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**Crowdscape (crowdfunding the forest landscape):
drivers of the population's willingness to influence
the management of abandoned private forested lands**

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Master Thesis

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Abstract

Portugal has been the European country with the most forestfires and the most hectares burned in the last 30 years. One of the main contributors to the problem is land abandonment, which is caused by, among other things, the landowners' low income. Given that the majority of Forest Ecosystem Services provided by landowners are not compensated, the purpose of this study is to determine whether the population is willing to contribute for environmental conservation, thereby increasing the provision of those services, and thus preventing land abandonment.

The research employs a mixed methods approach, starting with a quantitative study that analyses a database of crowdfunding donors; followed by a qualitative study that consists of semi-structured interviews with a diverse subsample of the previous study; and, finally, based on the findings of those previous studies, develops a survey instrument for use in the second quantitative study, distributed by two independent samples.

The target audience for these samples differs: one includes respondents who are expected to be concerned about environmental protection, while the other includes people with unknown levels of involvement in environmental issues.

Provisioning services, regulating, and support services were rated as very important in both samples, while cultural services were rated as less important. Moreover, most respondents expressed a willingness to contribute financially to ensure the provision of Forest Ecosystem Services, believing that "we all enjoy the benefits of nature"; on the other hand, those who refused justified their decision with budgetary constraints.

The results also suggest that the community has a reasonable willingness to pay for environmental conservation, which is mostly unrelated to demographics and is primarily motivated by the belief that there will be negative developments in the environment, which environmental associations can use to raise funds for local landscape management arrangements.

Furthermore, respondents seem to prefer a non-monetary vehicle of donation, which suggests that volunteer programs, in the form of time donations, may play a relevant role in bringing the community together to protect the environment.

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List of Abbreviations

AMU	<i>Áreas mediantemente urbanas</i> (Medially urban areas)
ANOVA	Analysis of variance
ANP	<i>Associação Natureza Portugal</i>
APR	<i>Áreas predominantemente rurais</i> (Predominantly urban areas)
APU	<i>Áreas predominantemente urbanas</i> (Predominantly urban areas)
ECSP	European Crowdfunding Service Providers
EFA	Exploratory factor analysis
FAO	Food and Agriculture Organization of the United Nations
FES	Forest Ecosystem Services
GAC	General Awareness of Consequences (Scale)
HSD	Tukey's Honestly Significant Different test
ICNF	<i>Instituto da Conservação da Natureza e das Florestas</i> Institute for Nature Conservation and Forests
ISSP	International Social Survey Programme
KMO	Kaiser-Meyer-Olkin test
LPP	Local purchasing power
MEA	Millennium Ecosystem Assessment
NGO	Non-governmental organization
PES	Payments for Ecosystem Services
UNCCD	United Nations Convention to Combat Desertification
UP	Universidade do Porto
WTC	Willingness to contribute
WTD	Willingness to donate
WTP	Willingness to pay
WWF	World Wide Fund for Nature

1 Introduction

1.1 Problem context

Every year, Portugal is ravaged by frequent and violent forest fires. According to the ANF|WWF (2020, p. 35) report, Portugal is the European country that is most affected by forest fires. It was the European country with the most occurrences and the most hectares burned in the last 30 years. Portugal is the first country in Europe and the fourth in the world that has lost the largest relative forest mass since the early twenty-first century.

The literature, e. g. Beighley and Hyde (2018), has identified four major contributions to this situation:

- i. A high percentage of unmanaged forest (approximately 80 percent of Portugal's forests are unmanaged);
- ii. Excessive biomass accumulation, both in quantity and extent;
- iii. A high number of human-caused ignitions (98 percent of all fires in Portugal); and,
- iv. Climate change, which causes longer-term dry periods and more frequent short-term heat waves, increasing the risk of extremely large fires.

Furthermore, the vast majority of forest areas (91 percent) are owned by private individuals, with the remainder held by local communities (6 percent) and by public entities (3 percent). Several hundred thousand individual owners make up private ownership, with industrial companies managing 4 percent. It is estimated that more than 20 percent of the territory has no owner or the owner's identity is unknown (ICNF, 2021b).

Simultaneously, a significative portion of resources are devoted to fire suppression rather than fire prevention, fuel management and pre-suppression. In fact, since 2000, nearly three times as much money has been spent on suppression as on prevention (Beighley & Hyde, 2018, p. 24). However, this trend has been shifting since 2017, and by 2020, prevention and suppression will have approximately the same relative weight, while concurrently duplicating overall public expenditure devoted to fire management (AGIF, 2021, p. 161).

Nonetheless, the annual trend in burned area has been steadily growing until 2019 (Florestas.pt, 2019). During the COVID-19 pandemic years, 2020 experienced the second lowest number of fires and the fourth lowest value of burnt area since 2010 (ICNF, 2020, p. 3), and 2021 had the lowest number of fires and the second lowest value of burnt area since 2011 until September 15 (ICNF, 2021a, p. 3).

In a country where forest areas (forest, shrubland and unproductive land) cover 69.4 percent of the mainland (ICNF, 2019), the impact of forest fires is felt at different levels. On the one hand, forests provide economic value to their owners, because they produce a variety of marketable goods and services. These goods include wood (for building industry and fuel), paper and cork industry, or non-wood goods (such as fruits and pastures). Forests, on the other hand, also provide ecosystem services, that vary from conservation of biodiversity to mitigation of greenhouse gas emissions, or leisure.

This multifunctionality of forests emphasizes the relevance of preventing their destruction, specifically by forest fires.

1.2 Problem description

Excessive biomass accumulation, as previously stated, is one of the factors that contribute to larger and more frequent forest fires, as it increases fuel load. Although the importance of a fuel management policy has been acknowledged by the Portuguese authorities (Observatório Técnico Independente, 2019), the root of the problem appears difficult to address, as it stems from rural abandonment and changes in agricultural (technical) practices, as a result of decreased productivity in agricultural and forest areas. The abandoned areas are being overtaken by shrubs and woody species, making the landscape's burning characteristics more uniform.

To reduce the flammability of the landscape, the ANF|WWF (2020) report proposes, among other things, the reversion of rural and forest abandonment, particularly by intervening in the restocking of abandoned areas, in a participatory manner with different interest groups, to plan alternatives to diversify the landscape.

One of the causes of rural abandonment is the insufficient income that forest landowners withdraw from the market value of their production (Terres et al., 2013). However, there are some *positive externalities* that the general population derives from forests that are not being considered. A positive externality occurs when an individual or firm provides an uncompensated benefit to others (Krugman & Wells, 2018). In the case of a positive externality, the marginal social benefit accruing to all consumers of another unit of the good or service exceeds the price received by the producer for that unit; as a result, the market produces an insufficient quantity as there is an insufficient incentive to provide an efficient amount of the good or service.

Some of the benefits of preserved forest that accrue to the general society, rather than the landowner, are disclosed in the form of Forest Ecosystem Services (FES). These benefits include, for example, water and air quality regulation, carbon sequestration, flood control, biodiversity, landscape maintenance or recovery, heritage values conservation, hiking and mountain biking, and others (Millennium Ecosystem Assessment, 2005). However, the link between ecosystems and the benefits they provide to the general population is subtle and less obvious; as such, landowners may find it difficult to be compensated by this service provision (LaRocco & Deal, 2011).

Asides from this issue of land abandonment and insufficient income, forest landowners must also contend with a very long production cycle (e.g., Eucalyptus, Pine, and Oak, with 10, 40, and 80 years, respectively), which may create additional economic pressures to abandonment or tree species change, even when forest landowners wish to maintain their current forest management.

So, in order to keep the forest land privately and endogenously managed by landowners, the value that they receive should be increased, thereby avoiding land abandonment and subsequent accumulation of fuel load that prone forest fires. As reported by Beighley and Hyde (2018, p. 6) “Ironically, areas that once stopped fires, now fuel increased fire intensity”.

The funding required may be obtained from either private or public sources. Private funding typically comes from Non-Governmental Organizations (NGO), foundations, charities, private individuals, or private investment by companies, whereas public funding is typically provided by general budget, or through earmarked taxes and charges (Prokofieva, 2016). This study focuses on private funding, specifically on how crowdfunding can be used a financing tool.

In crowdfunding campaigns, “funds are raised through the collection of small contributions from the general public (known as the crowd) using the Internet and social media” (Liagre et al., 2015, p. 63). Since private donations are one of the most important sources of funding for environmental conservation and management, and because most NGOs rely heavily on revenue from public donations (Veríssimo et al., 2018), crowdfunding emerges as a novel financing tool for forest and landscape restoration based on citizen participation.

Given that crowdfunding is a financing scheme that relies on individual voluntary financial contributions, it is critical to understand the drivers and barriers to public participation, as success or failure of a fundraising campaign can often determine whether conservation efforts are carried out.

To summarize, land abandonment is one of the causes of (increasingly larger) forest fires. This can be explained by the low income that forest landowners withdraw from the goods and services they provide. However, some forest benefits (FES) are a positive externality that do not benefit landowners. Furthermore, long forest production cycles put economic pressure on forest landowners to abandon or change tree species. Crowdfunding is one of the funding sources that can be used and adapted specifically for environmental protection, in order to maintain endogenous and sustainable forest management.

1.3 Research objectives, methodology and main contributions

Taking into account the urgency of funding environmental protection and the importance of understanding the drivers of a citizen-based participation, the research objectives are as follows:

- (i) To understand the community’s willingness to contribute to environmental conservation, particularly private forestland management, thereby compensating landowners for the negative income associated with forest management and preventing the abandonment of (unmanaged) forested lands.
- (ii) To understand the community’s perceptions on Forest Ecosystem Services and their willingness to contribute to their provision.
- (iii) To assess the use of crowdfunding as a financing tool to keep land privately owned and managed, by identifying the main motivators and deterrents to participating in crowdfunding initiatives.

These research objectives will contribute to delineate policy implications, particularly those related to the design of future crowdfunding campaigns directed at environmental protection.

To accomplish these objectives, this study has relied on the collaboration of MONTIS - Nature Conservation Association, a Portuguese non-profit environmental NGO, which has a national scope. MONTIS was founded in 2014 and is based in Vouzela, a district of Viseu (Central Portugal). As of January 2020, MONTIS has 473 associates and manages 26 properties (178,2 ha) in Central Portugal (MONTIS, 2021b).

The research employs a mixed methods approach, beginning with a quantitative study that analyses a MONTIS database of crowdfunding donors; followed by a qualitative study that consists of semi-structured interviews with a diverse subsample of the previous study; and, finally, based on the findings of those previous studies, develops a survey instrument for use in the second quantitative study, distributed by MONTIS and by University of Porto, thus generating two independent samples.

These samples differ in the target audience: the MONTIS sample includes respondents who are expected to be concerned about environmental protection, whereas the University of Porto sample includes individuals with undetermined levels of engagement to environmental issues.

The thesis is part of a larger, growing debate about how to prevent the progressive abandonment of rural areas, which has direct and indirect effects on forest disturbances, particularly forest fires. This study aims to add to the literature by assessing the population's willingness to contribute financially to the private and sustainable management of forestland. Furthermore, it is focused specifically on crowdfunding as a financing tool and aims to identify the main motivators and deterrents to participating in crowdfunding initiatives.

1.4 Dissertation outline

This chapter introduces the topic of forest landscape management, identifies the research the problem and poses the research objectives (Chapter 1). The report then discusses the main theoretical contributions in the context of land abandonment, Forest Ecosystem Services (FES) and their financing, and describes crowdfunding as a financing approach based on individual voluntary contributions (Chapter 2). The study's contribution (Chapter 3) is then presented in light of the existing literature, followed by an explanation of the methodology used to address the research objectives (Chapter 4). The dissertation then moves on to the presentation and treatment of collected information (Chapter 5), as well as the interpretation of the results in the light of the proposed objectives (Chapter 6). The main conclusions, recommendations, and proposed guidelines for future research are presented in the final section (Chapter 7).

2 Theoretical Framework

This chapter reviews the main contributions of the literature on the causes and consequences of land abandonment, focusing on the impact of this process on risk of wildfires. The discussion then shifts to the concept of Forest Ecosystem Services (FES), describing their impact on general population and emphasizing the difficulties in financing them. Following that, and in the light of the fact that crowdfunding can be used to fund environmental protection projects, the literature review moves on to survey the motivations and deterrents of crowdfunding donors in different contexts. Finally, previous research on the Willingness to Contribute (WTC) is examined, with an emphasis on its applicability in the field of nature conservation.

2.1 Abandoned landscapes: an overview of causes and consequences

Land abandonment has represented a significant process in European rural landscapes over the last few decades (Mantero et al., 2020), affecting rural communities, traditional landscapes, biodiversity and ecosystem services.

Depending on the approach, the literature contains a variety of definitions of land abandonment (Prishchepov et al., 2021). *Uncultivated land* ('Land used for agricultural purposes until recent times but not currently cultivated, with a noticeable cover of shrubs'), *abandoned land* ('Land not subject to any cultivation practice, including conservation agriculture, nor intended for grazing'), *neglected land* (when they pose a threat to neighbour owners) are all examples of land abandonment (Filho et al., 2017).

The most common definition of farmland abandonment is "land that was previously used for crop or pasture/livestock grazing production, but does not have farming functions anymore (i.e. a total cessation of agricultural activities) and has not been converted into forest or artificial areas either" (Perpina Castillo et al., 2018, p. 1).

The OECD (2021) "Glossary of statistical terms" defines abandoned land, also known as *fallow land* or *idle land* as "land that was cultivated but is now in a state of disuse". In this study, the notion of abandoned land is closer to the latter and is equivalent to *unmanaged lands*. This concept is defined *a contrari*, since the literature defines managed land, while labelling all remaining lands as unmanaged (Ogle et al., 2018). The glossary of the Intergovernmental Panel on Climate Change (IPCC, 2018) defines *managed land* as "where human interventions and practices have been applied to perform production, ecological or social functions".

The reduction in land-use intensity, including abandonment at the extreme, is a dynamic process, explained by a combination of time and space-varying drivers. The literature on the causes of land abandonment is extensive (Filho et al., 2017; Pointereau et al., 2008; Prishchepov et al., 2021; Rey Benayas et al., 2007; Terres et al., 2015; Ustaoglu & Collier, 2018), and identifies many socio-economic, political, and environmental factors. The Joint Research Centre (JRC) of the European Commission divides the determinants of farmland abandonment that appear frequently in the literature (Figure 1) into three blocks (Terres et al., 2013):

- Block1: Poor environmental / biophysical suitability for agricultural activity, such as ecological drivers associated with natural constraints (e.g., elevation);
- Block2: Low farm stability and viability, which includes the abandonment when managed land ceases to generate an income;

- Block3: Negative regional context drivers, which include socio-economic factors such as immigration into areas where new economic opportunities are available to rural population.

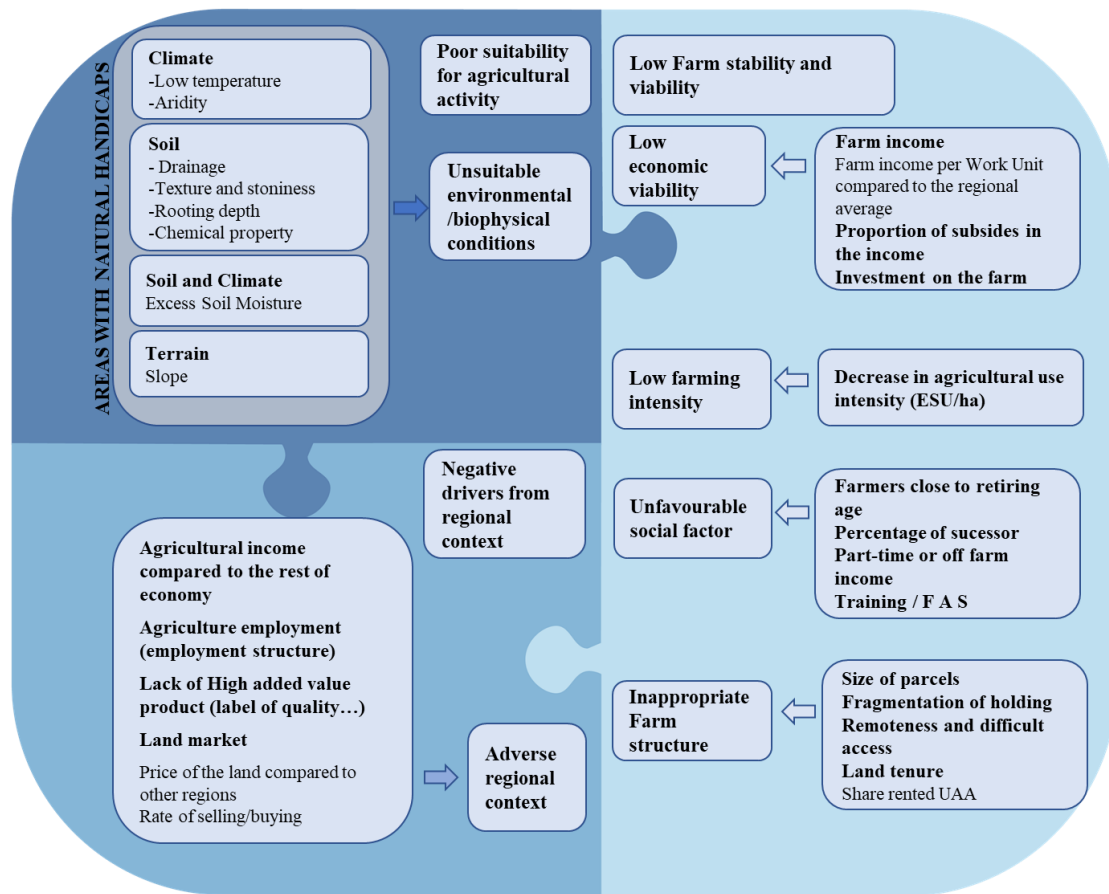


Figure 1: Main determinants of farmland abandonment and inter-linkages
Adapted from Terres et al. (2013).

Several studies support the low economic viability (included in Block 2) as a major driver of land abandonment.

In a study related to change in Europe's landscape, Levers et al. (2018) observe a rural exodus type of abandonment where diminishing income opportunities in rural areas have led to urban migration, resulting in agricultural land abandonment. In a literature review article, Rey Benayas et al. (2007) examine 45 studies on the causes of agricultural land abandonment, 33 of which report socio-economic drivers in different regions of the world. Filho et al. (2017) note, in a more recent review, that several articles identify economic and financial constraints (e.g. relative decline of the agricultural income) as drivers to land abandonment in Latvia, Slovakia, Swiss mountains, and temperate European Russia. Low income has also been identified as a driver of agricultural land abandonment in Colombia (Muñoz-Rios et al., 2020), in Scandinavia, Iberia and Oceania (Beilin et al., 2014), and in Portugal (van der Zanden et al., 2018).

Land abandonment has a wide range of consequences, and its scope and extent also vary over time and location. Several authors reviewed the literature on the implications of land abandonment (Andronic et al., 2020; Filho et al., 2017; Mantero et al., 2020; Ustaoglu & Collier, 2018). Table 1 summarizes the effects of farmland abandonment in the European Union, as proposed by Ustaoglu and Collier (2018).

Table 1: Brief summary of the impacts of land abandonment on ecosystem services.

Positive consequences	Negative consequences
• Restoration of a natural habitat (e.g., rewilding) • Better hydrological regulation, flooding mitigation, and increase in water quality • Increase in the capacity of ecosystems to retain pollutants and greenhouse gases • Soil recovery and reduction in soil erosion	• Higher fire risk resulting from increased plant biomass • Decrease in water provision depending on new vegetation • Increasing risk for soil erosion • Biodiversity loss • Threat to sustainable development of mountain communities • Threat to semi-natural habitats and corresponding ecosystem services

Source: Ustaoglu and Collier (2018)

Within these implications, we emphasize rewilding as a management option and the increased risk of wildfire frequency and intensity.

According to the literature review conducted by Mantero et al. (2020), wildfire is the most frequently cited consequence of land abandonment among the eight major natural disturbances it may cause. The same authors note that, in the twentieth century, the majority of papers focused on wildfires (65.8 percent of a total of 287 studies) in Mediterranean Europe (75 percent of a total of 189 wildfire studies). The literature generally agrees that land abandonment causes fuel build-up and increased landscape homogeneity, which increases wildfire risk or changes the fire regime exacerbating wildfires frequency, size, and severity.

The Mediterranean region has been subjected to studies on wildfire regimes following land abandonment (Ursino & Romano, 2014). The findings show that progressive land abandonment alters fire dynamics in the Mediterranean forest ecosystem. Starting with a no-fire regime when the land is almost entirely cultivated, the ecosystem progresses to a chaotic fire regime, passing through intermediate stages, where wildfires are more devastating, albeit more predictable, and have increased frequency. In this region, land abandonment and fuel accumulation are factors that favour the occurrence of megafires (San-Miguel-Ayanz et al., 2013). Furthermore, stand-level fuel accumulation and landscape fuel connectivity in this region were largely driven by (i) agriculture abandonment and expansion of forests and shrublands, which largely destroyed the mosaic structure of the Mediterranean landscape, (ii) as well as a general decrease in forest management and grazing livestock (Fernandes, 2013).

Portugal is a country that meets the criteria for being classified as a pyro-environment [“piroambiente”], since it combines Mediterranean characteristics, which join the hot and dry seasons, and Atlantic features, which allow for high plant productivity (Pyne 2006 *cit. in* Bento-Gonçalves (2021)). However, in a context of increasing number and size of fires, the reasons for wide burnt areas and high ignition rates are usually related to other non-natural factors, such as the absence of land management (Beighley & Hyde, 2018; Bento-Gonçalves, 2021; Moreira et al., 2001).

This increase in wildfire risk complicated forest fire management and prompted a large body of literature. A strand of literature focuses on fire suppression (Fernandes et al., 2016; Pacheco et al., 2014), but also increasingly on fire prevention (Collins et al., 2013; Minas et al., 2014; Pacheco & Claro, 2018), since effective forest fire management is essential for reducing fire hazard and improving forest fire prevention. The emphasis on prevention is incorporated into the concept of *fire-smart management*, which seeks to control the fire regime by intervening on vegetation (fuel) to promote more fire-resistant (less flammable) and/or fire-resilient environments (Fernandes, 2013).

However, while large fires have a negative impact, small-scale fires may benefit biodiversity in abandoned areas (Moreira & Russo, 2007). Furthermore, it can be argued that fires in most ecosystems can be understood as natural processes that provide a variety of benefits to humans, as wildfires create open habitats that allow the evolution of a diverse range of shade-intolerant plants and animals, as well as the provisioning, regulating, and cultural ecosystem services (Pausas & Keeley, 2019).

If, on one hand, land abandonment fuels wildfires, which are commonly perceived as destructive disturbances; on the other hand, under specific conditions and at certain stages of the abandonment process, beneficial outcomes may be observed, as it is an opportunity for ecosystem restoration or new landscape functions (Andronic et al., 2020; Beilin et al., 2014). In fact, several authors (Navarro & Pereira, 2015) have considered *rewilding* of abandoned landscapes, analysing the potential benefits of rewilding for ecosystem services and biodiversity. This process is carried out by passively assisting natural regeneration of forests and other natural habitats.

The dual effects of land abandonment call for the development of policies that incorporate increased environmental considerations into their design, thereby supporting positive outcomes in terms of land abandonment and land management (Andronic et al., 2020).

To summarize, failure to compensate landowners for *all* the goods and services provided may result in land abandonment. The following section delves into the provision of ecosystem services, and their potential to increase landowners' income.

2.2 Forest ecosystem services (FES): how to increase their provision?

Forest ecosystem services, also known as environmental services, are material goods and/or intangible services extracted from the environment and made available to humanity.

According to the Millennium Ecosystem Assessment (2005), forest ecosystem services (FES) can be classified into four categories (1) provisioning services, (2) regulating services, (3) cultural services, and (4) supporting services. The main goods and services obtained from ecosystems are summarized in Figure 2.

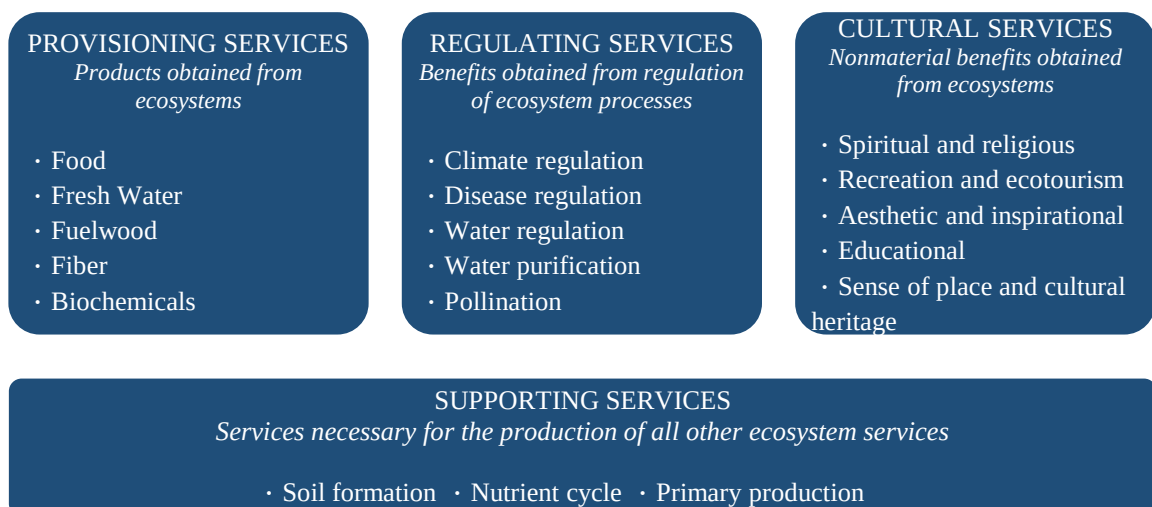


Figure 2: Ecosystem services

Source: Millennium Ecosystem Assessment (2005)

In 2011, the estimated value of these assets was approximately \$US125 trillion in 2007 \$US (Costanza et al., 2014). However, as shown in Table 2, DeGroot (2012) *cit. in* Liagre et al. (2015) estimated that the non-market value of temperate forest tradable services largely exceed its market value.

Table 2: Market versus non-market values of ecosystem services

Biome	% Market value (provisioning services)	% Non-market value (regulation, habitat and cultural services)
Marine	21	79
Coral reefs	16	84
Coastal wetlands	15	85
Tropical forest	35	65
Temperate forest	22	78
Woodlands	16	84
Grasslands	45	55

Source: Liagre et al. (2015)

The same authors observe that in order to finance ecosystems with higher share of non-market services' value, more investors interested in non-market values must be attracted, or new markets for non-market services should be created.

Nevertheless, while some ecosystem services are tangible and well known in daily life (e.g., the provision of food, fiber, other materials and fuel), other services are intangible and less known or easily perceived (e.g., climate regulation, water filtration, and protection against extreme events and hazards). As a result, the relationship between ecosystems and the benefits they provide can be subtler and less obvious.

From an economic point of view, FES represent a *market failure*, such that the economic pursuit based on individual self-interest does not lead to what is best for society as a whole – privately optimal choices may deviate from economically efficient choices. In the context of ecosystem services, externalities and public goods are the relevant types of market failure (Silvis & Van der Heide, 2013).

Activities, such as environmental conservation, that have unintended consequences that benefit others (aside from the producers) are said to generate a *positive externality* - an uncompensated benefit that an individual or firm confers on others (Krugman & Wells, 2018).

Additionally, (at least some) FES are characterised as *public goods*, which have the characteristics of non-rivalry and non-exclusion:

- Non-rivalry: Once the good is provided to a consumer, it can be made available to other consumers at no additional cost; for example, wildlife areas protected by or for one agent will benefit everyone else who can access the area.
- Non-exclusion: one user cannot prevent others from consuming. Because it is impossible or very costly to deny access to a natural asset – markets fail to allocate resources with public good characteristics efficiently (Silvis & Van der Heide, 2013).

From a positive externality approach, the fact that ecosystem services cannot be accurately priced in conventional markets, means that providers of these services (e.g., land owners or managers) or resource users do not consider prices in land- or resource-use decisions, resulting in either under provision or excessive use of critical ecosystem services (Prokofieva, 2016). From a public good perspective, the impossibility of excluding beneficiaries leads the free-rider problem; which is an attempt to make individual gains without contributing to the maintenance and improvement of the resource itself, because there is no incentive for people to pay for the good (Silvis & Van der Heide, 2013).

To summarize, when there are market failures such as those caused by FES, the market economy typically provides insufficient activity.

To ensure an adequate level of FES, the literature offers several alternatives that rely on economic incentives. One option is a direct compensation from firms to landowners, which Liagre et al. (2015) illustrate with the following examples:

- Vittel, a mineral water enterprise in France, offers incentives to farmers in upstream watersheds to adapt their farming practices to produce cleaner water.
- Coca Cola supports cork oak restoration in Portugal to preserve water quality and availability in relevant watersheds (Bugalho and Silva, 2014 *cit. in* Liagre et al. (2015).
- Hydroelectric companies have also launched ecosystem services payment schemes to compensate upstream farmers for undertaking forest ecosystem restoration to reduce soil erosion.

Environmental **taxes and subsidies** imposed by governments are also referred in the literature (Wunder, 2005). The example given by Krugman and Wells (2018) in the context of increasing the provision of goods and services with positive externalities is specifically related to farmland preservation. New Jersey tax payers approved a series of measures in 1961 that subsidized farmers who choose to keep their farmland rather than sell it to developers. As a result, by 2011, the state-managed Green Acres Program, had preserved over 650,000 acres of open space.

Other mechanisms, such as **auctions**, have been studied. Tóth et al. (2010) developed ECOSEL, a virtual-marketplace auction-based mechanism that matches potential buyers of ecosystem services (e.g., private individuals, corporations, and philanthropic organizations) with private forest landowners interested in diversifying their forest-based income. The public bids on competing alternatives, and the landowner implements the option with the highest combined value of bids over the associated costs.

Furthermore, Rabotyagov et al. (2012) conducted a series of experiments to test and inform the ECOSEL design variables in order to maximize social surplus and seller revenues. This study concluded that allowing participants to communicate with each other during the bidding process increases the likelihood of achieving an outcome that maximizes social surplus. Moreover, when fewer alternatives are presented to bidders, the seller profit increases. They also examined the impact on the auction outcome when the amount of funding required for each alternative is revealed; the authors reach different conclusions depending on the value of the FES bundle: when threshold costs are disclosed, high-value auctions perform better in terms of generating seller profit; however, if the auctions do not offer public goods of significant value, then disclosing the threshold costs is likely to lead to better efficiency. As a result, the auction administrator must choose between profit and efficiency.

Innovative financing mechanisms were also identified in FAO and the Global Mechanism of the United Nations Convention to Combat Desertification (UNCCD) discussion paper - *Sustainable Financing for Forest and landscape restoration* (Liagre et al., 2015). This report recognizes **Payment for Ecosystem Services** (PES) schemes and citizen-led crowdfunding to support the restoration of degraded land and ecosystems as a means of achieving forest and landscape restoration.

The original and most cited definition of PES is the one from Wunder (2005, p. 3). A PES is defined as: 1. a voluntary transaction where 2. a well-defined ES (or a land-use likely to secure that service) 3. is being ‘bought’ by a (minimum one) ES buyer 4. from a (minimum one) ES provider 5. if and only if the ES provider secures ES provision (conditionality).

The most innovative principle of PES is its *conditionality*, which means that payments are made contingent on the implementation of certain agreed-upon natural resource management practices. Voluntary behaviour of parties (either at the individual or collective level) ensures that both parties have the power to terminate the agreement if certain performance criteria are not met, and it is a necessary condition for being able to implement conditionality (Prokofieva, 2016).

Among the several alternative approaches to ensuring environmental conservation, land acquisition for sustainable land management has emerged as a way to increase the provision of ecosystem services. Wunder (2005, p. 7) describes this as a “one-off solution aimed at eliminating environmentally problematic actors”. In fact, acquiring forest land for sustainable land management has resulted in successful experiences, such as the one reported by Castro-Arce and Vanclay (2020) in Costa Rica.

It is difficult to evaluate the effectiveness of any financing tool. In fact, when “paying” for a FES, it is much less obvious whether the “buyer” receives what he paid for. Since the FES is provided over time, the “buyer” must always consider what would happen if the payment were not made, i.e., there is a need to construct some counterfactual FES baseline. Wunder (2005, p. 14) observes that PES includes the ‘business-like principle’ of only paying if the service is actually delivered, and the donor must ask the question “Does it really make a difference?”

Another significant issue is that the public appears to value a wide variety of ecosystem services differently. E.g., Jaung et al. (2016) show that the adaptability of stakeholders to a scheme incorporating FES was high for biodiversity conservation, carbon storage, and provision of non-timber forest products, medium for protection services, and low for ecotourism and agricultural products. In a different study, Roesch-McNally et al. (2016) assess the general public's willingness to participate in an auction mechanism for private FES in a regionally representative forest, and find that “Participants expressed clear preferences for recreational access, mature forest habitat, aesthetic amenities, and improved water quality.

Given that FES provision (particularly non-marketable services) can be augmented by private funding, the focus of this dissertation is to investigate land acquisition for private management via crowdfunding. As such, the following section characterizes this financing tool.

2.3 Crowdfunding as a financing tool

Several definitions of crowdfunding can be found in the literature, but they always emphasize three key elements: the crowd, the project creator and the crowdfunding platform (Bagheri et al., 2019). One possible definition of crowdfunding is “the outsourcing of an organizational function (capital formation) to a strategically defined network of actors (crowd) in the form of an open call via dedicated websites (crowdfunding platforms)” (Paschen, 2017, p. 179). In other words, crowdfunding is a financing tool that uses the internet to raises a specific amount of money from a large group of individuals (referred to as backers, supporters, funders, or donors) to fund a project solicited by an individual or organization (designated by creator, entrepreneur, founder, or project owner).

This tool can be used to fund private or social ventures. The following are the main types of crowdfunding (Chervyakov & Rocholl, 2019; European Commission, 2015):

- i. **Debt-based crowdfunding** (lending-based, or digital capital lending crowdfunding), which is similar to traditional bank lending, with peer-to-peer (P2P) loans being the predominant funding type. It is very similar to traditional bank borrowing from a bank, except that the firm borrows from a large number of investors. In this case, the crowd lends money to a company on the condition it will be repaid with interest.
- ii. **Reward-based crowdfunding** is commonly used to support start-ups or new products, with donations triggering some form of reward or in-kind repayment for the donor. For example, funding new products in exchange for the promise of testing a prototype or being the first to use it, or simply being a mentioned/credited in a film.
- iii. **Equity-based crowdfunding** (or digital capital raising), which involves selling a stake in a business to a group of investors in the same way that common stock is bought or sold on a stock exchange, or to a venture capital.
- iv. **Real estate crowdfunding** is a type of crowdfunding that focuses on real estate investments, either through loans or through equity (Kleverlaan et al., 2021).
- v. **Philanthropic crowdfunding** (also known as charity-based, donation-based, or patronage-based crowdfunding), in which contributors or donors do not expect a direct return on their contributions or donations. Individuals donate small amounts to meet the larger funding goal of a specific charitable project, in order to promote human welfare, while receiving no monetary or material return.

As investors expect returns or other financial benefits from the first four types of crowdfunding, these are comparable to existing sources of traditional financing and either complement or substitute them. The fifth type of crowdfunding, charity-based crowdfunding, is entirely philanthropic.

However, these categories are not mutually exclusive, as hybrid models that combine elements of more than one crowdfunding type may exist. E.g., the object of our project can be classified primarily as philanthropic, with elements of reward-based crowdfunding.

It is also worth noting that crowdfunding is regulated by the European Crowdfunding Service Providers (ECSP) regulation, adopted in 2020 and that will go into effect on November 10th, 2021. This regulation is intended to ensure crowdfunding legality, e.g. in terms of money laundering and terrorism financing (Ilin et al., 2020). Even though philanthropic and reward-based crowdfunding are not covered by this regulation, in Portugal a “full Know your Customer procedure is required for every donation or pledge made on these platforms” (Kleverlaan et al., 2021, p. 45), which the sector regards as an overly stringent regulation.

Participation in crowdfunding schemes has been studied in a variety of contexts, as the financing can be directed at tourism businesses (Bagheri et al., 2020), environmental conservation and management (Gallo-Cajiao et al., 2018; Kubo et al., 2021), charity projects (Bagheri et al., 2019; Farhoud et al., 2021), films and video projects (Cecere et al., 2017), political fundraising (Baber, 2020), or a private start-up (Schwienbacher & Larralde, 2012).

The **success** of crowdfunding in raising funds for projects has sparked an increase in research. Personal networks and underlying project quality are linked to the success of crowdfunding, and geography is related to both the type of projects proposed and successful fundraising (Mollick, 2014). Furthermore, the length (i.e., factual evidence of the project), readability (i.e., effective communication), and tone (i.e., moderate positive language to attract investors) of the project description, as well as project owners’ past experience and expertise, all influence the

funding success (Zhou et al., 2018). In terms of successful crowdfunding environmental campaigns, their success seems to depend on the topic (e.g., pet animal management outperforming landscape management and sustainable use) and is enhanced by marketing strategies directed at social networks. Popular topics, on the other hand, are frequently unsuccessful due to increased competition (Kubo et al., 2021). The importance of social networks is highlighted by findings that influential platform users have a significant impact on successful crowdfunding projects, and platforms should leverage their influence by implementing certain systems that increase the ease with which backers can connect with other backers while maintaining anonymity (Tan & Reddy, 2021).

There has been extensive research on crowdfunding, particularly related to **motivations and deterrents** of creators' and donors' participation. Table 3 summarizes the factors that motivate crowdfunding donors to participate, as this study focuses on the donor's perspective.

Table 3: Donors' motivations to participate in crowdfunding

Type of project and method	Literature	Motivations
General qualitative research	& Gerber and Hui (2013)	Desire to collect rewards; Help others; Support causes; Be part of a community
General quantitative research	& Rodriguez-Ricardo et al. (2018)	Social identification with the crowdfunding community (affected by attitudes toward helping others and interpersonal connectivity); Donor's level of innovativeness
Films and video projects & quantitative research	Cecere et al. (2017)	Mainly social influence: funding decisions of social neighbours To a lesser extent by rational motives (such as receiving rewards) and self-interest
Technological start-up & qualitative research	Schwienbacher and Larralde (2012)	Desire to participate in the "exciting adventure of building a start-up"; Expand their network with other supporters; Make a later profit
Charity project & mixed approach research	Bagheri et al. (2019)	Intrinsic individual characteristics: (i) The project and its objectives: Personal interest and concern; Personal value and importance; Shared thoughts, values and beliefs; Personal involvement in the problem and connection and empathy with the people; Help a minority; Project characteristics (attractiveness; novelty; presentation; technical knowledge of the project, and capacity to learn from the project); (ii) Project creators: Knowing personally; Determination, efforts and competencies; Help to realize ideas and create value Intrinsic social characteristics: Trust created by friends and other influential people; Contribute to fulfil collective efforts; Being a member of a team; Effectiveness and fewer risks o crowdfunding. Extrinsic individual characteristics: Attention and acknowledgement of others, Rewards; Extrinsic social characteristics - Social impact and consequences of the project: Solving social problems, Improving people's awareness and knowledge; Creating mobility and action in the people and society.

The literature in Table 3 is scarce on identifying specific deterrents to participation, except for lack of trust, i.e., a distrust of creators' use of funds (Gerber & Hui, 2013) or uncertainty about effectiveness, e.g. in the bioconservation projects (Gallo-Cajiao et al., 2018).

Sharpening empirical expectations for why people choose to participate or refrain from participating in crowdfunding may be included in a larger body of literature that studies the motivation to engage in voluntary contributions - Willingness to Contribute (WTC).

2.4 Willingness to Contribute (WTC) for environmental conservation

For a long time, the concept of willingness-to-pay has played an important role in many areas of marketing management, such as pricing decisions and new product development (Breidert et al., 2006). Regarding donations directed at environmental conservation, the literature is more recent and focuses primarily on specific ecosystems. Previous research indicates that:

- In Sweden, social capital (e.g., social trust towards other people in general or specific groups of people; institutional trust; and, civic participation) is a driver of Swedish WTC to environmental protection, when the payment vehicle are prices or taxes (Marbuah, 2019). The study relied on a dataset from the International Social Survey Programme - Environment III (ISSP Research Group, 2012).
- In Finland, findings suggest that knowledge of biodiversity conservation and familiarity with the habitat type, as well as people with higher education levels, had a higher WTC to ecosystems. The aesthetic appeal of a species was not related to an increased Willingness to Donate (WTD); however, the “need for conservation” also explained WTC, implying that highlighting the difficulties of less appealing threatened species or ecosystems could raise funds (Lundberg et al., 2019). The contingent valuation method and payment card approach were used in the study, which relied on data from a survey of potential online donors.
- In Scotland, people who have positive environmental attitudes and stronger attachment to the ecosystem (peatlands) and place identity tend to have higher Willingness to Pay (WTP) for environmental peatland restoration. However, there are differences depending on the socio-demographic profile and the geographical area (Faccioli et al., 2020). This study uses data from a choice experiment survey to estimate a hybrid choice model, which predicts choices between two or more alternatives.
- In Galicia, Spain, it was reported that value orientation (altruistic, egoistic, or biospheric) influences WTC to endangered species conservation. The results show the importance of anthropocentric orientations (egoistic and altruistic) in the WTC, and the reduced effect of the biospheric orientation (Ojea & Loureiro, 2007). The General Awareness of Consequences (GAC) scale is applied to a contingent valuation exercise in this study.
- In Australia, the study investigated WTC for ecosystem service benefits compared to biodiversity attributes, associated with value orientation (altruistic, egoistic, or biospheric) and attitudes (utilization or preservation). The findings indicate that WTC for habitat conservation is generally based on ecocentric values and attitudes, but WTC for ecosystem services is positively associated with pro-environmental behaviour and egoistic values (Matzek & Wilson, 2021). The methods used include an online survey based on existing scales of core values and environmental attitudes, as well as ordinary least squares regression models to understand the relationships between variables.

- In Brazil, respondents are concerned about the environment. However, most of them freely enjoy ecosystem's benefits, and few bother to make physical and financial conservation efforts. Respondents attribute this duty to the government because they already pay a lot of taxes and are sceptical about the effective use of their resources (Santos et al., 2010). A survey was used to apply the contingent valuation method.
- In the US, the research found that urban respondents were more familiar with the concepts of ecosystem service and PES than rural respondents; however this familiarity did not yield statistically different WTC estimates. The stronger driver of WTC for the restoration and protection of forest watershed ecosystem services under a Payments for Ecosystem Services (PES) program seemed to be personal norms, awareness of detrimental consequences to human wellbeing from environmental degradation (Obeng & Aguilar, 2018). A survey instrument assessed U.S. residents' knowledge and attitudes toward FES and PES, and elicited WTP, exploratory factor analysis (EFA) and ordered logistic regression.

The literature review on the drivers of WTC for environmental protection is critical for the development of the survey instrument used in this dissertation.

After reviewing the most relevant research topics, the following section explores how this research relates to previous ones, and how it contributes to expanding the field's current state of knowledge.

3 Contribution of the project

In 2030, approximately 11 percent of EU's agricultural land is expected to be at high (10.7 percent) and very high (0.4 percent) potential risk of abandonment, primarily in countries such as Portugal (Perpina Castillo et al., 2018). This (dynamic) process poses challenges to the Portuguese forest-fire management due to a high percentage of unmanaged forest (approximately 80 percent of Portugal's forests are unmanaged); and excessive biomass accumulation, both in amount and extent, which have been identified as two of the major drivers of wildfires in Portugal (Beighley & Hyde, 2018). In fact, significant fuel accumulation (20-40 percent) contributed to a threefold increase in the number of wildfires in Northern Portugal between 1980–1996. The fuel accumulation was caused by a significant decrease in agricultural and low shrubland cover in favour of tall shrublands and forests (Moreira et al., 2001).

The impact of forest fires is felt at various levels: on the one hand, forests provide economic value to their owners because they produce a variety of marketable goods; at the same time, forests also provide ecosystem services ranging from biodiversity conservation to greenhouse gas emissions reduction.

Alternative approaches to environmental conservation have attracted the attention of researchers in recent years. Among these approaches, this study emphasizes the financial incentives for the provision of ecosystem services, as environmental degradation results from the general failure of conventional markets to account for numerous public goods and positive externalities that ecosystems provide to society, as well as other relevant environmental threats, such as those stemming from the generalized inability of existing environmental policies to mitigate climate change and prevent the loss of biodiversity (Prokofieva, 2016).

Crowdfunding has emerged as a new mechanism for financing environmental conservation (e.g., assisting in the acquisition of land for private management), thereby improving the ecosystem services' provision. Motivation is critical in stimulating and enabling funding behaviour in donation-based crowdfunding because donors do not only accept the risks of supporting a new venture, but they also receive no guarantees on the effectiveness of the type of land management induced by their contributions. As such, practitioners and researchers must investigate the funding motivations of donors (Bagheri et al., 2019; Veríssimo et al., 2018).

Building on previous research, the thesis adds to the literature by incorporating multiple perspectives into a single, novel survey instrument. As a result, this study broadens research in the following ways:

- Understanding the community's perceptions of the causes and consequences of land abandonment.
- Understanding why people choose to participate or refrain from participating in crowdfunding, in general, and environmental crowdfunding, in particular.
- Understanding how the community values the multiple Forest Ecosystem Services.
- Identifying the factors that may influence the decision to contribute to environmental conservation.

Taking the previous findings into account, the research goes on to make suggestions for future crowdfunding campaigns directed at environmental protection.

4 Research methodology

This chapter presents the methodological approach used in this study. Alternative approaches are presented and then, given the nature of the study, a hybrid of explanatory and exploratory sequential mixed approach is chosen as adequate for addressing the research objectives. The mixed method starts with quantitative research that informs the ensuing qualitative study, which serves as the foundation for the subsequent second, and final, quantitative study. Finally, the sampling and data collection procedures are established, and the methods of analysis employed are described in detail.

4.1 Existing approaches and rationale for choosing the adopted approach

Yin (2018, p. 19) defines the *research design* as "(...) the logic that links the data to be collected (and the conclusions to be drawn) to the initial questions of study." The research design corresponds to the development of a guiding plan for data collection and analysis, and can result in quantitative, qualitative, or mixed methods research. The choice of one of these research methods is closely related to the type of problem under investigation and the research questions.

Following Creswell (2014), three (non-rigid) research approaches are advanced: (a) qualitative, (b) quantitative, and (c) mixed methods.

Qualitative research is an approach "for exploring and understanding the meaning individuals or groups ascribe to a social or human problem". Usually, the research process consists of emerging questions and procedures, open-ended questions typically collected in the participant's setting, data analysis inductively conducted from particular to general, and the researcher making interpretations of the meaning of the data. *Quantitative research*, on the other hand, is appropriate for testing objective theories by examining relationships among variables. These variables must be measurable, typically on instruments, so that quantitative data can be analysed statistically. *Mixed methods research* is more appropriate when the combination of qualitative and quantitative methods provides a more comprehensive understanding of a research problem than either approach alone, because it involves collecting both quantitative and qualitative data and integrating the two types of data.

According to the same author, the choice of one approach is influenced by four elements: the researcher's worldview, the research design, the research methods, and the research problem; additional factors that affect are the researcher's personal experiences, and the audience(s) for whom the report will be written.

Table A 1 in Appendix A provides an overview of the appropriateness of each approach (qualitative, quantitative, or mixed), depending on different research scenarios, thereby illustrating how those four elements (worldview, research design and methods, and research question) interact to form a research strategy.

Taking into account the pragmatic nature of the problem into consideration and the research objectives (chapter 1.3), the *mixed method approach* seems appropriate. As proposed by Creswell (2014), a pragmatic worldview justifies using mixed methods, since researchers tend to emphasize the research problem and "then using pluralistic approaches to derive knowledge about the problem".

Furthermore, the research design is also a combination of *explanatory and exploratory sequential methods*. In fact, an *explanatory sequential mixed* research design is one that begins

with quantitative research, where the researcher analyses the results, and then builds on these results to explain them in greater detail with qualitative research. This method is referred to as explanatory because the preliminary quantitative data results are explained further using qualitative data. Alternatively, Creswell (2014) defines an *exploratory sequential approach* as one in which the research begins with a qualitative phase, the findings of which are then used by a quantitative phase. According to the same author, this is an adequate method when the goal is to develop an instrument based on a small number of individuals and then administer it to a part of the population. Because an initial quantitative/qualitative phase is followed by a qualitative/qualitative phase, both explanatory and exploratory mixed methods are considered *sequential* (Creswell, 2014).

The current study is a hybrid of these methods, as it begins with a quantitative phase where a database is analysed, followed by qualitative interviews with individuals chosen from the database to assist in the development of a survey in the second quantitative phase.

4.2 Method used in the project

Figure 3 depicts the phases that were followed throughout this investigation.

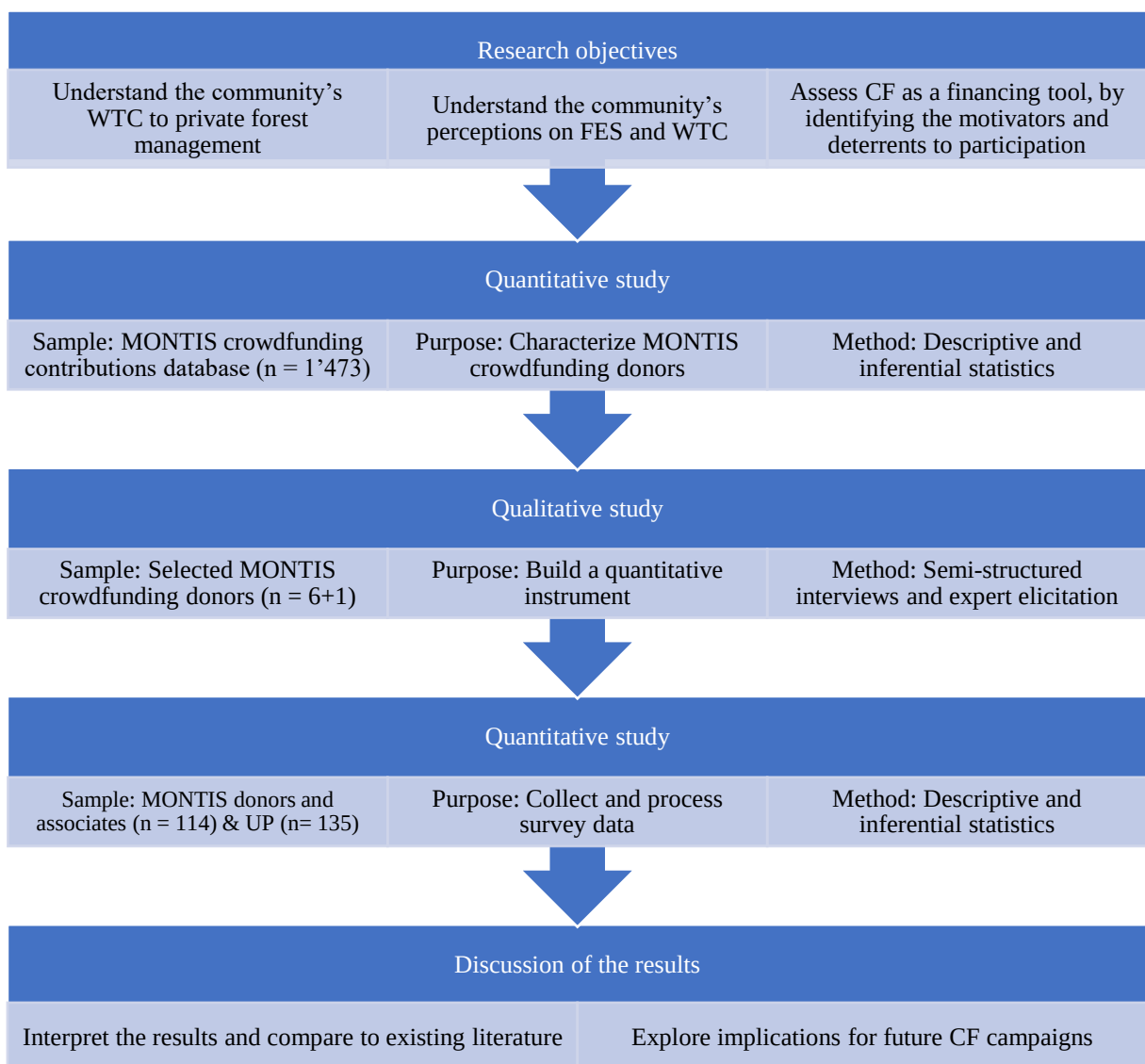


Figure 3: Sequence of the study

Legend: CF – Crowdfunding; FES – Forest Ecosystem Services; WTC – willingness to contribute.

The initial **quantitative study** uses secondary data provided by MONTIS - Nature Conservation Association, which is a non-profit environmental non-governmental organization that, since 2014, has been using crowdfunding as a financing tool. MONTIS's main objectives are "to ensure the development of natural processes, to promote conservation of native species, to smart-manage forest fires and other natural damages, and to increase the value of biodiversity" (MONTIS, 2021b). To accomplish these objectives MONTIS manages properties, both by establishing agreements with landowners for at least ten years during which MONTIS takes all management decisions related to the biodiversity in the property, or by acquiring land using crowdfunding donations.

By the end of January 2020, MONTIS manages 178.2 ha - corresponding to 26 properties in Central Portugal. Some of these properties were acquired through five crowdfunding campaigns based on [PPL](#), the Portuguese leading platform in donation and reward-based crowdfunding (Kleverlaan et al., 2021). These campaigns were fully funded, as reported in Table 4, and even exceeded the target amount.

Table 4: MONTIS five crowdfunding campaigns

Title of the campaign	Date	Supporters	Target	Raised
"What about to be owner of all this?"	15/10/2014 - 15/12/2014 (61 days)	255	12.000€	16.750€ (+40%)
"You and me, what do we have to do?"	15/04/2016 - 15/06/2016 (61 days)	201	16.581€	17.131€ (+3%)
"A sower went out to sow"	22/11/2017 - 15/12/2017 (23 days)	115	2.300€	2.680€ (+17%)
"Something entrusted to us"	22/03/2019 - 21/05/2019 (60 days)	313	29.195€	30.618€ (+5%)
"From eucalyptus to native woods"	06/10/2020 - 04/12/2020 (59 days)	427	18.730€	20.021€ (+7%)

Source: MONTIS (2021b)

MONTIS collected and provided information about these five crowdfunding initiatives. The sample includes $n = 1'473$ contributions, which differs from the total number of supporters (1'311), because donors frequently contribute more than once. Each case in the sample has a specific contribution amount (in €) and the majority of cases also include demographic information (e.g., age, location, gender, among others).

Firstly, in order to safeguard individual's anonymity, all personal information was separated from the observations using a coding and recording procedure carried out in Excel. In fact, one of the ethical issues that the researcher should consider while analysing the data is respecting "(...) the privacy and anonymity of participants" (Creswell, 2014, p. 138).

The original dataset cleaning and transformation was executed using Excel; and data analysis was performed using the statistical analysis software IBM SPSS v27.0.1.0 (IBM Corp., 2020), providing descriptive statistics (frequencies, central tendency, and dispersion measures) and measures of statistical inference (e.g., to compare group of observations).

Once the sample is characterized, the research proceeds with a **qualitative approach**, that begins by selecting a sample of interviews from the individuals included in the previous quantitative study and preparing a semi-structured script for the interviews.

In fact, to develop a questionnaire that contributes to addressing the research objectives, firstly, prior literature was analysed, followed by a qualitative phase aimed at refining the instrument by receiving input from selected individuals from the MONTIS donors' database. The same procedure has been used in different studies (Luís et al., 2018), as "[Setting] up discussions with members of a target group to identify key issues" is a "good practice" to improve the survey design, and thus the quality of results (OECD, 2012, p. 33).

During this phase, MONTIS invited 40 people to participate in a semi-structured interview to decide on the content and wording of the questions, a selection that was initially based on their diversity. In fact, qualitative research with diverse populations is useful when there are no valid instruments for the groups, and when the appropriate language to use or the appropriate concepts and questions to ask are unclear (Cohen et al., 2001).

Seven of those backers agreed to take part in 30-minute online interviews, during which they were asked to share information about their knowledge of crowdfunding campaigns, motivations to contribute to MONTIS initiatives, environmental attitudes, land management beliefs, and perceptions on compensating landowners to avoid land abandonment. In order to further improve the survey instrument, an interview with a MONTIS representative was also conducted. These viewpoints were then used to help shape the survey's design.

Finally, fifteen people (the interviewees from the previous phase and other survey design experts) were asked to pre-test it and the survey instrument was adjusted based on their feedback.

Figure A 4 in Appendix D depicts the final version of the survey's structure, identifying the survey's sections. In this context, the term "section" refers to a group of questions with a common theme (Hill & Hill, 1998, p. 10). Appendix D also contains the complete final version, and the corresponding relevant prior literature.

The second **quantitative study** uses primary data collected with the above-mentioned questionnaire. The online survey targeted people who have expressed an interest in nature conservation or MONTIS's work, as well as those who have uncertain sensitivity to crowdfunding contributions and to environmental issues. Thereby, MONTIS distributed the survey to potentially 450 associates and 180 donors in previous crowdfunding campaigns, and 114 responses were received. Universidade do Porto (UP) distributed the survey to a potentially 36'079 people, and 140 answers were obtained. A total of 5 people stated that they would not agree to participate in the survey, thus reducing the sample size to a total of $n_1 = 114$ and $n_2 = 135$, that is, $n = 249$ responses. Responses for the survey were collected from July to August 2021 using the online survey software Microsoft Forms.

By targeting two different audiences, rather than combining the samples and conducting a single analysis, we will be able to assess whether and to what extent previous behaviour influences environmental perceptions and attitudes.

Data analysis was based on descriptive and inferential statistics, using IBM SPSS v27.0.1.0., using the following methods:

- When comparing differences between the two samples, the independent-samples t-test is used to compare the mean of a continuous variable, whereas the Mann-Whitney U test is used to compare medians, when the dependent variable is ordinal and not normally distributed (Pallant, 2011). However, for five-point Likert items, the t-test and Mann-Whitney U test have similar power, so researchers do not have to worry about finding a difference when there is none in the population (de Winter & Dodou, 2010).

- To assess the internal consistency of a scale, that is “the degree to which the items that make up the scale are all measuring the same underlying attribute”, the study employs *Cronbach’s coefficient alpha*, which provides an indication of the average correlation among all the items that make up the scale (Pallant, 2011, p. 6). Whenever the scale had negatively worded items, Cronbach’s alpha was calculated by recoding the replies to ensure that all items were positively phrased (e.g., the GAC scale in Section 3 of the survey). “The generally agreed upon lower limit for Cronbach’s alpha is .70, although it may decrease to .60 in exploratory research” (Hair et al., 2014, p. 123).
- Furthermore, to test differences in proportions (e.g., in Yes/No questions), the study employs the *one-sample Chi-square* to test whether “there is no difference in the proportion in each category (50%/50%)” (Pallant, 2011, p. 215) and the *Pearson Chi-square test for independence* to compare “(...) the observed frequencies or proportions of cases that occur in each of the categories, with the values that would be expected if there was no association between the two variables being measured” (Pallant, 2011, p. 217).
- Whenever comparing mean scores (e.g., WTC) of more than two groups is required, the study resorts to one-way analysis of variance (ANOVA), which incorporates one independent variable (e.g., WTC) with several groups (e.g., several age levels). If there are any significant differences between the groups, we do further testing to determine where these differences occur (e.g., does Group 1 differ from Group 2). These tests are known as *post-hoc* comparisons, and the Tukey’s Honestly Significant Different (HSD) test is used to investigate the differences between the groups (Pallant, 2011).
- Moreover, Exploratory Factor Analysis (EFA) is used to reduce a “large number of items from a questionnaire or survey instrument to a smaller number of components, uncovering latent dimensions underlying a data set” (DiStefano et al., 2009, p. 1). Varimax rotation was used in the study, and factors with eigenvalues larger than 1 were then used in multiple regression analysis (Keskin et al., 2007).
- We also report Kaiser-Meyer-Olkin (KMO) and Bartlett’s tests to assess the appropriateness of the factor scores. The KMO Measure of Sampling Adequacy is a statistic that indicates the proportion of variance that might be caused by the underlying factors. High values (0.9 to 1.0) generally indicate that a factor analysis may be useful. Bartlett’s test of sphericity tests the hypothesis that the correlation matrix is an identity matrix, indicating that the variables are unrelated and hence inappropriate for structure detection. The rejection of the null hypothesis indicates that a factor analysis may be beneficial (Reis, 1997, pp. 278-279).
- Finally, after using EFA to determine the factor loadings (the correlation between each item and each factor) underlying the data set, the information about the factors is included as part of a regression analysis (DiStefano et al., 2009). That is, the factor scores (the variables calculated for each factor score as the weighted sum of each item) were treated as independent variables for predicting WTC, i.e. the fitted regression equation is:

$$WTC = a + b_1 \cdot FS_1 + b_2 \cdot FS_2 + (...) + e$$
(Keskin et al., 2007).

The research resorted to non-probability judgmental sample, as both samples, targeting two different audiences, were deliberately chosen based on their specific characteristics “in order to provide important information that cannot be obtained from other choices” (Taherdoost, 2016, p. 23). Because the respondents were self-selected (Bethlehem, 2008; Couper, 2000), it is not possible to extrapolate the results to the whole *Portuguese* population. However, this study includes two samples with complementary characteristics (those who already have an interest in forest and environmental-oriented crowdfunding initiatives and an undifferentiated sample). As such, this method allows us to address the research objectives.

5 Results

This chapter reports the study's findings based on the information gathered as a result of the previously described methodology. We will firstly present the findings of the dataset consisting of crowdfunding donors, then briefly describe the main input for the design of the survey instrument provided of the qualitative study, and finally report the results of the survey results.

5.1 First quantitative study: MONTIS crowdfunding donors

The dataset collected from the five crowdfunding initiatives described in Table 4 provides information about:

- The amount of the contribution (in €);
- The number of days until the deadline (deadline minus date of the funding);
- Demographic variables: gender and residence;
- Whether the supporter is an associate of MONTIS;
- Whether the donation is from (a) an individual, (b) a group, e.g., a group of friends or family, (c) an organization, gathered (d) in an event not promoted by MONTIS or (e) an event promoted by MONTIS, or (f) by MONTIS.

However, it should be noted that some contributions are anonymous (18.3 percent of cases) or provide an incomplete characterization of the donor, making a complete analysis of the data impossible. Table 5 shows the percentage of identified and unavailable data for each case from a total of 1'473 donations.

Table 5: Percentage of cases with complete and unidentified information for each variable

Category	Gender	Associate	Group	Residence
Identified cases	81.7%	80.8%	81.7%	35.4%
Unidentified cases	18.3%	19.2%	18.3%	64.6%

Figure 4 shows that, excluding completely anonymous donations, the vast majority of total donations corresponds to unique (or first time) contributions, followed by donations from backers who contributed twice for the five campaigns.

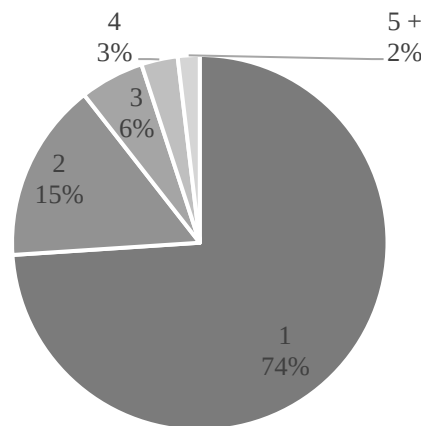


Figure 4: How often individual donors contribute (in percentage of identified donors)

5.1.1 How does the amount of contribution vary among campaigns?

Table 6 shown that 75 percent of supporters contribute to less than 50€, except the funding for CF3, which had a smallest target amount, and that the most donations amount to 20 €.

Table 6: Descriptive statistics for the amount of contribution (in €) by CF campaign

	Min	Q1 ^(b)	Median	Q3 ^(b)	P90 ^(c)	P95 ^(c)	Max	Mean	St. Dev	Mode
CF1	1.00	20.00	20.00	50.00	110.00	300.00	1 250.00	65.69	135.93	20.00
CF2	1.00	15.00	25.00	50.00	100.00	200.00	1 500.00	65.39	155.78	25.00
CF3 ^(a)	1.00	10.00	10.00	27.00	50.00	50.00	100.00	21.27	20.96	10.00
CF4	1.00	10.00	25.00	50.00	150.00	250.00	3 000.00	75.41	197.86	50.00
CF5	1.00	10.00	20.00	50.00	100.00	174.75	1 200.00	47.22	98.95	20.00
Total	1.00	10.00	20.00	50.00	100.00	200.00	3 000.00	59.20	146.16	20.00

Legend: (a) CF3 was the smallest campaign in target amount and duration; (b) First and third quartiles; (c) 90 and 95 percentiles.

Since 95 percent of donations are up to 200 €, Figure 5(a) shows the distribution of the amount of the contribution truncated from above, resulting in 5 percent of the observations removed from the right (long) tail of the distribution. Figure 5(b) shows a boxplot that confirms the findings that most donations correspond to small amounts.

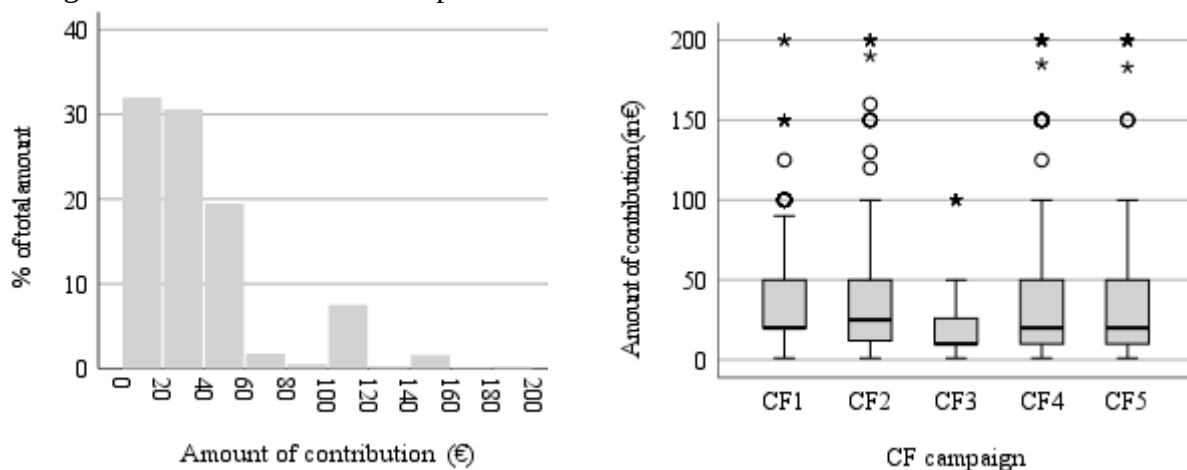


Figure 5: (a) Left pane – Truncated distribution of the amount including the lower 95% amounts; (b) Right pane: Boxplot of amount of contribution including the lower 95% amounts

5.1.2 How close are donations to the end of the campaign?

The number of days until the end of the campaign, can also provide insights into each campaign, particularly in terms of the timing of prospective reminders that the campaign is still active, as well as the option of self-funding. Descriptive statistics for the number of days until the end of the campaign by CF campaign are provided as supplementary material in Table A 2 in Appendix B. The median is approximately 16 days, which means that 50 percent of donations are made when 16 or less days remain until the end of the campaign Figure 6(a).

Since the duration of all five campaigns varied, the subsequent analysis began by normalizing the nr. of days remaining until the end of the campaign in relation to its total duration. E.g., if a donation is made for CF1 (with a duration of 61 days) and there are 16 days until the end of the campaign, the normalized measure is 26 percent of time left to go; however, if those same 16 days are related to a donation in CF3, the normalized result is 70 percent of time left to go. Thus, the lower the percentage, the closer to the deadline.

The boxplots represented in Figure 6 (and descriptive statistics details provided in Table A 3 of Appendix B) reveal that, with exception of CF3, which was a shorter duration campaign, most donations are concentrated in dates closer to the campaigns' deadline.

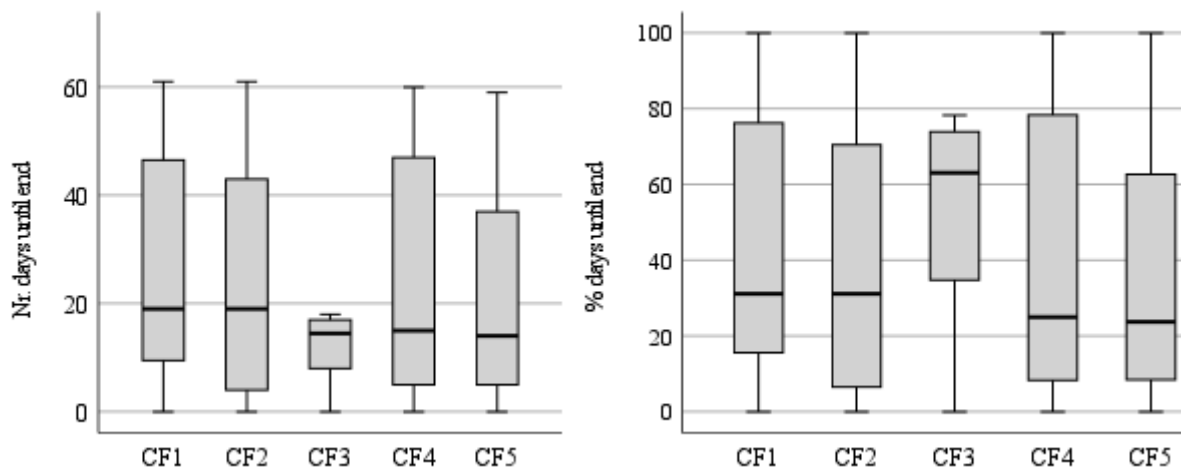


Figure 6: (a) Left pane: Boxplot of nr. of days before campaign ends by CF campaign; (b) Right pane: Boxplot of percentage of days before campaign ends by CF campaign

The simultaneous study of the total amount of contributions and the nr. of days until the end of the campaign allows an understanding of whether more funds are raised as the campaign nears completion. The results (provided as supplementary material in Figure A 1 of Appendix B) show that, with exception of CF3, which was a shorter duration and lower target campaign, most donations are concentrated in dates closer to the campaigns' deadline, but there is no evidence of a particular surge in donations in the last days of the campaigns.

5.1.3 How did MONTIS' affiliation affect the campaigns?

The relationship between the amount of the contribution and whether the supporter is a MONTIS associate (Table A 4 in Appendix B) indicates that while non-associate contributions account for the majority of identified cases (43.9 percent) with a median contribution of 20 €, associate contributions account for a larger fraction of total contributions (41.0 percent) with a median contribution of 40 €, a higher mean contribution, and less variability.

The timing of donations also aids in distinguishing between associate and non-associate behaviour. Both Table A 5 (in Appendix B) and Figure 7 show that, on average, associates and non-associates make their contribution approximately when 40 percent of days remain until the end of the campaign.

Equal mean contributions from associates and non-associates cannot be rejected; moreover, there were no significant differences between these groups when analysing whether the donation was closer to the deadline. The complete results of the independent sample t-test for equality of means is included in Table A 9 in Appendix B. However, due to space limitations, the results of subsequent similar tests are reported but no supplementary material is provided.

Figure 7 confirms that MONTIS associates contribute with amounts comparable to non-associates, and that the timing of their donations is likewise similarly distributed.

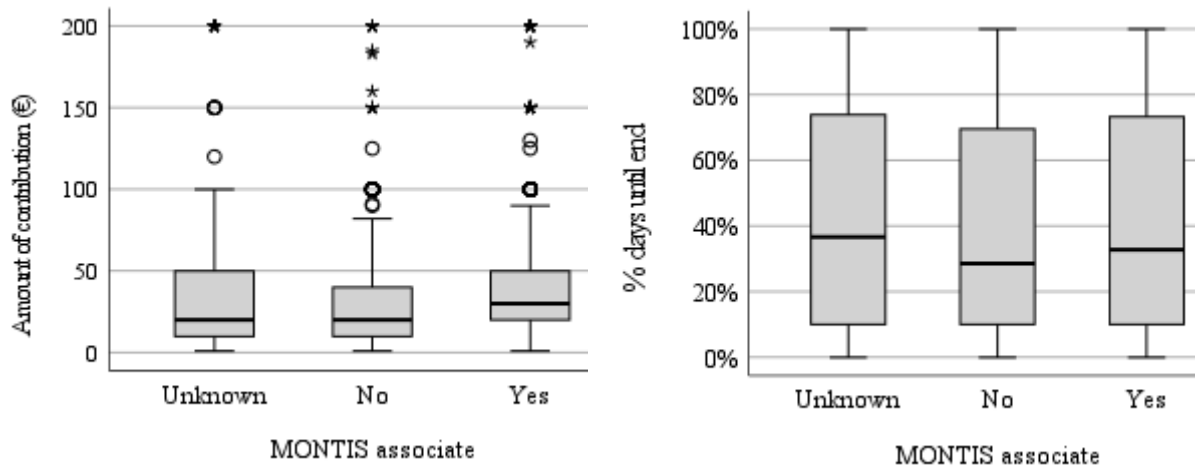


Figure 7: (a) Left pane: Boxplot of the amount of contribution (€) by affiliation including the lower 95% amounts; (b) Right pane: Boxplot of percentage of days until the end of the campaign by affiliation

5.1.4 In what ways did geography influence the campaigns?

Only 35.4 percent of cases have a known origin identified (Table 5). The region was classified using the Nomenclature of Territorial Units for Statistics (NUTS) developed by Eurostat and used for statistical purposes in Portugal; more specifically, the NUT3 categorization, which divides country into 25 subregions (Figure A 2 in Appendix B) was used. Additionally, the council (*concelho*) was also considered. The distribution of donations as percentage of total cases (Figure 8a) and as percentage of total donations (Figure 8b) among different NUT3 indicates that supporters come from more urban areas (AM Lisboa and AM Porto).

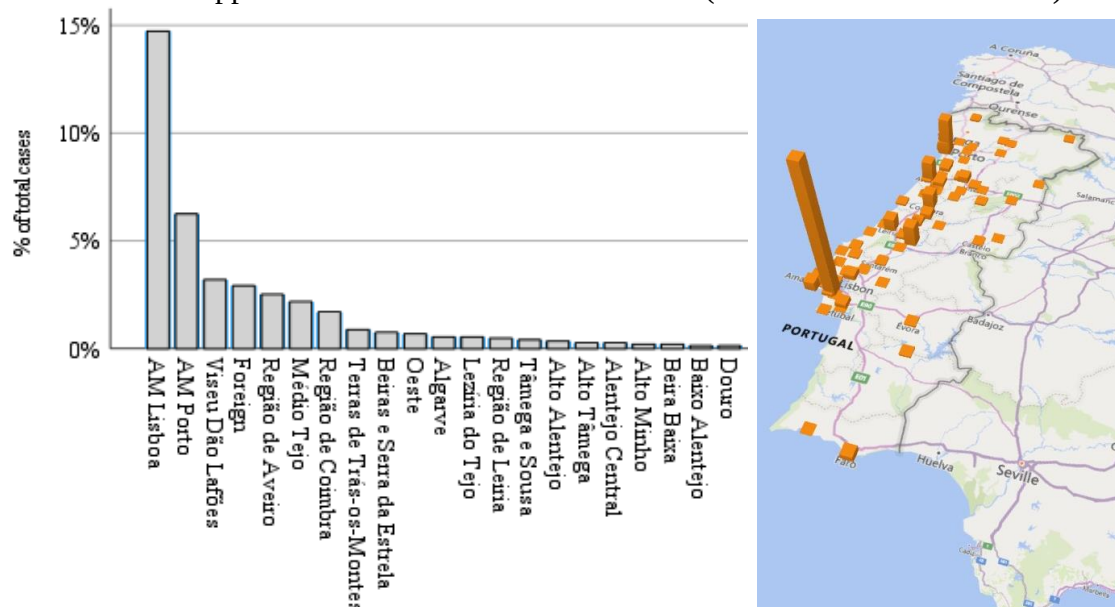


Figure 8: (a) Left pane: Distribution of cases by NUT3 (% of total cases); (b) Right pane: Distribution of the contribution amount by NUT3 (€)

Three proxies were used to measure the degree of urbanity in order to determine whether donors originate from more urban regions. The Portuguese *Typology of Urban Areas 2014* (Tipologia de Áreas Urbanas – TIPAU 2014) divides Parishes into three categories: “Predominantly urban areas (APU – *Áreas predominantemente urbanas*)”, “Medially urban areas (AMU – *Áreas mediamamente urbanas*)” and “Predominantly urban areas (APR – *Áreas predominantemente rurais*)”. However, such a classification is not available at a council-level. As such, the following *proxies* for the degree of urbanity were used:

- At a council-level, the percentage of APU Parishes in each council; e.g., Gondomar has a total of 7 Parishes, of which 1 is APR, 2 are AMU and 4 are APU (INE, 2021a); thus, the degree of urbanity is estimated to be 57 percent;
- At a council-level, the population density measured in nr. of inhabitants per Km² (INE, 2020);
- At a NUT3-level, the percentage of population in APU areas (INE, 2021b).

Additionally, in order to understand the possible effect of different local purchasing power (LPP) in the amount of the donation, this variable was also investigated (INE, 2019).

The (linear) correlation between the amount and the degree of urbanity, as measured by either variable – Freg_APU (%), Pop_km2, or Pop_APU (%) – is significant at 10% level. A more significant linear, albeit weak, linear association is found with respect to the amount the LPP (2017) of the NUT3.

Table 7: Correlation between amount and residence *proxies*

	Freg_APU (%)	Pop_km2	Pop_APU (%)	PPC (2017)
Pearson Correlation	0.063	0.064	0.062	0.104
Sig. (1-tailed)	0.074*	0.070*	0.077*	0.008***

Legend: *significant at 10%; ** significant at 5%; *** significant at 1%

These findings seem to indicate that the amount of contribution is more related to the council's revenue level than to population density or another proxy for rurality.

5.1.5 How were the campaigns influenced by gender?

The literature establishes that gender influences crowdfunding behaviour (Greenberg & Mollick, 2015); as such Table 8 registers descriptive statistics for the amount by *gender*.

Table 8: Descriptive statistics for the amount of contribution (€) by gender

Gender	% of Total N	% of Total Sum	Min	Median	P90	P95	Max	Mean	Std. Deviation
Male	46.2%	41.4%	1.00	20.00	100.00	200.00	1 250.00	53.10	100.62
Female	30.1%	22.4%	2.00	20.00	100.00	150.00	1 200.00	44.07	75.71
Non-individual	5.4%	16.7%	1.00	50.00	500.00	1 000.00	3 000.00	181.63	413.32
Anonymous	18.3%	19.5%	1.00	20.00	100.00	200.00	1 500.00	63.17	164.00
Total	100.0%	100.0%	1.00	20.00	100.00	200.00	3 000.00	59.20	146.17

According to these findings, males make up for the majority of supporters (46.2 percent) and contribute the highest amount of money (41.4 percent). Additionally, all categories show a very high variability in the amount of the contribution, as seen by the significant standard deviation when compared to the mean. Finally, the median amount is 20€, except for non-individual contributions, confirming that the distribution is biased to the right, implying that the majority of contributions are of a small amount.

For a significance level of 5 percent, the mean male and female donor *contributions* do not differ significantly; however, the mean of the individual (male or female) donations differ statistically from non-individual contributions (e.g., other associations or firms) (as reported in Table A 5 of Appendix B).

In terms of days until the end of the campaign (Table A 7 in Appendix B), the mean *timing of donation* is not influenced by gender; only the means of female and non-individual donors are significantly different (Table A 11 in Appendix B). These finding can be visually confirmed in the boxplots displayed in Figure 9.

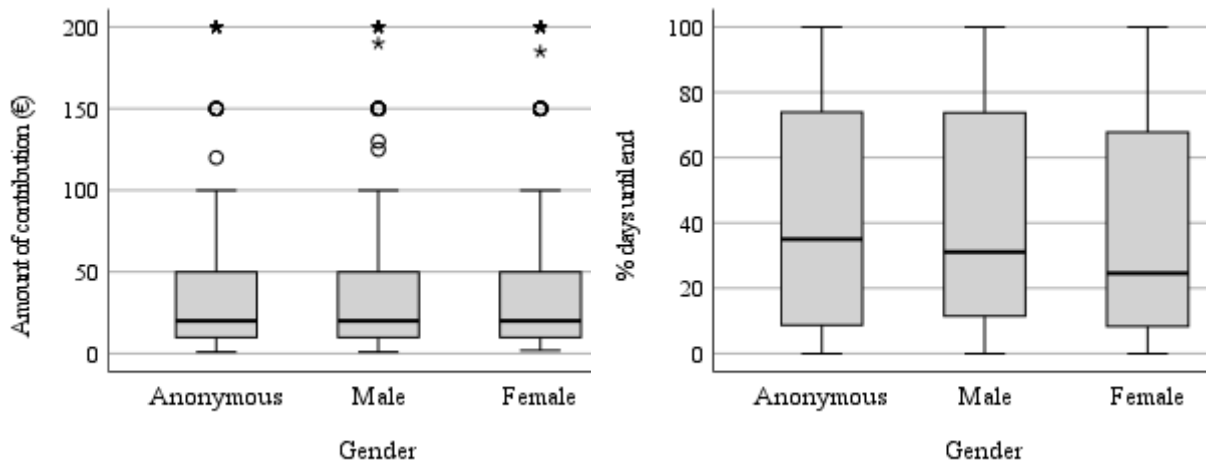


Figure 9: (a) Left pane: Boxplot of the amount of contribution (€) by gender, including the lower 95% amounts; (b) Right pane: Boxplot of percentage of days until the end of the campaign by gender

5.1.6 What effect did the type of group have on the campaigns?

As shown in Table 8, the (non-anonymous) individual contributions represent the highest number of donors and the overall contribution amount. Table A 8 in Appendix B shows, though, that while non-individual donations are only equivalent to 6.9 percent of total cases, they make up 18 percent of the total amount received. These non-individual contributions, include groups of individuals (e.g., a group or friends or family), organizations (e.g., firms), donations collected at events hosted or arranged by MONTIS, and donations collected by MONTIS to finance the campaign¹. Table A 8 shows that (i) organizations account for the largest mean donations and (ii) the average amount of donations coming from MONTIS coordinated events has a significantly higher average than the non-association organised average.

As far as the time of donations is concerned, Table A 6 in Appendix B shows that fund-raising in events not organized by MONTIS and which are directed towards crowdfunding campaigns is closer to its deadline. The boxplot in Figure 10a reinforces that the group type implies different donation behaviour, rather scattered and with many outliers, with the exception of the donations collected by MONTIS, that always had the same amount.

¹ These contributions are just for one of the campaigns, and do not exceed the self-funding legal limit of 20 percent of total target amount. Moreover, because these contributions were made in the middle of the campaign, they may have a possible acceleration impact on other donors, but there is no evidence of self-funding to meet the funding target.

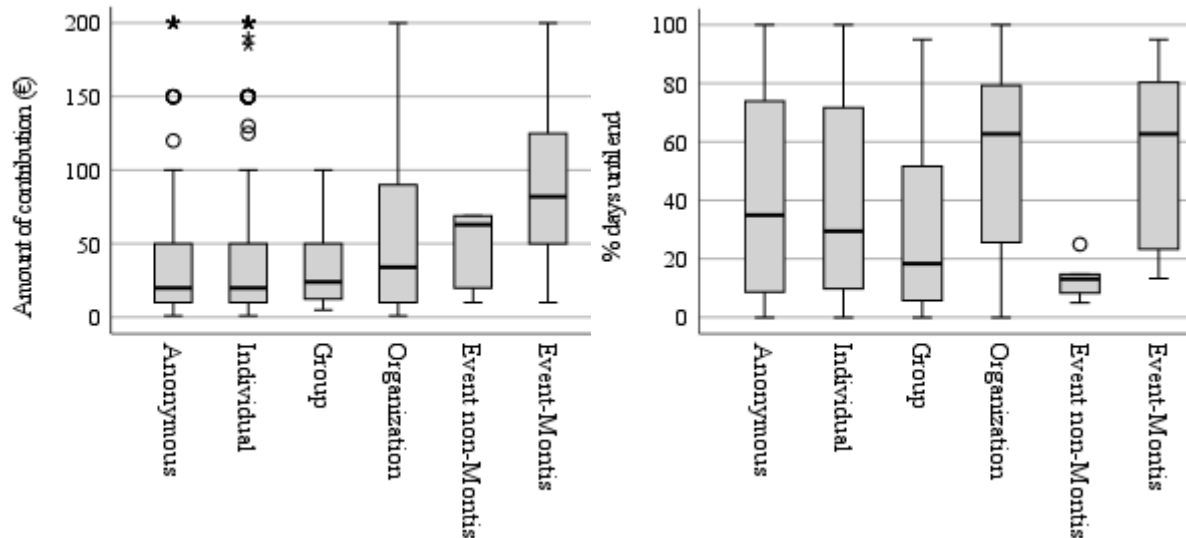


Figure 10: (a) Left pane: Boxplot of the amount of contribution (in €) by type of group, including the lower 95% amounts; (b) Right pane: Boxplot of percentage of days until the end of the campaign by type of group

In summary, excluding unidentified donations, the bulk of donations are made by entities (individual or collective) that are not MONTIS associates, mostly originating from metropolitan areas. At an individual level, most donations are made by male donors, whereas organizations, rather than groups of individuals, make up the majority of donations at collective level.

5.2 Qualitative study: interviews to inform the design of the survey

Following the first quantitative analysis, the research proceeds by selecting 40 individuals to participate in a semi-structured interview to decide on the content and phrasing of the survey instrument to be applied in the second quantitative study.

Those individuals were selected based on their diversity, since the purpose was to grasp the concepts that were significant to different environmental crowdfunding contributors, and to ask the right questions using the right language. Table A 12 in Appendix C shows how these 40 prospective interviewees were chosen, so that the sample included a wide range of attributes.

Within that sample, seven donors agreed to take part in 30-minute online interviews. The consent to participate was obtained via Google Forms (available as supplementary material in Appendix C). Their demographic is provided as supplementary material in Figure A 3 in Appendix C; however, only six backers attended the planned appointment. One additional interview was conducted with a relevant MONTIS representative.

The interviews took place between the 17th and 24th May 2021. During the interview, participants were asked to share information about their knowledge of crowdfunding campaigns, motivations to contribute to MONTIS initiatives, environmental attitudes, land management beliefs, and perceptions on compensating landowners to avoid land abandonment.

The main findings are related to the incorporation of additional survey choices, as follows.

— Q8. “Do you have any link to rural areas?”

The interviewees had one common characteristic: they were all involved in rural areas in some way; this is why it is so important to inquire whether respondents have any sort of relationship (e.g., as landowner and/or producer), since this link may impact the motivations to contribute.

— Q10-Q18 “General Awareness of Consequences (GAC) scale”

The scale was originally in English and was translated into Portuguese. In this case, the MONTIS responsible provided a crucial contribution to the phrasing of the questions.

— Q27. “In your opinion, how important are the following factors as motivation for your participation in crowdfunding initiatives?” & Q 41. “As a supporter of crowdfunding initiatives for the management and conservation of nature, what is the importance you attach to the following motivations for your participation?”

Most participants emphasized the significance of personally knowing the crowdfunding’s creator or the work developed by MONTIS, thus this motive was included in the survey. They all expressed concern for environmental issues.

— Q22. “In your opinion, in what way (negative or positive) do you evaluate the following consequences of the abandonment of agricultural or forestry territories?”

One participant drew attention to the possible benefits of wildfires, such as those stemming from rewilding. This was the reasoning behind framing the question as “negative/positive” effects.

— Q23. “In your opinion, how important are following factors as drivers of forest fires?”

One respondent underlined the relevance of “grazing in keeping land clean”, while all participants highlighted the importance of land management.

— Q28. “In your opinion, how important are the following factors as deterrents for the participation of other individuals in crowdfunding initiatives?”

Participants expressed a lack of confidence in charity-like projects, in light of problems with donations in public associations. Insufficient income was also frequently mentioned and added to the variety of answers.

Additionally, feedback from the pilot test was used to improve the design of the survey instrument, as follows:

— Section 10 | Forest Ecosystem Services

Respondents reported that the survey was too long, therefore we opted to include Section 10 as an optional section to minimize high abandonment rates. Notably, 88 percent of participants chose to go to the optional section.

— Q22. (...) consequences land abandonment” & Q 23. “(...) drivers of forest fires in forestry territories? & Section 10 | Forest Ecosystem Services

Respondents to the pilot test reported that they did not know the meaning or scope of some of the answer options, thus a “No option” choice was added.

— Q37 & Q 43 “How much confidence do you have in the following entities for a rational and appropriate forest management?”

One participant emphasized the significance of including the words “rational and appropriate” in these questions, which were originally worded as “How much confidence do you have in the following entities for forest management?”

Using these inputs, the survey instrument was modified such that it asked the right questions and used the right language (Cohen et al., 2001). The next section discusses the survey instrument’s findings.

5.3 Second quantitative study: survey instrument

5.3.1 Sample characteristics

The set of data consists of two samples, distributed by two different entities: the MONTIS sample, which includes 114 cases, and the Universidade do Porto (UP) sample, including 135 cases. Table 9 breaks-down the sample by entity that distributed the survey and also shows the frequency of respondents that have previously participated in crowdfunding (No/Yes).

Table 9: Decomposition of the total sample by source and participation in crowdfunding

		Participation in CF		Total
		No	Yes	
MONTIS	% within Source	7.0%	93.0%	100.0%
	% within Participation in CF	7.1%	77.9%	45.8%
	% of Total	3.2%	42.6%	45.8%
UP	% within Source	77.8%	22.2%	100.0%
	% within Participation in CF	92.9%	22.1%	54.2%
	% of Total	42.2%	12.0%	54.2%
Total	% within Source	45.4%	54.6%	100.0%
	% within Participation in CF	100.0%	100.0%	100.0%
	% of Total	45.4%	54.6%	100.0%

Within the MONTIS sample, 93.0 percent (106 cases) of respondents have participated in CF campaigns, but this number drops to 22.2 percent (30 cases) in the UP sample. From a different viewpoint, 77.9 percent of those who have contributed to CF (136 cases) come from the MONTIS sample, whereas 22.1 percent come from the UP sample.

Table 10 identifies individuals who have participated in CF, taking into account whether or not the campaign was directed at environmental protection.

Table 10: Decomposition of the CF=Yes sample, by source and participation in environmental crowdfunding

		Participation in environmental CF		Total
		No	Yes	
MONTIS	% within Source	1.9%	98.1%	100.0%
	% within Participation in environmental CF	9.5%	90.4%	77.9%
	% of Total	1.5%	76.5%	77.9%
Univ. Porto	% within Source	63.3%	36.7%	100.0%
	% within Participation in environmental CF	90.5%	9.6%	22.1%
	% of Total	14.0%	8.1%	22.1%

Within the total cases that participated in environmental CF (115 cases), 90.4 percent (104 cases) correspond to the MONTIS' sample, but that percentage drops to 9.6 percent (11 cases) in the UP sample. In different perspective, within the MONTIS sample, 98.1 percent of previous CF donors have participated in environmental crowdfunding, but, within the UP sample, only 36.7 percent of those who have participated in crowdfunding directed their donations to environmental protection.

Given that gender influences crowdfunding behaviour (Greenberg & Mollick, 2015), it is critical to segment both samples based on gender and prior CF participation. The total sample includes 42.2 percent of male participants and 57.4 percent of female participants. However, about 50.7 percent of individuals who participated in CF are male donors, while 48.5 percent are female donors. Figure 11 further refines the analysis, by separating the total sample into the MONTIS and UP subsamples.

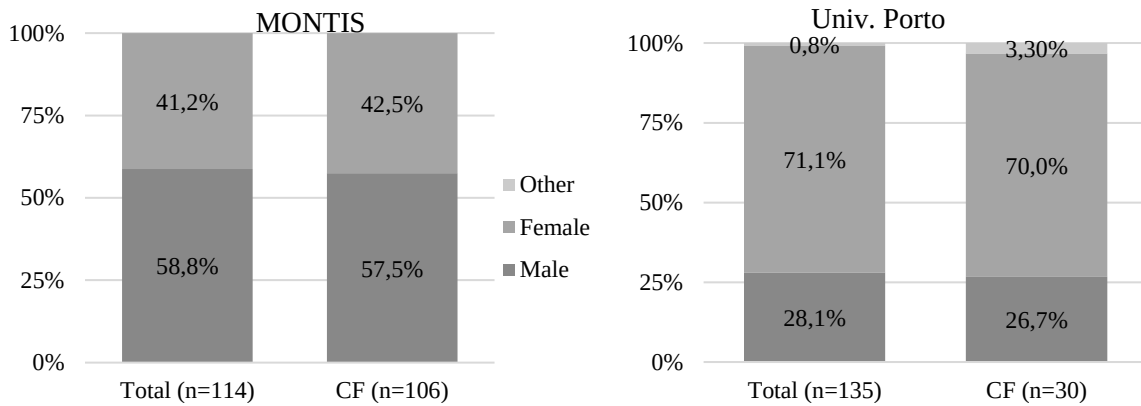


Figure 11: Distribution of gender (a) MONTIS sample; (b) UP sample

This Figure depicts the gender differences in both samples and, more significantly, underlines the importance of analysing the samples individually.

The socio-demographic characteristics (age, education level, income, nr. of children, residence, and link to rural areas) of the MONTIS and UP respondents are as follows.

Age has been identified as a potential determinant of the efficacy of fundraising appeals (Veríssimo et al., 2018). Figure 12 illustrates the age distribution for each sample, showing a significant difference between age groups, which is corroborated by the rejection of equality of medians (Mann-Whitney test). The median of the MONTIS sample is 45-54 years, while, as expected, the median of the UP sample is 25-34 years.

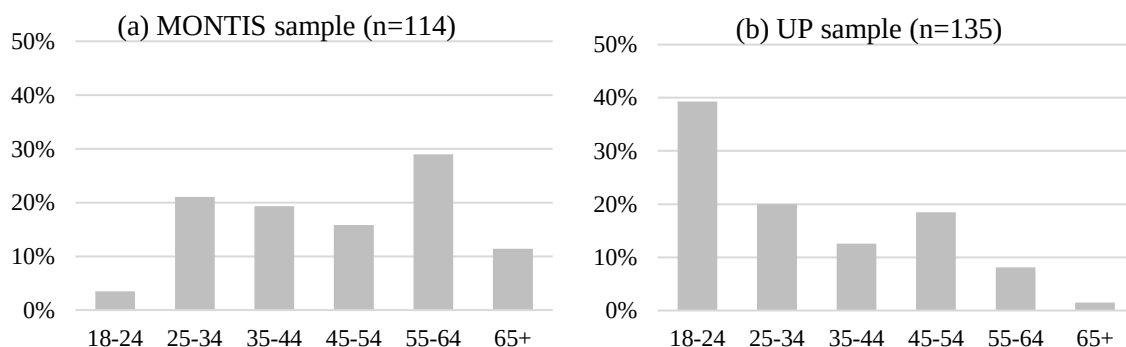


Figure 12: Distribution of the age in years. (a) MONTIS sample; (b) UP sample

The sample respondents can also be characterized depending on their education level, as shown in Figure 13. Indeed, education has been associated with environmental concerns attitudes and behaviours as well as willingness to contribute for environmental protection (Marbuah, 2019).

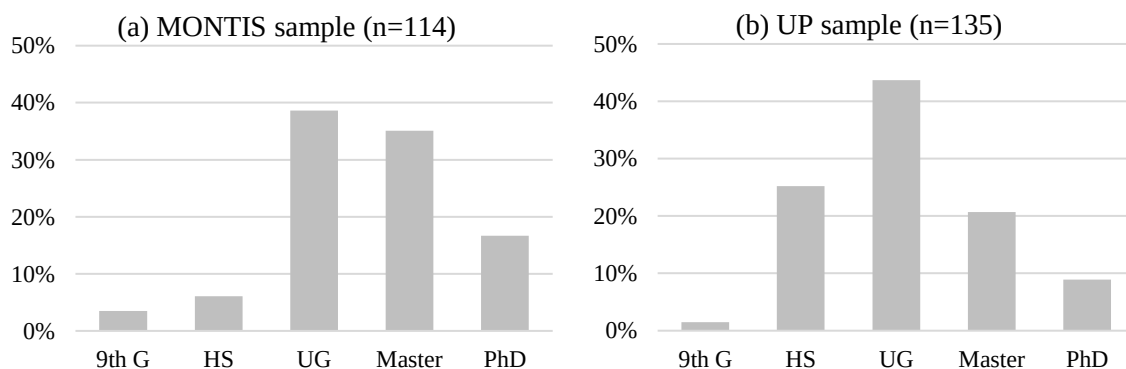


Figure 13: Distribution of the education level (a) MONTIS sample; (b) UP sample

Legend: 9th G = 9th grade; HS = high school; UG = undergraduation.

As show in the Figure 13, the mode of both samples is “undergraduation”; furthermore, the chi-square test for difference in the proportions does not reject the equality of proportions (two sided $p = 0.064$).

The income level is another variable that may influence the engagement in crowdfunding initiatives (Baumgärtner et al., 2017), thereby Figure 14 plots the distribution of this characteristic with respect to both samples.

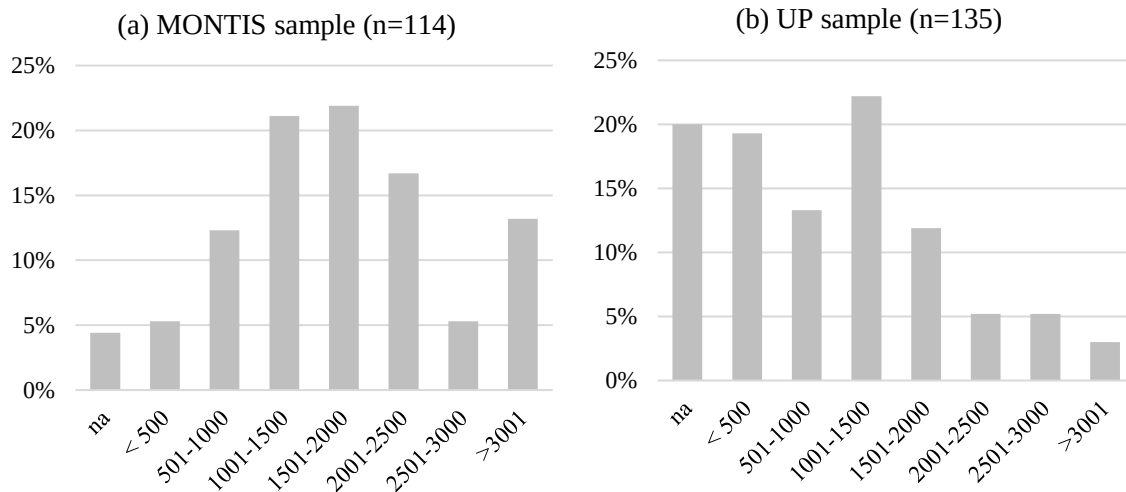


Figure 14: Distribution of the monthly income in euros. (a) MONTIS sample; (b) UP sample
Legend: na corresponds to “I’d rather not say”.

After excluding “I’d rather not say” cases, the Mann-Whitney test rejects the hypothesis of equal medians across samples (the MONTIS median is in the 1 501-2 000 € range, while the UP sample median range is in the 1 001-1 500 € interval).

Because the number of children may impact the environmental attitudes (Marbuah, 2019), Figure 15 shows how this variable is differently distributed in the samples, as confirmed by the appropriate t-test to the equality of means.

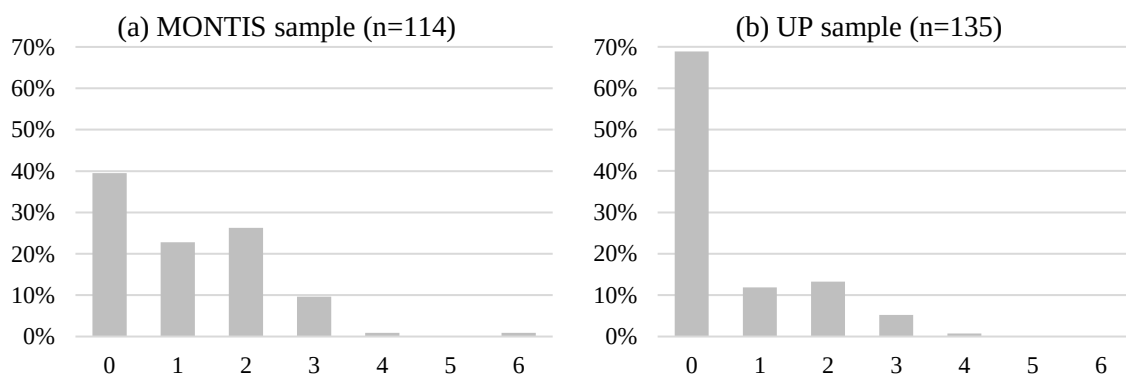


Figure 15: Distribution of the number of children. (a) MONTIS sample; (b) UP sample

The average number of children on the MONTIS sample is 1.1 children, while this value falls to 0.57 children in the UP sample.

The geographic distribution of the sample is depicted in Figure 16, which shows a higher concentration of participants residing in the District of Lisboa, for the MONTIS sample, and Porto, for the UP sample.

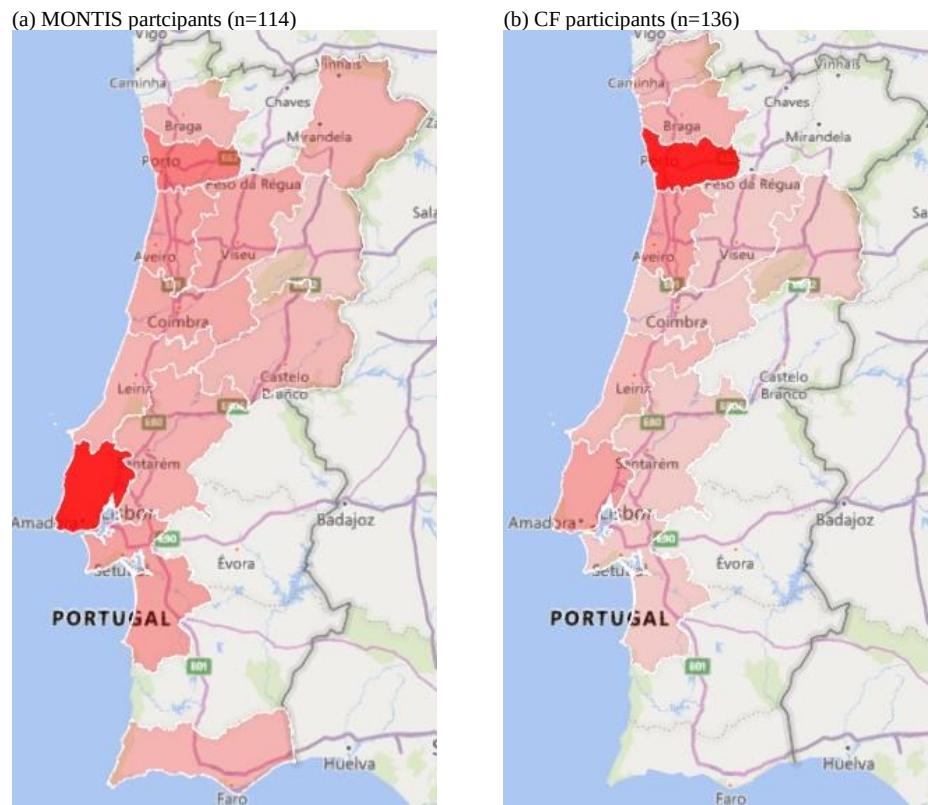


Figure 16: Geographic distribution (a) MONTIS sample; (b) UP sample

Finally, considering that all interviewees in the qualitative study has some type of liaison with the rural area, this study aims to investigate if this characteristic may be influential. Figure 17 shows that respondents' link is mainly due to their origins.

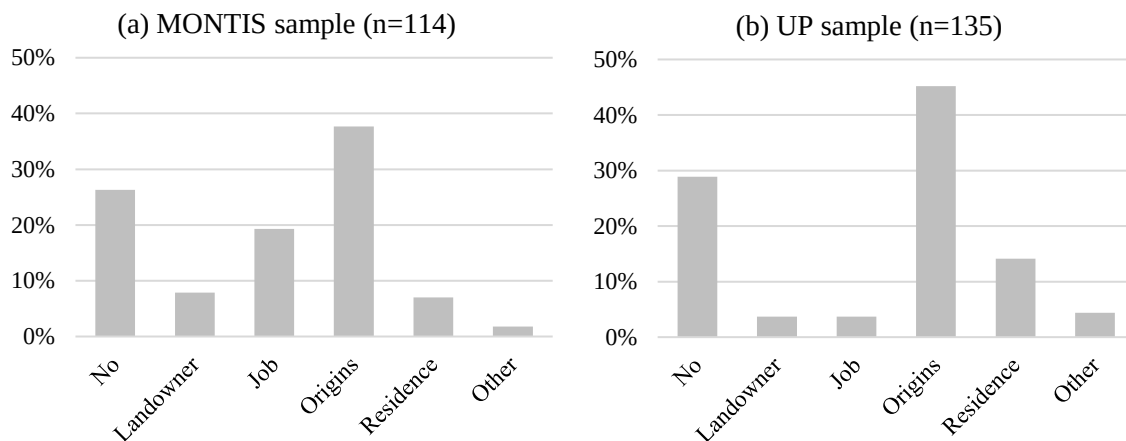


Figure 17: Distribution of link to rural area. (a) MONTIS sample; (b) UP sample

As perceived from the Figure 17, there are no significant differences between groups.

5.3.2 Attitudes and beliefs towards environment consequences

Environmental concerns is measured by General Awareness of Consequences (GAC) scale (Stern et al., 1995), which corresponds to Section 3 of the survey, as described in Appendix D.

This scale consists of nine items about the potential consequences of environment protection. For a better understanding, Table 11 repeats the scale items, information on whether the item is positively or negatively phrased, and the mean values. The advantage of the mean is that it can be located on the original scale. Because the median of a five-point scale is likely to encompass a large range of real percentile values, it is going to be ineffective for demonstrating disparities between groups.

Table 11: General Awareness of Consequences (GAC) scale (mean values)

Item (Q10-18)	Wording	MONTIS (n=114)	UP (n=135)
1. Environmental protection benefits everyone	Positive	4.89	4.82
2. Over the next decade, thousands of species of plants and animals will become extinct	Positive	4.15	4.28
3. Claims that we are changing the climate are greatly exaggerated	Negative	1.74	1.58
4. While some local plants and animals may have been harmed by environmental degradation, over the whole Earth there has been little effect	Negative	1.73	1.68
5. Environmental threats to public health have been exaggerated	Negative	1.77	1.62
6. Environmental protection is beneficial to my health	Positive	4.82	4.73
7. Environmental protection will provide a better world for me and my children	Positive	4.77	4.86
8. Environmental protection will help me to have a better quality of life	Positive	4.71	4.71
9. Environmental damage generated here harms people all over the world	Positive	4.17	4.33
Cronbach's alpha (recoded)		0.86	0.79

Scale (1 to 5): totally disagree; partially disagree; nor agree or disagree; partially agree; totally agree.

Legend²: (a) Reject equal means, and (b) reject equal medians at significance level of 5%.

At a significance level of 5%, both the t-test (to the equality of means) and the Mann-Whitney U test (to equality of medians) fail to reject the null hypothesis. As a result, the value orientation features in the responses of MONTIS and UP samples are not significantly different.

Furthermore, the scale comprises 9 items and Cronbach's alpha that exceeds the 0.7 threshold recommended by Hair et al. (2014). However, "it should be noted that while a high value of Cronbach's alpha indicates good internal consistency of the items in the scale, it does not mean that the scale is unidimensional" (Ojea & Loureiro, 2007, p. 811).

Stern et al. (1995) proposes that the items of this scale can be used to identify the following value orientation: egoistic [items 6, 7 and 8], social-altruistic [items 1, 5 and 9], and biospheric [items 2, 3 and 4]. However, Ryan and Spash (2008) propose a different interpretation as a measure of concern over the positive and negative consequences of environmental action and inaction. Thus, the literature is inconclusive regarding the interpretation of the factors.

² There are no statistically significant differences between the samples in this case. We chose to keep this legend in order to be consistent with other tables, and to highlight the fact that the statistical tests were actually applied.

The dimensionality of the scale was determined using exploratory factor analysis (EFA), and the factors loadings presented in Table 12 show the presence of two differentiated factors for the MONTIS sample and three factors for the UP sample.

Table 12: Factor loadings higher than 0.50 for General Awareness of Consequences (GAC) scale

Item (Q10-18)	MONTIS		UP		
	Factor 1	Factor 2	Factor 1	Factor 2	Factor 3
1. Environmental protection benefits everyone		0.631		.586	
2. Over the next decade, thousands of species of plants and animals will become extinct	0.693				.658
3. Claims that we are changing the climate are greatly exaggerated	0.783		.804		
4. While some local plants and animals may have been harmed by environmental degradation, over the whole Earth there has been little effect	0.766		.862		
5. Environmental threats to public health have been exaggerated	0.775		.842		
6. Environmental protection is beneficial to my health		0.764		.642	
7. Environmental protection will provide a better world for me and my children		0.822		.848	
8. Environmental protection will help me to have a better quality of life		0.826		.801	
9. Environmental damage generated here harms people all over the world	0.651				.863
Total variance explained cumulated	53.0%	64.2%	39.8%	54.9%	66.10%
KMO Measure of Sampling Adequacy	0.861			0.785	
Bartlett's Test of Sphericity (sig.)	<0.001			<0.001	

A KMO close to 1.0 and a low significance for the Bartlett's test suggest that the factor analysis may be useful. The percentage of total variance explained is consistent with the literature (Ryan & Spash, 2012).

In the MONTIS sample, two distinct factors were identified. Factor 1 appears to be characterized by a more “pessimistic” awareness [items 2, 3, 4, 5, and 9] (environmental protection has negative consequences), whereas factor 2 may be connected with a ‘beneficial (egoistic)’ attitude (beliefs that the environment is not being seriously harmed) [items 1, 6, 7, and 8].

With relation to the UP sample, factor analysis identifies three latent value orientations that might be characterized as “detrimental” [Items 3, 4 and 5], “beneficial (egoistic)” [items 1, 6, 7 and 8] and “global attitude” [items 2 and 9].

By combining the homogenous items together, factor analysis lowers the number of variables to be examined for subsequent analysis, such as regression modelling, in which environmental attitudes will be included as explanatory factors of the WTC.

5.3.3 Perceptions on land abandonment and wildfire

The next section of the survey seeks to understand the respondents' perceptions on the consequences (Table 13) of land abandonment and causes of forest fires (Table 14).

Table 13: Perception on the consequences of land abandonment (mean values)

Item (Q22)	MONTIS (n=114*)	UP (n=135*)
Loss of natural heritage ^(a)	1.70	1.49
Loss of cultural heritage	1.49	1.74
Increased wildfire risks	1.44	1.27
Increased environmental tourism	3.41	3.51
Increased area for wildlife	4.29	4.22
Increased area for native plants	4.34	4.33
Increased area for alien invasive plants	1.93	2.02
Accumulation of combustible material	1.95	1.64
Impact on biodiversity	2.82	2.71
Decreased human influence on ecosystems	3.62	3.87
Cronbach's alpha	0.77	0.61

Scale (1 to 5): very negative (1); negative (2) ; neutral, positive; very positive; no opinion.

*The calculation of the mean excludes "no opinion" response.

Legend: (a) Reject equal means, and (b) reject equal medians at significance level of 5%.

The weight attributed to each item does not significantly differ between groups. Moreover, the most negative consequence of land abandonment perceived by both samples is the increased risk of wildfires; furthermore, the loss of natural and cultural heritage also seems to be a cause of concern. Similarly, the item with the highest valuation - increased area for native plants - is considered to be very positive by both groups.

Regarding how these samples perceive the causes of wildfires, while the highest and lowest valuations are the same, there are significant differences in the other items.

Table 14: Perception on the causes of forest fires (mean values)

Item (Q23)	MONTIS (n=114*)	UP (n=135*)
Topography of land	3.20	3.17
Climate change ^{(a) (b)}	3.87	4.20
Land abandonment	4.22	4.07
Accumulation of flammable material	4.23	4.37
Land use planning ^{(a) (b)}	4.31	3.94
Rural depopulation ^{(a) (b)}	4.04	3.55
Decrease in grazing and land use ^{(a) (b)}	4.17	3.65
Cronbach's alpha	0.76	0.71

Scale (1 to 5): not at all important; low importance; important; very important; extremely important; no opinion.

*The calculation of the mean excludes "no opinion" response.

Legend: (a) Reject equal means, and (b) reject equal medians at significance level of 5%.

Significant differences exist between the MONTIS and UP samples in terms of (i) land use planning, rural depopulation and decreases in grazing and land use, which are more specific items, and more valuable to the MONTIS sample; and (ii) in climate change, which is a more general item, and highly important to the UP sample.

5.3.4 Crowdfunding motivations and deterrents

Sections 5 and 6 of the survey address the motivations of crowdfunding. Section 5 is directed at those individuals that have previously participated in crowdfunding (93 percent of MONTIS sample and 22 percent of UP sample), while Section 6 is for those who have claimed no previous participation in such initiatives. Only respondents who have prior participation were asked about their motives (Table 15).

Table 15: Motivation to participate in crowdfunding (mean values)

Item (Q27)	MONTIS (n=106)	UP (n=30)
Desire to collect rewards ^(a)	1.59	2.07
Help others	3.74	4.03
Support causes	4.18	4.17
Be part of a community	2.91	2.87
Gain social recognition	1.41	1.53
Contribute to projects in remote regions ^{(a)(b)}	2.68	3.17
Easiness of the process	3.41	3.60
Donate the amount I wish (no matter how small) ^{(a)(b)}	3.76	4.20
Donate anonymously	3.07	3.43
Personally support the creator of the campaign	3.15	3.40
Know all the details of the project ^{(a)(b)}	3.54	3.97
Know exact amount of the project	3.37	3.57
Cronbach's alpha	0.74	0.83

Scale (1 to 5): not important; low importance; important; very important; extremely important.

Legend: (a) Reject equal means, and (b) reject equal medians at significance level of 5%.

Gaining social recognition and the desire to earn rewards are given very low priority in both samples, implying an altruistic mindset. This assessment is in accordance with the evaluation of support causes. However, there is a significant difference in the ability to contribute a modest sum. This issue is more essential to the UP sample, which may be due to the respondents' lower median income.

Table 16 shows the findings of the impediments to participate in crowdfunding, both as perceived by those who have previously participated (CF=Yes), and as recognized by those without a former participation (CF=No). As a result, it is possible to compare perceived and real deterrents in addition to comparing groups.

Table 16: Deterrents to participate in crowdfunding (mean values)

Item (Q28, Q31)	CF=Yes		CF=No	
	MONTIS (n=106)	UP (n=30)	MONTIS (n=8)	UP (n=105)
Considering that the projects are untrusty ^{(b*) (c*) (d)}	4.08	4.27	2.50	3.30
Not knowing the creator ^{(a)(b*)}	3.52	4.13	2.88	4.10
Lack of confidence in crowdfunding process ^{(a) (d)}	3.31	4.10	2.88	3.69
Unappealing campaigns ^{(b*) (c*)}	3.35	3.43	2.50	3.24
Lack of promotion of the campaigns ^(a)	3.65	4.10	3.38	4.11
Uncertainty about effectiveness ^(a)	3.72	4.23	4.00	4.08
Finding that individual support makes no difference ^{(a*) (d)}	2.67	3.23	2.00	2.22
Having insufficient income to contribute ^(a*)	3.27	4.03	2.88	3.65
Cronbach's alpha	0.73	0.79	0.72	0.59

Scale (1 to 5): not important; low importance; important; very important; extremely important.

Legend: Within CF = Yes (a) Rejects equal means, and equal medians between MONTIS and UP; Within CF = No (b) Rejects equal means, and equal medians between MONTIS and UP; Within MONTIS sample (c) Rejects equal means, and equal medians between CF = Yes and CF = No; Within UP sample (d) Rejects equal means, and medians between CF = Yes and CF = No. *Rejects equality in means, but retains equality in medians; significance level of 5%.

Table 16 shows that the major reason for not contributing differs between individuals who have given through crowdfunding (CF=Yes) and those who have not (CF=No). The former feels that the primary obstacle is “considering that the projects are untrusty”, whereas the latter says that the main impediment is “Uncertainty about effectiveness”. Because of the different size of each subsample, there are statistical differences between the MONTIS and UP samples, which should be carefully evaluated.

Sections 7 and section 8 of the survey investigates the drivers of environmental crowdfunding as perceived by respondents who have never contributed to this sort of campaign and those who have already participated, respectively. Among these, the majority of MONTIS sample was able to identify a CF platform; however, in the UP sample, 68.6 percent of respondents could not identify a crowdfunding platform. Table 17 shows the motivations of respondents that claim to have participated in crowdfunding for environmental protection.

Table 17: Motivation to participate in environmental crowdfunding (mean values)

Item (Q41)	MONTIS (n=104)	UP (n=11)
Knowing the territory	2.76	2.91
Personally knowing the promotor	2.55	2.45
Protecting a Portuguese ecosystem	4.18	4.18
Preventing land abandonment	4.12	3.82
Promoting biodiversity	4.47	4.73
Be affectively connected to the region	2.22	2.64
Cronbach's alpha	0.54	0.83

Scale (1 to 5): not important; low importance; important; very important; extremely important.

Legend: (a) Reject equal means, and (b) reject equal medians at significance level of 5%.

The most common reason for contributing to environmental crowdfunding is “Promoting biodiversity”, with no significant differences between samples.

Finally, Table 18 exhibits the deterrents to participation in environmental crowdfunding (ECF), as viewed by those who had (ECF=Yes) and who had not (ECF=No) been involved in environmental crowdfunding campaigns.

Table 18: Deterrents to participate in crowdfunding directed at environmental protection (mean values)

Item (Q32, Q42)	ECF=Yes		ECF=No	
	MONTIS (n=104)	UP (n=11)	MONTIS (n=10)	UP (n=124)
I don't think the benefits are worth paying for. ^(c*) (d)	3.08	3.82	1.90	1.93
I think there are downsides to restoration that outweigh the benefits. ^(d)	2.06	2.45	2.10	1.59
I'm not confident that the restoration project will actually provide the benefits. ^{(c*)(d*)}	3.73	4.00	2.90	3.04
I think that government money should support the whole project, without need for private donations. ^(a)	3.38	4.45	3.50	3.85
I don't give to charitable or non-for-profit organizations. ^{(a*)(b)} ^{(c) (d)}	2.39	3.36	1.20	1.89
I don't trust that my money would actually go to the restoration project ^{(c*)(d)}	3.31	3.82	2.30	2.41
Cronbach's alpha	0.77	0.62	0.57	0.71

Scale (1 to 5): not important; low importance; important; very important; extremely important.

Legend: Within ECF = Yes (a) Rejects equal means, and equal medians between MONTIS and UP; Within ECF = No (b) Rejects equal means, and equal medians between MONTIS and UP; Within MONTIS sample (c) Rejects equal means, and equal medians between CF = Yes and CF = No; Within UP sample (d) Rejects equal means, and medians between CF = Yes and CF = No. *Rejects equality in means, but retains equality in medians; significance level of 5%.

The belief that environmental preservation is a government responsibility appears to be the most significant deterrent; yet, from the perspective of those who consistently contribute, the primary hurdle to involvement is (or would be) ambiguity regarding the advantages of environmental protection.

Table 18 demonstrates, for example, that the deterrent “*I don't give to charitable or non-for-profit organizations*” is differently evaluated by participants from all four different samples: participants drawn from either group, and that have already participated in environmental crowdfunding imagine that this deterrent is significantly more important than the judgment of those who have actually *not* participated in those campaigns.

Section 7 and 8 of the survey ask for additional information on the level of trust in four entities/institutions for rational and suitable forest management. The mean of the trust ratings is shown in Table 19.

Table 19: Degree of trust placed in different entities for rational and appropriate forest management (mean values)

Entities (Q37, Q43)	MONTIS (n=114)	UP (n=135)
Environmental associations ^{(a)(b)}	3.65	3.33
Landowners	2.59	2.47
Local government ^(a)	2.36	2.58
Central government ^{(a)(b)}	2.01	2.35
Cronbach's alpha	0.55	0.60

Scale (1 to 5): I do not trust; I have little trust; I have moderate trust; I have a lot of trust; I strongly trust.

Legend: (a) Reject equal means, and (b) reject equal medians at significance level of 5%.

The two samples show quite significant different levels of trust in environmental associations and the central government. However, both samples agree that environmental associations have the highest level of confidence, whereas central governments receive the lowest trust.

5.3.5 Perceptions on Forest Ecosystem Services (FES)

The aim of Section 10 is to assess the relevance assigned to various FES; however, due to the length of the survey, this section is optional. Within the MONTIS sample, 102 respondents chose to continue filling out the questionnaire, while 117 participants in the UP sample, agreed to answer additional questions.

Table 20 shows of the MONTIS and UP sample evaluations in terms of the importance assigned to each forest ecosystem product and service.

Table 20: Importance of FES (mean values excluding “No opinion” responses)

FES (Q45-48)		MONTIS (n=102)		UP (n=117)	
		Mean	No opinion (%)	Mean	No opinion (%)
Provision services	Food ^{(a)(b)}	4.28	0.0%	4.55	0.9%
	Clean water ^{(a)(b)}	4.71	0.0%	4.85	0.9%
	Wood	4.00	0.9%	4.19	1.7%
	Resin ^{(a)(b)}	3.61	3.5%	3.89	3.4%
	Game meat	2.66	2.6%	2.76	3.4%
	Medicinal plants ^(a)	3.90	2.6%	4.27	4.3%
Cronbach's alpha		0.72	---	0.67	---
Regulation services	Air quality regulation	4.67	0.0%	4.81	0.0%
	Water regulation ^{(a)(b)}	4.64	0.9%	4.81	0.7%
	Soil erosion regulation	4.76	0.0%	4.63	2.2%
	Climate regulation through carbon sequestration	4.58	1.8%	4.65	8.9%
	Pollination	4.67	1.8%	4.65	3.7%
	Cronbach's alpha	0.74	---	0.69	---
Cultural services	Recreation	3.97	0.0%	4.00	0.7%
	Tourism	3.72	0.0%	3.66	0.0%
	Landscape sightseeing	4.25	1.8%	4.19	0.0%
	Educational services ^{(a)(b)}	4.31	0.0%	4.52	0.0%
	Spiritual experiences	3.05	6.1%	3.09	6.7%
	Cronbach's alpha	0.74	---	0.70	---
Support services	Nutrient cycling	4.64	2.6%	4.62	5.9%
	Soil formation	4.63	1.8%	4.58	4.4%
	Cronbach's alpha	0.89	---	0.87	---

Scale (1 to 5): not important; low importance; important; very important; extremely important; no opinion.

Legend: (a) reject equal means, and (b) reject equal medians at significance level of 5%.

The results indicate that respondents value provision and regulation services the highest; moreover, the “no opinion” answer has a higher frequency in UP sample, suggesting that the MONTIS sample is better informed about FES. Furthermore, the UP sample, which presumably includes a large number of students (as suggested by the age distribution of this sample), places a higher value on “Educational services”.

In Section 10, following the identification of FES preferences, respondents were asked if they would be WTC for these services. The MONTIS sample participants signalled a stronger willingness to pay for these services, as seen in Table 21.

Table 21: Willingness to contribute to FES provision (% YES)

Item Q49	MONTIS (n=102)	UP (n=117)
Would you be willing to contribute financially to ensure the provision of forest ecosystem services? (Yes/No) ^(b)	94.1% ^(a)	68.4% ^(a)

Legend: (a) Chi-square test rejects equal proportions (within each group) at significance level of 5%; (b) Pearson Chi-square test rejects equal proportions between groups at significance level of 1%.

The final purpose of this section is to understand the drivers of the WTC for FES.

Table 22: Reasons for WTC for FES (mean values)

WTC = Yes	Item (Q50)	MONTIS (n=96)	UP (n=80)
How important are the following reasons why you would be <i>willing to contribute</i> financially to FES?	Because we all enjoy the benefits of nature.	4.27	4.48
	To supplement landowners' income and reduce the risk of forest abandonment. ^{(a)(b)}	3.50	3.13
	To encourage landowners to increase the supply of ecosystem services.	3.07	3.53
	Because it is fair that the owners' income is supplemented, as they are offering unpaid services to society. ^{(a)(b)}	3.67	3.24
	Cronbach's alpha	0.78	0.73
WTC = No	Item (Q51)	MONTIS (n=6)	UP (n=37)
Reasons why you would <i>not be willing to contribute</i> financially to FES?	I have insufficient income to be able to contribute.	2.67	3.73
	The problem is the state/government's problem.	3.83	3.49
	I don't think these services are relevant enough.	2.50	1.73
	I already pay too much taxes.	4.00	3.54
	I don't trust that my contribution will be put to good use.	2.83	3.14
	Cronbach's alpha	0.49	0.48

Scale (1 to 5): not important; low importance; important; very important; extremely important; no opinion.

Legend: (a) reject equal means, and (b) reject equal medians at significance level of 5%.

In terms of WTC motives, both samples agree that “we all enjoy the benefits of nature“, implying that respondents are aware of free-rider dilemma in the provision of FES. However, the samples differed in their identification of the most effective deterrents: the (small) MONTIS sample believes that they already pay enough taxes and paying for FES is a government duty; whereas, the UP sample main deterrent is income, which has previously been identified as having a lower median income (the MONTIS median is in the 1 501-2 000 € range and the UP sample median is in the 1 001-1 500 € range).

Concerning the reasons why respondents would be WTC, they have different means/medians in two items: to supplement landowner's income is more valued by the MONTIS sample; however, there are no statistically different means and medians in terms of the reasons why those participants do not contribute.

5.3.6 Willingness to contribute (WTC) to environmental protection

The WTC to environmental protection is assessed in two different sections: in Section 3, immediately following the value orientation that signals environmental concern (GAC scale in Table 23), using the International Social Survey Programme - Environment III (ISSP Research Group, 2012); and in Section 7, which includes questions posed to those who have never participated in environmental crowdfunding, using a scale developed for this study (Table 24).

Table 23: Willingness to pay to protect the environment (mean values)

Item (Q19-21)	MONTIS (n=114)	UP (n=135)
How willing would you be to pay much higher prices in order to protect the environment? ^{(a)(b)}	3.82	3.27
And how willing would you be to pay much higher taxes in order to protect the environment? ^{(a)(c)}	3.45	3.13
And how willing would you be to accept cuts in your standard of living in order to protect the environment? ^{(a)(c)}	3.88	3.51
Cronbach's alpha	0.85	0.78

Scale (1 to 5): very unwilling; fairly unwilling; neither willing nor unwilling; fairly willing; very willing.

Legend: (a) Reject equal means, (b) reject equal medians at significance level of 5%, (c) reject equal medians at significance level of 10%.

The WTC of the MONTIS sample is significantly higher than that of the UP sample. In fact, respondents of the MONTIS sample are more willing to contribute (by either scheme) to environmental protection than those in the UP sample; yet, both agree on the most preferred scheme: a reduction in the living standards.

Table 24: Willingness to contribute through a crowdfunding campaign (mean values)

Item (Q33-36)	MONTIS (n=10)	UP (n=124)
Would you be willing to voluntarily contribute through crowdfunding to protect the environment?	3.50	3.36
Would you be willing to contribute via crowdfunding for an environmental association to buy abandoned territories to proceed with their forest management and conservation?	3.40	3.27
Would you be willing to contribute via crowdfunding to the implementation of forest management protocols between an environmental association and the owners of territories at risk of abandonment?	3.30	3.34
Would you be willing to contribute via crowdfunding to the clean-up of territories at risk of abandonment in order to reduce fuel material (limiting the risk of fires)?	3.40	3.42
Cronbach's alpha	0.94	0.94

Scale (1 to 5): very unwilling; fairly unwilling; neither willing nor unwilling; fairly willing; very willing.

Legend: (a) Reject equal means, and (b) reject equal medians at significance level of 5%.

There are no significant differences across the samples when it comes to WTC via crowdfunding. However, due to the small size of the sample, the MONTIS sample results should be read with cautious. Respondents in the UP sample appear to be more inclined to pay for a more particular project (cleaning up areas to avoid wildfires) rather than general initiatives.

In summary, the WTC via higher prices, taxes, or a reduction in standards of living is significantly higher in the MONTIS sample; however, the WTC via crowdfunding it is not statistically different across samples. Again, caution is needed in the interpretation, as the items in Table 23 were answered by all respondents, but the items of Table 24 were directed at people who had never contributed to crowdfunding.

5.3.7 Determinants of willingness to contribute (WTC)

Demographics

One way ANOVA is used to test if *age, education, income, nr. of children*, and *link to rural areas* (each including more than two groups) are demographics that indicate different WTC means. If a significant difference exists, post-hoc Tukey's HSD test is used to determine the group(s) that differ from the others. Furthermore, the independent samples t-test for *gender* and *prior participation in CF* (both with two groups) is performed; and Pearson's correlation for *Pop. Km²* (continuous variable).

Table 25 shows the demographics for which at least one group mean differs from the other means, with a 5% significance level in relation to the WTP for environmental conservation.

Table 25: WTC to environmental conservation and demographic characteristics

Item (Q19-21)	MONTIS (n=114)	UP (n=135)
How willing would you be to pay much higher prices in order to protect the environment?	-----	Gender ^(a)
And how willing would you be to pay much higher taxes in order to protect the environment?	Gender ^(a)	Gender ^(a)
And how willing would you be to accept cuts in your standard of living in order to protect the environment?	Gender ^(a) , Income ^(b) , Link to rural ^(c)	-----

Scale (1 to 5): very unwilling; fairly unwilling; neither willing nor unwilling; fairly willing; very willing.

Legend: (a) Female respondents' mean WTC higher than male respondents; (b) Low income mean WTC higher than high income; (c) Link to rural areas "profession" with higher mean than link to rural area "origins".

Similarly, Table 26 shows the characteristics that impact the WTP through crowdfunding among people who have never engaged in environmental crowdfunding.

Table 26: WTC to crowdfunding and demographic characteristics

Item (Q33-36)	MONTIS (n=10)	UP (n=124)
Would you be willing to voluntarily contribute through crowdfunding to protect the environment?	-----	Age ^(a)
Would you be willing to contribute via crowdfunding for an environmental association to buy abandoned territories to proceed with their forest management and conservation?	-----	Education ^(b) , Age ^(a) , Income, Nr. of children ^(c)
Would you be willing to contribute via crowdfunding to the implementation of forest management protocols between an environmental association and the owners of territories at risk of abandonment?	-----	Nr. of children ^(c)
Would you be willing to contribute via crowdfunding to the clean-up of territories at risk of abandonment in order to reduce fuel material (limiting the risk of fires)?	-----	Education ^(b) , Age ^(a) , Nr. of children ^(c)

Scale (1 to 5): very unwilling; fairly unwilling; neither willing nor unwilling; fairly willing; very willing.

Legend: Tukey HSD test (a) Group 65+ years with lower WTC than any other group, (b) Group 9th grade with lower WTC than any other group; (c) Group with 0 with higher WTC than 2 children group.

Because of the small size of the MONTIS sample, none of the demographic characteristics influences the WTC. However, demographics influence the WTC in the UP sample. The Tukey HSD test identifies the 65+ age group as having a lower WTC than the other groups. Furthermore, in terms of education level, the 9th grade group has a significantly different lower mean than other education levels. Regarding the number of children, differences are found between the zero and two child groupings.

Attitudes

To assess if value orientation, as measured by GAC scale, impacts the WTC, the study used factor scores in multiple regression analyses to investigate the factors' capacity to predict WTP (Keskin et al., 2007; Ojea & Loureiro, 2007). The factor loadings coefficients in Table 12 were used to generate factor score values in SPSS, and these score values for the selected two factors (in MONTIS sample) or three factors (in UP sample) were used as independent variables in multiple linear regression analysis to determine significant factors of WTC. As seen in Table 27, all selected factors had strong significant linear relationships with WTC. However, these two or three factors account for just a small percentage of the variance in the WTC, as assessed by R^2 .

Table 27: Regression coefficients of WTC to environmental conservation on value orientation

Item (Q19-21)	MONTIS (n=114)			UP (n=135)			
	Predictor			Predictor			
	Factor 1	Factor 2	R ²	Factor 1	Factor 2	Factor 3	R ²
... to pay much higher prices?	0.361***	0.183**	16.4%	0.200	0.122	0.285***	9.7%
... to pay much higher taxes?	0.445***	0.235***	25.3%	0.134*	0.276***	0.211***	13.9%
... to accept cuts in your standard of living?	0.390***	0.268***	22.4%	0.250***	0.222***	0.160**	13.7%

Legend: *significant at 10%; ** significant at 5%; *** significant at 1%.

As shown in Table 27, both Factors 1 and 2 (pessimistic and optimistic value orientations) have positive and significant effects on WTC in the MONTIS sample, whereas only Factor 3 (“global attitude”) consistently has significant effects on WTC in the UP sample, suggesting that “detrimental” and “beneficial (egoistic)” concerns do not affect WTP. It is worth noting that R^2 values are relatively low, which indicates that several other elements influencing WTC are not being considered.

Table 28 exhibits the results of multiple regression analysis conducted on those who had never participated in environmental crowdfunding,

Table 28: Regression coefficients of WTC to environmental conservation on value orientation (CF = No)

Item (Q19-21)	MONTIS (n=10)			UP (n=124)			
	Predictor			Predictor			
	Factor 1	Factor 2	R ²	Factor 1	Factor 2	Factor 3	R ²
(...) to protect the environment?	0.179	-0.258	6.6%	0.384***	0.104	0.173**	18.8%
(...) to buy abandoned territories to manage?	0.001	-1.558	28.4%	0.330***	0.232***	0.173**	19.1%
(...) to implement management protocols?	-0.103	-0.849	13.6%	0.300***	0.195***	0.295***	21.5%
(...) to clean-up ... (limiting the risk of fires)?	0.001	-1.771	33.9%	0.363***	0.125	0.220**	19.5%

Legend: *significant at 10%; ** significant at 5%; *** significant at 1%.

Table 28 shows that the environmental attitudes do not seem to affect the WTC of the MONTIS sample; however, this sample is too small to allow for a reliable interpretation. Factors 1 (“detrimental”) and 3 (“global”) have positive and significant effects on all WTC dimensions in the UP sample. These findings also suggest that the WTC (of those who had not previously contributed) is higher when they have more “detrimental” concerns.

5.3.8 Information from additional comments

The findings from the comments left by respondents are presented in this section of the study.

Most comments concern who should pay for environmental protection. Some respondents express reservations about the effectiveness of private donations, pointing to the fact that not all environmental NGO, whether well-intentioned or not, deserve to be trusted. In this respect,

“When environmental associations decide to go further than they can go, they undermine their own mission and that of other environmental initiatives, increasing the general scepticism about the effectiveness of these actions.”

“The scandals of recent years have undermined all confidence in any endeavour.”

This apprehension extends to donating directly to landowners. However, respondents also stated that it is the government’s responsibility to complement landowners’ income,

“(…) not only for the social ideology of what a government should be (in this case protection of the greater interests of the environment while causing less harm to people), but also for the ability to monitor these actions on a much larger scale.”

Another respondent, on the other hand, assigns that responsibility to private firms:

“I do not believe that ordinary citizens should pay for the costs of a safer planet when those who profit from it are the large corporations that continue to earn profits via uncontrolled consumerism and rising pollution.”

Regarding FES, respondents refer that their benefits remain unclear to the general public, who could benefit from more information on several environmental issues. Furthermore, according to one respondent, not all FES are beneficial, such as

“(…) recreational activities, which are sometimes indiscriminate and often harmful to the environment (e.g., motorcross).”

Furthermore, some UP participants expressed preference for volunteer work over monetary contributions.

“Instead of money, offer your time (effort) for environment protection”

“I would also prefer to join in solidarity actions on my own (e.g., picking up litter in the forests).”

These comments seem consistent with the UP sample’s concern about environmental protection and their income distribution.

6 Discussion of results

The discussion section follows the sequence of the study: it begins by examining and interpreting the MONTIS donor set of data and moves on to understand the results of the survey instrument.

6.1 MONTIS donors' database

Crowdfunding allows founders to raise capital for a variety of purposes. In the case of MONTIS, the capital is used to purchase privately owned and abandoned land in order to implement appropriate land management and “to promote the conservation of native species, to smart-manage forest fires and other natural hazards, and to increase the market value of biodiversity” (MONTIS, 2021b).

Since 2014, all five crowdfunding campaigns used to purchase abandoned land have been fully funded, and by 2021, the campaign “*Como coisa que nos é cedida*” (CF4) is the environmental campaign that has raised the most funds within the universe of projects of the crowdfunding platform PPL, the Portuguese leader in reward and donation based crowdfunding with over 5 million euros raised (Kleverlaan et al., 2021; PPL, 2021).

The 100 percent success of MONTIS fundraising compares favourably to a 44 percent success rate in the same [PPL] crowdfunding platform (PPL, 2021), a 38 percent average success rate of Kickstarter (2021), the most popular US crowdfunding platform, and a 22.4 percent average success rate of crowdfunding campaigns in the US (Fundera, 2020). MONTIS raised an average of 17'440 € per campaign, far exceeding the average value of 3'523 € raised per campaign on PPL (2021). However, it falls short of the average US funding for successful campaigns, which is \$28'656 (Fundera, 2020).

Small donations, as expected, are the backbone of crowdfunding (Table 6): overall, 50 percent of supporters contribute with 20€ or less, and 75 percent of supporters contribute to less than 50€ (except on CF3, which had a lower target amount). The findings confirm previous ones, as they show that most backers are one-time contributors (Simon et al., 2019) and crowdfunding initiatives rely on a large number of (small) donations. We also found that 18.3 percent of cases are anonymous. According to the literature on charitable contribution, research has established that when people are scrutinized, they become more generous (Burtch et al., 2013), suggesting that anonymity increases the incentive to donate small amounts.

These results will have implications on the campaign's design, because they suggest that crowdfunding should be promoted widely in order to reach as many supporters as possible, regardless of how small their contributions may be.

Table 4 also shows that, with the exception of the inaugural campaign CF1 in 2014 and CF3 with the lowest goal, all three campaigns were 3 to 7 percent above target. This finding is consistent with previous research, which indicates that “failures happen by large amounts, successes by small amounts” (Mollick, 2014, p. 6). One possible explanation for this pattern is how donors react to the actions of other backers; herding and bystander effects among funders tend to favour projects that signal that the goal is attainable (Kuppuswamy & Bayus, 2018).

It is important to note that potential donors are aware of the current level of support from other backers, as well as the timing of their own funding decisions. As such, an initiative with a large amount of community support signals that the project is of high quality, thereby attracting more

backers. Our findings seem to support this motive, since most donations are concentrated in the second half of the campaign's duration, following other backers funding decisions. Another possible explanation is the "all-or-nothing" mechanism, in which donors are reimbursed if the goal is not met. This mechanism is an incentive for creators to make up the difference whenever the campaign is nearing the end. However, this does not seem to be the case, as there is no evidence of a significant increase in donations during the final days of the campaigns (Figure A 1 in Appendix B).

In terms of gender, male donors account for 46.2 percent of donations, while female donors account for 30.1 percent (the remainder correspond to non-individual entities); male total contributions amount to 41.4 percent of total funds raised, while female contributions correspond to 22.4 percent. Even after adjusting for non-individual donations, those percentages are far below their proportion in the overall population. These findings are consistent with other studies, e.g. Gafni et al. (2021, p. 237) who found that "The majority of backers were also men, (...) about 45% of Kickstarter project backers are female." Similarly, Cecere et al. (2017) observes that men appear to contribute more to crowdfunded projects than women; however, gender has no effect on the amount of the money invested. This profile has been associated with a high risk aversion in women (Mohammadi & Shafi, 2018). However, in charitable or humanitarian giving, women tend to contribute more than men, owing to their traditional and cultural gender socialisation role as caregivers and nurturers (Torgler & Garcia-Valinas, 2007). Taking into consideration the mixed results of prior research, our findings suggest that, in the sample, women's risk profile seems to override the gender social role.

The geographical dispersion of donors is consistent with previous research, as the increasing geographic spread from where platforms are based to where proponents are hosted and where projects are ultimately delivered signal a global-scale mechanism of flows (Gallo-Cajiao et al., 2018). Moreover, our findings indicate that most donors are concentrated in more urban areas. On the one hand, an income effect seems to exist, as these areas have higher local purchasing power (LPP). On the other hand, we can argue that a more urban population, eventually with a more "romantic view" of rural areas (as stated by one of the interviewees in the qualitative phase) is more prone to contribute, rather than individuals originating from rural areas, who understand the difficulties of a rational land management. Obeng and Aguilar (2018) found that urban respondents were more familiar with the concepts of ecosystem service and PES than rural respondents. The authors expected that this familiarity would induce higher donations from urban respondents, but results showed no impact on WTC estimates.

According to MONTIS, its success is due to a meticulous preparation, which seems to validate previous findings reporting that projects signalling high quality are more likely to receive funds (Mollick, 2014) and that marketing can have a significant impact on donor behaviour (Veríssimo et al., 2017). This preparation seems to be determinant in the success of MONTIS campaigns, and is consistent with other non-profit crowdfunding campaigns, as (i) campaign owners raise three times more if they update supporters every five days; (ii) crowdfunding campaigns with personal videos raise 150 percent than those without videos; and (iii) more than half of people who receive an email about a crowdfunding campaign made a donation (NPsource, 2015).

Finally, the creator's prior expertise and experience, which demonstrate the project owner's competence and trustworthiness, increase the likelihood of funding success (Zhou et al., 2018). Given that MONTIS has successfully raised funds in all previous campaigns, the cumulative experience suggests that future initiatives are more likely to succeed.

6.2 Survey's results

The following discussion begins with a description of the sample's demographics. The study then analyses the samples' perception on land abandonment in relation to forest fires, followed by an examination of the relevance of FES in the samples. Following that, we assess whether the sample is willing to contribute for environmental conservation and investigate how this willingness to contribute is related to demographics and to the sample's awareness of environmental consequences. Finally, we evaluate the sample's motivations and deterrents to participate in crowdfunding, and then, in particular, in environmental crowdfunding.

Demographics

This study relies on two different samples: the MONTIS sample, which was distributed by an environmental NGO to participants in previous crowdfunding campaigns (CF) directed at environmental organizations (114 cases), implying that participants are interested in contributing to environmental causes, and the Universidade do Porto (UP) sample, which includes participants who have an undetermined concern about the environment and an unexplored willingness to contribute (135 cases).

Accordingly, in the MONTIS sample, 93.0 percent of respondents have participated in CF campaigns, while this number falls to 22.2 percent in the UP sample. The share of those who have a prior participation in CF and donated to environmental crowdfunding is 98.1 percent in the MONTIS sample, and 36.7 percent in the UP sample. Because those samples have different a priori attitudes and behaviours, they should be studied separately.

The need for a segmentation of donors (in each sample) based on demographic characteristics is supported by their potential impact on CF motivations and deterrents, as well as the willingness to contribute (WTC) to environmental protection.

In terms of gender, male respondents correspond to 58.8 percent of the MONTIS sample, which is consistent with the findings of the previous quantitative study, while in the UP sample that drops to 28.1 percent, a lower percentage than the Portuguese average: in 2019/21, male students enrolled Public Universities accounted for 45.9 percent (DGEEC, 2021).

The age distribution also differs between samples, with the MONTIS sample having a median age of 45-54 years, while, as expected, the median age of the UP sample falls to 25-34 years. This latter interval seems to be higher than the corresponding figure for the Portuguese Public Universities (DGEEC, 2021), suggesting that survey participants include a considerable number of non-students.

For both samples, the distribution of education level shows a high frequency in the undergraduate level, with no significant difference in the proportions of all levels of education.

The income levels of both distributions are quite different, with the MONTIS median being in the 1 501-2 000 € range and the UP sample median being in the 1 001-1 500 € interval. These finding also suggest that the UP sample is mainly constituted by students, which would explain the lower income level, as well as a higher percentage of "I'd rather not say" answers.

The number of children varies across samples as well: the average number of children on the MONTIS sample is 1.1 children, falling to 0.57 children in the UP sample, supporting the argument that students predominate in the UP sample.

Finally, the geographic distribution of the survey respondents is as expected: the MONTIS samples concentrated in the District of Lisbon, as found in the first qualitative study, while the UP sample is clustered in the District of Oporto. Also, most respondents revealed that they had a link to rural areas, mainly due to their origins.

In summary, there were significant differences in the demographics of the MONTIS and UP samples. These differences concern gender (58.8 vs. 28.1 percent of male respondents in the MONTIS and UP samples), age (45-54 vs. 25-34 years median), income (1'501-2'000 € vs. 1'001-1'500 € median), and number of children (1.1 vs. 0.57 children). Both samples are primarily concentrated in urban area; however, the MONTIS sample is concentrated in the District of Lisbon, whereas the UP sample is concentrated in the District of Oporto. The education level is roughly the same, with a higher frequency of undergraduates, and respondents' link to rural areas is mainly related to their roots.

Next, the discussion examines the perception of both samples regarding land abandonment in relation to forest fires.

Perceptions on land abandonment and forest fires

Our study seeks to assess the perceptions of the community regarding the consequences of land abandonment, in order to determine whether the community finds important to fund an initiative, such as that promoted by MONTIS - to purchase privately owned and abandoned land in order to implement appropriate land management.

The determinants of farmland abandonment are multiple and complex (Filho et al., 2017; Terres et al., 2013). In this study, we emphasize the relevance of landowners' low income, which sometimes seems incompatible with conservation values, as some of the goods and services they provide are not always likely to be valued on the market.

The **consequences of land abandonment** are very diverse; however, it is important to note that they can be considered as potentially negative or positive at the same time (Filho et al., 2017).

The items that both samples consider to have very positive consequences are "increased area for native plants" followed by "increased area for wildlife", as found by van der Zanden et al. (2018). However, we find a slightly negative perception of land abandonment related to its "impact on biodiversity". Our interpretation is that, overall, respondents perceive land abandonment as harmful for biodiversity; however, they also recognize that those native plants and wildlife will potentially cover abandoned areas. It should be noted that MONTIS' core objectives include "to ensure the development of natural processes, promote the conservation of native species" (MONTIS, 2021a), therefore meeting the expectations of the respondents, as well as of their donors.

The most **negative outcome** of land abandonment perceived by both samples is the increased risk of wildfires. In fact, Mantero et al. (2020, p. 2727) conducts a literature review on land abandonment and finds that "Among papers analysing a specific disturbance in relation to land abandonment, wildfire is by far the most studied (65.8 percent papers) and has the largest number of studies in the higher relevance classes". Therefore, the samples' perceptions are in line with the relevance that scholars place on the topic. In addition, the loss of natural and cultural heritage seems to be a cause of concern, which is consistent with the research on the Portuguese context (van der Zanden et al., 2018). There are no differences in perceptions of the consequences of land abandonment between the two samples.

However, these are significant differences in how samples perceive the **causes of wildfires**, in some items.

The samples differ in terms of importance of (i) land use planning, rural depopulation and decreases in grazing and land use, which are more valuable to the MONTIS sample; and (ii) climate change and accumulation of flammable material, which are very important to the UP sample. The level of information of these sample is presumably different, implying that the MONTIS sample understands how specific causes relate to forest fires, whereas the UP sample has a general conviction related common sensible causes.

In contrast to the literature (Bento-Gonçalves, 2021) both samples regard land topography as the least important item.

In essence, respondents consider that the most negative consequence of land abandonment is “Increased wildfire risks”, and as a result, they believe that “land abandonment” is the most important cause of forest fires. Notably, there seems to exist a vicious cycle: rural migration causes land abandonment and, in addition, reduces the number of workers available to undertake forest operations, raising labour costs for forest owners. “This aggravates the risk of forest fires since forest owners are less willing to hire workers to clean their forest holdings. A direct consequence is the abandonment of forest land by the owners due to low forest revenues unable to cover the high maintenance costs” (Feliciano et al., 2015, p. 17).

To sum up, land abandonment and fuel accumulation are identified as factors that favour the occurrence of wildfires: however, the results also seem to accommodate a preference for rewilding management practices.

Perceptions on Forest Ecosystem Services (FES)

Among the different FES categories (provisioning, regulating, cultural, and supporting), García-Llorente et al. (2020) find that in their sample, 58.9 percent of respondents listed a cultural FES, 36.3 percent listed a provisioning service, while only 28.1 percent listed a regulating service. The authors also show that socio-demographic factors, such as place of origin (urban vs. rural) and educational level, as well as institutional factors like management and access regimes, shaped people’s perceptions about ecosystem services. Similarly, Gouwakinnou et al. (2019) finds that the population’s education level, poverty index, and village proximity to the forest were important demographics of the population that identified regulating and supporting services.

In our study, both samples place a high value on provisioning services (such as food, clean water, and resin); however, the UP sample assigns a significantly higher importance on those FES than MONTIS sample respondents. The importance of regulation services (such as air quality regulation, water regulation, soil erosion regulation, climate regulation through carbon sequestration, and pollination) has also been unanimously acknowledged. Notably, cultural services (such as recreation, tourism, landscape sightseeing, educational services, spiritual experiences), which are more widely recognised, were considered less important. Furthermore, opinion seems to be divided about educational services, with the UP sample ranking them significantly higher than the MONTIS sample. Supporting services (soil formation, and nutrient cycle) are equally important for improving production systems, with no significant difference between the samples perceptions.

These findings suggest that (i) respondents assign a high importance to provisioning services, which have a market value and are already being paid for; (ii) cultural services, which include intangibles easily recognized by the sample, are less important; (iii) regulating and support services, which may be more incomprehensible to the general population, are highly valued. These are also the FES where most respondents expressed “no opinion”. In this regard, it is worthwhile to recall what was left in the commentary box: the benefits of FES are still unclear to the general public, who could benefit from more information on a variety of environmental issues. It is also worth noting that respondents in the UP sample, who were presumably less informed than those in the MONTIS sample, assigned a higher importance to nearly all items.

The comparison with previous research is very difficult, as most studies focus on specific ecosystems, such as two forest reserves in Northern Benin (Gouwakinnou et al., 2019), eight study sites in Spain (García-Llorente et al., 2020), Brazilian Atlantic Forest (Brancalion et al., 2014), or North Western uplands of Vietnam (Nguyen et al., 2020).

Finally, it should also be noted that 94.1 percent of MONTIS sample respondents declared they would be WTC to ensure the provision of FES, while that portion falls to 68.4 percent in the UP sample. Those who expressed their WTC agreed that it is “Because we all enjoy the benefits of nature”; on the contrary, those who expressed their refusal, declared that “I already pay too much tax “MONTIS sample”, or “I have insufficient income to be able to contribute (UP sample). Since the MONTIS sample is mostly constituted of actual donors, we may interpret the UP sample result as a true intension to contribute.

In summation, both samples rated provisioning services, regulating, and support services as very important; cultural services were perceived as less important. Most respondents expressed their disposition to contribute financially to ensure the provision of FES.

Willingness to contribute

WTC to environmental conservation was measured using the International Social Survey Programme - Environment III (ISSP Research Group, 2012), and the WTC via CF was assessed using a scale developed for this study. First of all, it should be noted that all responses have a mean value between 3 and 4, indicating that respondents are somewhere between “neither willing nor unwilling” and “fairly willing” to contribute.

In either sample, most respondents indicated that they were willing to pay higher prices, pay higher taxes, or accept a reduction in their standard of living in order to protect the environment. Furthermore, both samples prefer a lower standard of living, implying a non-monetary form of contribution. Our findings are consistent with other revealed preferences (Marbuah, 2019).

However, there are differences between samples, as the MONTIS respondents have a significantly higher WTC, which we can attribute to a higher predisposition to contribute (since most of them are already involved as crowdfunding donors) and a higher awareness of environmental issues. Indeed, Valente and Ferreira (2014) find a positive relationship between the level of information on environmental issues and willingness to pay for more for environmentally friendly products. The same authors note that Portugal, however, is among the countries with the lowest level of environmental information and, as a result, among the least willing to pay more for environmentally friendly products.

The preference to accept a reduction in the standard of living, rather than to pay a monetary amount, suggests that volunteer programs, in the form of time donations, may play a relevant role in bringing the community together to protect the environment. The concept of

willingness-to-volunteer, also known as willingness-to-work, is a concept similar to WTC, but the payment vehicle is working time rather than money. It recognizes that some people are unemployed or earn low salaries, and as a result, it provides voluntary work as an alternative contribution vehicle (Gibson et al., 2016).

The survey on the WTC via CF targeted those who had never contributed via CF. The items were purposefully designed for this study based on feedback from the interviews. Because the MONTIS sample includes only 10 cases, the discussion focuses on the UP sample. These participants expressed high WTC via CF, but on average they were less willing to contribute via CF than via “higher prices” or “higher taxes”. The item that received higher preference was the WTC “via crowdfunding to the clean-up of territories at risk of abandonment in order to reduce fuel material (limiting the risk of fires)”, indicating that the level of detail of the project is a relevant driver of the WTC.

In summary, respondents show a moderate WTC; however, they would rather “accept cuts in [their] standard of living in order to protect the environment”, than pay higher prices, or pay much higher taxes. In terms of using CF as a financing tool, the UP sample expresses a (small) preference to “contribute via crowdfunding to the clean-up of territories at risk of abandonment in order to reduce fuel material (limiting the risk of fires)”.

Willingness to contribute and demographics

It is unclear how **age** will affect WTC. On the one hand, a negative relationship may exist if younger people are more concerned about the environment than older people (Ojea & Loureiro, 2007), because they are more exposed to media and are concerned about their future; on the other hand, if older people concerned about their children’s welfare are willing to contribute to better environmental protection, there may be a positive relationship (Marbuah, 2019).

Results indicate that people of different ages do not have different preferences for the WTC to environmental protection. This result contradicts some evidence in the literature (Obeng & Aguilar, 2018) but compares favourably with a few (Gibson et al., 2016; Marbuah, 2019), implying that younger people are more concerned with meeting their immediate life needs than making an extra payment for something they will probably find more beneficial in the future.

When considering WTC via CF in the UP sample, however, different ages imply different WTC. In fact, only the 65+ age group has a lower preference to contribute than the other age groups (except 55-64 years). In contrast to the previous finding, this seems to indicate that when the financing mechanism is more convenient and allows a social interaction similar to social media, the WTC of younger individuals increases.

Gender is expected to be related to the WTC for environmental conservation, with the literature predicting a higher WTC for women. This nexus has been attributed to differences in socialisation and social roles between men and women (Franzen & Vogl, 2013). Our study confirms those findings since female respondents show a higher mean WTC than male donors in terms of environmental conservation. Female donors in the MONTIS sample prefer to pay higher taxes and accept lower living standards than male respondents, whereas female respondents in the UP sample prefer to pay higher prices and higher taxes than male respondents. Notably, when taxes are used as payment vehicle, female respondents in both samples have higher preferences compared to the other alternatives.

These findings, however, do not hold when CF participation is considered, which appears to validate our previous findings that “more men than women seem to contribute to crowdfunded

projects”. One possible explanation is women’s risk aversion, which reveals that they prefer the government to take responsibility for environmental protection, as evidenced by their stronger preferences to pay taxes, but avoid crowdfunding because they lose control over the effective implementation of the proposed land management.

The literature found evidence that increased **education** (formal and informal) is positively related to an individual’s WTC for the environment (Lundberg et al., 2019; Obeng & Aguilar, 2018; Xiong et al., 2018), as environmental concern is positively associated with education (Franzen & Vogl, 2013). Our research, on the other hand, found no evidence that differences in WTC for environmental protection would result from different levels of education. Only in terms of CF contributions, as expected, the lower level of education (9th grade) has a weaker preference to pay when compared to all other groups.

In terms of **income**, most literature predicts a positive effect on WTC (Baumgärtner et al., 2017; Obeng & Aguilar, 2018). On one hand, wealthier individuals have fewer financial concerns and thus have more time to focus on other issues. Individuals with higher incomes, on the other hand, consume more private goods and demand more public goods. (Franzen & Vogl, 2013). However, the effect of income does not appear to be consistent across all WTP measures in our study. This result is consistent with Everuss et al. (2017), who find that people of Lisbon, Portugal, are more willing to contribute than those in Adelaide, Australia, despite Portugal’s poorer economic conditions.

With relation to the **number of children**, the expected relation to individual’s WTC for the environment is unclear. On the one hand, a negative relationship is expected, considering that larger households are more likely to spend a significant portion of their limited budget resources on other needs rather than environmental protection (Marbuah, 2019). On the other hand, a positive relationship is likely to emerge, as parents who are concerned about their children’s well-being are willing to contribute to increased environmental protection.

The same author finds that household size has no bearing on individual decisions to contribute, which is consistent with our results. In our study, only the UP sample that never took part in CF had a significantly higher WTC in the zero children group than the two children group.

Finally, there is no evidence that the type of **link to rural areas** or **population density** in the respondents’ council of residence affects their WTC for environmental conservation.

Summarizing, in the MONTIS sample, female donors express a higher WTC through higher taxes and lower living standards; higher income increases the WTC by accepting a lower living standard. In the UP sample, female donors have a higher WTC through higher prices and taxes; when it comes to CF as a payment method, younger respondents and those with fewer children appear to have a higher WTC. The mixed results of the effect of demographics on WTC call for additional research into the other factors that may explain WTC.

Willingness to contribute and attitudes towards the environment

The theory of Environmental Concern (EC) (Stern et al., 1995) proposes that people take environmental action because they are concerned about the consequences. As a result, the author developed the General Awareness of Consequences scale (GAC).

In our study, there is no evidence of differences in opinions between the MONTIS and UP samples. For example, most respondents agreed with the idea that “1. *Environmental protection benefits everyone*”, or “7. *Environmental protection will provide a better world for me and my children*” (mean value close to five); on the other hand, most respondents disagreed that “3.

Claims that we are changing the climate are greatly exaggerated“, or “*5. Environmental threats to public health have been exaggerated*”. Notably, no statistically significant differences between the two samples were found, suggesting that the undifferentiated UP sample is just as concerned about the environment as the better informed MONTIS sample.

To assess if the awareness of environmental consequences impacts the WTP, the study began by performing an Exploratory Factor Analysis (EFA) to group homogenous items together. The GAC scale has been proven to be a good predictor of egoistic, social-altruistic and biospheric value orientations. Ryan and Spash (2012) reinterpret the scale, by recognizing that people distinguish between beliefs supporting environmental action and beliefs supporting environmental inaction. The beliefs supporting environmental action are differentiable depending on beliefs in negative or positive outcomes from environmental protection. As a result, they propose that the scale be used to gauge concern about the positive and negative consequences of environmental action and inaction. Therefore, there is no consensus on how the factors should be interpreted.

In terms of WTC, Ojea and Loureiro (2007) estimate the sensitivity of WTP to such value orientations, concluding that egoistic and altruistic pro-environmental orientations are important when valuing goods, whereas the biospheric orientation has a smaller impact on WTP. In a similar study, Obeng and Aguilar (2018) find that awareness of biospheric and detrimental consequences had positive and significant effects on stated WTP, whereas beneficial (egoistic) value orientation was negatively associated with WTP.

In this study, two distinct factors in the MONTIS sample were identified: Factor 1 appears to be associated with a more “pessimistic” awareness, whereas Factor 2 may be associated with a “beneficial (egoistic)” awareness of environmental consequences. In fact, Factor 1 aggregates items related to the concern about negative consequences, e.g., “*2. Over the next decade, thousands of species of plants and animals will become extinct*”, whereas Factor 2 includes concerns about positive consequences, e.g., “*1. Environmental protection benefits everyone*”.

In the MONTIS sample, both “pessimistic” and “optimistic” value orientations have positive and significant effects on WTC to environmental conservation. Thus, the respondents’ value orientation toward environmental protection outcomes is related to their WTC. Furthermore, respondents who are more “pessimistic” about the future are more willing to contribute.

In the UP sample, factor analysis identifies three latent value orientations: “detrimental”, “beneficial (egoistic)” and “global” (items “*1. Environmental protection benefits everyone*“ and “*9. Environmental damage generated here harms people all over the world*”). Only “global” attitudes consistently have significant effects on WTC in this sample, whereas “detrimental” and “beneficial (egoistic)” concerns have no effect on WTC. This suggests that respondents in the UP sample are more concerned with “global” consequences that affect everyone, rather than those that affect specific individuals (including themselves and their families) or species.

It is worth noting that R^2 values are relatively low (ranging from 16.4 percent to 25.3 percent), implying that several other elements influencing WTC are not being considered. These values, however, are in line with the literature. For example, Ojea and Loureiro (2007, p. 812) report a pseudo- R^2 of 20.44 percent, Obeng and Aguilar (2018) show pseudo- R^2 between 13.73 and 18.72 percent, and Marbuah (2019) finds a pseudo- R^2 of less than 10 percent, despite the inclusion of several other variables in their logit regression model.

In terms of WTC via CF, these value orientations do not seem to induce WTP in the MONTIS sample ($n=10$); however, the small size of the sample suggests that results should be read

carefully. In the UP sample, considering those who had not previously contributed, the “detrimental” and “global” attitudes have positive and significant effects on all WTC dimensions. The findings also indicate that the impact of “detrimental” concerns has a higher impact on WTC, than “detrimental” attitudes.

Altogether, these findings are supported by previous research (Obeng & Aguilar, 2018), indicating that people who are more concerned about the adverse consequences for the things they value are more likely to take action to improve or remove the existing threat. This offers additional insight into the relative importance and the role that different value orientations play in decisions involving financial contributions to support environmental conservation.

In summary, the awareness of the consequences of environmental protection seems to be related to WTC. In the MONTIS sample, both “pessimistic” and “optimistic” value orientations have positive and significant effects on WTC to environmental conservation via any vehicle (higher prices, higher taxes, lower living standards); additionally, a more “pessimistic” perspective induces a higher WTC. In the UP sample, “detrimental”, “beneficial (egoistic)” and “global” orientations all have positive and significant impact on WTP via taxes or lower living standards. Considering those who had not previously contributed via crowdfunding, the “detrimental” and “global” attitudes have positive and significant effects on all WTC dimensions.

The following subsection provides additional insights into the factors that motivate respondents to participate in CF initiatives.

Motivations and deterrents to participate in crowdfunding

The survey assessed the motivations to participate in CF by posing question to those who had previous participation (93.0 percent of the MONTIS sample and 22.1 percent of the UP sample); the reasons for not participating in CF were asked to both former participants and to those who had never participated. It is worth noting that 68.6 percent of these latter respondents, mostly from the UP sample, couldn't name a single crowdfunding platform.

While we categorize motivations and deterrents as distinct from each other, they are in fact interconnected (Gerber & Hui, 2013). E.g., if “Considering that the projects are untrusty” is a major deterrent, then “Considering that the projects are trusty” can be considered as a motivator.

In terms of **motives** that drive general CF participation, respondents attribute a high importance to “support causes” and “help others”, which is consistent with the literature (Gerber & Hui, 2013; Rodriguez-Ricardo et al., 2018) findings, which show that non-equity crowdfunding is associated with altruism.

While supporters in the MONTIS sample are motivated to “give”, respondents in the UP sample are motivated to “Donate the amount I wish (no matter how small)”, which may be due to the respondents' lower median income. It should also be noted that the UP sample values “Know all the details of the project” and “Know exact amount of the project” more than the MONTIS sample, suggesting the presence of a more analytical mindset. As a result, campaign communication must be concrete (contextualized and detailed projects), precise, and interactive (increased use of Q&A) (Farhoud et al., 2021)

Furthermore, “gaining social recognition” and “desire to collect rewards” have little importance. The motivation to donate in order to obtain a desired reward, such as an acknowledgment, a tangible artifact, or an experience, is found by Gerber and Hui (2013, p. 15), who argue that “this suggests that supporters are aware of the value of the product, service, or experience that they will receive in exchange for their financial support.” This is known as

“impure altruism”, as the donors contribute to a public good while receiving some private benefit from their gift per se (Cecere et al., 2017). The low importance placed on rewards may be explained by the fact that our research is focused on environmental issues; thus, the main “reward” may be associated with better environmental conditions in the future, rather than receiving rewards in the present. However, most literature highlights the importance of rewards, which raises the possibility of designing more tailored rewards.

In terms of **deterrents**, respondents who had participated in CF campaigns believe that others do not participate because they “consider that the projects are untrustworthy”, whereas those who had never participated say their main impediment is “uncertainty about effectiveness”.

These findings seem reasonable, as people who have already donated to CF are likely to believe that their money will be used effectively, otherwise they would not donate. When they choose not to participate, it is because they find the project untrustworthy. Concerning those who never donated to CF, the main deterrent identified in the literature is distrust of how project owners use their money (Gerber & Hui, 2013). To overcome this scepticism, a successful campaign must signal project quality, and project owners should look for ways to signal preparedness.

When it comes to **motives** to participate in environmental CF, both samples agree on the importance of the drivers included in the survey. The main driver is to “promote biodiversity”, rather than “Knowing the territory”, “Personally knowing the promotor” or “Be affectively connected to the region”. These findings contrasts with those of Simon et al. (2019) who find strong ties between closeness and intention to participate in CF, since closeness triggers loyalty feelings that lead to compliance.

In terms of **deterrents**, MONTIS sample is concerned that the project will not deliver the promised benefits, while UP sample respondents believe that environmental preservation is the government’s responsibility; yet, when asked about the degree of trust placed in different entities for rational and appropriate forest management, the government is the least trusted entity. This seems to indicate that they do not trust their money to project owners, although they trust environmental associations to implement a “rational and appropriate forest management”. The findings are consistent with media reports of NGOs misusing funds, which interviewees in the qualitative phase and participants in the survey (comment box) find concerning.

According to those who consistently contribute (MONTIS sample), the primary hurdle for others would be ambiguity regarding the advantages of environmental protection. They also believe that others do not contribute because they “don’t think the benefits are worth paying for”, whereas the UP sample (mostly made up of non-donors) assigns a low importance to this impediment. Therefore, the MONTIS sample (presumably more informed) believes that those who do not contribute are unaware of the benefits of environmental conservation, which does not seem to be the case.

To summarize, for the MONTIS sample, crowdfunding can be a way to support causes and help others, whereas for the UP sample, crowdfunding is also motivated by its convenience, as such a scheme allows them to “donate the amount I wish (no matter how small)”. Respondents who have previously contributed via CF believe that “Considering that the projects are untrustworthy” hinders other people’s participation, whereas those who never used CF express that “Uncertainty about effectiveness” is their main deterrent. In terms of CF directed toward environmental protection, all respondents are primarily motivated by “Promoting biodiversity”, with the main deterrent being “I think that government money should support the whole project, without need for private donations.”.

6.3 Summary of the main implications

This section relates the discussion of results with the research objectives.

Table 29: Summary of implications

Findings	Implications
(i) To understand the community's willingness to contribute to environmental conservation, particularly private forestland management, thereby compensating landowners for the negative income associated with forest management and preventing the reduction of abandoned (unmanaged) forested lands.	
Land abandonment and fuel accumulation are identified as factors that favour the occurrence of wildfires & Land abandonment enhances rewilding	Importance of emphasizing these features whenever the project's forest management practices are in accordance with preferences
Socio-demographic variables such as age, income, education, and nr. of children explain only modest levels of WTC	Provide information and arguments by emphasizing values that potential donors may share
Value orientations seem more relevant in explaining WTP, especially the "pessimistic" awareness of environmental consequences	Subtle and tasteful references to the fear of loss, e.g., related to the most rated FES
Respondents show a moderate WTC, but they would rather "accept cuts in standard of living", instead of a monetary payment	Volunteer programs, in the form of time donations, may be useful in bringing the community together to protect the environment
(ii) To understand the community's perceptions on Forest Ecosystem Services and their willingness to contribute to their provision.	
Respondents rated provisioning services, regulating, and support services as very important; cultural services were perceived as less important	Education is essential to the future of forests [Among many other factors, Bento-Gonçalves (2021) associates the Portuguese forest-fire problem with the lack of forest-oriented education.]
Level of information is a relevant driver of the WTC	
(iii) To assess the use of crowdfunding as a financing tool to keep land privately owned and managed, by identifying the main motivators and deterrents to participating in crowdfunding initiatives.	
Most donations are small amounts	CF should be promoted widely, in order to reach as many supporters as possible, regardless of how small their contributions may be
Donors react to the actions of other backers Herding effects among funders tend to favour projects that signal that the goal is attainable	It is important to keep potential donors informed about the current level of support from other backers
Most donors are men & Women are more risk averse Marketing can have a significant impact on donor's behaviour	There is a leeway to develop marketing campaigns to reassure women that the project will be implemented, e.g., publicising previous successful projects
Donors are mainly concentrated in urban areas Knowing the region is not important	The location of the project is irrelevant
68.6 percent of respondents with no previous participation in CF couldn't name a single crowdfunding platform	Need for awareness-increasing advertising strategies, e.g., directed to people who are not actively seeking information
Successful campaigns are the ones that signal quality Bystander effects among funders: a high level of community support indicates a high-quality initiative A large amount of community support for an initiative indicates that the project is of high quality	Meticulous preparation of the CF campaign To increase campaign success for intangible goods, provide objective information accompanied by physical evidence (e.g., video)
Motivations to CF: mainly to support causes Respondents rate rewards as less important Previous literature agrees on the importance of rewards	Raises the possibility of designing tailored rewards to engage backers
Deterrents to CF: projects that are deemed untrustworthy & uncertainty about their effectiveness The project owner's competence and trustworthiness of the project, increase the likelihood of success	Reduce the perceived information asymmetries Provide potential donors with sufficient information and arguments Need to strengthen transparency and communication, e.g., by providing direct access to projects' locations

7 Conclusion and future research

Concerns about the environment and environmental conservation are growing among people, particularly in Portugal, which occupies the top of the rankings of forest fires. In the meantime, crowdfunding has come to be used to fund a variety of initiatives aimed at environmental conservation, with varying results depending on the various drivers and deterrents that should be investigated. The purpose of this research was to address the following objectives (cf. p. 3), and the results are as follows:

(i) To understand the community's willingness to contribute to environmental conservation, particularly private forestland management, thereby compensating landowners for the negative income associated with forest management and preventing the abandonment of (unmanaged) forested lands.

In general, participants express a willingness to contribute to environmental protection, preferring non-monetary forms of payment, opening the door to the possibility of volunteering and thus paying with time. In this regard, most socio demographic traits were inconclusive in explaining willingness to contribute, with the exception of gender, as female respondents expressed a higher willingness to contribute for environmental conservation than male donors. Nonetheless, the attributes that seem to best explain willingness to contribute are attitudes towards environmental consequences. Respondents who are more pessimistic about the environmental consequences, in particular, are more motivated to pay for environmental conservation.

Furthermore, environmental associations are the entities in which they have the most faith for forest management (a preference revealed both by the sample which already contributes and by a more undifferentiated sample whose orientation of preference is, at the outset, unknown).

Respondents evaluate the consequences of land abandonment as both positive (allowing for rewilding) and negative (potentiating the appearance of forest fires). This result indicates that management for conservation, rather than management for production, is the preferred type of forest management.

(ii) To understand the community's perceptions on Forest Ecosystem Services and their willingness to contribute to their provision.

With the exception of provisioning and cultural services, a significant proportion of Forest Ecosystem Services are not easily identified by the general population. Thus, while the high importance placed on provisioning services (which have a market value and are already being remunerated) is unsurprising, the low importance placed on cultural services (enjoyed by the majority of the population as free-riders) is. Respondents did, however, place a high value on regulation services (e.g., air quality and water regulation) and support services (nutrient cycle and soil formation), which may indicate that they have a considerable level of information, which is consistent with the degree of environmental engagement of, at least, in one of the samples (MONTIS) studied.

Moreover, most respondents expressed a willingness to contribute financially to ensure the provision of Forest Ecosystem Services, believing that “we all enjoy the benefits of nature”; on the other hand, respondents who expressed a refusal justified their decision with budgetary constraints.

(iii) To assess the use of crowdfunding as a financing tool to keep land privately owned and managed, by identifying the main motivators and deterrents to participating in crowdfunding initiatives.

The main motivations indicated by the respondents for participating in crowdfunding were altruistic reasons ("support causes" and "help others") for the sample that has already participated in crowdfunding, and convenience ("donate the amount you want"), for the more undifferentiated sample (UP). On the other hand, the main impediments were related to viewing the project as unreliable or being unsure of its effectiveness.

In terms of crowdfunding directed toward environmental protection, all respondents are primarily motivated by "Promoting biodiversity", while their main deterrent is the concern that the project will not deliver the promised benefits, and they believe that environmental preservation is the government's responsibility.

Respondents (who had never participated in crowdfunding) show only a moderate willingness to contribute via crowdfunding, and this willingness decreases when CF is directed towards the purchase of land to manage unmanaged lands or towards contracting protocols to take over management of those territories. A higher willingness to pay is associated with a more detailed option for cleaning-up territories at risk of abandonment, in order to reduce fuel material (limiting the risk of fires).

By addressing these research questions with a hybrid explanatory and exploratory mixed methods approach, the study has contributed to the literature by going beyond intentions to donate for environmental conservation, as the study analyses both an actual crowdfunding audience and potential crowdfunding backers.

Limitations of the research

The most significant limitation of this research is related to problems with web surveys (Couper, 2000) and their self-selection process (Bethlehem, 2008). The surveys were not based on probability sampling: respondents are those who have Internet access, receive the email invitation, and choose to participate in the survey. When the survey researcher is not in control of the selection process, it is impossible to compute unbiased estimates, or determine the accuracy of estimates. The problems of noncoverage and nonresponse are not unique to web surveys, and statistical adjustments are commonly used in survey research to compensate for these shortcomings (Couper, 2000), but at the expense of increasing costs and time (Bethlehem, 2008).

Another limitation of the study is that the MONTIS dataset of CF donations contains a significant amount of anonymous (18.3 percent of cases) and incomplete information, which compromises the study's findings and interpretation.

Future research

Taking into consideration that the respondents' preferred vehicle for contributing are non-monetary forms of donation, and that volunteering may be possible instrument to “donate time”, future studies may assess the “willingness to contribute labour” to environmental protection, similarly to Lankia et al. (2014) study on WTC-labour by individual recreationists on private lands would be willing to purchase management *actions* from landowners that influence recreational quality.

Additional possibilities for future research is the use of contingent valuation methods to assess relative differences in allocating money to different ecosystems or management practices (Lundberg et al., 2019). These methods are used to estimate economic values for all kinds of ecosystem and environmental services, and can be used to estimate both market and non-market values, and is widely used for estimating ecosystem valuation. The contingent valuation method involves directly asking people, in a survey, how much they would be willing to pay for specific environmental services. In some cases, people are asked for the amount of compensation they would be willing to accept to give up specific environmental services. It is called “contingent” valuation, because people are asked to state their willingness to pay, contingent on a specific hypothetical scenario and description of the environmental service (Mitchell & Carson, 1989).

Finally, with the purpose of reducing the high uncertainty derived from financing a management practice, whose results are only indirectly perceived in the far future, it remains unclear how the various management options affect economic, ecological, and social aspects of sustainable forest management. It would be important to assess the consequences of various management options on different aspects of sustainable forest management, e.g., through scenario analysis using a forestry decision support system (Eggers et al., 2019). In fact, if such an assessment was sufficiently precise, it would be worth comparing crowdfunding as a financing tool and other mechanisms, such as ECOSEL, an auction-based mechanism where the public bids on competing alternatives, and the landowner implements the option with the highest combined value of bids over the associated costs (Tóth et al., 2010).

The suggestions for future research presented here should help to strengthen environmental crowdfunding research and encourage the use of limited resources to support forest services and environmental conservation. If such a result is achieved, the study's ultimate goal of raising awareness about forest conservation and the value of forest services will be met.

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APPENDIX A: Comparison of existing research approaches

Table A 1: Selection of the appropriate approach

	Quantitative	Mixed methods	Qualitative
Worldview	Postpositivist	Pragmatic	Constructivist Transformative
Research designs	Experimental design Nonexperimental designs, such as surveys	Convergent Explanatory sequential Exploratory sequential Transformative, embedded, or multiphase	Narrative research Phenomenology Grounded theory Ethnographies Case study
Research methods	Pre-determined Instrument based Performance data, attitude data, observational data, and census data Statistical analysis Statistical interpretation	Both predetermined and emerging methods Both open- and closed-ended questions Multiple forms of data drawing on all possibilities Statistical and text analysis Across databases interpretation	Emerging methods Open-ended questions Interview data, observation data, document data, and audiovisual data Text and image analysis Themes, patterns interpretation
Research question	The identification of factors that influence an outcome The utility of an intervention Understanding the best predictors of outcomes Testing a theory or explanation	When the quantitative or qualitative approach, each by itself, is inadequate to best understand a research problem The strengths of both quantitative and qualitative research (and its data) can provide the best understanding.	The concept or phenomenon needs to be explored and understood because little research has been done New topic that has never been addressed with a certain sample or group of people, and existing theories do not apply with the particular sample or group under study

Source: Creswell (2014)

APPENDIX B: Supplementary results | MONTIS crowdfunding donors

Additional descriptive statistics

Table A 2: Descriptive statistics for the number of days until the end of the campaign by CF campaign

CF (duration)	% donations	Min	Median	Max	Mean	Std. Deviation
CF1 (61 days)	17.3%	0 days	19.0 days	61 days	26.0 days	19.9 days
CF2 (61 days)	17.8%	0 days	19.0 days	61 days	23.4 days	20.6 days
CF3 (23 days)	8.6%	0 days	14.5 days	18 days	12.5 days	5.2 days
CF4 (60 days)	27.6%	0 days	15.0 days	60 days	23.5 days	20.8 days
CF5 (59 days)	28.8%	0 days	14.0 days	59 days	22.1 days	18.9 days
Total	100.0%	0 days	16.0 days	61 days	22.6 days	19.5 days

Table A 3: Descriptive statistics for the percentage of days before campaign ends by CF campaign

	Min	Q1 ^(a)	Median	Q3 ^(a)	P90 ^(b)	P95 ^(b)	Max	Mean	St. Dev
CF1	0.0%	14.8%	31.1%	77.1%	91.8%	96.7%	100.0%	42.6%	32.6%
CF2	0.0%	6.2%	31.1%	70.9%	89.7%	95.1%	100.0%	38.4%	33.8%
CF3	0.0%	34.8%	63.0%	73.9%	78.3%	78.3%	78.3%	54.2%	22.6%
CF4	0.0%	8.3%	25.0%	78.3%	93.3%	95.0%	100.0%	39.2%	34.6%
CF5	0.0%	8.5%	23.7%	62.7%	90.7%	98.3%	100.0%	37.4%	32.0%

Legend: (a) First and third quartiles; (b) 90 and 95 percentiles

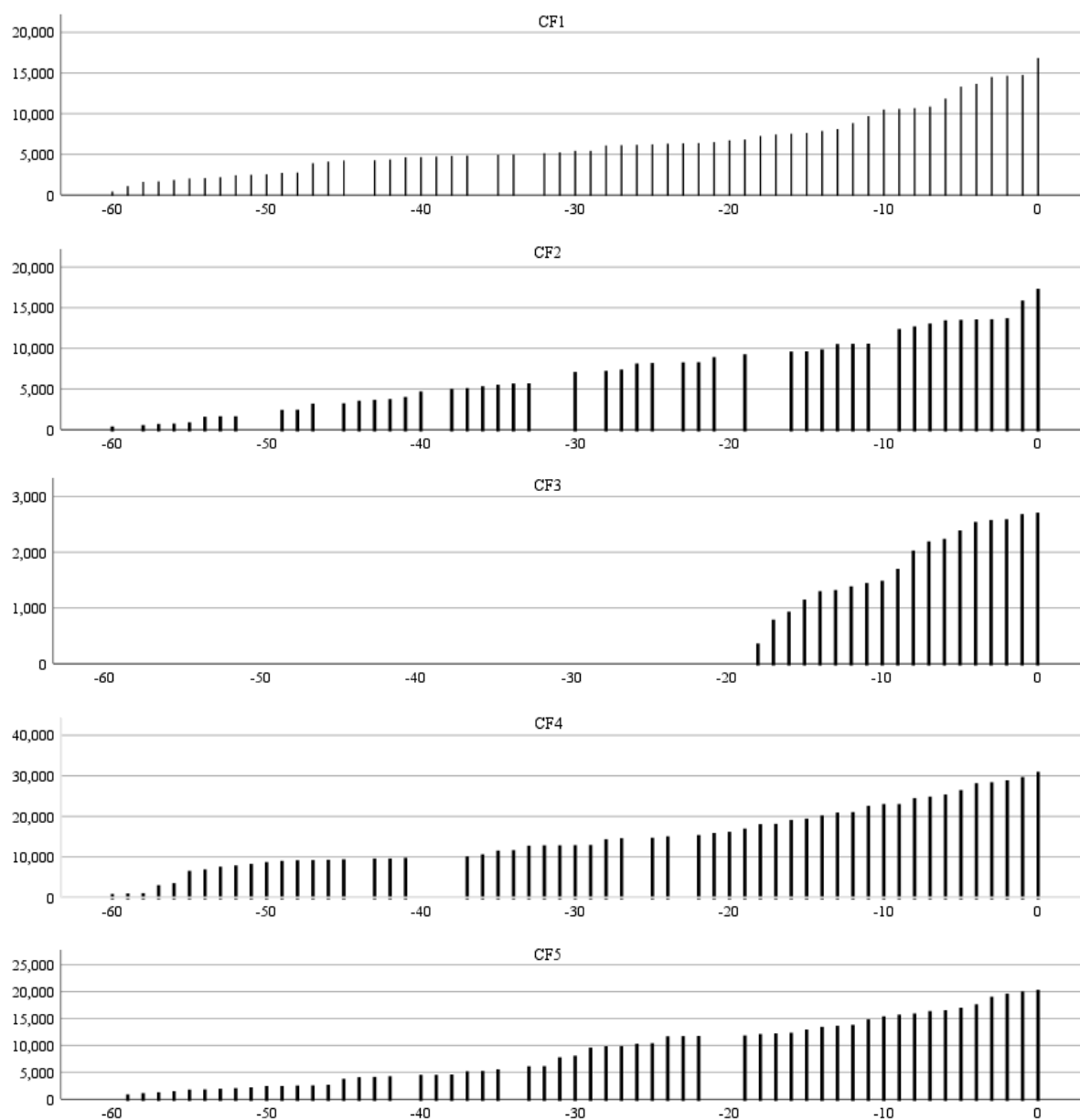


Figure A 1: Cumulated amount of contributions (in €) relative to the nr. of days until the end of each campaign

Table A 4: Descriptive statistics for the amount of contribution (€) by affiliation

Associate	% of Total N	% of Total Sum	Min	Median	P90	P95	Max	Mean	Std. Deviation
Yes	36.9%	41.0%	1.00	40.00	140.00	250.00	1 250.00	65.78	106.45
No	43.9%	35.4%	1.00	20.00	100.00	150.00	3 000.00	47.80	153.92
Unidentified	19.2%	23.6%	1.00	20.00	138.00	290.00	1 500.00	72.59	186.94
Total	100.0%	100.0%	1.00	20.00	100.00	200.00	3 000.00	59.20	146.17

Table A 5: Descriptive statistics for the percentage of days until the end of the campaign by affiliation

Associate	% of Total N	Min	Median	Max	Mean	Std. Deviation
Yes	36.9%	0.0%	32.8%	100.0%	41.1%	33.3%
No	43.9%	0.0%	28.6%	100.0%	39.1%	32.3%
Unknown	19.2%	0.0%	36.7%	100.0%	42.0%	33.0%
Total	100.0%	0.0%	30.5%	100.0%	40.2%	32.8%

Table A 6: Descriptive statistics for the percentage of days until the end of the campaign by type of group

Group	% of Total N	Min	Median	Max	Mean	Std. Deviation
Individual	74.7%	0.0%	29.8%	100.0%	39.8%	32.8%
Group	2.0%	0.0%	18.3%	95.0%	31.6%	32.4%
Organization	3.4%	0.0%	49.1%	100.0%	50.2%	33.9%
Event non-MONTIS	0.3%	0.0%	13.1%	100.0%	13.2%	7.6%
Event MONTIS	1.2%	0.0%	61.7%	100.0%	50.6%	29.5%
MONTIS	0.2%	0.0%	46.7%	100.0%	43.9%	12.7%
Anonymous	18.3%	0.0%	36.7%	100.0%	42.0%	32.9%
Total	100.0%	0.0%	30.5%	100.0%	40.2%	32.8%

Table A 7: Descriptive statistics for the percentage of days until the end of the campaign by gender

Gender	% of Total N	Min	Median	Max	Mean	Std. Deviation
Male	17.3%	0.0%	31.1%	100.0%	40.7%	32.7%
Female	17.8%	0.0%	25.2%	100.0%	37.7%	32.7%
Non-individual	8.6%	0.0%	47.2%	100.0%	47.8%	32.5%
Anonymous	27.6%	0.0%	36.7%	100.0%	42.0%	32.9%
Total	100.0%	0.0%	30.5%	100.0%	40.2%	32.8%

Table A 8: Descriptive statistics for the amount of contribution (in €) by type of group

Group	% of Total N	% of Total Sum	Min	Median	P90	P95	Max	Mean	Std. Deviation
Individual	74.7%	59.0%	1.00	20.00	100.00	150.00	1 250.00	46.80	84.29
Group	2.0%	2.0%	5.00	25.00	100.00	400.00	500.00	60.24	101.74
Organization	3.4%	12.4%	1.00	50.00	500.00	1 041.85	3 000.00	217.02	478.58
Event non-MONTIS	0.3%	0.3%	10.00	63.00	---	---	69.00	46.20	28.81
Event MONTIS	1.2%	3.3%	10.00	91.00	212.50	502.00	830.00	170.24	198.81
MONTIS	0.2%	3.4%	1 000.00	1 000.00	1 000.00	1 000.00	1 000.00	1 000.00	0.000
Anonymous	18.3%	19.5%	1.00	20.00	100.00	200.00	1 500.00	63.17	164.00
Total	100.0%	100.0%	1.00	20.00	100.00	200.00	3 000.00	59.20	146.17

Independent samples t-test for equality of means by category

Table A 9: Independent samples t-test for equality of means - associates vs. non-associates

<i>Amount of contribution</i>	Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	.540	.463	-2.300	1188	.022**
Equal variances not assumed			-2.371	1146	.018
<i>Percentage of days until deadline</i>	Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	.636	.425	-1.050	1188	.294
Equal variances not assumed			-1.047	1141.715	.295

Legend: *significant at 10%; ** significant at 5%; *** significant at 1%

Table A 10: Independent samples t-test for equality of means amount of contribution between gender

<i>Amount of contribution</i> <i>Male vs. female</i>	Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	5.435	.020	1.615	1122	.107
Equal variances not assumed			1.712	1099	.087*
<i>Amount of contribution</i> <i>Male vs. non-individuals</i>	Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	109.155	.000	-6.633	758	.000
Equal variances not assumed			-2.772	80.105	.007***
<i>Amount of contribution</i> <i>Female vs. non-individuals</i>	Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	104.572	.000	-6.462	522	.000
Equal variances not assumed			-2.968	79.958	.004***

Legend: *significant at 10%; ** significant at 5%; *** significant at 1%

Table A 11: Independent samples t-test for equality of means % days until deadline between gender

<i>Amount of contribution</i> <i>Male vs. female</i>	Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	.005	.944	1.546	1122	.122
Equal variances not assumed			1.546	947	.122
<i>Amount of contribution</i> <i>Male vs. non-individuals</i>	Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	.000	.995	-1.820	758	.069
Equal variances not assumed			-1.829	98	.070
<i>Amount of contribution</i> <i>Female vs. non-individuals</i>	Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	.001	.976	-2.550	522	.011***
Equal variances not assumed			-2.560	109.765	.012***

Legend: *significant at 10%; ** significant at 5%; *** significant at 1%

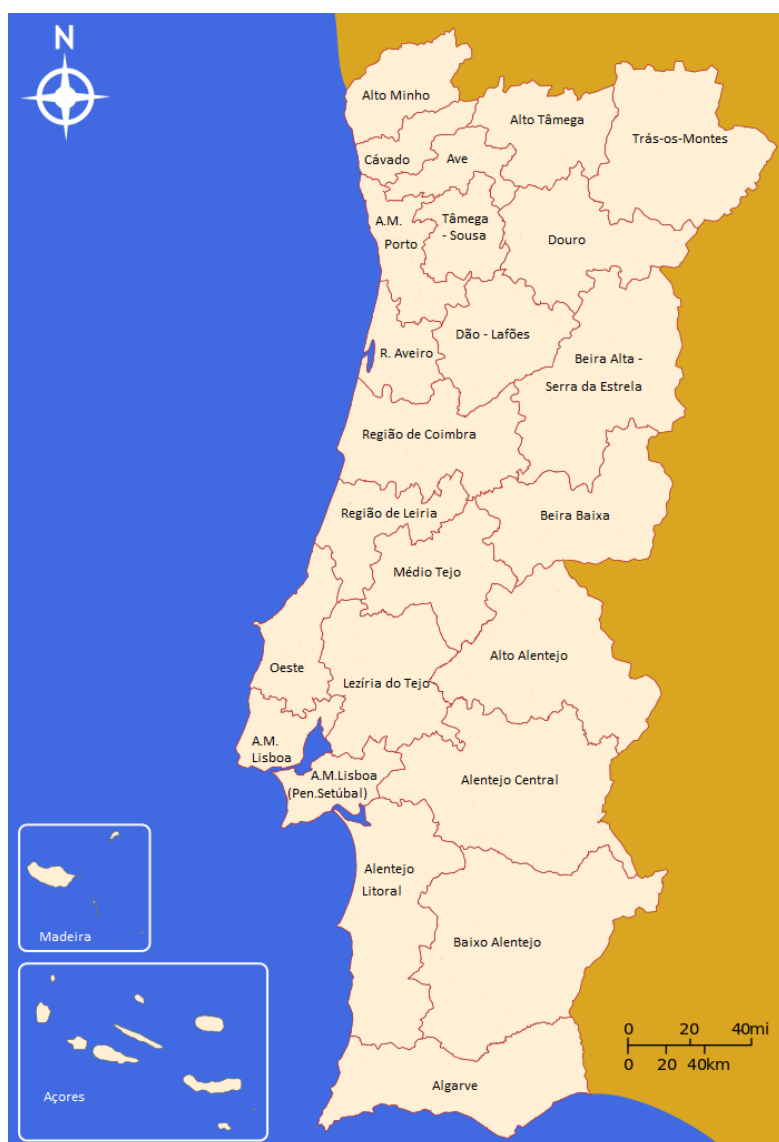


Figure A 2: Portuguese NUT3 regions

APPENDIX C: Supplementary material | Interviews

Table A 12: Characterization of the sample used to invite for interviews

Case	Male	Female	Group	Organization	Associate	Non associate	NUT3	Council		CF1	CF2	CF3	CF4	CF5
1		X				X	n.a.	n.a.	3		10		5	10
2	X					X	n.a.	n.a.	1					3
3		X				X	n.a.	n.a.	1					5
4	X					X	AM Porto	Porto	2	50	25			
5	X		X			X	AM Lisboa	Lisboa	1	300				
6	X				X		Tâmega e Sousa	Lousada	3	20	25		20	
7		X			X		Foreign	Foreign	4	300	300	50	250	
8	X					X	Viseu Dão Lafões	Oliveira de Frades	1		20			
9	X					X	n.a.	n.a.	3	10			10	20
10		X				X	Lezíria do Tejo	Azambuja	2	20	25			
11	X					X	Viseu Dão Lafões	São Pedro do Sul		22				
12				X		X	Médio Tejo	Santarém		1x	14x	7x		
13	X				X		AM Porto	Vila do Conde	3	50	50			20
14				X		X	Viseu Dão Lafões	Mangualde	1		50			
15	X					X	Beiras e Serra da Estrela	Seia	4	10	10		50	10
16				X		X	Beira Baixa	Castelo Branco	1	100				
17		X	X		X		AM Lisboa	Lisboa	5	100	50	50	50	100
18	X				X		Alto Tâmega	Ribeira de Pena	2			20	100	
19	X				X		Alto Tâmega	Vila Pouca de Aguiar	2	50			20	
20				X		X	Viseu Dão Lafões	São Pedro do Sul	1		80			
21		X				X	Tâmega e Sousa	Castelo de Paiva	1				10	
22		X			X		Beiras e Serra da Estrela	Figueira de Castelo Rodrigo	2	20				50
23		X			X		Douro	Vila Real	←				20	30
24		X				X	Oeste	Cadaval	1		19			
25	X				X		Alto Alentejo	Avis	2				500	100
26		X				X	Alto Minho	Arcos de Valdevez	1				10	
27				X		X	Baixo Alentejo	Vidigueiro	2	20	150			
28	X				X		Lezíria do Tejo	Santarém	3	25	50	25		
29	X				X		AM Porto	Porto	5	50	20	20	50	20
30				X			Oeste	Nazaré	1					30
31				X	X		Região de Leiria	Leiria	1				1000	
32		X			X		Região de Aveiro	Águeda	3	30			20	20
33	X				X		AM Lisboa	Oeiras	3	50		20		50
34		X				X	AM Lisboa	Lisboa	3		5		5	20
35		X			X		Algarve	Faro	1				350	
36	X					X	Alentejo Central	Évora	1	20				
37		X			X		Terras de Trás-os-Montes	Mogadouro	2	50				20
38		X			X		Algarve	Portimão	1			15		
39		X			X		Região de Coimbra	Coimbra	4	75	100		250	250
40	X		X		X		Região de Aveiro	Aveiro	4	20	150		150	50

Questions and answer options

Crowdscape (crowdfunding the forest landscape)

Mestrado em Engenharia de Serviços e Gestão | FEUP

Aluna: Sandra Bernardo | up201903013@edu.fe.up.pt

Orientadores: Prof. Doutor Abílio Pereira Pacheco | Prof. Doutor Jorge Grenha

OBJETIVO DO ESTUDO:

Compreender as motivações e os impedimentos de participação em iniciativas de crowdfunding dirigidas ao apoio da gestão e conservação privada da natureza, com ênfase na prevenção de incêndios florestais.

A investigação em curso inclui a realização de um inquérito a pessoas conhecedoras das campanhas de crowdfunding da Montis.

***Required**

1. Encontra-se disponível para uma breve entrevista (20 a 30 minutos) on-line que possibilite aferir da adequabilidade do inquérito que irá ser desenvolvido?

Mark only one oval.

- ☐ Sim Skip to question 3
☐ Não Skip to question 2

Obrigada pelo tempo dispensado.

2. Comentários:

Caracterização do respondente

3. Por favor, indique se está a responder em nome individual ou em nome de uma Instituição.

Mark only one oval.

- ☐ Individual
☐ Instituição

4. Nome individual ou designação da Instituição:

5. No caso de participar em nome individual, por favor indique o seu género.

Mark only one oval.

- ☐ Feminino
☐ Masculino

6. Distrito:

Mark only one oval.

- ☐ Aveiro
☐ Beja
☐ Braga
☐ Bragança
☐ Castelo Branco
☐ Coimbra
☐ Évora
☐ Faro
☐ Guarda
☐ Leiria
☐ Lisboa
☐ Portalegre
☐ Porto
☐ Santarém
☐ Setúbal
☐ Viana do Castelo
☐ Vila Real
☐ Viseu
☐ R. A. dos Açores
☐ R. A. da Madeira

7. É associado da Montis?

Mark only one oval.

- ☐ Sim
☐ Não

8. Em quantos crowdfunding da Montis participou?

Mark only one oval.

- ☐ 0
☐ 1
☐ Vários

9. Para além da Montis, já participou em outras iniciativas de crowdfunding?

Mark only one oval.

- ☐ Sim
☐ Não

10. Comentários:

Consentimento de contacto

11. Declaro o meu consentimento para receber o contacto da aluna Sandra Bernardo - FEUP, para efeitos de realização de breve entrevista auxiliar dirigida à construção de um inquérito sobre participação em iniciativas de crowdfunding no apoio à gestão e conservação privada da natureza. *

Mark only one oval.

- ☐ Aceito
☐ Não aceito Skip to question 2

Obrigada pela disponibilidade.

12. Horário preferencial para agendamento da entrevista on-line: *

P. ex. Indicar dia da semana, período do dia (manhã, tarde, noite), hora e/ou dia do mês.

13. Plataforma on-line preferencial:

Mark only one oval.

☐ Zoom

☐ Google meet

☐ Skype

☐ Other:

14. Email: *

15. Telemóvel:

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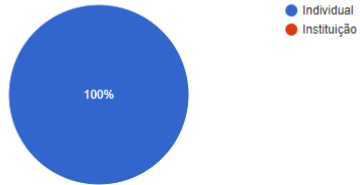
Google Forms

Characterization of the participants in the interviews

Caracterização do respondente

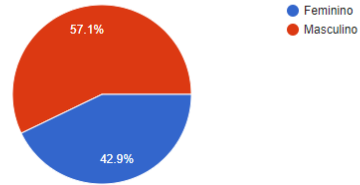
Por favor, indique se está a responder em nome individual ou em nome de uma Instituição.

7 responses



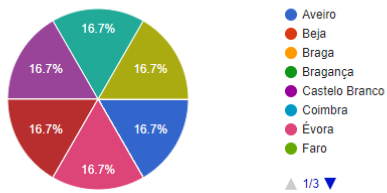
No caso de participar em nome individual, por favor indique o seu género.

7 responses



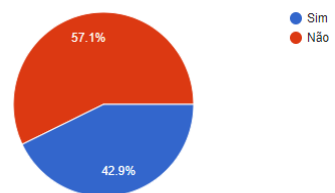
Distrito:

6 responses



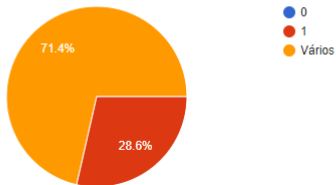
É associado da Montis?

7 responses



Em quantos crowdfunding da Montis participou?

7 responses



Para além da Montis, já participou em outras iniciativas de crowdfunding?

7 responses

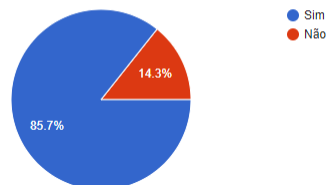


Figure A 3: Characterization of the participants in the interviews

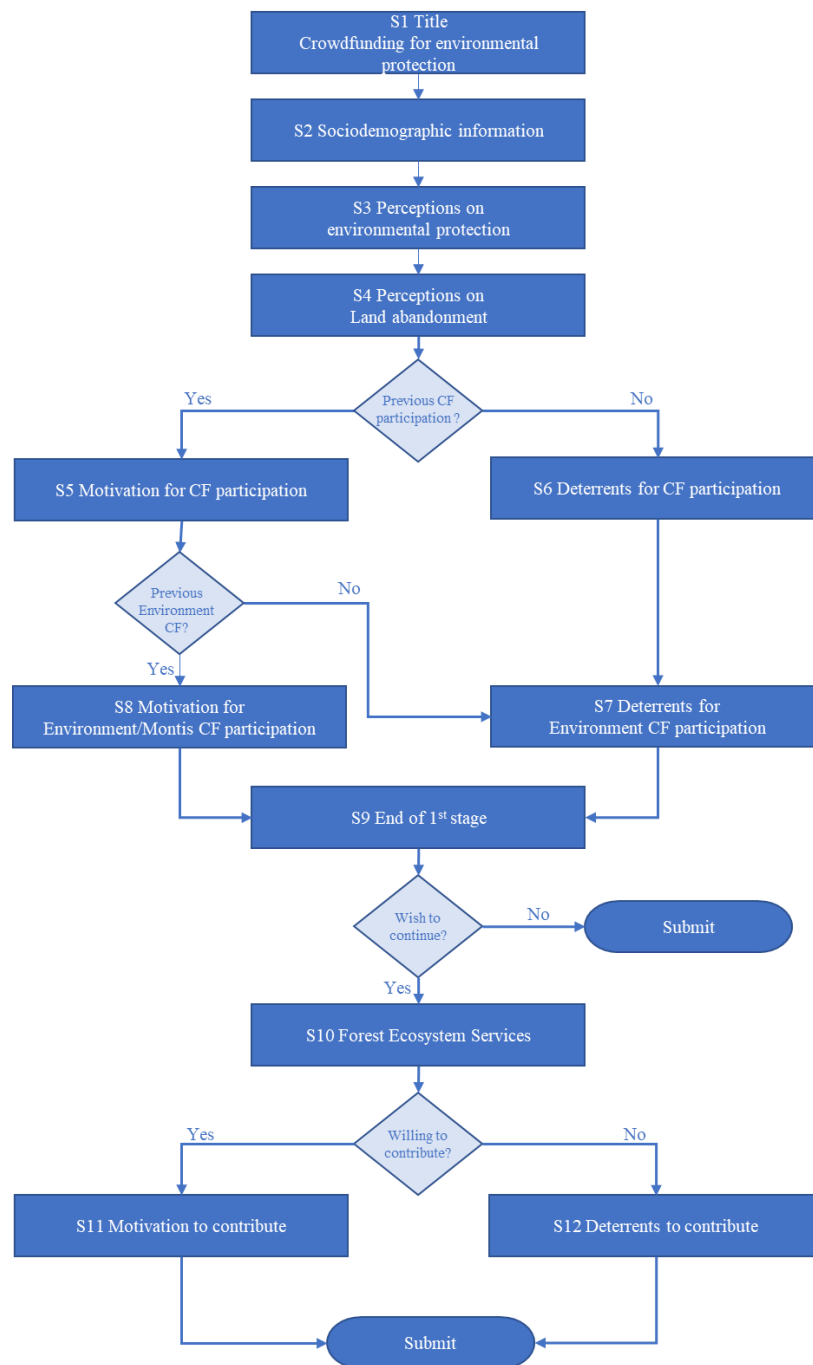
APPENDIX D: Online survey

Figure A 4: Overview of the survey instrument's sections

The original online survey was in Portuguese and has been translated to English for Supporting Information.

Section 1 Crowdscape	Source
1. Informed consent.	
Section 2 Sociodemographic information	Source
2. Gender	Marbuah (2019) Farhoud et al. (2021)
3. Age	Veríssimo et al. (2018)
4. Education	Veríssimo et al. (2018)
5. Nr of children	Marbuah (2019)
6. Income	Baumgärtner et al. (2017)
7. Residence (council)	
8. Do you have any link to rural areas:	Interviews
Yes, I am a landowner and/or producer (e.g. farmer, forester, etc.).	
Yes, because of my profession (e.g. biologist, researcher, fireman, etc.).	
Yes, because of my origins I have an emotional attachment.	
Yes, because it is my place of residence.	
No.	
Other	
9. Are you a member of any group whose main aim is to preserve or protect the environment?	(ISSP Research Group, 2012)
Section 3 Perceptions on environmental protection	Source
[Totally disagree; partially disagree; nor agree or disagree; partially agree; totally agree]	Stern et al. (1995) GAC scale
10. Environmental protection benefits everyone.	
11. Over the next decade, thousands of species of plants and animals will become extinct.	Ojea and Loureiro (2007)
12. Claims that we are changing the climate are greatly exaggerated.	
13. While some local plants and animals may have been harmed by environmental degradation, over the whole Earth there has been little effect.	Lundberg et al. (2019)
14. Environmental threats to public health have been exaggerated.	Marbuah (2019)
15. Environmental protection is beneficial to my health.	
16. Environmental protection will provide a better world for me and my children.	
17. Environmental protection will help me to have a better quality of life.	
18. Environmental damage generated here harms people all over the world.	
[Value orientations: egoistic - items 6, 7 and 8; altruistic – items 1, 5 and 9; biospheric – items 2, 3 and 4]	
[Very unwilling; Fairly unwilling; Neither willing nor unwilling; Fairly willing; Very willing]	ISSP Research Group (2012)
19. How willing would you be to pay much higher prices in order to protect the environment?	Franzen and Vogl (2013) Luís et al. (2018)

20. And how willing would you be to pay much higher taxes in order to protect the environment?

21. And how willing would you be to accept cuts in your standard of living in order to protect the environment?

Section 4

This section aims to uncover people's perception on abandonment of rural territories, resulting, for example, from the cessation of agricultural or pastoral activities, or the absence of forestry exploitation.

Source

22. In your opinion, in what way (negative or positive) do you evaluate the following **consequences of the abandonment** of agricultural or forestry territories?

[Very negative; Negative; Neutral, Positive; Very positive; No opinion]

Loss of natural heritage

Loss of cultural heritage

Increased wildfire risks

Increased environmental tourism

Increased area for wildlife

Increased area for native plants

Increased area for alien invasive plants

Accumulation of combustible material

Impact on biodiversity

Decreased human influence on ecosystems

Interviews and
Negative and positive impact:

Ustaoglu and Collier (2018)

Filho et al. (2017)

Andronic et al. (2020)

Beilin et al. (2014)

Positive perceptions:

Navarro and Pereira (2015)

Negative perceptions:

van der Zanden et al. (2018)

23. In your opinion, how important are following factors as **drivers of forest fires**?

[Not at all important; low importance; important; very important; extremely important; No opinion]

Topography of land

Climate change

Land abandonment

Accumulation of flammable material

Land use planning

Rural depopulation

Decrease in grazing and land use

Interview and Bento-Gonçalves (2021)

Terres et al. (2013)

Questionnaire branching

24. Did you ever participate in a CF campaign?

Includes the definition of crowdfunding.

Yes → proceed to Section 5 (motivations)

No → proceed to Section 6 (deterrents)

Section 5 | CF own motivations and society deterrents

Source

25. What type(s) of crowdfunding campaigns have you participated in?

Environmental; cultural; start-up investment; solidarity; other

Cecere et al. (2017)

26. Do you know other people (family/friends/colleagues) who have supported crowdfunding initiatives?	Cecere et al. (2017)
I don't know anyone.	Mollick (2014)
I know few people (3 or less).	
I know a few people (between 3 and 10).	
I know a lot of people (more than 10).	
27. In your opinion, how important are the following factors as motivation for your participation in crowdfunding initiatives?	Interviews and Gerber and Hui (2013)
[Not important; low importance; important; very important; extremely important]	
Desire to collect rewards	Mollick (2014)
Help others	Ustaoglu and Collier (2018)
Support causes	
Be part of a community	Cecere et al. (2017)
Gain social recognition	
Contribute to projects in remote regions	Rodriguez-Ricardo et al. (2018)
Easiness of the process	
Donate the amount I wish (no matter how small)	
Donate anonymously	
Personally support the creator of the campaign	
Know all the details of the project	
Know exact amount of the project	
28. In your opinion, how important are the following factors as deterrents for the participation of other individuals in crowdfunding initiatives?	Interviews and Gerber and Hui (2013)
[Not important; low importance; important; very important; extremely important]	
Considering that the projects are untrusty	Gallo-Cajiao et al. (2018)
Not knowing the creator	
Lack of confidence in crowdfunding process	
Unappealing campaigns	
Lack of promotion of the campaigns	
Uncertainty about effectiveness	
Finding that individual support makes no difference	
Having insufficient income to contribute	
Questionnaire branching	
29. Did you ever participate in a CF environmental campaign?	
Yes → proceed to Section 8 (motivations?)	
No → proceed to Section 7 (why not and WTC)	

Section 6 CF own deterrents	Source
30. Which crowdfunding platforms are you familiar with? None PPL (https://ppl.pt/) Crowdfunder (https://www.crowdfunder.co.uk/) Kickstarter (https://www.kickstarter.com/) Indiegogo (https://www.indiegogo.com/) Other: _____	
31. In your opinion, to what extent do you agree that the following factors are deterrents for your participation in crowdfunding campaigns? [Not important; low importance; important; very important; extremely important] Considering that the projects are untrustworthy Not knowing the creator Lack of confidence in crowdfunding process Unappealing campaigns Lack of promotion of the campaigns Uncertainty about effectiveness Finding that individual support makes no difference Having insufficient income to contribute	Gerber and Hui (2013) Gallo-Cajiao et al. (2018) Santos et al. (2010)
Next: Proceed to Section 7 – deterrents of participation in a CF environmental campaign (why not and WTC)	
Section 7 Environmental CF own participation deterrents Not having supported crowdfunding campaigns for ENVIRONMENTAL PROTECTION This section aims to understand the reasons that prevent people from participating in crowdfunding campaigns for the management and conservation of nature. Consider that you are aware of a crowdfunding campaign created by an ENVIRONMENTAL ASSOCIATION to raise funds to support forest management of abandoned territories	
32. In addition to the deterrents already indicated in the previous section, to what extent do you agree that the following factors are deterrents to your participation in crowdfunding campaigns for the management and conservation of nature? [Totally disagree; partially disagree; nor agree nor disagree; partially agree; totally agree] I don't think the benefits are worth paying for. I think there are downsides to restoration that outweigh the benefits. I'm not confident that the restoration project will actually provide the benefits. I think that government money should support the whole project, without need for private donations. I don't give to charitable or non-for-profit organizations. I don't trust that my money would actually go to the restoration project.	Matzek and Wilson (2021)
33. Would you be willing to voluntarily contribute through crowdfunding to protect the environment? [Very unwilling; Fairly unwilling; Neither willing nor unwilling; Fairly willing; Very willing]	Intention to participate #156 Bruner II (2009) #

34. Would you be willing to contribute via crowdfunding for an environmental association to buy abandoned territories to proceed with their forest management and conservation?

[Very unwilling; Fairly unwilling; Neither willing nor unwilling; Fairly willing; Very willing]

35. Would you be willing to contribute via crowdfunding to the implementation of forest management protocols between an environmental association and the owners of territories at risk of abandonment?

[Very unwilling; Fairly unwilling; Neither willing nor unwilling; Fairly willing; Very willing]

36. Would you be willing to contribute via crowdfunding to the clean-up of territories at risk of abandonment in order to reduce fuel material (limiting the risk of fires)?

[Very unwilling; Fairly unwilling; Neither willing nor unwilling; Fairly willing; Very willing]

37. How much confidence do you have in the following entities for the rational and appropriate management of forests?

[I do not trust; I have little trust; I have moderate trust; I have a lot of trust; I strongly trust]

Environmental associations

Landowners

Local government

Central government

Section 8 | Crowdfunding for Management and Conservation of Nature

Source

38*. Are you an associate of MONTIS - Associação para a Gestão e Conservação da Natureza?

Yes/No

39*. Have all the crowdfunding you supported for nature management and conservation been promoted by MONTIS?

Yes/No

40**. How did you learn about the existence of the crowdfunding campaign you supported?

☐ Through family/friends/colleagues/

☐ Through the campaign creator/Montis

☐ Through Montis associates

☐ Through the crowdfunding campaign - PPL

☐ Other. Which one?

41. As a supporter of crowdfunding initiatives for the management and conservation of nature, what is the importance you attach to the following motivations for your participation?

Interviews and Lundberg et al. (2019)

[Not at all important; low importance; important; very important; extremely important]

Knowing the territory

Personally knowing the promotor

Protecting a Portuguese ecosystem

Preventing land abandonment

Promoting biodiversity

Be affectively connected to the region

42. In addition to the deterrents already indicated in the previous section, to what extent do you **agree** that the following factors are **deterrents** to the participation of *other individuals* in crowdfunding campaigns for the management and conservation of nature?

[Totally disagree; partially disagree; nor agree nor disagree; partially agree; totally agree]

I don't think the benefits are worth paying for.

I think there are downsides to restoration that outweigh the benefits.

I'm not confident that the restoration project will actually provide the benefits.

I think that government money should support the whole project, without need for private donations.

I don't give to charitable or non-for-profit organizations.

I don't trust that my money would actually go to the restoration project.

43. How much confidence do you have in the following entities for a rational and adequate forest management?

[I do not trust; I have little trust; I have moderate trust; I have a lot of trust; I strongly trust]

Environmental associations

Landowners

Local government

Central government

Section 9 | End of the 1st stage of the survey

Having completed this stage of the questionnaire, we thank you in advance for your participation and you may submit your answers by clicking on the option Finish in the next field. If you have 2 additional minutes, we would be grateful if you could answer any additional questions by clicking on Continue

44. Do you want to Finish or Continue

Finish: This will take you to the submission page for your answers.

Continue: This will take you to additional questions (2 minutes).

Section 10 | Forest Ecosystem Services

Forest ecosystem services, also known as environmental services, are material goods and/or intangible services taken from the environment and made available to humanity.

According to the Millennium Ecosystem Assessment (MEA), Forest ecosystem services can be classified into 4 categories (1) provisioning services, (2) regulating services; (3) ; cultural services; and (4) supporting services.

45. In your opinion, how important are the following products derived from the forest ecosystem? Gouwakinnou et al. (2019)

Includes a definition of "provision services" Jaung et al. (2016)

[Not at all important; low importance; important; very important; extremely important; No opinion]

Food (e.g., berries, mushrooms, or honey)

Clean water

Wood

Resin

Game meat

Medicinal plants

46. In your opinion, how important are the following benefits obtained from the regulation and control of ecosystem over natural processes?

Includes a definition of “regulation services”

[Not at all important; low importance; important; very important; extremely important; No opinion]

Air quality regulation

Water regulation

Soil erosion regulation

Climate regulation through carbon sequestration

Pollination

47. In your opinion, how important are the following experiences and benefits obtained when in proximity with nature?

Includes a definition of “cultural services”

[Not at all important; low importance; important; very important; extremely important; No opinion]

Recreation

Tourism

Landscape sightseeing

Educational services

Spiritual experiences

48. In your opinion, how important are the following supporting services necessary to generate all other ecosystem services?

Includes a definition of “support services”

[Not at all important; low importance; important; very important; extremely important; No opinion]

Nutrient cycling

Soil formation

Question branching

49. Would you be willing to contribute financially to ensure the provision of forest ecosystem services?

Yes → proceed to Question 50 (motivations?)

No → proceed to Question 51 (why not?)

Section 11 | If WTC = yes

Source

50. How important are the following reasons why you would be willing to contribute financially to forest ecosystem services?

[Not at all important; low importance; important; very important; extremely important]

Because we all enjoy the benefits of nature.

To supplement landowners' income and reduce the risk of forest abandonment.

To encourage landowners to increase the supply of ecosystem services.

Because it is fair that the owners' income is supplemented, as they are offering unpaid services to society.

Section 12 | If WTC = no

Source

51. How important do you consider the following reasons why you would not be willing to contribute financially to forest ecosystem services?

Santos et al.
(2010)

[Not at all important; low importance; important; very important; extremely important]

I have insufficient income to be able to contribute.

The problem is the state/government's problem.

I don't think these services are relevant enough.

I already pay too much tax.

I don't trust that my contribution will be put to good use..

Section 13 | Thank you

52. Do you have any information you would like to add that has not been covered previously?

53. If you would like to receive information about this study please leave your e-mail address.

END

APPENDIX E: Supplementary results | Survey

Demographic characterization of crowdfunding participants

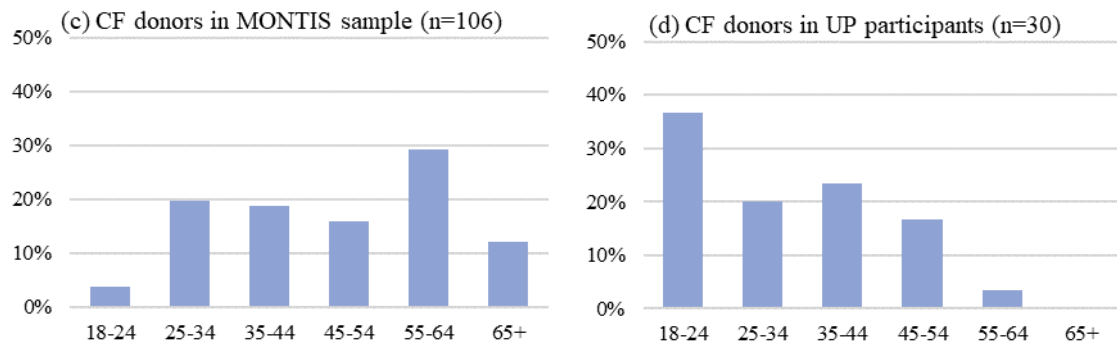


Figure A 5: Distribution of the age in years. (c) Crowdfunding donors in MONTIS sample; (d) Crowdfunding donors in UP sample

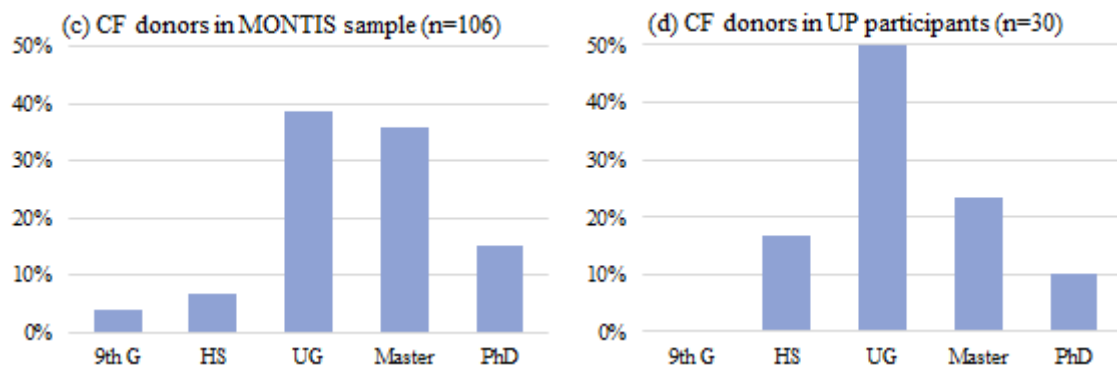


Figure A 6: Distribution of the education level. (c) Crowdfunding donors in MONTIS sample; (d) Crowdfunding donors in UP sample

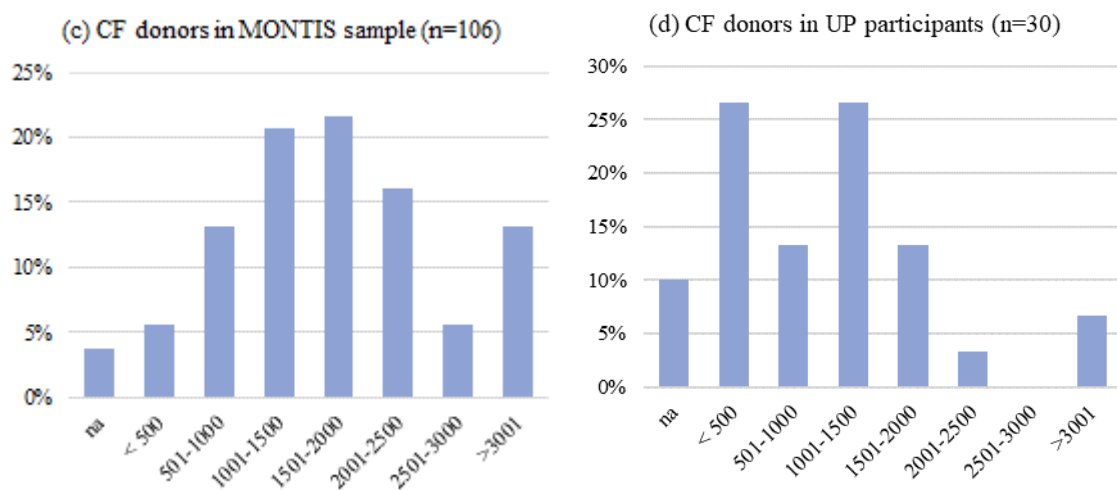


Figure A 7: Distribution of the monthly income in euros. (c) Crowdfunding donors in MONTIS sample; (d) Crowdfunding donors in UP sample.

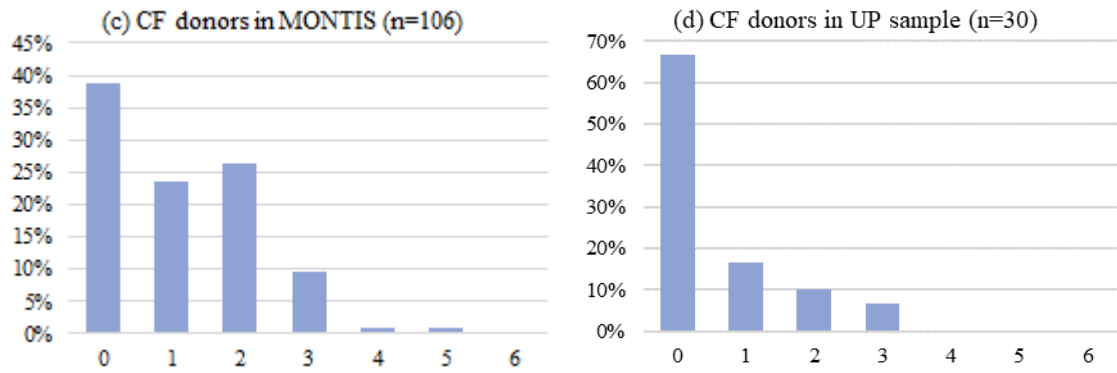


Figure A 8: Distribution of the number of children. (c) Crowdfunding donors in MONTIS sample; (d) Crowdfunding donors in UP sample

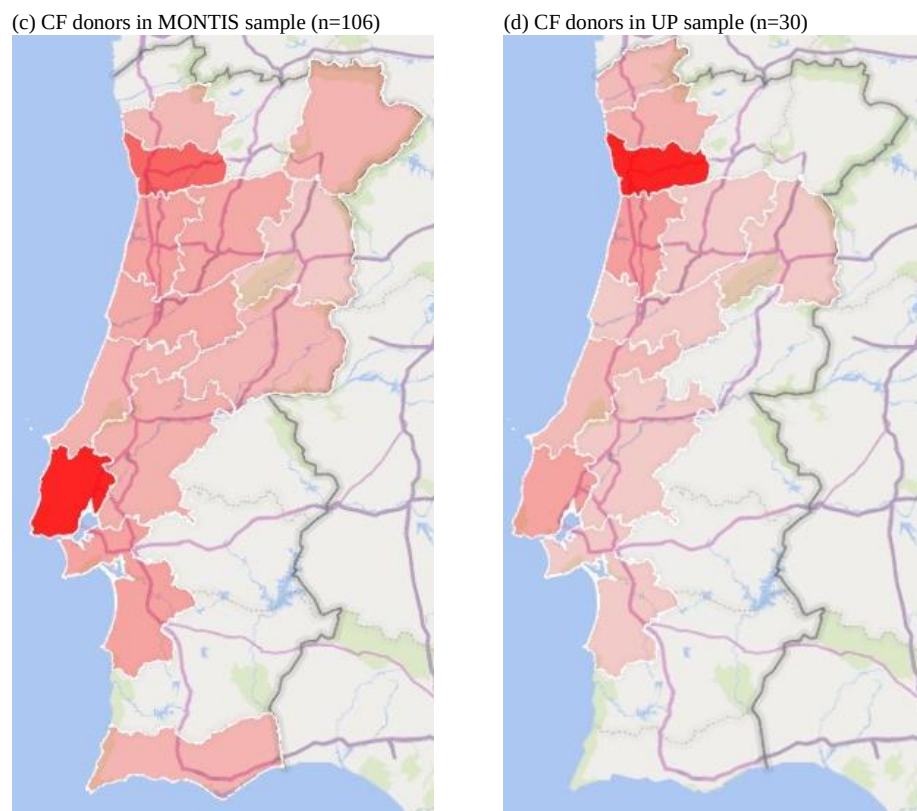


Figure A 9: Geographic distribution. (c) Crowdfunding donors in MONTIS sample; (d) Crowdfunding donors in UP sample