The role of place attachment in forestry behavior

Passive forest management in a fire-prone area in Central Portugal

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Keywords: Non-industrial private forest owners, passive forest management, wildfires, power, place meanings, emotional connections, place attachment.

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Abstract

This master thesis explores the phenomenon of passive forest management among Non-Industrial Private Forest (NIPF) owners in Castanheira de Pera, a municipality in Central Portugal highly susceptible to wildfires. The primary research problem is to understand why NIPF owners in this fire-prone area exhibit passive, or partially passive, management behaviors, focusing particularly on emotional factors in addition to socioeconomic ones. Through identifying and analyzing the meanings that NIPF owners assign to their forest lands, this study is guided by understanding how these meanings are influenced by place-making and have evolved over time (1st research question), and how the emotional connections arising from place meanings characterize place attachment (2nd research question). Ultimately, this study investigated how the forest's place attachment of passive, or partially passive, NIPF owners impacts their forestry behavior (3rd research question).

Utilizing a place-based theoretical framework, the research combines semi-structured interviews, a questionnaire, analysis of grey literature and spatial data. The findings reveal that NIPF owners' passive management is not solely due to economic unviability, such as high maintenance costs and low timber prices, but also deeply rooted in emotional connections to the forest land. These feelings manifest as a view of the forest linked to personal and familial histories, indicating a strong place attachment that influences forestry decisions. Additionally, the study uncovers that emotional connections are also driven by economic challenges, power asymmetries, the increasing spread of eucalyptus, and the impact of wildfires, leading to a pervasive sense of frustration and disempowerment within the community, further complicating active forest management.

By integrating place attachment theory, this study contributes to a deeper understanding of how emotional connections and place meanings influence NIPF owners' forestry practices. The findings underscore the necessity for community-centered initiatives that acknowledge these emotional connections and foster sustainable forest management strategies tailored to the unique socio-emotional landscape of Castanheira de Pera. These insights offer valuable recommendations for policymakers, local authorities, and stakeholders aiming to enhance rural development and climate change mitigation and adaptation through sustainable forest management.

Keywords: Non-industrial private forest owners, passive forest management, wildfires, power, place meanings, emotional connections, place attachment.

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Abbreviations and glossary

Absentee forest owner	Forest owners that do not live in the same locality as the forest property (Matilainen & Lähdesmäki, 2023; Wiersum et al., 2005). In the context of this study, "locality" is interpreted as "municipality".
AIGP	Integrated Area for Landscape Management.
APA	Environmental Portuguese Agency.
APFLOR	Pedrogão Grande's Association of Forest Owners and Producers.
Climate change adaptation	Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (UNFCCC, as cited in Thompson et al., 2009).
Climate change mitigation	A human intervention to reduce the sources or enhance the sinks of greenhouse gases (UNFCCC, as cited in Thompson et al., 2009).
Communal land	Referred in Portugal as *baldios*. It corresponds to a forest that belongs to a local community constituted by people that live in a certain place and where all its members have ownership rights (Feliciano et al., 2015).
DGT	Directorate General for Territory.
EEA	European Environment Agency.
ENF	National Strategy for Forests.
EU	European Union.
FAO	Food and Agriculture Organization of the United Nations.
Forest plantation	Forest of introduced species and in some cases native species, established through planting or seeding, mainly for production of wood or non-wood goods (FAO, 2006, as cited in Thompson et al., 2009).
Forest plot	Equivalent to "rural plot" but for forestry use.
GTPR	Working Group for Rural Land.

ICNF	Nature and Forest's Conservation Institute.
ILO	International Labour Organization.
INE	National Institute of Statistics.
Non-Industrial Private Forest (NIPF) owner	Private individuals or corporations, other than forest industry, that own forest land and where management may include objectives other than timber production (Helms, 1998:124, as cited in Harrison et al., 2002).
Forest resilience	The capacity of a forest ecosystem to return to the pre-condition state following a perturbation, including maintaining its essential characteristics, taxonomic composition, structures, ecosystem functions, and process rates (Holling, 1973, as cited in Thompson et al., 2009).
Forest resistance	The capacity of the forest ecosystem to absorb disturbances and remain largely unchanged (Holling, 1973, as cited in Thompson et al., 2009).
LUC	Land Use and Land Cover.
PGF	Forest Management Plan.
PROF	Forest Management Regional Plan.
Rural land	Referred in Portugal as *terreno rústico*. It corresponds to land which, due to its recognized suitability, is intended for agricultural, livestock and forestry use, the conservation and valorization of natural resources, the exploitation of geological resources or energy resources, as well as for natural, cultural, touristic and recreational spaces and that which are not classified as urban (Regulatory Decree 15/2015, of August 19).
Rural plot	Referred in Portugal as *prédio rústico*. It corresponds to each piece of rural land that is registered as a unique plot, even if attached to other plots that belong to the same owner.
ZIF	Forest Intervention Zone.

1. Introduction

This chapter introduces the present study by highlighting the diverse perspectives on how forests contribute to sustainable rural development, as well as the role and objectives of non-industrial private forest owners and the trend towards passive forest management. The chapter also provides a detailed examination of forest ownership and management in Portugal, the historical evolution of Portuguese forests, and the challenges posed by passive forestry and wildfires. The chapter concludes by identifying the research problem: understanding the reasons behind passive, or partially passive, forest management by NIPF owners in Castanheira de Pera, a fire-prone area in Central Portugal, particularly considering both socioeconomic and emotional factors.

1.1 Forests for rural development and climate change

Forests are considered crucial assets for rural development, considering how they can contribute to increased opportunities and well-being of rural people through their ecosystem services. Besides that, forest ecosystem services also have broader global impacts that affect the entire planet (Pain & Hansen, 2019; Brockerhoff et al., 2017). Therefore, forestry should be done in a sustainable manner. In this study, sustainable forest management is understood following the Helsinki Resolution H1 General Guidelines for the Sustainable Management of Forests in Europe, which states that sustainable forest management is "the stewardship and use of forests and forest lands in a way, and at a rate, that maintain their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems" (MCPFE, 1993:1). Thus, forest's use should strive for balancing the three dimensions of sustainability – social justice, environmental health and economic development – to maintain the long-term use of the forest while maximizing social benefits and minimizing environmental impacts (Bansard & Schröder, 2021).

However, there are different perspectives on how forests and forestry can contribute to sustainable rural development. Even if much of previous research has been focused on the impact of forestry on rural economies, a sustainable use of the forest implies more than emphasizing economic growth alone (Slee et al. 2004;

Munday & Roberts, 2001). In this sense, the promotion of and the importance given to the forest's multifunctionality, where forests are not only for wood production but also for carbon sequestration, biodiversity enhancement, or recreational activities, has been growing steadily (Londres et al., 2023; Bjärstig & Sténs, 2018; Almstedt et al., 2014; Urquhart et al., 2012; Carvalho-Ribeiro et al., 2010; Elands & Praestholm 2008; Elands & Wiersum 2001). Moreover, ensuring that monocultures do not dominate forest landscapes is now understood as crucial to increase their resistance and resilience to the uncertainties and risks associated with climate change (Felton et al. 2016; Jactel et al., 2009).

Finally, Thompson et al. (2009) state that maintaining or restoring forest resistance and resilience is often claimed as a necessary societal adaptation to climate change. Thus, it is important to advocate for sustainable forestry practices that contribute to climate change mitigation and adaptation, leading to resistant and resilient forests that can withstand, adapt to, and recover from disturbances like diseases, pests, and climate change impacts, such as wildfires. These forests typically have high biodiversity, with a mix of tree species and ages, and a variety of plants and animals. This diversity helps the forest to remain healthy and maintain its ecological functions even when faced with challenges (Damianidis et al., 2021; FAO & UNEP, 2020; Ruiz-Peinado et al., 2017; Thompson et al., 2009).

1.2 Non-industrial private forest owners and the passive management of forests

As referred by Matilainen and Lähdesmäki (2023), most European forests are privately owned (60%), and 83% of these belong to Non-Industrial Private Forest (NIPF) owners. In this sense, NIPF owners play a decisive role in sustaining forest ecosystems and enhancing rural development. Moreover, several studies have shown that NIPF owners are becoming a more diverse group with increasingly varied objectives and values concerning their forests (Ficko et al., 2019; Deuffic et al., 2018; Feliciano et al., 2017; Wiersum et al., 2005; Karppinen, 1998). This shift has been driven by global socio-demographic transformations, including urbanization and depopulation from rural areas (Matilainen & Lähdesmäki, 2023; Wiersum et al., 2005). Consequently, at a European level, NIPF owners are less economically reliant on their forests, the number of absentee owners is rising, and they are also aging, in general (Matilainen & Lähdesmäki, 2023). As stated by the authors (*ibid*), this has led to discussions about the potential passivation of NIPF owners in their forestry practices, as well as to the identification of forest owner's types such as "passive" (Ficko et al., 2019).

Thus, passive forest owners have many understandings and interpretations, and are very much context-bound, as suggested by Matilainen and Lähdesmäki (2023).

The term “passive” can be misleading since it can imply a normative valuation that suggests disinterest or indifference in relation to the forest. However, the authors (*ibid*:6) argue that passive forest owners are a heterogeneous group and “the lack of management activity does not seem to indicate the lack of interest towards the forest (…) Instead, some passive types had great interest in their holdings”. In the context of the present study, where NIPF owners mainly own what is considered as production forest (FAO, 2014), passive NIPF owners are the ones that do not implement any productive interventions in their forest land, even if they show a big interest and strong emotional connections towards their forest. Productive interventions include selection of logs, thinning, pruning, trimming, clearing or controlling shrubland, fertilization and phytosanitary treatments (Canadas et al., 2023). Therefore, an active management in a production forest is determined by doing productive interventions, as opposed to a passive management. Considering the local context that will be further analyzed, I also engage with the term “partially passive” NIPF owners, which I define as NIPF owners that might actively manage some of their forest plots but not all of them.

According to Matilainen and Lähdesmäki (2023), passive management of the forest can be seen as a challenge in achieving the environmental, social and economic benefits derived from the forest, and therefore counterproductive to societal goals, such as mitigation and adaptation to climate change. Though, it is also important to note that active forest management, if understood as intensive forestry, can also cause severe negative impacts in the forest ecosystem and its multifunctionality (Pohjanmies et al., 2021; Laudon et al., 2011). In this sense, an active forest management should be characterized by sustainable forestry practices.

1.3 The Portuguese case

1.3.1 Evolution of forests

The land covered by forests in Portugal increased rapidly in the past century and a half, shifting from representing 7% of continental Portugal in 1875 to more than a third of that same area at the end of the 20th century (Radich & Baptista, 2005).

From 1875 to 1939, forest coverage in continental Portugal expanded from 640 thousand hectares (ha) to 2.5 million ha, driven by the planting of cork oak (*Quercus suber*) and holm oak (*Quercus rotundifolia*) in the South, and maritime pine (*Pinus pinaster*) in the Central and Northern regions. This growth was largely due to private forest owners who used the forests for cork, timber, and resin production, and as part of traditional agrarian systems (Radich & Baptista, 2005). From 1939 to 1974, the forest increased by about 450 thousand ha, largely due to state initiatives, notably the Forestry Promotion Fund. This program encouraged afforestation on private lands to provide alternatives for large landholders

struggling with cereal cultivation and to meet the pulp and paper industry's demands. During this period, approximately 150 thousand ha each of holm oak, maritime pine, and introduced eucalyptus (*Eucalyptus globulus*) were planted. The forest's production function was emphasized, especially in the 1960s, since eucalyptus was introduced on a commercial scale driven by the expansion of the pulp and paper industry, and the role of forests supporting agrarian systems declined due to mass emigration, agricultural mechanization, and increased access to industrial products (Radich & Baptista, 2005). From 1974 to the end of the 20th century, Portugal's forest area expanded by 515 thousand ha, predominantly through eucalyptus planting. This growth was supported by the Portuguese Forestry Project, funded by the World Bank, which facilitated afforestation of private lands of NIPF owners and the pulp and paper industry, as well as communal land. Post-1986, with European Union (UE) membership, various European programs further supported private land afforestation, linking forest area increases primarily to public policy funding (Radich & Baptista, 2005). However, the rapid expansion of eucalyptus plantations also faced resistance from some rural communities, especially in the 1980s and 1990s (Baptista, 2018). One of the most successful cases of resistance happened in 1989, when hundreds of people, concerned about fire risks and water sources, joined to uproot more than 200 ha of eucalyptus trees in a small village in the North of the country (Rodrigues, 2017). During this period, forest conservation efforts also emerged, particularly with the 1987 Environmental Act (Radich & Baptista, 2005).

In 1995, forests covered 3,5 million ha of Portugal, and this area has been decreasing since then (Camargo & Castro, 2018). At that time, maritime pine was still the most dominant tree species in the Portuguese territory (Fermiani, 2016). Since introducing eucalyptus to meet the pulp and paper industry's needs, there has been a shift from maritime pine to eucalyptus due to its rapid growth, allowing multiple harvests in shorter periods and higher yields for producers (Meneses et al., 2017). By comparing the cartography of land use and land cover (LUC) in Portugal in 1951-80 with the same cartography in 2018, Sequeira et al. (2022) concluded that the biggest transition during this period in terms of tree species was from maritime pine to eucalyptus, equivalent to 375 thousand ha. This transition was accelerated by frequent wildfires and the widespread presence of the pinewood nematode in Portugal, causing significant maritime pine losses (Meneses et al., 2017). In 2010, eucalyptus started being the dominant tree species in the Portuguese forest, followed by cork oak and maritime pine (Fermiani, 2016).

Nowadays, according to the Nature and Forest's Conservation Institute (ICNF), which is the responsible governmental body for the nature and forest policies in Portugal, the forest occupies 36% of the Portuguese territory – corresponding to 3,2 million ha – and is followed by shrubland and pastures (31%), agriculture (24%), urban areas (5%), inland waters (2%) and unproductive land (2%). The tree species

that dominate the landscape are eucalyptus, cork oak, maritime pine and holm oak, covering 26%, 22%, 22% and 11% of the territory, respectively (ICNF, 2021). Portugal has the largest area of eucalyptus in the world, in terms of relative area, and only Brazil, India, Australia, and China have more eucalyptus in absolute terms (Munnion, 2018). In terms of distribution, the forest exhibits significant regional diversity in continental Portugal, as shown in Appendix 1 - Maps and charts, Figure A. The Southern region predominantly features the *montado* system, which integrates cork oak and holm oak with agricultural and grazing activities, while the landscape in the Central and Northern regions primarily consists of eucalyptus and maritime pine (Valente et al., 2015).

1.3.2 Forest ownership and management

In the world, there are only three countries on record with lower area of public forest compared to Portugal: Cook Islands, Barbados and Uruguay (Camargo & Castro, 2018). While 3% of the Portuguese forest is public, 4% belongs to industrial companies, 6% is communal land, and 87% is from NIPF owners (ICNF, 2021; APA, 2020). Moreover, land ownership is characterized by small and fragmented rural plots since the average dimension of rural plots in Portugal is around 2,5 ha and there are 11 515 368 registered rural plots in the Portuguese Tax Authority, almost as much as the Portuguese population (GTPR, 2022).

Around 41% of the Portuguese forest is designated for production of wood, fiber, bioenergy and/or non-wood forest products, and 27% is categorized as multiple-use forest. Maritime pine and eucalyptus, as well as other coniferous stands, belong to production forest, while oak, chestnut and other broadleaves stands belong to multiple-use forest (FAO, 2014). Both maritime pine and eucalyptus are mostly used for industrial wood production, except for some areas of maritime pine along the Atlantic coast that are associated with protection functions (Council of Ministers' Resolution 6-B/2015, of February 4). At the same time, 17% of the Portuguese forest is within formally established protected areas, around 10% is designated or managed for protection of soil and water, and around 5% is identified mainly for conservation of biological diversity (FAO, 2014).

As Valente et al. (2015:372) state "The environmental functions of forests were undervalued by decision-makers and by the general population for a long time", and this is mostly related to the economic relevance of the forests to Portugal: while the protection and conservation functions contribute 202 million Euros to the forest's gross value, the multiple-use and production functions add 312 million Euros and 876 million Euros, respectively (APA, 2020). Here, it should be added that 17,5% of the eucalyptus area in Portugal is managed by the industrial pulp and paper companies (Biond, 2022). This area, together with the raw material bought to NIPF owners and the one imported, makes Portugal the 13th biggest producer of pulp in the world, only behind Sweden, Finland and Russia, in Europe (FAO, 2022).

Moreover, in 2022 Portuguese forest-related exports have reached their highest values ever. Forest-origin products accounted for 9.1% of total Portuguese exports, with more than half coming from the pulp, paper, and cardboard sector, which confirms their relevance in the Portuguese finances (Biond, 2022).

Despite this, passive forest management in Portugal is a well-known phenomenon and has been identified by several actors, ranging from Portuguese public institutions (APA, 2020; Council of Ministers' Resolution 6-B/2015, of February 4) to European institutions (Feliciano et al., 2015; Mendes et al., 2004) and academia (Alves et al., 2022; Almeida, 2020; Valente et al., 2015; Baptista & Santos, 2005). However, there still lacks official information on the forest land affected by passive forest management, considering that until recently only 46% of the forest plots had an official land cadaster (APA, 2020). This is equivalent to 40% of Portuguese municipalities (around 50% of the territory) without information about who owns the land and the land's respective location, geometric configurations, and boundaries. This cadaster exists mainly in the Southern region of Portugal, characterized by large-scale properties, while the Central and Northern regions, characterized by small-scale properties, roughly have any land cadaster (Camargo & Castro, 2018; Feliciano et al., 2015; Beires et al., 2013). Although, a new legal regime for land cadaster came into effect on November 21, 2023 (DGT, 2023), which amended the one in force since 1995 and is expected to increase coverage of land ownership. Portugal and Greece are the only EU Member-States that do not have a land cadaster for the whole territory, and the Portuguese case is worse considering that only 3% of the forest land is managed by the State, while in Greece this number rises to 75% (Camargo & Castro, 2018).

1.3.3 Forest policies

In Portugal, the forest legal regime has been in place for over 100 years. Several legislative, regulatory, financial and planning instruments have been created, though they are constantly modified and updated, often with potentially conflictive outcomes (Mateus & Fernandes, 2014). Moreover, besides weakly implemented, these measures have been mostly focused in approaching forest management through its negative impacts and consequences, such as abandonment and wildfires, and ignored its ecological and socioeconomic context, such as forest composition, the decline of forestry income, or the dominance of industrial actors (Camargo & Castro, 2018; Lourenço, 2018a; Valente et al., 2015).

Presently, there are two key documents for the forest sector in Portugal: the Forest Policy Act, in force since 1996, and the National Strategy for Forests (ENF), approved in 2006 and updated in 2015 (APA, 2020; Valente et al., 2015). While the first one establishes the framework for the use of forest areas with a view of a sustainable and sustained production, the second one provides guidelines for the public and private intervention in forest areas in accordance with European

directives and with an overall goal of achieving a sustainable forest management (APA, 2020; Council of Ministers' Resolution 6-B/2015, of February 4). Moreover, the ENF is generally implemented, regionally, through the Forest Management Regional Plans (PROF) and, locally, through the Forest Management Plans (PGF). However, stakeholder participation in forest decisions in Portugal has been very limited since policies and tools were developed by the forestry administration, and involvement of forest partners was limited to discussions with specific agents or public consultations on legal and policy documents (Valente et al., 2015). At the same time, only a few forest owners develop plans for their plots since the approved PGF only cover 35% of the forest land in Portugal (ICNF, 2021). One reason for this might be the fact that the PGF are only mandatory in public and communal lands, in areas part of public mechanisms for common land management such as the Forest Intervention Zones (ZIF) or the Integrated Areas for Landscape Management (AIGP), as well as in private land above 25 ha, even if the average dimension of rural plots is 2,5 ha, as already mentioned.

There is no lack of forest policies in Portugal that promote a sustainable forest management, however its implementation falls short (Lourenço, 2018a; Moreira, 2018). However, in general the State has been escaping its responsibility regarding guaranteeing a sustainable forest management, by transferring it to market instruments such as forest certification mechanisms, by not having extension services impartial to commercial interests, or by not having policies to regulate the market activities (Camargo & Castro, 2018).

1.3.4 Wildfires

According to the Environmental Portuguese Agency (APA), wildfires are one of the main obstacles to forests' sustainability and associated ecosystems, degrading and disrupting economic, social and environmental goods and services (APA, 2023). Wildfires are "a complex phenomenon that occurs when three conditions are met: available fuel, an ignition source (due to lightning or human activities) and weather conditions conducive to fires (fire weather)" (Ruffault et al., 2020:1).

The threat of wildfire is especially pronounced in Portugal since it has one of the highest wildfire risk rankings in Europe (Vayo, 2023; Beighley & Hyde, 2018). The country is part of the Mediterranean Basin, one of the regions of the world most vulnerable to climate change and where wildfire activity is expected to increase (Ruffault et al., 2020; Camargo & Castro, 2018). However, when compared to the other European Mediterranean countries, like Spain, Italy, France and Greece, the situation of Portugal in terms of burned area in relation to country area, and number of wildfires, is way worse. Moreover, while Spain, Italy, France and Greece have reduced in number of wildfires or in terms of burned area (or both) from 1980 to 2016, Portugal almost tripled the number of wildfires and almost doubled the burned area (EEA, 2021; Lourenço, 2018; Camargo & Castro, 2018). The worst

wildfires in the Portuguese history happened in 2003, 2005 and 2017, burning an area of around 472 thousand ha, 347 thousand ha, and 540 thousand ha, respectively (APA, 2023). Though, the wildfires of 2017, in June and October, were not only the biggest but also the deadliest in Portugal, killing 116 people.

Climate change-linked weather events, characterized by long periods of hot, dry conditions and strong winds, have increased fire risks. These conditions hinder fire extinguishing efforts. However, it is the forest's composition and continuity that mainly determine the intensity and size of the fire (Tedim, 2018). Forests dominated by eucalyptus, maritime pine and shrubland, especially in areas of passive forest management, are highly flammable and contribute significantly to wildfire spread. Eucalyptus oils are highly combustible, projecting spot fires due to volatile compounds in its leaves, while pine needles, wood litter, and resin ignite easily. The proximity of pine and eucalyptus trees increases surface fuel, intensifying fire risks, and dense shrubland acts as a fuel ladder, enabling rapid fire to spread to tree canopies (Lourenço, 2018; Camargo & Castro, 2018; Bowman et al., 2014; Catry et al., 2013; Xanthopoulos et al., 2012). In addition, eucalypti are known for their invasiveness, fire resilience (meaning their ability to survive and even thrive after fires), and ecological impacts (particularly on soil health and water availability) (Cidrás & González-Hidalgo, 2022; Deus et al., 2019; Botequim et al., 2017).

Eucalyptus and maritime pine are, by far, the main forest types affected by wildfires (APA, 2020; Council of Ministers' Resolution 6-B/2015, of February 4). Meneses et al. (2018) investigated the recurrence of wildfires in continental Portugal and identified LUC patterns affected by these fires, revealing a high frequency of wildfires in certain regions, particularly in LUC types like shrubland and areas of eucalyptus and maritime pine. Thus, while climate change exacerbates the risk of wildfires, it is the passive forest management, coupled with the forest's composition and continuity, the main cause of a real fire hazard in Portugal (Canadas et al., 2023; Casau et al., 2022; Magalhães et al., 2021; Almeida, 2020; Oliveira & Zêzere, 2020; Camargo & Castro, 2018; Lourenço, 2018; Amaral, 2018; Silva et al., 2018; Baptista, 2018; Ferreira-Leite et al., 2016; Valente et al., 2015a).

1.3.5 The drivers of passive forest management

Nowadays, less than 20% of the Portuguese population inhabits interior regions and the passive forest management is intricately connected to a deagrarianisation process that has been happening in Portugal for decades (Almeida, 2020; Figueiredo, 2018). Deagrarianisation is "a process producing social, material and biophysical conditions that are not conducive to the reproduction of agrarian and land-based livelihoods" (Hebinck, 2018:227). In Portugal, particularly from the 1950s and 1960s, some of these conditions were the extremely poor living situation in the countryside and the already limited space for agricultural expansion, leading to a massive emigration wave to better off countries, such as France, and gradual

depopulation of rural areas. From the 1980s, this was also exacerbated by the increasing emigration of young people for professional or educational purposes and the expansion of forest monocultures due to the growth of cellulose industries (Silva et al., 2018). Moreover, Portugal's entry into the EU brought significant legislative reforms to align its agricultural sector with European norms. Under the Common Agricultural Policy, Portuguese farmers were motivated to intensify and modernize their farming practices. Additionally, many farmers received compensation to leave their land fallow, leading to a decline in rural populations and a shift away from traditional agriculture (Almeida, 2020). Furthermore, European community funds boosted infrastructure development and civil construction emerged as the country's primary economic sector, which created thousands of jobs, predominantly attracting former agricultural and forestry workers. This encouraged a greater migration of people to urban areas and opened space for the continuous expansion of eucalyptus, "that promised income with little or no management at all, and a rapid return when compared to other forest crops" (Nunes et al., 2019:4). Similar challenges are faced globally, particularly in regions with significant rural populations and traditional agrarian lifestyles (e.g., see Hebinck, 2018; Cidrás el al., 2018; Schilling et al., 2018; or Martinez-Alier & Walter, 2016;).

In addition, the passive forest management by NIPF owners in Portugal has been attributed mainly to the economic unviability of forestry. The small and fragmented land ownership, the irregular topography in many areas of the country that makes access difficult, high maintenance costs, the low prices for selling timber, or the recurrent wildfires, all contribute to the low expectancy NIPF owners have of obtaining an economic return from investment. Moreover, the continuous rural exodus and the aging rural population, as well as the distance that separates owners and properties, dictates that the profitability of investments is best achieved through the occupation of fast-growing trees, with reduced maintenance and minimum management requirements (Canadas et al., 2023; Mateus & Fernandes, 2014; Canadas & Novais, 2014; Beires et al., 2013; Baptista & Santos, 2005; Mendes et al. 2004). Thus, there has been an expansion of passively managed forest land and, consequently, an accumulation of high levels of fuel.

1.3.6 Passive forest management

Given that NIPF owners control about 87% of forest land, understanding their reasons for passive management is crucial for fostering a resistant and resilient forest in Portugal. Sustainable forests should be achieved through people-centered solutions, aligning conservation goals with the interests of those managing the forest (Fleischman et al., 2020).

In this sense, different studies have been assessing the objectives and perceptions of NIPF owners, which has contributed to identifying the prevalence of passive NIPF owners and their characteristics. Baptista and Santos (2005) identified

different forest owner's types in terms of economic rationalities, and regarding passive management, the most relevant typology is "Property-reserve". It encompasses 31% of the respondents and is defined as smallholding owners who do not carry out productive interventions or invest (i.e., planting, purchasing equipment, or maintaining forest roads) in their properties, viewing it as family heritage and not by their profitability. Moreover, Feliciano et al. (2017) investigated how NIPF owners across 7 European countries perceive forest management. In the case of Portugal, the study reveals that NIPF owners describe forest management as preserving forests for future generations, giving more importance to the forest sustainability that solely to economic aspects. At the same time, Valente et al. (2015a) investigated forest management perspectives among stakeholders in Central Portugal, noting that despite increasing wildfire risks and changing ownership, economic factors like timber production and local employment still dominate stakeholder views. The study found a trend towards passive ownership, with 24% of owners not managing their land and the remaining not economically dependent on their forests, leading to minimal or no investment. This reflects a contradiction where owners recognize their economic value but are hesitant to invest, though they value forests as a legacy. The authors (*ibid*:10) suggest the need for future research "to understand the reasons behind the increasing disinterest and absenteeism and to find the best ways of promoting active forest management, while also meeting the individual interests and values of forest owners".

1.4 Research problem

In line with this, I want to explore in my study why NIPF owners in fire-prone areas in Central Portugal, particularly in the municipality of Castanheira de Pera, are passive, or partially passive, managers of their forest land. While the NIPF owners' socioeconomic reasons for this have already been studied in the Portuguese context, as previously mentioned (e.g., see Canadas & Novais, 2014 or Valente et al., 2015a), the same is not true regarding emotional reasons. However, the emotional connections that NIPF owners have towards their forest land can also play a significant role in their passive forest management, as suggested by Matilainen and Lähdesmäki (2023). Thus, the emotional connections that NIPF owners have towards their forest land will be identified and analyzed through the lens of Place Attachment theory and a process of place attachment elaborated by myself, which will be further detailed in the following chapter, in a tentative to explain the NIPF owners passive forest management behavior.

2. Theoretical framework: a place-based theory

This chapter delves into the intricate relationship between humans and their environment, exploring the diverse theoretical underpinnings and methodologies that characterize place-based research. It starts by defining "place" in contrast to "space," highlighting the transformation of space into place through human experiences and the significance of place meanings. The narrative then transitions through historical shifts in the conceptualization of place. Each theoretical approach contributes to an evolving understanding of place attachment and its implications for natural resource management. There is an overabundance of concepts with no generalized agreement on the relationship between them – such as sense of place, place attachment, place meanings, place identity, topophilia, rootedness, or place dependence –, and different metrics for defining emotional ties between people and places (Hernández et al., 2021; Williams, 2014; Fresque-Baxter & Armitage, 2012). The lack of a unified approach or agreement on these concepts and metrics, as well as the large existing literature, adds to the complexity of working with place-based research. This diversity reflects the multifaceted relationship between humans and their environment, necessitating nuanced and multidisciplinary approaches to fully understand it. At the end of the chapter, the process of place attachment will be detailed, and the research questions will be put forward.

This chapter is structured to guide the reader through the complex terrain of place theory, elucidating how these concepts inform the study's aim to understand the dynamics behind NIPF owners' land management practices in Castanheira de Pera, Central Portugal.

2.1 Defining place

Before exploring the theoretical foundations for this study, it's essential to define "place" as used in social theory, particularly by human geographers like Tuan (1977). Unlike "space," which refers to a general geographic area, "place" is enriched with significance through human activities. Space becomes place when imbued with social experiences; it transitions from being abstract and general to being specific and meaningful. Thus, the essence of place lies in its meanings

(Stedman, 2003). These arise from people's material and discursive practices, making places socially constructed and politically contested (Williams et al., 2013). This concept is crucial for understanding how identities, cultural practices, and environmental behaviors relate to specific locations.

2.2 Evolution of place-based research

Place-based research, spanning disciplines like human geography, environmental psychology, or sociology, has evolved into an interdisciplinary field marked by diverse perspectives, as it can be seen in Appendix 2 – Images and tables, Figure AA. This research has adapted over decades to social science's broader epistemological trends, with Williams and Miller (2021) identifying six key approaches, each building on the last, enriching the field's complexity.

Initially, the Modernist view before the 1970s treated place as a mere backdrop to human activities, focusing on technocratic planning and development. Place was perceived through a scientific lens, largely ignoring its emotional significance. The Modernist viewpoint held that humans were rational actors operating within a rational world and diminished the role of place in favor of a scientific management of human satisfaction and well-being (Williams & Miller, 2021).

The 1970s brought a Humanist shift, particularly influenced by Tuan’s (1977) work, viewing place as a meaningful space central to human existence. This phenomenological perspective emphasized emotional connections and critiqued global capitalism's impact on place diversity and authenticity. The Humanist perspective views place attachment – understood as the cognitive-emotional relationship between individuals and their environment – as fundamental to human needs, highlighting the importance of context and grappling with themes of experience, emotion, body, and performance (Williams & Miller, 2021).

By the late 1970s, the Experiential approach emerged, prioritizing empirical studies into the psycho-social processes of place attachment and meaning. This period expanded the focus on how place connections affect satisfaction and well-being (Williams & Miller, 2021). Despite the ongoing contribution of qualitative research during this time (Manzo, 2005), a significant portion of early interdisciplinary efforts focused on developing quantitative methods to understand and measure attachments to place (Williams & Vaske, 2003). The predominance of quantitative methodologies not only persisted into the 1990s and beyond but also prompted a constructivist critique (Williams & Miller, 2021).

From the late 1980s, influenced by narratives, social position, and power dynamics, the Critical-Constructivist approach considered social constructions of reality, emphasizing relational aspects and the influence of social practices on place attachments (Williams & Miller, 2021). This perspective highlights individual sense-making and challenges the notion of a singular, objective reality, proposing

instead that reality is subjective and varies with each participant, including researchers (Robson & McCartan, 2016). Yet, this Critical-Constructivist focus on meaning through text, language, and discourse sometimes neglected the role of material practices, movement, and the embodiment of emotions in forming attachments to place (Williams & Miller, 2021).

Prominent in the 2000s, the Performative approach adopted a dynamic, relational view of place-based research, mindful of the impact of globalization and the fluidity of place interactions, and challenging conventional notions of attachment based on fixed places. This perspective broadened researcher's view on agency to emphasize networks and interconnectedness within a complex system, over isolated individuals or rigid structures (Williams & Miller, 2021).

In the 2010s, the Systems Thinking approach conceptualized place as part of a social-ecological system (SES) that "view(s) humans both as part of and actively shaping the ecosystems they depend on for development and well-being" (Masterson et al., 2019:555). The rise of SES has elevated relational concepts of place and place-making – here understood as "the set of social, political, and material processes by which people iteratively create and recreate the experienced geographies in which they live" (Pierce et al., 2011:54) – as key frameworks for advancing sustainable conservation and other environmental practices (Williams, 2014). Places are influenced not only by broad environmental shifts but also through social actions of individuals, communities, corporations, and government agencies within institutional frameworks (Masterson et al., 2019; Williams, 2018). Hence, place-based research draw attention for its potential role in bolstering social-ecological resilience – defined as "the capacity to adapt or transform in the face of change in social-ecological systems, particularly unexpected change, in ways that continue to support human well-being (Folke et al., 2016).

Overall, the evolution of place-based research highlights its increasing complexity and the shift from a static to a more integrated and systemic understanding of place within social and ecological contexts.

2.3 Place attachment, sense of place, place meanings and emotional connections

The diversity in theoretical approaches to place-based research is aggravated by a wide variety of concepts, which can also differ across disciplines (Erfani, 2022; Hernández et al., 2021). The most widely utilized are place attachment and sense of place, which are primarily used as overarching place concepts (Hernández et al., 2021; Sebastien, 2020; Trentelman, 2009). Place attachment is usually used as the combination of place identity and place dependence. Here, place identity is defined as the expression of a place's importance through feelings that provide purpose to

life, while place dependence is a functional attachment based on activities that happen in a place, reflecting the significance of that place in providing conditions that support an intended use (Brown & Raymond, 2007; Williams & Vaske, 2003).

Place attachment can be also considered part of a broader concept like sense of place, together with place identity and place dependence, where place attachment refers to place-related emotional connections, place identity refers to place-specific beliefs, and place dependence refers to place-related behavioral commitments (Jorgensen & Stedman, 2001; 2006). Simultaneously, sense of place can be used as an umbrella of place attachment and place meanings. In this case, while place attachment has an evaluative purpose – to understand how much people are attached to certain places –, place meanings are descriptive of the personal relationships and elements of the place – to understand what the place means and what it is that people are attached to (Masterson et al., 2017; Brehm et al., 2013; Williams et al., 2013).

Despite this, meanings have been underemphasized in place-based research, and are often confused with attachment (Masterson et al., 2019). However, place meanings and place attachment are analytically different: people who are attached to a place might not be attached to the same aspects, as a single environment can represent a variety of meanings, highlighted by different individuals (Masterson et al., 2017). For example, let's consider a forest that serves as both a communal gathering space and a source of livelihood for different groups within the same community. While for one group the forest may represent a place of social interaction and cultural rituals, for the other group the forest may be primarily viewed as an economic resource. Despite both groups having an attachment to the same forest, the aspects to which they are attached differ significantly, illustrating the analytical distinction between place attachment and place meanings.

Furthermore, Fornara et al. (2021) refer that while there remains broad consensus on the early definitions of place attachment – originally understood as a collection of positive feelings between individuals, communities, and their everyday environments –, recent perspectives acknowledge that place attachment can also encompass ambivalent or negative feelings (Manzo, 2005). This shift recognizes the complexity of place attachment, moving beyond solely positive feelings to include a broader spectrum of emotional connections towards places. This can be due to significant transformations that occur in the physical, social, cultural, or political processes of the place, like environmental conflicts (González-Hidalgo & Zografos, 2017) and environmental disasters (Scannel et al., 2021; Butler et al., 2018), or to transformations that occur in the individuals' lives (Skår, 2010).

2.4 Pluralism in place-based research

The diversity in theoretical and empirical approaches can be seen either as a complication or a benefit, highlighting the complexity and significance of this psycho-environmental process. On one hand, the inconsistency of place-related terminology and usages can create problems for direct comparability of studies, concepts, and operationalizations of those concepts (Hernández et al., 2021). On the other hand, Manzo and Carvalho (2021:121) argue that "Conceptual and methodological heterogeneity is essential for a full appreciation of place attachment and its various manifestations and dynamics". Moreover, using conceptualizations that align with one's own research while ensuring clarity about the definitions and measurement methods of these concepts can be beneficial (Trentelman, 2009).

According to Williams and Miller (2021), ontological and epistemological pluralism in place-based research will continue to be the norm, contrary to suggestions that place-based research is, or ought to be, converging into a unified theory. Ontological pluralism is closely linked to cultural diversity and the clash of meaning systems among different groups of stakeholders. It manifests in the varied interpretations, purposes, and values that people assign to a place. Likewise, epistemological pluralism is related to the different foundations of science and knowledge, and place facilitates knowledge generation through multiple context-independent (objective, universal) and context-dependent (subjective, locally situated) lenses or positions. Moreover, the axiological perspectives of what makes a place good, authentic, or sustainable, connected to competing values, preferences, and choices of individuals, will also keep its plurality, particularly in natural resources management (Williams, 2018; Williams, 2013).

Therefore, because of the intricate interplay between the material, biophysical, and geographical aspects of a place, and its human, social, and meaning-rich elements, comprehending the full complexity of place requires a multidisciplinary exercise that recognizes the positioning of different concepts, approaches, and observers (Williams & Miller, 2021; Williams, 2014; Trentelman, 2009).

2.5 A place meanings framework with a pluralist approach to investigate place attachment

A pluralist approach to place attachment, containing elements of different ontological, epistemological and axiological perspectives, it is understood as the most useful framework to carry out the present study, considering the complexity and diversity of meanings attributed to the place under analysis – the forest.

In this sense, my definition of place attachment frames place meanings as the source of attachment since the emotional connections that individuals form with a place are created through the process of attributing it significant meanings. Based on

Williams' (2014) definition, place meanings are characterized by the knowledge (including scientific and traditional knowledge), values and ideas about a place, as well as the symbolic relationships between a person or group and a place. As stated by the author (*ibid*:76), "These vary from surface meanings that are tangible and widely shared or experienced regardless of culture to deeper, intangible meanings that are more personal" and can be divided into four layers: inherent, instrumental, sociocultural, and identity-expressive meanings. The meanings are based on varying ontological and epistemological assumptions, as shown in Appendix 2 – Images and tables, Figure AB, and an explanation follows.

- Inherent meanings are recognizable across cultures, based on their essential or material features that are generally perceivable by most people from place to place. In a forest, this could refer to its intrinsic value, like its natural beauty, tranquility, or ecological significance.
- Instrumental meanings are linked to the material aspects of places that help fulfill individual behavioral or economic objectives. Humans are viewed as rational decision-makers, choosing the best options to fit their needs within a framework of socio-physical opportunities and constraints. Thus, the ability of a place to meet these needs is defined by specific, practical attributes and their usefulness. For a forest, this can involve recreational opportunities, air purification and carbon sequestration, or wood for production and non-timber products.
- The sociocultural layer shifts attention to meanings that are socially constructed within cultural, historical, and geographical contexts of everyday life. These meanings are not just mental constructs but are formed through language and social interactions. In a forest, this could include historical significance, cultural practices, or communal activities happening there.
- The identity-expressive meanings are also viewed as socially constructed but with a narrative or voluntaristic approach to reality. It emphasizes the symbolic, historical and spiritual connections individuals form with places. This layer highlights that individuals can imbue places with their unique, personal meanings due to their subjective experiences. In a forest, this might involve personal memories of time spent there, or how the forest reflects an individual's environmental values.

Moreover, understanding place meanings should also include being aware that these meanings can change and evolve over time as material and social practices occur, and these changes can alter perceptions of place meanings, which is described by the concept of place-making. This concept draws on a pluralist approach and includes both the individual subjective experiences with the place, and the social relations (e.g., social norms, economic relations, and political processes) revolving the place and its features (Williams, 2014).

On one hand, meanings are constructed through experience with the place, and attachment is formed through the accumulation of experiences. Therefore, place

meanings can strengthen or diminish the attachment since more experience (e.g., length of time, intensiveness, or extensiveness of interaction) will create stronger attachment (Stedman, 2003). These experiences may be based on work, recreation, or everyday life (*ibid*). Thus, place is conceived as "a product of a bounded, localized, and subjectively experienced history" (Williams, 2014:79) and place attachment is based on the creation and development of place meanings.

On the other hand, the social relations (e.g., social norms, economic relations, and political processes) through which people create and contest meaning within the place's unique features are also fundamental to the place-making process. It allows more sensitivity to the influence of power relations in shaping place meanings, considering that power sets the rules that organize the landscape and guide meanings (Masterson et al, 2017).

What is certain is that the meanings that people assign to a place will influence their behavior and interactions with that place, as demonstrated by several authors (Leahy & Lions, 2021; Brehm et al., 2013; Fresque-Baxter & Armitage, 2012; Smith et al., 2012). Moreover, Masterson et al. (2017:8) argue that "By focusing on the meanings to which people are attached, we move beyond a normative view of sense of place as always positive for sustainability outcomes".

Finally, the process of attributing significant meaning to a place, or place-making, can be past, present, or expected in the future, and lead to place meanings from which a wide spectrum of feelings arises to characterize place attachment. It is important to note that 'feelings' and 'emotional connections' are used interchangeably throughout the text. These are understood following the neuroscientist António Damásio, who states that emotions are complex physical reactions to certain stimuli, while our awareness and interpretations about these physical changes is what makes feelings, or emotional connections, occur (Lenzen, 2005). Figure 1 shows the diagram representing this process of place attachment.

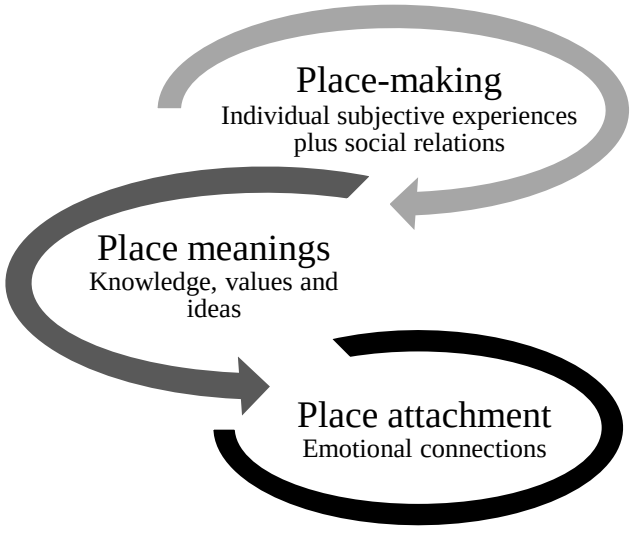

Figure 1: The process of place attachment elaborated by the author.

By conceiving place not only as localized and subjectively experienced, but also as relational, networked and fluid, disciplinary boundaries matter less and the focus is on the promotion of the human, meaning-oriented dimension of place in natural resource management decisions. This contrasts with a mechanistic and commodified view of nature where people are either disregarded as genuine components of ecosystems or merely viewed as consumers of resource commodities, thus denying, surpassing, and devaluing the reality of place, endemic to particular and complex lifestyles, meanings, and social relations (Williams, 2018; Williams et al., 2013; Trentelman, 2009). Promoting a collective understanding of place "that incorporates both natural and social history allows managers (the) opportunity to find common ground without pigeonholing people into utilitarian, environmentalist, or romantic preservationist positions" (Williams et al., 2013:13). Thus, acknowledging the human role in creating and interpreting the local landscape, through the meanings that foster place attachment, is crucial. In this sense, Davenport and Anderson (2005) underscore the importance of recognizing diverse place meanings in natural resource management to aid in addressing contentious issues like development more effectively. Therefore, place meanings based on local knowledge should be recognized and embraced in a more holistic perspective, for natural resource management to succeed by building social-ecological resilient landscapes.

2.6 Understanding forest management decisions through place attachment

As discussed before, behaviors and interactions with a place are influenced by the meanings people assign to that place. Thus, analyzing the emotional connections arising from place meanings, which characterize place attachment, is crucial to understand the forestry behavior of NIPF owners. This aligns with the research problem I want to explore in my study and identified in chapter 1.

For this, through identifying and analyzing the meanings that NIPF owners assign to their forest lands, this exploratory study aims at understanding how these meanings are influenced by place-making and have evolved over time, and how the emotional connections arising from place meanings characterize place attachment. Ultimately, this study strives for understanding how the place attachment of passive, or partially passive, NIPF owners impacts their forestry behavior.

Research on the impacts of place attachment in NIPF owners' forest management has been mostly focused on NIPF owners' practices and intentions regarding their forest lands. Leahy and Lions (2021) applied a survey methodology to investigate how place attachment and landowner concern influence family forest landowner practices, focusing on legacy planning and future land management

intentions in Maine, USA. Mook et al. (2022), also through a survey, explored the relationship between place attachment and conservation intentions among family forest landowners in Georgia, USA, with a particular focus on how these relationships differ between male and female landowners. Bergstén et al. (2018) explored, via interviews, how private forest owners' experiences and emotions related to their land ownership, and how these factors manifest in their relationship with the public's use of their forests and public planning for recreation and biodiversity. Likewise, Johnsson and Beery (2022) investigated, through a survey methodology, the perspectives of private forest owners in the Hallandsås region of southwest Sweden to understand how their place attachment and social values influence their attitudes towards public access and outdoor recreation development on their lands. Finally, Creighton et al. (2008) interviewed family forest owners to investigate the role of place attachment in shaping their attitudes towards growth management plans in a context of rapid urbanization.

However, there is a research gap when it comes to studying how the emotional connections arising from place meanings, which characterize place attachment, affect the forestry behavior of passive, or partially passive, NIPF owners, particularly in fire-prone areas. Moreover, as highlighted by Masterson et al. (2019), investigating what makes place meanings so influential in a certain context, and what kinds of power structures – an element of place-making – underpin them, also needs further research.

2.7 Research questions

Considering my research problem and the research gaps already identified, as well as my definition of place attachment, I will be guided by three research questions:

1. How are the meanings that passive, or partially passive, NIPF owners assign to their forest land influenced by place-making, and how have these meanings evolved over time?
2. How does emotional connections arising from forest's place meanings characterize place attachment of passive, or partially passive, NIPF owners to their forest land?
3. How does forest's place attachment of passive, or partially passive, NIPF owners impact their forestry behavior?

3. Methodological framework and analysis

This chapter outlines the methodological approach for investigating place-making, place meanings and place attachment among NIPF owners in the municipality of Castanheira de Pera, emphasizing the qualitative nature of the study. It details the use of semi-structured interviews to understand NIPF owners' place-making process, assess NIPF owners' place meanings, and capture NIPF owners' emotional connections revolving around the forest. Additionally, the chapter explains the integration of a preliminary questionnaire, analysis of grey literature, and mapping tools to provide a comprehensive understanding of the forest management context. After presenting the methods, the data analysis process is detailed. The analysis was done through thematic analysis, based on a discursive approach. This methodology is designed to uncover the complex dynamics between NIPF owners and their land, facilitating insights into their management behaviors and preferences. At the end of the chapter, a detailed reflection on my personal connections to the research site, as well as its power asymmetries and my critical perspective on the pulp and paper industry, will show how these factors have influenced the study.

3.1 Methods

Research on place attachment has been done through different methodological approaches, using either quantitative, qualitative, or mixed methods (for a comprehensive review, see Hernández et al., 2021 and Manzo & Carvalho et al. 2021). Some examples are the usage of standardized quantitative methods such as psychometric scales (Stedman, 2003; Williams & Vaske, 2003), as well as qualitative and mixed methods such as narrative interviews (Russ et al., 2015), in-depth open-ended interviews (Manzo, 2005), map-based measurements (Brown et al. 2015; Brown & Raymond, 2007), or visual tools (Beckley et al., 2007). As already mentioned, the methods used in the present study were semi-structured interviews, a questionnaire, grey data analysis and spatial mapping.

3.1.1 Interviews

The empirical evidence in this study was collected through semi-structured interviews. Creswell and Creswell (2018:41) state that a qualitative approach is the

most adequate “for exploring and understanding the meaning individuals or groups ascribe to a social or human problem”. Thus, this approach is most useful in place attachment research because it captures the context, subjectivity, and emotional aspects of human-place connection. Additionally, Manzo and Carvalho (2021) argue that qualitative methods are crucial for examining the less understood and evolving aspects of place attachment, such as the influence of power dynamics on attachment. These methods capture experiences and complexities of place attachment that standard quantitative measurement tools overlook. The authors (*ibid*) add that this approach highlights the geopolitical context of place attachment through individual narratives and contextual knowledge. It is particularly effective in uncovering the political elements of place attachment and addressing issues like social conflict, power struggles, and social transformation. Moreover, it facilitates the expression of diverse, non-dominant perspectives on place, regarding the power relations affecting marginalized groups such as rural communities. Eventually, this approach allows for an exploration of the emotional intricacies associated with place, acknowledging the wide spectrum of feelings towards place *(ibid*).

As it can be seen in Appendix 3 – Interview template, the interview guide included questions to assess the NIPF owners meanings associated with the forest, as well as their place-making process, which focused in understanding the land’s forestry memories, the NIPF owners forestry preferences, their obstacles to an active forestry, the power relations revolving around the forest, and their future expectations regarding the forest land. Although there were specific questions regarding the power relations, it is important to note that this was an issue present in answers to several questions, either directly or indirectly. Moreover, there are also questions aiming to capture the feelings that the NIPF owners link to the forest. Finally, throughout the whole interview guide, the temporal dimension is present, to understand how place-making has changed over time and, consequently, how the meanings attributed to the forest have evolved.

In March and early April 2024, I conducted interviews with thirteen NIPF owners. Locating passive NIPF owners was challenging due to the lack of a comprehensive database and limited assistance from local stakeholders such as the pulp and paper industry, sawmill industry, forest owners’ association, and municipality. Despite their initial promises of support starting in January 2024, only 5 interviews resulted from their referrals. The remaining interviews were secured through my personal contacts and snowball sampling. Most interviewees were strangers to me, although many knew my family members, which facilitated a safe and open interview environment. Each interview was conducted in a relaxed setting without time constraints. At the start, I introduced myself, explained my connection to the research site, the study's purpose, and obtained written consent for recording and handling personal data, ensuring confidentiality with the use of pseudonyms. Interviews typically lasted 1 to 2 hours, with some extending beyond two hours.

3.1.2 Questionnaire

I also used a preliminary questionnaire before the interviews started, to be filled by the interviewee to collect specific data about forest management activities (or lack thereof), and socioeconomic and demographic characteristics, as presented in Appendix 4 – Questionnaire template. This served, for example, to learn about the NIPF owners' age, the number and average size of forest plots, the dominant species in the forest land, or why they do not manage their forest actively. This method was used as an additional subjective description of the interviewees.

3.1.3 Analysis of grey literature

Regarding the historical events and policy frameworks, relevant literature and documents were analyzed. This analysis was done through a process of reviewing and interpreting the literature and documents, and developing upon the information they provide. This allowed understanding how different socioeconomic patterns, forest policies at different scales, or land use regulations might influence forest management practices.

3.1.4 Spatial mapping

As for the information about LUC, among others, maps were created with the software ArcGIS Pro to describe and visualize the situation in the study area and Portugal, in general. The spatial data used for this purpose was collected through secondary sources, such as Portuguese governmental institutions that make available open-source data. The most important features regarding this spatial data can be consulted in Appendix 2 – Images and tables, Table 1.

3.2 Data analysis

The data analysis aimed at exploring, through thematic analysis, the place-making process of NIPF owners around the forest land, their place meanings in relation to the forest, and which feelings have arisen from these place meanings. A discursive approach was applied, allowing me to investigate how meanings are socially constructed and influenced by contextual understandings, either historical, cultural, or political (Di Masso, et al. 2021; Moon & Blackman, 2014). Di Masso (2021:84) states that "the main contribution of the discursive approach is to shift analytic and conceptual focus onto a new object of inquiry: the everyday linguistic practices through which place meanings and associated person-place relations are created, reproduced, and contested". This suggests that place attachment is not perceived as just an innate affinity for places, but a product of linguistic and social actions (*ibid*).

The analysis process started by familiarizing myself with the data, which involved transcribing the interviews, reading through the transcriptions, and noting initial ideas. This step was crucial for gaining a deep understanding of the content and context of the data. Then, I identified features of the data – codification – that were pertinent to my research questions. The transcriptions and codification of the interviews were done both during and after the interviewing process. For the interview's codification, 3 categories, comprising a total of 10 themes, were defined, based on the theoretical and methodological frameworks that informed the interview guide. The codification process for each of these categories and themes was done as follows:

- Forest-Making category:
  - → For the Forestry Memories theme, I looked for references to changes in the forest's condition, management practices, or the impact of events (such as wildfires) over time.
  - → For the Forestry Preferences theme, I sought to identify specific forest management practices or intervention preferences.
  - → For the Obstacles to Active Forestry theme, I highlighted challenges or barriers mentioned in managing the forest actively, including institutional, economic, physical, or social barriers, among others.
  - → For the Power Relations theme, I looked for any references to external influences, decision-making power, or feelings of control (or lack thereof) over forest management, past and present.
  - → For the Future Expectations theme, I gathered the interviewees' hopes, concerns, or plans regarding the future of their forests.
- Forest Meanings category:
  - → For the Inherent Meanings theme, I searched for expressions that highlight the natural or intrinsic value that interviewees associate to the forest, such as appreciation for natural beauty, tranquility, or ecological significance.
  - → For the Instrumental Meanings theme, I investigated the knowledge about the forest's utilitarian aspects and how is the forest land used by the interviewees, such as economic benefits from timber, land use for agriculture, carbon sequestration or other aspects.
  - → For the Sociocultural Meanings theme, I focused on mentions of community activities, traditions, cultural practices, or the role of the forest in community identity.
  - → For the Identity-expressive Meanings theme, I looked for personal stories, memories, or ways the forest reflects the individual identity or family history of the interviewees.
- Forest Attachment category:

→ Emotional Connections theme, I looked for expressions of joy, pride, peace, or satisfaction related with the forest, as well as expressions of concern, fear, sadness, or frustration related to the forest.

Lastly, the analysis was done by following the process of place attachment, as developed in the theoretical framework. Figure 2 illustrates the process of place attachment to the forest.

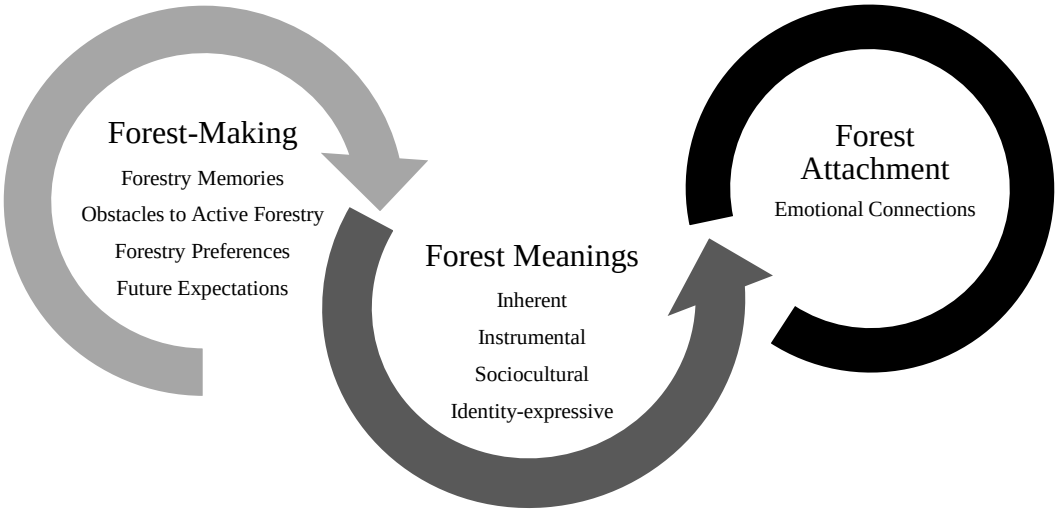

Figure 2: Process of place attachment to the forest elaborated by the author.

3.3 Reflexivity of the researcher

In qualitative research, it is crucial for researchers to reflect on their roles and the potential influence of their personal backgrounds, culture, and experiences on the study. This reflexivity goes beyond merely acknowledging biases and values; it involves understanding how these factors shape the direction of the research and the interpretations made (Cresswell & Cresswell, 2018).

My personal connection to the research site significantly influenced this study. Castanheira de Pera is my father's family place of origin, which provided me with an intimate understanding of the local culture, traditions, and challenges faced by the community, particularly in relation to forest management. Moreover, one of the study's participants is a family member known since childhood. While this familiarity facilitated open and honest communication, I remained vigilant about maintaining objectivity and managing biases. The 2017 wildfires in Castanheira de Pera, which greatly affected my family, intensified my motivation for this research. Witnessing the emotional and physical toll of the wildfires on my family and the broader community instilled in me a sense of responsibility to address the issues surrounding forestry and wildfire risk in this area. To mitigate potential biases, I approached the interviews with a heightened sense of reflexivity.

Additionally, during the research I encountered situations that highlighted the power asymmetries and distrust prevalent in Castanheira de Pera, particularly concerning the forestry sector. One situation occurred during an interview when the spouse of an interviewee realized that the questionnaire included a question about earnings from forest management. This person expressed concern that I might misuse the information, fearing exploitation or loss of their land. Joel's spouse said, "Husband, that is already too much. With our age, why are you doing those things? For what? I think it is too much for our age. We must be afraid of everything". This incident was a poignant reminder of the power dynamics at play and the mistrust that exists within the community. It highlighted the importance of building trust and ensuring transparency in the research process, thus I made it a priority to reassure participants about the confidentiality and purpose of the study.

At last, my personal views on the pulp and paper industry also affected this study. I am highly critical of the industry due to the significant power it wields over forest management policymaking in Portugal and the adverse social and environmental impacts of its economic interests. This critical stance stems from observing the widespread effects of monoculture plantations and the industry's influence on local communities. Being aware of my critical perspective, I approached the research with an explicit intent to remain balanced and rigorous. Throughout the analysis, I continuously ensured that my interpretations were supported by the empirical evidence and reflected the genuine concerns and insights of the NIPF owners in Castanheira de Pera.

3.3.1 Reflexivity in practice

I acknowledge my situated knowledge and my partial perspective. As argued by Haraway (1988), the traditional notion of objectivity in science, which pretends to be free of interpretation, might hide the particular viewpoints and power structures that influence scientific inquiry. In this sense, I believe that my subjective experience allowed me to reveal new sources of evidence and conceptualization.

To become more accountable for my interpretations and ensure sufficient reflexivity, I maintained field notes and reflective journals throughout the research. These records included my thoughts, feelings, and observations during interviews and data analysis, providing a transparent account of how my own experiences influenced the study. By doing this, I aimed at adjusting my approach as needed to conduct this research with a high level of integrity and rigor. Acknowledging and addressing these factors was essential in ensuring that the study's findings accurately represented the perspectives of NIPF owners and contributed meaningfully to the understanding of place attachment and forest management practices in Castanheira de Pera.

4. Description of study area and its relevance

This chapter will look into the characteristics of Castanheira de Pera, mostly in relation to its morphological and socioeconomic features, as well as its specificities in terms of LUC, impact of wildfires and forestry projects being implemented in the municipality.

4.1 Physical features

As shown in Appendix 1 – Maps and charts, Figure B, the research site for the present study is the municipality of Castanheira de Pera. It has an area of 66,77 km2 (square kilometers) and is part of the sub-region of Leiria and the region of Central Portugal. Morphologically, Castanheira de Pera has significant altitudinal variations, with elevations ranging from 340 meters near Ribeira de Pera, located in the south of the municipality, to 1 200 meters at Serra da Lousã, in the north of the municipality (Castanheira de Pera's Municipal Chamber, 2022).

4.2 Socioeconomic features

As stated by the Portuguese Council of Ministers, the (former) sub-region of Pinhal Interior, which Castanheira de Pera is part of, is characterized by a low population density, limited and uncompetitive economic activity, insufficient connectivity and access to social services, and underdeveloped inter-institutional dynamics (Council of Ministers' Resolution 1/2018, of January 3).

As of 2022, the total population in Castanheira de Pera is 2 679 inhabitants and the population density is 40,1 persons per km2. In terms of population by age range, persons with 65-years old or more represent 37,3% of the total residents, while persons between 15- and 64-years old and persons under 15-years old account for, respectively, 55,7% and 7% (INE, 2023). According to the population censuses, although the population in Castanheira de Pera has been steadily decreasing since 1960, the number of persons with 65-years old or more have been increasing every decade (PORDATA, n.a.). In terms of education levels, the population with

secondary and higher education have been growing in the last decades, though in 2021 these only represented, respectively, 18,5% and 7,6% of the total population under such conditions. Moreover, in terms of professional occupation, in 2021 only 5,2% of the population was employed in the primary sector, while 28,6% and 66,3% was employed in the secondary and tertiary sectors, respectively. However, the percentage of economically inactive population[1] reached, in 2021, the highest percentage since 1960, which was 61,4% of the total population (PORDATA, n.a.).

The low population density, besides reflecting significant aging, it also reflects a low birth rate, an increased emigration, as well as the territory's insufficient capacity to attract investment and create jobs, especially for more qualified young people. Moreover, while the business sector is uncompetitive and based on low-value-added activities, the education and training level of the working population is low and quite below the national average, which is a bottleneck to the economic and social development process of the territory (Council of Ministers' Resolution 1/2018, of January 3).

4.3 Land use and land cover

In 2023, around 91% of Castanheira de Pera was covered by forest and shrubland, whereas eucalyptus, maritime pine and shrubland represent around 34%, 9,5% and 31%, respectively, as it is shown in Appendix 1 – Maps and charts, Figure C. Before the 2017 wildfires, these numbers were significantly different. According to the LUC data developed by the Portuguese Directorate General for Territory (DGT), in 2015 the municipality's area covered by eucalyptus, maritime pine and shrubland was around 29%, 40% and 13%, respectively, as it is shown in Appendix 1 – Maps and charts, Figure D. Thus, after the 2017 wildfires, the maritime pine area in Castanheira de Pera reduced by 76%, while the areas of eucalyptus and shrubland grew 16% and 141%, respectively. Clearly, the accumulation of forest fuels has grown exponentially.

At the same time, Castanheira de Pera is characterized by small and extremely fragmented landholding. According to the Portuguese Working Group for Rural Land (GTPR), constituted through governmental dispatch in 2021, in Central Portugal the average size of the rural plots is 0,3 ha (GTPR, 2022). Moreover, the number of rural plots in Castanheira de Pera registered in the Portuguese Tax Authority is massive, making up a total of 21 841 rural plots. However, as of June 2024, only 39% of these rural plots are part of the official land cadaster in Portugal, corresponding to 60% of the total area of the municipality (BUPi, 2024).

[1] The economically inactive population is represented by the percentage of persons with 15-years old or more that is not employed or unemployed (or actively looking for employment).

4.4 Impact of wildfires

The North and Central regions of Portugal have been the most affected regions by wildfires in the last decades (Lourenço, 2018; Meneses et al., 2018). In Castanheira de Pera, between 1975 and 2023, the total area affected by wildfires was around 1.39 times its size. The biggest wildfires affecting the municipality, as it can be seen in Appendix 1 – Maps and charts, Figure E, were in 2017, 1985 and 1991, by this order. Although, the size of the affected area by the 2017 wildfire was unprecedent, burning 53,35% of Castanheira de Pera's area, and mainly the Southern part, as seen in Appendix 1 – Maps and charts, Figure F. Before the 2017 wildfires, the Southern part of the municipality was mainly covered by eucalyptus and maritime pine. According to the information produced by DGT, by overlapping the data about the municipality's LUC in 2015 and the spatial distribution of the 2017 wildfires, it can be verified that the most affected LUC's categories were eucalyptus and maritime pine forests, corresponding to 43,4% and 34% of the burned area, respectively, followed by shrubland, which represented 6,4% of the burned area. The result of this data overlap can be seen in Appendix 1 – Maps and charts, Figure G. Thus, despite maritime pine covering more area at that time, as mentioned before, it was eucalyptus that burned the most.

Furthermore, in the cartography produced by ICNF regarding the wildfire risk for 2020-2030 in Portugal, 46,5% of the Castanheira de Pera's area has been identified in a very high level of risk, and 42,9% of the municipality's area in a high level of risk, as shown in Appendix 1 – Maps and charts, Figure H. The level of risk in calculated considering historical information on the occurrence of wildfires, land use, orography, climate and demography (Law Decree 124/2006, of June 28).

4.5 Forestry projects

Several forestry projects with diverse goals are currently being implemented in Castanheira de Pera, as informed by fieldwork and discussions with local municipal representatives, including the mayor and the Forestry Technical Office.

One project, called Better Forest, is being executed by Biond, the association that represents the pulp and paper industry. It aims to reduce wildfire risk by clearing forest fuel, selectively logging eucalyptus, collecting biomass (subject to owner permission), and spreading fertilizer (subject to owner permission). It also supports the identification of forest owners and georeferencing of rural plots, thus improving the land cadaster in Portugal. The project is 100% funded by European funds through the Resilience and Recovery Plan, with a total investment of 2.4 million Euros, and it is being implemented in 3 pilot areas, where Castanheira de Pera is included, and 15 demonstration fields (Produtores Florestais, 2023). The

Municipal Chamber is involved only through the project's dissemination, not having any monitoring responsibility or others.

Another project, called Village Condominium, is carried out by the Municipal Chamber and is part of the Landscape Transformation Program. It has an investment of 468 thousand Euros, also funded by the Resilience and Recovery Plan. The project focuses on reducing fire risk in 100 meters radius around the built-up areas of 10 villages in the municipality (26 other villages are still waiting for approval), by clearing the land from accumulated fuel, reconverting what is identified as abandoned land, replacing flammable species with native trees, or organizing trainings and awareness sessions for the population.

Moreover, the Municipal Chamber has also a forest-related project ongoing called 12 Months, 12 Hikes. Monthly hikes are organized to appreciate local biodiversity and learn about the area's history.

Nevertheless, there is no forest owners' association in Castanheira de Pera, and it was never created any ZIF. However, there is APFLOR (Pedrogão Grande's Association of Forest Owners and Producers) in the neighboring municipality, that includes Castanheira de Pera's forest owners as their beneficiaries. There is also a proposal for the constitution of a AIGP in Castanheira de Pera.

4.6 Relevance of the study area

The main problem that this study aims to investigate is why NIPF owners are passive, or partially passive, managers of their forest land, particularly in fire-prone areas. Canadas and Novais' (2014) research suggest that forest owners are less active in socioeconomic contexts that are exclusively rural, demographically depressed, characterized by smaller size of forest holdings, lower standards of living and lack of alternatives to employment in the primary sector, which is the case of Castanheira de Pera. Moreover, the authors' (*ibid*) show that non-clearing and non-harvesting areas are predominantly maritime pine and eucalyptus forests, which also fits the context of my study area.

As discussed in chapter 1, combining passive forest management with a highly flammable forest composition creates a high-risk environment for wildfires, making Castanheira de Pera strongly prone to these disasters. In line with this, Magalhães et al. (2021) developed the FIRELAN model – a fire prevention model which aims to achieve a fire-resilient and sustainable landscape. The model was applied in 3 municipalities in Central Portugal, including Castanheira de Pera, and concluded that about 72% of the research site requires significant changes in land use and tree species composition, emphasizing shifting away from flammable species, like eucalyptus, to native species. Therefore, and considering the main problem being explored throughout this research, it can be concluded that Castanheira de Pera is a highly relevant area to be studied.

5. Results

This chapter presents the results of the data analysis and are organized to answer the research questions of the study, starting with a general characterization of the NIPF owners, based on the questionnaire answers, to provide context on their socioeconomic and forestry characteristics. The key themes identified in the data analysis are then examined, structured around the process of place attachment as developed in the theoretical and methodological frameworks. For most themes it will be presented the key ideas shared by the NIPF owners interviewed, which includes the discovered patterns and important contradictions in the interviewees' statements. This is part of the main objectives of a content analysis, as highlighted by Amado (2014) in his book *Qualitative Research Manual in Teaching*. Exceptionally, the Power Relations theme will be present throughout the results, considering that the role of the power structures is transversal to most themes.

The organization of the findings facilitates answering the research questions by systematically addressing the core elements of forest attachment: forest-making, forest meanings, and emotional connections towards the forest. By following this structured approach, the results show how place attachment influence forestry behavior among NIPF owners in Castanheira de Pera.

5.1 NIPF owner's characteristics

The interviewees' answers to the questionnaire that preceded the interviews, pertaining their main socioeconomic and forestry characteristics, are summarized in Appendix 1 – Images and tables, Table 2.

Most of the interviewees are over 65 years old, with ages ranging from 51 to 86 years old, and they possess diverse experiences and connections to their forest land in the municipality of Castanheira de Pera. Out of thirteen interviewees, two of them are absentee forest owners, meaning that they possess forest land in the municipality but do not live there, and the remaining reside in Castanheira de Pera. At the same time, while ten interviewees are male, the other three are female.

Most interviewees have acquired their properties through inheritance and some through purchase, and while eleven interviewees own more than 10 forest plots, two of them own between 5 and 10 forest plots. The average size of the forest plots of eight interviewees is less than 0,5 hectares, while four of them stated having an

average dimension of the forest plots below 2 hectares and one interviewee between 2 and 5 hectares. Moreover, five interviewees own less than 5 hectares in total, while six of them own 5 to 20 hectares of forest land, and the remaining two own more than 20 hectares. This suggests small and extreme fragmented landholding. Visits to these properties are generally infrequent, with some visiting monthly (three interviewees), others less than once a year (five interviewees).

The predominant tree species are eucalyptus and maritime pine, with some interviewees also referring to shrubland as one of the predominant vegetation in their forest plots. The income derived from the forest land is minimal or residual, contributing little to their overall livelihoods. The landscape protection is often described as inadequate or hardly suitable, and most have experienced significant wildfires, notably in 2017. This have impacted their land and management practices and reflects the high-risk nature of the area.

Common reasons for passive, or partially passive, management of the forest land include advanced age, small forest plots, the impact of wildfires, and the lack of time or profitability.

5.2 Forest-Making

Following a pluralist approach, as explained in the theoretical framework, both the individual subjective experiences with the place and the social relations revolving the place and its features are what characterize the forest's place-making. Thus, thereafter I have assessed the past, present, and expected in the future local forest's context in Castanheira de Pera.

5.2.1 Forestry Memories

To get to know the forestry memories, in the analysis I looked for references to changes in the forest's condition, management practices, or the impact of events (such as wildfires) over time.

Some interviewees noted that before their time, forests primarily consisted of chestnut and oak trees because chestnuts were a dietary staple, and the land was used for shrubland to support animals and agriculture. However, they all recall when the forests were largely maritime pine with few eucalypti, and the land was cleared of shrubland. During this time, many relied on the forest and agriculture for their livelihoods. Maritime pine was planted for resin and timber to meet industrial demands but also supported other agrarian activities such as livestock grazing, collecting shrubland for agriculture, and gathering wood for heating, as referred by Anthony:

> "Before, there was pine forest, which employed many people due to the resin. It was the source of employment to rural people (…) People collected scrub and wood for agriculture, and pine

> tree's wood to light the fireplaces (…) My village, at that time, provided olive oil, bread, beans and every vegetable for people to eat, and we could still sell."

Furthermore, the forest was remembered as a place of communal labor and rural life, strengthening community ties and mutual support. However, traditional knowledge of these communal activities, such as corn peeling, is fading as they are no longer practiced, as highlighted by Lewis:

> "The community used to help uprooting the potatoes, even cutting the pine trees (…) During olive picking they would help each other. Threshing the wheat and the rye. Everything. It was wonderful (…) Everyone helped each other. Not today. Today each one takes care of their one, and less. In the past, if there was something, everyone would run to help."

The transition from maritime pine to eucalyptus plantations began in the 1960s, driven by the decreased profitability of pine resin and the rising demand for eucalyptus, fueled by the expansion of Portugal's pulp and paper industry at that time, as recalled by John:

> "But here the transition to eucalyptus was mainly from the 60s decade on. Always increasing. Because it was more profitable (…) Before there was the resin's exploitation, which also started to come to an end (…) Everything began to decline, and then people started giving up and, ever more, turning to eucalyptus plantation. That is when it spread a lot."

Moreover, the wildfires are also seen as critical in changing forest management practices. On one hand, the wildfires influenced the type of species planted since maritime pine production is less feasible in a fire-prone area, as claimed by Donald:

> "Then, the wildfires also have undermined these past forest practices, because if there is a wildfire, you cut the eucalyptus and it bursts again. And the pine trees you must wait way many years."

On the other hand, due to the deagrarianisation process and people's less availability to spend time in the forest, eucalypti were seen as a more practical option compared to the challenges of managing maritime pine, as Anne referred:

> "They ended up selling the pine forest and planting eucalyptus. Because the pine trees were too much work to people at that time."

The shorter growth cycles and quicker returns from eucalyptus better met economic needs in the evolving rural economy. Thus, most interviewees noted that traditional forestry and agricultural practices, like pastoralism and subsistence agriculture, were abandoned. This move towards less labor-intensive forest management led to increased shrubland and fuel accumulation in forests, as recalled by Charles:

> "Clearly, from the 90s decade, I started noticing much more shrubland, which reflected not taking care of the forest land, either because people have died of age, or their heirs ended up

> not living in the village. I started seeing much more shrubland, much more lack of clearing, particularly when we were in the road that accesses the village."

In turn, this increased the number and size of wildfires since then, as noted by Anne:

> "In my day, there was not a single student. Fourth grade and nothing else. That is why the villages were full of people, and some had to leave to find work, because there was no work here for that many people. And the forest was cleared, so there was not as many wildfires as there are now."

Additionally, some interviewees, like Phil, described eucalyptus as cause and consequence of the decline in agricultural practices, due to its ecological impacts, particularly in the availability of water:

> "Maritime pine did not grow as fast, and since by that time there was a lot of water, people started turning to eucalyptus. What came out of this, the primary issue, was a generalized drought. The massive planting of eucalyptus determined that, in areas that had water all year round, coming from the mountain, the water availability decreased a lot. Downstream, it determined something else, people stopped harvesting their plots because of not having water to irrigate."

It is also crucial to acknowledge the power dynamics influencing the shift to eucalyptus. As outlined in chapter 1, from the mid-1960s, the pulp and paper industry became a significant force in Portugal. In Castanheira de Pera, people were encouraged to plant eucalyptus through word-of-mouth for higher economic returns and direct incentives from the industry, including material benefits, as stated by some interviewees like Henry:

> "They were incentivized by the market, because the fellows that were buying the timber and taking it to the pulp industries showed up. The market's dynamism took advantage of it (…) and then there were people which we knew that were offering, for example, fertilizer bags to incentivize the forest owners to produce even more."

The forestry industry, balancing public and private interests, presented eucalyptus plantations to NIFP owners as a win-win situation, leading to increased eucalyptus growth in the municipality. This growth is even higher after the 2017 wildfires, as well as the level of passive forest management, as referred by the interviewees. However, the complexity and diversity of challenges in actively managing forests to withstand extreme climate events like wildfires are significant.

5.2.2 Obstacles to Active Forestry

To better understand the obstacles that passive, or partially passive, NIPF owners face to actively manage their forest land in Castanheira de Pera, in the analysis I searched for challenges or barriers in managing the forest, including institutional, economic, physical, or social barriers, among others. Some of them were already

identified in the questionnaire, but the issues at stake around them were deepened during the interviews and the first conclusion is that most of these challenges are intertwined and affect each other.

Some of the economic challenges mentioned are related with the lack of financial viability in managing the forests. This has to do with the low economic power of NIPF owners and the high costs associated with forest's maintenance, or the low return on timber sales, critical factors for not investing in forest management since potential financial gains do not cover the cost of management, as noted by Phil:

> "If I do not have any help, I cannot spend 600€ or 700€ to clear a forest plot that do not give me minimal profit. No one has profits to work the land, there is no chance."

Moreover, when the interviewees were asked why they do not sell the forest land since they do not have any return on what they might invest, some of them, such as Joel, referred to the low price of the land:

> "I have paid him 0,50€ per square meter. A lot of people buy forest land for 0,20€ and 0,15€ per square meter. Behind the mountain, there they are bought for 0,05€ and 0,10€ per square meter."

On top of this, most times paying the deed is costlier than what is received for the land. Thus, most interviewees prefer to keep the land to the next generations, even if unmanaged, as assumed by Anne:

> "She sold their land for 0,20€ per square meter. At that price, let it be there…"

In terms of social challenges, most interviewees referred the aging of forest owners and rural depopulation, leading to decreased physical capability of forest owners, lack of interest in forest management, and the loss of labor force, as stated by John:

> "We are in a very depopulated area. There are no youngsters. And then, there is the other side of abandonment, where people are not able to manage and are going to abandon. They are really forced to. As willingly as they might be, people cannot find someone to do it. Here, it is very difficult to find people to work."

The challenges related with physical constraints are also highly stated. These are, mainly, the small, scattered and fragmented landholding, and forest's accessibility issues due to lack of roads and cleared forest paths. Additionally, one of the absentee NIPF owners has not visited the forest plots in decades and, nowadays, does not know where they are located, making it impossible to manage in any way.

These challenges hinder efficient management and can deter investment in the forest land. Considering that most interviewees own more than 10 forest plots with an average size of less than 0,5 ha, these are often not economically viable for operations like mechanized cleaning or planting, and costs increase due to logistical

difficulties managing multiple dispersed small plots, even if the accesses exist. These physical constraints are emphasized by Nicole:

> "My father has forest plots which are 10 or 15 kilometers away from here. He also has one that might be 500 or 1000 meters from his house. He has them really far. And forest plots relatively small, so there is not much possibility for people to do its management."

Several interviewees cited institutional challenges at both national and local levels as reasons for passive forest management. Nationally, they pointed to burdensome bureaucracy and complex regulatory environments that complicate obtaining permissions, licenses, and financial incentives for forest management, as referred by some interviewees like Nicole:

> "For the strawberry and quince trees' project I have done, the paperwork we had to fill out, the verifications… We submitted the project, we knew it would be accepted but it was still under decision, and we decided to move with it because we had the money to do it. But not everyone has the possibility to advance the money. And that is how projects are, to have access to the money you need to present the receipts. And most people do not have that power."

On a local level, interviewees such as Colin highlight that there is insufficient support and engagement from APFLOR, from practical management advice to advocacy for better market conditions or regulatory support:

> "Now I'm going to talk about something else, that is APFLOR's own management. I became a member 3 years ago. I left my email, my contacts. And it is here where things fail: until today I have not received any email from them. Not even to charge the membership fees."

Moreover, on both national and local level, most interviewees refer to the disparity in resource access since subsidies and resources tend to flow to private companies and those who already have substantial holdings, exacerbating inequalities in resource distribution and management opportunities, as affirmed by Anthony:

> "The forest represents a huge economic power. But because most of the profit is to the loggers (…) Subsidies are only for the ones who already have a lot. The smallholders, if they apply to it, do not get anything. If I want to clear the land or to replace the eucalyptus for something else, I cannot because they only accept projects for large areas. The smallholders are burdened to not have anything. We are all affected because they take our money and do nothing."

As for ecological barriers to an active forest management, several are referred by the interviewees, including the spread of invasive species like acacias and the increased presence of wild animals such as wild boars and deer, which damage undergrowth and young trees, incurring extra costs for landowners. Additionally, water availability has been reduced by eucalyptus plantations, and land degraded from repeated plantings and natural disasters like wildfires, as stated by Phil:

> "Most people have a small area of eucalypti, and because those were planted 70 or 50 years ago, they already have been cut three times and the land is completely degraded. My brothers made that experience: they tilled the soil, uprooted the eucalyptus strains, did everything, and today nothing good grows there. The land became so degraded…"

Lastly, the devastating impacts of wildfires are also noted as one of the main obstacles, especially after the 2017 wildfires. The wildfires lead to demotivation and questioning the worth of investing in forest management, as argued by Henry:

> "The wildfires are the kind of things that discourages everything. I have not been using the forest because it has been burnt every few years. And I question myself, why should I put my money there if it is only to see everything burnt down later? It is not worth it to go there."

Many interviewees highlighted power dynamics as significant barriers to active forest management by NIPF owners. They perceive that larger economic forces like the pulp industries and local sawmill exert disproportionate control over forest management, often marginalizing smaller forest owners. In Castanheira de Pera, the interplay between local politics and business interests is clear, with local elites influencing access to forest-related services. For example, a single family, which runs the only local sawmill and owns a road and forest clearing company, is seen as monopolizing the forestry sector. Interviewees like Henry claim this family will get ahead of anyone that tries to make forestry business in the municipality, or that they are the ones benefitting the most from the project Better Forest:

> "There is no doubt about that some people are benefitted at the expense of others (while referring to projects funded by public funds). Including who does the services. One of the companies that has been doing the services (for the project Better Forest) belongs to the son of the sawmill fellow. It is conflict of interests."

Interviewees also refer to the lack of accountability and impunity of these economic forces. The local ones, for example, carry out illegal activities such as logging in forest plots which they are not authorized to, as said by Nicole:

> "We already know that when that company (belonging to the local sawmill) is cutting, they are not careful at all. Once, they cut a eucalyptus stand from someone else, next to our strawberry trees, and then they entered in our forest plot. We warned them once, twice, and one day we called the local police. In front of the police, they cut a cork oak tree (which is forbidden by law). So, I think they earn this fame, the impunity. Because afterwards we made a formal complaint, which I do not know if it led to somewhere or not. The man said it would pay, but for him to pay we need to go after him. So, we keep letting things go and they keep getting away with it. In that sense, I think they are getting more and more power."

Besides, most interviewees refer to a timber's price fixing, which remain the same for decades, by the loggers. Phil is one of the interviewees noting it:

> "When we try to sell at the end of the growth cycle, they give us crumbs for it. They pay the money they want, the loggers, the intermediaries, the buyers. Either we keep watching the trees there, or they give us crumbs. The people are frustrated for not being able to sort out the forest land, and because when they are going to sell, they are wrongly treated, they are given a few pennies and nothing else."

Moreover, after the 2017 wildfires, these forces are said to have taken advantage of the situation to buy burned timber for a very low price (useful as biomass for power plants), and to acquire or rent the forest land for 20/30 years contracts, to increase their property size and profits. Phil is one of the interviewees highlighting this:

> "People are selling for any price just to get rid of it, and there are people seizing that opportunity. It is two or three persons that have been buying the forest land to the discouraged ones and to the ones that are not here, for pennies the square meter. There are vested interests in this, too. Then they buy for residual amounts when it burns. And we see them thriving, while the others…"

Furthermore, interviewees are also concerned about corruption and inefficiency within forest management projects, which they believe are often more about monetary gain than actual ecological or community benefit, as stated by Colin:

> "Another thing that is not right are the subsidies attributed by the State. For example, I mentioned before the fertilizer for free. Which is a way to compensate the forest owners. Then, it is obvious that the paper industry buys at a low price. Why? Because, in the meantime, the forest owner already received a subsidy for this and for that. And this is highly rigged. It is very difficult, in a system like this, for us to be able to do something truly different. And now is what we see, plenty of eucalyptus, badly managed, and with vested interests from that industry which is not going to bring any benefit. The profit that remains in the municipality is zero."

Finally, the absentee forest owners interviewed are not aware of the power dynamics in the municipality. However, both refer to the big forest industries as the ones benefitting at the expense of smallholders, as expressed by Charles:

> "The issue is the political power. And if the political powers can be immune to the economic lobby's pressure that want to use the forest in a wrong way, only and exclusively to have profit, even if harming the environment."

The vested interests of powerful actors clearly contribute to the obstacles to actively manage the forest land. Though, the interviewees also expressed their forest management preferences, which could help in reducing these power asymmetries.

5.2.3 Forestry Preferences

To assess the forestry preferences of passive, or partially passive, NIPF owners in Castanheira de Pera, in the analysis I sought to identify specific forest management practices or interventions that the interviewees would like to be implemented in their forest land.

A key forest management preference noted by almost all interviewees involves shifting from individualistic approaches to community-based strategies. This would involve forming community cooperatives to effectively manage forest resources through land consolidation and shared decision-making. Interviewees, like Anthony, believe that such a collective approach could maintain profitability while addressing various challenges including economic, social, physical, and some institutional barriers:

> "An association that would hire personnel, have machines, manage everything. Cutting, clearing, and doing the math to divide the costs by the forest owners. As long as it would be a fair division that considers what each owner has within their square meters of forest land. And then each one would have their own income, accounting for the value that one square meter would be. The forest being managed by a cooperative."

In terms of forest use and composition, most interviewees see the forest mainly for its productive role, even if there are different economic logics associated to it. On one hand, some interviewees such as Donald strictly view the forest for its profit:

> "To me, planting eucalyptus is easier, because eucalyptus can be controlled and it is more profitable, given the reduced growing years. You wait 40 years for maritime pine, and you can cut eucalyptus after 10 years. It has its benefits (…) I have some maritime pine in my forest land, I like it, but now I must wait 40 years? I'm 53 years old, I would never cut them, so I do not care about them at all. Profit is essential in everything. We can say 'It is pretty having maritime pine there'; it is pretty but if it does not give us any money, we cut it."

On the other hand, most interviewees would like to implement sustainable practices focused on long-term investments in native species, like cork oak or chestnut trees. These interviewees aim to contribute to ecological stability and are mostly concerned with not losing money from the investment made, as noted by Nicole:

> "I'm a bit anti-eucalyptus. What I would like was that the native forest, the oak trees, the chestnut trees, the cork oak trees, could be maintained. If I could and had money to plant native trees, in most of my forest plots I would try to plant them (…) What I invested in my strawberry and quince trees' project it is what I received. But the maintenance I need to pay myself. I hope that will pay off. I usually say that I'm already happy if what I earn is what I have spent."

The absentee NIPF owners interviewed do not have economic goals. They claim they would prefer to see the forest with native trees, described as more fire resilient and part of a long-term sustainable plan that considers climate change.

At the same time, some interviewees expressed interest in the forest's environmental and social benefits, advocating for a resilient landscape. They suggest transitioning from monocultures like eucalyptus to diverse forests with native species, reducing pesticide use, and reintroducing traditional practices such as pastoralism. They view these changes as communal efforts to protect the environment and community by reducing fire risk, preserving water quality,

conserving wildlife, and enhancing biodiversity. This approach is also seen as a legacy for future generations, emphasizing a long-term commitment to sustainability. Colin highlighted some benefits mentioned by the interviewees:

> "I think it is better to have our native trees, that grow spontaneously, which are much more resistant to diseases that might appear. Because it is ours and it is still profitable (…) This type of species is not like eucalyptus. And, in that sense, it is an investment we are doing to the Portuguese people. And it is really important, in my opinion, for us to have this attitude. It is an attitude on behalf of the community. Again, the species protection, etc."

Interviewees emphasized the need for stronger regulations and State involvement in forest management to ensure sustainability, proper land use, fire resilience, and fair market pricing. Some of them, like Phil, advocated for the creation and effective implementation of environmental plans that account for the region's ecological features, such as establishing buffer zones around eucalyptus plantations:

> "I'm not against eucalyptus. But I think they should be orderly planted, specific forest plots should be made for them, for the people to rent, for the pulp industries to buy, whatever. Only in specific places without a negative and direct effect on populations, because of the proximity to houses and the ecological issues they create, such as the excessive water consumption (…) The fact that people have eucalyptus leaning against the houses, it should be mandatory to cut them all and plant there some broadleaf trees, rightly ordered. Because there are trees that are fire resilient. Cork oak trees are fire resilient. (…) Moreover, I believe that having guaranteed prices is also fundamental, and the support by the State or the community. That way we could have an interesting and ordered forest. This is, in terms of production."

Furthermore, many interviewees support creating incentives for active forest management. While some are skeptical about financial incentives from the State, preferring non-financial incentives like tax exemptions for sustainable practices, others, like Phil, suggest replacing penalties (e.g., for not clearing shrubland) with financial incentives for NIPF owners:

> "If you want active forestry, it must be with incentives. There is no other way because there is no income. It is utopic. The forest is not profitable. If it is not profitable, it needs to be incentivized."

Interviewees also highlight that an active sustainable forest management could be increased by promoting local development and attracting younger generations to forest-related activities. Interviewees such as Nicole allude to boosting forest-related investments, like ecotourism or trainings and awareness raising activities:

> "More trainings, especially for younger generations. Presenting projects that are done in other places and that are profitable. It is a way to make people invest in their forest land, to maintain their forest land, and get some earnings with it. I think that is something to invest in."

Finally, in Castanheira de Pera, power dynamics within forestry actors affect interviewees' preferences for forest management. Most interviewees perceive a loss of power over their land, with larger economic entities dictating land use and crop choices, particularly eucalyptus. This influence is evident in criticisms from interviewees like Donald, who argue that projects like Better Forest primarily benefit the pulp and paper industry:

> "No one asked anyone's opinion. It works like this: the guys from Biond remembered that they need the timber and went to get the money from the economic community (European communitarian funds), which is our 'father'. The day that that ends, we will all die here from hunger. And then they created this project (the project Better Forest) and presented it, already finalized."

Moreover, interviewees feel their preferences are overlooked if they conflict with the interests of large economic forces, particularly when obtaining necessary planting permissions and licenses, as expressed by Henry:

> "There are people here that plant eucalyptus like if they are planting walnut trees. All is authorized. There are others that not even an apple tree they can plant. And then everything is complicated. And we really get discouraged."

Lastly, while most interviewees see collective approaches or State incentives as solution to give power back to the smallholders, others like Joel believe that these can be unfair and only benefit a handful of people:

> "Having an association will make things go to the same people, again. Right now, the way corruption is, it will be for a handful of them to earn something."

Considering this local context, interviewees were also asked about future expectations regarding the forest land and forest management in the municipality.

5.2.4 Future Expectations

To learn about the future expectations that passive, or partially passive, NIPF owners have regarding their forest land and forest management practices in Castanheira de Pera, in the analysis I gathered the interviewees' hopes, concerns, or plans regarding the future of their forests.

Some interviewees are optimist about the greater environmental consciousness of younger generations, due to better education and better access to information. They believe that this shift could lead to new, innovative approaches to forest management that prioritize sustainability, as claimed by Nicole:

> "I think younger generations start having some environmental concerns that we did not have in the beginning. In our generation, we became worried later than them. In a way I'm optimist, because in that sense they care more and there is a bigger effort to conserve what exists."

At the same time, some interviewees express concerns about the younger generations not being interested in forest-related activities and not knowing where the forest plots that they might heir are located, as assumed by Anthony and Donald:

> "Some forest plots I have, my children never been there. They do not know where it is. If I die tomorrow… Now all is registered, but they do not even know where it is."

> "The forest is over. I mean, you do not see any youngster interested in working in the forest. Right now, the only ones working in the forest are middle-aged people, or someone that did not study and has some machinery."

In addition, interviewees like Nicole expressed concerns about rural depopulation and the insufficient structural and infrastructural support to attract younger people to rural and forestry-related activities and careers:

> "It worries me the desertification of these rural areas, because the old people are dying and the young ones that want to come and make a living here are less and less. That is going to be the biggest problem, the desertification. I think that, either there will be better conditions created, more attractive for the people to settle here, or if not, I do not know."

Simultaneously, other interviewees, like Anne, believe that soon enough people will need to return to rural areas due to the increasing cost of living in big cities:

> "But there is something I'm convinced, there is a lot of people returning to their place of origin, because serious problems are coming. I see many people already – nurses, doctors – fleeing to the rural areas. And that will happen. It will happen because it will be needed."

The power relations associated to the forest are also noticed in the interviewees' statements about their future expectations. Several interviewees such as John shared their concerns about the commercial interests of the large economic powers, particularly the pulp and paper industry, which might dominate local forestry practices and sideline local needs and sustainable practices:

> "In a few years, if there are half a dozen generations taking care of the forest, it is a lot. If there are no changes, if we do not try to organize the forest land in another way – there it is, the land consolidation issue –, it will be really difficult. Either that, or people will be obliged to give in the forest land to the pulp industry."

As it is clear, forest-making in the municipality of Castanheira de Pera has been influenced by diverse individual subjective experiences, and strong social relations around forest management. This has been true in the past, it is true in the present, and it also impacts the expectations that the interviewees have about the future. Moreover, forest-making has been crucial in influencing the meanings that passive, or partially passive, NIPF owners attribute to the forest land.

5.3 Forest Meanings

Using a pluralist approach allowed me to acknowledge the importance of the different layers of meanings and gain a deeper understanding of how varied aspects of place meanings interact and contribute to place attachment. In this sense, this study incorporates a wide range of place meanings put forward by Williams (2014), including inherent, instrumental, sociocultural, and identity-expressive meanings, as already discussed. Moreover, forest meanings are influenced by the interviewees' forest-making process and are distinguished by their subjective knowledge (including scientific and traditional knowledge), values and ideas about the forest, as well as their symbolic relationships with the forest.

In Castanheira de Pera, these have been assessed through direct inquiry to passive, or partially passive, NIPF owners. The forest-making process' influence on the forest meanings will be further explored in chapter 6. Thereafter, the place meanings attributed to the forest by the interviewees will be identified.

5.3.1 Inherent Meanings

To find the inherent meanings that interviewees assign to the forest in Castanheira de Pera, in the analysis I searched for expressions about the natural or intrinsic value that interviewees associate to the forest, such as appreciation for natural beauty, tranquility, or ecological significance. Almost half of the interviewees did not mention anything linked to the natural or intrinsic value of the forest.

Some interviewees associate forests as places of relaxation and tranquility, often tied to personal well-being, as said by Charles:

> "The forest is connected to quietness, to relaxation, to tranquility."

Moreover, interviewees like Colin think of forests as places to appreciate natural beauty and biodiversity of the landscape, connected to a sense of quality of life:

> "All that is oak trees is extremely important to have, not so much for the profitability, but for the natural beauty and the importance that native trees have in our landscape. There are no institutions that are truly dedicated and look to a centenary tree with affection. The trees and shrubs' diversity, the wildlife, that is a forest."

At the same time, Anthony refers to the forest in contrast with the city life, but also mentions that that is not found in the local landscape:

> "The forest creates a good environment. We leave the house and see the forest, which does not happen in the cities. In the city we only see streets and cars, nothing else. Not here, here we go out, we see the landscape, the forest. We even see things grow (…) Unfortunately it is only eucalyptus, there are no pine trees. Cork oak trees, no one plants here. Another trees, such as strawberry trees or others, are not planted either."

However, Nicole noted that biodiversity is returning to her forest plots where she uprooted eucalyptus, let native trees grow and planted strawberry and quince trees:

> "The forest is the biodiversity and wildlife, which we can verify it is back with much more strength than before."

While some interviewees do not think about the forest for its inherent meanings, the ones that do mostly reflect upon a landscape that is different from the local one.

5.3.2 Instrumental Meanings

To understand the instrumental meanings that interviewees assign to the forest in Castanheira de Pera, in the analysis I investigated the interviewees' knowledge about the forest utility and how is it used. This can be related to economic benefits from timber, land use for agriculture, carbon sequestration or other aspects.

The instrumental meanings were the most recurrent throughout the interviews, which depicts the role that the forest has been having in the local area for a long time and the utilitarian approach the interviewees have towards their forest land.

Even if there are different economic logics regarding the forest, as already discussed, there is a strong focus on profitability. Several interviewees such as John had difficulties in identifying forest's functions besides the economic benefits:

> "A person always thinks about the forest to get income from it, right? You are going to invest always to see if you can take something afterwards."

Although, even if other uses are identified, the profit is the priority for some interviewees, as claimed by Donald:

> "The first thing that comes to my mind is the profit it can give; it is the income. Also, the environmental and scenic part, which is also important. But the first one is the profit. If it was not for the profit, I would not have any forest land."

Considering this prioritization of profit over other aspects, some interviewees like Nicole reflect on the economic allure of eucalyptus, due to its rapid growth and high demand in the timber industry, which now dominates the landscape:

> "People here, and I realize because of my parents, to them the forest must bring income. And it must give money as fast as possible. That is why eucalyptus, eucalyptus, eucalyptus. Nowadays, there is nothing that beats eucalyptus. Because it is immediate, people do not have the patience that they had in the past."

In line with this, interviewees are also aware of the forest's weight on the Portuguese economy, as emphasized by Anthony:

> "The forest is a huge source of income. The forest is, in fact, an essential asset to the country and to the landowners."

Furthermore, some interviewees like Nicole and Colin believe that the ecological health of the forest it is not a concern for some NIPF owners in Castanheira de Pera, and forest abandonment is a natural step if it is not a profitable asset:

> "There are a lot of people that do not care at all about the forest. The people see the forest, mainly, to earn some money. People's concern after the 2017 wildfires was that they would not have wood for the next 5 years."

> "If the forest stops being profitable, the people start giving up. They will give up naturally."

At the same time, the forest is recognized for its ecological services, enhancing health and well-being. Many interviewees, including Phil, refer to the forest as a "lung" and a place free from air pollution, vital for providing clean air and oxygen, which they consider its most crucial roles:

> "We can never dissociate the forest from the 'ecological lung' issue. We need trees. Sometimes people forget that, but the forest is a lung. The ecological part is the most important and it is that what everyone must think. In the water and the landscape issues."

Lastly, some interviewees also acknowledge forest's recreational value, noting its potential to enhance well-being, connect people with nature, and boost tourism and economic growth. The interviewees such as Nicole refer, particularly, to the project 12 Months, 12 Hikes, promoted by the Municipal Chamber:

> "It is funny, because the hikes promote physical exercise, promote people to get to know their land and leave some trails for the people to start hiking more."

However, other interviewees, like Joel, question the forest's value for recreation, highlighting tensions between private property rights and public recreational use:

> "There is no reason to be hiking on certain private lands and not paying anything. The owners have the forest land and do not get anything. They should be given a compensation at least."

Clearly, in Castanheira de Pera there are diverse, overlapping and contested instrumental meanings assigned to the forest. Although, the one that stands out the most is the economic benefits that the forest land might bring to the interviewees.

5.3.3 Sociocultural Meanings

To know the existing sociocultural meanings that the interviewees assign to the forest in Castanheira de Pera, in the analysis I focused on mentions of community activities, traditions, cultural practices, or the role of the forest in identity.

Nevertheless, the interviewees did not share anything related to sociocultural meanings in the present. As discussed before, community activities and traditions connected to the forest were a reality in in the past, but not anymore.

5.3.4 Identity-expressive Meanings

To find out the identity-expressive meanings that interviewees assign to the forest in Castanheira de Pera, in the analysis I looked for personal stories, memories, or ways the forest reflects the individual identity or family history of the interviewees.

Most interviewees remember their childhood experiences in the forest, forming a strong identity connection with it. Some, like Colin, recall the forest as a place of freedom for playing and exploring nature:

> "There were these natural dynamics of the forest. Like climbing the pine trees, following the parents to the cultivation fields, swimming in the river. What is curious is that when people talk about this, they talk with nostalgy. Because there was that freedom."

Other interviewees such as Phil remember when the forest was more diverse in terms of tree species, portraying an historical connection to the landscape:

> "I look every day to that forest plot next to my house, that I bought, where the oak and cork oak trees look pretty. Which was how I saw it when I was a kid. Is a return to childhood, seeing all those oak trees around the village. Someone that is raised in a village like I was obviously keeps the linkage to what my grandfather and father passed on to me."

Several interviewees shared personal stories of when forestry and agricultural practices were part of their livelihoods, such as harvesting, planting, livestock grazing, and traditional communal work. Anne was one of these interviewees:

> "What is sure in my history is that I was 'born' in the land. All my life I worked in the land. And still today I miss sowing the land. The cultivation fields used to be full of people, each one in their plot. We chatted with each other. People were much more united than nowadays."

Thus, the role of family was extremely important to the interviewees, revealing the repository of family heritage that the forest represents, as stated by John:

> "I was raised within forestry, my father had the forest plots, I was obliged to go with him. I was the only boy there, my brother was younger, I went with my father a lot and that awaken the pleasure for the forest in me. And, from then on, I always followed him, planting eucalyptus, opening holes, all that. I was the only one that followed his footsteps."

Moreover, George manifests his identitarian connection to the forest land through his willingness to honor the family legacy he inherited, even if he is absent:

> "My connection is strong. I really like coming here, I'm rebuilding my grandparent's house. Lately, I have been coming here frequently. In the past, I would come rarely, but I really like being here. Getting rid of my inheritance does not go through my mind."

The unique, personal connections that the interviewees associate with the forest are profound and extremely relevant to understand why they are so fond of it, even if the obstacles to actively manage their forest land surpass their capacity to do it.

The identity-expressive meanings, together with the remaining forest meanings, give rise to different emotional connections that the interviewees feel towards the forest and characterize their attachment to it.

5.4 Forest Attachment

As elaborated in the theoretical framework, the emotional connections arising from forest meanings are what characterize the interviewees' attachment to the forest. Investigating these feelings can help comprehending the forestry behavior of the passive, or partially passive, NIPF owners in Castanheira de Pera. This will be further explored in chapter 6, while the feelings will be analyzed thereafter.

5.4.1 Emotional Connections

On one hand, to assess the feelings that the interviewees associate to the forest in Castanheira de Pera, in the analysis I looked for expressions of joy, pride, peace, or satisfaction related with the forest and its features. Though, only ten out of thirteen interviewees expressed this kind of emotional connections related to the forest.

Some interviewees, like the absentee landowner Charles or Nicole, who grew up in the city and moved to her family's place of origin, feel that their quality of life is enhanced by being close to the forest, which is also related to the sense of freedom, peace, therapeutic benefits and sensory experiences brought by nature:

> "It is basically freedom, tranquility, relaxation, calmness, contemplation too. And reflection. Let's say that these are the feelings I associate to the forest and the countryside."

> "The forest, essentially, brings me peace, that is why I came to live here (…) The forest is leaving home and seeing everything green. It is feeling the smell of the trees when the weather is fresher. It is walking around and seeing the animals. I like that a lot."

Interviewees such as Anne also feel a sense of pride and nostalgia for the rural lifestyle they had in the past, deeply tied to their identity values:

> "I love the cultivation field, not the cities. Still today, I'm sad I cannot go anymore, because I always loved it. Sometimes my former work colleagues said, 'It is in the field where you feel good!'. And it is. Even in winter I missed it. I love the forest and the cultivation field."

On the other hand, to investigate the feelings that the interviewees associate to the forest in Castanheira de Pera, in the analysis I also looked for expressions of concern, fear, sadness, or frustration related to the forest and its features.

The interviewees are frustrated with the perceived unfairness in how forest resources are managed and valued, particularly due to how economic activities

benefit few at the expense of many. This leads to distrust regarding new projects in the municipality, as emphasized by Henry:

> "Now I question myself what it has been done here, who is going to benefit, how and when. The project Better Forest was announced as something for everyone. I still do not even know how to apply to it and what is the forest clearing's priority. To me, the priority is having a lot of land. There are people here (referring to the local sawmill) which might have 100 ha or 200 ha up the hills, and those are prioritized, while the others keep waiting."

Moreover, most interviewees are extremely resentful and upset towards the perceived impunity of the local elites, that exert a disproportionate power in the municipality for their own benefit, as highlighted by Anne:

> "Those things he has been doing (referring to the local sawmill owner), he cannot do. Over there (referring to a forest plot), my son was cutting eucalyptus, brought some down here and left others in the ground. The sawmill owner took what was cut, what was standing, everything. My son went crazy because it was the wood we had for the winter. In the meantime, the sawmill owner gave us something (referring to a monetary compensation), but very little. People complain but nothing happens. The sawmill owner's son already told someone to take legal action, knowing people don't follow through. And the sawmill owner took hundreds and hundreds of meters of wood from people. He has been the trashiest person around here. The biggest thief that we could have."

Interviewees like Nicole are also discontent about the evident lack of support from governmental and local authorities, and how policies are implemented or enforced:

> "What upsets me the most is that, in the paper we have great legislation, and then there is no one to monitor and to guarantee its compliance. They turn a blind eye, someone jumps ahead. If there are vested interests or not, I'm not even going to get into that…"

Thus, interviewees feel resigned to their preferences and needs being disregarded in favor of big economic interests in decision-making processes that affect their forest land. This leads to an acceptance of the negative status quo, as noted by Phil:

> "People are used to be deceived… And they are always distrustful. Because this is all ours (referring to the forest land), but, in reality, it is not ours. It is all relative."

Moreover, all these negative feelings just described were exacerbated by the traumatic effects of the wildfires in 2017. Most interviewees express feelings of disillusionment with the institutional indifference or inefficiency in the recovery efforts post-disaster and the recurring cycle of mismanagement, as said by Donald:

> "The best thing it happened here it was the 2017 wildfires. Besides the people that died. There were projects, money, machinery, houses rebuilt that were not burned… Money wise, it was amazing. It is a shame we cannot say this in public, but it is the reality (…) And another thing that upsets me is to watch the savage plantations in here. Plantations with much more trees that

> it should have. People were concerned, and the forest is worse after the 2017 wildfires. After it burned, the forest owner could have had State incentives to replant, but that was hardly done."

In line with this, several interviewees such as Anthony or Anne also shared feelings of sadness and fear due to the spread and dominance of eucalyptus in the landscape, which is seen as a threat:

> "It is only eucalyptus; it is a pest of eucalyptus here in the region and all over Portugal. The eucalyptus, as everyone knows, when the fire comes it is very flammable."

> "You know, there is something about eucalyptus, it seems that it pulls the fire. Me, I have seen, from my own house, the flames jumping around between eucalyptus. To me, the eucalyptus might pay off in terms of income, but they are the worst thing that ever appeared."

Furthermore, some interviewees, like Charles, demonstrate feelings of loss and pain associated with the destruction of the forest, especially when it involves personal memories and the loss of human lives:

> "It hurts me when the forest is destroyed. When it is under attack, like it happened in 2017, which affected directly that place with the loss of human lives, people that I knew… It brings me pain when it is attacked, either in a natural or criminal way."

Interviewees such as John shared intense emotional responses to the 2017 wildfires, including trauma and the physical sensation of being overwhelmed by the disaster:

> "I'm the only one who knows what I went through. There was a moment it felt that my arms were shrinking. It felt that my hand was next to my shoulder. So warm… The oxygen decreased a lot, it became almost dark, and people were not aware if it was already burning here. Coming back home was frightening, but fortunately nothing happened. After the 2017 wildfires, I would look at the landscape and cry alone watching it. I was really shattered. It was after the wildfire that I faltered a bit. The fire came, everything burnt. I gave up, I really had to give up."

Finally, the repeated fire damage and its impact on natural resources leads to a sense of helplessness and a loss of agency and hope among the interviewees, highlighting a demotivating environment for active management, as stated by Phil:

> "The memories I have are all negative, unfortunately. We have been buffeted by wildfires. When things are oriented, it burns again. It is cyclical. It has burned several times. In fact, it has no meaning in economic terms, the selling or exploitation of the forest land. There is a feeling of frustration (…) I'm a person who looks at that, aware of my inability, my helplessness, in relation to what I wished I could do but not having the means to."

As it is evident, emotional connections such as joy, pride, peace, or satisfaction are overwhelmed by feelings of concern, fear, sadness, or frustration that the interviewees have towards the forest in Castanheira de Pera.

6. Discussion of results

This chapter serves to interpret and discuss the findings of the study in relation to the research questions and theoretical framework. As already mentioned, the primary purpose of this research was to investigate the place meanings that foster place attachment among NIPF owners in Castanheira de Pera, a fire-prone area in Central Portugal. Through identifying and analyzing the meanings that NIPF owners assign to their forest lands, this exploratory study aimed at understanding how these meanings are influenced by place-making and have evolved over time (1st research question), and how the emotional connections arising from place meanings characterize place attachment (2nd research question). Ultimately, this study strived for learning how the forest's place attachment of passive, or partially passive, NIPF owners impacts their forestry behavior (3rd research question). By comprehending these factors, this research could offer insights into the relationship between NIPF owners' attachment to their forest land and their forestry behaviors, which can further help in developing future strategies that align with local values and promote an active sustainable management and wildfire risk reduction.

The chapter is structured into several sections to systematically address and discuss the research questions. Moreover, the last section outlines the limitations of the study and suggests directions for future research.

6.1 Forest meanings and its evolution over time

The results of this study indicate that forest meanings by passive, or partially passive, NIPF owners in Castanheira de Pera are significantly influenced by historical, social, economic, and political contexts, reflecting the complex process of forest-making. This subjectivity of place meanings, affected by different factors, confirms that "place meanings are never simple or unitary – they are diverse, overlapping, and often contested", as suggested by Ingalls et al. (2019:625). Moreover, the evolution of forest management practices, shifts in economic priorities, and the impact of wildfires have all played critical roles in shaping these meanings. This reinforces the idea of place attachment's ability to change as people's interactions with the place evolve, as something not static but dynamic, as defended by Masterson et al. (2017).

Historically, the interviewees recall the time when the forest's landscape was predominantly maritime pine plantations, which were integral to the local agrarian livelihoods. The transition to eucalyptus plantations began in the mid-20th century, driven by economic incentives and market demands. This shift was influenced by the declining profitability of traditional forestry products like resin from maritime pine and the increased demand for eucalyptus in the pulp and paper industry. Consequently, the forest's meanings began to evolve, with a stronger emphasis on its instrumental value for timber production. The forest was increasingly seen as an economic asset, as recalled by several interviewees, valued for its ability to generate quick returns on investment through the rapid growth cycles of eucalyptus.

As repeated by the interviewees, while the dominance of eucalyptus plantations grew, the inherent and identity-expressive meanings of the forest began to diminish. The landscape's natural beauty and biodiversity were overshadowed by the economic allure of eucalyptus, and the forest's role in community identity and traditional practices declined. These findings support the view of place as relational, networked, and fluid rather than merely a fixed, localized entity, which aligns with contemporary theories that emphasize the interconnectedness of places and the influences of broader socioeconomic networks on local environments (Williams, 2018). Additionally, as the economic pressures and the commodification of the forest intensified, the recurrent impact of wildfires exacerbated these changes. The 2017 wildfires, particularly, were a turning point, leading to significant ecological and emotional losses, as referred by various interviewees. These events highlighted the vulnerabilities of the forest monocultures and their ecological impacts, including soil degradation and reduced water availability. As a result, negative emotions such as frustration, fear, and helplessness became more prominent, influencing the meanings assigned to the forest.

The sociocultural context of Castanheira de Pera also played a critical role in the evolution of forest meanings. As suggested by several interviewees, the process of deagrarianisation, characterized by rural depopulation and the decline of traditional agrarian lifestyles, further altered the sociocultural and identity-expressive meanings of the forest. As younger generations moved to urban areas in search of better economic opportunities, the communal practices and traditions associated with the forest diminished. The forest, once a space for communal labor and social interaction, became increasingly individualized and economically driven. The forest's sociocultural and identity-expressive meanings, while still present among the older generations rooted in personal and communal histories, weakened over time. This generational shift is reflected in the interviewees' narratives, where a sense of loss, nostalgia and concerns about the future coexist. The forest's role in personal and communal identity has been compromised by the economic imperatives and the practical challenges of managing fragmented and fire-prone forest land.

The political and economic forces have had a profound impact on the forest-making process and the evolution of forest meanings in Castanheira de Pera. The dominance of the large economic forces, as well as the bureaucratic challenges in accessing support for sustainable forest management, have shaped the current landscape, as mentioned by several interviewees. These power dynamics have influenced the instrumental meanings of the forest, reinforcing a commodified view of natural resources. This economic dominance is further complicated by power asymmetries, where local elites and the pulp and paper industry exert disproportionate influence over forest management decisions, often marginalizing smaller forest owners, as recalled by various interviewees. This aligns with Masterson et al. (2017), who defends that power subtly manifests itself by shaping the people's experience, which are not entirely freely chosen but affected by the prevailing power structures. Moreover, this study's results are also in line with Ingalls et al. (2019) research, which found that place meanings are deeply contested and shaped by uneven power dynamics, and that dominant place claims often marginalize others in the place-making process.

Moreover, the political context in Castanheira de Pera also shaped forest meanings, mainly due to the perceived State inefficiencies and inequities in resource management, and the lack of effective support for small forest owners, as stated by diverse interviewees. These power dynamics and sense of lack of control over the forest land have led to feelings of frustration and disempowerment among many passive or partially passive NIPF owners, which illustrate how power relations can hinder active place-making and forestry practices. In turn, less experiences in the forest might lead to diminishing or dissolving place attachment, as claimed by Stedman (2003).

Thus, the evolution of forest meanings over time reflects a complex interplay of historical, social, economic, and political factors. In Castanheira de Pera, forest meanings have evolved from being multifaceted and community-oriented to being predominantly economic and individualized. This evolution reflects broader socioeconomic changes, including a process of deagrarianisation, and the increasing commodification of natural resources promoted by power structures. Additionally, the persistent impact of wildfires has further exacerbated these changes throughout time. These changes in forestry practices and the increase, in number and size, of wildfires in Castanheira de Pera reinforced the already existing strong emotional connections derived from power asymmetries and distrust of institutions. This originated the current discouragement of people and the progressive abandonment of the forest.

6.2 Emotional connections in forest attachment

The emotional connections that NIPF owners have with their forest land are deeply intertwined with the meanings they assign to it. These emotional connections, whether stemming from personal joy and nostalgia or frustration and fear, play a crucial role in shaping behaviors toward the forest and reflect the complexity of place attachment in a fire-prone and economically marginalized context.

Feelings such as pride, joy, and peace are primarily associated with personal and familial histories connected to the forest. For many interviewees, the forest is a source of personal identity and heritage, evoking memories of childhood, family labor, and communal activities. These emotional connections are often linked to the inherent and identity-expressive meanings of the forest, emphasizing its role in personal well-being and cultural continuity.

Feelings like frustration, fear, and sadness dominate the interviewees' narratives. These emotional connections are largely driven by the economic challenges, power asymmetries, the increasing spread of eucalypti and the recurrent impact of wildfires, as emphasized by the interviewees. The resentment with perceived inequities in resource management, the dominance of large economic actors, and the bureaucratic challenges in accessing support for forest management contribute to a pervasive sense of frustration and disempowerment. The fear and sadness associated with the continuous rise of eucalyptus plantations and wildfires, and the consequent loss of forest resources and personal safety, further exacerbate these feelings. Thus, several interviewees referred to the 2017 wildfires as the tipping point for their helplessness and discouragement to actively manage the forest.

The emotional connections arising from these challenges have shaped a conflicted and often disempowered attachment to the forest. Despite this, there are still traces of joy and peace towards the forest, and a desire for sustainable and community-based forest management practices. Thus, while traditional theories of place attachment often emphasize positive emotional connections and beneficial outcomes for sustainability (Fornara et al., 2021), this study highlights that place attachment is a more complex construct that includes a wide spectrum of feelings. Moreover, this study’s findings contribute to literature on place attachment in the context of natural environmental risks and hazards. Scannell (2021) identified that individuals with strong place attachment are less likely to evacuate or relocate during environmental threats. In the specific case of NIPF owners in Castanheira de Pera, their forestry practices are driven by deep-rooted emotional connections, which align with Scannell's (2021) observations on the reluctance to abandon cherished places despite evident risks. Furthermore, the study highlights the complexity of these emotional connections, showing how they coexist with socioeconomic factors and power dynamics, thereby enriching the understanding of place attachment's role in shaping responses to environmental hazards. This nuanced perspective adds depth to Scannell's (2021) findings by illustrating how

emotional connections can both hinder and potentially facilitate adaptive management practices in fire-prone regions.

6.3 Place attachment influence over NIPF owners' forestry behavior

The interplay of diverse and strong emotional connections of passive, or partially passive, NIPF owners to their forest land significantly impacts their forestry behavior. This finding not only tackles the research problem that has been investigated throughout this study, but also addresses the research gap of studying how the emotional connections arising from place meanings, which characterize place attachment, affect the forestry behavior of passive, or partially passive, NIPF owners, particularly in fire-prone areas. Moreover, this finding also validates the literature mentioned in section 2.6, which underscores the substantial role that place attachment plays in shaping forest management behaviors. However, the unique challenges that NIPF owners face in Castanheira de Pera, particularly the recurrent wildfires and socioeconomic difficulties, highlight the need for place-specific strategies that acknowledge and address these emotional and practical constraints.

The prevalent emotional connections, such as frustration, distrust or helplessness, and the challenging socioeconomic context led many interviewees to adopt a passive approach to forest management. The lack of financial viability, physical constraints, and institutional support, combined with the trauma and demotivation caused by recurrent wildfires, discourage active engagement with forest management. The perceived powerlessness in the face of larger economic forces and regulatory complexities further entrenches this passive behavior. For many interviewees, the forest is seen as a burden rather than a viable economic asset, leading to abandonment or minimal intervention.

At the same time, some interviewees exhibit a partially passive approach to forestry. Some of them engaged in limited management activities based on immediate economic incentives or personal preferences for native tree species, aiming to support and improve human and environmental well-being. What is common in some of these interviewees is that, despite being personally affected by the wildfires, their forest attachment has been strengthening through accumulation of experiences in the forest. Other interviewees may also clear shrubland or plant economically valuable species like eucalyptus in a few forest plots, but they do not engage in comprehensive or long-term forest management practices. The partially passive approach reflects a pragmatic response to the constraints the interviewees face, balancing limited resources with the need to maintain some level of forest productivity.

This shows a dichotomy in response strategies to similar experiences, considering that while most interviewees indicate a forest management's abandonment approach due to overwhelming negative experiences, others still engage in limited forestry actions despite their frustrations. This supports that, at least when specific conditions are met, attachment to the forest can lead to adaptive responses in face of environmental transformations, such as tragic wildfires (Folke et al., 2016; Fresque-Baxter & Armitage, 2012).

Despite the dominant passive or partially passive behaviors, there is potential for more active sustainable forest management driven by place attachment and community-based approaches. Some interviewees express a desire for sustainable and communal forest management practices, emphasizing the need for collective efforts and supportive policies. This emphasis on local knowledge and values in forest management aligns with the principles of social-ecological resilience (Folke et al., 2016). Initiatives that align with local values and address socioeconomic and institutional barriers, such as land consolidation and cooperative management, could enhance the financial viability and efficiency of forestry and ensure equitable access to resources. Public mechanisms for common land management in Castanheira de Pera could be helpful but they do not exist in the municipality, as referred in chapter 4. Moreover, the NIPF owners do not have the means, resources or emotional strength to do it independently, in the face of power asymmetries and wildfires' impact in the municipality. In this sense, addressing the power dynamics that influence forest management is essential for promoting equity and sustainability. Policies should aim to reduce the disproportionate influence of larger economic entities and empower smallholders. In addition, engaging younger generations and highlighting the long-term benefits of diverse and resilient forest landscapes, through education and awareness, can foster a more proactive approach to sustainable forest management.

These changes could empower NIPF owners and lead to strengthening forest's place attachment of passive, or partially passive, NIPF owners since they would accumulate experiences in the forest, which can create a stronger attachment, as defended by Stedman (2003). Moreover, Dang and Weiss (2021:8), in their systematic literature review of the relationship between place attachment and behavioral intention, highlight that "Strengthening place attachment can strengthen attitudes and intentions toward pro-environmental behaviors, moral norms, and awareness of consequences", as long as pro-environmental efforts are not seen as threats to local identity (Devine-Wright & Howes, 2010) or to the activities, goals, and well-being of people (Junot et al., 2018). This also aligns with Kil et al. (2014) study's conclusions, where, by examining the relationship between place meanings and the intention to participate in planning processes, the authors found a significant positive effect of place meanings on participatory planning intentions, indicating that individuals with stronger place attachments are more likely to engage in

planning processes, and highlighted the importance of incorporating place meanings in resource management to foster community involvement. Thus, changes driven by place attachment and community-based approaches could foster a shift towards more active sustainable forest management in Castanheira de Pera.

6.4 Limitations and further research

While this study provides valuable insights into the relation between place attachment and forestry behaviors of NIPF owners in Castanheira de Pera, several limitations need to be acknowledged. Recognizing these limitations is essential for understanding the scope and applicability of the findings.

One significant limitation is the relatively small number of interviewees. While the insights gained from the thirteen participants are rich and provide a deep understanding of the research questions, the sample size limits the generalizability of the findings. A larger sample size could offer a more comprehensive view of the diverse experiences and perspectives of NIPF owners in Castanheira de Pera. Future research should aim to include a larger and more diverse group of participants to ensure a more representative understanding of the population.

In addition, the study also faced a gender imbalance among the interviewees, with male participants predominating. This gender disparity confirms that forestry is a male-dominated sector (ILO et al., 2022) and it might influence the findings, as men and women may have different experiences, perspectives and roles in forest management. The overrepresentation of male interviewees might skew the data towards male-centric views, potentially overlooking critical insights that female NIPF owners could provide. Future research should be more balanced as for gender representation, to capture a wider range of experiences and to understand better how gender dynamics influence place attachment and forestry behaviors.

Furthermore, the study relied primarily on semi-structured interviews, a questionnaire, analysis of grey literature and spatial mapping. While these methods provided valuable qualitative data, incorporating additional methods like focus group discussions could enhance the analysis. These can facilitate a more interactive and collective exploration of the forest's place-making process, place meanings and emotional connections, revealing dynamics and shared experiences that individual interviews might miss. Future studies should integrate this method, or others, to provide a more holistic understanding of the research questions.

By addressing these limitations and incorporating these suggestions, future research can build on the findings of this study, offering more robust and comprehensive insights into the place attachment and forestry behaviors of NIPF owners in Castanheira de Pera, as well as similar contexts. This will contribute to developing more effective strategies for active sustainable forest management and wildfire risk reduction that align with local values and needs.

7. Conclusions

This research aimed to explore the process of forest's place attachment among NIPF owners in Castanheira de Pera, a fire-prone area in Central Portugal, and how this influences their forestry behavior. The study was driven by three research questions: how the meanings assigned to forest lands by NIPF owners are influenced by place-making and have evolved over time; how the emotional connections arising from place meanings characterize place attachment; and how the forest's place attachment of passive, or partially passive, NIPF owners impacts their forestry behavior.

Through the findings, it is possible to understand why the place meanings assigned to the forest are so influential to forest management in the municipality of Castanheira de Pera, as well as to identify the power structures that underpin them, which was one of the research gaps that I have tried to approach with this study. The forest meanings evolved from multifaceted and community-oriented to predominantly economic and individualized, reflecting broader socioeconomic changes, including a process of deagrarianisation, and the commodification of natural resources. Moreover, the NIPF owners' emotional connections to the forest land are linked to personal and familial histories, emphasizing the forest's role in personal well-being and identity, but are also driven by economic challenges, power asymmetries, the increasing spread of eucalyptus, and the impact of wildfires, leading to a pervasive sense of frustration and disempowerment. Despite this, there remains a desire among some NIPF owners for sustainable and community-based forest management practices. Eventually, the prevalent emotional connections and challenging socioeconomic context lead many NIPF owners to adopt a so called "passive" approach to forest management. Thus, the lack of financial viability and institutional support, coupled with the NIPF owners' sense of disempowerment and trauma from wildfires, discourage an active forest management. Although, there is potential for more active sustainable forest management driven by place attachment and community-based approaches.

Therefore, this study provides valuable insights into the complex interplay of place meanings, emotional connections, and forestry behaviors among NIPF owners in Castanheira de Pera. By highlighting the importance of emotional factors in natural resource management, coupled with historical and socioeconomic features of the place, the findings contribute to a deeper understanding of how place

attachment, influenced by the place-making process and by place meanings, can be a useful framework to investigate the so called "passive" forestry behavior of certain NIPF owners. This "passivity" is not equivalent to indifference or disinterest towards the forest, but it is a reaction to the emotional and socioeconomic obstacles of managing the forest in the context of Castanheira de Pera, as demonstrated in the findings. In this sense, the findings also highlight the need for integrated rural development strategies that consider both the socioeconomic and emotional dimensions of forest management, especially in areas affected by environmental disasters such as wildfires. For this, applying the process of place attachment developed in the present study, where the socio-political context and the distribution of power within natural resources management are considered, can also be an important tool to design strategies that account for the multiple place meanings and emotional connections among NIPF owners.

In the Portuguese context, sustainable rural development should tackle the process of deagrarianisation by creating opportunities and enhancing the quality of life in rural areas, as well as empower local communities and improve forest management practices by promoting community-based forestry and cooperative approaches. In this sense, addressing power dynamics and providing equitable access to resources can reduce the disproportionate influence of larger economic entities. Therefore, there is a need for more State involvement to ensure forest's resistance and resilience to environmental phenomenon, and fair regulation of market activities. Furthermore, similar challenges of processes of deagrarianisation and commodification of natural resources are faced globally, particularly in regions with significant rural populations and traditional agrarian lifestyles. Additionally, power dynamics and equitable resource access are critical issues in many countries. In this sense, the process of place attachment of the present study can be useful to enhance sustainable forest management in diverse rural contexts.

Rural development strategies should only be considered successful if it is understood that rural areas are highly heterogeneous and if the agrarian context is analyzed at a micro and macro-scales – influenced by local and global politics and economics, geography, social and power relations, property rights and other context-specific characteristics influencing access to and use of natural resources.

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Popular science summary

This master thesis explores why some private forest owners in Castanheira de Pera, a small town in Central Portugal that often experiences wildfires, manage their forests passively or partially passively. Passive forest management means that the owners do little to actively maintain, harvest, or improve their forest lands. The study seeks to understand not only the economic reasons behind this behavior but also the emotional connections that these owners have with their land.

By conducting interviews with the forest owners and analyzing various types of data, the research reveals that the reasons for passive management are complex and multifaceted. Economic factors are significant. High costs of maintaining forests and low prices for selling timber make active management financially unviable for many owners. However, there is more to the story than just economics. Many forest owners have strong emotional connections to their land. They see their forests as part of their family heritage, with personal and familial histories deeply intertwined with these lands.

These emotional connections are also influenced by other challenges, such as economic difficulties, power imbalances within the community, the increasing spread of eucalyptus trees, and the severe impact of wildfires. Together, these factors create a pervasive sense of frustration and disempowerment among the forest owners, making active forest management even more challenging.

The study uses a theory called "place attachment" to explain how these emotional ties to the land shape the owners' actions and decisions. Place attachment refers to the emotional connections people form with specific places, which can strongly influence their behavior. The findings suggest that to improve forest management, policies need to take these emotional aspects into account, not just the economic ones. Recognizing and supporting the strong feelings people have towards their forests can lead to better and more sustainable management practices.

By integrating these emotional and economic perspectives, the study offers valuable insights for policymakers, local authorities, and other stakeholders. It highlights the need for community-centered policies that acknowledge the unique socio-emotional landscape of Castanheira de Pera. These insights can help develop strategies that not only protect the forests and support rural communities but also mitigate the effects of climate change by fostering sustainable forest management.

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Embarking on this research journey has been one of the most rewarding experiences of my academic career. It has allowed me to delve deeply into the complex and meaningful connections between people and their environment, and I have grown both personally and professionally through this process. This thesis represents not only the culmination of my studies but also a reflection of the many individuals who have supported me along the way.

I would like to extend my deepest gratitude to my supervisor, Marien González-Hidalgo, for her unwavering support, insightful guidance, and constant encouragement throughout this journey. Her expertise and dedication have been instrumental in shaping this thesis, and her constructive feedback has greatly enriched my research. I am immensely thankful for the opportunity to learn under her mentorship.

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Finally, I wish to thank the research participants in Castanheira de Pera, who generously shared their time, experiences, and insights. Their stories and perspectives are at the heart of this research, and I am truly appreciative of their openness and trust. This thesis is a testament to their lived experiences, and I hope it contributes in some small way to the understanding and support of their communities.

Appendix 1 - Maps and charts

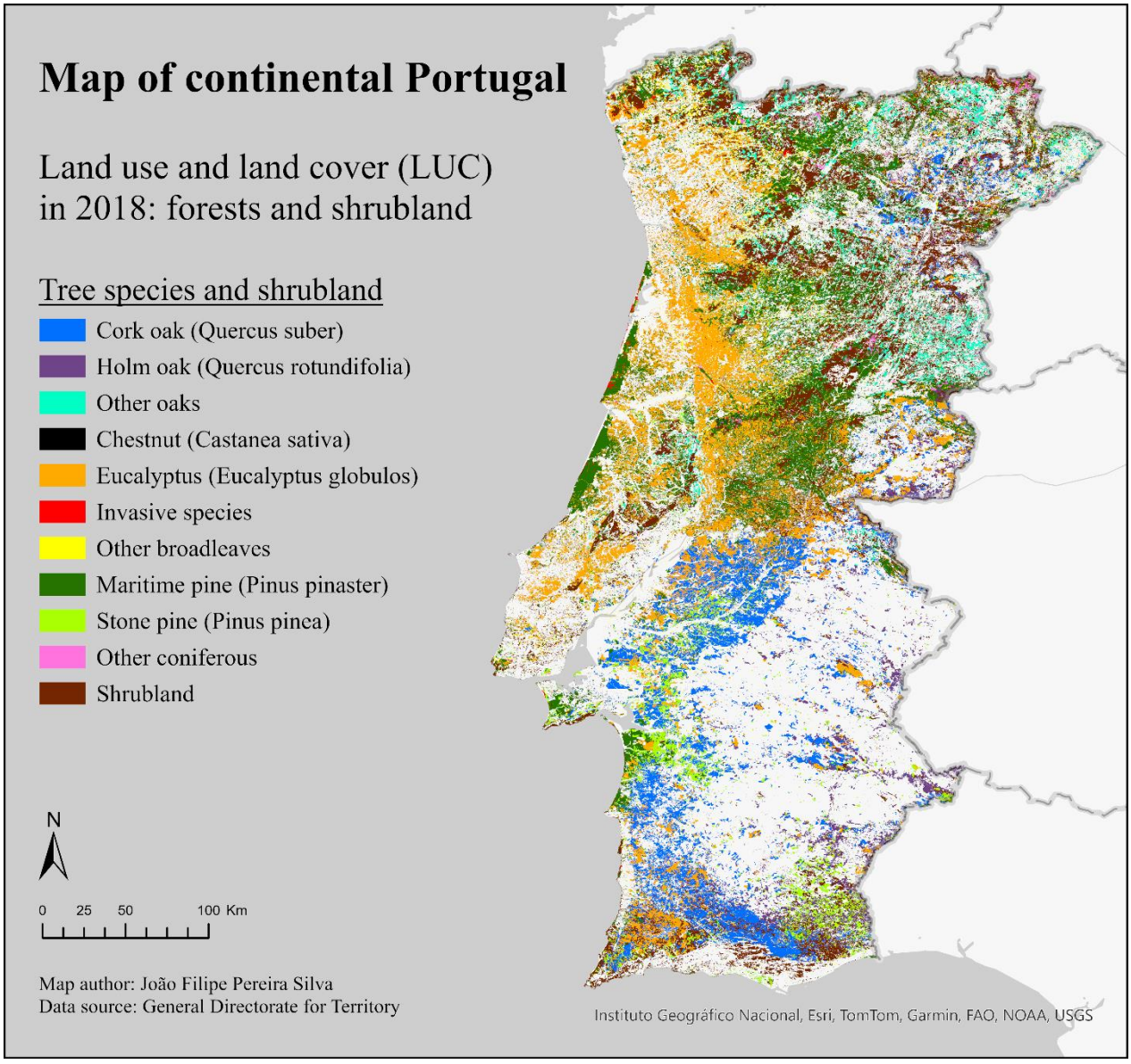

Figure A: Map of the Forest and Shrubland categories, part of the Land Use and Land Cover (LUC) data in 2018, in continental Portugal.

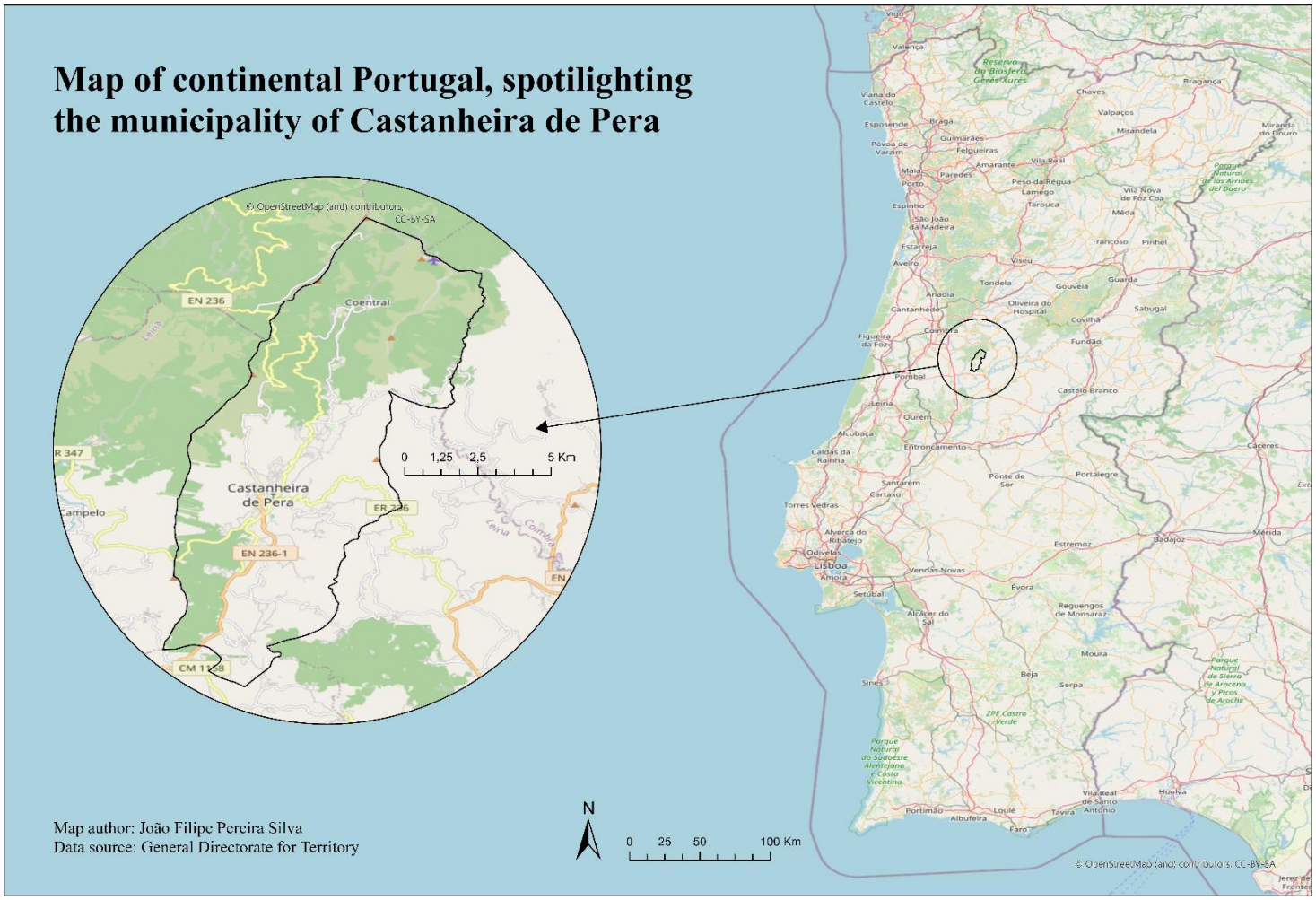

Figure B: Map of the study area.

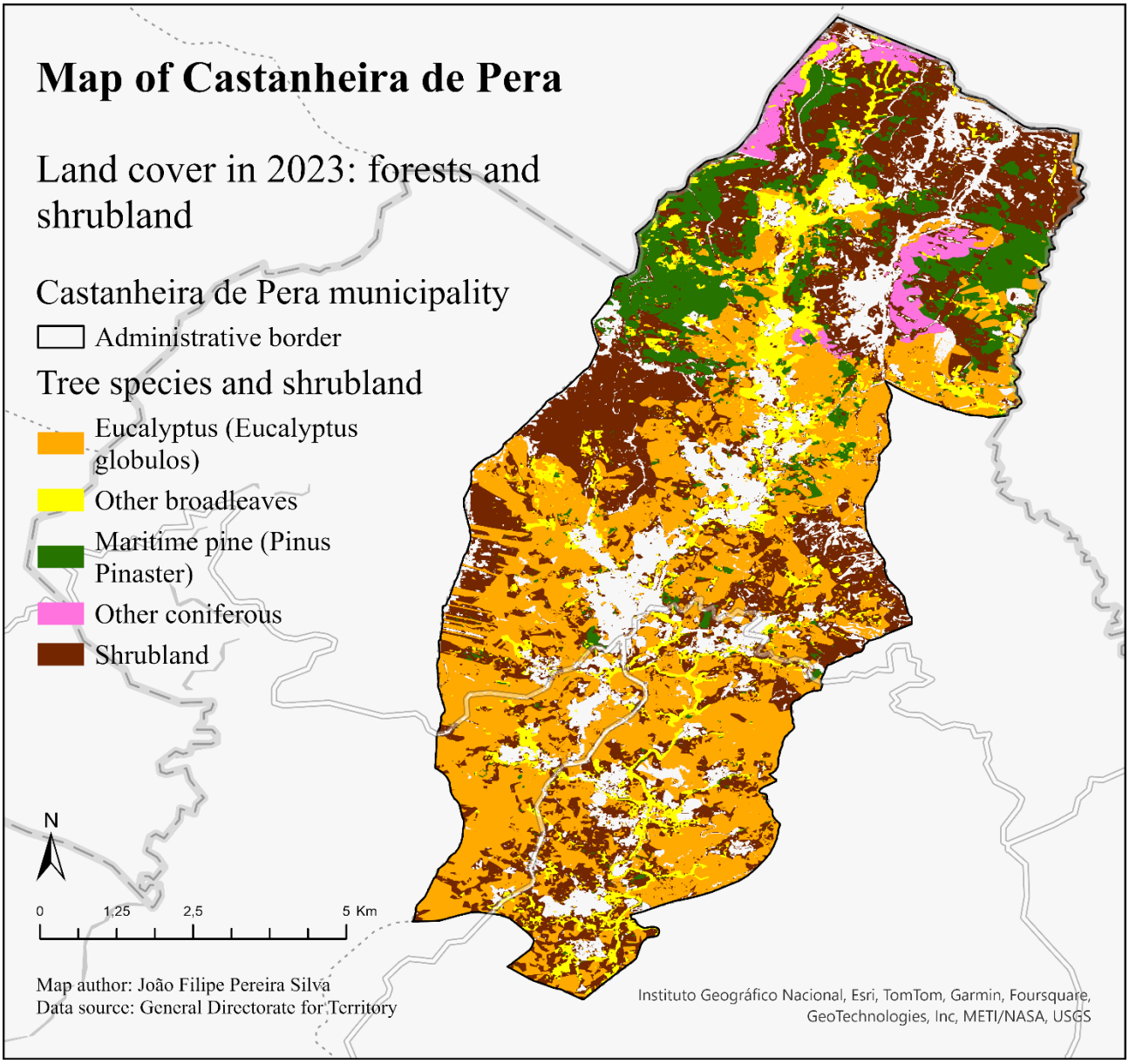

Figure C: Map of the Forest and Shrubland categories, part of the land cover data in 2023, in Castanheira de Pera.

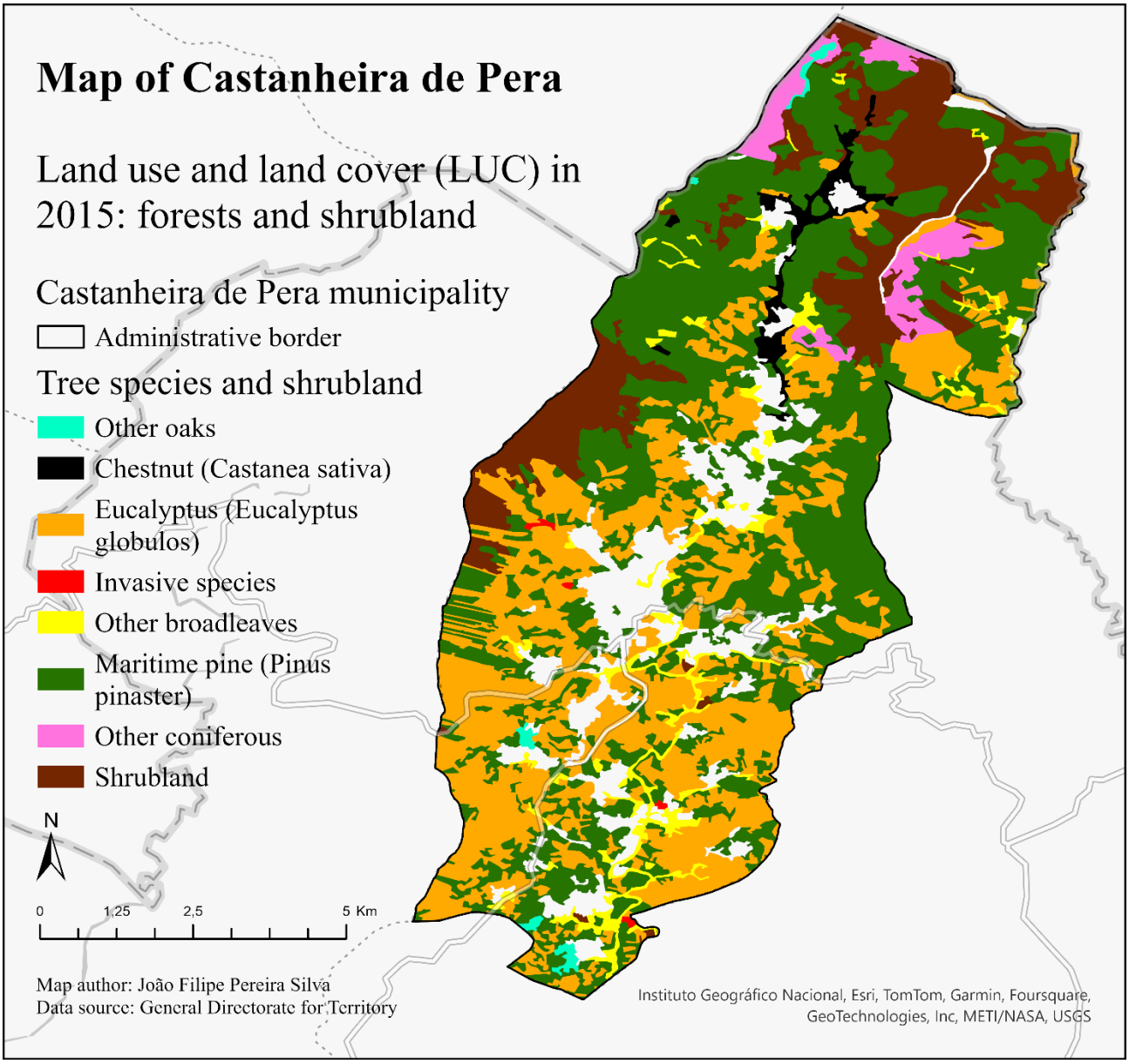

Figure D: Map of the Forest and Shrubland categories, part of the Land Use and Land Cover (LUC) data in 2015, in Castanheira de Pera

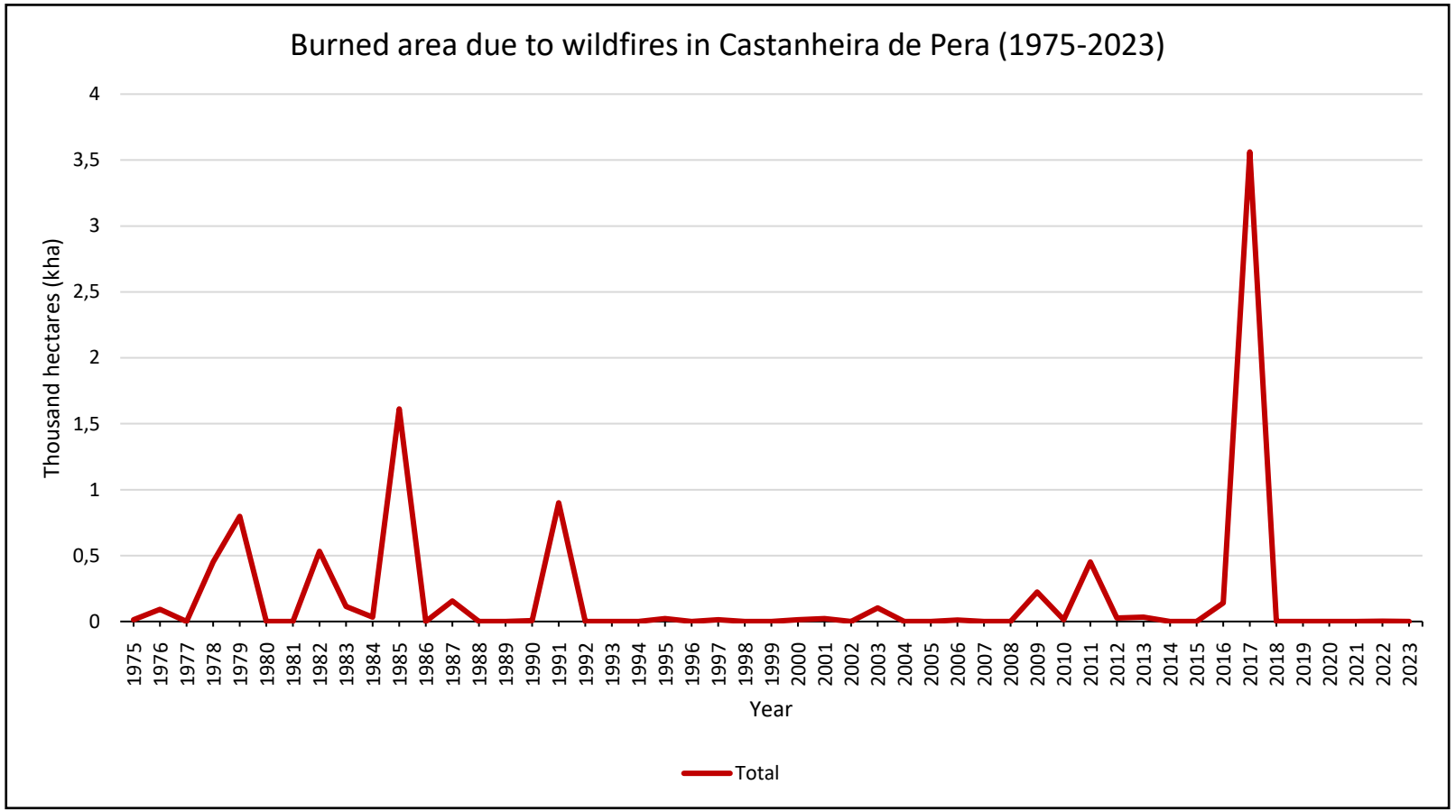

Figure E: Burned area, in thousand hectares (kha), due to wildfires in Castanheira de Pera from 1975 until 2023.

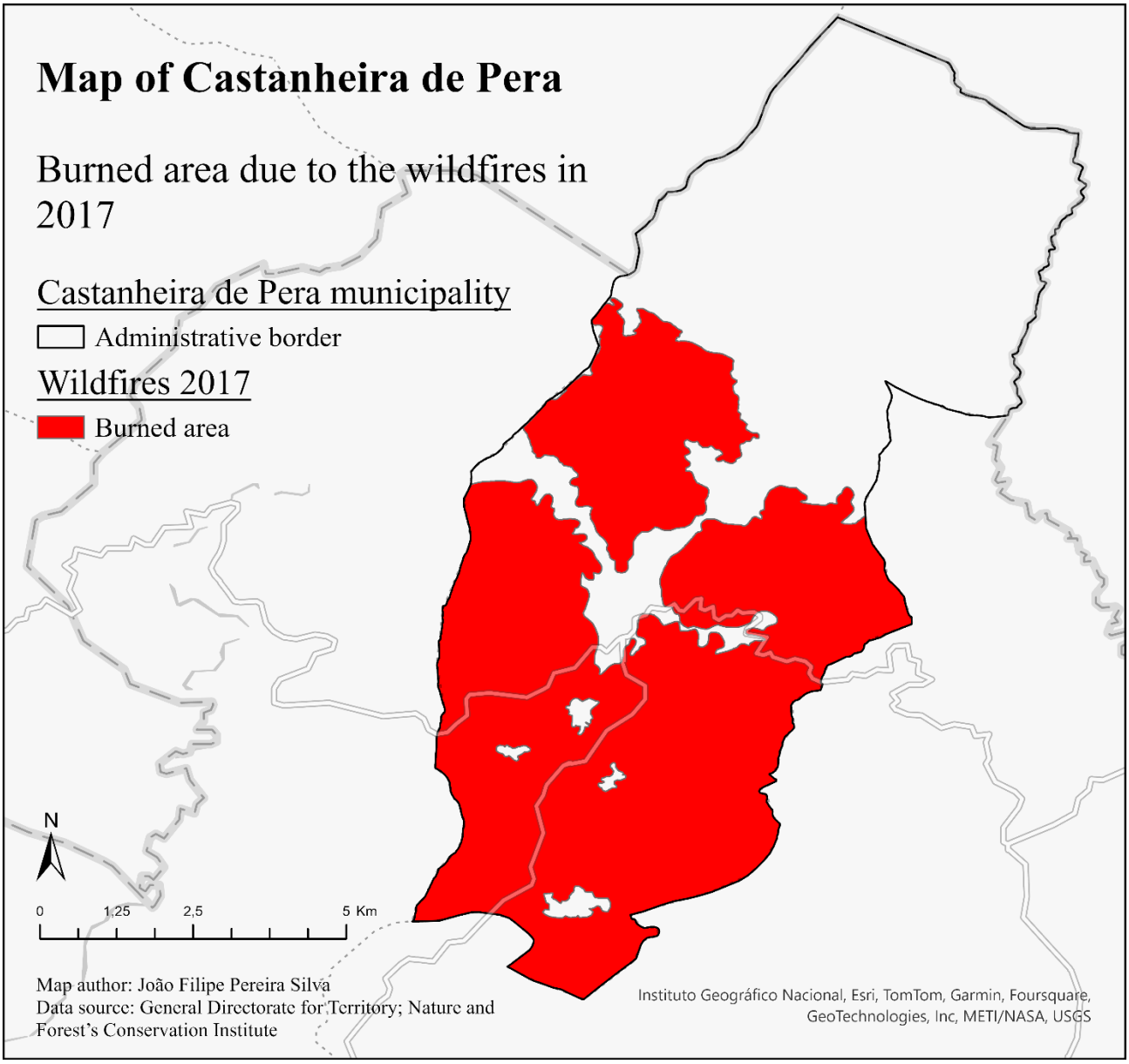

Figure F: Map of the burned area in Castanheira de Pera due to the 2017 wildfires.

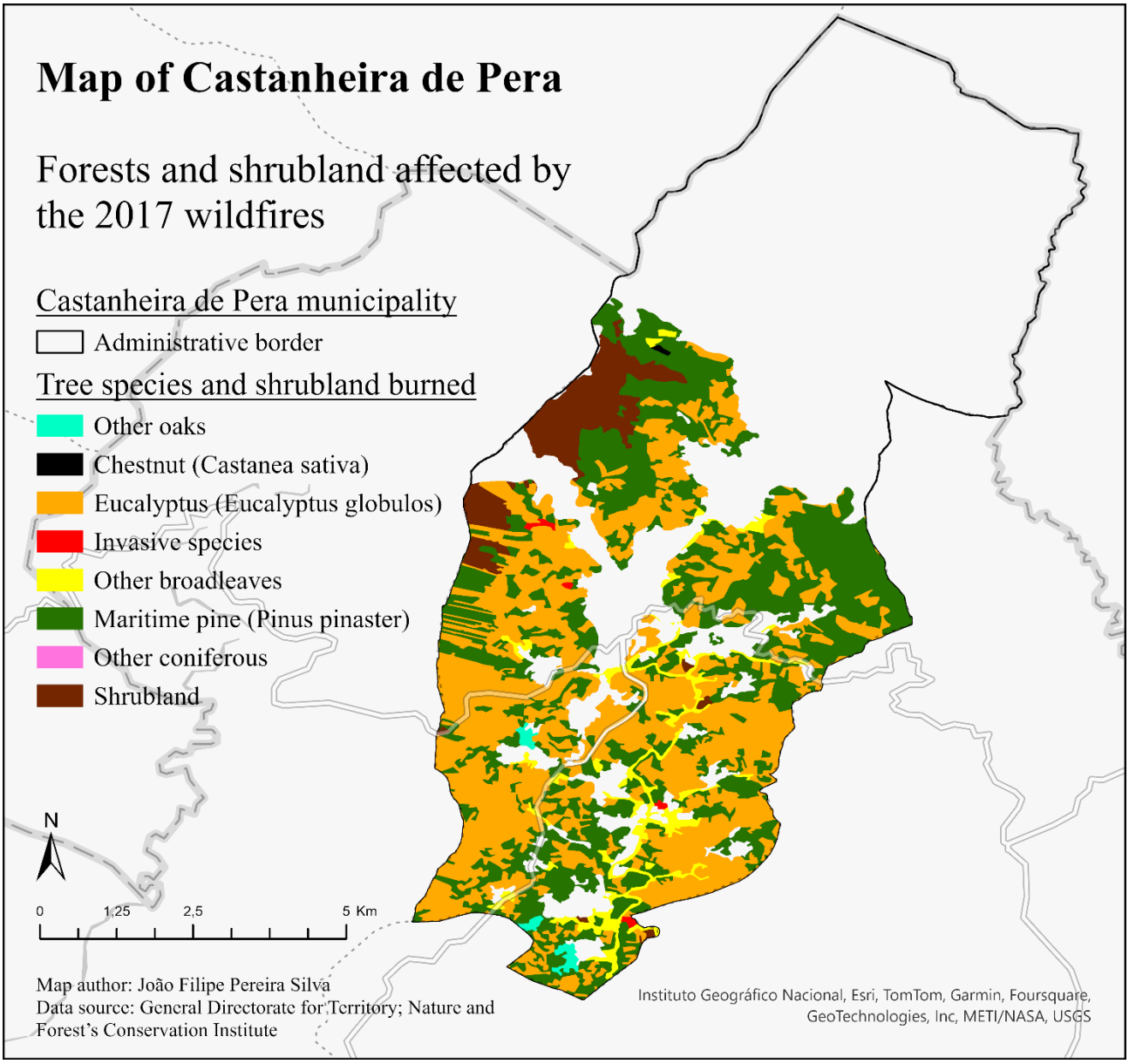

Figure G: Map of the intersection between the spatial distribution of the 2017 wildfires and the Forests and Shrubland categories, part of the Land Use and Land Cover (LUC) data in 2015, in Castanheira de Pera in.

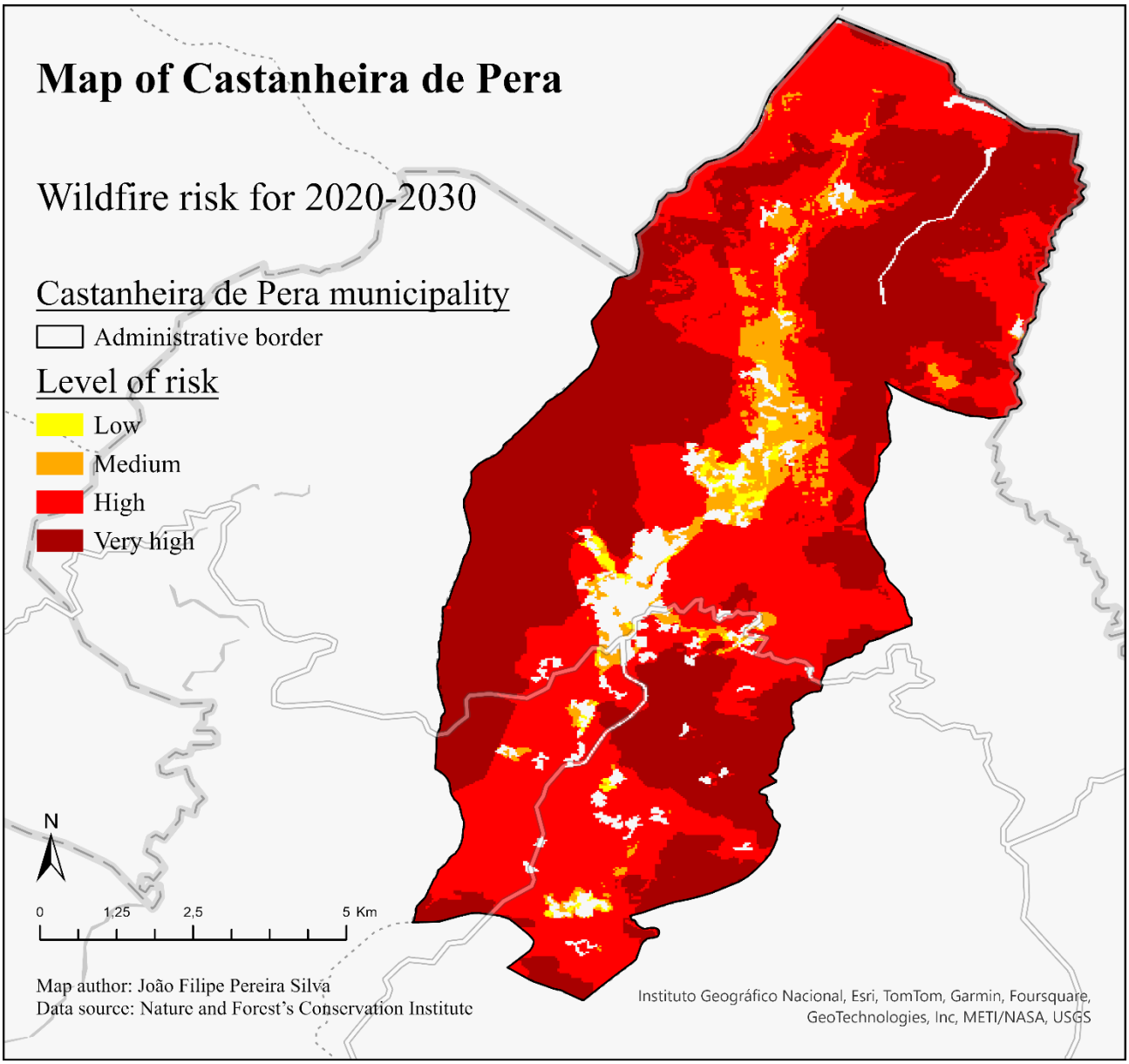

Figure H: Map of the wildfire risk for 2020-2030, by level of risk, in Castanheira de Pera.

Appendix 2 - Images and tables

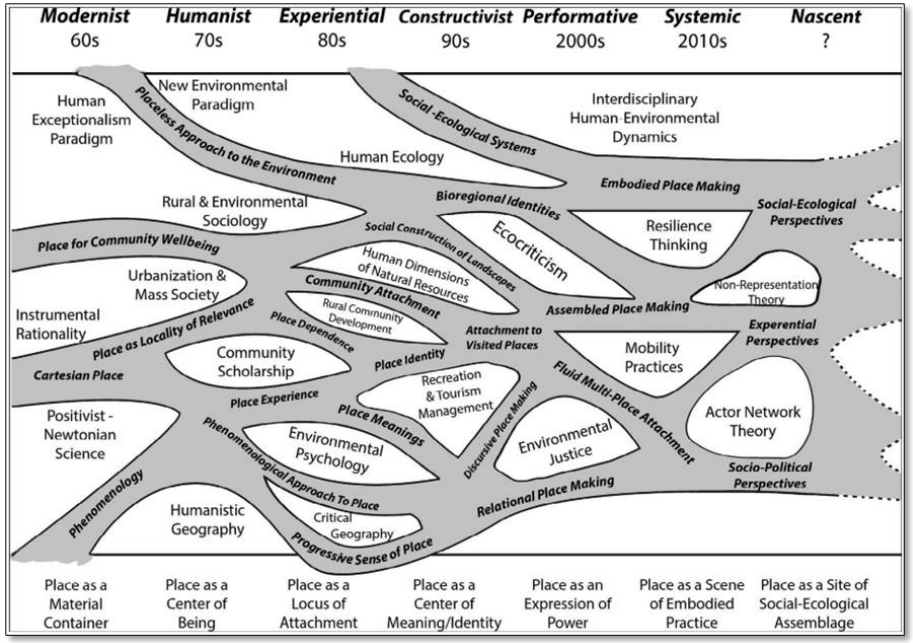

Figure AA: Metatheoretical approaches shaping place-based research (Williams & Miller, 2021).

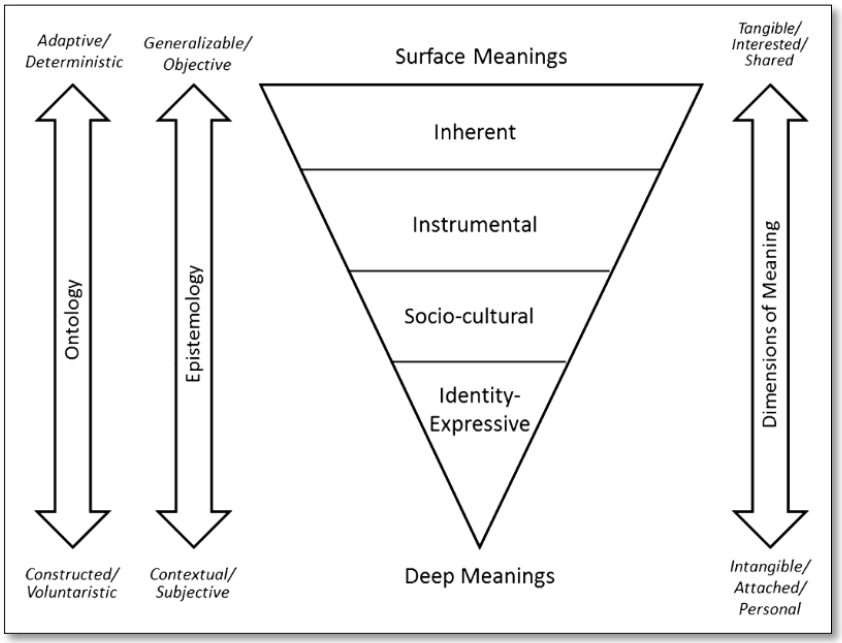

Figure AB: Layers of place meaning (Williams, 2014).

Table 1: Features of the spatial data used in the study.

Data	Source	Time reference	Scale / spatial resolution	Format	Description
Burned Area Map	Nature and Forest's Conservation Institute (ICNF)	1975-2023	1:100 000	Vector	This cartography delimitates the areas affected by wildfires from 1975 until 2023 in continental Portugal.
Land Use and Land Cover Map (COS)	Directorate General for Territory (DGT)	2015	1:25 000	Vector	This cartography delimitates the Land Use and Land Cover (LUC) in continental Portugal for the year 2015. The nomenclature consists of a hierarchical system of LUC classes and includes 83 classes at the most detailed level.
Land Use and Land Cover Map (COS)	Directorate General for Territory (DGT)	2018	1:25 000	Vector	This cartography delimitates the Land Use and Land Cover (LUC) in continental Portugal for the year 2018. The nomenclature consists of a hierarchical system of LUC classes and includes 83 classes at the most detailed level.
Official Administrative Map of Portugal (CAOP)	Directorate General for Territory (DGT)	2021	1:25 000	Vector	This cartography delimitates and demarcates the administrative borders of Portugal, i.e., the official boundaries of districts, municipalities, and parishes (these boundaries also correspond to NUTS I, NUTS II, and NUTS III).
Temporary Land Cover Map (COSc)	Directorate General for Territory (DGT)	2023	10 meters	Raster	This cartography delimitates the land cover in continental Portugal for the year 2023. It is produced annually due to its temporary timeframe and aims to provide complementary information to the LUC map (COS).
Wildfire Risk Map	Nature and Forest's Conservation Institute (ICNF)	2020-2030	1:25 000	Vector	This cartography, also referred as the structural risk for 2020-2030, delimitates the level of wildfire risk in continental Portugal utilizing 5 classes, namely "very low", "low", "medium", "high" and "very high".

Table 2: Characteristics of NIPF owners interviewed.

	Henry	Charles	Anthony	Colin	John	Phil	Joel	Donald	George	Lewis	Nicole	Louise	Anne
Sex	Male	Male	Male	Male	Male	Male	Male	Male	Male	Male	Female	Female	Female
Age	81	56	86	53	67	77	77	53	65	70	51	71	85
Place of residence	Castanheira de Pera	Santarém	Castanheira de Pera	Castanheira de Pera	Castanheira de Pera	Castanheira de Pera	Castanheira de Pera	Castanheira de Pera	Oeiras	Castanheira de Pera	Castanheira de Pera	Castanheira de Pera	Castanheira de Pera
Forest land's acquisition mode	Heritage + divorce	Heritage	Heritage + purchase	Heritage	Heritage + purchase	Heritage + purchase	Purchase	Heritage	Heritage	Heritage + purchase	Purchase	Heritage + purchase	Heritage + purchase
Number of forest plots	More than 10	5-10	More than 10	More than 10	More than 10	More than 10	More than 10	More than 10	More than 10	5-10	More than 10	More than 10	More than 10
Average dimension of forest plots (ha)	0,5 to 2	Less than 0,5	Less than 0,5	0,5 to 2	Less than 0,5	0,5 to 2	Less than 0,5	2 to 5	Less than 0,5	Less than 0,5	Less than 0,5	0,5 to 2	Less than 0,5
Total area of forest land (ha)	Less than 5	Less than 5	5 to 20	20 to 50	5 to 20	5 to 20	5 to 20	More than 50	Less than 5	Less than 5	5 to 20	5 to 20	Less than 5
Number of visits to forest land	Not frequently (at least once a year)	Rarely (less than once a year)	Rarely (less than once a year)	Not frequently (at least once a year)	Regularly (at least once a month)	Fairly regularly (at least once every 6 months)	Regularly (at least once a month)	Fairly regularly (at least once every 6 months)	Rarely (less than once a year)	Rarely (less than once a year)	Fairly regularly (at least once every 6 months)	Regularly (at least once a month)	Rarely (less than once a year)
Dominant species in forest land	Eucalyptus + Maritime pine	Eucalyptus + Shrubland	Eucalyptus + Shrubland	Eucalyptus + Maritime pine	Eucalyptus + Maritime pine	Eucalyptus + Cork Oak	Eucalyptus + Maritime pine	Eucalyptus + Maritime pine	Maritime pine + Shrubland	Eucalyptus + Maritime pine	Eucalyptus + Maritime pine	Eucalyptus + Olive	Eucalyptus + Shrubland
Reasons for passive, or partially passive, management	Non-productive + wildfires	Distance + small dimension	Age + wildfires	Lack of profitability	Small dimension + wildfires	Age + small dimension	Age + non-productive	Non-productive + lack of profitability	Non-productive + small dimension	Lack of time + carelessness	Lack of time	Age + wildfires	Age + small dimension
Income	Residual	No	No	Residual	Residual	Residual	Residual	Complementary	Residual	Residual	Residual	Residual	No
Suitability of forest land for landscape protection	Inadequate	Inadequate	Hardly suitable	Adequate	Hardly suitable	Hardly suitable	Adequate	Hardly suitable	Inadequate	Adequate	Hardly suitable	Hardly suitable	Hardly suitable
Impact of wildfires	Yes (2003, 2005; 2017)	Yes (2017)	Yes (2017)	Yes (2017)	Yes (2017)	Yes (2017)	Yes	Yes (2016, 2017)	Yes (2017)	Yes (1985; 2017)	Yes (2017)	Yes (2017)	Yes (2017)

Appendix 3 - Interview template

Date: _____
Student's name: _____
Participant's name: _____

1. Introduction

• Brief introduction of myself and my connection to the research site.
• Briefly explain the purpose of the interview and the research.
• Assure confidentiality and anonymity, remembering that publications can come out of the investigation.
• Ask to audio-record, explain the consent form, and ask to sign it (one copy to the interviewer and one copy to the interviewee).
• Explain the general structure of the questionnaire and interview (e.g., nº of questions, time it should take).
• There are no right or wrong answers, they are not to worry about these and do as best they can with them. I'm only interested in their opinions and personal experiences.
• The interviewee can stop the interview at any time!
• Ask the interviewee if he/she has any questions.
• Start recording and hand out the questionnaire first!

2. Background Information

• Can you tell me a bit about yourself and how long you've been living here?
• Can you tell me about your history with the forest? How did you come to own it?

3. Place Meanings

3.1. Inherent Meanings

• When do you think of the forest, what comes to your mind?
Prompt: What does it represent to you? What natural forest features do you find most appealing or important?

3.2. Instrumental Meanings

• In what ways do you use the forest for practical purposes?
• Do you know about the different forest functions?

Prompt: The forest can be connected to economic objectives, personal use of forest products, recreational activities, environmental conservation, or health benefits. What do you think are the most important? Why?

3.3. Sociocultural Meanings

• Are there any traditions or family/community activities that happen in the forest?
Prompt: Here, in the past, people helped each other in doing communal activities related with the forest and agriculture, is there something similar nowadays?
• How does the forest contribute to your sense of belonging in your family/community?

3.4. Identity-Expressive Meanings

• Are there any special memories or stories you associate with your forest land?
• Is the forest important to you? Does it have any personal meaning?

4. Place-Making

4.1. Forestry Memories

• How has the forest changed since you first knew it?
Prompt: When and why did the forest started changing from pine trees to eucalyptus trees?
• Can you describe how forest management practices have evolved on your land over time?
Prompt: How did these events influence your connection to the land?

4.2. Forestry Preferences

• What is the most correct way to manage the forest, in your opinion?
Prompt: Did you change your behavior toward forest management after the forest fires?

4.3. Obstacles to Active Forestry

• What are the main barriers you face in actively managing your forest land?
Prompt: How do you deal with them?
Prompt: Did you ever consider renting or selling the land?

4.4. Power Relations

• How have external factors like laws, the economy, or community changes impacted how you manage your forest?
Prompt: Do you feel that your opinions/preferences about the forest land are considered in the forest management policies of the State and private companies?

4.5. Future Expectations

• How do you think the future generations will relate to this forest?
Prompt: Which conditions should be created to motivate NIPF owners to manage their land more actively?

5. Emotional connections

• What are some of the positive feelings you associate with your forest?
• Have you ever felt worried or sad about your forest? Can you explain why?
Prompt: Do you feel that managing your forest land is a responsibility or a burden?

6. Closing

• Is there anything else you would like to share about your relationship with your forest land?
• Can I contact you if I need further clarification?
• You can also contact me if you want to add something else (contact information in the consent form).
• Thank you for your time and valuable insights.

Appendix 4 - Questionnaire template

Date: _____
Name: _____
Age: _____
Gender: Male |_| Female |_| Other |_| Specify: _____
Nationality: _____
Place of residence: _____
Contact number: _____
Email (if any): _____

1. Number of forest plots that you own?

1. Less than 5 |_|
2. 5-10 |_|
3. More than 10 |_|
4. No answer |_|

2. Average dimension of the forest plots?

1. < 0,5 ha |_|
2. 0,5 to 2 ha |_|
3. 2 to 5 ha |_|
4. > 5 ha |_|
5. No answer |_|

3. Total forest land area?

1. < 5 ha |_|
2. 5 to 20 ha |_|
3. 20 to 50 ha |_|
4. > 50 ha |_|
5. No answer |_|

4. How many times do you visit your forest plots?

1. Regularly (at least once a month) |_|
2. Fairly regularly (at least once every 6 months) |_|
3. Not frequently (at least once a year) |_|

4. Rarely (less than once a year) |_|
5. No answer |_|

5. Dominant species in your forest plots? (identify one or at maximum two dominant species)

1. Eucalyptus |_|
2. Pine |_|
3. Cork oak |_|
4. Shrubs |_|
5. Other |_| Which? _____
6. No answer |_|

6. Why you do not manage your forest land actively? (identify one or two reasons)

1. I do not live in the area |_|
2. I am old |_|
3. My properties are very small |_|
4. Is not a production forest |_|
5. It is not worth it because of frequent fires |_|
6. Other |_| Which? _____
7. No answer |_|

7. Do you have any income from forestry? (mark only one option)

1. Yes, is the main economic activity of my familiar unit |_|
2. Yes, it complements the familiar unit income |_|
3. Yes, but only sporadically or residual income |_|
4. No |_|
5. No answer |_|

8. Do you consider the management of your forest land suitable for landscape protection?

1. Very suitable |_|
2. Suitable |_|
3. Not very suitable |_|
4. Unsuitable |_|
5. No answer |_|

9. Was your forest land affected by forest fires?

1. Yes |_| How many times? If possible, specify the year(s) ___
2. No |_|
3. No answer |_|

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