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The role of forest policy in Mediterranean mountain community lands: A review of the decentralization processes in European countries

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ABSTRACT

Between the nineteenth and twentieth centuries, a vast part of the mountain forests of Mediterranean counties was created by the State Forest Services. Through afforestation with the introduction of the Forest Regime, a management system was created to protect water and soil on centralized community land, which in turn resulted in a valuable cultural and natural heritage and an important place for environmental protection and forestry activities.

Since the second half of the last century, in some countries, under the influence of several political and economic processes, these community forests (CF) lands were returned to rural communities and/or local authorities, while in other countries their governance was decentralized to the municipal level. Consequently, multiple tenure land regimes developed and continued to emerge at national or regional levels, increasing the diversity of stakeholders involved in their management. However, the efficiency of such transformations in the management of Mediterranean mountain forests is largely unknown.

The purpose of this review is to analyse and compare the development and management of CF in five large Mediterranean countries. By extracting and examining information from more than two hundred documents and using the cognitive hierarchy theory we show the roles and shifts of anthropocentric and ecocentric values in the resource management decision-making process by communities, the Forest Services and other stakeholders.

Special attention is given to the effect of CF regarding reducing hydrological risks in mountainous regions of Portugal, Spain, France, Italy, and Greece in the past and increasing fire risk in the present because of a shift in management values. As a result of this analysis, several suggestions are proposed to increase the sustainability of CF by balancing anthropocentric and ecocentric management values.

1. Introduction

With the beginning of the governance decentralization process, in the second half of the last century, ownership and access to forest areas became increasingly diverse, allowing for a wider range of stakeholders to participate in their governance (FAO, 1978, 2014). Nevertheless, despite numerous forest studies, current community forests (CF) in European countries have been studied very little (FAO, 2016) alongside the question of how different stakeholders with different values (e.g. Forest Services, Parishes and/or City Councils, commoners, associations) affect the governance of these resources.

In Mediterranean European countries, the existence of common property institutions dates to at least a thousand years (Jeanrenaud 2001; Moor 2015). For rural populations, community lands served as a means of livelihood (Thirgood, 1981; M'Hirit, 1999; Scarascia-Mugnozza et al., 2000). The mosaic landscapes (forests, fields, pastures) of the time were created by locals, in accordance with traditional practices and under multiple forms of management and uses, for the development of specific economic and social functions (Parrotta and Agnoletti, 2007). Oftentimes, community lands were placed in high uplands with steep slopes and livestock grazing was the only possible way to use them (Iriarte-Goñi, 2002). The difficulty of growing many agricultural crops made firewood, charcoal, and wool the main commodities, essential for the survival of local mountain populations. Over time, in some of these places, intensive use reduced forest cover and degraded the pastures, which increased risk of soil erosion in some of the mountainous regions (Agnoletti, 2007; Chauvalier, 1990; Scarascia-Mugnozza et al., 2000).

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Land ownership and access to resources changed profoundly in Mediterranean countries with the impact of the new political ideas of the nineteenth-century (Moor, 2015). Professionals and politicians considered traditional community rights ineffective regarding resource management. As a result, community lands with good soils were privatized (Jeanrenaud, 2001). Others, because of their soil erosion and risks of flooding, passed to State administration for subsequent afforestation (Bebi et al., 2017; López, 1999; Nemoz-Rajot, 1998; Rego, 2001; Tarazona, 2019). The occupation and afforestation of community lands created large areas of fast-growing trees, increasing wood production, which dismantled traditional relationships with the environment in many rural areas (Baptista, 2010; Iriarte-Goñi, 2002). Beginning in France and later in Italy, Greece, Spain, Portugal, and other Mediterranean countries, the Forest Regime[1] implementation began in mountainous areas with a high soil erosion risk (Boutefeu, 2005; Devèze, 1966; Devy-Vareta, 1999; Pérez-Soba Diez del Corral, 2016; Rego, 2001) and the dictatorships of the time favoured this process. It also defined technical regulations and established the principle of multi-year forest management planning. Land use restrictions in these areas led to conflicts with local communities, who used these lands for subsistence (e.g. pastures, firewood, fruits and mushrooms, etc.) (Baby, 1972; Dupont, 1933; Ribeiro, 1958; Tarazona, 2019). Over time, the emergence of industry, the emigration of rural populations and the reduction of agricultural and livestock activities increased these forest areas (Le Houérou, 1993; Strijker, 2005).

The post–World War II political shift in Europe initiated the democratic decentralization of forest resource management. In the following decades, in many countries, some level of forest control was transferred to regions, municipalities, local governments, and even local communities (Brouwer, 1995; Gatto and Bogataj, 2015; Montagne et al., 2014; Pérez-Soba Diez del Corral, 2016), forming a wide range of CF management regimes (Gatto and Bogataj, 2015; Germano, 2013; Jeanrenaud, 2001; Montiel-Molina, 2003). The decentralization of CF governance and local communities' tenure-right changes occurred in most Mediterranean countries (Montagne et al., 2014), but studies on forest tenure systems in these areas reveal mixed results and large gaps of information. These forest areas remain poorly studied when compared to other European mountain forests (Kräuchi et al., 2000).

Furthermore, the Mediterranean region is more vulnerable to soil degradation because of a dry climate and a history of over-exploitation alongside other numerous threats (Palahi et al., 2008), particularly an increased risk of wildfires over the last decades because of land management abandonment (Moriondo et al., 2006). This is why we focus our analysis on five large European Mediterranean countries.

The main objective of this review is to fill this knowledge gap through a comparative analysis of the CF management modalities in five large European Mediterranean countries and, based on the cognitive hierarchy theory, to analyse how the values that guide the management systems of different actors and related governance mechanisms have evolved. Based on the analysis of numerous scientific publications we will address (i) the brief history of community land in these countries; (ii) the chronology of the common Forest Regime implementation in the nineteen and twentieth centuries, and (iii) the management of these areas in recent decades and the relationship with wildfire risk.

[1] The 'Forest Regime', whose history begins with the development of the first Forest Code in France in 1827, is a legal regime and can be defined as a set of special rules for the management, exploitation, and enforcement of public and community forests. It is a set of norms necessary not only to create, operate, and preserve forest resources but also create and maintain forest cover, control the water regime, protect the floodplain, and decrease drylands or mountainous soils erosion risks

2. Conceptual framework

2.1. The cognitive hierarchy theory

As the decentralization of forest governance began, issues relating to the sustainability and effectiveness of CF tenures are often discussed in the scientific world (Bullock and Hanna, 2007, 2012; Castro and Nielsen, 2001). Different management groups maintain different values and attitudes or norms regarding relevant actions.

Studies by Fulton et al. (1996) and Vaske et al. (1999; 2001) explain this by suggesting that the relationship of the individual with the environment in which their lives may be organized into a cognitive hierarchy, consisting of values, orientations, attitudes, behavioural intentions and behaviours. The arrangement of these elements in relation to each other can be expressed in a pyramid form, where abstract values have a causal effect on orientations and attitudes, leading to behavioural intentions and, as a result, the behaviour of a person or group of people (Fig. 1).

Values impact the orientation of a person significantly. They include rational, moral, aesthetic, economic, and spiritual values — the top of the hierarchy (Fig. 1). Therefore, this top is represented by a set of proposals concerning who we are and how we relate to the world (More et al., 1996). This is the most abstract part of the cognitive hierarchy (Schwartz and Bilsky, 1987), which serves as a prototype to attitudes and behaviours to be developed (Homer and Kahle, 1988). The quantity of values is limited, occupying a central role in beliefs, and they are difficult to change in the short term. In turn, attitudes towards values lead to several behavioural scenarios because of the wide range of responses regarding changes in environmental conditions (Vaske and Donnelly, 1999). For example, although two natural resource managers may agree on the importance of the same fundamental value, they may differ in their basic beliefs regarding the use of that value (Fulton et al., 1996), because of the influence of important variables such as age, socioeconomic status, knowledge, and or experience (Vaske and Donnelly, 1999). Therefore, according to the cognitive hierarchy model, any common fundamental value can lead to several possible behaviours by two managers.

Additionally, the values for local populations often do not coincide with those of the Forest Services. For local populations, the value attached to these areas is primarily livelihood, whereas for the Forest Service their underlying value is protecting these lands from erosion and managing their river basin through the development of forest cover. In these cases, multiple intentions and behaviours should be expected.

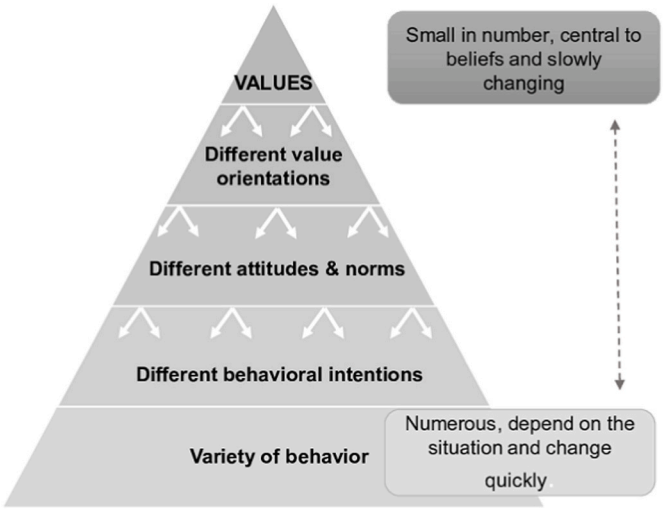

Fig. 1. The cognitive hierarchy. Adapted to Fulton et al. (1996) and Vaske and Donnelly (1999).

2.2. Conflict resolution and value orientation for natural resources

The total number of values concerning natural resource management is small. Therefore, in relation to other subsequent factors of the cognitive hierarchy, their analysis can describe and explain similarities and differences between groups who are interested in managing the resources (Groot and Steg, 2008). More et al. (1996) and Nordlund and Garvill (2002) show that value orientations towards natural resource management can be viewed on an anthropocentric to biocentric scale (or ecocentric, as it is also known) (Gagnon Thompson and Barton, 1994). People with anthropocentric value orientations are more inclined towards human well-being, while people with ecocentric orientations care for all life forms, viewing everything equally valuable in the natural resources they manage. These two are not mutually exclusive, but their influence level will be determined by the decision-making subject and the dependency on the resources under management (Vaske et al., 2001).

Since the end of the last century, forest values have evolved on a large-scale (Bengston, 1994). Some empirical studies show that, in general, increased well-being, education, and urbanization, as well as a decreased stability regarding the place of residence, change the propensity of societies towards ecocentric values (Vaske et al., 2001). Other studies, like Agrawal et al. (2008), suggest an increase in anthropocentric value orientations, due to a growing and competing need for resources, posing serious problems for effective forest management in the future. In addition, the impact of different forestry risks, like fires or diseases, on value systems is poorly studied. Studying such changes, especially community forest management, could help forest policy-makers find solutions to current problems and improve forest policies and management (Ciancio and Nocentini, 1997). Therefore, based on the cognitive hierarchy theory, we analyse how value orientations of local communities and the Forest Services in European Mediterranean countries are changing in relation to forest resource management. In this study, we focus on the processes occurring at the top of the pyramid (Fig. 1), although other levels are also taken into consideration.

Undoubtedly, processes that promote the changing of values are, in most cases, followed by conflicts, as there are always at least two sides involved: in this case the traditional management and its reform. From the perspective of Dagan and Heller (2005), ownership is useful not only when solving interest conflicts involving the management of natural resources, but also in the democratization of this process. However, some studies show that this is not always the case where CF are concerned. For instance, a study by Lopes et al. (2013) showed that the recognition of private community property in Portugal did not effectively help solve the issue of equitable access by local communities to their resources and has also given rise to new types of conflicts. On the other hand, the FAO land tenure scale under the CF mode (FAO, 2019, pag.9) indicates that ownership cannot be considered full if, along with the right of exclusion, local communities were not handed the right to sell these lands. However, in the case of CF, this seems unacceptable since the sustainable use of community lands also implies their conservation for future generations.

2.3. Systematization of concepts

Currently, Community Forests cover a wide range of connections between people, forests and forest products, from forest communities to rural populations who use public or community forest areas as their livelihood, and those who manage tree stocks and maintain this type of soil use, although they do not live there (Arnold, 2001). The recognition of community ownership along with the forest land tenure decentralization process complicated and multiplied the CF types (Roberts and Gautam, 2003). Bullock and Hanna (2007) argue this diversity arose from the need to include several participants with different interests, knowledge and values in CF and to adapt to the influence of unique local factors and needs.

At the European level, data on CF distribution is fragmented and difficult to form a complete and unambiguous understanding of its extent. The difficulty in obtaining consistent statistics between different countries is because of the scope of the CF concept (Montagne et al., 2014; Živojinović et al., 2015).

In this study, we focus on the mountain forest lands of Mediterranean Europe. In the past, these lands belonged to local communities and were later occupied and afforested by the State, however, their management is currently decentralized.

Most of these CF belong to different scales of government power (autonomous regions, provinces, municipalities, or local authorities), although some of these lands were recognized as a type of collective private property. In terms of management, some of these CF are managed only by local authorities or rural communities, while the rest in most cases are co-managed with State Forest Services.

3. Materials and methods

3.1. Systematic and chronological review method

To conduct this analysis, we selected a chronological review approach as described by Grant and Booth (2009). The history of the studied CF is therefore presented in chronological order and is accompanied by the corresponding tables. Adding critical review elements helps identify the missing parts.

All collected and processed information is divided into four historical periods. First, a long history of community lands before the centralization process by governments. Second, a centralization and appropriation of community land for State control and afforestation. Next, a decentralization of land tenure and or management powers in these forest areas. Lastly, current management challenges, wildfire risks, and nature protection. The goal is to understand and compare how, during these four historical periods in five Mediterranean countries, the concept of values changed between an anthropocentric and an ecocentric perception regarding CF management.

3.2. Study area

In this analysis, we focus on community lands in five large European Mediterranean countries with a common history regarding highland afforestation in the nineteenth and twentieth centuries. Some CF characteristic of these countries is shown in Table 1, based on information from the literature review. The CF under study are in the mountainous forests of Portugal, Spain, France, Italy, and Greece. They play an important role in preserving biological diversity, regulating the hydrological cycle, and combating desertification while allowing for the development of economic activities by local communities and recreation for the society. However, these ecosystems are increasingly threatened by fires, climate change, and weakening management (FAO, 2013). Some are public forests. Others are owned by local authorities or communities without legal rights to sell the land. CF management also varies, from autonomous management by owners, to complex co-management models with the state Forest Services and other institutions (Montagne et al., 2014; Živojinović et al., 2015).

In Portugal, CF are concentrated in the central and northern mountainous areas of the country. Most were created during the State occupation of *baldios* (the local name for Portuguese community lands), between 1940 and 1960 (Rego, 2001). Today, *baldios* alongside forest land use occupies approximately 13% of the national forest area (Table 1). In the Portuguese forest sector, they are a valuable heritage and an important space for forestry (AFN, 2010) and protection activities. More than 60% of the Natura 2000 areas are located in *baldios* (Lopes et al., 2013).

With the return of these territories to local communities in 1976, the management decentralization process began. More than 70% opted for a co-management solution with State FS. Today, there are over one

Table 1
Description of some examples of community forests in the Mediterranean European countries (Portugal, Spain, France, Italy and Greece).

Countries	The local name of CF	Localization	Decentralization of forest governance	Number of units	Total area (millions ha)	The average area of community forests (ha)	% of the total forest area	Type of ownership	Management types	Bibliographic references
Portugal	Baldios	North and Center of Portugal	1976	1150	0.5	450	13–15	community property	co-management with FS (70%) and self-government (30%)	Germano (2013); Montagne et al. (2014); DR (2015); Feliciano et al. (2015)
Spain	Montes Veciñais en Mán Común	North and Northwest of Spain	1970s	2835	0.5–0.7	170–240	20[a]	property of the neighbouring community	co-management with FS (55%) and self-government by neighbours (45%)	MAPA, 2019; Leiceaga et al., 2006; Montagne et al. (2014); Caballero (2015)
	Montes Comunales	Mediterranean coast and islands of Spain Inner Spain (Castilla y León)		5714	4.1[b]	620	27	collective or public property	co-management between local authorities, communities and FS	MAPA (2019) Álvarez (2005); Madrazo (2007)
France	Forêts communales	The mountainous area of the Alps and Pyrenees	1983	11 000	3.0	400	10–15	municipal property	co-management between city councils, communities and FS	Deuffic et al. (2015); Montagne et al. (2014); Zingari (1998)
	Forêts sectionals			4000	0.4	250–400	6	community property	self-government by communities	Couturier (2003); Deuffic et al., (2015)
Italy	Regole, Patriziati and Vicinali	Alpine part of Italy	1945	760	0.2	971	6	community property	co-management between commoners and FS	Bassi and Carestiato (2016); Merlo (1995)
	Comunalie				0.9	1137	22	municipal property	co-management between city councils and FS	Montagne et al. (2014);
Greece			1983	339	0.5–0.8	2400	13–15	municipal property	management by FS	Montagne et al. (2014); Spanos et al., (2015)

[a] 20% of the total forest area of Galicia ((NW Spain).
[b] 14 133 ha of which are harvested directly by communities of Catalonia, Valencia region and Balearic Islands (Montiel Molina 1996).

thousand *baldios* under different management modalities, from autonomous, controlled by commoners, to complex models including the FS, associations, Parishes, and or City Councils (Germano 2013). Most have forest management plans.

In Spain, CFs occupy about 21% of the total forest area (one of the largest in Europe) and encompass a wide variety of management models (Montagne et al., 2014). Regional differences in CF land tenure rights were created under the influence of historical events dependent on local socio-economic conditions and dynamics (Iriarte-Goñi, 2002; Montiel-Molina, 2003; Quiroga et al., 2015). Community land tenure in Spain underwent two different and parallel processes. First, the lands were absorbed as municipal property. Currently, they occupy 98% of CF, are public forests, and belong to municipalities. Second, there are independent management modalities, or societies, of CF without dominance by municipal administrations (Nieto, 1987). In total, there are 8.549 CF units with a total area of 4.5 million hectares (MAPA, 2019). The most representative examples are located in Galicia of Northwest Spain, covering a third of the area (Caballero, 2015), in Castile and Leon, formerly known as the Crown of Castille, and in Mediterranean coasts and islands of the former Aragon's Crown which is current Catalonia, Valencia region, and the Balearic Islands (Madrazo, 2007; Montiel-Molina, 1996) (Table 1). These forests are mainly for production, providing a source of income for local communities where pine stands are dominant.

The evolution of the nineteenth-century Spanish forest policy complicated property and management systems, which makes it difficult to harmonize Spanish forest land tenure structures, including CF, with international classification schemes (Iriarte-Goñi, 2002; Montiel-Molina, 2003). In managing CF, at the beginning of the twentieth century, special attention was paid to forestry and hydrological protection (Cervera et al., 2015; Linares, 2007). Currently, the management planning of CF is voluntary, and the number of forest management plans is small. For example, in Galicia, they cover only 17% of the MVMC forest areas (Domínguez and Shannon, 2011). Promoting sustainable forest management in autonomous communities is one of the roles of regional administrations (Montiel-Molina, 1996).

In France, CF cover 2,5 million ha with 10,000 *forêts communales*, owned by municipalities, and 4000 *forêts sectionals*, owned by local rural communities. They comprise more than 15% of all forests. Almost 40% of the CF are in the mountainous area of the Alps and Pyrenees and represent 50% of all mountain forests. Deciduous species predominate in local community forests at 68%, but resinous stands are considered more productive. About 22.8% of CF areas produce environmental protection measures (Montagne et al., 2014). The management of these areas is structured as follows: Municipal councils and the National Federation of Forestry Communes are responsible for implementing environmental policies at the local level and the FS, responsible for the French forest heritage since 1924, is responsible for the management of CF forest resources. 87% of these forests belong to the Forest Regime, provided for in Article L111.1 of the Forest Code. The existence of an approved and periodically revised forest management plan is mandatory (Deuffic et al., 2015).

Italy is divided into twenty regions. The Italian forestry sector is decentralized and characterized by a federal administrative structure.

This justifies a large number of institutions developed at the regional level to implement forestry policies. As in other Mediterranean countries, Italian CF management types are complex, created under the influence of multiple historical events (Bassi, 2016). At the national level, CF occupies 28% of the total forest area (Table 1), and its density differs between regions (Montagne et al., 2014). More than 70% of the CF units are in the mountainous regions of the Apennine Peninsula and 46% are in the north (Gatto, 2017). *Regole, Patriziati,* and *Comunalie* are the most famous Italian CF, located in the Alpine region of Italy (Merlo, 1995) and managed by municipalities, associations or local communities

Table 2
Organization of materials selected and studied for this article, by type of publication and geographical scope.

Geographic scope		International scientific indexing journals	National scientific journals	Publication in proceedings of scientific meetings	Books/chapters of books	Ph.D. thesis	Reports
Country/ Re-gion	Scale						
Portugal	National	Brouwer (1995); Devy-Vareta (1999); Catry et al., (2009); Lopes et al., (2013); Fernandes et al., (2014); Skulska et al., (2019), 2020	Devy-Vareta (2003)	Germano (2013)	MA 1939; Ribeiro (1958); Germano (2000); Rego (2001); Baptista (2010)		AFN (2010) [a]
	Regional	Valente et al. (2015)	Luz (2017)		Carvalho (2017); Serra et al., (2018)	Gomes (2009)	
Spain	National	Sala (2000); Iriarte-Goñi (2002); Valbuena-Carabaña et al., (2010); Lana and Iriarte-Goñi (2015)	Nieto (1987); López (1999); Alcutén (2002); Montiel-Molina (2003); Montiel-Molina (2007)	Rey (2004); Pérez-Soba Diez del Corral (2016)			Quiroga et al., (2015); MAPA 2019
	Regional	Linares (2007); Lana Berasain (2008); Gómez-Vázquez et al., (2009); Marey-Pérez et al., (2010); Domínguez and Shannon (2011); Fuentes-Santos et al., (2013); Serrano Alvarez (2014); Caballero (2015); Cervera et al., (2015); Garcia-Prats et al., (2018)			Chauvalier (1990); Montiel-Molina (1996); Tarazona (2019)	Madrazo (2007)	
France	National	Cinotti (1996); Zingari (1998); Andréassian (2004); Boutefeu (2005)	Vivier (1993); Nemoz-Rajot (1998); Plack (2012)	Brugnot and Cassayre (2003)	Gagneraux (1827); Baby (1972)		Deuffic et al. (2015)
	Regional	Bravard (2002); Cosandey et al., (2005); Simon et al., (2007)			Dupont (1933)		
Italy	National	Pettenella (1994)	Bassi (2016); Gatto (2017)	Caliceti (2011)	Sereni (1997); Poussi and Pettenella (2000)		
	Regional	Merlo 1995; Agnoletti (2007); Cullotta and Maetzke (2009); Lovreglio et al., (2010); Bassi and Carestiato (2016); Favero et al., (2016)				Carestiato (2008)	
Greece	National	Christopoulou (2011); Koutalakis et al., (2015)		Hatzistathis and Hatzistathis (2003)	Solomou et al. (2016)		Spanos et al. (2015)
	Regional	Apostolopoulou et al., (2012); Jones et al., (2015)		Dimitra (2000)			
Mediterranean region		Le Houérou (1993); M'Hirit (1999); Scarascia-Mugnozza et al., (2000); Moriondo et al., (2006); Serrano-Muela et al., (2008); Palahi et al., (2008); Moreira et al., (2011); Pereira et al., (2012); Sheffer (2012); Agnoletti (2014); Gatto and Bogataj (2015); Bebi et al., (2017)			Thirgood (1981); Barbero et al., (1998)		FAO (2013)
Europe		Devèze (1966); Kräuchi et al., (2000); Glück (2002); Strijker (2005); Bullock and Hanna (2007); Henle et al., (2008); Bravo and Moor (2008); Pereira et al., (2012); Jones-Walters and Čivić (2013); Cullotta et al., (2015); Weiss et al., (2019)			Ciancio and Nocentini (1997); Parrotta and Agnoletti (2007); Barbosa et al., (2008); Short (2011); Moor (2015)		Jeanrenaud (2001); Camia et al., (2013); Montagne et al., (2014); Ž ivojinović et al., (2015)
Global		Schwartz and Bilsky (1987); Homer and Kahle (1988); Bengston (1994); Gagnon Thompson and Barton (1994); Fulton et al., (1996); More et al., (1996); Vaske and Donnelly (1999); Castro and Nielsen (2001); Vaske et al., (2001); Nordlund and Garvill (2002); Groot and Steg (2008); Agrawal et al., (2008); Dagan and Heller (2005); Grant and Booth (2009)			Bullock and Hanna (2012); FAO, 1978, 2014, 2016, 2019		Arnold (2001); Roberts and Gautam (2003)

[a] Unpublished document.

(Carestiato, 2008).

Greece has the most contrasted geographical landscape. More than 60% consists of mountainous or semi-mountainous areas where forests provide interrelated social, economic, and ecological functions (Solomou et al., 2016). Because of an acute soil erosion issue, 2.7 million hectares have been declared protected (Spanos et al., 2015). Official statistics reveal that 70% of the forests belong to the State. Under State ownership, CF managed by local communities accounts for about 12% of the total forest area (Spanos et al., 2015). However, according to Montagne et al. (2014), with the lack of registration and the forest governance decentralization process, these statistics could be far from reality. In the past, CF had an important role in the daily lives of local communities, but intense exploitation led to strong soil erosion. The destruction of forest vegetation was a result of deforestation for agriculture and other purposes, successive wildfires and overgrazing. Nowadays, the restoration of forest ecosystems is of great importance and is the main environmental concern in Greece (Solomou et al., 2016).

3.3. Literature search and identification of relevant publications

For the development of this review, we collected, analysed, and compared information concerning the management of CF resources since the end of the 18th century in the five countries under study (Table 2).

Community Forests in France and Spain are well documented in various scientific publications. In Portugal, they are somewhat documented, in Italy, there is little information, and in Greece, information was difficult to find. Therefore, we used different information sources, according to availability.

Primary data were extracted from peer-reviewed journals, articles, books and international reports. Secondary data were collected from literature published in the local languages, legal acts, and grey literature including graduate university studies. Finding the necessary information for Greek documentation was difficult and most publications in English provided only general information.

During the literature review, the following keywords were used: commons, community forest, communal forest, community-based forestry, community land, Forest Regime, afforestation, decentralization of forest governance.

In total, more than two hundred documents were studied, of which only half served as a source of information for this analysis. Basic information, such as land tenure rights, property size and management, the community of references, and existing rights were collected through the analysis of multiple documents. The main data is presented in tables, identifying the source.

4. Results and discussion

4.1. History of community lands before the centralization process by governments

For more than a thousand years, CF played an important role in the development of Mediterranean rural areas (Brouwer, 1995; Gatto and Bogataj, 2015; Jeanrenaud, 2001; Moor, 2015; Rey, 2004; Zingari, 1998). In international literature, they are referred to as *commons*[2] (Bravo and Moor, 2008). At the national level, they have different names in local languages (Table 1).

In Spain and Portugal, there is a long CF tradition, documented after the Germanic invasions of the Iberian Peninsula (Baptista, 2010; Brouwer, 1995; Iriarte-Goñi, 2002; Rey, 2004; Valbuena-Carabaña et al., 2010). As integral elements of the natural environment in the Middle Ages, community lands were also reported in early Alpine communities (Gatto and Bogataj, 2015; Zingari, 1998) and in the Balkans (Hatzistathis and Hatzistathis, 2003).

Community tenure rules were one of the main foundations of social relations and the entire agricultural system. There is ample evidence of rural communities with a high level of self-government and control over vast community lands and their resources (Carvalho, 2017; Montiel-Molina, 1996; Plack, 2012; Sereni, 1997; Serrano Alvarez, 2014).

In each region or rural area, the conditions that gave access to the use of commons were clearly defined and, on the whole, could significantly differ among themselves on a national scale. For example, Berasain's study (2008) provides a model in which, at the scale of a country, access to commons can be divided into groups, depending on the geographic location of the land/resources and socio-economic conditions of the population that usufruct it. For example, in mountainous zones, due to the relief, the area of arable land was very limited, and the local economy was supported mainly by livestock. The population was relatively low and community lands were managed by groups of families or neighbours, through the councils. As a rule, these were the closure of society, with the participation of only native people. In lowlands with a more developed urban infrastructure and varied employment, the main institutions that linked resources (cereal production, grazing, hunting, gathering firewood, etc.) with local residents were municipalities. Such communities were more open and even included immigrants.

In these systems, each CF belonged to an owner group (local community) without individual quotas (Caballero, 2015; Gatto, 2017; Gatto and Bogataj, 2015). One of the important resources obtained in the CF was wood, coal, medical herbs, honey, bark for tanning. Hunting and fishing were also an important livelihood of food. The diversity of raw materials in these forest lands contribute to the development of many local professions (e.g. lumberjacks, carpenters, coal miners) and important industrial activities like naval shipbuilding (Merlo, 1995; Rey 2004; Simon et al., 2007). In mountainous areas, difficult environmental conditions forced locals to expand the variety of goods produced and developed adapted management methods. Such approaches contributed to the development of mosaic landscapes (Agnoletti, 2007). CF financial revenues, mainly produced by timber sales, were used to support rural communities like building and maintaining churches, schools, roads, and water supplies (Baptista, 2010; Merlo, 2003).

Commoners themselves monitored CF use and punished abuses (Dimitra, 2000; Hatzistathis and Hatzistathis, 2003; Sala, 2000). Most councils or municipalities developed the *coutos* system - strict regulation of the use of common pastures, including the definition of the number and type of acceptable livestock (Bassi and Carestiato, 2016; Serrano Alvarez, 2014). However, many studies describe the overexploitation of these resources by shepherds in times of high wool demand with the support of animal husbandry institutions (Baptista, 2010; Dimitra, 2000; Iriarte-Goñi, 2002; Thirgood, 1981; Valbuena-Carabaña et al., 2010). Some studies blame feudalism for this, in which, for tax purposes, the nobility and clergy covered the community lands with "supreme property", introducing new rules for their exploitation (e.g. to destroy the forest area or drain swamps in order to increase pasture areas) (Plack, 2012).

With the over-exploitation of CF resources and frequent pasture burnings by shepherds, many vulnerable Mediterranean mountainous areas gradually became barren with poor vegetation coverage (Bravo and Moor, 2008; Cervera et al., 2015; Linares, 2007; Nemoz-Rajot, 1998; Sheffer, 2012).

At the end of the eighteenth century, the desire for economic progress, organized by the physiocrats, condemned collective ownership (Vivier, 1993). Community-based land tenure received increasing opposition and was considered as an inefficient resource management solution (Bravo and Moor, 2008). After a series of hesitations, the French state strongly advocated the division of commons between the state and private property. Not everywhere such an approach acted with equal force but, over time, it spread to other countries, which led to the

[2] While '*commons*' include mills, ovens, wells, arable lands and other communal assets, this paper focuses only on forests, woodlands and grazing areas.

dismantling and destruction of community-based tenure regimes (Carestiato, 2008; Moor, 2015).

Some CF became the property of local authorities (Gatto and Bogataj, 2015). Part of this land was sold (Carestiato, 2008; Pérez-Soba Diez del Corral, 2016), excluding high mountain areas because of hydro-geological functions (Cervera et al., 2015; Ciancio and Nocentini, 1997; Iriarte-Goñi, 2002).

Communities lost the right to traditional autonomous management over community lands (Lana Berasain, 2008). This led to conflicts between government services and the local populations (Lana and Iriarte-Goñi, 2015; Moor, 2015; Ribeiro, 1958; Serrano Alvarez, 2014) and the regime change did not reduce the economic pressure on resources.

Summing up the results of this first period of analysis, we can say that the fate of community lands, in the countries under study, was diverse and complex. However, in most cases, as in the management of CF by local communities or under state control, anthropocentric values prevailed. These were mainly aimed at the collection of material goods and/or enrichment. There is evidence of the distribution of rights to use common resources and their control by communities, but, in most cases, they were insufficient. Although a variety of situations have evolved in different landscapes (Agnoletti, 2014; Parrotta and Agnoletti, 2007), excessive exploitation of common pastures, weak governments and the absence of forestry and knowledge could not ensure protection of CF, leading to their destruction in highlands (Ciancio and Nocentini, 1997) and as the consequence, to frequent flooding and abundant soil erosion (Boutefeu, 2005; Ciancio and Nocentini, 1997; Hatzistathis and Hatzistathis, 2003; Thirgood, 1981).

4.2. *Centralization or appropriation of community lands for state control and afforestation*

The most important changes regarding the CF occurred in the nineteenth and twentieth centuries. They can be divided into three evolutions including the creation and development of Forest Services, the cadaster and expropriation of CF, and the development of the Forest Regime and the afforestation of community lands with high soil erosion risks.

4.2.1. *Development of Forest Services*

The close relationship between water and forests in mountain areas was first identified in France, by royal decree of King Philippe IV Le Bel in 1219. In this document, the specialists who were responsible for forest management were called 'Ingénieurs des Eaux et Forêts '(Andréassian, 2004) or water and forest engineers. Today, the hydrological roles of forests in the Mediterranean are still the subject of scientific research (Cosandey et al., 2005; Garcia-Prats et al., 2018; Serrano-Muela et al., 2008). The serious hydrological events registered in the early nineteenth century in the mountainous regions of the Alps increased the need for intervention by the French FS (Brugnot and Cassayre, 2003). Water-forest engineers believed that the erosion of the high Alpine mountains and the floods in the valleys were directly connected with the deforestation and intensive grazing on the slopes (Bravard, 2002). In 1824, the first forestry school was established in Nancy, France (Simon et al., 2007) which contributed to the development of public mountain forests and long-term management plans (Cullotta et al., 2015). New science questioned the ability of rural communities to manage their CF in the highlands (Sala, 2000). Forest engineers proposed the expansion of forest areas through the industrial planting of *Pinus* ssp. stands (Ciancio and Nocentini, 1997). In the following decades measures were taken to regulate livestock grazing in these zones, developing the first community land inventory under State administration and planned forest plantations (Ciancio and Nocentini 1997; Rego 2001; Simon et al. 2007; Solomou et al., 2016; Pérez, 2016).

Other Mediterranean countries followed the example of the leading German and French schools (Table 3).

Table 3
Chronology of the Forest Service's development in Mediterranean countries.

Country	Description	Source
Portugal	1852 — Creation of the Agricultural Institute and Regional School in Lisbon. The introduction of forest management-related subjects begins in 1886. 1886 — Creation of the Forest Services, with extended characteristics and obligations in the afforestation of dunes and mountainous areas, based on the implementation of the Forest Regime. 1901–1904 — Creation of the Forest Regime Law and reorganization of the Forest Services, connecting this institution to afforestation projects involving community mountain areas, forestry hydraulics and dune fixation.	(Devy-Vareta, 1999; Rego, 2001)
Spain	1847 — The Government mandates the creation of a special school for forest engineers, following the German model. 1848–1859 — Creation of the Forest Engineer Corps, to answer an increased need for mountain forest productivity. 1988 — Adoption of an afforestation law for the upper reaches and drainage basins. 1901 — The hydrological section of the Forest Services is formed.	(Quiroga et al., 2015; Valbuena-Carabaña et al., 2010) (Sala, 2000)
France	1291 — Creation of a group of Water and Forest Masters by Philip IV Le Bel, forming a body of "investigators, inquisitors and reformers." 1597 — A decree by Henry IV on the general regulation of water and forests is issued. 1669 — Reform of the Forest Administration to promote wood production. The idea of sustainable development is mentioned for the first time. 1824 — Establishment of the first Forestry School in Nancy. 1924 — Establishment of the Forest Services, a public institution responsible for the management of public forests.	CHAN Centre Historique des Archives Nationales (1997); Simon et al. (2007)
Italy	1822 — The State Forestry Corps is formed, specializing in the defence of the Italian agroforestry heritage, the protection of the environment and the control of rural and mountain landscapes. 1867–1869 — The first forestry training course in Italy opens in Valombros, based on the experience of the Nancy Academy. 1910 — Creation of the Royal Forest Corps, which promotes the protection of the Italian forest heritage.	(Ciancio and Nocentini, 1997; Sanchioli, 2002)
Greece	1833 — The Greek Forest Services are originally formed to combat erosion and prevent flooding, by means of afforestation.	(Chrissi, 2018; Solomou et al., 2016)

This process changed and simplified the characteristics of many traditional pre-industrial landscapes in the Mediterranean (Brouwer, 1995; Cullotta and Maetzke, 2009; Koutalakis et al., 2015; Linares, 2007; Parrotta and Agnoletti, 2007; Sala, 2000; Valbuena-Carabaña et al., 2010) and provoked a shift in fundamental values in the management of mountain community lands.

4.2.2. Cadastre and expropriation of community lands

From 1836 to 1862, France produced an extensive collection of statistical information to create an inventory of non-urban property. In the forest sector, 1822 community lands were registered, which covered 18% of the country (Cinotti, 1996). Similar processes occurred in the Iberian Peninsula. Between 1855 and 1924 in Spain, within the framework of a liberal revolution targeting land ownership, the process of confiscating and selling public forests in auctions occurred. Simultaneously, the cataloguing process of public forests that was expected of auctions was performed because of their public utility conditions. The first Catalogue of Public Forests including forests for sale and protected forests of public utility was completed in 1859 (Valbuena-Carabaña et al., 2010). According to some sources, the high mountain zones were excluded from public auction because of their hydrological functions (Lana Berasain, 2008).

In Portugal, the recognition and inventory of community lands began in 1936, within the internal colonization reform developed by the Ministry of Economy of the Estado Novo. In 1939, more than 7000 community area units, with a total area of half a million hectares were surveyed and registered (MA 1939). Most of these areas were centralised and used to increase and improve forest coverage (Devy-Vareta, 2003; Germano, 2000, 2013).

The study of community mountain lands in Italy was conducted by agricultural economists (Carestiato, 2008). 90% of these areas were considered hydrogeological restriction zones, meaning that they could only be used as forests and managed according to well-defined local environmental criteria (Pettenella, 1994). As a result, in 1927, Law No. 1766 on Land Reform was passed, which radically excluded commoners from the management of community resources (Cullotta et al., 2015).

The centralization of community lands in Greece started in 1828 and was included in the process to build the current forest tenure system (Dimitra, 2000). The first attempt at a Greek forest cadastre took place from 1963 to 1992, by the Forest Services. The inventory data covers important quantitative aspects, but according to Christopoulou (2011), they are not complete.

In the countries under analysis, some communities-maintained ownership of their lands, but they lost administration rights, which were transferred to new government entities (Lana Berasain, 2008). The resistance of commoners to these constraints was expressed in many ways (Alcutén, 2002; Boutefeu, 2005; Brugnot and Cassayre, 2003; Caliceti, 2011; Ribeiro, 1958).

The development of forestry schools, together with the evolution of forestry as a science, introduced major changes in ecocentric and anthropocentric value orientations. Then, owing to a simplified use of the soil, these landscapes have been managed under more limited purposes, and environmental values have mostly focused on soil erosion and watershed control. Income deriving from the sale of forest products has not been distributed at the local level, being directed to the State treasury instead.

4.2.3. Development of the forest regime

In the nineteenth and twentieth centuries, the protection of the mountains became one of the main tasks of Mediterranean foresters engineers (Bravard, 2002). In 1826, under the motto, 'think globally and act locally,' French water and forestry agents developed a community land afforestation plan (Boutefeu, 2005; Ciancio and Nocentini, 1997). In 1827, the first forest code in France was adopted, regulating a mandatory Forest Regime (Gagneraux, 1827). This legal instrument defined a set of specialised rules for sustainable management, operation, and protection of public forests (Simon et al., 2007). It also defined technical regulations and established forest management planning principles for more than one hundred years (Boutefeu, 2005). In areas under a Forest Regime, transitions in land usage were prohibited and special methods of forest management were imposed.

The Forest Regime became a model and a turning point in forestry development for many European countries (Ciancio and Nocentini, 1997). Forest laws have been enacted and large-scale afforestation projects launched to cultivate degraded land, to combat soil erosion (Table 4), to prevent landslides and stabilize coastal dunes (Germano, 2000; Valbuena-Carabaña et al., 2010). In fact, the establishment and development of the Forest Regime can be considered the official beginning of a forest policy of these countries.

Despite its eco-centric philosophy, afforestation was carried out using monoculture plantings of *Pinus* ssp within the structure of the Forest Regime (Barbero et al., 1998). This approach was driven by the desire of forest engineers to make erosion control more sustainable. Pine was used as a pioneer because it is a fast-growing and productive species with a well-branched plastic root system, which made it excellent in resisting the winds and protecting the soil of mountainous areas from erosion (Barbero et al., 1998; Sheffer, 2012), satisfying both environmental and economic goals.

During execution, several parallel beneficiary projects for both rural populations and national economy were conducted such as the installation and control of pastures, the construction of roads and development of infrastructures, and new jobs emerged in rural areas; etc. (Christopoulou, 2011; Germano, 2013; Poussi and Pettenella, 2000).

Afforestation with monoculture plantings changed and simplified the Mediterranean landscapes (Parrotta and Agnoletti, 2007; Sheffer, 2012). These significant changes in both anthropocentric and ecocentric orientational values in the management of natural community resources was often violent to communities (Iriarte-Goñi, 2002; Ribeiro, 1958; Tarazona, 2019). CF were subjected not only to the Forest Regime but also given over to State management. Engineers wanted to increase and preserve mountain forest areas for their role in maintaining a wide ecological balance and the future of the nation (Simon et al., 2007), but reduced community access to their main sources of subsistence. These conflicting values, along with other factors (industry development and urbanizations, fertilizer invention and decline of cattle breeding, transition to new types of energy, etc.), led to the decline of agriculture in Mediterranean highlands and to rural exodus as shown in many examples in several Mediterranean countries as in Greece (Dimitra, 2000), Italy (Agnoletti, 2007) or Portugal (Baptista, 2010).

4.3. Decentralization of CF governance

After World War II, states faced a growing need to maintain forests under a reduced budget and increased manpower (Brugnot and Cassayre, 2003; Scarascia-Mugnozza et al., 2000). In 1948, Italy began to decentralise forest management to local governments and communities (Gatto and Bogataj, 2015). Since the 1960s, similar processes have been observed in other Mediterranean countries (Brouwer, 1995; Montagne et al., 2014; Pérez-Soba Diez del Corral, 2016) (Fig. 1), forming different communal, community, or collective management models (Montiel-Molina 2003, 2007; Germano 2013; Gatto and Bogataj 2015; Jeanrenaud 2001). For many governments, the goal for these reforms was to reduce the financial burden of forestry while recognising the dependence of local communities on forest products. As a result, these forest tenure reforms have contributed to their more democratic governance.

These decentralization processes were not homogeneous in all Mediterranean regions and, the relationships between the State, the FS, regional, and local authorities differ depending on how they were adapted to fulfil forestry duties and actions (Montagne et al., 2014; Živojinović et al., 2015). In addition, the lack of a cadastre for modern forest property types in Mediterranean forests (Caballero, 2015; Carestiato, 2008; Christopoulou, 2011), different levels of tenure rights and a

Table 4
Chronology of forest reform developments and subsequent reforestation in Mediterranean countries, in the 19th and 20th centuries.

Countries	Events	References
Portugal	1901–1903 — Creation and regulation of the Forest Regime legislation. Results in about 85 thousand hectares of State forest heritage and over 370 thousand hectares of community lands included in the Forest Regime. 1938–1968 — Large-scale afforestation of community lands (over 300 thousand hectares) during the implementation of the Afforestation Plan.	(Devy-Vareta, 2003; Germano, 2000; Rego, 2001)
Spain	1894 — The Law on Forest Ordinances is issued. 1930 — Publication of a series of laws relating to the principles of forestry. 1901–1936 — Restoration of hydrographic basins in the context of forest reforms and a new legal regime, the Catalog of Forests of Public Utility. 1914–1925 — Development of a School of Agriculture and Hydrological Forest Services in Catalonia. 1939 — Implementation of a general afforestation plan in Spain, based on protection and economic functions 1941 — Creation of State Forestry Heritage. 1939–1984 — Great reforestation campaign to increase public forest ownership and promote the correction of hydrographic basins.	(Caballero, 2015; Cervera et al., 2015; Iriarte-Goñi, 2002; Pérez-Soba Diez del Corral, 2016)
France	1827 — Development of the Forest Code. 1860, 1864 and 1882 — Laws on the reforestation of mountains and development of public utility reforestation perimeter in connection with "the state of the soil and resulting hazards." 1882–1914 — The Forestry Services treat 300 thousand hectares of the most problematic areas.	(Brugnot and Cassayre, 2003; Fourchy, 1963; Gagneraux, 1827)
Italy	1877 — Issuing of the Forest Law. 1923 — Reorganization and reform of mountain forest legislation for hydrological purposes. 89% were included in hydrological protection zones (forbidding land-use changes and imposing a special forest stand management method). 1927 — Law No. 1766 on land reform is issued, radically excluding communities from CF administration and considering collective management rights economically inefficient. Hydrological afforestation actions begin in the post-war years. 1970s — Development of the most exhaustive reforestation plans involving 400 thousand hectares, of which only 98 thousand are concluded.	(Sanchioli, 2002; Poussi and Pettenella 2000; Cullotta and Maetzke 2009; Caliceti 2011; MA, 2019)
Greece	1929 — Creation of protection status for forest areas of hydrological importance (Forest Law No. 4173/1929), which is still considered one of the most important provisions in Greek forestry legislation. These forests protect settlements from soil erosion, landslides and flooding. 1975 — The Greek Constitution protects the Forestry Regime. According to Article No. 24, forest land-use changes are prohibited, unless for public economic or agricultural purposes. 1941–1990 — The most intensive reforestation action takes place.	(Christopoulou 2011; Spanos et al., 2015; Solomou et al., 2016)

disorganized and fragmented forest ownership (Živojinović et al., 2015), do not allow for accurate and reliable comparisons of current CF management between countries.

Since the second part of the last century, the abandonment of agriculture and the growth of urbanization changed values and led to a loss of traditional knowledge (Živojinović et al., 2015). CF lost their role as generators of economic resources and incomes (Ciancio and Nocentini, 1997). Moreover, the demographic structure of rural communities and their interest in management decisions declined (Gatto and Bogataj, 2015). Women and young commoners have little involvement in CF management (Serra et al., 2018). Governance forms created during the decentralization process were not always permanent. Transitions were observed from co-management models with the SF to autonomous management forms and associative with other institutions (Christopoulou, 2011; Germano, 2013; Nemoz-Rajot, 1998). CF are no longer a part of the daily lives of local communities in the production of goods and income. Instead, new recreational functions and environmental problems emerged, indicating that this forest governance form is becoming more complex regarding decision-making and management (Short, 2011).

Common property regimes are considered to be promising for the multi-purpose management of mountain forests (Glück 2002). However this type of management requires time for restructuring (Ciancio and Nocentini 1997) and decentralization can trigger serious problems for forest resource governance such as a lack of feedback from other environmental contexts and the loss of economies of scale (Pettenella 1994). Predominance of a group over national interests in sustainable management may also be a problem (Pettenella 1994) and commoners may show a low ability to form community groups or collaborate with other communities (Marey-Pérez et al. 2010). This may be due to a low level of technical knowledge and training opportunities for commoners, and few innovations in economic activities developed by communities. These recent changes in value orientations will likely affect the quality and variety of management models in these CF.

On the other hand, the needs and involvement of communities are often ignored when preparing national forest strategies and regional planning. But, as we have already shown in this document, the ecocentric and anthropocentric value orientations of local communities and the SF are significantly different. Thus, considering the experiences of the Forest Regime implementation in the nineteenth and twentieth centuries and consequences for local communities, current CF management models should include a harmonious and consistent interaction between bottom-up and top-down principles (Gatto and Bogataj, 2015).

4.4. New challenges and concerns: wildfire risk and nature protection

Despite the variety of socio-economic realities involving current CF, they share new problems like an increased risk of wildfires and nature protection concerns.

Since the second half of the twentieth century, wildfires have become

the main problem involving forests, especially in Portugal, Spain, France, Italy, and Greece (Fig. 2), because of climate and land-use changes (Moreira et al., 2011). Every year, two out of three wildfires occurring in Europe take place in one of these countries (Barbosa et al., 2008).

The EFFIS annual fire reports indicate that the spatial distribution of fires is not random and is partly related to factors such as protection, property, and management types in agroforestry systems.

Camia et al. (2013) show that, in recent decades, at least 20% of the fires occurring in Mediterranean countries were caused by shepherds trying to regenerate common pastures. Additionally, in many countries, the presence and intervention by the FS in the management of CF have significantly decreased in recent decades.

Forest fires have become a serious problem for CF managers in Mediterranean countries. For example, Fuentes-Santos et al. (2013) and Skulska et al. (2020) argues that over the last decade in some parts of the Iberian Peninsula, a large part of the annual wildfires occurred in community lands.

The causes of fires in CF are vast and vary on different scales from international to local. Some of the most common causes include property disputes in Galicia (Fuentes-Santos et al., 2013); land usage conflicts and loss of control over fuel loads because of a lack of forest management in Portugal (Fernandes et al., 2014; Skulska et al., 2020); and traditions of silvopastoral activities, namely burning for renovation of pastures for livestock in Greece (Dimitra, 2000), Portugal (Catry et al., 2009) and Italy (Lovreglio et al., 2010).

Another common factor is the creation of protected areas within CF and the increased vulnerability of these areas to wildfires (Pereira et al., 2012). Protected areas are created to defend biodiversity, and strict protection is often applied here, forgetting that these important ecosystems were also formed under the influence of fire. Due to the specifics of management, the modern system of protection of protected areas causes important changes, increasing the accumulation of biomass, which, in turn, increases the vulnerability of these ecosystems to destructive fires (Pereira et al., 2012).

There is a growing network of protected areas since the 1960s. Since then, their numbers and the overall size is growing, including in CF (Fig. 3). Yet, this policy excluded rural populations from decision-making processes (Iriarte-Goñi, 2002).

Long before the existence of any laws regarding nature protection, the existence of Forest Regime underscored the importance of ensuring the sustainability of public forests including conditions to increase and support biodiversity (Nemoz-Rajot, 1998). As a result, the modern European network of protected areas includes a large portion that was once covered by Forest Regime for water protection.

However, the wildfires in protected areas has been growing at the same pace as in unprotected ones. The EFFIS reports show that over 800 thousand hectares were burnt in last decade in Natura 2000 sites (part of the network of protected areas) in the countries we are analysing. Fig. 4 shows the annual percentage of these burnt areas.

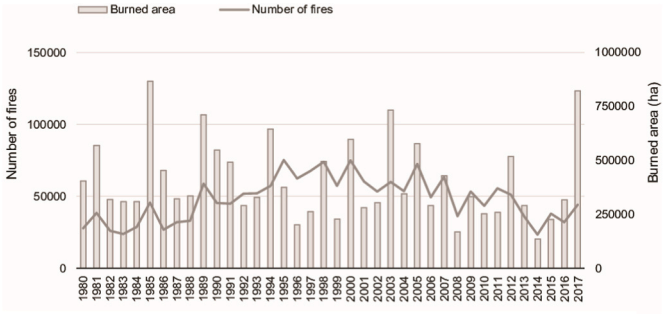

Fig. 2. The number of fires (black) and burned area (grey) in Portugal, Spain, France, Italy and Greece between 1980 and 2017. Source: Annual European Forest Fire Information System (EFFIS).

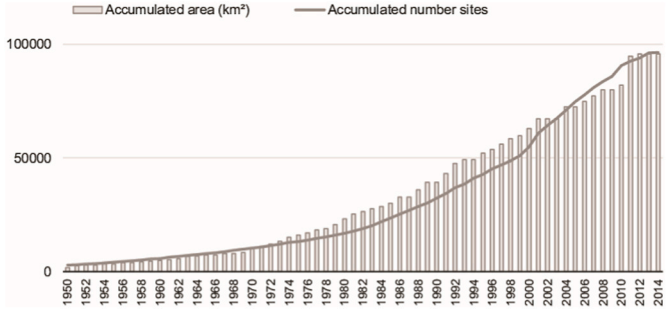

Fig. 3. The cumulative number and surface area of protected areas in the 39 EEA countries. Source: European Environment Agency.

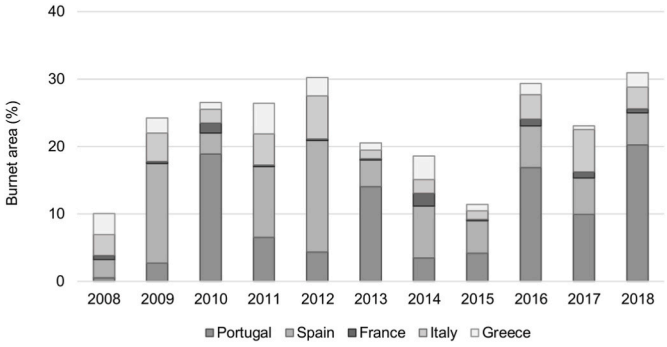

Fig. 4. Annual percentage of Natura 2000 burned areas in different countries under analysis on the total area burnt. Source: Annual European Forest Fire Information System (EFFIS).

The area burnt under Natura 2000 protection in the five countries represented from 10% to 30% of the total area burnt in these countries. Portugal and Spain were the two countries with major losses, but Greece and Italy also show significant values in some years. France has smaller values.

The enforcement of protected areas disrupted the balance between anthropocentric and ecocentric values in management and caused different reactions among the populations (Henle et al., 2008). For instance, studies in Greece and Portugal have shown that decision-making processes in CF protected areas do not often consider the views of local communities and stakeholders (Apostolopoulou et al., 2012; Luz, 2017). Meanwhile, a clash in Galicia of different schemes and management interests was observed not only between institutions but also between commoners (Fuentes-Santos et al., 2013), which led to different conflicts, including fires (Gómez-Vázquez et al., 2009). On the other hand, some studies in Portugal and Greece indicate a loss of public interest towards the implementation of any forest management, offering the preservation or conservation of these territories as an excuse (Dimitra, 2000; Valente et al., 2015). Consequently, the dominance of ecocentric values negatively impacted the forest management in some places and increased the abandonment of others, raising the risk of fires.

According to Jones et al. (2015), despite the many advantages of co-management models in areas with a high biodiversity value, their success largely depends on finding a balance between State and local communities. In complex socio-ecological systems, such as in mountainous areas, land use restrictions and Forest Regime, are often barriers and reinforce a sense of injustice amongst commoners and other CF managers (Apostolopoulou et al., 2012; Favero et al., 2016; Jones-Walters and Čivić, 2013). Since the causes and consequences of conflicts due to land-use restrictions and biodiversity protection vary between European regions, ways to resolve them should take into account the geographic features and interests of local communities (Henle et al., 2008).

5. Searching for governance alternatives under decentralized policies

In this study, we show that part of the existing mountain forests in Mediterranean Europe that fulfils hydrological protection roles and form biodiversity reservoirs share common development and emerged as a result of the occupation and subsequent afforestation of community lands by the State FS between the nineteenth and twentieth centuries.

The need to mitigate soil erosion and reduce flooding served as the basis for the development and implementation of the Forest Regime through the afforestation of mountainous community lands, centralised by governments since the nineteenth century. Highly conflicting concepts of mountain area usage and management as sources of livelihood for local communities versus their preservation under the FS control for the future benefit of the nation led to a shift in the anthropocentric and ecocentric value system when managing the lands. As a result, the occupation of these areas and their afforestation increased the forest areas, composed of pure pine forests, and significantly changed their environmental and economic indicators. Additionally, its simplified landscapes and changed the interests of local communities towards the traditional use of their lands.

The decentralization of forest management tried to reduce the financial burden of forestry and democratize management involving local populations. The return of CF management rights to communities and local authorities created a complex variety of tenure regimes in these lands. Lack of knowledge about the effectiveness of community-based forestry makes it difficult to perform quality management analysis of these areas.

This literature review shows that, despite the millenary history of CF and their resilience as a form of land tenure in Mediterranean countries, little is known about their current state including the diversity of their resources, tenure systems, and main management agents. Mountain forests continue to play an important role in combating soil erosion and floods, but changes in their ownership, management and/or protection are not well understood. The impact of ownership on conflict resolution in the newly formed CF is a complex subject both in space and in time and, therefore, should be subject to analysis in a separate study. In addition, we believe it is important to study in more detail the relationships between the forest regime and the network of protected areas in CF.

Complex anthropological changes in community lands in recent centuries, especially in land use, in the homogenization of their landscape by afforestation, as well as the introduction of a network of protected areas and its corresponding restrictions have changed the fire regime in these areas. The exodus from the mountains and the gradual decline in dependence on forest and agricultural resources led to the accumulation of biomass, which, together with climate change, increases the risk of wildfire and its extremeness.

Future research should develop a differentiated picture concerning the legal property categories of these forests and their management systems — one that goes beyond the simple dichotomy of State and private property forms. Particular attention should be paid to the detailed analysis and the comparison of values underlying the vision of local communities and the State in CF management.

The diversity and complexity of current CF management types call for a detailed study analysing internationally to locally with subsequent conceptualization. New challenges and concerns of CF, such as wildfire risks and nature protection, require special attention alongside collaborative work from multiple experts and institutions at different scales.

The interests involved in CF management are still numerous and diverse. They continue to emerge many conflicts, the resolution of which is reliant on the ability to consider the interests of the groups involved in CF management. The issue studied in this paper is quite complex and requires a more in-depth analysis. To achieve a balance between anthropocentric and ecocentric values in CF management, we recommend expanding and continuing the direction of this research at national and regional levels in the search for solutions adapted to local conditions. It is also important to develop similar studies in other Mediterranean countries outside the European Union. This will improve the available knowledge and, as a result, the governance of the Mediterranean mountainous forests as a whole.

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