.

- Mas Forners, A. (2004) 'Conquesta i creació del Regne', in Belenguier, E. (ed.) *Història de les Illes Balears*. Barcelona: Edicions 62, pp. 9–39.
- Mas Forners, A. (2005) *Esclaus i Catalans: esclavitud i segregació a Mallorca durant els segles XIV i XV*. Palma: Lleonard Muntaner Ed.
- Mataix-Solera, J. *et al.* (2011) 'Fire effects on soil aggregation: A review', *Earth-Science Reviews*, 109(1–2), pp. 44–60.
- Mataix-Solera, J. and Doerr, S. H. (2004) 'Hydrophobicity and aggregate stability in calcareous topsoils from fire-affected pine forests in southeastern Spain', *Geoderma*, 118(1–2), pp. 77–88.
- Mathews, A. S. (2005) 'Power/Knowledge, Power/Ignorance: Forest Fires and the State in Mexico', *Human Ecology*, 33(6), pp. 795–820.
- Mavsar, R. *et al.* (2012) *Post-Fire Management and Restoration of Southern European Forests*. Edited by F. Moreira *et al.* Dordrecht: Springer Netherlands (Managing Forest Ecosystems).
- Mayol, J. (1998) 'El Parc Natural de la Serra de Tramuntana', in Rodríguez, A. *et al.* (ed.) *La Serra de Tramuntana. Aportacions per a un debat*. Sa Nostra, pp. 124–134.
- Mayol, J. (2011) *Arbres i boscos de les Illes Balears*. Palma: Govern de les Illes Balears, Conselleria d'Agricultura, Medi Ambient i Territori.
- Mayol, J. (2015) 'Cabras asilvestradas: peores que el fuego o el cemento', in *Apuntes de conservación biológica. Experiencias, reflexiones y perplejidades de un naturalista*. Ed. Tundra, pp. 249–252.
- Mayol, J. *et al.* (2017) *La cabra, espècie invasora a les Balears*. Palma: Lleonard Muntaner.
- Mayol Serra, J. and Rayó Ferrer, M. (1998) 'Aportació a la història de la defensa del medi ambient a les Balears', in *El medi ambient a les illes Balears: Qui és qui? actes, Can Tàpera, 27-29 novembre 1997*. Palma: Sa Nostra, pp. 140–157.
- Micó, R. (2006) 'Radiocarbon Dating and Balearic Prehistory: Reviewing the Periodization of the Prehistoric Sequence', *Radiocarbon*, 48(3), pp. 421–434.
- Miller, A. M. and Davidson-Hunt, I. J. (2010) 'Fire, agency and scale in the creation of aboriginal cultural landscapes', *Human Ecology*, 38, pp. 401–414.
- Milton, K. (1996) *Environmentalism and cultural theory*. London and New York: Routledge.
- Ministerio de Medio Ambiente (2002) *Plan Forestal Español*. Madrid: Dirección General de la Conservación de la Naturaleza.
- Minnich, R. A. (1983) 'Fire mosaics in southern California and northern Baja California', *Science*, 219(4590), pp. 1287–1294.

- Moll, I. (1991) 'Los estudios de Historia Agraria en Mallorca', *Noticiario de Historia Agraria*, (1), pp. 29–38.
- Moll, I. and Suau, J. (1979) 'Senyors i pagesos a Mallorca (1718-1869/70)', *Estudis d'Historia Agraria*, (2), pp. 95–170.
- Montenegro, G. *et al.* (2004) 'Fire regimes and vegetation responses in two Mediterranean-climate regions', *Ecological Research*, 77, pp. 455–464.
- Montenegro, M. (2010) 'La patrimonialización como protección contra la mercantilización: paradojas de las sanciones culturales de lo igual y lo diferente', *Revista Colombiana de Antropología*, 46(1), pp. 115–131.
- Montiel, C., Costa, P. and Galán, M. (2010) 'Overview of Suppression Fire Policies and Practices in Europe', in Sande Silva, J. *et al.* (eds) *Towards Integrated Fire Management - Outcomes of the European Project Fire Paradox*. Joensuu: European Forest Institute Research Report, pp. 177–188.
- Montiel, C. and Herrero, G. (2010) 'An Overview of Policies and Practices Related to Fire Ignitions at the European Union Level', in Sande Silva, J. *et al.* (eds) *Towards Integrated Fire Management- Outcomes of the European Project Fire Paradox*. Joensuu: European Forest Institute Research Report, pp. 35–46.
- Moreira, F. *et al.* (2009) 'Regional variations in wildfire susceptibility of land-cover types in Portugal: Implications for landscape management to minimize fire hazard', *International Journal of Wildland Fire*, 18(iii), pp. 563–574.
- Moreira, F. *et al.* (2011) 'Landscape-wildfire interactions in southern Europe: implications for landscape management', *Journal of environmental management*, 92(10), pp. 2389–402.
- Moreira, F., Rego, F. and Ferreira, P. G. (2001) 'Temporal (1958 – 1995) pattern of change in a cultural landscape of northwestern Portugal: implications for fire occurrence', *Landscape Ecology*, 2(16), pp. 557–567.
- Moreno, M. V. *et al.* (2014a) 'Fire regime changes and major driving forces in Spain from 1968 to 2010', *Environmental Science and Policy*, 37, pp. 11–22.
- Moreno, M. V. *et al.* (2014b) 'Fire regime changes and major driving forces in Spain from 1968 to 2010', *Environmental Science and Policy*, 37, pp. 11–22.
- Moreno, M. V. and Chuvieco, E. (2013) 'Characterising fire regimes in Spain from fire statistics', *International Journal of Wildland Fire*, 22(3), pp. 296–305.
- Morgan, M. (1969) 'The Roman Conquest of the Balearic Isles', *Californian Studies of Classical Antiquity*, (2), pp. 217–231.

- Moritz, M. A. *et al.* (2014) 'Learning to coexist with wildfire', *Nature*, 515(7525), pp. 58–66.
- Mouillot, F. *et al.* (2005) 'Long-term forest dynamic after land abandonment in a fire prone Mediterranean landscape (central Corsica, France)', *Landscape Ecology*, 20, pp. 101–112.
- Mulero, A. (2002) *La protección de espacios naturales en España: antecedentes, contrastes territoriales, conflictos y perspectivas*. Madrid: Mundi Prensa Libros S.A.
- Murdiyarsa, D. and Lebel, L. (2006) 'Local to global perspectives on forest and land fires in Southeast Asia', *Mitigation and Adaptation Strategies for Global Change*, 12(1), pp. 3–11.
- Murray, D. G., Pascual, A. and Llabrés, A. (eds) (1992) *Conventos y Monasterios de Mallorca. Història, Arte y Cultura*. Palma: José J. de Olañeta ed.
- Murray, I., Rullan Salamanca, O. and Blázquez Salom, M. (2005) 'Las huellas territoriales de deterioro ecológico. El trasfondo oculto de la explosión turística en Baleares', *Scripta Nova*, IX(199), pp. 1–27.
- Murray, I., Yrigoy, I. and Blázquez, M. (2017) 'The role of crises in the production, destruction and restructuring of tourist spaces. The case of the Balearic Islands', *Investigaciones Turísticas*, 13(July), pp. 1–29.
- Mut Calafell, A. and Rosselló-Bordoy, G. (1993) *La remembrança de Nunyo Sanç. Una relació de les seves propietats a la ruralia de Mallorca*. Palma: Govern Balear.
- Narayan, K. (2007) 'How Native is a "Native" Anthropologist', *American Anthropologist*, 95(3), pp. 671–686.
- Nash, R. (1970) 'The American invention of national parks', *American Quarterly*, 22(3), pp. 726–735.
- Nauslar, N., Abatzoglou, J. and Marsh, P. (2018) 'The 2017 North Bay and Southern California Fires: A Case Study', *Fire*, 1(1), pp. 1–18.
- Naveh, Z. (1989) 'Fire in the Mediterranean - a Landscape Ecological Perspective', in Goldammer, J. G. and Jenkins, M. J. (eds) *Fire in Ecosystems Dynamics*. The Netherlands: The Hague, pp. 1–20.
- Neves, K. and Igoe, J. (2012) 'Uneven development and accumulation by dispossession in nature conservation: Comparing recent trends in the Azores and Tanzania', *Tijdschrift voor Economische en Sociale Geografie*, 103(2), pp. 164–179.
- Nicas, J. and Fuller, T. (2018) 'Wildfire Becomes Deadliest in California History', *The New York Times*.

- Niño Vallejo, V. M. (2012) ‘Los incendios se apagan en invierno’, *El País*.
- Noticiasmallorca (2013) ‘UPyD vincula los recortes del Govern con los “devastadores efectos” del fuego de Andratx’, *Noticiasmallorca.es*.
- Novellino, D. (2003) ‘Contrasting landscapes, conflicting ontologies. Assessing environmental conservation on Palawan Island’, in Anderson, D. G. and Berglund, E. K. (eds) *Ethnographies of Conservation*. New York: Berghahn Books, pp. 171–188.
- Núñez, L. (2002) *El banyarriquer. L’insecte perforador que ataca als alzinars*. Palma: Conselleria de Medi Ambient. Govern de les Illes Balears.
- Ollés, M. (2013) ‘El Ibanat da por controlado el incendio forestal de Cala Torta’, *Diario de Mallorca*.
- Orfila, M. *et al.* (1996) ‘Nuevas perspectivas en torno a la romanización de la isla de Mallorca: el mundo rural’, *Mayurqa*, 23, pp. 9–30.
- Pafilis, P. *et al.* (2013) ‘Grazing by goats on islands affects the populations of an endemic Mediterranean lizard’, *Journal of Zoology*, 290(4), pp. 255–264.
- Page, B. (2003) ‘The political ecology of “Prunus africana” in Cameroon’, *Area*, 35(4), pp. 357–370.
- El País (2013) ‘Interior reduce personal forestal para priorizar medios aéreos’, *El País, Cataluña*.
- Palafox, J. (coord) *et al.* (1999) *Curso de Historia Económica*. Valencia: Tirant lo Blanch.
- Palol, P. (1967) *Arte paleocristiano en España*. Barcelona: Ed. Polígrafa.
- Patriquin, L. (2004) ‘The Agrarian Origins of the Industrial Revolution in England’, *Review of Radical Political Economics*, 36(2), pp. 196–216.
- Pausas, J. G. (1999) ‘Response of plant functional types to changes in the fire regime in Mediterranean ecosystems: A simulation approach’, *Journal of Vegetation Science*, 10(5), pp. 717–722.
- Pausas, J. G. (2004) ‘Changes in fire and climate in the eastern Iberian Peninsula (Mediterranean Basin)’, *Climatic Change*, 63, pp. 337–350.
- Pausas, J. G. *et al.* (2008) ‘Are wildfires a disaster in the Mediterranean basin? A review’, *International Journal of Wildland Fire*, 17(6), pp. 713–723.
- Pausas, J. G., Belliure, J. and Montagud, S. (2018) ‘Fire benefits flower beetles in a Mediterranean ecosystem’, *PLoS one*, 13(6), p. e0198951.
- Pausas, J. G. and Fernández Muñoz, S. (2012) ‘Fire regime changes in the Western Mediterranean Basin: from fuel-limited to drought-driven fire regime’, *Climatic*

- Change*, 110(1–2), pp. 215–226.
- Pausas, J. G. and Keeley, J. E. (2009) ‘A Burning Story: The Role of Fire in the History of Life’, *BioScience*, 59(7), pp. 593–601.
- Pausas, J. G. and Paula, S. (2012) ‘Fuel shapes the fire – climate relationship: evidence from Mediterranean’, *Global Ecology and Biogeography*, 21, pp. 1074–1082.
- Peluso, N. L. (2005) ‘Seeing property in land use: Local territorializations in West Kalimantan, Indonesia’, *Danish Journal of Geography*, 105(1), pp. 1–15.
- Pereira, H. M. and Navarro, L. M. (eds) (2015) *Rewilding European Landscapes*. New York, Dordrecht, London: Springer Open.
- Pereira, M. G., Aranha, J. and Amraoui, M. (2014) ‘Land cover fire proneness in Europe’, *Forest Systems*, 23(3), pp. 598–610.
- Pérez Bustamante, L. and Parra Ponce, C. (2004) ‘Paisajes culturales: el parque patrimonial como instrumento de revalorización y revitalización del territorio’, *Theoria*, 13, pp. 9–24.
- Pérez Fariña, M. L. (2003) ‘El turismo y sus impactos en las Islas Baleares’, *Carta Económica Regional*, 85, pp. 20–28.
- Pericot García, L. (1975) *Las islas Baleares en los tiempos prehistóricos*. Barcelona: Destino.
- Perry, G. L. . *et al.* (2012) ‘Reconstructing spatial vulnerability to forest loss by fire in pre-historic New Zealand’, *Global Ecology and Biogeography*, 18, pp. 1609–1621.
- PFIB (2013) *Pla Forestal de les Illes Balears*. Palma: Conselleria d’Agricultura Medi Ambient i Territori.
- Phillips, A. (2004) ‘The history of the international system of protected area management categories’, *The international journal for protected area managers*, 14(3), pp. 2–14.
- Picornell, C. (1990) ‘Turisme i Territori a les Illes Balears’, *Treballs de Geografia*. Palma, (43), pp. 43–48.
- Picornell, L., Guerrero Ayuso, V. M. and Calvo, M. (2010) ‘Anàlisis antracològiques a Son Matge i Son Gallard (Valldemossa, Mallorca). Algunes hipòtesis sobre la dinàmica de la vegetació i l’rxplotació forestal durant el Calcolític a Mallorca’, *Mayurqa*, 33(315–332).
- Picornell, L., Guerrero Ayuso, V. M. and Calvo Trias, M. (2010) ‘Anàlisis antracològiques a Son Matge y Son Gallart, Valldemossa, Mallorca: algunes hipòtesis sobre la dinàmica de la vegetació i l’explotació forestal duran el calcolític a Mallorca’, *Mayurqa*, 33, pp. 315–332.
- Piñol, J., Terradas, J. and Lloret, F. (1998) ‘Climate warming, wildfire hazard, and wilfire

- occurrence in coastal eastern Spain', *Climatic Change*, 38, pp. 345–357.
- Pinya, M. (2013) 'El Col·legi de Biòlegs critica les retallades en prevenció', *Ara Balears*.
- PORN (2007) *Pla d'Ordenació dels Recursos Naturals de la Serra de Tramuntana*. Available at: www.caib.es/sites/espaisnaturalsprotegits (Accessed: 20 August 2019).
- Posey, D. A. (1985) 'Indigenous management of tropical forest ecosystems: the case of the Kayapo Indians of the Brazilian Amazon', *Agroforestry Systems*, 3, pp. 139–158.
- Prats, L. (2005) 'Concepto y gestión del patrimonio local', *Cuadernos de Antropología Social*, 21, pp. 17–35.
- Prats, L. (2006) 'La mercantilización del patrimonio: entre la economía turística y las representaciones identitarias', *Boletín del Instituto Andaluz del Patrimonio Histórico*, 58, pp. 72–80.
- Press, E. (2013) 'Arran critica la actuación del PP en el incendio de Andratx con una pintada en la sede de la formación de Palma', *Europa Press Islas Baleares*.
- Primer Inventario Forestal Nacional: Baleares (año 1970)* (1971). Madrid: Ministerio de Agricultura. Secretaria General técnica. Sección de Publicaciones Agrarias.
- Próspero de Bofarull, D. (1856) *Repartimientos de los Reinos de Mallorca, Valencia y Cerdeña*. vol. XI. Barcelona: Colección de Documentos Inéditos del Archivo General de la Corona de Aragón.
- Purcell, N. and Horden, P. (2000) *The Corrupting Sea: A Study of Mediterranean History*. Oxford: Blackwell.
- Pyne, S. J. (1998) 'Forged in Fire: History, Land, and Anthropogenic Fire', in *Advances in historical ecology*, pp. 64–103.
- Pyne, S. J. (2001) *Fire. A brief History*. Seattle & London: University of Washington Press.
- Pyne, S. J. (2009) 'Eternal Flame: An Introduction to the Fire History of the Mediterranean', in Chuvieco, E. (ed.) *Earth Observation of Wildland Fires in Mediterranean Ecosystems*. Dordrecht, Heidelberg, London and New York: Springer, pp. 11–26.
- Pyne, S. J. (2012) *Fire: Nature and Culture*. London: Reaktion Books Ltd.
- Pyne, S. J. (2016) 'Fire in the mind: changing understandings of fire in Western civilization', *Philosophical Transactions of the Royal Society B: Biological Sciences*, 371(1696), p. 20150166.
- Quadrado, J. M. (1847) *Historia de la conquista de Mallorca*. 1857th–1958th edn. Palma: Ed. Mallorquina de Francisco Pons.
- Quintero, V., Valcuende, J. M. and Cortés-Vázquez, J. A. (2008) 'Contemplar o vivir.

- Símbolos y legitimaciones en un espacio protegido’, in Beltran, O., Pascual, J. J., and Vaccaro, I. (eds) *Patrimonialización de la Naturaleza. El Marco Social de la Políticas Ambientales*. Donostia: Ankulegi Antropologia Elkarte, pp. 65–82.
- Raddi, A. (2000) ‘Recursos públicos destinats als boscos catalans. Període 1984-1997’, *Quaderns d’Informació Tècnica*.
- Radeloff, V. C. *et al.* (2005) ‘The wildland-urban interface in the United States’, *Ecological Applications*, 15(3), pp. 799–805.
- Ramis, A. (2012) ‘El Llegat Cultural de les Possessions: Etnografia, Lliteratura i Art’, in Morey, A. and Jover, G. (eds) *Les possessions mallorquines: passat i present*. Mallorca: Govern de les Illes Balears, pp. 401–422.
- Rayó, M. (2004) *L’Ecologisme a les Balears*. Palma: Edicions Documenta Balear.
- Real Academia de Ingeniería (2012) *Diccionario Español de Ingeniería*. Available at: diccionario.raing.es (Accessed: 25 June 2018).
- Redman, C. L. (1999) *Human Impact on Ancient Environments*. Tucson: University of Arizona Press.
- Rego, F. *et al.* (2010) ‘Solving the Fire Paradox – Regulating the Wildfire Problem by the Wise Use of Fire’, in Sande Silva, J. *et al.* (eds) *Towards Integrated Fire Management - Outcomes of the European Project Fire Paradox*. Rego, F. e. Jakarta, Indonesia: European Forest Institute Research Report, pp. 219–228.
- Riera Font, A. (2002) ‘El valor d’ús turístic dels espais naturals protegits de Mallorca’, in Picornell, M. and Pomar i Gomà, À. M. (eds) *L’espai turístic*. Palma: Institut d’Estudis Ecològics.
- Riera Frau, M. M. (1993) *Evolució urbana i topografia de Medina Mayurqa*. Palma: Ajuntament de Palma.
- Riera Frau, M. M. (2004) ‘Les Balears islàmiques’, *Història de les Illes Balears*. v. I. Edited by E. Belenguer. Barcelona: Edicions 62.
- Riera Frau, M. M. (2019) ‘Mayurqa: els darrers temps d’una societat andalusina’, in *Seminari Els Darrers Andalusins de Mayurqa*. Palma: Departament de Ciències Històriques i Teories de les Arts, Universitat de les Illes Balears.
- Riera, S. and Turu, V. (2011) ‘Cambios en el paisaje del valle de Ordino al inicio del Holoceno: Evolución geomorfológica, paleovegetal e incendios de época mesolítica (NW del Principado de Andorra, Pirineos Orientales)’, in Turu, V. and Constante, A. (eds) *El Cuaternario en España y áreas afines, avances en 2011. XIII Reunión Nacional de Cuaternario*. Andorra: La Vella, pp. 201–204.

- Ripoll, A. (2000) 'Turisme i Territori a les Illes Balears', in *Welcome! Un segle de turisme a les Illes Balears*. Palma: Fundació La Caixa, pp. 37–48.
- Rita, J. (1998) 'Els Pisos de Vegetació de la Serra de Tramuntana', in *La Serra de Tramuntana. Aportacions per a un debat*. Palma: Sa Nostra. Caixa de Balears, pp. 59–69.
- Rodrigues, M., Jiménez, A. and de la Riva, J. (2016) 'Analysis of recent spatial–temporal evolution of human driving factors of wildfires in Spain', *Natural Hazards*, 84(3), pp. 2049–2070.
- Roe, D. *et al.* (eds) (2013) *Biodiversity Conservation and Poverty Alleviation. Exploring the evidence for a link*. Chichester: Wiley-Blackwell.
- Roigé, X. and Frigolé, J. (2014) 'La patrimonialización de la cultura y la naturaleza', in Roigé, X., Del Marmol, C., and Frigolé, J. (eds) *Construyendo el patrimonio cultural y natural. Parques, museos y patrimonio rural*. Alzira: Germania Editorial, pp. 9–29.
- Romme, W. H. *et al.* (2011) 'Twenty Years After the 1988 Yellowstone Fires: Lessons About Disturbance and Ecosystems', *Ecosystems*, 14(7), pp. 1196–1215.
- Roos, C. I. *et al.* (2016) 'Living on a flammable planet: interdisciplinary, cross-scalar and varied cultural lessons, prospects and challenges', *Philosophical Transactions of the Royal Society B: Biological Sciences*, 371(1696), p. 20150469.
- Rosselló-Bordoy, G. (1968) *L'islam a les Illes Balears*. Palma: Ed. Daedalus.
- Rosselló-Bordoy, G. (1972) 'La prehistoria de Mallorca. Rectificaciones y nuevos enfoques al problema', *Mayurqa*, 7, pp. 115–156.
- Rosselló-Bordoy, G. (1973) 'Los siglos oscuros de Mallorca', *Mayurqa*, X, pp. 77–99.
- Rosselló-Bordoy, G. (2007) *Mallorca Musulmana*. Palma: Universitat de les Illes Balears.
- Rosselló i Verger, V. M. (1974) 'La persistencia del catastro romano en el Migjorn de Mallorca', in Universidad Autónoma de Madrid (coord) (ed.) *Estudios sobre centuriaciones romanas en España*. Madrid: Universidad Autónoma de Madrid, Servicio de Publicaciones, pp. 137–155.
- Rosselló Verger, V. M. (2014) 'The Serra de Tramuntana of Mallorca. Physical and human landscape', *Social, Catalan Review, Sciences*, 4, pp. 15–30.
- Rössler, M. (2009) 'The Anthropological Study of Landscape', in Bolling, M. and Bubenzer, O. (eds) *African Landscapes*. New York: Springer Science & Business Media, pp. 407–427.
- Rothermel, R. C. (1983) *How to Predict the Spread and Intensity of Forest and Range Fires, General Technical Report*. Ogden (U.S.A.): Department of Agriculture, Forest

- Service, Intermountain Research Station.
- Ruiz-Ballesteros, E. *et al.* (2009) 'Naturalizing the environment: Perceptual Frames, Senses and Resistance', *Journal of Material Culture*, 14(2), pp. 147–167.
- Rullan-Salamanca, O. (1998) 'De la cova de Canet al tercer boom turístic. Una primera aproximació a la Geografia Històrica de Mallorca', in *El medi ambient a les Illes Balears: qui és qui? Jornades a Can Tàpera (1997)*. Palma: Caixa de Balears, pp. 171–213.
- Rullan-Salamanca, O. (2007) *L'ordenació territorial a les Balears (segles XIX-XX)*. Palma: Edicions Documenta Balear.
- Rullan-Salamanca, O. (2010) 'Las Políticas Territoriales en las Islas Baleares', *Cuadernos Geográficos*, 40(2), pp. 403–428.
- Runte, A. (1977) 'The National Park Idea: Origins and Paradox of the American Experience', *Journal of Forest History*, 21(2), pp. 64–75.
- Runte, A. (1987) *National Parks: The American Experience*. Lincoln: University of Nebraska Press.
- Sabater, T. (2010) 'El renacimiento de las artes en los inicios de un reino. Mallorca 1298-1317', *Hortus Artium Medievalium*, (16), pp. 171–177.
- Saglam, B. *et al.* (2008) 'Spatio-Temporal Analysis of Forest Fire Risk and Danger Using LANDSAT Imagery', *Sensors*, 8(6), pp. 3970–3987.
- Salvà i Tomàs, P. A. (1985) 'Turisme i canvi a l'espai de les Illes Balears', *Treballs de la Societat Catalana de Geografia*, 2, pp. 17–32.
- Salvà i Tomàs, P. A. (1989) 'Competencias espaciales entre agricultura y turismo', pp. 81–92.
- Salvà i Tomàs, P. A. (1998) 'Alternatives i Vocacions de la Serra de Tramuntana en el Marc d'un Desenvolupament Sostenible', in *La Serra de Tramuntana*, pp. 111–123.
- Salvà i Tomàs, P. A. (2000) 'Les noves funcions no agràries del món rural a les IB la seva conversió a espai oci per a us de pobl urbana', in *Les II jornades de turisme i medi ambient a les Illes Balears*. Palma, pp. 185–206.
- Salvà i Tomàs, P. A. and Socias Fuster, M. (1985) 'Las residencias secundarias y la agricultura a tiempo parcial en las Baleares', pp. 65–67.
- Salvà, P. A. (1978) 'Las funciones residencial y de ocio como elementos de transformación del espacio rural de la Serra de Tramuntana de la isla de Mallorca', *Treballs de Geografia*, 35(I), p. 163.
- Salvà, P. A. (1979) 'La decadencia de la población activa agraria en la Serra de

- Tramuntana de la isla de Mallorca', *Mayurqa: revista del Departament de Ciències Històriques i Teoria de les Arts*, 19(2), pp. 31–62.
- Salvà, P. A. (1983) 'L'estructura de la propietat a la Serra de Tramuntana de l'illa de Mallorca el 1862-63', *Estudis d'història agrària*, (6), pp. 157–186.
- Salvà, P. A. (1992) 'La Serra de Tramuntana de la isla de Mallorca: transformación y declive de un espacio rural de montaña mediterránea', *El Campo*, (123), pp. 78–83.
- Salvà, P. A. (2002) 'La nova realitat geodemogràfica de les Illes Balears al començament del segle XXI: creixement de la població i fluxos migratoris', *Treballs de Sociolingüística Catalana*, 18, pp. 131–141.
- Salvà, P. A. (2003) 'La Serra de Tramuntana. La transició de l'etapa preturística a l'actualitat', in *La Serra de Tramuntana: aportacions per a un debat*. Palma, pp. 99–110.
- Salvà, P. A. and Binimelis, J. (1993) 'Las residencias secundarias en la isla de Mallorca: tipos y procesos de crecimiento', *Mediterranéa*, 77, pp. 73–76.
- Salvati, L. and Ranalli, F. (2015) "'Land of Fires": Urban Growth, Economic Crisis, and Forest Fires in Attica, Greece', *Geographical Research*, 53(1), pp. 68–80.
- San-Miguel-Ayanz, J. *et al.* (2012) 'Land Cover Change and Fire Regime in the European Mediterranean Region', in Moreira, F. *et al.* (eds) *Post-Fire Management and Restoration of Southern European Forests*. Dordrecht: Springer Netherlands (Managing Forest Ecosystems), pp. 21–43.
- San-Miguel-Ayanz, J., Moreno, J. M. and Camia, A. (2013) 'Analysis of large fires in European Mediterranean landscapes: Lessons learned and perspectives', *Forest Ecology and Management*, 294, pp. 11–22.
- Sánchez-Osorio, I. *et al.* (2005) 'Cerambícidos xilófagos de encina y alcornoque en andalucía: algunas notas sobre la identificación de especies del "grupo Cerambyx", sus daños al arbolado y las posibilidades de control de sus poblaciones', in *IV Congreso Forestal Español*.
- Sande Silva, J., Rego, F., Fernandes, P. and Rigolot, E. (2010) 'Suppression Fire Use in Learning Organizations', in *Towards Integrated Fire Management - Outcomes of the European Project Fire Paradox*. Joensuu: European Forest Institute, pp. 189–201.
- Sande Silva, J., Rego, F., Fernandes, P., Rigolot, E., *et al.* (2010) *Towards Integrated Fire Management- Outcomes of the European Project Fire Paradox*. Edited by J. Sande Silva *et al.* Joensuu: European Forest Institute Research Report.
- Santamaría, A. (1978) 'Fernando el Católico y la Germanía', in Mascaró Pasarius, J.

- (coord) (ed.) *Historia de Mallorca*. Palma: Vicente Colom ed., pp. 385–404.
- Santamaría, A. (1981) ‘En torno a la evolución del modelo de sociedad en el reino de Mallorca (siglos XIII al XVIII)’, *Estudis Balearics*, 3, pp. 5–197.
- Santamaría, A. (1990) *Ejecutoria del Reino de Mallorca*. Palma: Ajuntament de Palma.
- Santamarina, B. (2005) ‘La patrimonialización de la naturaleza: figuras y discursos’, in Pascual, J. J. and Florido, D. (eds) *¿Protegiendo los recursos? Áreas protegidas, poblaciones locales y sostenibilidad*. Sevilla: Fundación el Monte, FAAEE, Asociación Andaluza de Antropología, pp. 25–44.
- Santamarina, B. (2008a) ‘Antropología y medio ambiente. Revisión de una tradición y nuevas perspectivas de análisis en la problemática ecológica’, *Revista de Antropología Iberoamericana*, 3(2), pp. 144–184.
- Santamarina, B. (2008b) ‘Patrimonialización de la naturaleza en la Comunidad Valenciana. Espacios, ironías y contradicciones’, in Beltran, O., Pascual, J. J., and Vaccaro, I. (eds) *Patrimonialización de la Naturaleza. El Marco Social de la Políticas Ambientales*. Donosti: Ankulegi Antropologia Elkarte, pp. 27–44.
- Santamarina, B. (2009) ‘De parques y naturalezas. Enunciados, cimientos y dispositivos’, *Revista de Dialectología y Tradiciones Populares*, 64(1), pp. 297–324.
- Santamarina, B. and Beltran, O. (2016) ‘Heritage and Knowledge. Apparatus, Logic and Strategies in the Formation of Heritage’, *Anthropological Forum*, 26(4), pp. 397–414.
- Santamarina, B. and Bodí, J. (2013) ‘Lugares rurales versus espacios naturalizados. Conocimientos y reconocimientos en las lógicas patrimoniales de las áreas protegidas’, *AIBR, Revista de Antropología Iberoamericana*, 08(01), pp. 111–138.
- Santamarina, B., Hernández, G.-M. and Moncusí, A. (2008) ‘Patrimonio etnológico e identidades en España: un estudio comparativo a través de la legislación’, *Revista de Antropología Experimental*, 8, pp. 207–223.
- Santamarina, B., Vaccaro, I. and Beltran, O. (2014) ‘La patrimonialización de la naturaleza. Génesis, transformaciones y estado actual’, *Arxius de Ciències Socials*, 30, pp. 87–98.
- Santana-Morro, J. (2018a) ‘Gestió i aprofitament de l'alzinar’, in *Manual de gestió rural de la Serra de Tramuntana*. Palma: Tramuntana XXI, p. 3.2.
- Santana-Morro, J. (2018b) ‘Gestió i aprofitament del pinar’, in *Manual de gestió rural de la Serra de Tramuntana*. Palma: Tramuntana XXI, p. 3.3.
- Santana Morro, M. (2004) ‘Les transformacions socials’, in Belenguer, E. (ed.) *Historia de*

- les Illes Balears*. Barcelona: Edicions 62, pp. 213–230.
- Santín, C. and Doerr, S. H. (2016) ‘Fire effects on soils: the human dimension’, *Philosophical Transactions of the Royal Society B: Biological Sciences*, 371(1696), p. 20150171.
- Sastre, J., Sastre, V. and Rayó, M. (2014) *GR 221 Ruta de pedra en sec: Serra de Tramuntana*. Sant Lluís, Menorca: Triangle Postals.
- Scoones, I. (1999) ‘BORRAR AQUEST New Ecology and the Social Science: What Prospects for a Fruitful Engagement?’, *Annual Review of Anthropology*, 28, pp. 479–507.
- Scott, A. C. *et al.* (2014) *Fire on Earth: An introduction*. Oxford, Chichester and Hoboken: Wiley-Blackwell.
- Scott, A. C. *et al.* (2016) ‘The interaction of fire and mankind’, *Philosophical Transactions of the Royal Society B: Biological Sciences*, 371(1696), p. 20150162.
- Scott, A. C. (2017) *Against the Grain*. New Haven and London: Yale University Press.
- Seguí, B. *et al.* (2005) ‘La cabra salvaje mallorquina: origen, genética, morfología, notas ecológicas e implicaciones taxonómicas’, *Bolletí la Societat d’Història Natural les Balears*, 48, pp. 121–151.
- Segundo Inventario Forestal Nacional (1986–1996)* (1998). Madrid: Ed. Ministerio de Medio Ambiente, ICONA.
- Selwyn, T. (2004) ‘Privatising the Mediterranean Coastline’, in *Contesting the Foreshore: Tourism, Society and Politics on the Coast*. Amsterdam: Amsterdam University Press, pp. 35–60.
- Sevillano Colom, F. (1974a) *Historia del puerto de Palma de Mallorca*. Palma: Diputació Provincial de Balears.
- Sevillano Colom, F. (1974b) ‘La demografía de Mallorca a través del impuesto del morabatí: siglos XIV, XV y XVI’, *Bolletí de la Societat Arqueològia Lul·liana (BSAL)*, (34), pp. 232–272.
- Shakesby, R. . (2011) ‘Post-wildfire soil erosion in the Mediterranean: review and future research directions’, *Earth-Science Reviews*, 105, pp. 71–100.
- Simmons, C. S. *et al.* (2004) ‘Wildfires in Amazonia: A pilot study examining the role of farming systems, social capital, and fire contagion’, *Journal of Latin American Geography*, 3(1), pp. 81–95.
- Smith, L. (2016) ‘The Discourse of Heritage’, in *Uses of Heritage*. London and New York: Routledge, pp. 11–43.

- Sociás, A. M. (2000) 'La incidencia del turismo en el espacio litoral: evolución normativa turística en las Islas Baleares', in Picornell, M. et al. (eds) *Evolució turística de la darrera dècada i disseny de futur. Actes de les II Jornades de Turisme i Medi Ambient a les Illes Balears*. Palma: Ed. Institut d'Estudis Ecològics INESE, pp. 299–307.
- Solà, M. et al. (2010) *La vida a pagès: el món perdut de les masies i les possessions de Catalunya i les Balears: l'estudi de la Masia Catalana*. Barcelona: La Magrana.
- Soliño, M., Prada, A. and Vázquez, M. X. (2010) 'Designing a forest-energy policy to reduce forest fires in Galicia (Spain): A contingent valuation application', *Journal of Forest Economics*, 16(3), pp. 217–233.
- Soto, R. (1984) 'Mallorca 1229-1302: del repartiment a les ordinacions', in Barceló, M. (ed.) *Historia de los pueblos de España. Los antiguos territorios de la Corona de Aragón: Aragón, Baleares, Cataluña, País Valenciano*. Madrid: Argos Vergara, pp. 117–129.
- Soto, R. (1991) 'Repartiment i repartiments: l'ordenació d'un espai de colonització feudal a la Mallorca del segle XIII', in Sanchez, M. (ed.) *De al-Andalus a la sociedad feudal: los repartimientos bajomedievales*. Barcelona: CSIC, pp. 1–51.
- Sousa-Silva, R. et al. (2018) 'Adapting forest management to climate change in Europe: Linking perceptions to adaptive responses', *Forest Policy and Economics*, 90(January), pp. 22–30.
- Stephenson, J. and Greer, L. (1981) 'Ethnographers in their own cultures: Two Appalachian cases', *Human organization*, 40(2), pp. 123–130.
- Steward, J. H. (1955) *Theory of Culture Change: The Method of Multilinear Evolution*. Illinois: Board of Trustees of the University of Illinois.
- Steward, P. J. and Strathern, A. (2003) 'Introduction', in *Landscape, Memory and History*. London: Pluto Press, pp. 1–15.
- Stewart, S. I., Radeloff, V. C. and Hammer, R. B. (2003) 'Characteristics and location of the Wildland-Urban-Interface in the United States', in *Proceedings of the 2nd International Wildland Fire Ecology and Fire Management Workshop*. Orlando, pp. 16–20.
- Struzik, E. (2017) *Firestorm: How wildfire will shape our future, Firestorm: How Wildfire Will Shape Our Future*. Washington, Covelo, London: Island Press.
- Suàrez, M. et al. (2014) 'Ecoturisme a Mallorca'. Palma: GOB.
- Sureda Negre, J. et al. (1997) *Els incendis forestals a les Balears. Anàlisi de les actituds i proposta de programes de comunicació i educació*. Palma: Universitat de les Illes Balears.
- Sureda Negre, J. et al. (2011) 'Perception of Pine Trees Among Citizens of the Balearic

- Islands: Analysis and Description of Some Mistaken Ideas', *Applied Environmental Education & Communication*, 10(1), pp. 31–42.
- Swetnam, T. W. *et al.* (2016) 'Multiscale perspectives of fire, climate and humans in western North America and the Jemez Mountains, USA', *Philosophical Transactions of the Royal Society B: Biological Sciences*, 371(1696), p. 20150168.
- Syphard, A. D. *et al.* (2007) 'Human influence on California fire regimes', *Ecological Applications*, 17(5), pp. 1388–1402.
- Syphard, A. D. *et al.* (2017) 'Human presence diminishes the importance of climate in driving fire activity across the United States', *Proceedings of the National Academy of Sciences*, 114(52), pp. 13750–13755.
- Tàbara, D., Saurí, D. and Cerdan, R. (2003) 'Forest fire risk management and public participation in changing socioenvironmental conditions: A case study in a Mediterranean region', *Risk Analysis*, 23(2), pp. 249–260.
- Tarradell, M. (1962) 'El poble dels talaiots a Mallorca i Menorca. Els indígenes de les Balears vistos pels autors clàssics', in Soldevila, F. (ed.) *Història dels catalans*. Barcelona: Ed. Ariel, pp. 121–156.
- Tarradell, M. (1983) 'La Romanització de Mallorca: alguns aspectes i un programa', in *Symposium de Arqueologia Pollentia y la Romanización de las Baleares*. Palma: Ayuntamiento de Alcúdia, pp. 123–128.
- Tercer Inventario Forestal Nacional (1997-2007): Islas Baleares* (2008). Madrid: Ministerio de Medio Ambiente.
- Theobald, D. M. and Romme, W. H. (2007) 'Expansion of the US wildland-urban interface', *Landscape and Urban Planning*, 83(4), pp. 340–354.
- Tilley, C. and Leslie, T. (2018) *Paradise goes up in flames*, *ABC News*.
- Tolón Becerra, A. and Lastra Bravo, X. (2000) 'Los espacios naturales protegidos. Concepto, evolución y situación actual en España', *M+A. Revista Electrónica de Medioambiente*, 5, pp. 1–25.
- Tonini, M., Parente, J. and Pereira, M. (2018) 'Global assessment of land cover changes and rural-urban interface in Portugal', *Natural Hazards and Earth System Sciences*, 18(6), pp. 1647–1664.
- Trias Mercant, S. (1980) 'Les possessions', in *Valldemossa: una historia. Una cultura. Un poble*. Lluçmajor: Imp. Moderna, pp. 51–65.
- Trias, S., Muntaner, J. and Lladó, J. (1996) *Valldemossa. Historia, Mitos y Tradiciones*. Palma: José J. de Olañeta ed.

- Tuñón de Lara, M. (1960) *La España del siglo XIX*. Barcelona: Ed. Laia.
- UNESCO (2011) *Cultural Landscape of the Serra de Tramuntana. Proposal for Inscription in the World Heritage List (UNESCO)*. Available at: whc.unesco.org/en/list/1371 (Accessed: 23 August 2019).
- Urgell Hernández, R. (2000) *Mallorca en el segle XV*. Palma: El Tall.
- Vaccaro, I. (2006) 'Postindustrial valleys: The Pyrenees as a reinvented landscape', *Social Anthropology*, 14(3), pp. 361–376.
- Vaccaro, I. and Beltran, O. (2008a) 'Consumiendo espacio, naturaleza y cultura. Cuestiones patrimoniales en la hipermodernidad', in Beltran, O., Pascual, J. J., and Vaccaro, I. (eds) *Patrimonialización de la Naturaleza. El Marco Social de la Políticas Ambientales*. Donostia: Ankulegi Antropologia Elkarte, pp. 45–64.
- Vaccaro, I. and Beltran, O. (2008b) 'The New Pyrenees: Contemporary Conflicts around Patrimony, Resources and Urbanization', *Journal of the Society for the Anthropology of Europe*, 8(2), pp. 4–15.
- Vaccaro, I. and Beltran, O. (2009) 'The mountainous space as a commodity: the Pyrenees at the age of globalization', *Revue de Géographie Alpine | Journal of Alpine Research*, 97(3), pp. 0–13.
- Vaccaro, I. and Beltran, O. (2010) 'Turning nature into collective heritage: The social framework of the process of patrimonialization of nature', in Roigé, X. and Frigolé, J. (eds) *Constructing Cultural and Natural Heritage. Parks, museums and rural heritage*. Girona: Documenta Universitaria, pp. 63–74.
- Vaccaro, I. and Beltran, O. (2014) 'La transformación de la naturaleza en patrimonio colectivo', in Roigé, X., Del Mármol, C., and Frigolé, J. (eds) *Construyendo el patrimonio cultural y natural. Parques, museos y patrimonio rural*. Alzira: Germania Editorial, pp. 77–92.
- Vaccaro, I. and Beltran, O. (2017) 'Consuming Space, Nature and Culture: Patrimonial Discussions in the Hyper-Modern Era', *Tourism Geographies*, 9(3), pp. 254–274.
- Vaccaro, I. and Beltrán, O. (eds) (2007) *Ecología política de los Pirineos: estado, historia y paisaje*. Barcelona: Garsineu Edicions.
- Vaccaro, I., Beltran, O. and Paquet, P. A. (2013) 'Political ecology and conservation policies: some theoretical genealogies', *Journal of Political Ecology*, 20, pp. 255–272.
- Valcuende, J. M., Quintero, V. and Cortés-Vázquez, J. A. (2011) 'Naturalezas discursivas en espacios protegidos', *AIBR Revista de Antropología Iberoamericana*, 6(1), pp. 27–56.

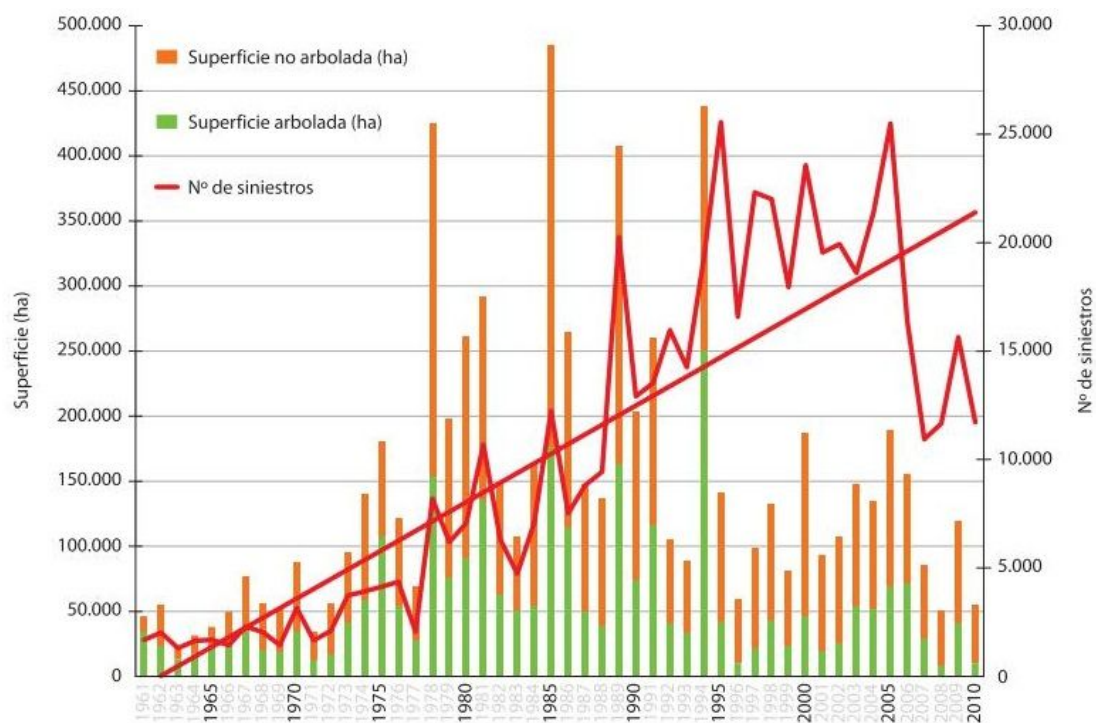
- Valdéz (ed.), M. (2004) *Naturaleza y Valor: una aproximación a la ética ambiental*. Edited by M. Valdéz. México: UNAM y Fondo de Cultura Económica.
- Vale, T. R. (2002) *Fire, Native Peoples, and the Natural Landscape*. Washington: Island Press.
- Vallejo, V. R., Arianoutsou, M. and Moreira, F. (2012) 'Fire Ecology and Post-Fire Restoration. Approaches in Southern European Forest Types', in Moreira, F. et al. (eds) *Post-Fire Management and Restoration of Southern European Forests*. London and New York: Springer, pp. 93–121.
- Vannièrè, B. et al. (2008) 'Climate versus human-driven fire regimes in Mediterranean landscapes: the Holocene record of Lago dell'Accesa (Tuscany, Italy)', *Quaternary Science Reviews*, 27, pp. 1181–1196.
- Vaquèr Bennásar, O. (2001) *El comerç marítim de Mallorca*. Palma: El Tall.
- Vayda, A. P. (2006) 'Causal Explanation of Indonesian Forest Fires: Concepts, Applications, and Research Priorities', *Human Ecology*, 34(5), pp. 615–635.
- Vega-García, C. and Chuvieco, E. (2006) 'Applying local measures of spatial heterogeneity to Landsat-TM images for predicting wildfire occurrence in Mediterranean landscapes', *Landscape Ecology*, 21(4), pp. 595–605.
- Vilar, L. et al. (2016) 'Modeling temporal changes in human-caused wildfires in Mediterranean Europe based on Land Use-Land Cover interfaces', *Forest Ecology and Management*. Elsevier B.V., 378, pp. 68–78.
- Villalonga de Cantos, P. (1989) 'Los libros de viajes y la ilustración litográfica como medio difusor del romanticismo en Mallorca', *Bolletí de la Societat Arqueològica Lul·liana. Revista d'Estudis Històrics*, 843(45), pp. 343–356.
- Vinyas, J. (2016) 'La massificació ja no és exclusiva del sol i platja', *Ara Balears*.
- Vives, J. A. and Baraza, E. (2010) 'La cabra domèstica asilvestrada (*Capra hircus*) en Mallorca ¿Una espècie a erradicar?', *Galemys*, 22, pp. 193–205.
- Vogiatzakis, I. ., Papayannis, T. and Mannion, A. . (2008) 'Political Landscapes of Mediterranean Islands', in Vogiatzakis, I. ., Pungetti, G., and Mannion, A. . (eds) *Mediterranean Island Landscapes: Natural and Cultural Approaches*. New York: Springer, pp. 100–114.
- Waldren, J. (2000) 'Som Turistes, Vivim Aquí?', *Revista d'Etnologia de Catalunya*, (16), pp. 24–33.
- Waldren, W. H., Ensenyat, J. and Cubi, C. (1989) *Son Mas. Balearic Prehistoric Sanctuary*. Deià: D.A.M.A.R.C.
- Waldren, W. H. and Kopper, J. S. (1967) 'Majorca chronology for Prehistory based on

- radiocarbon metod', *Pyrenae*, (3), pp. 45–65.
- Waldren, William H (1987) 'A Balearic beaker model. Ferrandell-Oleza, Valdemosa, Mallorca', in Waldren, W. H and Kennard, R. C. (eds) *Bell Beakers of the Westner Mediterranean: definition, interpretation, theory and new site data. The Oxford International Conference 1986*. Oxford: BAR International Series, pp. 207–266.
- Wallach, B. (2005) *Understanding Cultural Landscape*. New York and London: The Guilford Press.
- West, P. and Brockington, D. (2006) 'An anthropological perspective on some unexpected consequences of protected areas', *Conservation Biology*, 20(3), pp. 609–616.
- West, P. and Carrier, J. G. (2004) 'Ecotourism and Authenticity: Getting Away from It All?', *Current Anthropology*, 45(4), pp. 483–498.
- West, P., Igoe, J. and Brockington, D. (2006) 'Parks and Peoples: The Social Impact of Protected Areas', *Annual Review of Anthropology*, 35, pp. 251–277.
- Westerling, A. L. *et al.* (2016) 'Climate and Wildfire in Western US Forests', in Alaric Sample, V., Patrick Bixler, R., and Miller, C. (eds) *Forest Conservation in the Anthropocene: Science, Policy, and Practice*. Boulder: University Press of Colorado, pp. 43–55.
- Westerling, A. L. (2016) 'Increasing western US forest wildfire activity: sensitivity to changes in the timing of spring', *Philosophical transactions of the Royal Society of London. Series B, Biological sciences*, 371(1696), pp. 717–728.
- Williams, J. *et al.* (2011) 'Findings and Implications from a Coarse-Scale Global Assessment of Recent Selected Mega-Fires', in *5th International Wildland Fire Conference*. Sun City, South Africa.
- Xamena, P. and Riera, F. (1986) *Història de l'Església a Mallorca*. Palma: Ed. Moll.
- Xanthopoulos, G., Calfapietra, C. and Fernandes, P. (2012) 'Fire Hazard and Flammability of European Forests Types', in Moreira, F. *et al.* (eds) *Post-Fire Management and Restoration of Southern European Forests*. Dordrecht: Springer Science & Business Media (Managing Forest Ecosystems), pp. 79–92.
- Ximénez de Sandoval, P. (2018) 'El incendio de Paradise, el más mortal de la historia de California con al menos 48 muertos y 200 desaparecidos', *El País*.
- Xofis, P. (2006) *Post-fire vegetation dynamics and ecosystem recovery in north-east Mediterranean ecosystems (thesis)*. University of London.
- Yll, E. I. *et al.* (1995) 'Dinámica del paisaje vegetal en la vertiente mediterránea de la

- Península Ibérica e Islas Baleares desde el Tardiglacial hasta el presente', in Aleixandre, T. and Pérez-González, A. (eds) *Reconstrucción de paleoambientes y cambios climáticos durante el Cuaternario*. Madrid: Monografías del Centro de Ciencias Mediambientales, pp. 319–328.
- Yll, E. I. *et al.* (1997) 'Palynological Evidence for Climatic Change and Human Activity during the Holocene on Minorca (Balearic Islands)', *Quaternary Research*, 48(3), pp. 339–347.
- Zucca, R. (1998) *Insulae Balearis. Le isole Baleari sotto il dominio romano*. Roma: Carocci editore.

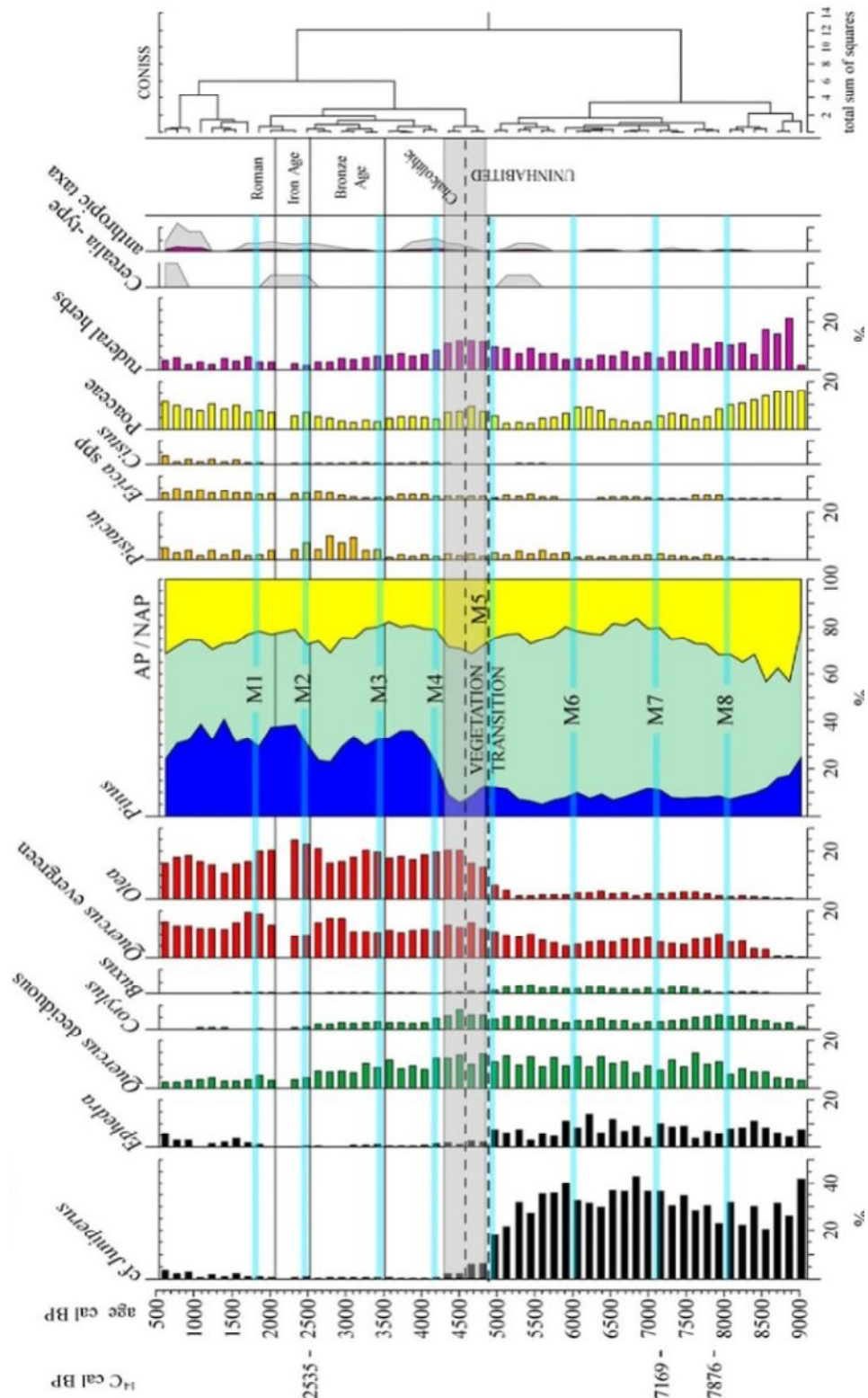
Appendix

Appendix 1. Graph of the evolution of the number of fires and affected areas in the Spanish State in the period 1961-2010. Source: Cubo et al. (2012, p. 13).



Right axis: surface (hectares)
 Left axis: Number of fires
 Orange: Burned non-forested area (hectares)
 Green: Burned forested area (hectares)
 Red: Number of fires

Appendix 2. Pollen diagram chart of s'Albufera (Mallorca). Source: Burjachs et al. (2016, p. 852).



Climatic events (M8 to M1) correspond to Minorca events (Frigola et al., 2007), marked with blue bars. The grey bar shows the transition towards the first settlements. The grey double curve in Cerealia-type and anthropic taxa corresponds to an exaggeration of the real value for better visualization.

SERRA DE TRAMUNTANA UN PARAÍSO POR DESCUBRIR

■ UN PARAÍSO POR DESCUBRIR

La Serra de Tramuntana nunca deja de sorprender, desde la admiración de los que la visitan por primera vez o a la incuestionable lealtad de los que continúan visitándola, hasta los que han decidido que forme parte de su vida y entorno.

■ UN PARADIS PER DESCOBRIR

La serra de Tramuntana mai no deixa de sorprendre, des de l'admiració dels qui la visiten per primera vegada o la inqüestionable fidelitat dels qui la segueixen visitant, fins als qui ha decidit que formi part de la seva vida i entorn.

■ ENTDECKEN SIE EIN WAHRES PARADIES!

Die Serra de Tramuntana ist immer wieder beeindruckend. Sie versetzt nicht nur jene, die sie zum ersten Mal besuchen, in Bewunderung, sondern birgt auch für die getreuen Besucher, die immer wiederkehren und für jene, die diese Landschaft zu ihrer gewohnten Umgebung gemacht haben, stets neue Überraschungen.

■ A PARADISE TO DISCOVER

The Serra de Tramuntana never fails to continue to surprise, from the admiration of those visiting for the first time or the unquestionable loyalty of those who keep coming back, and those who have decided to permanently become part of its life and environment.

■ UN PARADIS À DÉCOUVRIR

La Serra de Tramuntana ne cesse de surprendre, allant de l'admiration de ceux qui la visitent pour la première fois à ceux qui ont décidé qu'elle ferait partie de leur vie et de leur environnement, en passant par ceux qui continuent de la visiter, faisant preuve d'une loyauté incontestable.

■ РАЙ, КОТОРЫЙ ЕЩЕ ПРЕДСТОИТ УЗНАТЬ

Серра-де-Трамунтана не перестает удивлять. Она вызывает одинаковое восхищение и у тех, кто видит ее первый раз, и у тех, кто хранит ей верность и возвращается к ней, и у тех, кто решает здесь поселиться и стать частью ее жизни и ее среды.



TURISMO "VERDE" AIRES DE AVENTURA

■ Con una orografía que ofrece todas las posibilidades a los amantes de la naturaleza y del deporte de aventura: ascensos a las cumbres más altas, caminatas atravesando frondosos bosques de encinas y pinos, descensos por torrentes y acantilados. La Serra de Tramuntana le brinda experiencias inolvidables.

■ TOURISME "VERD", AIRES D'AVENTURA

Amb una orografia que ofereix totes les possibilitats als amants de la naturalesa i dels esports d'aventura: ascensions als cims més alts, caminades per densos boscos d'alzines i pins, descensos per torrents i penyasegats. La serra de Tramuntana ofereix experiències inolvidables.

■ "GRÜNER" TOURISMUS UND EIN HAUCH VON ABENTEUER

Aufgrund der verschiedenen Geländeeigenschaften eröffnen sich zahlreiche Freizeitmöglichkeiten für Naturliebhaber und Anhänger des Abenteuersports: Kletterausflüge bis zu den höchsten Gipfeln, Wanderungen durch dicht belaubte Steineichen- und Kiefernwälder sowie Wildwasser-Bootsfahrten auf den Bergbächen und auf den Gewässern am Fuße der Steilküsten. In der Serra de Tramuntana werden Sie unvergessliche Abenteuer erleben.

■ "GREEN" ADVENTURE TOURISM

With mountain orography that will inspire nature lovers and sporting adventurers: ascents to the highest summits, trails through verdant ilex and pine forests, descents by rivers and cliffs. The Serra de Tramuntana is an unforgettable experience.

■ TOURISME "VERT" AIRS D'AVENTURE

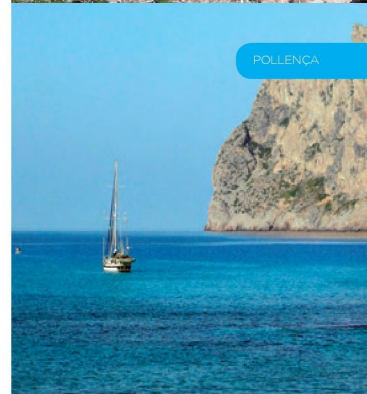
Présentant une orographie qui offre toutes les possibilités aux passionnés de la nature et du sport d'aventure: ascensions aux cimes les plus élevées, longues randonnées traversant des sous-bois touffus de chênes verts et de pins, descentes de torrents et falaises. La Serra de Tramuntana vous offre des expériences inoubliables.

■ ЭКОЛОГИЧЕСКИЙ ТУРИЗМ С ПРИКЛЮЧЕНЧЕСКИМ ОТТЕНКОМ

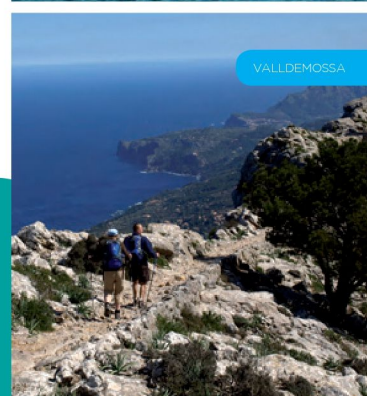
Рельеф этой местности предлагает самые разнообразные возможности любителям приключений и экстремальных видов спорта: восхождение на высочайшие вершины, пешие походы по лесным чащам, заросшим каменным дубом и соснами, спуски по бурным рекам и отвесным скалам. Серра-де-Трамунтана всем подарит незабываемые впечатления.



VALLDEMOSSA



POLLENÇA



VALLDEMOSSA

Appendix 11. Table summarizing the regulations governing the use of fire to burn agroforestry remains.

Source: own elaboration from the Ministry of Environment's website

Use of fire	1 st January – 30 th April	1 st May – 15 th October	16 th October – 31 st December
Forest Areas	Administrative authorisation required	Prohibited	Administrative authorisation required
Less than 500 meters from the forest land	Free with protection	Administrative authorisation required	Free with protection
More than 500 meters from the forest land	Allowed	Free with protection	Allowed