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Forest governance developments during economic crises: The case of Greece

PhD

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Abstract

This thesis aims to gain an understanding of the developments that take place inside forest governance regimes during economic crises, especially with respect to policies included in bailout deals. It focuses on the case of Greece, because the Greek forest regime has been showing signs of neglect in recent decades, and despite the huge impacts of the 2009 economic crisis, its effects on the Greek forest governance regime have not been explored.

The study starts with describing the theoretical background, and then examines how large-scale economic crises have differentially affected forest governance regimes in in the past, when IFIs are involved. Then it dives into Greece's forest governance regime's most prominent stakeholders; it identifies developments and the experience of key bodies in the national forest governance regime since the beginning of the 2009 crisis; and it determines the public's valuation of specific forest attributes and some basic elements about their relationship with forests. Findings can help to increase the resilience of forest regimes and relevant stakeholders to the volatility that often accompanies economic crises.

The importance of pre-crisis arrangements in forest governance are highlighted for both international and national (Greece) settings, as they can affect the developments during economic crises. Some of the key patterns identified in forest governance vis-a-vis specific policies, namely privatization of public property, deregulation, and austerity in public finances, have to do with decentralization of power; underfunded forest authorities; and in cases with no coherent strategy for forests, economic values dominating over environmental or social ones. For the case of Greece, the abandonment of rural areas and lack of forest-related economy, along with significant decrease in funding towards key forest actors played major role in the adverse developments in the governance of forest regime. Nonetheless, the public's valuation of both environmental and social forest values remains positive, despite the effects of the economic crisis onto the society.

This thesis recommends that national and international actors intensify their efforts to adopt and/or support official plans for forests, and to consider external effects of policies that do not target primarily the forest regime, preferably through increased consultation with stakeholders, while it also highlights the importance of up-to-date relevant data, which can be crucial to informed decision making.

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List of Abbreviations

Abbreviation	Meaning
AMA	Athens Metropolitan Area
COFORD	Council for Forest Research and Development (Ireland)
(D)CE	(Discrete) Choice Experiment
CM	Choice Modelling
CV	Continent Valuation
EC	European Commission
ECB	European Central Bank
EEA	European Economic Area
e.g.	Exempli gratia (for (the sake of an) example)
EKBY	Greek Biotope-Wetland Centre Ελληνικό Κέντρο Βιοτόπων-Υγροτόπων (in Greek)
EKC	Environmental Kuznets Curve
ENGO	Environmental Non-Governmental organization
EU	European Union
FAO	Food and Agriculture Organization
FLEG	Forest Law Enforcement and Governance
GDP	Gross Domestic Product
GVA	Gross Value Added
ha.	Hectare
HRADF	Hellenic Republic Asset Development Fund
i.e.	Id Est (that is)
IFI	International Financial Institution
IMF	International Monetary Fund
KEDE (ΚΕΔΕ)	Central Union of Greek Municipalities Κεντρική Ένωση Δήμων Ελλάδας (in Greek)
LULUCF	Land Use, Land-Use Change and Forestry
MoU	Memorandum/a of Understanding
ML	Mixed Logit

MNL	Multinomial Logit Model
MTCC	Malaysian Timber Certification Council
NFP	National Forest Plans
NGO	Non-governmental organization
NIE	New Institutional Economics
OECD	Organization for Economic Cooperation and Development
PEFC	Programme for the Endorsement of Forest Certification
RUM	Random Utility Model
REDD	Reducing Emissions from Deforestation and Forest Degradation
RFD	Royal Forest Department (Thailand)
SAP	Structural Adjustment Programme
SE Asia	South-Eastern Asia
SFM	Sustainable Forest Management
SQ	Status Quo
UN	United Nations
US	United States
USAID	United States Agency for International Development
WTA	Willingness To Accept
WTP	Willingness To Pay
WWF	World Wide Fund for Nature

1 Introduction

1.1 Background

Despite the large overlap and interrelation between large-scale economic crises and escalating environmental issues, historically, economic crises have tended to receive a lot more attention and overshadow environmental, climate change, and natural resource issues, which are often neglected in the process (Clapp *et al.*, 2009). At the same time, a long-term study by Deutsche Bank showed that financial crises occur more often than before (Reid *et al.*, 2017), with experts (Kindleberger, 1993; Kindleberger and Aliber, 2005; Pollock, 2015) claiming that financial crises occur once every decade.

Existing research from international agencies and organisations has either described some of the impacts an economic crisis may have on forests and the forest sector industry, focusing mainly on country-specific impacts, or have briefly touched upon the intersection between economic crises and forests. For example, Colby (2008) focused on the likely (not observed yet at the time of writing) impacts of the 2007- crisis and economic slowdown on biodiversity and natural resources management (forests, agriculture, fisheries) in India, China, and Brazil. Gellert (2005) addressed the boom ‘‘miracle’’ in Indonesia during Suharto’s reign and the structural adjustment packages led by the IMF in Indonesia during and after the 1997 crisis, concluding that the increasing social and environmental costs of reliance on timber-based export growth were neglected in both cases, which led to the degradation of forests and the environment in general. Similarly, Sunderlin (1999b) describes the effects of the economic crisis in combination with the political change in Indonesia to their national forest sector.

Academic literature has addressed some impacts of economic crises on the environment, but has not addressed forest governance in detail. Elliot (2011), Lekakis and Kousis (2013), and Siddiqi (2000) indicate that economic crises can affect environmental outputs positively in the short run, for example due to decrease in economic activity, but negatively in the medium- or long- term, due to changes in environmental protection and budget cuts from environmental bodies. Burns *et al.* (2020) found that during economic crises environmental policy slips down the agenda, which may have long term consequences for environmental quality. Similarly, Stiglitz (2002) argues that during periods of crisis, decision makers tend to neglect how the policies used for economic growth may have any adverse impacts on the

environment, or the society, and how governance may change. Burns and Tobin (2016) argue that changes to the means (*i.e. budgets*), outputs (i.e., number of policies) and outcomes of environmental protection (short-term or long-term) are some main impacts from economic crises. However, they recognise that even though changes in budgets can be an effective indicator regarding the impacts of the economic crisis on the means of pursuing environmental protection, the existing literature on how and whether environmental budgets change as a consequence of economic downturns, and their impacts on the environment or forests has been significantly scarce (Burns and Tobin, 2016).

Academic literature has also approached the impacts of economic crises on forests and forest governance indirectly, by focusing on other sectors from specific events. Siddiqi (2000) describes both the positive and negative effects of the '97 financial crisis on the energy sector and consumption in 10 Asian countries, and the subsequent impacts on air, land, and ocean environment. Ffrench-Davis (2005) comments on the impact of the control of natural resources in general, while analysing the economic reforms in Chile during the economic crisis since the 1970s. In addition, Rodriguez (2000) describes both the short-term positive and long-term negative impacts of the Venezuelan crisis on wild populations of animals and plants, which also touched on forest resources. Carandang (2008) analyses the costs of environmental damage in the forestry sector in the Philippines and both the costs and benefits of priority interventions in the period 1934-2007, which includes the period of financial crisis in South-East Asia. Finally, Apostolopoulou and Adams (2015), using the UK and Greece as case studies, argue how in the post-crisis era, neoliberal conservation allows for the nature to either be used for economic growth and become degraded, or to be 'saved' through the commodification of conservation in the markets.

1.2 Research aim and scope

The aim of this thesis is to investigate and identify developments that take place inside forest governance regimes in periods economic crisis, and specifically vis-à-vis policies adopted during the crisis period. This research offers an insight about how the most frequently adopted socio-economic policies during economic crises may have affected forest governance, focusing mainly on policies included in bailout deals by IFIs. These changes are described in terms of the forest governance structure, actors' power and synergies, new

elements that are introduced, its overall direction, as well as qualitative characteristics, depending on the regime's pre-crisis status. This understanding can help to formulate recommendations and guide regional, national, and international policy makers, who are involved in, or whose decisions and actions may impact forests.

Furthermore, this research focuses on the case of Greece in two primary research chapters, focusing on the perspectives and input of different forest governance actors. The Greek forest regime has been showing signs of neglect and decline in the last couple of decades, in terms of very low levels forest-related economic activity (Eurostat, 2023), large decline in funding towards the national forest services and decentralized administrations, two of its major public actors (Ministry of Environment and Energy, 2015, 2016, 2017, 2018a, 2019, 2020b, 2021a; Ministry of Finance, 2023), as well as huge and catastrophic forest fires in the last few years (WWF Greece, 2019; Psaropoulos, 2021, 2023; Xanthopoulos, 2022; Rafenberg, 2023), while public participation in forest management and forest-related schemes is also on the decline. In the same period the country experienced extreme adverse impacts from the 2009 economic crisis that are comparable with the Great Depression in the US in 1930s (Alderman *et al.*, 2015; Galatsidas, Sklias and Roukanas, 2022). Greece resorted to external lenders to rescue its banking system multiple times since 2010, with the second bailout deal including the largest debt restructuring in history (McBride, Lizarazo and Sherlick, 2022).

Some reported impacts from the 2009- economic crisis in the Greek forest governance regime are related to changes in regulation with the intent to boost economic growth, which led to discontinuity in the forest strategy or an unclear policy framework in the forest regime (Apostolopoulou and Adams, 2015; WWF Greece, 2019). Major changes in the structure of the forest governance have been introduced twice since the beginning of the economic crisis with opposite directions. Law 3852/2010, most commonly referred to as the Kallikratis administrative reform programme, was adopted in 2011, designated more responsibilities about forests, including the administration of forest offices and directorates, to decentralised municipal and regional public authorities. Au contraire, more recently, the forest services were transferred to the ministry of the Environment and Energy in 2021 (Law 4824/2021), and the General Secretariat of Forests was established in the ministry of Environment and Energy in 2022 (Presidential Decree No. 6/2022) (Ministry of Environment and energy, 2022),

which incorporated and moved various decentralized services and bodies directly under the ministry of Environment and Energy, pushing towards a more centralized regime. This came on top of a complex and often inconsistent regime, in terms of the responsibility allocation among the different bodies in the Greek forest regime, especially regarding forest management, protection, and fire suppression, which have been a persistent and perennial problem (Bokaris, 2002; Georgiopoulou, 2007; Eleftherakou, 2019; Papasteriou, 2022)

In addition, deregulation in the form of fast track procedures and exemptions from land planning and Environmental Impact Assessment studies have also been identified in the literature (Lekakis and Kousis, 2013; Apostolopoulou and Adams, 2015; Paliogiannis, Koedam and Cliquet, 2019). These cases have reportedly increased environmental threats from economic activity even in protected areas (WWF Greece, 2011, 2012) and unrest in local societies, e.g. the cases of Apophgadi (Troubis, Mitsos and Botetzagias, 2013) or Skouries (Apostolopoulou and Adams, 2015). Lekakis and Kousis (2013), Apostolopoulou and Adams (2015), Calvário, Velegrakis, and Kaika (2017) and the Hellenic Ornithological Society (2014) also observed some adverse environmental impacts as unintended side-effects resulting from economic policies imposed as prerequisites for receiving a bail-out deal, such as deregulation and privatization of public forest land and property. Such policies were reportedly adopted for the purpose of short-term revenue, but neglected the long-term implications for the country's forests, biodiversity, and natural wealth (ibid.).

1.3 Thesis structure and research objectives

This thesis deploys 4 standalone but complementary chapters. Each asks a different question, uses different methods, and sheds light on a different element of the topic.

Chapter 2 provides the theoretical background for the relationship between forest governance and economic crises. To do this, it explores the evolution of key concepts in economic theory with respect to large scale economic crises, and the approach of the same schools of economic thought on natural resource management, along with the properties of forest goods and services, the importance of property rights, and the role of externalities. Next, it clearly defines key terms and links in the relationship between forest governance and economic crises, and describes some complexities in the relationship between forest governance and economic crises.

Chapter 3 provides the historical background and an overview of past experiences of transformation and developments in forest governance regimes during large-scale economic crises. The objective of the chapter is to examine how economic crises originating in the financial sector may differentially affect countries' forest governance regimes, focusing on cases where the states agreed to bank bailout deals with IFIs. To do this, it applies a comparative case study with cases from the EU periphery financial crisis in 2009 and the South-east Asia financial crisis in 1997. It considers both pre-crisis arrangements in the countries' forest governance and financial sector regimes, as well as developments that took place during the economic crisis, which may have affected the direction of the forest regime.

Chapter 4 addresses the perspectives of leading members of key official bodies in the Greek forest governance regime with respect to the impacts of the 2009 economic crisis onto their organization and regime more broadly through interviews. The objectives of this chapter are to capture and map important developments shared by each interview participant, to find common patterns or themes among all interviews, as well as discuss approaches for the improvement of the Greek forest regime in the future.

Chapter 5 focuses on the public, which have experienced both economic and environmental pressures since 2009. The main research objectives in this chapter are to estimate the public's valuation of specific forest attributes (Willingness To Pay - WTP), along with sample characteristics which may play a role (covariates), and explore some basic elements of the public's relationship with forests in the area. It uses a Discrete Choice Experiment (DCE) that explores the preferences of the citizens in Athens Metropolitan Area (AMA) towards economic investment in nearby forests. The results offer an insight on the current approach of the public towards economic investment in forests, and can be used as an indicator to policy and decision makers with respect to potential future investment.

Finally, chapter 6 brings lessons from all chapters together, and it highlights both key threads in all chapters, as well as policy recommendations and implications that rely on findings from all chapters. The appendices are also divided and presented per chapter, to facilitate the reader.

2 The relationship between forest governance and economic crises. A theoretical background

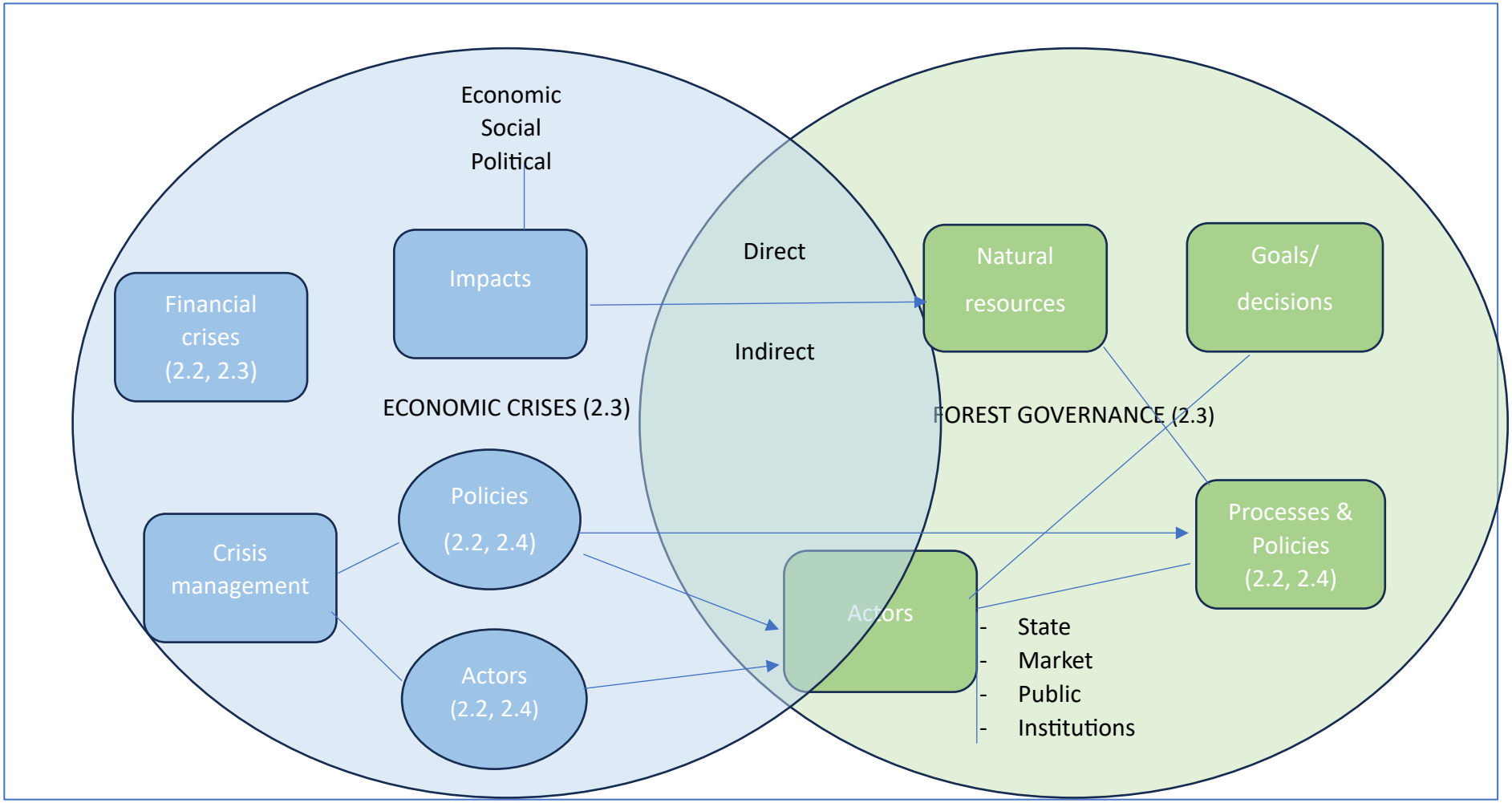
2.1 Introduction

This chapter provides the theoretical background of the relationship between forest governance and economic crises. It is based on literature review and each section explores and focuses on a different perspective of this relationship. The objective of this chapter is to set the foundation and a common background, in terms of key and relevant terms, ideas, and notions, which the rest of the thesis chapters revolve around.

Chapter Structure: Section 2.2 brings together some of the most influential movements of economic thought and their take on both economic crises and natural resource management, while it also briefly touches upon the socio-political conditions each one was formulated in. Section 2.3 discusses three parameters of environmental economics regarding the complexities of forest governance. First, how different forest goods and services may have different yet mutually exclusive attributes and values, depending on their management and use. The second is property rights, which determine how these forest goods and services may be used and the difficulties in their efficient assignment. Finally, it refers to externalities and the complexity of the combination of property rights with forest good attributes. Section 2.4 looks at the literature to carefully define both forest governance and economic crises in the way they will be used in this research. It then establishes the theoretical link between forest governance and economic growth, which has been the primary focus in the policies suggested by IFIs and adopted by governments in response to economic crises (more in detail in Chapter 3). Section 2.5 develops 2.4 further and describes the impacts of the economic-crisis-related changes in governance that affect some already complex elements of forest governance. It looks at both the direct impacts of the crisis, i.e., before any response to the economic crisis, and the indirect impacts, which are associated with the policy responses to the economic crisis. Finally, the summary brings all the sections together, and highlights how findings from this chapter may relate to gaps in the literature that have not been previously exposed or adequately described.

The theoretical framework is visualized in Figure 2.1 below.

Figure 2.1 Theoretical Framework: Relationship between forest governance and economic crises



Source: Own elaboration

2.2 Economic crises, governance, and natural resources in early economic theory

This section aims to highlight the evolution of concepts that were considered key in economic theory debates with respect to large scale economic crises, which this thesis focuses on, as well as the takes of the same schools of economic thought on management of natural resources, mainly forests. The literature is presented in chronological order and discussed only the views of the most influential and relevant figures to help the reader.

The point of reference for this section is the first large scale economic crisis, i.e. the great depression in 1929, which was addressed at the time from the perspective of the Keynesian, Chicago, and Austrian schools of economic theory. These schools explored and proposed arrangements with respect to the role, power, and responsibility of formal, informal, state and non-state institutions (e.g. markets) and actors, with respect to the origins and coping with the 1929 economic crisis. Literature review also addressed earlier theories and discussions about economic growth, the role of markets (classical economics), as well as the consumer preferences, allocation of resources (neoclassical economics that are considered mainstream today). Finally, this section also highlights literature from more recent economic theories that are relevant to this study, i.e., new institutional economics and environmental economics that focused on institutions, properties of natural resources goods and services, property rights, and externalities.

The socio-political conditions faced when these theories were formulated in are also briefly described, in order to explore whether and how these theories were influenced by these conditions, how changes in these conditions and scientific progress contributed to the formulation of other relevant theories, and whether the conditions these theories referred to might be relevant to the current social, economic, or environmental conditions.

2.2.1 Classical economists

Classical economic theory considered the functioning of markets that were efficient, self-regulating. This is best illustrated by Adam Smith's (1776, p.349) work, where an invisible hand, representing the incentives and the market powers, brings stability and improvement in the market and the society when all pursue their own interest. Classical political philosophers and economists, such as John Stuart Mill (1859, p.13) (Appendix 2.1) also discussed freedom and liberty and proposed limits and boundaries for human actions,

including the actions and the power of the state. However, according to Hicks (1936, p.239) classical theory cannot explain why or how economic crises occur, as the markets should self-adjust, and thus consider them as 'deviations from this norm'.

Despite Smith's support of liberty and individual action and responsibility, both in social and economic life, he recognised that limits might exist to the efficiency of allocation of goods and resources through market mechanisms. Some goods and services cannot be provided through the markets efficiently, such as certain public goods and services, and that the role of the state to provide them is essential:

> *"the duty of erecting and maintaining certain public works and certain public institutions which it can never be for the interest of any individual, or small number of individuals, to erect and maintain; because the profit could never repay the expense to any individual or small number of individuals, though it may frequently do much more than repay it to a great society"*
> (A. Smith, 1776, p.534)

Smith (1776) recognised the role of the state and local or regional municipalities, when it comes to erecting and maintaining public works and infrastructure that support commerce and markets. In his view, infrastructure that supported commerce, such as roads, bridges, harbors, and canals, would benefit commerce and all involved in it, including producers, merchants, and consumers. Smith (ibid.) asserts that the management of such public works and infrastructures should be under either state, regional, or local management, depending on the distribution of benefits, so that the costs are also distributed accordingly, providing examples from management under a toll-scheme in England, and public management in Asia. He thought private management of such works were unfit compared to joint-stock companies (public), as the directors of private companies would have no interest in the prosperity of general trade, rather than their own firm, and public companies usually have more means and capital to maintain such works effectively, while he also referred to the potential adverse effects of such toll services (ibid., p.571-2).

Similar observations and theories regarding the role of the individuals, markets, and the state, regarding the management, allocation, and/or use of resources have also been made by other political philosophers and classical economists, such as Thomas Malthus, David Ricardo, and John Stuart Mill. They addressed the relationship between land and natural

resources and the population from the perspective of ownership, management, and/or use of natural resources, as well as the most efficient use of such resources and goods.

Ricardo suggested the use of the markets for finding the most efficient use of the land and natural resources. In 'On the Principles of Political Economy and Taxation' (1817), Ricardo formulated the law of land rent, according to which the rent of land should be equal to the economic benefit from the most productive use of the land, relative to the benefits from using marginal land for the same purpose, ceteris paribus (labor, capital), and not from the value of the output from a piece of land itself.

> *"for it is found, that the laws which regulate the progress of rent, are widely different from those which regulate the progress of profits, and seldom operate in the same direction."*
> (Ricardo 1817) p .40

Ricardo's theories relate to contemporary considerations about how and which ecosystem services should be valued, as well as whether markets should dictate how natural resources and forest resources should be used (Brown, 2000; Altieri A., 2002; Bolwig *et al.*, 2009), as well as policy and regulation related to permitted economic activity in forests, which may not always be forest-centred[1], such as agriculture, mining, energy projects, etc. (Wright, 2005; Zhang and Pearce, 2011; Lambin, 2012; Agrawal *et al.*, 2013; Bradley, 2020).

Malthus, in his 'Essay on the principle of population' (1798), highlighted that although population has the potential to increase exponentially, land doesn't. This led him to claim that land dedicated to agriculture will not be able to cover the needs of the population, which will result in poverty, disease, famine, and war. He discussed the role of institutions and incentives with respect to behaviour changes, comparing long-run (population growth) and short-run events affecting subsistence (Malthus, 1798). Although technological and research progress that started during the industrial revolution helped people overcome some subsistence and resource scarcity problems (Thomas, 1985; Goldstone, 2002), something that Malthus didn't foresee, there are still common elements between his approach and current environmental problems and debates, namely the scarcity of resources, substitution of land uses, as well as the proposed solutions to such issues.

[1] The economic activity does not rely on the existence of forests, although forests are affected by this activity.

In particular, the subsistence needs of a growing population, as well as increased global demand for agricultural products still remain factors exerting pressures on forest land to turn to agriculture, which has in recent years been the major driver for global deforestation (Grabrielle Kissinger, Herold and De Sy, 2012). However, agriculture growth is not dependent only on the subsistence needs of a growing population, but a complex combination of factors. For example, increasing population in Malawi, in combination with (agriculture-related) market and policy failures, poverty, and structural adjustment policies had been the main drivers of deforestation in the country in the early 2000s (Minde *et al.*, 2001). In addition, extensive deforestation and biodiversity loss even in the present day are linked with high demand for agricultural products, such as palm oil, which is widely used and consumed in a variety of food and cosmetic products (WWF UK, no date; Vijay *et al.*, 2016; Lyons-White and Knight, 2018; Cisneros, Kis-Katos and Nuryartono, 2021).

Also, his ideas that natural resource scarcity can be dealt with through either mitigation (through institutions and incentives to manage population growth to prevent adverse effects) or adaptation (change of social conditions because of the adverse effects, such as famine, and wars over food) are similar to the current approach to climate change by many relevant actors and specialist institutions, such as the UN (2019), FAO (2012), and NASA (2019).

Evidently, there is no consensus or common approach among the classical economists, with respect to the environmental management of natural resources, as natural resource scarcity was not a pressing issue for the time. For example, for Smith, the management of natural resources, and particularly timber, as well as natural resource scarcity was not an issue that would create an obstacle to economic growth, but quite the opposite, as he believed that nature was generous and agriculture was capable of offering outputs far in excess of inputs (Smith, 1776; Barber, 1967).

> *The price of wood again varies with the state of agriculture, nearly in the same manner, and exactly for the same reason, as the price of cattle. In its rude beginnings the greater part of every country is covered with wood, which is then a mere encumberance of no value to the landlord, who would gladly give it to anybody for the cutting. As agriculture advances, the woods are partly cleared by the progress of tillage, and partly go to decay in consequence of the increased*

number of cattle. […] Numerous herds of cattle, when allowed to wander through the woods, though they do not destroy the old trees, hinder any young ones from coming up so that in the course of a century or two the whole forest goes to ruin. The scarcity of wood then raises its price. It affords a good rent, and the landlord sometimes finds that he can scarce employ his best lands more advantageously than in growing barren timber, of which the greatness of the profit often compensates the lateness of the returns. […] The advantage which the landlord derives from planting can nowhere exceed, at least for any considerable time, the rent which these could afford him; and in an inland country which is highly cultivated, it will frequently not fall much short of this rent

(A. Smith 1776, p.134)

However, Smith viewed timber as a resource in itself only, and he did not take into account the environmental benefits of forests, nor the environmental damages deriving from the lack of forests, as there are no relevant passages in his specific work. On the other end of the spectrum regarding natural resources, John Stuart Mill (1848 p.532-533) recognised and expressed his concerns that nature could be negatively affected in order to enhance production (economic activity) (Appendix 2.2).

Finally, another school of thought that succeeded classical economics, in regards to liberty and the freedom of the markets came from the political philosopher Karl Marx. Karl Marx (1867) in 'Capital', used the labour theory of value, which some classical political economists (Smith, 1776; Ricardo, 1817) had also advanced, to criticise the classical political economy and how the individual's self-interest may not always serve the common good in the capitalist mode of production. Marx was likely influenced by the development of the social and working conditions and capitalist production during the industrial revolution, which resulted in the conflict between the working class and the capitalist owners of the industry (Smelser, 1959).

In Marxian economics, economic crises happen not as deviations from the norm, but as the norm, due to the structure of the capitalist system (Marx and Engels, 1848). His theory of crisis is based on the law of the tendency of the rate of profit to fall over a business cycle, due to competition (Clarke, 1993). As the rate of profits is decreasing, economic crises are a

necessary component that can restore the rate of profits, as businesses are taken out of the market enabling more profitability for the remaining firms, consolidations between firms, and reduced labour costs (wages) for the firm due to unemployment. However, there are several factors that delay the onset of declining profits, such as improvements in productivity in consumption goods producing industries, improving the efficiency of production, extend the working day, foreign trade, and globalisation (Bowman, 2009).

Although Karl Marx did not address any concerns directly regarding forest-specific or environmental problems, such as environmental degradation, many more contemporary scientists applied notions of his writings to their theory, in the sense of forces of capitalism (which would inherently lead to economic crisis) exploiting nature and natural resources. For example, Neil Smith (1986) distinguishes nature into 'first', i.e. nature untouched by human activity, and 'second', i.e. nature transformed by human activity/capitalism, and the impact of human activity (such as production, distribution, exchange, and consumption) on nature in the latter case (Smith, 1986; Pepper, 2002). Similarly, David Harvey (1974) has argued that the political/economic systems in place are related to the ecological limits in each case, and has also criticised neoliberalism (and the underlying powers of capitalism) with respect to deterioration and exploitation of natural resources (Harvey, 2001, 2005).

Lastly, there is little information on Marx's thinking on the relations between humans and nature, as value in all commodities is dependent on or derived from human labour (Marx, 1867). This can lead to the assumption that Marx did not consider environmental values and that environmental resources were not a source of value on their own, although some have attempted to reflect on the concept of nature in Marxism, e.g. Castree (2001), Schmidt (1962). At the same time, others have used Marx's critique to capitalism to reflect on the field of environmental economics and describe capitalism's environmental consequences (eco-Marxism). Some examples include O'Connor (1988) and Perelman (1974) who describe how the capitalist system undervalues natural resources; Altvater (1993, 2007), who argues that capitalism is incompatible with nature (environment), in terms of continuous growth (capitalism) vs finite resources (nature); Grundmann (1991a, 1991b) who considers anthropocentricism and the control over nature as the main causes of environmental problems; and Douai (2018) who discusses a number of environmental and ecological economics topics through the prism of Marxism, such as environmental quality and class

conflict, the neoclassical natural capital value theory of natural resources, externalities, and sustainable human development, while distinguishing between crises of capital accumulation and crises of human development.

2.2.2 Neoclassical economists

The contribution of the neoclassic theory is significant in the microeconomic field even today, in terms of understanding how markets and the participating actors may operate. Neoclassical economics are based on some fundamental assumptions, namely that individuals make rational choices and have rational preferences among outcomes; individuals are viewed as consumers who aim to maximize their utility, and firms their profits; and people act on the basis of full and relevant information (Hennings and Samuels, 1990; Colander, 2000; Weintraub, 2011). Market competition in the neoclassical model is perfect, always geared towards a static equilibrium (self-restoring), with a large number of both consumers and firms, with individual firms and consumers not able to dictate market conditions, and well-defined property rights (Henry, 1999; Engerer, 2001; Tsoulfidis, 2013; Ledyard, 2020). Their contribution also changed the perspective of economics from a moral philosophy approach to a more scientific approach (e.g. Marshall, Pareto).

Alfred Marshall is a key figure in the transformation of modern economics and the founder of the neoclassical school of thought, which is based on his theory that the supply and demand of a good can determine both the produced quantity and its price (Marshall, 1890). Marshall is credited for introducing and bringing concepts such as supply and demand, price elasticity, marginal utility, and costs of production into a coherent scientific whole using both economics and mathematics in his books (Dimand, 2007). In terms of his contribution to macroeconomic issues, such as economic growth and progress and poverty, Caldari (2004) claims that Marshal believed that dealing with such issues should be accompanied by institutional, cultural, and political development, as he also emphasized the necessity of dealing with poverty, which in Marshall's (1926) view was the main obstacle to progress[2]. His principle underlying (sustainable) development was the improvement of the quality of the

[2] Market failures are attributed to when one of the main assumptions (section 2.2) is broken or absent, i.e. imperfect information, market control, existence of externalities, etc.

present and the future life conditions, which is distinguishable and emphasized in his later work:

> *"Wealth exists only for the benefit of mankind. It cannot be measured adequately in yards, nor even as equivalent to so many ounces of gold; its true measure lies only in the contribution it makes to human well-being."*
> (Marshall quoted by Pigou 1925, p.366)

Later, Marshall (1929) also observed how carelessness on behalf of some agents of financial institutions between the 17th-19th century, in terms of monetary and credit management, as well as not matching the society's needs with new financial products (loans, new activities, etc.) had an adverse impact of the society's trust towards some financial institutions. This lack of trust, affected the financial system as a whole later, leading to situation similar to what is now known as a bank run, while he referred to how states can or should oversee financial institutions' activity for the benefit of society (ibid.)(Appendix 2.3).

Vilfredo Pareto (1906) in 'Manuale' addressed economic efficiency in his works and defined the term more clearly. Pareto efficiency, or optimality (for welfare), or originally 'ophelimity for the community' describes a situation, where no action or reallocation of resources in a society will make a person better off without making someone worse off (Pareto, 1906; Berthonnet and Delclite, 2014). In neoclassical economics, the allocation of goods and resources in a free market that does not result in a pareto efficient (or optimal) outcome is considered a market failure (Bator, 1958). Some researchers (Varian, 1976; Mathur, 1991; Barman, Krishnamurthy and Vaish, 2018) have argued how Pareto efficient or optimal allocations are not necessarily fair or equitable.

Pareto efficiency is absolute (an allocation either is or isn't efficient, with no degrees in between), which in practice (applied through social or environmental policy) is almost impossible to introduce changes without making someone involved worse-off. The only comparison that can be made would entail a Pareto improvement, which refers to a situation when change in the allocation of resources can make an individual better off without making anyone worse off (Rule A), compared to the previous situation (Rule B). In this case Rule A is considered pareto superior to Rule B. Pareto was one of the first to address and realize that there are alternatives to cardinal utility, and that economic equilibria can be determined in terms of ordinal utility (Aspers, 2001), or in simple terms that we don't need to know how

much an individual values something, rather that this individual prefers something over something else (good/service -X- over good/service -Y-).

His work has played a significant role in welfare and environmental economics, and were elaborated further by other economists (e.g. Samuelson). This has enabled other means to determine the efficiency of systems, such as the Buchanan unanimity criterion (Buchanan, 1962), according to which a proposed change can be efficient if all participating members agree to it; the Coase theorem (Coase, 1937, 1960), which relies on the collaboration and bargaining among participating stakeholders to find common ground; and the Kaldor-Hicks efficiency (Hicks, 1939; Kaldor, 1967), which measures all benefits and all damage from a proposed change, and when the benefits outweigh the losses and appropriate compensation is involved then a proposed change can be considered efficient. There has also been some discussion about the operation of real life competitive markets through the lens of Pareto efficiency and improvement, including for example whether the assumption that when a market operates in perfect competition, the distributions of wealth should be pareto efficient (Stiglitz, 1981, 2010b; Mathur, 1991), or that under the right conditions, certain central bank intervention can lead to a Pareto improvement in welfare (Allen and Gale, 1998).

Irving Fisher and Leon Walras also contributed to the utility and market's general equilibrium theories (George J Stigler, 1950; George J. Stigler, 1950), but also discussed the role of money in financial crises. Fisher developed his theory about capital, investment, and interest rates, (Fisher, 1906, 1907), as well as capital budgeting, credit markets and factors determining interest rates (Fisher, 1930). His later research about the quantity theory of money inspired the later economic theories of monetarism. Fisher's later (post-depression) debt-deflation theory, which attributed financial crises to the bursting of credit bubbles (Fisher, 1933), attracted attention and was accepted by Post-Keynesians later on (Keen, 2012). Similarly, Walras took into account the demand for money as a factor that can contribute to a financial shock or crisis:

> *"One should use gold in all international transactions, side by side with a limited amount of silver as token money (billon regulateur) to pay for domestic transactions. Therefore, whenever the quantity of gold increases or diminishes, the quantity of silver will be diminished or increased in such a way*

so as to avoid crises of high or low prices."
(Walras 1896b, p.163)

However, Walras also supported monetary policy to be taken in collaboration between countries that they trade goods with each other, and not by countries independently of other countries with whom they trade. This is because as a major shock in one country could have negative impacts in other countries, and a single country's efforts may not be adequate to avert crises of global scale (Walras, 1896b). Cirillo (1986) supports that Walras was against the mechanistic theory of money [3], motivated by his concern for workers, because he understood that they would be the first to feel the adverse impacts in times of economic crisis, while

"In effect as the quantity of money increases producers gain, while workers and other consumers lose. On the other hand, when the supply of money diminishes, entrepreneurs suffer, while landowners, workers, and capitalists gain. In either case economic equilibrium is destroyed. The crisis will last until a new equilibrium is established."
(Walras 1896b, p.163)

While there are similarities in terms of the operation of the market or even about how money quantity and management can lead to financial crises, the contribution of neoclassical economists regarding natural resources, their long-term management, and allocation was diverse, touching upon issues and areas between the economy and the environment. The concern of neoclassical economists regarding the sustainable use of natural resources, mainly regarding agriculture and forestry, was rather limited and mostly focused on their optimal use (Dasgupta and Heal, 1974; Halkos, 2011). Hotelling's theoretical approach (1931) about the (optimal) exhaustion of non-renewable resources (mines) is one of the main exceptions in that era.

Marshall was one of the first economists to touch on externalities and the qualities of goods. In Book 2, Chapter 2 about Wealth, Marshall (1890) distinguishes goods in material and personal/non-material, and then further categorizes personal goods in external and internal, while each category can be either categorized as transferable or non-transferable. When it comes to natural resources and goods, Marshall considers that goods that can be found in

[3] According to which the state/government made changes in the money supply only in response to demand.

nature (such as trees, fish, water, etc.) are free if they are not appropriated and if they don't require any human effort. If, on the other hand, a natural good has been appropriated or has required human labour to grow should be considered private and therefore not free.

Marhsall (1890, p.152, 286) also recognised the effects of external-to-the-firm factors in a firm's production, similar to what we would today refer to as externality. He distinguished between internal and external economies of a firm; internal economies are those dependent on conditions that are under the control of the firm, such as the efficiency of the management, resources used, etc., while external economies are described as those dependent on conditions, such as the general development of the industry, for example in terms of technology or scale of production. He also briefly touched upon the delicate human-environment relationship, in terms of the use of (natural) resources for the production of a good, or looking in a more long-term horizon and addressing the scarcity and depletion of natural resources across generations (Marshall, 1890, 1919) (Appendix 2.4).

Fisher (1909) expressed his thoughts in terms of conservation of (natural) resources, in what can be interpreted today as social geography of class, taking on subject such as race, population, and health policies, and taking into account issues such as ill health, pollution, and industrial accidents in an industrialized society (Appendix 2.5). On the other hand, Walras paid more attention to the production and distribution of natural resources, embodying the concepts of efficiency and optimality, similar to his contribution in economic theory. He made a distinction between the production and distribution of natural resources, where he supported laisser-faire in the production of goods and services, but a more social approach and reforms when it comes to distribution (Walras, 1896b; Cirillo, 1980). In terms of land and natural resources property and management, he advocated against big monopolies, but instead supported that land and natural resources should be managed collectively by a central body, such as the state.

"Land is by natural right the property of the state" [4]
(Walras 1896a, p.189)

"Land belongs to all individuals, collectively considered, because all rational and

[4] "Les terres sont, de droit naturel, la propriété de l'etat" - (Second theorem of the property theory)

> free individuals have the same rights and duties in order to pursue their goals so as to fulfil their destiny, and for the same reason they are themselves responsible for such pursuit and accomplishment. Here one applies the principle of equality of opportunity according to which we all should be able to profit equally from the resources which nature offers us for the exercise of our activities"
> (Walras 1896a, p.218)

It is the public nature of natural resources that made Walras support a more a more collective/social management of land and natural resources, potentially forming a state monopoly. He recognised the need for sustainable use of natural resources, taking into considerations both the present and future generations of the population (Cirillo, 1980), touching upon what is today known as sustainable development (Parris and Kates, 2003; Sneddon, Howarth and Norgaard, 2006; Blewitt, 2008).

> *"In juridical terms humanity is the owner and the present generation has the land in trust* [5]*"*
> (Walras 1896, p.189)

2.2.3 Macroeconomics scholars

Classical and neoclassical economics could not explain why the economic crisis of 1929-1939 (the great depression) happened, nor how to fix it, and the Marxist approach identified economic crises as inherent to capitalist system of production. However, none of these movements could offer any direct practical solutions regarding how to deal with economic crises, which spurred discussion regarding the role of the state in terms of its functions (macroeconomic policy), as well as managing financial crises, which allowed room for subsequent schools of (macro) economic thought like the Keynesian, the Austrian, and the Chicago to emerge.

2.2.3.1 Keynesian school of economic thought

Keynes is considered the founder of macroeconomics and his work was inspired by the consequences of the 1st World War and the great depression in the US in the 1930s. In his 'The General Theory of Employment, Interest and Money', Keynes (1935) considered three market equilibria simultaneously (goods, labour, and money) reflecting on issues such as

[5] "*l'humanité est propriétaire*, et la génération présente *est* usufruitière des terres"

mass unemployment, financial and monetary imbalances, which if corrected would favour peace (Skidelsky, 2009). The period in which he lived in and the stimuli he was exposed to (World War, Great depression) may explain why there are but rare references in his work about natural resource management and environmental issues. However, in his texts there are spaces where he expresses that economic and financial logic may not be in line with environmental/ ecological and social reasoning (Keynes, 1933) (Appendix 2.6).

The contribution of the Keynesian school of thought is not restricted on John Keynes himself, but also to the contribution to later movements, such as the post Keynesian and neo-Keynesian economics. For example, the contribution of neo-Keynesian economist John Hicks in both micro and macroeconomic theory has been very important, especially relating to the theory of general equilibrium, the IS-LM model, and welfare economics. In the latter field, he is known for his contribution regarding the willingness-to-pay/accept measures, which can allow for monetary measurement of welfare changes, as a type of trade-off and the Hicks-Kaldor efficiency criterion. Hicks (1939, 1941, 1943) also proposed the equivalent and compensating variation to describe utility trade-offs subject to welfare conditions changes. In detail, compensating variation refers to the monetary adjustment that can offset the market/ price change, to bring back the consumer's initial utility after the change. Equivalent variation refers to the monetary adjustment that may change the consumer's utility equal to the level that would occur if the changed had taken place.

Keynesian and neo-Keynesian economists, including John Keynes himself and John Hicks argued that markets don't self-correct quickly, as both prices and wages take time to adjust (Keynes, 1935; Hicks, 1936). John Keynes in his book 'The General Theory of Employment, Interest, and Money' proposed new answers to economic crises, namely the involvement of the governments, through monetary and fiscal policies, to increase public spending in order to help adjust the economy in terms of unemployment and output (Keynes, 1935), sketching a demand-driven model of economic growth. Later other economic schools of thought, such as the Austrian and the Chicago schools fiercely advocated for the least possible involvement of the state and governments in the economy as well as the crisis management (sections 2.2.3.2, and 2.2.3.3).

Although Keynes (1933) sees benefits to free trade for the states involved, he claims that these benefits are mutually beneficial when trade takes place in the basis of mutual aid; not competition, which "will merely shift the problem of unemployment to the neighbour which is worsted in the struggle" (Keynes 1935, p.241). Other Keynesian and post-Keynesian economists agreed with the idea that that full employment can be achieved by increasing public spending and investment, regardless of what those investments are, also advocating that state intervention and spending should be motivated by the desire to improve the conditions of the broad population, e.g. Kalecki (1943). However, Keynes' position on unemployment (Keynes, 1933, 1935; Hicks, 1936) was opposed by Pigou (1933) in the basis of whether it is/can only be voluntary and frictional. The contribution of Pigou in the fields of welfare economics, which was later used in environmental economics, specifically regarding externalities, and how (Pigouvian) taxes can help internalize them, will be discussed more in section 2.3.

Berr (2009) observes that Keynes was also heavily influenced by the role of uncertainty, highlighting evidence in Keynes' text (Keynes, 1921, 1935). Berr then allows this convention to be linked to one of the potential causes of the economic crises (the nonprobabilistic elements, such as speculation and expectations in investment) in the developing countries since the second half of the 1990s and before the post-2007 world financial crisis and to the precautionary principle (principle 15), which is adopted by the UN in 1992 (UNCED, 1992)(Appendix 2.7). Holt (2005) describes how advocates of post-Keynesian economics[6], who are concerned about "how to sustain and stabilise a world economy that is susceptible to economic and financial crises and collapse" (Holt 2005, p.174), were influenced by the notion of irreversibility and uncertainty, and supported complementarity (instead of substitutability) of production factors, combined with a reasonable management of natural resources are compatible with the foundations of an ecological approach of sustainability. Indeed many post Keynesian economists consider growth to be a necessary but insufficient condition for development (Berr, 2015), while they also consider how decisions and action in

[6] A branch of economics based on a particular interpretation of Keynes's 'The General Theory of Employment, Interest, and Money'

the presence may affect both people and the environment (biosphere) in the future, which is closely related to the notion and work related to sustainable development (Lavoie, 2009).

2.2.3.2 The Austrian school

Austrian economists Friedrich Hayek (1944) and Ludwig Von Mises (1998) argued that heavy state interventions never produced the promised results, and that state regulation and involvement is more likely to be a problem than a solution. They rejected almost all forms of government monetary and fiscal policy, as they viewed the economy too complicated to be manipulated, and to avoid/solve the problem of government corruption.

D. Gordon (1993) states that this movement draw inspiration from both world wars, and the great depression, where the states had failed to secure peace, prosperity, and used the economy and trade to enhance their power, which is clearly manifested in von Mises (1985) work 'Omnipotent government: the rise of total state and total war'. Von Mises (1998) argued that economics is not a hard science, like mathematics or physics, because of the human factor which is not always predictable, and for this reason resource allocation can take place either through free choice of individuals, depending on what they consider valuable (through trade), or through coercion and force (state control).

For the Austrian school of economics, economic crises happen because of human action. For example, the Great depression crisis of the 1930s happened because politicians and bankers intervened in the market by keeping the interest rates low, which distorted the incentives as it encouraged firms to borrow, it increased the tendency to consumption and decreased rates of investment (Mises, 1953); the 2008 crisis because of the profit speculation of bankers, and the decision of people to spend more rather than invest in production (Maier and Koumparoulis, 2012).

The Austrian school advocates for clearly defined property rights, coordination among institutions and individuals and minimal government role that will only establish a set of common laws to guide the actions of users, in most aspects of everyday life, also with respect to "environmental problems of every kind" (Dolan, 2014, p.199), such as pollution, climate change, etc. (Dawson, 2011; Dolan, 2014).

Furthermore, Dolan (2014) identifies 3 main components in the Austrian school of economics with respect to natural resource management, namely framing of environmental

problems as *problems of coordination*; the *institutional approach*, i.e. which institutions are the most suitable to facilitate coordination for the goals of all the potential users involved, opposing the neoclassical approach, which referred to maximizing efficiency, utility, or social welfare; and *property rights* as the core of the approach and key to solving environmental problems. Similar takes were discussed by Cordato (2004), who identifies the conflict resolution approach as the focus of the Austrian school by claiming that environmental problems such as pollution is "not about harming the environment, but about human conflict over the use of physical resources" (Cordato, 2004, p.7) and that "both the origin and the solution of the problem is to be found in a lack of clearly defined or enforced property rights" (ibid. p.9), as they facilitate coordination to deal with negative externalities, e.g., pollution.

2.2.3.3 The Chicago school

The ideas against government intervention were later carried on in the US at the university of Chicago starting from the late 1950s, where some of its scholars, the most notable of which was Milton Friedman, advocated against (heavy) government intervention and regulation, and was in favour of a more laissez-faire government policy. According to this political economic theory, the government's role should be restricted to create and maintain the institutional structures for the markets to be able to function, such as guaranteeing the quality and quantity of money and enforcement property rights through legal structures and police and army forces for security (Harvey, 2005) or in other words "a rule-maker, referee, and enforcer of private contracts" (Friedman 1975, p.130). Harvey (2005) claims that IFIs, such as the World Bank, the WTO, and the IMF, advocate for a laissez-faire approach, with deregulation, free trade, privatisation of state property, cuts in public spending and in taxes as their main approach, a set of policies and ideology, which is also described as neoliberalism[7] today.

Although the ideas of Austrian school and the Chicago school may appear similar, one of their main differences is that the latter supports that the only acceptable form of government intervention can be the regulation of money supply, i.e. monetary policy, which

[7] The term neoliberalism has had different meanings since the 1940s, when it was associated with von Mises's and Hayek's ideas, as a philosophy and ideology opposed to Nazism (Kumar, 2014). The usage of the term shifted towards a more radical liberalisation of markets and laissez-faire economics during 1980s in connection to the Augusto Pinochet's economic reforms in Chile, which were assisted by IMF (Boas and Gans-Morse, 2009).

is in contrast to the views of the Austrian school which regards both monetary and fiscal policies as disruptions to the market (Miller, 1962; Storfner, 2004). The Chicago school rely more on mathematical models and data, opposed to the Austrian school, which considers economics a soft science, where not everything can be quantified (accurately or at all) (Storfner, 2004).

Friedman (1962, p.38) stated the great depression in the US in the 1930s "was produced by government mismanagement rather than by any inherent instability of the private economy", as the Federal Reserve could not stop the reduction of money supply, and that the government should have printed more money to provide economic stability. Cord and Hammond (2016) highlighted that Friedman was not against all state intervention (like the Austrian school), but he supported that intervention was required to stabilize the system around its long-term growth trend. However, unlike Keynes who advocated for the government to get a more active role in favour of stability, Friedman (1962, 1975) advocated for the role of central banking authorities, like the Federal Reserve System, to be more active in averting financial crises through monetary policies and regulating the quantity of money in the market. Although Friedman supported that free market economy can succeed in the long-run, he was aware that external shocks may disrupt market equilibria within a monetary economy in the short-term (Cord and Hammond, 2016).

Friedman's ideas regarding financial shocks and how they can be averted, many of which were advocated and supported by the Chicago school movement, referred to the Great Depression of 1930 (Friedman, 1962, 1975). However, the most recent global financial crisis of 2008 is often related to race-to-bottom deregulation in financial markets (Acharya and Richardson, 2009; RBA, 2009; Bresser-Pereira, 2010; Merrouche and Nier, 2010), which intended to allow financial institutions freedom to operate in the market without the burdensome regulations of the government. During this financial crisis the intervention of behalf of national governments was deemed necessary to rescue these institutions and subsequently the whole financial system. This led to increased criticism of the laissez-faire model and the Chicago school of economic thought from notable figures from different schools of economic thought (Harvey, 2009, 2016; Krugman, 2009, 2011; Posner, 2009, 2011; Ménard and Ghertman, 2010; Delong, 2011), each highlighting evidence on how unsustainable the application of such a philosophy can be.

According to the Chicago economic theory, environmental and natural resources and services, similarly to other sectors and services should either combined with or left to the private sector, which will ensure the best possible allocation of resources through the markets, the prices in which signal where these resources are best suited and should be allocated in order to maximize their value, while the government should be restricted to creating and enforcing institutional frameworks to facilitate these markets (Harvey, 2005; Castree, 2008, 2010). Following this notion, conservation of nature, which has value to everyone, should also have a price, which should create the respective incentives in the right market, for it to be conserved (Buscher *et al.*, 2012).

2.2.4 New Institutional Economics

The term New Institutional Economics (NIE) refers to the economic perspective incorporating a wide theoretical input of institutions[8] into economics (Williamson, 1975; Coase, 1998; Ménard and Shirley, 2005), and can be seen as mix of institutional economics[9] with elements from neoclassical economics theory, building on the core assumption of resource scarcity (The Ronald Coase Institute, no date; Ménard and Shirley, 2005).

NIE unites both empirical and theoretical research that examine the role of institutions in furthering or preventing economic growth, from a wide range of social sciences, e.g. economics, law, sociology, political science, and anthropology (The Ronald Coase Institute, no date). Neoclassical economist Ronald Coase (1937, 1960), who analysed efficient allocation of resources and stressed the importance of well-defined property rights to control and regulate externalities, had a significant influence on NIE, which often includes work on transaction costs, property rights, political economy, hierarchy and organization, and public choice (The Ronald Coase Institute, no date; Coase, 1998).

The origins of economic crises from the NIE point of view can be found in governance and institutional arrangements that lead to system failures (e.g., market failures), rather than

[8] North defined institutions as the humanly devised constraints that structure human interaction, including formal rules, informal rules, and enforcement mechanisms, which aim to create order and reduce uncertainty in exchange (North, 1991).

[9] Institutional economics highlighted the evolution and the processes behind institutions (Veblen, 1899; Bromley, 1992, 1997; Semov and Semov, 2009), as well as the framework and legal foundations of capitalism (Commons, 1924).

individual actions or mistakes. Ricketts (2011) supports that NIE acknowledge that 'economic institutions of capitalism', as described by Williamson (1985), such as financial institutions, markets, hierarchies, etc. best fit the 'greedy' model of our current system, i.e. capitalism. He continues to claim that issue is not the greed of the agents of such institutions (e.g. bankers), but the structure itself, as well as the lack of provisions, in the form of reforms, property rights, and institutions that enable the unchecked greed in the economic institutions themselves (Ricketts, 2011). This is in line with Williamson (1985), who expressed that property rights, are often vulnerable to opportunistic predation (viz. greed).

Rickets (2011) lists some such examples of institutional failures in the financial system including the subprime mortgages, where there was clear asymmetry of information (adverse selection) among the participating agents, as well as no incentives to prevent the moral hazard that was fuelled by greed; bankers' bonuses, which are often linked to excessive risk taking and short-time horizons and can encourage behaviours that undermine the organisation as a whole, or even threaten the entire financial system; institutional and governance arrangements that have substituted (to some extent) private oversight with public oversight when it comes to the activities of participants in the financial markets, as it undermines the incentive of financial institutions to bear significant costs to invest in (a reputation for) safety; and the existence of financial firms that are 'too big to fail', who can rely on the support of state-led institutional governance mechanisms, while their risk-taking and actions can have a direct impact not only in the financial sector, but the society as a whole.

Similarly, the management of environmental resources is seen through the lens of property rights, organizational and transactional issues, the role of the state, the public, and social capital. Attention to institutional and governance arrangements are key in understanding resource management, especially natural resources and the commons, such as forests, fisheries, or water in the current society, as well as addressing any problems arising in these regimes (Caballero and Garza, 2010).

In addition, institutional analysis should be context-specific, addressing both the social, economic, and the environmental conditions. Williamson (2000) sketched 4 levels of social analysis, namely (1) Social embeddedness, which includes culture, religion, social norms and

habits deriving from social evolution; (2) Institutional environment, which refers to formal rules such as laws, the constitution, property rights, as well as decision taken collectively and the state, (3) Governance, which focuses on institutions that can (re)shape incentives, and (4) the market, which draws from the neoclassical analysis and refers to resource allocation, employment, and price formation.

NIE and institutional history have analyzed and witnessed successful experiences in dealing with the problem of the commons, in terms of different institutional arrangements in different regimes (forest, fisheries, water, agriculture, etc.). Apart from exploring the role of governance structures and property rights and regulation (de jure), they also emphasized on solution driven and adopted directly by local communities (de facto), highlighting the importance of social capital in natural resource governance, especially for the governance of the commons (Ostrom and Ostrom, 1977; Ostrom, 1990, 2010; Schlager and Ostrom, 1992; Heltberg, 2002; Dietz, Ostrom and Stern, 2008; Brondizio, Ostrom and Young, 2009). In particular, Ostrom showed that local communities that can collaborate and agree on the boundaries of both the resource use and the users, and at the same time monitor and enforce the commonly-agreed rules, can produce much better outcomes compared to dealing with the same issues through private ownership or state regulation (Ostrom, 1990; Dietz, Ostrom and Stern, 2008). In this sense, NIE shifted away from the top-down paradigm of natural resource management, which assumed that government regulation or private property were the primary tool to deal with natural resource degradation and over-exploitation.

2.2.5 The emergence of environmental economics and its major components

The current literature on environmental economics[10] and the economic theories described in the previous sections share some common elements, such as the wide range of possible arrangements with respect to the role and power of formal, informal, state and non-state institutions and actors, in terms of de jure and de facto arrangements, especially regarding the role of governance arrangements. This section deals with the properties of

[10] The formal integration of the environmental components into economics, most commonly referred to as environmental economics, began in the 1960s (Pearce, 2002) and sustainable development became a central pillar in economic policy after the 1987 Brundtland Commission Report 'Our Common Future' (United Nations, 1987).

environmental/forest goods and services and the role of state and non-state actors in their provision and production, the importance of property rights, and describes the emergence of externalities and different approaches to dealing with them.

2.2.5.1 Properties of forest goods and services, and the role of state and non-state actors

Forests are a source of many goods and services with different economic, social, cultural, and environmental values. For example, a forest can offer environmental services, such as carbon sequestration, temperature adjustment, biodiversity, water retention; economic goods extracted from forests and processed and sold in the market, such as logs, resin, timber; and recreation opportunities to people who have access to it. Although there are different methods to capture the value of these goods and services, their accurate valuation may not always be possible, and may depend on the methodology used (see Chapter 5.2.1).

Forest goods and services can be categorized in terms of their rivalry (rival/non-rival), i.e. whether the consumption of the same good from many users is impossible, and excludability (excludable/non-excludable), i.e. whether they have a price which may exclude some from obtaining it, although the boundaries in terms of excludability and rivalry are often not clear. The combinations of these attributes are depicted in Appendix 2.8 along with a small number of forest goods and services as examples.

According to Ostrom and Ostrom (1977), depending on the category of the good or service, a distinction should be made about their provider. The private sector, which relies on market mechanisms and transactions, seems more suitable for delivering private and club goods, i.e. excludable goods, while the public sector, which is organised through governmental institutions and whose services are delivered through systems of public administration, more often focuses on public, common, and club goods. The production of public goods and services (public economy) does not necessarily involve only the government or state as the unit of production; it may also involve the participation of private actors (Ostrom and Ostrom 1977, p.2). Compared to the delivery of private good from private actors, the delivery of public goods and services from private actors has other attributes, as the quantity and quality of public goods is difficult to measure; it is difficult to exclude consumers who do not pay, especially when the consumption takes place jointly and simultaneously by many users; the consumer does not always have an option or an alternative of not consuming (e.g. air);

and the allocation decisions are made primarily by political processes and public participation (Ostrom and Ostrom 1977, p.7).

Regarding the consumption of different types of goods, most non-rival goods are subject to partial marginal subtractibility, i.e., after a certain threshold level, a person's use of a good may decrease the use, access, or quality of the same good by others. The conduct of a user of a non-rival good (joint consumption good) may also detract from the quality or quantity of the same good by others. Also, a consumer of public goods (non-excludable and non-rival) and often club goods (excludable and non-rival) and common goods (non-excludable and rival)) rarely has the choice or different options regarding the quality of the good/service, and individual preferences cannot affect the quality of the public good or service. However, individuals are able to exercise their influence, when they organise in collective consumption units and are able to control or influence the -public- production units of this good, or even hire a private vendor to provide a public good or service (Ostrom and Ostrom, 1977).

2.2.5.2 Property rights

A property right comprises the authority to undertake defined actions related to a specific domain, particularly with respect to the exchange value of property (Commons, 1924; Schlager and Ostrom, 1992). A right is different to a rule in the sense that rules can create or specify the authorizations allowed (rights), while rights refer to the specific actions that are permitted or authorised (Ostrom, 1976; Schlager and Ostrom, 1992) .

Property rights come in bundles or partitioning of rights with respect to use of property or resources (Alchian, 1965) and they stand for choices made to signify the production or use of properties or resources, under which circumstances and to what extent, sometimes including the potential to harm others in cases of conflict (Coase, 1960). They are usually agreed upon by the shareholders or enforced by a central authority, and used among different partaking bodies as a baseline for negotiations, in order to resolve conflicts and satisfy competing demands (Alchian, 1965; Alchian and Demsetz, 1973). The initial apportionment of property rights plays an important role in the negotiations among the interested parties, and what we would today describe as externalities, as Alchian describes in the case of the Coasian example (Coase, 1960) of a railroad spreading sparks in nearby wheat fields (Alchian, 1965). In this example, the farmer could pay the railroad company to not spread sparks, if the initial

apportionment of property rights allowed the railroad company to spread sparks, or in the other hand, the railroad company could pay the farmer so that they could spread sparks, if the property rights regarding the land use (farm) were reserved with the farmer only, who would not allow sparks in his field. The initial apportionment of property rights would imply a choice between either the railroad or the farmer.

Schlager and Ostrom (1992) defined 5 distinct types of 'rights'[11], which are present in common-pool resources; *the right to access*, which refers to the right of a user to enter a defined physical property; *withdrawal*, which refers to the right of a user obtain products of a resource (e.g. logs or fish*); the right to management*, which deals with the right to regulate the patterns of internal use and potential transformations of the resource; *the right to exclusion*, which is the right to determine who can have access to the resource or the property and how/whether this right can be transferred; and finally *the right to alienation*, which is the right to lease or sell the management and exclusion rights (Ostrom, 2003).

Similar observations about the nature of property rights had been made earlier as well. Demsetzh (2000) and Alchian and Demsetz (1973) argue that the notion that property rights do not refer to the ownership of a resource, but the combination or a portion of rights to use a resource that is owned (which is defined through property rights). In other words, the owner(s) of a resource does not have absolute decision-making power regarding the use of a resource, but rather they are entitled to use the resource according to the predefined rights of what is allowed to do with it.

An important element of property rights is the right to exclusion. A division deriving from this element is the formulation of 'communal rights' and 'private rights', as described by Alchian and Demsetz (1973). 'Communal rights' do not give the power to anyone, individual or state, to exclude others from using the resource, while in the case of 'private rights' this is possible, referring to either private or state (public) ownership of a resource or a property. However, there are cases when both rights can be attributed to different aspects of the same resource. For example, communal rights are attributed to air from trees, access to a forest, or even in

[11] The combination of these 5 types of resource property rights gives us 4 distinct categories of property right holders; 'authorised users' are entitled to 'access and withdrawal'; 'claimants' are entitled to 'access and withdrawal' and 'management'; 'proprietors' hold the rights to 'access', 'withdrawal', 'management', and 'exclusion'; 'owners' hold all of these 5 property rights.

some cases harvesting of deadwood, but private rights are attributed to the use of the harvested logs from the same trees.

Table 2.1 De facto and de jure property rights

Row #	Officially (De jure) defined rules	Enforced rules	De facto/ accepted rules	Outcome	Property ownership of the resource
1	YES	YES	YES	Regulated (perhaps with both official and extra self-regulating conditions)	Defined property status (private, state, communal, etc.)
2		YES	NO	Regulated by officials but with potential or actual conflicts, or leaving certain areas unregulated	Some areas will be treated as de facto open access resource, while others as defined by property status. It depends on how easy/costly it is to enforce property rights
3		NO	NO	Unregulated	De facto Open Access
4		NO	YES	Regulated (rules are followed by the community)	Defined property status (private, state, communal, etc. depending on the property rights)
5	NO	NO	YES	Regulated by and within the self-organised community	Common resource / communal property
6			NO	Unregulated	Open access

Source: own elaboration, based on literature included in this section.

When someone has private rights to a resource before it's harvested or claimed, but communal rights to the same resource before its harvest, with no other arrangements regarding the use of resource, the resource users may be incentivised to capture the

resource before others, ending up with the private right displacing the communal right (Alchian and Demsetz, 1973). In these cases, private rights could have a positive effect to the society if people are encouraged to take account of social costs, but on the other hand, if the social costs are not undertaken by those with private rights, negative externalities may arise, with adverse effects on the society (ibid.).

The responsible body for the formulation and enforcement of property rights is another significant variable. If there is an authority (e.g., government) that formulates property rights through policies or laws, then property rights exist de jure. The de facto perspective depends on whether property rights exist outside the control of the central authority, or are not officially formulated through laws or policies, and whether de jure property rights are successfully applied (or enforced). This is illustrated in Table 2.1 above.

The first column refers to whether de jure property rights exist, i.e., whether a central authority has set any policies defining property rights with respect to the use of natural resources (and forests in particular) and the second column whether these rules are enforced by the central authority. When no de jure rules are designed by a central authority, there are no rules to be implemented or enforced (2 last rows). The third column shows whether the population or the users of a resource have agreed upon and accepted any set of rules. If there are no rules designed or applied by the central authority, the resource users may have agreed upon and accepted their own set of rules. The 4th and 5th column respectively show the outcome in terms of regulation and the property ownership of the resource in each case.

Starting with the 1st row, where official rules exist (de jure property rights), are successfully enforced, and accepted by the users of the resource, then the resource is regulated, which means that the resources is managed in a way that can exclude users, restrict its use, and determine conditions for its conservation. Additional to the centrally-defined official rules (nominal property rights), additional ones may also exist, which are in effect by the local community (Heltberg, 2002). Well defined property rights enable well defined property status, either private or state, whose designated decision makers can apply and enforce their own rules with respect to the property rights (e.g., exclusion, use of resources, etc).

When de jure property rights exist and are enforced, but they are not accepted by the users (2nd row), the role of enforcement is key in determining the outcome. In many cases, the enforcement of the de jure property rights is incomplete and not fully effective, either because of the cost of enforcement (detection, management, or fines) or spatial characteristics, or a combination of both (Robinson and Albers, 2006; Robinson, 2008). Enforcement of property rights is almost always restrained by capped fines and costly punishment of crime, and adopting a full enforcement strategy, where all illegal activities are either captured or prevented, is rarely optimal to do so, due to high costs, a situation that unofficially enables some illegal activities (Sutinen and Andersen, 1985; Clarke, Reed and Shrestha, 1993; Robinson, Kumar and Albers, 2010). Abbot and Mace (1999) showed that even when enforcement takes place, and an illegal activity is detected and penalised, the incentives of the offenders may not change, for example if the penalties illegal activities are too low.

Given that incomplete enforcement of de jure property rights occurs described above, forest/ natural resource managers face the spatial management of resources and enforcement of property rights under budgetary restrictions: will they protect a small area more effectively or a larger area less effectively? According to Albers (2010), the possible patterns of enforcement and resource extraction in such cases can lead to regions of full or complete enforcement, regions of deterrence, and other regions of incomplete enforcement, all within the same case. In areas where the enforcement of property rights takes place, the resource will be treated according to its property rights, while in others, the incomplete enforcement of property rights leads to a de facto open access regime.

When de jure property rights exist, but are not enforced (properly or at all), and are also not accepted by the potential users (3rd row), the whole area of the resource is framed a de facto open access resource, in contrast with specific areas treated as a de facto open access in the 2nd case. In such cases, the resource is at risk of overuse, congestion, and degradation, if it is beneficial to the users, taking into account potential costs for the extraction of the resource, or if the resource serves a disproportionately large group of people (Heltberg, 2002; Ostrom, 2003).

Schlager and Ostrom (1992) identified some traits in cases where there are only de facto property rights, without any de jure ones. These regimes may work only if the participants have agreed upon, understand, follow, and perceive as legitimate their own rules with respect to exclusion and use of the resource, i.e., if de facto property rights exist and are properly enforced by the users. Such arrangements usually produce rules more relevant to the physical and socio-economic conditions of the particular area, as the local participants have accumulated experience from daily life, they tend to reduce the incentives to overinvest in harvesting efforts, and the harvesters undertake (internalise) the cost of monitoring and exclusion, which would otherwise be attributed to the state authority, and thus reduce inefficiencies (ibid.). These forms of self-regulation, (de facto) property rights can also be used in the future as the basis or groundwork for (de jure) official regulation.

Seabright (1993) defines as “common property resources”, or “commons” (p.113) the cases where property rights are exercised collectively by members of a group and identifies local and global commons. In the case of the local commons, the resources are managed by local communities (e.g., villages or groups of villages), the participants may have a more personal relationship with each other, some of their actions with respect to the managing of the commons are observable by the local community, and they have the incentive and the ability to behave in a positive way and promote positive behaviours (reputation within the community). In the case of the global commons, there is no global government or similar authority, nor even the potential for a centrally planned intervention), enforcement of laws, or monitoring procedures, and it is up to voluntary agreement among individual states to solve problems of global commons, e.g., climate change.

In the last category, there are no de jure rules designed or enforced, nor any de facto rules accepted by the local communities. In this case the resource is not managed by anyone, and no one can be excluded from the resource. The individuals who have access to the resource may see the resource as an open access resource, which they can transform to private after they harvest it or acquire it; this may create strong incentives to the users to use the resource in the most valuable (Alchian and Demsetz, 1973; Heltberg, 2002). This is similar to Hardin’s (1968) popular theoretical example of the ‘tragedy of commons’, where the resource (grazing land) had neither de jure (open access) nor de facto (collaboration – communication among users) property rights, which lead to the deterioration and

exhaustion of the resource. De facto open access natural resources are usually very prone to degradation and overuse, particularly when the open access resource is seen as commercially valuable or when the population density of the communities that benefit from it increases (Ciriacy-Wantrup and Bishop, 1975; Baland and Platteau, 1996).

From the above examination of property rights configurations, the resource can end up treated as de facto open access if the users don't follow any set of rules with respect to its use, either de jure or de facto. Evidence suggests that the resource users are more likely to accept to follow rules, if the procedures leading to the rules are perceived fair (Sutinen and Kuperan, 1999). This is often seen in communal (de jure) or community-managed (de facto) forests. In a case from in Nepal, local groups contributed to and managed to reverse the deforestation trend, which contributed to the community in terms of conservation, soil stabilization, and carbon sequestration, and cultural value to local communities (Nagendra, 2007). Also, larger organized communities and forest councils in India were successful in terms of monitoring, enforcement, and protecting the villages' forests (Agrawal, 2000). On the other hand, there have been cases in Thailand (Feeny, 1984), Niger (Thomson, Feeny and Oakerson, 1986), Nepal (Arnold and Campbell, 1985), and India (Gadgil and Iyer, 1989), where nationalization of communal forests (from de facto management to de jure) had catastrophic consequences for the forests (Ostrom, 1990).

However, it is not only the mismatch between de jure and de facto property rights that may deliver adverse effects on resources; even when de jure property rights exist, and users accept them, problem may also arise, if the property rights do not consider all potential effects from owning or using a resource, which is typically when externalities arise.

2.2.5.3 Externalities

The structure of the property rights, and especially the lack of properly or fully defined property rights, or in cases of a mismatch between de jure and de facto property rights, are considered a key source of externalities (Baumol and Oates, 1988). Property rights describe the combination of multiple rights regarding the use of different aspects of resources, and not the ownership of the resource (and therefore all of its attributes and uses) (Alchian and Demsetz, 1973; Demsetz, 2000). Each of these resources may have different attributes in terms of excludability and rivalry. Thus, using a resource in a certain way according to its

defined property rights, may enhance or diminish the quality or quantity, or exclude other uses or services of the same or another resource, without all involved parts consenting to it.

Ayres and Kneese (1969) ascertained that the theoretical literature by that time viewed externalities as minor and exceptional, while most of which treated the issue through the lens of equilibria, while treating each environmental problem as a separate issue. Scholars including James Meade (1952) and Tibor Scitovsky (1954) referred to external economies and external diseconomies[12] on a theoretical level since the mid-1950s, to describe the unpaid factors in production the consumption respectively that may create market distortions, and therefore failure, in perfectly competitive environments. Later, Davis and Whinston (1962) described the difficulty in determining the exact compensation that would lead to an efficient outcome.

In the early literature, "definitions of external economies are [were] few and unsatisfactory" (Scitovsky 1954, p.143). De Villiers Graaff (1957) defined the concept of externalities:

> *"External effects exist in consumption whenever the shape or position of a man's indifference curve depends on the consumption of other men". (p.43)*

> *"[External effects] are present whenever a firm's production function depends in some way on the amounts of the inputs or outputs of another firm". (p.18)*

Buchanan and Stubblebine (1962, p.371) considered such definitions to be typical for the time, acknowledging that more operational definitions were necessary, and attempted to define externalities using mathematical models, incorporating interactions and utility changes between two individuals.

This study defines externalities as the uncompensated (without it being reflected in the market prices) positive or negative side effects from the main activity of unit A (individual or firm) towards unit B. The externalities paradigm, along with illustrative figures is provided in Appendix 2.9. Many cases of externalities exist in forest regimes. With respect to production externalities for example, cutting trees in forests depending on the volume of harvested trees, may decrease the quality of other attributes of the forest, which the trees contribute to, such as biodiversity, recreation, or reduced flood control, a cost which the producing firm

[12] Matching the term external economies to what we call nowadays positive externalities and external diseconomies to negative externalities.

or group may not undertake. The users of these services are adversely affected by the tree cutting activities. On the other hand, if a beekeeper introduced more bees in a forest to collect and sell the honey, this will have a positive effect on the flora in the forest (due to pollination), which increases the environmental value of the forest, for which the beekeeper may not be compensated.

Managing externalities

In order to minimise the external and unaccounted values that occur during the consumption/production of a good, theory suggests identifying, measuring, and pricing all unaccounted values, and allocating this value to the consumer/producer. This is commonly referred to as internalizing an externality. By internalising an externality, the total value to the social cost or benefit usually remains the same, but the producer/consumer undertakes (part of) the external benefits or damages, that occurred during the production/consumption.

The two main market-centred tools to internalize externalities are the creation of new markets that deal with the externality (unaccounted) goods or services (the Coase theorem - (Coase, 1937)), or taxes and subsidies for the external value of the production of consumption (Pigou, 1932). Although the Coase theorem is relevant to the creation of markets with no transaction costs, and stressed the importance of well-defined property rights to control and put a price on and regulate externalities, the role of incentives of actors involved in this theorem may lead to failure of negotiations towards an efficient outcome (Hahnel and Sheeran, 2009). One such relevant market is forest certification schemes, where forest resources get a price premium for certified sustainable management practices (FAO, no date; Pokorny, 2014).

Furthermore, although in theory the (Pigouvian) tax is considered to be equal to the externality, in practice it is often difficult to determine the appropriate level of compensation (tax or subsidy), and in some cases who should be taxed and compensated (Meade, 1952; Buchanan and Stubblebine, 1962; Davis and Whinston, 1962; Buchanan, 1969; Cornes and Sandler, 1985; Carlton and Loury, 2013). This is often the case in environmental and forest ecosystems where not all ecosystem services are valued appropriately or at all, and the level of externalities are difficult or too costly to determine or enforce (Lee, 1984; Merlo and Rojas

Briales, 2000; Chen, Innes and Tikina, 2010); how such taxes will be used (Schlager and Ostrom, 1992); or even the willingness of authorities to tax the parties causing externalities, e.g. logging companies (Rolfe, Bennett and Louviere, 2000).

Other ways to minimise negative externalities is command and control strategies, usually manifested as regulations, policies, or plans, undertaken by the responsible authorities or policy makers, which aim to directly limit or stop the certain activities that are considered the source of the externality. In the forest regime, this can be applied as set banning the harvest of timber from natural forests, or imposing restricted access to certain areas of forests during high fire risk days. Some scholars have claimed that command and control strategies are inefficient (Rose-Ackerman, 2001; Arts and Buizer, 2009; Irwansyah, 2017), although Cole and Grossman (1999), found that this claim is inaccurate both in terms of economic theory and experience in terms of both nominal (on its own) and relative (compared to the other) efficiency and efficacy.

Other hybrid 'command without control' methods can moderate some of the negative consequences, by using 'command' in terms of the quantifiable outcome (e.g., total level or emissions, or total level of harvested timber), but freedom about how each actor can reach that level (Cole and Grossman, 1999). The tradable CO_2 quotas or permits are one such example, where a specific level of emissions (CO_2) is set by relevant authorities, but without specifying how each actor should use their quotas (e.g. use them for production or selling them) which may limit the emission of harmful gases, although they do not stop them completely (UNDP, 2022).

Cole and Grossman (1999) identified economic, institutional, and technological factors that affect the outcome and success of these instruments. These include technological constraints and innovations, the social, legal, and political context in each case, such as information about market mechanisms for environmental protection, funding of agencies, general concern about the environment. Institutional knowledge and learning, capabilities, and costs for monitoring, implementation, compliance, and abatement, as well as the development of all through time (dynamic model - changing costs and benefits of pollution control over time) and the ability to modify and adjust these mechanisms through time are also considered to play an important role in determining the efficacy and efficiency of these mechanisms. Their

analysis suggests that when “abatement costs are relatively low and monitoring costs are relatively high, command-and-control is likely to be at least as efficient and effective as effluent taxes or a tradable emissions program. In the obverse case of relatively high abatement costs and relatively low monitoring costs, market mechanisms are likely to be more efficient” (Cole and Grossman 1999, p.937).

There is no single answer in terms of which mechanism is the best to use, but rather, there should be a thorough cost-benefit examination for each case, in which, apart from the aforementioned factors, environmental costs and benefits should also be valued. Looking back to the theoretical model, these costs and benefits affect both the private costs that the producer undertakes and the external costs, which have an impact of the environment and the society.

2.3 The link between forest governance and economic crises.

2.3.1 Defining forest governance

Forests are complex ecosystems that can provide multiple goods and services for either commercial or subsistence use and public goods that from local to global scale that benefit many involved stakeholders. From a social science point of view (rather than a physical science), the need to clarify and define key terms in forest regimes is essential (Giessen and Buttoud, 2014; Krott and Giessen, 2014). This section describes what forest governance is, and which factors can affect its quality.

Governance has often been referred to as a ‘buzzword’ among scientists and other stakeholders in their analysis (e.g. B. J. M. Arts & Visseren-Hamakers (2012, p.4), Giessen & Buttoud (2014, p.1), Cochrane *et al.* (2004, p.216)). There have been many efforts to define forest governance, each focusing on or highlighting different elements of what comprises the term or not. Among the interpretations for governance, some academics and researchers focus on the processes and mechanisms in governance (Lemos and Agrawal, 2006), others on its structure (Folke *et al.*, 2005) and others on the relationship among the engaged members in various scales (global, local, regional, etc.) (Krahmann, 2003), while FAO’s definition focuses more on the creation and enforcement of “binding decisions about the management, use and conservation of forest resources” (FAO, 2019).

More specifically, FAO defines forest governance as “the way in which public and private actors, including formal and informal institutions, smallholder and indigenous organizations, small, medium-sized and large enterprises, civil-society organizations and other stakeholders negotiate, make and enforce binding decisions about the management, use and conservation of forest resources” (FAO 2018, p.2). The World Bank’s Worldwide Governance Indicators project defines governance as “the set of traditions and institutions by which authority in a country is exercised” (World Bank 2006, p.2).

Academics have also provided useful definitions for governance. Giessen and Buttoud (2014) have defined that forest governance comprises all formal and informal, public and private regulatory structures concerning forests, their utilisation and conservation, the interactions between public and private stakeholders, and the effects of either on forests. In Larson and Petkova ’s broader definition (2011, p.87) of forest governance refers to “who makes decisions and how decisions are made, from national to local scale, including formal and informal institutions and rules, power relations and practices of decision making”. Tacconi (2011, p.240) defined environmental governance as “the formal and informal institutions, rules, mechanisms and processes of collective decision-making that enable stakeholders to influence and coordinate their interdependent needs and interests and their interactions with the environment at the relevant scales.”.

Factors related to the Quality of (forest) Governance

The World Bank’s Worldwide Governance Indicators project in 2006 described 6 key aggregate indicators with respect to *governance dimensions* , expressly (i) voice and accountability, (ii) political stability and absence of violence, (iii) government effectiveness, (iv) regulatory quality, (v) rule of law, and (vi) control of corruption (World Bank, 2006). Similarly, the World Bank also identified 5 principal components of what constitutes *forest governance* in order to determine, assess and evaluate its quality, namely (i) transparency, accountability, and public participation; (ii) stability of forest institutions and conflict management; (iii) quality of forest administration; (iv) coherence of forest legislation and rule of law; and (v) economic efficiency, equity, and incentives (World Bank, 2009, p.21). The final component (v) was added considering that economic factors have a very strong influence on how societies use forest resources (World Bank, 2009).

FAO (FAO, 2018) also considers a set of elements that characterise good or responsible governance: Transparency, low levels of corruption, and accountability are pivotal for good governance, especially with respect to decision-making processes and effective planning (FAO, 2018). Coherent set of laws, both in the forest sector and other sectors influencing forest management, and adherence to law are identified as important elements of good forest governance. Policies in sectors such as agriculture, transportation, mining, biodiversity and climate change should also be consistent with forest policies. There are many examples of forest conversion for either agriculture, pasture for cattle or mining in literature, where incentives and policies in other sectors have had negative effects on forests (FAO, 2018). Finally, stakeholder participation in decision making, adequate equal rights, low regulatory burden, implementation of laws, political stability, and the necessary capacities to govern effectively and efficiently are also identified as elements that can have an impact of good forest governance (FAO, 2018).

A report from the World Bank (2006) that measured the quality of governance in more than 200 countries, using data from 31 different data sources from 25 organisations worldwide, found that many countries, especially in Africa, have improved different dimensions of forest governance since the 1990s (World Bank, 2006). According to the same report, academics and policy makers agree that good governance is important for economic development and that it is good governance that has enabled countries to improve their financial condition, rather than the other way around (World Bank, 2006). Other benefits of good forest governance can refer to acceptance of traditional knowledge and rights, equitable distribution of benefits deriving from forests, and the promotion of platforms for prior and informed consultations with legitimate stakeholders (World Bank, 2009).

On the other hand, in regimes with weak governance there are often threats to the conservation of forest resources and biodiversity, as well as violations in protected areas (World Bank, 2009). The chances for success in REDD (*Reducing Emissions from Deforestation and Forest Degradation*) schemes is limited, in the absence of good and effective governance (World Bank, 2009). With respect to REDD+ programmes, many countries have reported[13]

[13] More information and analysis available on the Readiness Preparation Proposals (R-PPs) for the REDD+ programme (Gabrielle Kissinger, Herold and De Sy, 2012)

that conflicting cross-sectoral policies and weak enforcement of the rules, which are related to illegal activities, all of which are associated with weak governance and institutions in forest related sectors, are “critical underlying drivers for deforestation and degradation” (Gabrielle Kissinger, Herold, and De Sy 2012, p.9).

2.3.2 Defining economic crises

There is no universally agreed definition for an economic crisis, as they are complex phenomena (Catullo, 2017). Schubert (2010) claims that definitions tend to refer to cases along national boundaries, as their resolution tends to be at national level, even in cases of large-scale regional crises, whose resolution measures are orchestrated in regional or international levels, for example in the case of Laeven and Valencia (2008; 2012); however some definitions also take into account regional and global economic crises e.g., by Claessens, Ayhan Kose, and Terrones (2010) and Ricketts (2011). Very often the term is used to describe an economic recession, i.e. a decline in economic activity expressed as negative economic growth (GDP) for at least two consecutive quarters, along with impacts on other measures of economic activity (Clapp *et al.*, 2009; Kose *et al.*, 2009; Terrones, Scott and Kannan, 2009; Claessens and Kose, 2010; Dassonneville and Lewis-Beck, 2014; Novo-Corti *et al.*, 2019).

Some examples of the impacts are usually manifested in the society in the form of increased unemployment, lower incomes and investment, increased poverty and social exclusion, increased vulnerability, and other forms of deterioration of the social life and welfare; the market, in terms of reduced productivity, or increased number of firms shutting down; the central government balance and borrowing ability (decreased credit rating), along with other secondary effects in both the economy, the society, the environment, and politics (Stiglitz, 2000; UN DESA, 2011; Novo-Corti *et al.*, 2019). Economic crises are also associated with deterioration in certain health indicators (van Gool and Pearson, 2014) and change in mentality and rise in mental health disorders (Gili *et al.*, 2013; van Gool and Pearson, 2014), which in turn has negative impacts and substantial economic costs for firms, employees, and more generally in the society (Bubonya, Cobb-Clark and Wooden, 2017).

Some of these effects may have a direct effect on forests, or natural resources in general, through for example increased exploitation of forest resources, which may cover the

subsistence needs or provide some income or resources for some communities. Indirect effects, which are related to the responses of the governments (or decision makers in general), usually take place in the form of changes in policies or governance structures, such as increased or decreased funding for forest-related activities, or changes in regulation directly, or indirectly related to forests (some examples in literature include (United Nations, 1987; Furman and Stiglitz, 1998; Stiglitz, 2002; Apostolopoulou and Adams, 2015)).

This research focuses on economic crises (or recessions) that have originated the financial and banking sector and will not take into account cases where economic crises originated from other sources, such as wars, outbreaks of diseases, or natural disasters in order to narrow down the area of study. Not only would it take considerably more time, resources, and expertise to consider and study economic crises of all natures, but also responses to financial crises are often similar and towards the support of the financial sector, whereas responses for economic crises originating from natural disaster, public health crisis, war, or embargo may be very different in nature.

Terrones, Scott, and Kannan (2009, p.240) define financial crises as "episodes during which there is widespread disruption to financial institutions and the functioning of financial markets", regardless of whether their impacts are manifested onto the society. Laeven and Valencia (2008; 2012) define banking/financial crises as events with both significant signs of financial distress in the financial system (e.g., bank liquidations, bank runs, losses in the banking system, etc.), and significant corresponding policy intervention measures in the sector in response to the losses.

2.3.2.1 Types of financial crises

The earliest attempts to approach a financial crisis was by John Stuart Mill (Mill, 1867), where he looked at previous panics in commercial crises and identified what he expressed as 'waves' (p.13) and 'periodicity of commercial crisis' (p.13) to describe the crisis cycle (panic, revulsion, caution moderation, euphoria, panic), during which he also noticed a significant shift in mindset and confidence. Later in the neoclassical economics era, economists including Alfred Marshall and Irving Fisher also discussed the role of the instability in the supply of the credit (Fisher, 1920; Humphrey, 2012), which Hyman Minsky (1977) later

followed to highlight that the supply of credit increased when the economy was doing well and decreased when it didn't, i.e. the pro-cyclical changes in the supply of credit.

Both Fisher and Minsky assigned significant importance to the behaviour or the borrowers, and specifically those who expanded their debt and assets looking towards short-term capital gains (Kindleberger and Aliber, 2005). In addition, Minsky also recognised and identified 3 types/stages of finance, each relating to a different relation in terms of the operating income in contrast to the person's debt service payments, i.e., hedge finance, speculative finance, and Ponzi finance, challenging the perception that a modern market economy is fundamentally stable. Kindleberger and Aliber (2005) also identified non-sustainable patterns of financial behaviour in different schemes since the mid 1800s. Such schemes rely on the same patterns of behaviour (i.e., speculation and/or predatory behaviour) and are referred to different names in different periods, such as chain letters, Ponzi finance, bubbles, pyramid schemes, and manias. The common characteristic among these schemes is the inconsistency of asset prices today compared to distant future dates.

In a thorough study on the nature of financial crises, Reinhart and Rogoff (2009) propose the distinction of crises into two types; The first type would be classified using strictly quantitative definitions, as the variables responsible for or related to these types of financial crises can be measured quantitatively, which *include inflation, currency crashes, and debasement*; the second type includes variables that are not always easily measurable and therefore depends largely on qualitative and judgmental analysis, and it includes (systemic) *banking crises, external and domestic debt crises*. Similarly, Claessens and Kose in a working paper for the IMF (2013) focused on the theoretical and empirical explanations of four types of financial crises and categorized them accordingly in the two types proposed by Reinhart and Rogoff, including *currency and sudden stop crises* in the first category, and *debt and banking crises* in the second one.

Inflation and currency crashes refer to crises that take place due to a sudden drop of a nation's currency in respect to other currencies, such as money or gold, (relevant analysis of 'KFG' crisis models (Krugman, 1979; Flood and Garber, 1984) can be useful to the interested reader), due to external events (e.g. capital controls) or a speculative event on the currency. Debasement crises refer to types of crises that depend on the material that certain types of

currency (most usually coins) are made of. Reinhart and Rogoff include the bursting of asset prices bubbles in this category as well (Reinhart and Rogoff, 2009b). Sudden stop crises refer to capital account or balance of payment crises and is defined as a large drop in international capital inflows or a sudden reversal in aggregate capital flows to a country (Claessens and Kose, 2013). Miao, Wang, and Xu (2016) found that some financial crises, such as the collapse of stock market bubbles, are consistently linked to high and persistent unemployment, as firms reduce investment and freeze hirings.

The second type of crises usually include variables that are not easily measurable, so they rely on qualitative and judgmental analysis. External debt crises occur when a country does not service its external debt and domestic debt ones when they don't serve their domestic fiscal obligations (domestic public debt). The latter can be expressed in different ways, such as defaulting, inflating or debasing its currency, or through other forms of financial repression, such as forcible conversions, freezing of bank deposits, etc. (Reinhart and Rogoff, 2009b; Claessens and Kose, 2013). Systemic banking crises are expressed mainly through banking panics (bank runs and withdrawals), which may lead to the closure, merge, or takeover by the state of financial institutions (Reinhart and Rogoff, 2009b).

2.3.2.2 Dealing with financial crises

Retrospectively after the 2nd World War (1945) banking crises have been similarly frequent in both high income and middle-to-low income countries (Reinhart and Rogoff, 2008). Despite the 'this time is different' syndrome regarding debt and economic crises, there are often similar broad outcomes such as weakened fiscal position, decreased output and employment, declined asset prices, decreased government revenues and increased government debt (Reinhart and Rogoff, 2008, 2009a). However, the duration of the crisis and the magnitude of the impacts on society and the economy may vary, depending on the existing framework and structure of the economy and society in each case.

In times of large financial crises, financial institutions, such as the IMF, the World Bank, or the ECB, have stepped in to help with the stabilization of the financial and banking sectors. They usually provide emergency bail-out loans, which are accompanied by a set of policies whose aim is to stimulate the (private) national economy and reduce budget deficits in order to restore confidence in the international investing community (IMF, no date b, no date a;

World Bank, no date; Stiglitz, 2000). Policies that these institutions often suggest include austerity in the public sector finances and reducing public spending, in order to reduce budget deficits, changes in regulation and privatization of public property, in order to stimulate economic activity and investment, and strengthening property rights, although such policies may also have adverse effects on the society and the environemnt, (Radelet *et al.*, 1998; Chomsky, 1999; Harvey, 2005; Thorsen and Lie, 2006; Larner, 2006; Pop-Eleches, 2009; Cahill, 2011; Mccarthy, 2012; Karanikolos *et al.*, 2013; Apostolopoulou and Adams, 2015; Sikka, 2015). Some early examples of IFIs (IMF) suggesting such policies took place during the 1980s debt crisis in a number of Latin American countries. Chapter 3 deals in depth with some such cases.

The application of such reforms in periods of economic crises had a wide range of outcomes in terms of success. In some cases, such as the 1980s debt crisis in Latin America, fiscal austerity and tighter monetary policies improved some economic conditions, while on the other hand, austerity in some cases in SE Asia plunged the economy into deeper recession and slowed economic growth (Stiglitz, 2000). Similarly, decentralisation, privatisation, and opening the market to international investors may have paved the way to ger rid of corrupt officials and local conglomerates in Suharto's authoritarian regime during the 1997 crisis, but rapid privatisation in Russia in 1992-4 allowed a group of oligarchs to gain access and control of state assets (Nellis, 1999; Stiglitz, 2000).

On the other hand, green stimulus measures, which focus on economic activity in the short-run, while aiming to enhance environmental benefits, have also been adopted (less frequently) as responses to economic shocks (ILO, 2011). Pollitt (2011) suggests that the most effective policy formula for both economic and environmental impacts would involve larger stimulus packages, combined with attention to domestic conditions and sectoral composition, and speedy implementation. With respect to forest and natural resources, Strand and Toman (2010) describe that, albeit not very frequent, some relevant measures in green stimulus packages linked to natural resources may include the natural resource maintenance, policing, and monitoring, which are labour-intensive activities, can be implemented quickly, and can help the mitigation of unemployment. OECD (2020) considers such investments and projects to be better for tackling recovery in the medium and long run, even though available (ex post) evaluation of any projects has been very scarce, and ex-ante

ones rely on very strong assumptions. OECD also states that "the most effective short-run measures in terms of economic recovery often may not have an environmental aspect" (OECD, 2020, p.12).

Some such examples from the most recent global financial crisis in 2008 include: the EU that promoted energy efficiency, vehicle scrappage schemes, investments in transport infrastructure, and investment in renewables, for which Pollitt (2011) suggests that their overall economic impact was small, due to the fairly small share of green measures included in the fiscal stimulus package; the US through the American Recovery and Reinvestment Act (ARRA - 2009), which Mundaca and Luth Richter (2015) found to be successful in stimulating the national renewable energy sector; and the Korean Green New Deal (2009), which Mundaca and Damen (2015) assessed as successful in terms of boosting economic growth and reducing unemployment, but its climate-related targets were not met in the projected time-frame. Strand & Toman (2010) assert that forest restoration has had the most impact on employment per unit expenditure among all sectors in Korea's Green New Deal.

2.3.2.3 The Governance perspective

> *"In short, (the way that the) crisis (was constituted) is governance"*
> (Brassett and Vaughan-Williams, 2012, p.19)

Brassett and Vaughan-Williams (2012) addressed the framing of the context of economic crises, which (when framed) as a dramatic and catastrophic event, demands particular responses from governance. In their argument, economic crises are portrayed as events, external to people's will, which have catastrophic consequences to the population (homelessness, unemployment, etc), all of which need a quick response to mitigate effects, protect the victims, and restore stable conditions, which in turn create a path/direction for decision makers and governance to move towards (in order to save the victims). Using this thinking, it makes sense for the direction of governance to turn towards economic growth, as since the 1950s and 1960s economic growth has been perceived as increasing the size of the wealth that can be distributed to the people, and as a solution to the problem of poverty, (Perman *et al.*, 2003); this perception is also supported by major financial institutions, such as the IMF (2019) and the World Bank (Loayza and Pennings, 2022).

However, the framing(s) of each crisis are not independent of the social and cultural contexts (Castells, Caraça and Cardoso, 2012), which explains the different responses to economic crises and each economic crisis is different not only in terms of the origins, but it is also "a unique social experience, operating as a catalyst for rebalancing various aspects of state–market–society relations" (Rethel, 2012, p.129).

Political changes that take place during economic crises relate in particular with changes in electoral outcomes, polarization, and political instability, as has been found to be the case both in Europe during the recent 2008- economic crisis (Hernández and Kriesi, 2016), in Latin America during the 1980s crises (Remmer, 1991), as well as in 20 states worldwide during the 1929-1933 crisis (Lindvall, 2014). It is also a common occurrence that economic crises give way to political crises, both of which (economic and political crises) have repercussions for social policies (Farnsworth and Irving, 2011). These are in line with and support O'Keeffe and Terzi's (2015) position that decision-making during financial crisis occurs under a lot of uncertainty, which upsets old political economy equilibria, in terms of institutions and politics, both of which play a role in the formulation of policy choices and decision-making in times of financial stress. This uncertainty does not refer only to the governing authorities but to households as well, whose coping mechanisms change during periods of crisis and are also affected by policy interventions (Skoufias, 2003).

In addition, new actors may often emerge and play a key role in periods of crisis, such as the IMF or the World Bank, which act as lenders to states to fill the financing gap of the states. While in some cases, the participation of these institutions may have prevented greater economic and social consequences for some countries (e.g. Iceland, even though Iceland later rejected the policy recommendations of the IMF (Karanikolos *et al.*, 2013)), their involvement comes with a high price with respect to the economic sovereignty and electoral support (Broome, 2011). Agreeing to the IMF's offer for financial support and to improve policy credibility with external audiences often requires strong commitment to achieving required targets even in harsh economic circumstances in order to be successful, while conducting parallel negotiations with other potential supplementary financiers (as other states may make bilateral credit conditional on adherence to the goals of an IMF programme) may increase a state's dependence on the IMF (ibid.). Small states during (international) economic crises "are likely to struggle to level the playing field" (ibid. p.155) when they

negotiate with respect to the constraints, policy measures, and targets that come with the involvement of the IMF, as they face high stakes and have a limited policy spectrum at their disposal (ibid.). In a similar way, Stiglitz (Stiglitz, 2000) described and criticized the one-sided field, in terms of the power of the IMF during the economic crisis in SE Asia (1997), and the thin line between the Fund negotiating and imposing policies. According to him, the IMF "rarely allows sufficient time for broad consensus-building or even widespread consultations with either parliaments or civil society. Sometimes the IMF dispenses with the pretense of openness altogether and negotiates secret covenants." (Stiglitz, 2000, p.2)

With respect to the policy responses to the economic crisis of 2008, two priority areas were identified by OECD, namely finance, competition and governance; and restoring long-term growth (Guellec and Wunsch-Vincent, 2009), while the importance of the economic stimulus packages and economic policy measures was highlighted towards achieving the required goals. Responses to economic crises must be durable, based on and leading to sustainable economic growth, as otherwise it would lead to a temporary recovery only, while leaving the roots of the crisis untouched (ibid.). Looking both into the past and the future, the same report approaches the recent economic crisis as an opportunity to foster innovation, sustainable growth, and to create incentives for a greener economy, and to invest in people (e.g. education) (ibid. p.10, 14). Similar reports with focus on policies and approaches that worked during the economic crisis, which looked for potential positive lessons from the crisis have also been drafted for specific countries in previous economic crises (e.g. Noland (2000) for the economic crisis in Indonesia in 1997).

Although the labour market is considered key in promoting economic policies towards social sustainability, it is often adversely affected in periods of economic crisis, for example through increased unemployment and lower wages, which do not only affect the employees but also their families (Kennedy, 2016; Novo-Corti *et al.*, 2019). During the most recent crisis, apart from increased unemployment, especially among young people, there has also been an increase in social inequalities and poverty (Novo-Corti *et al.*, 2019). In such stressful periods, households tend to change their expenditure patterns as a coping strategy, which can adversely impact education, nutrition, and health, all of which may lead to perpetuated deficits, and thus preserve the intergenerational transmission of poverty according to the Department of Economic and Social Affairs Social Inclusion of the United Nations, (UN DESA,

2011). Academic scholars who are critical towards neoliberal policies argue that austerity in combination with deregulation of the labour market contribute to increased employee insecurity and decrease in employee protection (Kennedy, 2016).

Health and mental health developments also appear to be negative in periods of economic and financial crises. Austerity measures imposed from or on governments, substantial reforms on the health sector, and deterioration of the financial status and security of the population have all had an impact on the health conditions of the population and health systems in many OECD countries (van Gool and Pearson, 2014). In addition, recessions are associated with negative developments for some health indicators, such as stress in both mental (Depression, anxiety) and physical health, or reductions in or even passing up preventative care, which may lead to adverse health consequences in the following years. However, these impacts vary depending on the existing structure of the policy framework in each country, as "social security provisions including social and health care services may mitigate the effects of recessions" (van Gool & Pearson, 2014, p.8). A few positive outcomes have also been reported during the period of crisis, e.g., decrease in substance abuse, and motor vehicle accidents and deaths (ibid.). Similar findings has also been reported from countries that have been hit harder by the crisis, such as Greece and Spain, showing an increase not only in mental health disorders and suicide rates, but substance and alcohol abuse as well (Gili *et al.*, 2013; Simou and Koutsogeorgou, 2014), while poverty has also been associated with mental health disorders out of the context of an economic crisis (The Lancet, 2011).

2.3.3 The relationship between economic growth and forests

The cases of economic and financial crises, which this research is interested in the extent to which they may be drivers for change in the forest regime, are examples where states tend to act fast to create (recovery) strategies, which focus mainly on economic growth (Stiglitz, 2002; Lekakis and Kousis, 2013; Apostolopoulou and Adams, 2015). For example, during periods of crisis, decision makers tend to neglect how the policies used for economic growth may have any adverse impacts on the environment, or the society, how governance may change (Stiglitz, 2002), and how the drivers of deforestation and forest degradation are affected (Humphreys, 1996; Apostolopoulou and Adams, 2015).

Economic growth has been a key goal for many governments worldwide and it can play a crucial role in both positive and negative developments in forest. On one hand, economic development based on forest and agricultural resources and products increases pressures on forests and deforestation rates, especially in low income countries (Panayotou, 1993; Angelsen and Kaimowitz, 1999; Barbier, 2004); on the other, countries that get richer can afford to develop and protect their forests, e.g. Panayotou (1993). Although the nexus between the economy and the environment, and specifically economic growth and forests, may be complicated, some models and theories have tried to depict this relationship to apply in a theoretical (at least) level. Two such theories that are also relevant to this research are the forest transition model and the environmental Kuznets curve.

The forest transition hypothesis is, simply put, the change (transition) from shrinking to expanding forest area (Mather, 1992)(Appendix 2.10). Population growth, economic growth, perceptions about natural resources from the population and the government, and the development of the agricultural sector are few of the main reasons behind this transition (Mather and Needle, 1998). Some of these factors are nonetheless interrelated, for example population growth has been related with the expansion of the agricultural sector (Mather and Needle, 1998) and agricultural growth is related to economic growth, deforestation and forest degradation (Angelsen, 2007).

The environmental Kuznets curve (EKC) is a hypothesized relationship between various indicators of environmental degradation and income per capita (Appendix 2.11). The hypothesis is that early states of economic growth may lead to an increase in environmental degradation and pollution, but after some point (level of income per capita or GDP) the environmental decline trend reverses, and higher level of economic growth leads to environmental improvement (Panayotou, 1993; Stern, Common and Barbier, 1996; Stern, 2003).

The EKC is essentially an empirical phenomenon, but most of the EKC literature has been econometrically weak (Stern, 2003). However, Crespo Cuaresma *et al.* (2017) have shown robust evidence supporting the existence of at least the first half of an EKC for deforestation using a global sample covering all borders of the world with available data. In other words, their results support that as income per capita increases, deforestation decreases, but there

is no robust evidence that the deforestation trend will revert after a threshold level of income per capita (the second half of the curve). They indicate "the deforestation effect of economic development disappears (but does not revert) as the income level increases" (Crespo Cuaresma *et al.*, 2017, p.5). Their results are coherent with a similar study by Grossman & Krueger (1995) that showed robust evidence supporting the existence of an EKC for water and air pollution, where the reversal effect was also not significant.

2.4 Complexities of Forest governance and economic crises

The effectiveness and the outcomes of forest governance depend on a very large number of factors (Agrawal and Chhatre, 2006; Ostrom, 2007; Dietz, Ostrom and Stern, 2008). Some of these have been identified as 'critically important' (Agrawal *et al.*, 2008, p.1462) especially in tropical country contexts, including the careful definition of property rights in terms of use and responsibilities and stronger enforcement of property rights and governance arrangements, greater participation by those who depend on and use forests, accountability of decision-makers, improved monitoring of forest outcomes, as well as investment in institutional capacities at all levels (local, regional, and national) (Agrawal, Chhatre and Hardin, 2008). Credibility of relevant schemes and models, enforcement mechanisms, and those who impose them (Dietz, Ostrom and Stern, 2008), as well as trust in actors in the forest regime (Schluter and Koch, 2011) also play a key role in both governance effectiveness and the stability and direction of the institutions in the forest sector.

While Agrawal, Chhatre, and Hardin (2008) recognise the great importance of governance in influencing outcomes in forests, they also acknowledge that there are major gaps in literature and knowledge about how different features of governance may affect the outcomes, as well as the history and distribution of forest governance arrangements. One such gap in the literature is the case of changes that take place during periods of economic crises, and how they may affect the governance arrangements and outcomes in forests that this research addresses.

With respect to the direct effects of economic crises on forests, the most important one relates to the demand side of the market and the new pressures it puts on forest resources , as Lekakis and Kousis (2013) found for the case of Greece, where the demand for firewood, timber, and agricultural land increased, as well as illegal logging, which is also associated with

looser forest protection due to reduced budgets and deregulation. Similar observations have been made in the case of Peru by Tariq and Aziz (2015), where they found that the increased poverty and unemployment inflicted by the economic crisis, may potentially play a role in forest degradation or deforestation because of overuse of forest resources for fuelwood, or illegal harvesting for income for the poor. Research has also shown that in tropical developing countries debt and deforestation are positively linked, mainly through the clearing of forestland for agricultural expansion (Culas, 2006).

The indirect effects of economic crises, i.e., those related to the policy changes which were applied during the period of economic crises are more complex. Policies related to both environmental and economic regimes (market), combined with demographic change and economic growth are often acknowledged as the main underlying factors and causes of forest cover changes worldwide, and especially in the tropics (FAO, 1993; Contreras-Hermosilla, 2000). However, apart from institutional framework changes aiming to help or save the banks and the financial sector, governments are also encouraged to make plans for supporting businesses, or even specific sectors, as well as private households that are or may be affected by the crisis, without failing to plan ahead for innovation long-term economic growth (Guellec and Wunsch-Vincent, 2009).

Government policies are usually based on utilitarian economic techniques and values, which fail to address many of the regional characteristics, such as tradition, spiritual environmental values and customs, as well as capture adequately all environmental values (Bengston, 2004; Waeber *et al.*, 2015). In addition, the role of economic incentives towards economic growth especially in the fields of agriculture and forestry, combined with lack of state regulation may also play an important role in the depletion of resources and long term effects such as deforestation (Burns *et al.*, 1994). While these activities can bring potential short-term economic gain, in the long-run they may cause economic losses due to the depletion of renewable resources, or other environmental impacts such as drought and floods (Chowdhry, Chen and Tendler, 1989).

Reforms applied in periods of crises are usually expressed through changes in both governance structure and regulation. For example, newly established governance structures and power dynamics towards a pro-market economy, often combined with deregulation in

environmental regimes and with austerity from the public sector may lead to profitable outcomes, as markets tend to do, but are not necessarily sustainable or related to resource conservation or protection (Humphreys, 2009). Similarly, openness to international markets may bring international investors, but the type of investment, i.e. Long-Term productive investment, or Short-Term speculative gain, the market opens to is not always monitored or distinguished (Strange, 1998).

The following sections reflects on how both existing complexities in forest governance regimes and impacts from both direct and indirect changes related to or induced by economic crises may determine the outcome(s) in forest regimes. There is a side-by-side compilation of information and data, referring to the current complex situation in forest governance regimes on the one hand, and the main pro-economy-oriented policies and measures adopted in periods of economic crises on the other, which can separately and combined affect forest regimes.

2.4.1 Variability in forest governance structure

Wellstead *et al.* (2013) attempt to explain the reasons behind the failure in conceptualization of governance in the forest sector, in political and institutional levels, by emphasizing that a structural-functionalist approach[14] is often used in forest sector vulnerability assessments (in terms of analysing structure and policies). In other words, focus is often given on the micro level and the macro level, i.e., role and structure of forest institutions and actors, but analyses often neglect the role of many institutional and political variables in the meso-level, i.e., the connection between micro and macro, which according to their analysis depicts the mechanisms of governance better. By neglecting the meso-level, this type of analysis treats government as a procedural 'black box', and doesn't provide systematic exploration of how institutions or their instruments really operate, nor the circumstances in which they operate, nor their capacity to actually deliver their goals, nor structural power dynamics in the existing system/regime. Giddens (1984) made a similar claim in the field of sociology, that many attempts to explain social change focus either on the potential limitations of structures

[14] A social theory, according to which, the structure and the functions of institutions are taken into account, assuming, however, that politics will be rational in order to counter problems that will arise, and treats the government as an input-output mechanism, which simply gives solutions to problems quasi-automatically through bureaucratic procedures (Almond and Powell, 1966)

(such as rules or resources), or on the behaviour of actors, which led to his structuration theory, in which he argues that both individuals and structures interact and can influence one another, and that none of the two alone can explain social action.

This idea reflects the turn towards post-structuralism in many authors' work, (Fischer *et al.*, 2010; Nel, 2015; Chaffin and Gunderson, 2016; Dandy, 2016), who do not only look at the function and structure of institutions in environmental and forest regimes, but also at the context in which each institution may function, combining quantitative and qualitative criteria. In my interpretation of their analysis, structural-functionalist analysis should not be avoided, in order to lay the foundation of what each body's role is supposed to be (or during later stages what changes are needed in the institutions involved), but it should be complemented with a more descriptive approach, including and enabling the structural meso-level of the analysis.

Also, theoretical models of forest governance can sometimes be different to research findings, where other parameters and restrictions may apply both in the short and long run. For example some researchers, such as Ostrom (1990) and Schlager and Ostrom (1992), have successfully challenged the theoretical paradigms of the tragedy of commons as presented by Hardin (1968) or Gordon (1954) for the case of fisheries, where the commons were presented as wealth that is free for all and therefore leading to overexploitation and depletion. Similarly, Nel (2015) using a post-structural approach highlighted the qualitative changes in the intentions and outcomes of forest governance changes in Uganda. The importance of adaptiveness and flexibility in governance has been highlighted in the literature, along with examining each case both in its own perspective and with a view to a bigger scale has been also highlighted (Folke *et al.*, 2005; Lemos and Agrawal, 2006; Dietz, Ostrom and Stern, 2008; Tacconi, 2011)

While forests may have a similar 'structural' role in different countries (i.e. production, employment, or spiritual and cultural), each case is unique in terms of the governance regime they operate in and its own unique characteristics (Unruh, 2011; Lawrence *et al.*, 2013; Wellstead, Howlett and Rayner, 2013; Faye, 2015; Waeber *et al.*, 2015). For instance, the governance regime in which they operate in may be different, in terms of political, cultural, economic, and environmental characteristics, such as corruption, or coalitions

among actors and political stability, or the characteristics of the industry itself, in terms of size of the industry and the units it is comprised of, economic power or contribution to GDP, as well as qualitative characteristics of people (e.g. Education, or tradition) involved in it may differ in each case. The involvement or not of local communities and institutions, as well as their structure and power in each system have also been identified as variable parameters, i.e. they may change from case to case (Lemos and Agrawal, 2006; Schluter and Koch, 2011).

The (multidisciplinary) research and information available with which the policy makers and researchers view each case plays a valuable role to set an meaningful context for resource governance (Agrawal and Chhatre, 2006; Dietz, Ostrom and Stern, 2008; Tacconi, 2011); This information may refer to local and aggregate conditions and needs, human actions, individual and social values as well as the effects of the decision making on different valued outcomes (qualitative characteristics) (Dietz, Ostrom and Stern, 2008), all of which may influence the outcome of policies and the direction of governance. As both social and biophysical conditions change over time, there is need for scientific understanding of the interaction between human and biophysical systems, from a multidisciplinary point of view, which can offer a more in-depth context to the data each discipline has to offer (Agrawal and Chhatre, 2006).

However, rural communities use sources of knowledge and information for various purposes, which formulate their practices, which might be different from the knowledge and practices of professionals. Their management plans for forest activities might appear different, more closely related to tradition rather than production (with the latter reflecting on what policies tend to promote), or even seem absent, according to professionals (Lund, 2015). On the other hand, professionalization in forest management, which enables expertise and certain skills in forest management, such as level of literacy and education, knowledge of processes and procedures of forest management, etc., or participation of professionals and experts is often promoted through policies. This might be interpreted by policy makers as lack of capacity on behalf of the local rural communities to properly manage forests, despite their different management methods and efforts (Lund, 2015).

2.4.1.1 Decentralization

Decentralisation is defined as the transfer of either property, power, and/or property rights from the state to non-state actors, such as local communities, and regional or local governments, which aims to increase participation and accountable representation in local decision making (Ribot, 2002). Decentralised forms of forest and natural resource management are considered to have the potential to be efficient, equitable and sustainable, as local communities and other forms of local governance are more empowered to make decisions over natural resource use (Ribot, 2002; Tacconi, 2007).

Local communities have shown to have the capacity to organise, coordinate their actions, set and enforce their own rules, with some very beneficial outcomes in terms of managing the commons (Ostrom and Ostrom, 1977; Ostrom, 1990; Dietz, Ostrom and Stern, 2008). Redistribution of political power and access to resources should be taken into account as an objective in decentralisation processes, for it to have a positive effects on people's livelihoods and natural resource management (Schafer and Bell, 2002; Larson and Soto, 2008). Tacconi (2007) claims that apart from clear authority and responsibility assigned to the participating stakeholders, specific objectives for natural resource management should also be set in the decentralisation planning, as well as a formulation of strategy through penalties and support linked to agreed environmental standards.

However, power distribution is not always clear in decentralisation procedures, and while the possibility for local people and communities becoming more empowered exists, the opposite may also be the case, depending on the specific arrangements, e.g. which institutions receive more powers, as the state may extend its control over them (Larson and Soto, 2008). In cases where property is transferred from the state to local governments or communities, but the laws and policies fit a state-centre model, or are rigid or outdated, these rules can become an obstacle to sustainable forest (and resource more general) management (Ostrom and Ostrom, 1977; Ostrom, 1990; Dietz, Ostrom and Stern, 2008). Another case where decentralisation processes fail to empower local communities is when central government personnel are reluctant to redistribute power or resources and they often find ways to maintain control, which is an often observed phenomenon (Larson and Soto, 2008).

2.4.1.2 Privatisation

Privatisation is the transfer of non-private (public, state, communal) assets to private owners. The objective of privatisation of forest resources ideally aims to improve the quality of forest management, and not just transfer property rights and responsibilities from non-private to private owners (Siry, Cubbage and Ahmed, 2005). For privatisation to be efficient and effective, parameters, such as the ability of the state to select the appropriate candidates, regulate and monitor their progress play a crucial role (Ioras and Abrudan, 2006).

In some cases privatisation of forestland may promote better management of forests in terms of generating revenue for local governments or communities (Ylhäisi, 2003; Schoneveld, 2014) and avoiding neglect of the forests by the responsible forest management (FM) authority (Schoneveld, 2014). On the other hand, there are arguments that FM strategies focusing on generating revenue through timber-related activities may conflict with other forest functions and services that add to common welfare, such as recreation (Ruppert-Winkel and Winkel, 2011). Linking this to section 2.2, policy makers should be aware of the variety of goods and services that are available from forests and how each sector (private and public) is more suitable for delivering different types of goods and services. The role of trade-offs among economic, social, and environmental benefits and costs has been highlighted by Larson and Soto (2008) for both the cases of decentralisation and privatisation.

In addition, Burns *et al.* (2017) distinguishes between informal and formal actors and programs' goals and interests, which can help explain the route to domestic policy changes with respect to natural resource management and forest management in particular. In their study they found that while World Bank interventions in Armenia targeted the reduction of rural poverty and improvement of natural resource management, the policy and administrative changes that were implemented, restricted the access of pool local users to natural resources and benefited transnational private companies. The privatisation and deregulation that took place in natural resource regimes in Armenia have actually weakened the capacities and roles of state actors, while they also incentivised an increase in extractive natural resource production (timber harvest and exports) (Burns *et al.*, 2017).

Privatisation of forests and natural resources in combination with other economy-oriented policies may bring economic and environmental changes, due to the expansion of the industry in natural resource regimes, such as forestry (Giminiani 2016), or mining (Colchester *et al.*, 2000), or agriculture. Conflicts with local communities may also arise in privatisation procedures, as described by Apostolopoulou and Adams (2015) for the case of Greece, and World Rainforest Movement (Colchester *et al.*, 2000) more broadly in various developing countries regarding rainforests.

In a more specific context regarding conflicts, Ruppert-Winkel and Winkel (2011) collate the pro-privatisation and anti-privatisation story lines for the controversial privatisation reforms of the state forests in Schleswig–Holstein in Germany. In this context, some of the pro-privatisation coalition arguments included that welfare services in forests were a luxury and could be set aside; that experts should decide about the future of the forests, as they are more knowledgeable about them; that state forests should be commercial forests and privatisation should be given a chance. The anti-privatisation coalition viewed the welfare services provided by forests as basic needs, and that the future of the state forests which belong to all citizens is a public issue, where the public and not only experts should be asked.

2.4.2 Changes in regulation and power dynamics

There is need for communication and common language, even for diverse problems (as governance is complex and dynamic, as described above), in order for all bodies who participate, or are willing to participate, to be able to communicate their needs and interests (Straka, 2011; Lawrence *et al.*, 2013). A very common phenomenon in governance in the forest sector is the lack of communication and coordination among different bodies, or even among the individuals that comprise an actor in the scheme (e.g. loggers, farmers, or local government agencies), in such way that they are excluded from or neglected in the regime. This can be attributed to either the lack of relevant coordinating structures and institutions (Wolf and Hufnagl-Eichiner, 2007), the lack of social networks (Fischer *et al.*, 2010; Nybakk *et al.*, 2013), contest for power which intentionally seeks to exclude or diminish the power of other bodies (Kamoto *et al.*, 2013; Faye, 2015), or policies that encourage or discourage the participation of many actors (Kamoto *et al.*, 2013; Lund, 2015).

Effective communication plays a role in rule compliance for actors involved in forest regimes. There are different channels through which rule compliance is communicated to different actors in the regime, each of which relies on different tools, and each has different advantages and disadvantages over the others. Dietz, Ostrom, and Stern (2008) identified 3 main channels to induce rule compliance, a combination of which can create the incentives for compliance:

i) Community based institutions, which usually use informal strategies and rely on participants' commitment to rules with minor/subtle social sanctions.
ii) Command and control, which require or prohibit certain behaviours, and are usually created and enforced by state actors (governments) and require available resources for monitoring and enforcement.
iii) Market instruments, the participation to which is voluntary, and which provide financial incentives for compliance with environmental rules or information disclosure.

They also identified that power relations have also been affected by these changes, in terms of rulemaking in global forest politics (ibid.).

Governments were usually able to influence governance through binding law making, rule design and implementation, and control of compliance, while private and civil society actors engage through private and public-voluntary rules, e.g. forest certification (Arts and Buizer, 2009). However, the failure of many governmental and intergovernmental state-led initiatives of the 1980s, allowed space for many non-state actors to fill that gap through their own initiatives during the 1990s (Wiersum, 1999; Dimitrov, 2012). In turn, non-state actors gained more power in relation to states with more influence in political decision making, framing and co-framing political discourses, and having the capacity to design their own private rules themselves, for example in the case of labelling and certification schemes (Arts and Buizer, 2009). Yet, as the potential for private actors alone to achieve sustainability at a larger scale is very limited (Glasbergen, Biermann and Mol, 2007), there have been cases where state and non-state actors have tried to adopt to the new challenges, in schemes that involve the presence of both from different roles, such as the PEFC (Programme for the Endorsement of Forest Certification) certification scheme in the EU, and the MTCC (Malaysian Timber Certification Council) in Malaysia, or the FLEG (Forest Law Enforcement and Governance) initiatives (Arts and Buizer, 2009).

2.4.2.1 Austerity

Austerity refers to the reduction of public spending, often associated with policies involving cuts in social programmes, tax increases, and adoption of a tighter fiscal policy, in order to reduce budget deficits (and debt), and balance the public budgets (Farnsworth and Irving, 2011). IFIs, such as the International Monetary Fund (IMF) often include austerity measures as part of Structural Adjustment Programmes (SAPs), when they act as lender of last resort (Stiglitz, 2000; Cahill, 2011; Apostolopoulou and Adams, 2015). During the most 2008 global economic crisis, most of the EU states adopted austerity policies, including budget cuts in the public sector, in order to handle the impacts of the crisis, even if the IMF was not involved in all cases (European Commission, 2009).

There have been cases where the fiscal austerity and tighter monetary policies proposed by the IMF and adopted by many countries in Latin America helped the situation in terms of the crisis recovery, but in some cases in SE Asia during the 1997 crisis, the austerity measures plunged the economy into deeper recession and slowed economic growth (Stiglitz, 2000), similar to the 1990s crisis in Sweden, where despite the proposed austerity measures, the economic crisis continued and turned into a political crisis, as well as a banking and currency crisis, with dramatical increases in unemployment levels, public debt, and inflation (van Hooren, Kaasch and Starke, 2014).

The power and the role of forest, environmental, and natural resource actors (e.g. ENGOs and state agencies) may also diminish due to reduced budgets and funding in periods of economic crisis. For example, the United States Agency for International Development (USAID) addresses how government agencies related to the environment (e.g. departments of forestry, fisheries, or agriculture) are almost never a priority in times of austerity, and that declining government revenues may possibly lead to funding cuts for institutions of natural resource governance and biodiversity conservation, as well as a reduction of environment conservation activities from NGOs, due to cuts in funding (Colby, 2008).

Sezer, Kocasoy, and Aruoba (2003) found that the austerity measures, adopted by the Turkish government to stabilise the budget deficits during the economic crisis in 2002-3, had a direct (proportional) relationship with the reduction in environmental financing, especially for the cases of environmental protection and investments towards environmental activities.

Similarly, the World Bank found that despite support from the World Bank, UNDP, and Canadian International Development Agency towards various environmental programs in Indonesia in 1990, the austerity measures and conditions impede the maintenance of core environmental programmes, regardless of the institute that provides it (World Bank, 1990).

2.4.2.2 Deregulation and reregulation

Deregulation refers to the removal of regulation and policies, which can create market distortions, and thus are inefficient and burdensome to both the markets and the society, after which the markets will be able to work more effectively (Humphreys, 2009), similar to what has been expressed by political economy movements and theories, such as the Austrian school and the Chicago school. In a similar manner to deregulation, reregulation is the adjustment of existing regulation, through removal of existing policies and deployment of new state policies, in order to facilitate privatisation and marketisation of wider areas of social and environmental life, without the interference of the state (Castree, 2008). However, there have been some political economy scientists who have argued that markets always need regulating if they are to survive, e.g. Polanyi (1944).

Although many regulations and policies have been put in place to serve some valued social objectives, deregulation has the potential to reduce corruption, in cases where regulations have been designed to (primarily) serve the patronage-dispensing power of politicians and bureaucrats (Bardhan, 1997). Deregulation, in the forms of either removal of regulation or reformulation towards a 'light-touch' regulation can also enable the participating actors in social and environmental regimes and schemes to become self-governed (Castree, 2008).

On the other hand, while focus is given on the economic development in forests, not all functions of forests are always taken into account (Ruppert-Winkel and Winkel, 2011). Natural products, and ecosystem services and basic resources, such as soil or air quality, may also experience increased pressures from the combination of increased poverty and deregulation (Colby, 2008). Similarly, more economic freedom, provided through deregulation has the potential to disproportionately benefit those who can invest and capitalise on the opportunities (for example investment opportunities) that arise from this deregulation, causing more inequality (Sturm and De Haan, 2015; Krieger and Meierrieks, 2016). In the cases of deregulation of forest protection rules and policies, loose forest

protection may lead to deforestation through increased propensity of forest fires and illegal logging (Lekakis and Kousis, 2013).

Nowadays, extensive deregulation and reregulation in forests and natural resources in periods of economic crises aim at encouraging and boosting investments, or accelerate public-private partnerships in the environmental schemes by surpassing the obstacles of legislation, as described by Apostolopoulou and Adams (2015) for the case of Greece. For the case of Brazil, deregulation in environmental regimes and in the forest sector in particular, in combination with corruption, lack of proper infrastructure, and lack of funding towards environmental protection, has been linked with exposing forests to dangers, such as deforestation and degradation (Bernsten, 2014; Riemersma, 2018).

2.5 Summary and Discussion

Significant developments in history, such as the industrial revolution or the Great depression, challenged many economic ideas and models that were once prominent and kickstarted new eras. For example, even when the role of state and non-state actors had been in the centre of the discussion since the earliest political economic theories, the Great Depression in the US in the 1930s brought notions like market failures and/or economic crises into the spotlight, and scholars started to explore and challenge the role of actors such as the state, the markets, financial institutions, and individual citizens.

Similarly, environmental components and considerations in economics until the early 20th century were sparse, but since the emergence of environmental economics in the 1960s, the exploration and research relating to environmental regimes and their management and governance has flourished. Relevant debates and research started acknowledging the multiple values of goods and services, the existence and the difficulties to assign property rights adequately or fairly, the impact and the role of potential externalities that may arise from the management of forests and forest products. At the same time, the cooperation and collaboration among environmental governance regime actors and institutions with different goals and agendas may complicate things. In periods of economic crises, new variables are introduced in this already complex governance regime, such as new actors, (combination of) policies, priorities, coping mechanisms of existing actors, and other forces that may change the direction of governance and its outcome in economic, social, and environmental terms.

The debate about the role and power of the state in stabilizing the economy in times of economic crises, which started after the Great depression, continues to be relevant today, especially regarding whether a state should use any fiscal policy tools, and to which extend, or rely on monetary policies and market mechanisms. For example, regarding the 2008 global economic crisis, Krugman (2015) and Varoufakis (2017) suggested increasing public spending could stimulate production and consumption, and also offer a safety net contra the outcomes of the crisis, (similar to the (post-) Keynesian approaches). On the other hand, Alesina *et al.* (2018) claim that implementing austerity measures to reduce public spending can help to balance economic deficits (similar to the Austrian and Chicago schools). In practice both ends have gained support from different stakeholders, and with different applications in recent times.

Since the 1950s and 1960s, economic growth has been perceived as increasing the size of the wealth that can be distributed to the people, and as a solution to the problem of poverty (Perman *et al.*, 2003). This may explain the acceptance of a wide range of pro-growth policies from many governments since then, such as privatization of public assets, deregulation to attract foreign investment, tighter fiscal policies to reduce the state budget and debt. Such sets of policies, which aim to reduce the responsibility and power of the state and increase the economic activity of private actors (similar to Friedman's approach), have gained support and popularity among IFIs, such as the IMF and the World Bank, and have become a frequent response to economic crises in the recent years (more in Chapter 3).

On the other hand, there are also examples of (post-) Keynesian approaches that inspired contemporary environmental-friendly movements that advocate for increased public spending towards environmental improvement in order to counter pressing contemporary issues, such as climate change, e.g. the Green New Deal in the US (Jacobs, 2019; Pettifor, 2019), and in the EU (Keating, 2019; Kelleher, 2019), and the Green New Deal in Korea. During periods of economic crisis, such approaches can help to reduce unemployment, while also investing towards infrastructure and/or the environment.

Even though each set of policies may have the potential to enhance economic growth under certain conditions, focusing only on economic growth may bring adverse effects to both the society and natural environment, especially if these changes take place hastily and without

prior consultation with relevant stakeholders (e.g. citizens, local communities, academics, NGOs, etc). On the other hand, there are often certain developments in the economy in periods of economic crisis, such as decline in output, increase in unemployment, declined asset prices, decreased government revenues and increased government debt, as well as pre-crisis socio-political, environmental, economic conditions in each country which may not enable, favour, or allow the adoption of other sets of policies even if looser fiscal policy may be appealing during financial crises. This is explored in detail in the next chapter.

3 How does the participation of International Financial Institutions (IFIs) in the management of financial crises differentially affect forest governance regimes? A comparative case study from the 2009 EU and the 1997 South-east Asia crises

3.1 Introduction

This chapter considers how and to what extent the large-scale financial crises along with the accompanying state recovery and crisis management strategies that focus mainly on economic growth, interact with forests and forest governance in multiple and diverse ways. Apostolopoulou & Adams (2015) and Humphreys (1996) have described how the drivers of deforestation and forest degradation are affected from an economic crisis, including the lens of the public's coping mechanisms to the economic crisis. The main focus of this research is the application of policies that are adopted from the participation of IFIs in the crisis management/recovery period as part of recovery strategies, most of which focus mainly on economic growth (Stiglitz, 2002; Lekakis and Kousis, 2013; Apostolopoulou and Adams, 2015) in the extent to which they may be drivers for change in the forest governance regime.

The role of the political environment is important to the country's economic and forest governance development when going through a financial crisis. FAO (2018) states that effective forest governance depends on political stability, in terms of adherence to the rule of law and accountability, coherent set of regulations, low levels of corruption, and stakeholder participation and adequate rights for stakeholders. Similarly Radu (2015) supports that a stable political environment is important to a country's economic growth, and helpful towards building a coherent and continuous path for sustainable development, while Nunn *et al.* (2018) that countries with higher levels of trust in their political leadership experience faster economic growth right after a recession.

This chapter adopts an exploratory approach and uses a comparative case study framework with multiple cases from 2 regions, namely the Southeast (SE) Asia during the 1997 financial crisis and the European Union (EU) periphery crisis in 2009 (selection criteria explained in section 3.2.2). The focus is on policies that were adopted during the crisis management period with respect to developments in the forest-related governance regimes for each country. However, this chapter considers that IFIs played a significant role in the crisis

management process of the selected cases and therefore the spotlight is on the policies that were imposed or suggested by IFIs through the SAPs that accompanied bailout loans. It takes into account both the past configurations, the governance actors' configurations, and the governance direction both before and during the financial crisis in each case and aims to shed light both on individual cases and on patterns and links among these cases.

Section 3.2 describes the methodology and the selection criteria for the case studies, and Section 3.3 the conceptual framework of this chapter, the data collection and use processes. The analysis in section 3.4 addresses two different regions/clusters of cases; namely 3.4.1 refers to the region of SE Asia during the 1997 financial crisis, and 3.4.2 the EU periphery financial crisis from 2009. Finally, section 3.5 summarizes findings from both clusters, while it also includes relevant brief policy recommendations, based on the findings and patterns identified in this chapter looking both within and across regions.

3.2 Methodology

3.2.1 The multiple case study approach

A multiple case study methodology is used in this chapter. Although many researchers have produced very detailed description and approaches to case study methodology, the work of Yin (2018), and Baxter and Jack (2015) were used as guides for this research, as they offered more practical and structured guidelines with respect to the design and implementation of the case study. A case study is an empirical method that explores a contemporary phenomenon in its real-world context in depth, i.e. the case(s), and it is appropriate when the boundaries between the context and the phenomenon itself may be blurry (Yin, 2018). The open-endedness of the case studies methodology with the blurry (at the beginning) boundary between the context and the subject is useful in the attempt to create or discover new links (Morgan, 2012; Yin, 2018), and allow the researcher to explore and answer "how" and/or "why" questions (Yin, 2018), which is the quintessence of this chapter. Yin (2018) asserts that a multiple[15] case study methodology allows the research of multiple cases in their context, and not isolated or in a controlled environment, which in turn allows for

[15] Although generally single case or multiple cases are the 2 types of case studies (Yin, 2018), some researchers consider comparative to be a separate sub-category of case multiple studies, e.g. (Agranoff and Radin, 1991; Dion, 1998; Knight, 2001). This chapter considers the terms multiple and comparative when referring to case studies to be the same and may use them interchangeably.

observations of their background/context as well as the case itself, while it also allows for cross-case comparisons and conclusions.

Multiple case analysis takes different cases sharing some common element(s) and explores similarities and differences among them (Knight,2015). To do so, the researcher should initially link a hypothesis to a group of cases and narrow down the focus or strategy of the research. Knight (2015) describes how multiple case studies that investigate human–environment issues can focus on different elements, ranging from communities, places, structures, systems, to theories and perspectives, and depending on their focus, either qualitative or quantitative data can be useful in their analysis, without the combination of foci or the strategies being mutually exclusive, i.e. different foci and strategies can be combined together. The researcher should then collect data and develop evidence from the cases, and finally construct theories, explanations, generalizations from this evidence, relying primarily on the data, but also on their intuition, creativity, insight, or even luck (ibid.).

Multiple case studies can create a coherent picture by connecting together different bits and pieces of evidence, also described as a "jigsaw puzzle" (Morgan, 2012, p.675). Comparing and collating data and insights from different perspectives in case study research provides the opportunity for a more comprehensive understanding of the phenomenon, and can reveal commonalities and differences between the cases (Stake, 1995; Baxter and Jack, 2015; Yin, 2018) and can also depict new relationships which may be uncertain or vague in a single case (Knight, 2015). Looking at international phenomena, and taking conditions of globalization into account, researchers (Sonnenfeld and Mol, 2002; Lenschow, Newig and Challies, 2016; do Amaral, 2022) have increasingly paid attention on case-based approaches as opportunities to research complex contemporary issues of policy and practice. For this chapter, this method allows the exploration and analysis of the development of forest governance during periods of financial crisis at a state level, while addressing an international contemporary experience.

At the same time however, Flyvbjerg (2006) claims that case studies are challenging in terms of construct validity, as concerns have been raised that subjective judgment may be used to collect data. Adherence to the data provides the discipline and the 'honesty' required to make an objective case in cases of theory building from cases (Eisenhardt and Graebner,

2007). In order to enhance the construct validity of this study, this chapter establishes a chain of evidence during data collection, i.e., describes every step of the process and clearly links between each step, and uses multiple sources of evidence during data collection (Punch, 2014; Yin, 2018; Häder, 2022). This is described in detail in section 3.3.

Yin (2018) suggests that researchers using case studies should be aim for analytical (rather than statistical) generalization, which offers greater insight regarding the 'how'/'why' questions, and target the conceptual/theoretical level and not the numerical/statistical level (Yin, 2018). In multiple cases studies, it is not possible to generalize from each individual case to the whole population, but rather generalize from what is learnt from the analysis of all cases with respect to theory or certain concepts. To enhance external validity in multiple case studies, the researcher should pursue replication logic, i.e., upon finding something important, they should aim to make inferences about multiple cases, rather than stopping upon finding it in one case as a stand-alone positive example (Ridder, 2017). In addition, the collation and juxtaposition of different and potentially conflicting realities (cases) of the same phenomenon can generate theories with less researcher bias, compared to theories that are built from incremental studies or axiomatic deduction (Eisenhardt, 1989).

3.2.2 Selecting the case studies

Recent research and literature tends to recognize that the context and the phenomenon of the study in case study research often overlap and can be difficult to set clear boundaries between them (Gustafsson, 2017; Kruck, 2018; Yin, 2018; Häder, 2022). For this, the focus is on the relationships between the whole and its parts, highlighting different patterns and configurations both within and across cases. Specifically for multiple case studies, the researcher should need to account for scalar, spatial, and temporal aspects of case studies (do Amaral, 2022). The following section describes the process and the criteria for selecting the case studies that will be analysed in this chapter.

Case studies can be "extremely time consuming and expensive" (Baxter and Jack, 2015, p.550) to perform, although this depends on the type of required data and the project in hand (Yin, 2018). In order to manage the time and cost of this study without compromising its quality, this study focuses on a small pool of relevant cases, based on specific criteria, in

order to explore how economic crises differentially affect forest governance regimes. The following criteria have been used to narrow down the pool of cases in focus:

1. *Forests: States with more than 5% forest area*

This study acknowledges that the current definition for forests from FAO was established in FRA 2000, and values related to forests and forest cover may differ for previous years, as described in the FRA 2005 Annex (FAO, 2006). In order to collect meaningful data for cases that fit the research question of this chapter, without addressing changes in forest cover attributed to the change in the definition, a minimum 5% forest area threshold is set at any time between 1995-2015. Although this threshold is set rather arbitrarily, in order to work around the change of definition for forests, this study does not consider or imply that forest governance in states with forest cover less than 5% is not important or significant.

Other environmental, or socio-economic aspects of forests, such as contribution of the forest sector to the GDP, active public participation, deforestation rates, etc. are not considered in the selection of the cases (but will be discussed in the analysis). This is because forests may serve multiple roles and offer different values, and such characteristics may vary drastically among different states, as each governance regime may choose to manage and/or govern forests according to their needs and agenda.

2. *Origins of economic crises: Financial sector crises*

Focusing on the financial sector as an origin for an economic crisis makes this research more relevant and applicable today, as a financial crisis can occur in any country with common effects on unemployment, GDP, poverty, etc., as opposed to cases where economic crises come from war, natural phenomena, or diseases. Lindgren, Garcia, and Saal (1996, p. 20, Annex) found that 73.5% of the 181 members of the IMF had experienced “significant bank sector problems” from 1980 to 1995, and many of these countries experienced such problems repeatedly. Cases of economic crises that originated from sources or parameters other that the financial sector, such as wars, embargo, or natural phenomena such as tsunamis, extensive droughts or hurricanes, or outbreaks of diseases, such as the current one caused from COVID-19 are therefore excluded from the analysis.

In addition, the research looks at cases where the financial downturn, event or crisis led to an economic crisis, i.e., when GDP levels decreased, unemployment and poverty levels were affected. This criterion excludes financial downturns events that didn't turn into full-scale economic crises, i.e., where GDP growth may have declined but remained in positive levels in the short run and unemployment and poverty were not affected significantly, such as the dot-com bubble in the US of 2000-2, or the 2015 Chinese stock market turbulence.

3. *Time frame: Cases of economic crises that have occurred between 1995-2015*

The financial system changes rapidly and cases within the same time frame will be both easier to evaluate, and also more relevant to the current status of the financial system. From some early review of relevant databases (e.g., Eurostat, IMF, World Bank), not many countries have adequate datasets for their economic and environmental/forest conditions before 1990 or 1995, also taking into account that many new countries emerged in the mid-1990s (e.g. after the dissolution of the Soviet Union and Yugoslavia).

The starting point was to check the GDP growth (%) database from world bank for cases between 1995 and 2015 (this research started in 2016) where the index reached negative levels for at least two consecutive quarters. Then all the cases were cross referenced to literature searching for connections to financial events. The list of financial crises between 1995-2015, in countries with more than 5% forest cover can be found in Appendix 3.25.

4. *Responses to financial crises: Participation of International Financial Institutions (IFIs) in the state recovery management efforts*

This research focuses in on cases where International Financial Institutions (IFIs), such as the IMF, ECB, or the World Bank, were involved in the financial crisis recovery process. Even though these institutions operate mainly within the scope of the international and national economic governance, certain policies may affect forest or related industries, state and private sector investment in forest or forest related regimes, as well as the countries' forest governance dynamics. The potential economic, environmental, or social impacts of such policies may have a wide range of outcomes on forests and forest governance, depending on both the design and application of policies, and the context in which they are applied (Cubbage, Harou and Sills, 2007; Holmes and Cavanagh, 2016).

On one hand, major IFIs, such as the IMF and the World Bank started taking environmental issues into consideration with respect to the countries' macroeconomic stability since 1991 (Gandhi, 1998) and 1989 (Shihata, 1992) respectively, including environmental implications with respect to both financial crises and adjustments (World Bank, 1999a; Guérin, Natalucci and Suntheim, 2020). On the other hand, Angelsen and Kaimowitz (1999) found structural adjustment programs (SAPs) and policy reforms included in current economic liberalization and adjustment efforts may increase the pressure on forests. Similarly, Shandra, Shircliff, and London (2011), using a sample of 61 nations from 1990 to 2005, confirm that "poor nations undergoing World Bank investment and structural adjustment loans tend to have higher rates of deforestation than poor nations not undergoing these types of loans" (p.292).

IFIs have very often worked with a very specific set of policies in financial crises cases, such as austerity and changes in regulation to enable increased private investment (Stiglitz, 2000, 2010b; Kranke, 2020). This specific set of policies are studied both within each state separately, and compared across different states and regions, in order to find common patterns and/or differences in their outcomes and applications. This enables this study to narrow down the types and number of policy responses that took place and use the policies as a common denominator for all cases. However, this criterion doesn't exclude other policies that were adopted by a state, if these policies were not suggested by IFIs; rather, the focus is on policies that were adopted in specific countries, when IFIs were involved in the crisis recovery stage.

5. *Area of effect: Financial crises affecting more than 1 countries in a region*

The focus of this study will be on financial crises that affected more than one countries in a specific region at the same time. This allows for better monitoring of changes in governance responses and policy applications (criterion 4) from multiple cases of crises from the same financial event. The comparative case study methodology allows us to dive into the specifics and uniqueness of each case, while at the same time explore and look for common treads at the national and international levels.

There are three cases of large-scale financial crises between 1995 and 2015 that affected more than one countries at the same time, namely the 1997 South-east financial crisis, the 2008 Global financial crisis, and the 2009 EU periphery financial crisis. The latter can be seen

as a sequence to the 2008 global financial crisis, but due to separate characteristics, severity and structural causes, it is treated as a separate case. The 2008 global financial crisis affected the economic activity in more than half of all countries in the world. Among the countries that experienced a banking crisis in 2007–08, about 85% of the economies were still operating at output levels below the pre-crisis ones in 2018 (Chen, Mrkaic and Nabar, 2018). However, there was no common approach to the crisis management in all countries, nor IFIs involved in every case that was affected (US, EU, Asia, Iceland). In addition, contagion from the original case (US) affected the economy of different countries differently, e.g., direct or indirect exposure of banks to toxic assets, reliance on the US financial market, balance of trade with the US or other trade partners, industrial production, confidence in investment in emerging economies, etc. For this reason, the 2008 global financial crisis is not studied in this research. Thus, the empirical past cases of periods of financial crises derive mainly from two regions in respective periods:

1) the 1997 financial-economic crisis in south-eastern Asia. Indonesia, the Philippines, Thailand, Korea, and Malaysia have been identified as the main cases in this regional economic crisis (Furman and Stiglitz, 1998; Dauvergne, 1999; Pagiola, 2001) Hong Kong and Taiwan were also affected, but due to the lack of available data in databases they were not included in the analysis.
2) The 2009 - European periphery economic crisis, which sparked from the 2008 world economic crisis. Although many EU states were affected by this event, 5 countries have been identified to have suffered the most, namely Greece, Italy, Portugal, Spain, and Ireland (Lane, 2012; Quaglia and Royo, 2015).

In every country in both clusters IFIs were involved in the crisis management process. IMF offered bailout loans, accompanied by mandated policies through Memoranda of Understanding (MoU) and SAPs, to most (4/5) countries in each cluster, while the countries that didn't ask IMF's assistance received financial assistance and guidance from other IFIs. These are Malaysia for the region of SE Asia which consulted with the World Bank both before and during the 1997 crisis (World Bank, 2023); and Italy in the EU periphery region, which was influenced by the EC and the ECB during the 2009 crisis (Busch *et al.*, 2013).

Yin (2018) lists 3 potential compositional formats for multiple case studies. The first format, apart from the individual case studies, also contains an additional section covering cross-case analysis and results. The second format, which can be used for either multiple or single case studies, presents as a series of questions and answers that are repeated for each individual

case. Finally, in the third format there are no separate sections for each individual case, but instead the entire section contains topics found in the cross-case analysis, which means that information from individual cases can be found scattered around the chapter. This study uses a combination of the first and the third suggested formats, by adopting the structure of the first format (case by case analysis followed by cross-case comparison), but working with each regional cluster separately, instead of separate states. In other words, each cluster is studied separately and data from each country in that cluster is collated to reflect on certain themes identified in the literature.

The number of cases allows the exploration and analysis of individual cases both separately, and their comparison both within their own geographical clusters and altogether. Although the selected cases may have different environmental, socio-political, and economic characteristics, they fit into two 'clusters' of geographical regions (SE Asia, EU). One cluster comprises middle income countries, while the other comprises high-income countries, but both can provide additional information, such as common policies, shared population characteristics, or common types of forests, or even policies. Each cluster is first analysed separately (each case separately within each region and then the region itself) so that region-specific characteristics may come up. Once both regions are analyzed separately, this chapter searches for similarities, patterns, and common elements from comparing and collating information within and across each period of economic crises in the selected regions. In detail the compositional format of the analysis will consist of 3 main sections:

1) A section referring to the selected cases from the 1997 financial crises in SE Asia, focusing on regional cross-case analysis findings, instead of individual states (section 3.4.1).
2) A section about the selected cases from the 2008 economic crisis in the EU, focusing on regional cross-case analysis findings, instead of individual states (section 3.4.2).
3) A section covering the cross-case analysis between the regions, and exploring key patterns, similarities, and differences across all cases. In this section, lessons from each geographical cluster are discussed and brought together, in order to find common or prevailing traits, patterns, changes, or mechanisms in governance or policies that took place in the period of crisis both within and across regions (Section 3.5). Focus is given on identifying similar patterns and conditions that are related to policies adopted during the economic crisis that may have affected the development of the forest regimes.

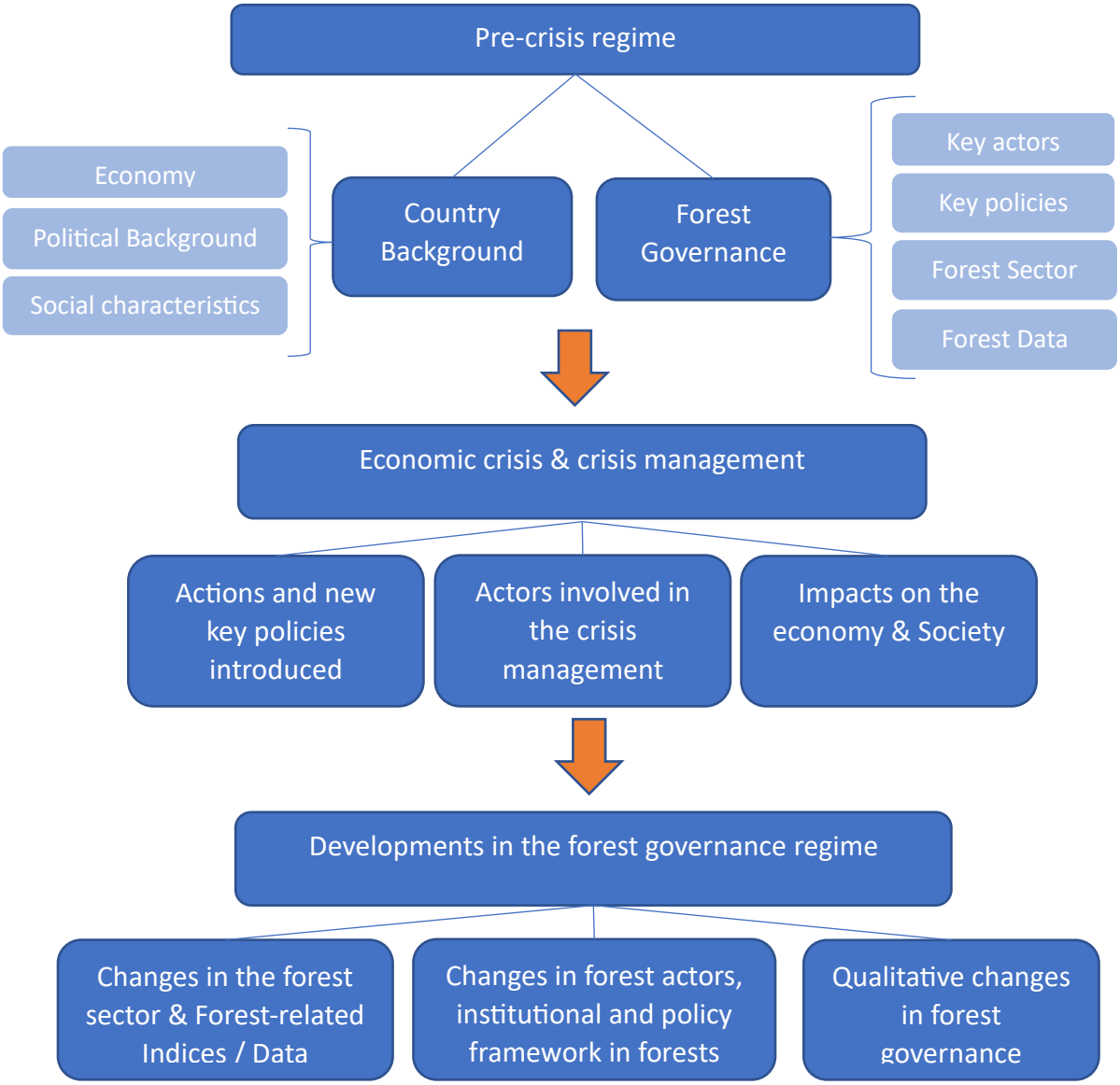
3.3 Data collection and use

3.3.1 The conceptual framework

The working hypothesis for this chapter relies on evolutionary governance theory (Van Assche, Beunen and Duineveld, 2014). According to evolutionary governance theory, governance direction and available future paths are dependent on (i) past configurations of rules and actors roles, (ii) co-evolution of participating institutions and actors, and (iii) the steering towards future goals (Van Assche, Beunen and Duineveld, 2014; Beunen, Van Assche and Gruezmacher, 2022). It builds on the premise of the parallel evolution of governance elements, such as actors, institutions and discourses, and is influenced by (new) institutional economics, post-structuralism, and development studies (such as Acemoglu & Robinson, (2012); Foucault, (1982); Larsson, (2015); North, (2005); Ostrom & Basurto, (2011); Pottage, (1998); Seabright, (2010)). These three main parameters are examined in each selected case and are illustrated in Figure 3.1 below.

The first element refers to the legacy of past decisions, which may limit the available options now or in the future (Garud *et al.*, 2010; Vergne & Durand, 2010). Earlier literature has also addressed similar notions, e.g. Liebowitz & Margolis (1999, p.981) supporting that "where we go next depends not only on where we are now, but also upon where we have been". This concept of path dependency addresses how existing and past configurations (including the absence) of different dominant actors, institutions, practices, and perspectives, as well as their respective power, may influence certain decisions for the future (North, 1990)(For the field of environmental policy (Kirk, Reeves and Blackstock, 2007)). Material dependencies, including either infrastructure projects, natural environment elements, e.g. climate, or hybrid dependencies such as pollution, or strongly embedded forest management traditions and practices, can also be included as part of the legacy that can influence governance direction and path changes (Van Assche *et al.*, 2022). In the case of forest governance, although forests may have a similar 'structural' role in many countries or regions (e.g. production, employment, biodiversity), each case is unique in terms of existing governance arrangements, their history, as well as other unique characteristics (Unruh, 2011; Lawrence *et al.*, 2013; Wellstead, Howlett and Rayner, 2013; Faye, 2015; Waeber *et al.*, 2015).

Figure 3.1 Conceptual framework: How do forest governance regimes develop during economic crises?



Source: Own elaboration

The interplay of actors and institutions, i.e. a combination of governance structure, actors' dynamics, their interdependencies, and their relevant discourse (laws and policies) are another element that can influence future governance paths and direction, as most actors and institutions depend on one another (Beunen, Van Assche and Gruezmacher, 2022). The role of certain actors and institutions that are linked to the roles of experts can play a significant role in different governance processes and therefore influence the direction of developments and changes (Beunen, Van Assche and Gruezmacher, 2022). Such examples

can be found in literature both for environmental regimes (Latour, 2004; Broto, 2013) and for economic regimes – International Financial Institutions (IFIs) (Holtom, 2005; Dargent, 2011).

Finally, the direction of the goals set by the governance actors is another factor that contributes to the overall direction of governance systems. This can be examined in terms of their importance, whether they are expressed concretely, flexibly, or abstractly, whether they are official or unofficial, whether they are in similar or opposing direction and bring governance actors together or create tension (Van Assche, Beunen and Duineveld, 2014; Van Assche *et al.*, 2021), e.g. (Shtaltovna, Van Assche and Hornidge, 2012). The assigned property rights (Chapter 2.3.2) and the power of the actors involved are also addressed.

In practice, the first element, i.e. legacy of past decision focuses on the pre-crisis regime, is explored mainly through state background and forest governance regime (such as past configurations of rules and actors' roles), in order to determine the conditions inside which the crisis developments took place. This study does not consider forest governance regimes to be independent of the country background, but nested in its environmental governance context/background. 'Country Background' and 'Forest governance' are listed separately to highlight the focus given in this study. A similar set of data and indices is initially examined to describe the background of each country, namely the economy (GDP and key sectors), the political background, and social characteristics. Similarly, the forest governance in the pre-crisis regime is described by primarily exploring the key actors involved and the key milestone policies in each country's forest governance regime, as well as both economic (e.g. forest sector) and environmental (e.g. forest area) data regarding the forests in each case. This is depicted in the top third of Figure 3.1, and highlighted in the analysis in the first section of each region, i.e. sections 3.4.1.1 and 3.4.2.1.

Second, the economic crisis impacts and crisis management refers to (i) the actors involved in the crisis (recovery) management, (ii) the impacts of the crisis on both specific forest governance actors, and the society more broadly, as well as (iii) actions and key policies adopted in this period. This is illustrated in the middle part of Figure 3.1, and covers the remaining two elements of evolutionary governance theory, i.e. the co-evolution of participating institutions and actors, are explored through indices, such as unemployment, GDP, poverty and inequality, as well as political stability; and the steering towards future

goals, which is expressed through the actions and new key policies introduced (overall, not forest-regime specific). This part is discussed briefly in sections 3.4.1.2 for the 1997 crisis, and 3.4.2.1.2 and 3.4.2.2 for the 2009 crisis.

Finally, the bottom part of Figure 3.1 refers to the developments that took place in the forest governance regime during the periods of economic crises. This is explored through changes in the forest sector and forest-related indices, funding towards specific forest actors and schemes, changes in the national institutional and policy framework related to forests, and also qualitative changes in forest governance, which may not be captured by quantitative data, such as increased public unrest, or newly established forest-related schemes. Elements of this can be found in sections 3.4.1.1 and 3.4.2.1 that focus on the pre-crisis regimes, but contain timeseries data for different forest-related indices, and mainly in sections 3.4.1.2 and 3.4.2.2 that deal with forest governance developments during the crisis management period.

3.3.2 Data sources

This chapter relies only on secondary sources. Literature review and descriptive analysis of the main economic and forest-related data of the periods of focus (financial crises) are used to explore and determine developments in forest governance regimes during periods of economic crises. The use of existing sources of information and data for this chapter also works around the problem of limited available time and resources. The literature and data used for this chapter comes from a wide range of sources, including academic articles, reports, publications from newspapers, databases, magazines, and journals, media interviews, and agencies archives.

The data collection and analysis took place in 2 stages. During the initial stage, patterns from certain core indices were explored through quantitative/numerical data. These indices referred to GDP, GDP growth, unemployment, and Gini index with respect to socio-economic conditions, and forest cover, forest production and trade with respect to the forest conditions. Some such patterns referred to both forest-related conditions, such as trends in the countries' forest cover; forest-related production and trade, e.g. large increase in palm oil exports in certain countries; and different trends in the environmental or socioeconomic indices within the same cluster, for example, which country/ies were affected more in terms of unemployment, or GDP growth both in magnitude and duration).

During the later stage of data collection and analysis, both qualitative and quantitative data from the literature were used to shed light onto economic or forest governance regime developments or specific events that enabled or contributed to the identified patterns from the initial stage, such as the adoption or application of policies, governance structure changes. For instance, using the examples of patterns from the previous paragraph, this research dug deeper to explore and identify which developments enabled the rapid growth of oil palm plantations in these countries, or which (crisis-driven) temporary measures or (pre-crisis) existing policy framework could have helped some countries deal with certain forest regime issues, e.g. increased forest cover loss, or some effects of the economic crisis, e.g. increased unemployment.

To ensure reliability in the data collection process in both the initial and subsequent stages and analysis, numerical data were collected from the same open access databases and referred to the same years for each case cluster. In detail, socioeconomic data were retrieved from the World Bank (World Bank, 2024) Open Database, the IMF World Economic Outlook database (IMF, 2023) for both the EU and SE Asia cases, and Eurostat (2023) for the EU cases. Forest-related data were retrieved from either the FAO (2024) Global Forest Resources Assessment series, FAOSTAT (FAO, 2023), the World Bank (2023b) Open Database, and Eurostat (2023) specifically for the EU cases. In cases where data were not available in these databases for certain years, data in the timeseries were collated with other open access official data retrieved from either bulletins from ministries (e.g. (Department of Statistics Malaysia, 2015), of published academic articles that collated similar data from national databases (e.g. (Tsujino *et al.*, 2016) after clarifying that both FAOSTAT and these sources had similar data for years that were available in both sources.

3.4 Analysis

3.4.1 The 1997 crisis in SE Asia

The financial crisis of 1997 originated from Thailand, and it quickly spread to other South-eastern Asian countries, including Indonesia, the Philippines, Republic of Korea, Malaysia, Taiwan, and Hong Kong through their financial sectors. Hong Kong and Taiwan were not included in the analysis, due to the lack of available relevant quantitative data in international databases. Some have argued that rapid deregulation and liberalisation of the

financial markets, without the proper regulation and supervision increased the vulnerability of the SE Asian countries to economic crises through contagion (Furman and Stiglitz, 1998; Stiglitz, 2000; Glassman, 2001).

Among the 5 cases, Korea, Indonesia, and Thailand experienced more adverse effects compared to their neighbours, possibly from the failure of foreign creditors to roll over short-term loans (Furman and Stiglitz, 1998). Malaysia and the Philippines were the least affected countries (in economic terms) among the 5, partly due to being able to contain the crisis at an early stage through financial mechanisms (exchange rate, currency control, etc). An overview of the crises and their impacts, along with the state reaction to the 1997 crisis, and the developments in forests during and after the 1997 crisis is presented in Appendix 3.1.

Before 1997 all 5 countries had achieved decades of strong economic growth, but their development paths were different, with respect to both their economy and their forest regimes. Both Indonesia and Thailand based their development on exploitation of natural resources, protectionism through tariffs, cheap labour, courting foreign investment, and creating a favourable environment for export (Hill, 1996; Phongpaichit, 1996; Doner and Ramsay, 1999; Gellert, 2005). However, this development model was not viable in international markets. Similarly, after Korea's declaration that it would join the OECD in 1993, its financial markets underwent a fast opening without adequate preparations of its industrial and financial systems, which led Korea's economy to get exposed to the vulnerabilities and instabilities of the international financial markets (Lee, 1999). More details for all countries in Chapter 3.4.1.1.

All countries except for Malaysia agreed to a bailout deal with the IMF. However, the World Bank assisted Malaysia both before and during the 1997 financial crisis in terms of reforms, infrastructure development, and financial help (The World Bank, 1998; Baietti, 2002; Yusof and Bhattasali, 2008; World Bank, 2023). The IMF offered loans, accompanied with policy reform packages (SAPs), which promoted privatisation, fiscal austerity, deregulation, financial liberalisation, and freer trade in most cases, with different applications in each country. (e.g. duration, levels of austerity, privatisation of which assets, etc.), All countries returned to positive growth rates at most 3 years after 1997. Indonesia was the only country with large-scale significant (adverse) developments in forests during and after the 1997 crisis, mainly for

economic reasons, as deregulation in the palm oil sector led to forest clearing for oil palms. In the 4 other states, there were minor developments and although there were some pressures on forests during the period of the economic crisis, quantitative characteristics of forests, such as forest cover (Appendix 3.4), were not compromised as much.

Section 3.4.1.1 describes how each country had different socioeconomic and environmental environments and governance structures and mechanisms in place when the crisis hit them, and the role of the forest sector in each country both historically and at the time of the crisis in terms of economic, social, and environmental attributes, such as revenue generation, community participation, governance structure, and policy provisions for its sustainability. Section 3.4.1.2 focuses on the crisis recovery period (1997-2000), by looking at the role of IFIs in the crisis management processes and the SAPs that accompanied the bailout loans, as well as the coping mechanisms of the populations, both in regard to the forest regime.

3.4.1.1 Pre-crisis configurations of rules and actors

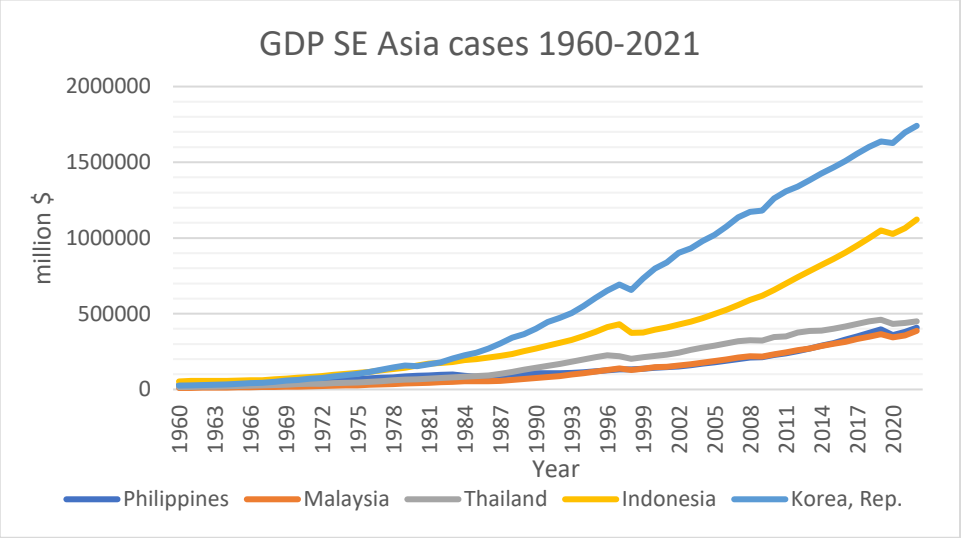
The direction that each country had taken with respect to their economic development and forest management until 1997 (including policies, governance structure, plans for future development, and mentality of the population) affected the level of resilience, adaptability, and development of both the economy and forest regimes during the economic crisis of 1997. In most countries past configurations in either environmental and/or economic governance (before 1997) affected how the financial crisis unfolded and how the forest governance was affected by the economic crisis, while the political environment also seems to have played a role to both economic and forest-related developments during the crisis.

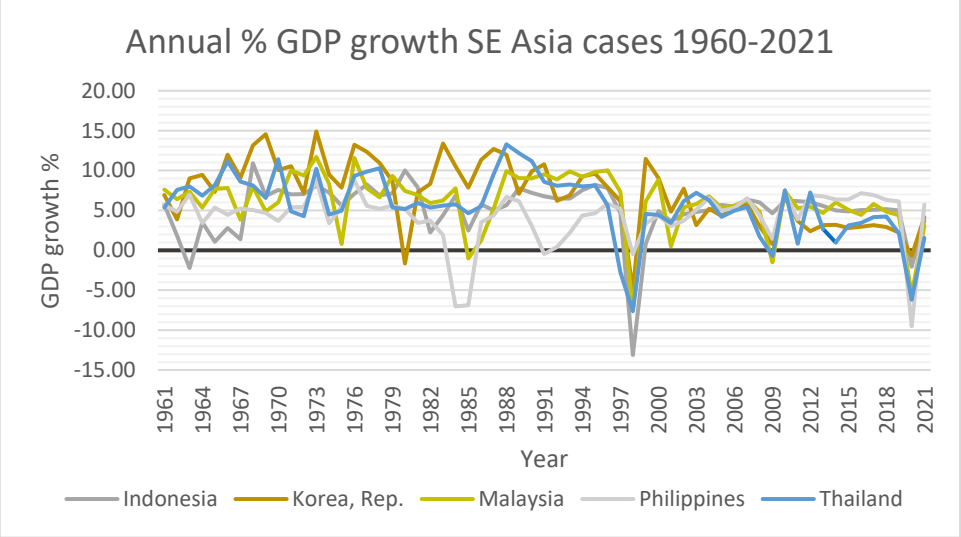
The retrospective economic and environmental governance context gives a very useful insight into the state of both the economic and forest regimes each country was in, when the crisis was manifested, which can also shed some light on the decisions taken during and after the crisis. Focus is given on to two main areas of developments prior to the 1997 financial crisis, which were found to play a role when it comes to the country's development during the financial crisis, namely (i) the past configurations of the economic governance, especially in terms of political stability, and whether the country had gone through other economic crises in the recent past, and (ii) the past configurations of the environmental governance, especially their transition away from unsustainable exploitation of forest resources.

3.4.1.1.1 Pre-crisis configurations of economic governance: Background, sound financial system, and prior crises

All 5 cases experienced economic growth in terms of GDP for years or even decades before the economic crisis of 1997. However, among the 5 states, Malaysia and the Philippines were in a better position with respect to their economic governance and political environment when the crisis hit, and were the least affected from the 1997 financial crisis. Figure 3.2 depicts the GDP and the annual GDP growth for all cases in SE Asia between 1961 and 2018, in order to highlight the constant levels of growth they experienced before 1997. figures for the unemployment and inequality rates for all cases are presented in Appendix 3.2 and 3.3.

Figure 3.2 GDP and GDP growth (%)in the selected SE Asia cases 1960-2021





GDP measured in constant 2015 US$

Data source: World Bank (World Bank, 2024)

First, both Malaysia and the Philippines had stable political environments. In Malaysia, Mahathir Mohamad who had been the longest-serving prime minister in the history of the country, was the prime minister during the period of the financial crisis (1981-2003) and despite political turbulences caused by his opponents, he retained the support of his government (Nesadurai, 2000; Noordin *et al.*, 2010). In the Philippines both president Corazon Aquino and president Fidel Ramos worked towards political stability in the previous years, due to the riddance of the earlier authoritarian dictatorship and the respective crony relations (Case, 1999).

On the other side, the political environment in Thailand, Korea, and Indonesia was more turbulent and unstable. Thailand had changed 9 different governments from 1988 to 1997, while its political system tended to lack cohesion and unity before 1997 (Punyaratabandhu, 1997). Korea's got rid of the authoritarian regime of the 5th republic only in 1987, and although 6th republic (1987-) was a lot more democratic to the previous authoritarian regime, there were still elements of corruption before 1997 (Kim, 1991). H. Lee (1999) and Kim (2000) support that the business elites had favourable relationships with the state, which resulted in their excessive overinvestment and risk taking, rising the external debt of the country, which in turn increased the external debt of the country, which was a major driver for the crisis. Finally, president Soeharto[16]'s authoritarian regime in Indonesia had faced a lot of criticism, focusing on the lack of transparency and equity, collusion, corruption and nepotism in civil bureaucracy, armed forces, and industry- especially in the forest sector (Barr, 1998; Gellert, 2005; Human Rights Watch, 2003), which may explain Indonesia's initial vulnerability and weakness to the financial contagion of the 1997 Asian crisis and later on the depth of the impacts of the crisis itself (Seymour *et al.*, 2000).

Secondly, Malaysia and the Philippines had dealt with significant economic crises and downturns soon before the 1997 crisis, and had relevant mechanisms in place to protect their economies. Malaysia faced the 'Commodity Shock' crisis during 1985-86, during which the state had to deal with painful adjustments to their macroeconomic imbalances, increased unemployment, a banking crisis (30% of non-performing loans), and a rising number of corporate bankcrupties (Athukorala, 2010). The Philippines had to face the most

[16] Soeharto or Suharto (this study uses Soeharto) was the second president of Indonesia (1968-1998)

severe economic crisis between 1984-6 and a recession between 1988 and 1991, while the country's government had also resorted to the IMF in 7 cases since 1980 for a loan deal, in order to either deal with an economic downturn, or ask for help towards its economic growth[17] (IMF, 2001). During and due to their past economic crises, Malaysia and the Philippines adopted a more conservative financial sector profile and undertook measures to strengthen their financial systems, such as prudent regulations in the banking sector that limited foreign bank lending and the exposure to short-term borrowing (Noland, 2000; Sundaram, 2006; Athukorala, 2010).

On the other hand, the financial and banking sysmens in Korea, Thailand, and Indonesia were not as insulated from external shocks. Thailand experienced positive GDP growth since 1961, Indonesia since 1964, and Korea since 1961 (with the exception of 1980 due to the coup d'etat), and had no first-hand experience in dealing with such events, nor similar provisions in place. Thailand and Indonesia relied on protectionism of national firms, creating a favourable environment for domestic actors and exports, but they were left vulnerable when they opened up their financial markets markets to foreign investors (Gillis, 1988; Worldbank, 1993; Phongpaichit, 1996; Wade, 1996; Doner and Ramsay, 1999; Gellert, 2005).

Furthermore, Thailand's absence of industrial upgrading during the boom period in the 70s and 80s combined with increased competition with other developing countries due to the rapid financial liberalisation in the late 90s contributed to loss of competitiveness in labour-intensive, export-oriented industries, which were crucial to Thailand's growth the mid-1980s to early 1990s (Doner and Ramsay, 1999). In addition, the excessive borrowing from the national private sector from foreign sources of money, financial instabilities caused by borrowing for long-term purposes on a short-term basis (Overholt, 1999), the deterioration of the quality of national financial institutions, rendering them effectively insolvent and the excessive support by the national central bank to ailing financial firms by issuing money (Chalamwong, 1998; Overholt, 1999) were the main reasons behind Thailand's financial crisis, where the 1997 crisis started.

[17] Stand By Arrangements: 1980-1, 1983-4, 1984-6, 1986-8, 1991-3; Extended Fund Facilities: 1989-91, 1994-7 (IMF, 2006)

Similarly, Korea's financial markets underwent a fast opening after the 1993 declaration that Korea would join the OECD, with its banks importing foreign capital, most if which was of short-term maturity (Lee, 1999; Kim, 2000). Korea had not adequately prepared its industrial and financial systems for the global economic integration, enabling structural susceptibility to the 1997 financial crisis (Kim, 2000). Its trade competitors, which were mainly southeastern Asian countries (Thailand, Indonesia, Malaysia, the Philippines) had devaluated their currencies due to the financial crises they had been facing, which resulted in loss of competitiveness (Kim, 2000), while it had to compete against China and Japan whose economy and trade was much larger (Lee 1999). The financial crises in other SE Asian countries also demotivated many investors and led them to revaluate their investments in the region and withdraw their funds and short-term loans to Korea (Lee 1999).

Even though Korea's 6th republic (1987-) is a lot more democratic than the previous authoritarian regime, there were still levels of corruption before 1997, as the business elites had favourable relationships with the government. The state used business conglomerates (chaebols) as the principal agents of capital and commodity exports (Kim, 1991), and they benefited from the state support, enabling them to overborrow from the financial system, while there were also hints of corruption and moral hazard in the regime (Lee 1999). This resulted in their excessive overinvestment and risk taking, which in turn increased the country's external debt, which was a major driver for the crisis (Lee, 1999; Kim, 2000).

3.4.1.1.2 Pre-crisis configurations of environmental governance & Transition from unsustainable exploitation of forest resources

Forests in these selected 5 states had a different role, different configurations in governance, and different levels of sustainability integrated in their governance. At the same time, forest governance and management had mainly been state-led all 5 cases, while all 5 cases suffered from deforestation or forest degradation in their early years of development, due to unsustainable exploitation of forest resources, which created additional social, political, and environmental problems. However, drivers related to economic growth were identified as causes of deforestation and forest degradation for all cases, especially in their early stages of their development [see (Boado, 1988; Solon and Floro, 1993; Sajise, 1998) for the Philippines, (Barr, 1998; Barber and Schweithelm, 2000; FWI/GFW, 2002; Tsujino *et al.*, 2016) for Indonesia, (Herzi and Alizan, 2015) for Malaysia, (Sadoff, 1995; World Bank, 1999b) for

Thailand]. While the same applies for Korea, the Korean war, the subsequent poverty, and unstable policy framework were also identified as drivers (Park and Youn, 2017). The transition away from unsustainable exploitation started taking place in previous decades for most cases and were combined with economic development plans and targets, except for Indonesia, which took place abruptly during the period of the 1997 financial crisis.

In most cases, sustainability provisions, regulations, and plans, which were adopted many years before the 1997 economic crisis, along with their proper enforcement played a crucial role in negating and mitigating potential adverse impacts to the forest sector during the 1997 economic crisis. The approach to transition away from the unsustainable exploitation of resources that each state adopted had direct impacts both on the economic contribution of the forest sector, and on the society itself, as in some cases, unsuitable transition led to conflicts among communities or even issues with subsistence. That being said, the levels of state support towards forest regime and forest sustainability in each case did not necessarily match the magnitude of the economic contribution of the forest sector to the overall economy, i.e. sustainable forest governance did not translate into high economic contribution of the sector, and high economic performance of the forest sector was not always accompanied with sustainable forest management.

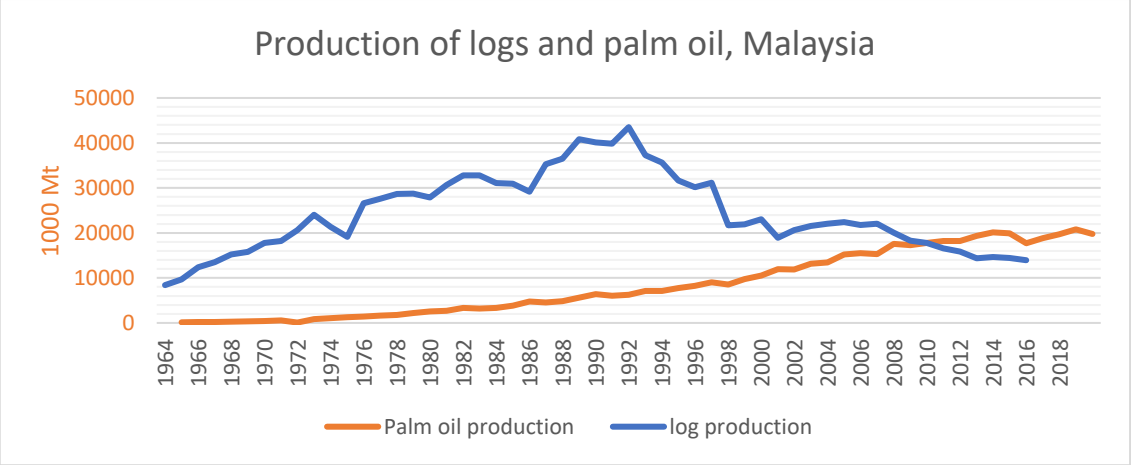
Briefly, the economic contribution and importance of the forest sector was low in Korea, Thailand, and the Philippines, and high in Malaysia and Indonesia (Lebedys and Li, 2014). On the other hand, state support towards forest sustainability (with respect to economic, environmental, and social values – not just economic) is deemed by this study as high in Korea and Malaysia, very low in Indonesia, and average (not very high nor very low) in Thailand and the Philippines. Forests have historically played an important role both financially and socially for Malaysia (Herzi and Alizan, 2015), the Philippines (Sajise, 1998), and Indonesia (Tsujino *et al.*, 2016), especially during their early development stages, but not so much for Thailand and Korea[18].

[18] In Thailand it is in the low levels of timber exports in the 1980s and 1990s (Appendix 3.13); Korea had invested in other sectors and had adopted an export-oriented economic strategy, due to the lack of natural (forest) resources in combination with the availability of a well-educated and cheap labour force (Yoo, 1997)

Malaysia relied heavily on the exploitation of forest and natural resources since its colonial days up until around the 1970s (Aiken and Leigh, 1992; Vincent, Ali and Chang, 1997) (Appendix 3.7). Malaysia adopted 5-year plans (Malaysian Plans) since 1966 & 10-year plans (Industrial Master Plans) since 1986 that set targets and priorities for the country's development, both of which played a role in Malaysia's direction of development, evolution of its economy, and transition from natural resources. Specifically with respect to forests, the rate of logging included in the 5-year management plans started decreasing from 366.000 ha annually in the

2nd plan (1971-5), to 318.000 ha/year in the 3rd one (1976-80), down to 152.148 in the 5th plan (1986-90) (Mohd 1988, as cited by Sani, 1993). Also, starting from as early as 1976, the third Malaysia Plan started taking into account and recognising the environment as a development component (PMOM, 2020). Palm oil was included as one of the sectors with potential for development in Malaysia's first Industrial Master Plan (1986--95), as oil palms have the highest average productivity compared to other major crops (Abdullah, 2011).

Figure 3.3 Palm oil and Log production in Malaysia, 1964-2019



Data sources: Data from Malaysian Palm Oil Board as referenced by Indexmundi (Indexmundi, 2020) *and log production data from* (Department of Statistics Malaysia, 2015). *The figure starts from 1964 in order to depict changes taking place after the adoption of the 1st Malaysian Plan in 1966*

The early outcomes of the 5- and 10- year plans were promising for both the economy and the environment: GDP growth reached almost double digits between 1988-1996 (Figure 3.2); the relatively high unemployment of the 1980s started to decline after 1986 (Appendix 3.2); after 1992 log production declined sharply as the country moved towards manufacturing and

services, while palm oil production was (and still is) considered a valuable resource with constant international demand and still follows an increasing trend (Woon and Norini, 2002)(Figure 3.3). Even though log production fell sharply, forest cover continued declining in the short- and medium- term until 2010, as both forest areas and agricultural areas were converted to palm oil plantations, with adverse environmental impacts (Yong, 2006; Koh and Wilcove, 2008; Wicke *et al.*, 2011). As suggested by Miyamoto *et al.* (2014), this reversed in the long-run (after 2010), since palm oil trade was profitable and helped with poverty alleviation, which in turn caused a decrease in deforestation (theory in Chapter 2.4.3).

Similarly in the Philippines, recovery from deforestation was mainly a state-led effort since the 1980s. The several decades of unsustainable exploitation of the forests, poorly designed and inconsistent reforestation policies, and lack of accountability and responsibility since the 1970s had an impact on the environment, the society, and economy, as millions of people depended on forests for a living, as well as the government that had to deal with these issues (Boado, 1988; Sajise, 1998; Durst *et al.*, 2001; Pulhin, 2002).

A series of efforts and policies to reverse the negative trend included several regulations being introduced to conserve the forests and include more individuals and communities in forest management (Victor, Lang and Bornemeier, 1997), the budget for reforestation increasing significantly (albeit still not able to cover all needs) (Boado, 1988). At the same time, there was a shift of the share of generally traditional exports, such as logs, coconuts, and sugar, with non-traditional exports, such as light manufactures, electronics and textile[19] (Victor, Lang and Bornemeier, 1997; Pulhin, 2002). In addition, since the 1987 constitution[20], the state was officially responsible for the full supervision and control, as well as the development, exploration, and utilization of natural resources (Article XII, Section 2). In 1990 the department of the Environment and Natural Resources completed the Master Plan for Forestry Development, which is a 25 year plan aiming to provide the framework for coordinated efforts in forest management and forest resource development (DENR, 1990). Later, in 1992, all logging in old growth forests was banned, aiming to shift the production of

[19] In 1970 traditional exports counted for more than 90% of the total exports, while non-traditional less than 10%, while in 1990 the respective ratio was approx. 20%-80% (Solon and Floro, 1993).

[20] In Philippines the state undertook the explicit provision for environmental protection in the 1987 Constitution, which stated that "the State shall protect and advance the right of the people to a balanced and healthful ecology in accord with the rhythm and harmony of nature" (Article II, Section 16).

wood and timber to residual forests (Sajise, 1998). As a result, the declining trend for forest cover seems to reverse in 1990, coinciding with the increase of state-led reforestation efforts (also in 2010) (Appendix 3.6). At the same time, the national production of logs and lumber drops significantly, while the trade of logs and lumber reverses from mainly exporting to mainly importing between 1988 and 1992 (Appendix 3.14).

Due to the great demand for fuelwood for cooking and heating by the public in the 1950s and 60s, the Korean government started taking reforestation and forest restoration seriously since the mid-1960s, by adopting and undertaking various forest programs and reforestation plans (Bae, Joo and Kim Yeon-Su., 2012; Park and Youn, 2017). For example, between 1967-1977, an area of 643.000 ha of fast-growing trees was established to cover the public's needs. Korea also invested in up-to-date forest related data, which start from as back as 1953 (and 1934 before the civil war) (Korea Forest Service, 2022). In addition, Korea adopted 10-year plans specifically for forests (National Forest Plans -NFP), which approached forests in a considerate manner and gradually shifted from rehabilitation of forests, reforestation, and development of new economic forest zones (1st NFP 1973-1982) to multifunctional sustainable forest management (SFM) and promotion of multiple environmental, social, and economic benefits after 1998 (4th NFP) (Lee and Lee, 1999; Park and Youn, 2013; Development Asia, 2018; Korea Forest Service, 2019a). Their NFPs were connected to their National Economic Development Plans and promoted the coordination of different bodies as well as providing economic incentives to the general public (Bae, Joo and Kim Yeon-Su., 2012). Even though Korea's forest cover seems to follow a declining trend, the growing stock of forests follows an upward trend since 1973 when the 1st NFP was adopted (Appendix 3.11). This empirically illustrates that forest area alone cannot explain the changes in forest conditions for sustainability. In addition, NFPs often promoted forest sustainability elements to the public. For example, Saemaul Undong, a community movement, was established as a consequence of the 1st NFP, which systematically promoted various aspects of SFM to the public, such as environmental education, environmental, economic, and social factors to improve living conditions through forests, as well as cultural transformation elements, and encouraging many local and civic communities to participate in tree planting and tree tending programs (Lee and Lee, 1999).

While industrial demand for timber (particularly teak) has been a persistent driver for deforestation since the late 19th century in Thailand, the major drivers for deforestation are linked to population growth, agricultural, and ownership policies (Lombardini-Riipinen, 1994; Pye, 2005). Although Thailand was the main exporter of teak in the early 20th century, the main beneficiaries from the increased exports were international (mainly European) companies and the state didn't really benefit from profitable exports. Even at its peak in the 1970s, the forest sector contributed only 2,5% to the country's GDP, while by 1990 its contribution had fallen to 0,2% (Sadoff, 1995). At the same time, the government had adopted an auxiliary role by controlling the forest regime through the Royal Forest Department (RFD) (Sadoff, 1995; Pragtong, 1998; Pye, 2005). Pye (2005) states that the state, through the army and RFD, has historically supported a more capitalist development of the forests, and international companies, often neglecting environmental and social values. For example, the boost in state-led plantations effort in the mid-1880s took place in order to resolve the issue of illegal settlers in deforested land, which obstructed economic investment from international companies, which was met by resistance from local communities (Pye, 2005). In addition, Pye (2005) supports that despite the lack of de jure authority, the public has a rather significant role in the country's forest governance, as many communities rely on forests for their subsistence, while many grassroot movements rose in the 1990s, inspired by the resistance to the RFD, the army, and the Khar Jar Kor project.

The turning point for deforestation in Thailand was a flood in southern Thailand in 1988 which led to the logging ban in 1989 after years of unsustainable exploitation. Although the logging ban managed to slow down and eventually reverse the deforestation trend (Appendix 3.5), the quality of standing forests continued to decline, which is more difficult to monitor and capture (World Bank, 1999b). At the same time, the logging ban also drastically changed conditions and incentives in the market (Sadoff, 1995): production and exports of timber products nosedived to 0 levels, which, in combination with the lift on certification of timber origin (Sadoff, 1995), also increased the imports of timber products, until 1997, when the economic crisis reduced economic activity (Appendix 3.13). Timber imports rose significantly (Appendix 3.13) in order to cover the gap that was left from domestic timber production and illegal logging activities increased (Mahannop, 2004). However, state efforts towards forest conservation did not take into account existing social values and practices,

which created distrust and tensions between local communities and authorities, while poor state control of fires, illegal logging, and clean water also raised conflicts among local communities (Hares, 2009). The turn of the state strategy to enhance public participation in forest governance started a couple of years before the financial crisis 1997 and manifested through the country's 8th Economic and Social Development Plan (1997-2001) and the decentralization processes that were supported by the new constitution (1997) (Poffenberger *et al.*, 2000). The new constitution specifically targeted natural resources regimes and human resource development, and encouraged the participation of local people and organisations in natural resource and forest management through various strategies (Pragtong, 1998; Poffenberger *et al.*, 2000; NESDC, 2020).

Finally, the forest regime in Indonesia under Soeharto was the only one among the selected cases, which had not taken any measures to halt or mitigate the adverse trends of deforestation and forest degradation that it faced in the past. On the contrary, it focused on an export-based forest sector so much, that Indonesia became the leading exporter of tropical timber by the late 1970s, which led many to label it a 'miracle' in terms of economic growth (Gillis, 1988). During his regime, the country's forest sector was the second biggest contributor to Indonesia's GNP, after the petroleum sector (Barr, 2001). The authoritarian regime focused mainly on the economic values of forests, while environmental and social values were often neglected for economic gains in favour of Soeharto's cronies, who controlled the regime and the timber sector.

During Soeharto's reign in Indonesia (1960s-1998), a big part of the country's forests were managed through concessions given to private or government owned firms, where a narrow band of politically well-connected enterprises and the army captured most of the benefits (Gellert, 2005). For example, the ban on log exports in 1984 was accompanied with incentives and subsidies to manufacturing, the combination of which increased the production of manufactured wood products, which still used domestic logs, without including provisions for forest protection, e.g. fire protection, for firms operating in forests, which later contributed to the vast forest fires in 1997 (Barr, 2001; Gellert, 2005). As a result, 5 years after the export ban on logs, Apkindo (Indonesian Wood Panel Association), who had very close ties with president Soeharto, controlled the market, in terms of prices, quantities and export destinations (Barr, 1998). Also, the overcapacity of the forest sector and related

industry sectors in the 1990s increased the incentives for illegal logging, clearing forests in unsustainable ways, such as forest fires, in order to change the production, all of which could push the price of forest resources even lower (Gellert, 2005).

3.4.1.2 The role of IFIs in the crisis management and the subsequent developments in the forest governance

International financial institutions, such as the IMF and the World Bank, had played an active role in the development paths of the selected cases in the region of SE Asia, both before and during the 1997 financial crisis. Each country had a different historical relationship with IFIs in terms of different policies being applied or enforced both before and during the 1997 crisis. Malaysia was the only country that didn't resort to a bailout deal with the IMF[21] during the 1997 crisis, but did consult with the World (World Bank, 2023).

During the 1997 economic crisis, the IMF focused on austerity policies in the public sector, usually combined with deregulation and privatisation of state property to combine both reducing the public spending and increasing the revenue through the sales of public assets (Fischer, 1998; Ramesh, 2009)(See Section 2.5, p.65-6). Many (Sachs, 1997; Lane *et al.*, 1999; Stiglitz, 2000, 2002; Furuoka *et al.*, 2012) criticised the ineffective policy approach of the IMF for the cases of SE Asia in 1997, on which the IMF used the same policy tools it used for the economic crises in Latin America in the 1980s, as the economies of the countries in the two regions had "virtually nothing in common" (Furman & Stiglitz, 1998, p.46). The careful design and fitness of the policies that were suggested or imposed by IFIs with respect to the existing policy framework seemed to have played a role in their smooth application and reaction from either the public or political opponents, i.e. the SAPs accompanying bailout agreements offered by IFIs seem to have had fewer adverse effects when the policies did not introduce very radical changes to the existing regime.

For example, the first package of reforms after Soeharto's resignation from the Worldbank and IMF was incomplete and inconsistent, while the conditions were described by specific

[21] Malaysia had never made any loan agreement deals with the IMF before the 1997 financial crisis and refused the economic assistance from the Fund during the crisis (IMF, 2012a). However, a few months after the crisis affected Malaysia, the government initially adopted measures similar to the IMF's standard package of policies, such as tighter fiscal and monetary policy, austerity measures, and delaying infrastructure projects, which they reversed a few months later (Sundaram, 2006).

measures rather than goals, often together with unrealistic deadlines, and sometimes lacked understanding of the Indonesian policy making processes and their forest management regime (Seymour *et al.*, 2000). Gellert (2005) also argues that there could have been a better outcome in the Indonesian forestry reform, if the lenders did not "rely only on direct pressure at a moment when Indonesia's economy was on its knees" (Gellert, 2005, p.1353). Au contraire, many policies accompanying the 1997 loan agreement to the Philippines were quite similar in nature compared to the existing regime and in line with the existing direction, e.g. decentralization efforts (Zanini, 1999; Noland, 2000). This can be attributed to the fact that the Philippines were consulting with the IMF for many years prior to the economic crisis[22], gradually transforming from a centralised state-led industry-focused regime before the 1970s to a more decentralised and participatory one in the 2000s (IMF, 2006). The small magnitude of the 1997 crisis in the country that didn't necessitate any major changes in governance was another factor enhancing the fitness of the proposed policies.

While some policies that were included in the SAPs did bring positive developments in the forest governance regimes, in some cases governments had to reverse the policies, in order to mitigate their adverse effects, restore confidence in the markets, and reduce the political cost, especially from austerity and privatization policies (Knowles, Pernia and Racelis, 1999; Lane *et al.*, 1999; Lee, 1999, 2001; Kim, 2000; Hewison, 2005). Overall, the main effects on the forest regimes from the involvement of IFIs in the crisis management process in most cases seems to be linked to decentralisation of authority and responsibility in forests through (i) adjustments in existing regulation, (ii) a decrease in funding from forest-related authorities through austerity policies in the public sector, as all selected cases relied on a state-led forest governance regime before the 1997 crisis, and (iii) new privatisation policies.

3.4.1.2.1 Changes in the existing regulatory framework and deregulation

Seymour and Dubash (2000) argue that while international financial institutions can be an effective part in promoting forest policy reforms through adjustment lending, this requires the right conditions for both the borrower and the bank, which was more apparent in the case of Indonesia, where policy framework restructuring was considered necessary to get rid

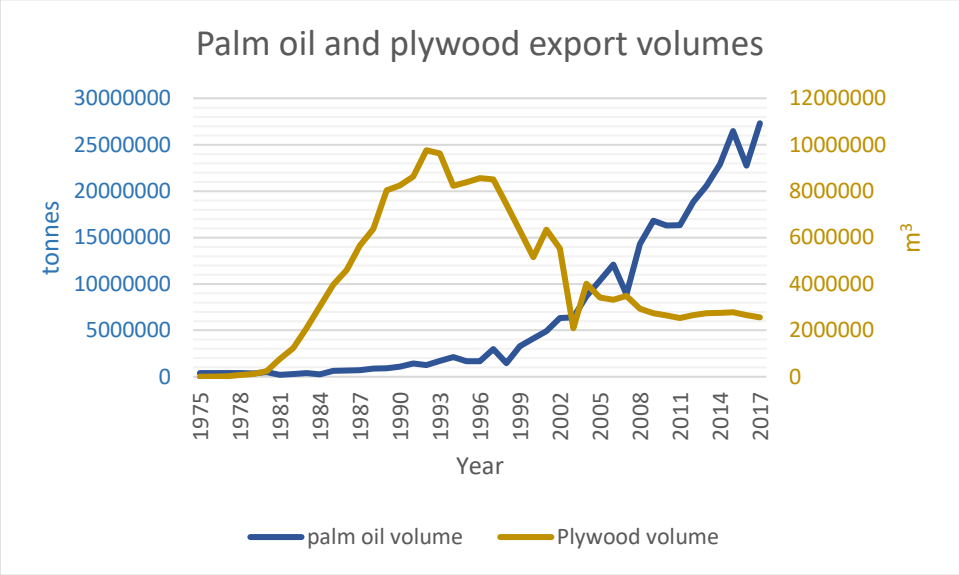
[22] 23 loan deals with the IMF alone between 1965 and 2005 (IMF 2006). During all three of the country's economic crises and recessions (1983-5, 1988-91, and 1997), the respective governments resorted to either the IMF or the World Bank for loan packages that were accompanied by SAPs.

of Soeharto's policy framework which favoured his cronies and national conglomerates, especially in the forest regime, where they had control of the timber market, i.e. prices, exports, industry (William D. Sunderlin, 1999; Barr *et al.*, 2010). In detail, efforts from both the IMF and the Worldbank to empower local actors in local forest regimes in Indonesia was crucial, particularly through pushing the government for increased transparency with respect to disclosing information about reform processes, and stimulating meaningful participations from local actors in the reform processes (Seymour *et al.*, 2000). Policies included the ending of the monopoly of Apkindo (the Indonesian Wood Panel Association), freeing the export market and replacing the export taxes on logs and other taxes on timber with a resource rent tax, and rationalizing the Reforestation fund and auctioning permits (McCarthy, 2000).

However, the rework of the environmental policy framework led to a vast increase in palm oil plantations in forest areas, especially since the late 1990s (Appendix 3.10), while large-scale plantations and particularly oil palm plantations have since established themselves as one of the principal agent of deforestation in the country (Holmes, 2002; Gellert, 2005; Greenpeace, 2013). Although Indonesia was not a major exporter of palm oil before the 1997 crisis and the subsequent deregulation and trade liberation, by 2006 it had increased its exports by more than 700% and in the same year Indonesia overtook Malaysia's palm oil production to become the world's largest palm oil producer due to the country's land expansion policies (Abdullah, 2011). By 2011 Malaysia and Indonesia together produced and offered 85% of the global supply of palm oil worldwide (ibid.). Vijay *et al.* (2016) also confirmed that palm oil plantations have been a major driver for deforestation in the whole SE Asia region, as 45% of the oil palm plantations in the region came from areas that were forests in 1989.

In Figure 3.4 below, plywood exports, which accounted for 79% of the world supply in the late 1980s (Adam, 2008), show a declining trajectory since 1993. Palm oil exports follow the opposite trajectory starting to increase in 1997, after the application of deregulation and privatisation reforms in the forest and oil palm sectors. Palm oil exports increased 65% in a decade from 1988 to 1998, while after removing the restrictions in investments in the palm oil sector and trade, it had a steep increase up to 14,290,686 tons in 2008 (866% increase since 1998), and 27,308,509 tons in 2017 (91% increase since 2008 and 1746% since 1998) (FAO, 2023).

Figure 3.4 Palm oil and plywood exports development in Indonesia 1975-2017



Sources: Data from FAO (2023)

In Thailand and the Philippines, changes in regulation enabled enhanced participation of local people, communities, and organisations in natural resource and forest management, (Poffenberger *et al.*, 2000; Forest Management Bureau, 2009). In the case of Thailand, deregulation policies in the SAP were combined with decentralisation efforts, which also supported the constitution of 1997 and the 8th development Plan (1997-2001) (Hewison, 2005), and it enabled local authorities to become more autonomous and self-governed in terms of policy, personnel, and financial administration, with the state however remaining responsible for their supervision (Jumbala, 1998). In the Philippines changes in environmental regulation facilitated permits to cut and transport trees for private plantations (Forest Management Bureau, 2009), limited the bureaucracy in private plantations regimes, and contributed gradually to a more decentralised governance, both in forest governance and generally (Victor, Lang and Bornemeier, 1997; IMF, 2001).

Malaysia did not consult with the IMF, but did get help from the World Bank during the 1997 financial shock, with respect to reforms, infrastructure development, and financial help (The World Bank, 1998; Baietti, 2002; Yusof and Bhattasali, 2008; World Bank, 2023). Malaysia introduced new environmental and forest-specific policies and mechanisms in order to fortify and develop their forest and wider environmental regimes. Some such examples include the adoption of the Sustainable Forest Management License Agreement in 1997, regarding the

harvest and rehabilitation of forests using SFM practices in a certain forest reserve; the National Policy on Biodiversity in 1998, regarding the conservation of flora and fauna "in a sustainable manner for the continued progress and socio-economic development of the nation" (MOSTE, 1998, p.1); and the creation of the MTCC in 1998, as an independent certifying and accrediting body for forests (Woon and Norini, 2002).

In Korea deregulation did not affect the forest regime as much, as it focused mostly on the restructuring of the banking sector, by removing all restrictions on foreign borrowing for domestic firms, and the labour market reforms that aimed to make Korea's labour market more flexible (Kim, 2000), and not directly to the forest regime. The subsequent rise in the unemployment rate, which more than doubled in a year, was a serious social problem since the country's safety net was not adequate for the unemployed (Kim, 2000). The increased unemployment in turn created substantial change to social disparities and deteriorated social inequality levels, which increased the state's budget towards enhancing the social safety net and unemployment-related expenditures the following years (Cheong, 2001; Lim and Han, 2003; Kalinowski, 2008).

3.4.1.2.2 Austerity in public finances

Different degrees of austerity policies were adopted in all 4 cases where the IMF was involved during the period of the 1997 crisis with mixed results. Positive outcomes have come out of rationalising budgets of corrupt state authorities and actors. At the same time, funding towards environmental and forest protection and conservation were affected, as the forest regimes in focus were state-led and many forest-related bodies and policies such as reforestation programmes, forest-related education, or training, relied on state funding. Most governments reversed the austerity policies later, in order to support the domestic market and reduce the political cost, or because of a switch in the governments.

In Indonesia the budget of the Reforestation Fund was rationalised and consolidated in the national budget along with the scheme for auctioning permits (William D Sunderlin, 1999; Gellert, 2005), as it was perceived as a source of corruption (Barr, 1998; Barr *et al.*, 2010). In addition the funding for many forest-related authorities was decreased, causing practical issues in the regime, especially when the country dealt with forest fires (Barber and Schweithelm, 2000). Similarly in Thailand, expenditures on environment-related activities

(Pagiola, 2001) and plantation development declined sharply after 1997 (except for rubber plantations), due to both cut in public funding to the RFD, which was the main government engine of forest plantations, and reduced financial incentives to private investors (Pragtong, 1998; World Bank, 1999b; Mahannop, 2004). At the same time there is anecdotal evidence that forest protection was not affected (Pagiola 2001, p.23). Thailand reversed from austerity to procyclical policies in 1999, in order to support the domestic market (Paitoonpong, 2001).

Korea also adopted austerity measures, affecting its government expenditures on environmental programmes (Knowles, Pernia and Pernia, 1999), but the new president and government quickly turned to Keynesian policies in 1998 to stimulate domestic demand (Kim, 2000). The country initiated a large-scale public labour-intensive project through the 4th Korean National Forest Plant, which included the planting of 200.000 ha, thinning of 730.000 ha, and tending of 930.000 ha in a decade (Development Asia, 2018).The 4th NFP started in 1998 aimed to transition the national forest policy from "mainly focusing economic functions to enhancing overall forest benefits including public and recreational benefit" (Korea Forest Service, 2019b). In addition, the handling of the financial crisis in Korea proved to be useful for the state to break the ties between the political parties and the chaebols (Pempel, 1999); despite the large number of corporate bankruptcies in 1997, including 7 of the top 30 chaebols which faced insolvency (Lee, 1999), the government did not offer any financial help, due to the large amount of debt and the restructuring of the financial sector which was mandated by the IMF.

There were no large public funding cuts during the 1997 crisis in the Philippines, as the IMF had been assisting the country since the 1960s, and the country's (continuous) previous agreements with the IMF had not allowed any space for large public spending. Imposed austerity may have played a role in the lack of government funding to different forest-related programmes, such as reforestation efforts, which burdened their development both during the 1997 economic crisis and in the past (Boado, 1988; Sajise, 1998; Pulhin, 2002).

Finally, the Malaysian government initially adopted austerity in the public sector and delayed the construction of several infrastructure projects (Noordin *et al.*, 2010), but they quickly reversed the austerity policies in July 1998 (Lim and Goh, 2015). The short-term application of the austerity policies were not reported to have direct effects on the forest-related

authorities or industry (Ariff and Abubakar, 1999; Nesadurai, 2000; Hasan, 2002; Yong, 2006), possibly due to the adoption of the 2nd Industrial Master Plan (1996-2005) and its provisions for the development of the forest and agricultural sectors (Woon and Norini, 2002).

3.4.1.2.3 Privatisation

The goals of privatisation and deregulation policies were to limit the state's ability for interventions in the economy and to insulate officials and technocrats from cronyism and vested interests in the economy (Hewison, 2005). Although privatisation efforts took place in all case where the IMF was involved, Indonesia was the only case that had direct impacts on its forest regime from privatisation.

In Indonesia privatisation intended to eliminate the corruption from Soeharto's regime in the forest sector and in general. To help with the privatisation process, in 1999 the State Minister for the Empowerment of State Enterprises announced a plan to merge the country's 159 state companies into 10 holding companies, with the state's 14 forest plantation firms consolidating into 1 (Casson, 2000). In 1999 the Indonesian Bank Restructuring Agency was created with a 5 year mandate to revitalise the country's banking sector and ailing banks as well as heavily indebted wood industries came under its control (Barr, 2001; Gellert, 2005). Despite the government's commitment to close forestry companies because of overcapacity, the Indonesian Bank Restructuring Agency planned to sell most forestry assets by the end of its mandate, at approx. 15-20% of their value (Gellert, 2005).

Privatisation policies for non-forest related state firms caused unrest and disputes and were greatly opposed by the society in Thailand (Overholt, 1999). With respect to the forest regime, there were many stakeholders of the private sector who advocated for tenure security similar to private ownership, or even complete privatization of state forest lands, as the 25+25 years tenure was considered insufficient for long-term investment, but the proposed policies did not finally pass (Enters and Durst, 2004).

In the Philippines, Korea, and Malaysia, there were not any reported direct impacts on the forest regime from privatisation. In the Philippines privatisation policies were active and scheduled both during and before the 1997 crisis from both the Aquino and Ramos administrations, but still received criticism from some parts of the population and NGOs (Bautista and Lamberte, 1996). Privatising state property, land, and firms reduced the

country's borrowing requirements, as well as the overall interest rates from their loans (Castro, 2007). In Korea, the downsizing of the government took place through the privatisation of 109 state-owned firms, 24 of which were not financial firms (Lee, 1999), which has reportedly undermined the state capacity and restricted a proactive and developmental role of the state (Lim and Han, 2003; Kalinowski, 2008). On the other hand, the government in Malaysia, which did not consult with the IMF, suspended the active privatization programme, which was already in place since the beginning of the 1990s, when the crisis hit the country until December 1997, thereby postponing the approval of proposed ventures worth RM90 billion (Nesadurai, 2000).

3.4.1.3 Coping mechanisms of the population

In periods of economic crisis changes in economic conditions, policies, and governance may affect certain groups of the population, which will try to find new mechanisms to cope with the new reality and provide for themselves and their families. While the coping mechanisms of the population may be unpredictable in periods of economic crises and depend on the magnitude of the economic crisis and the living conditions of the population. In cases where community livelihoods rely on forests for subsistence, forests may receive additional pressure, but government plans may have the potential to reduce adverse impacts of certain coping mechanisms on forests. How these changes and coping mechanisms can affect forests depends on a number of parameters. Some of them include other policies in place to protect these vulnerable groups (e.g. unemployment or housing benefits) or the forests (logging ban), available opportunities in the forest or agricultural sectors to provide for subsistence or jobs, as well as potential conflicts that may arise. The lack of effective governance and adequate protection to the poor has the potential to create unrest to the population and uncontrolled developments in periods of economic crisis.

For example, even though Malaysia was not severely affected by the economic crisis, and it also had active provisions both for forest protection and conservation and the economy, there was still deterioration in socioeconomic conditions. The poor were not as affected as in other countries, because Malaysia increased public spending to protect vulnerable groups, so the changes in their consumption habits and coping mechanisms did not add any significant pressure on forests (Ramesh, 2009).

Similarly**,** Korea used its social and environmental policy to mitigate some of the effects of the crisis onto the society, without compromising forest sustainability. The crisis hit the society hard, increasing the unemployment rate more than 200% compared to the previous year, while poorer groups were harder, which worsened income equality (Knowles, Pernia and Racelis, 1999). The government however, expanded its welfare state through a series of reforms due to the impacts of the crisis on unemployment, income inequality, and healthcare "beyond the functional minima necessary to cope with social problems caused" (Kwon, 2004, p.19). There was no reported migration to forest areas nor increase of illegal logging due to the 1997 crisis. The state through the 3rd (1988-1997) and 4th (1998-2007) NFPs created formal employment opportunities in forest areas and rural areas, such as forest mechanization, education for foresters and forestry workers, forestry income enhancement projects and public awareness-raising programmes (Korea Forest Service, 2019a), as well as through large-scale public projects such as tending, planting, and thinning of forests in 10-year periods (Development Asia, 2018).

On the other hand, in Thailand the lack of adequate safety nets for the poor and most vulnerable to the crisis led to migration from urban centres to rural areas for subsistence or trade, which added some pressure to the forests pushed many to leave urban centres to move to the countryside, many of which started to occupy land close to or even within state forests and increased the collection of forest products to cover their subsistence needs (Tangprasert and Ratchasima, 1999; Pagiola, 2001). In turn, Markou and Lasote (2015) and Hewison (2005) claim that the dissatisfaction of the public with the crisis management direction and policies was translated into the populist neo-nationalistic party Thai Rak Thai winning the 2001 elections. Pye (2005) and Taw (2007) mention that once they got to power, the prime minister used claims regarding deforestation to promote the nationalist narrative of the refugees from Burma being responsible for destroying forests, enabling him to relocate them and even suspend new refugee admissions, and create tensions in the forest governance regime.

While social conditions, such as health, education, income inequality, and nutrition in the Philippines had already been poorer relative to the other SE Asian countries prior to the crisis, the crisis induced increased poverty and unemployment further, caused a sharp drop

in education enrolment[23], and led many of the pool unable to protect their consumption, which created the potential to hinder the country's long-term sustained growth through a reduction in human capital formation and deterioration of living conditions necessary for productivity (Alburo, 1999; Datt and Hoogeveen, 1999). The increasing number of poor people, who mainly lived in rural areas, increased pressure on forests, as the poor relied on them to cover their subsistence needs (Durst *et al.*, 2001; Cagalanan, 2015). Cagalanan (2015) suggests that support for education as well as other opportunities for an off-farm livelihood, might further benefit both landholding and landless households and potentially reduce pressures on the forest.

The financial crisis in Indonesia led to unrest in local communities, displacement of communities, and increased land clearing (Barber, 2002). The conflicts were created in local societies and forest stakeholders due to both the impacts of the economic crisis and the change in the political regime (e.g. displacement of communities, increased land clearing). These conflicts were left unchecked, as they could no longer be supressed by the army, which after a while became an internal security threat for the country, which in turn weakened the state's capacity to reform forest policy (Barber, 2002). Despite the conflicts, some reforms were advocated and introduced by various stakeholders of the Indonesia's forests, such as NGOs' campaigns to ensure the rights of traditional forest communities and to improve community-based forest management, and former minister of forestry Muslimin did try to ratify a new forestry law and allocate concessions to cooperatives (William D Sunderlin, 1999).

3.4.2 The 2009 European periphery financial crisis

The 2009 European periphery financial crisis has its origins in the 2007–2008 global financial crisis, which started in the United States of America and quickly transmitted to other countries. Many reports have highlighted the dependence of the European banks on US money markets, as well as high levels of exposure of many major European banks (mainly German, French, Swiss, Dutch, and from the UK) to the US market losses in asset-backed securities (Acharya and Schnabl, 2009; Song Shin, 2011; Mcguire and Von Peter, 2012). Most

[23] The exact impact is not clear due to lack of data of drop-outs after 1998 (Paitoonpong, 2001)

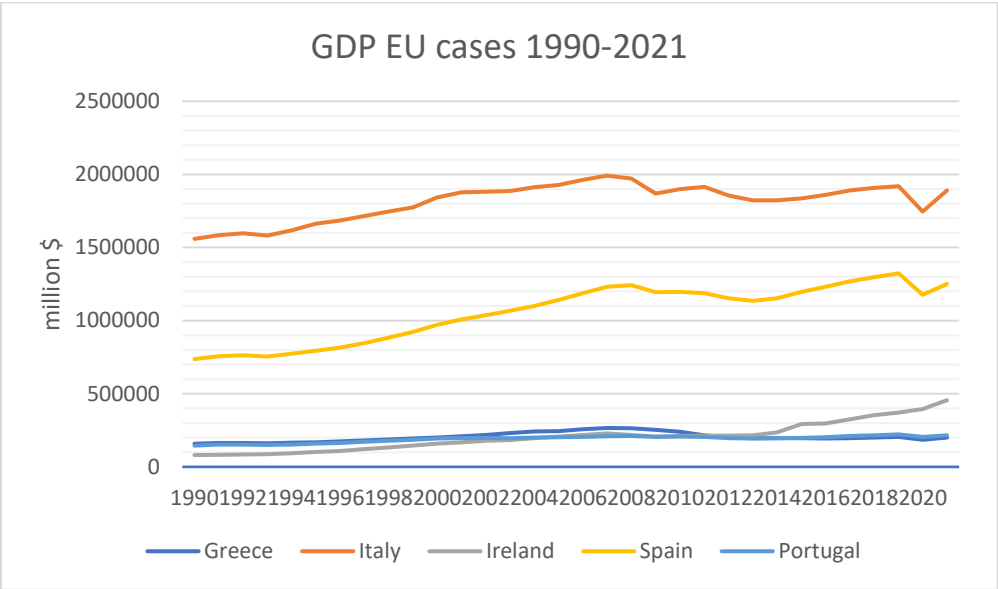
EU countries were affected by that crisis during 2008 and 2009, while the recession accompanying the crisis was much more severe in the EU than in the US (Tomczak, 2023).

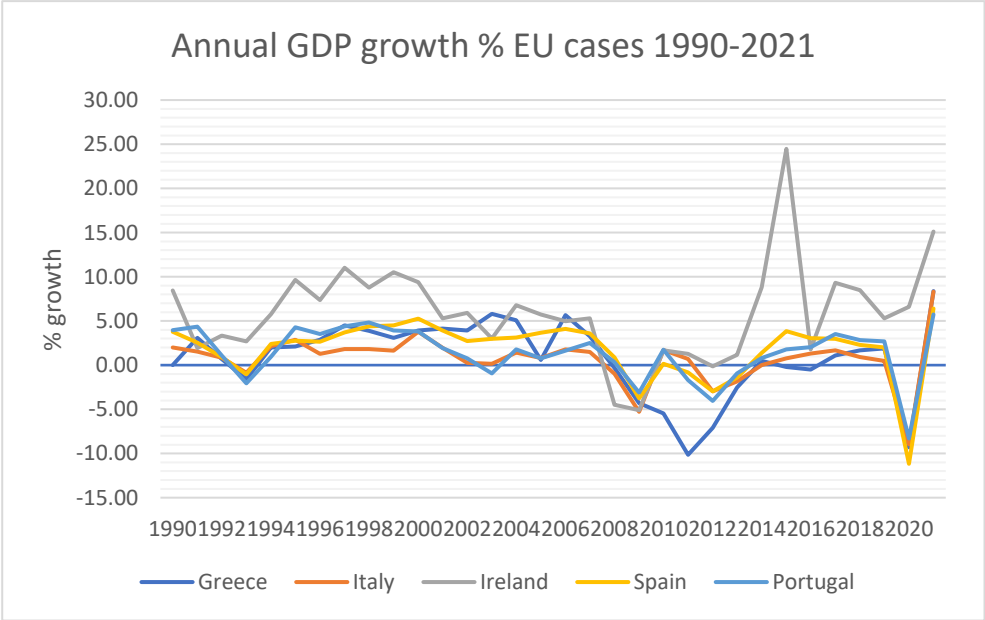
National and international environmental and natural resource policies in the EU were also been affected by economic crises, and specifically policies adopted during the recovery period. Skovgaard (2014) claims that during 2009-2011 the economic crisis in the EU played an important role in deepening divisions among EU members, with respect to how climate and environmental policy is framed and discussed, i.e. away from environmental targets to mainly economic ones. Similarly, Gravey and Jordan (2016) and Steinebach and Knill (2017) discuss how since the 2009 economic crisis, there have been some indications that the EU environmental policy ambition is stagnating or even reversing.

On the other hand, Burns and Tobin (2016) carefully argue that even though the number and content of environmental policies can capture potential adverse effects and the relative importance of environmental policy on the wider political agenda, such outputs alone cannot capture the mentality or ambition of the decision makers. They did note that environmental issues are possibly not going to be addressed effectively, in cases where environmental protection is rolled back or remains static, in combination with conflicts or shocks in the economy. Similarly, Gravey and Jordan (2016) and Jordan, Bauer, and Green-Pedersen (2013) argue that budget cuts may directly affect the density or intensity of environmental regulation adversely, for example through added pressure to reduce or remove public policies.

This section focuses on the five EU periphery states that have been identified to have suffered the most in the region according to relevant literature, i.e. Greece, Italy, Portugal, Spain, and Ireland (BBC News, 2010; Quiggin, 2010; Lane, 2012; Zamora-Kapoor and Coller, 2014; Alessi and McBride, 2015; Takagi, 2016; Dooley, 2019). While all 5 countries had steady economic growth for many years before 2007 in terms of GDP growth, some link their pre-2007 growth with characteristics, such as high risk investment, large external deficits, excessive economic specialisation, environmental unsustainability, and social polarisation (Gros, 2012; Lane, 2012; Méndez, 2015; Quaglia and Royo, 2015; Pérez, González and Mantiñán, 2016).

Figure 3.5 GDP and GDP growth (%) (1990-2021) in the selected EU cases





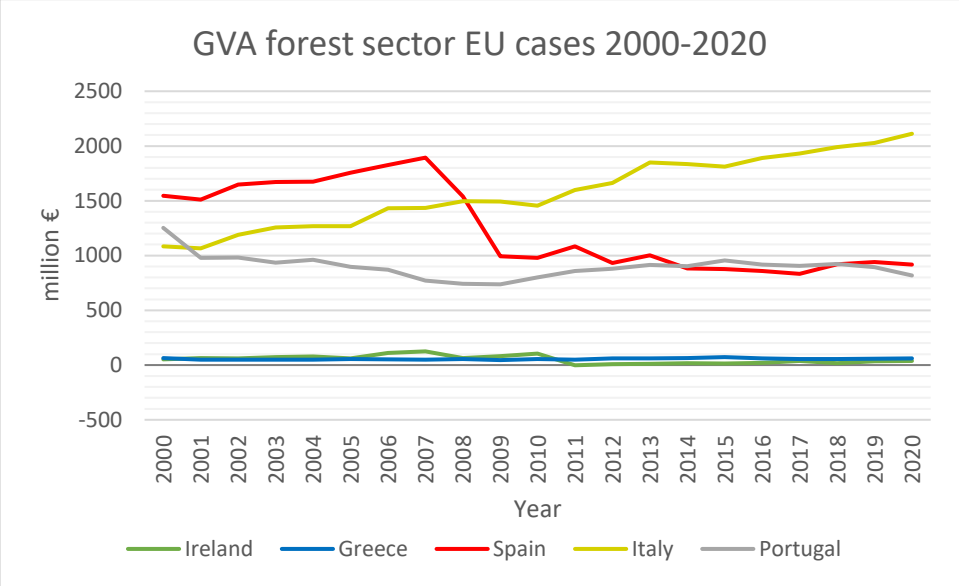
GDP measured in constant 2015 US$

Data source: World Bank Open Data (World Bank, 2024)

Section 3.4.2.1 refers to the pre-crisis forest governance configurations in each separate country, while also acknowledging the common EU policy framework. Section 3.4.2.2 describes the role of the troika of lenders, along with the 3 sets of policies that they suggested with respect to the 2009 European crisis, i.e., rework in the existing regulation; austerity of public finances; and privatization policies (Kousis, 2013; Diani and Kousis, 2014; Pedroso, 2014; Leschke, Theodoropoulou and Watt, 2015; Sacchi and Roh, 2016; Calvário, Velegrakis and Kaika, 2017).

After the crisis was manifested, for most years between 2008 and 2014, the GDP growth of the 5 EU member states was negative and only started to stabilise for some of them after 2014 (Figure 3.5). The political environment changed drastically, as national governments in all 5 EU cases faced the disapproval of their voters and were voted out of office in 2011, adding to the fragility of the political stability that accompanied that beginning of the 2008 crisis. In terms of social outcomes, unemployment increased more than double in all countries in the same period, from single digits percentages to as high as 27.5% and 26.1% in Greece and Spain respectively in 2013 (Appendix 3.15). The rate of severe material deprivation also increased in all cases, while the Income inequality also increased for every case except for Portugal (Appendix 3.16, Appendix 3.17).

Figure 3.6 Forest sector GVA EU cases 2000-2020



Source: (Eurostat, 2023)

The developments in the forest regimes in the 5 EU states during the 2008 economic crisis were not homogenous, but can offer an insight to the direction of forest governance in each case. For example, in Italy, Greece, and Spain there was restructuring of the forest services, accompanied with deregulation, in order to reduce public expenses or attract economic investment from the private sector. On the other hand, in Ireland and Portugal more regulations were introduced towards safeguarding the forests, in order to support the forests' sustainability in line with their long-term development plans.

The effect of the 2009 on the forest industries of the selected cases had mixed outcomes (Figure 3.6). Italy, Portugal, and Spain have been above the EU's average in terms of GVA of the forestry industry since the early 2000s, while Greece and Ireland have been at the bottom (Eurostat, 2023). Spain experienced a huge drop in terms of GVA (Gross Value Added) due to the drop in the domestic demand from the construction sector, Italy experienced a minor setback in 2010, while Portugal's GVA followed a decreasing trend for up to 2009 and then started increasing. Ireland also experienced a small decline for a few years after 2010 (also due to links of their industry with the construction sector), while Greece's GVA remained stable in minimal figures.

Industry sectors that affect the demand of forest and timber products, such as the construction, furniture, and paper industries faced serious setbacks during the crisis (Eurostat, 2022) (Also Appendix 3.22, Appendix 3.23). Building construction decreased sharply in all 5 cases and still haven't recovered to the pre-crisis levels (Appendix 3.21). On top of that, the economic crisis in Spain and Ireland was linked to the burst of property bubbles, which added to the initial crisis effects (Drudy and Collins, 2011; Fraser, Murphy and Kelly, 2013; Royo, 2020). In Spain the timber sector's turnover decreased from € 21 billion in 2005 to only € 14 billion in 2011 (35% decrease), the related employment also decreased by 30,000 jobs, while the exports also declined in the same period (Pérez, 2012; Eurostat, 2023), while in Ireland things were not as severe due to the already small contribution of the forest sector before the crisis.

The Portuguese forest industry also experienced turbulences in both production and trade of different forest products (Eurostat, 2023), due to drop in demand (both domestic and international, as many EU states/trade partners were also affected by the crisis) and changes in the prices of many wood products (Bol, 2017). However, due to the existence of some of the largest companies in the international market with multiple existing channels of distribution based in Portugal[24] the long-term impact on the industry wasn't huge (Bol, 2017; MITECO, 2018; Munnion, 2020).

[24] Some examples include The Navigator Company in paper market; Sonae Indústria, in wood-based panels; Amorim, in cork production.

Employment in all countries regarding the 3 main manufacturing sectors of wood and timber[25] decreased both in the short and long term up to 2014; paper and paper products for Spain and Portugal were the only categories that increased slightly after 2014 (Eurostat, 2023). Employment in logging and forestry remained more or less the same for all cases with different levels of fluctuation (Eurostat, 2023) (Appendix 3.20).

3.4.2.1 Pre-crisis configurations of rules and actors

3.4.2.1.1 Separate countries

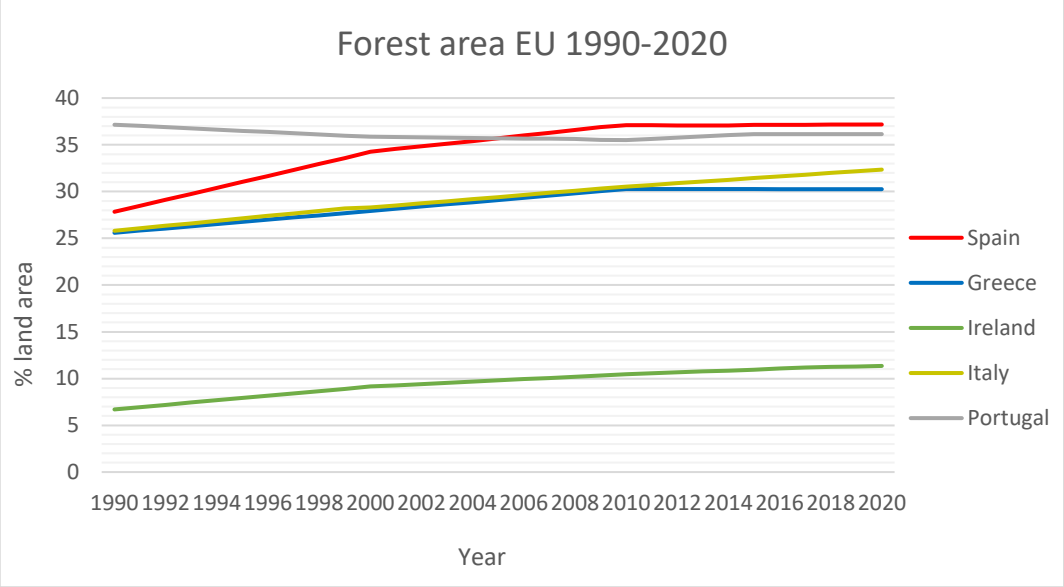
Historical, economic, social, and environmental reasons have played a role in the development of forests and forestry sector in the countries' early development. For instance, Mediterranean countries were deforested at the start of the 20th century, due to their political, social and military histories being linked with habitat destruction and deforestation (Perlin, 1999; Valbuena-Carabaña *et al.*, 2010; Dasarxeio, 2014). Forest cover regeneration started to take place since the 1960s for Spain and Portugal, mainly through government activity and due to the abandonment of agricultural and livestock activity (Pérez and De Linares, 2019). The use of forests and forest products has developed drastically in the past decades in Mediterranean nations, in line with the economic development of the countries. For example, up to the 3rd quarter of the 20th century some forest products were essential for many households, as firewood and charcoal that were the main domestic fuels (Thirgood, 1981; Barbero *et al.*, 1990), while recently other sources of fuel have been more favourable and popular (Eurostat, 2020).

Figure 3.7 depicts the recent trends in forest cover for the 5 selected EU cases. In detail, forest cover follows an increasing trend for most countries since 1990, with the only exception being Portugal, which follows a declining trend. Although quantitative data for the forests and forest sectors for the selected EU cases can adequately describe certain developments, complementary qualitative data are equally as important to better illuminate the development of the forest governance regime in each case more accurately. For example, despite the declining trend in forest cover, the forest sector is considered relatively important to Portugal, as more than half of Portuguese forests are designated for production purposes

[25] (i) Manufacture of wood and of products of wood and cork (except furniture), (ii) manufacture of paper and paper products, and (iii) manufacture of furniture

(Forest Europe, 2011) and has the highest forest industry GVA/ha of forest land in the EU (Banco Espirito Santo, 2014, p.2), which also justifies the declining trend of the forest cover. Forestry has played an important role in the Portuguese economy for many years and their forest strategy was formulated together with the most influential forest regulations and policies between the late 1990s and mid-2000s[26]. Their national forest inventory is updated approximately every 10 years (starting in 1965) and considered a cornerstone for national forest policy, which helps with the design of quantitative targets and the monitoring of the transformation of the forest regime (Uva, 2019).

Figure 3.7 Forest cover as % of land cover in the EU cases 1990-2020



Data source: World Bank Open Data (World Bank, 2024)

The geographic conditions in Portugal (high rainfall, temperature, growing season) lead to high potential wood productivity, which allows for high financial profits for forest owners (Reboredo, 2014). 93% of forests are privately owned, with regional differences between the north and the south; in the south there are mainly organised large scale properties, while in the north there many smallholders with a very incomplete cadastre (Feliciano *et al.*, 2015). Despite the very high percentage of private forest land owners, stakeholder participation in

[26] The *Forest Policy Law* (33/96), the Sustainable Development Plan for the Portuguese Forest in 1998, the Portuguese Forest Sustainable Development Plan in 1999, the Forest Sector Structural Reform in 2003, including the Agency for the Prevention of Forest Fires within the Ministry of Agriculture, and enacting the Permanent Forest Fund, which was created by the Forest Policy Law in 1996, but was not enacted until 2003, the Permanent Forest Fund (Law no. 63/2004), and the adoption of the *National Forest Strategy in 2006* (UN, 2000; DGRF, 2006; Mendes, 2006; Branco and Ferreira, 2012; Feliciano *et al.*, 2015; Valente *et al.*, 2015)

forest-related decision-making processes has been very limited, because policy-making in Portugal has been within the domain of the forest public authorities, while large-scale forest owners tend to have more power and are usually better informed (Valente *et al.*, 2015). Since 2005 there has been a significant expansion of the associations and cooperative management of the forest lands through the "forest intervention zones" (ZIF), (Luca Cesaro, Gatto and Pettenella, 2008; MITECO, 2018).

On the other hand, despite the above average GVA and increasing forest cover in Italy, the forest sector has a marginal role in the Italian political and economic agenda. According to Secco et al. (2017), Italian forests have been systematically underutilized for various reasons over the years. There is disconnection between the industry and the use of domestic forests, which is associated with very limited active management and land abandonment, while the expansion of forest area is mainly associated with farmland abandonment and natural expansion of the forest and not active reforestation (Secco *et al.*, 2017). In the social sphere, the Italian public don't really engage with forests and "the only reasons for forests becoming visible to public opinion are forest fires during summer." (Secco *et al.*, 2018, p.2).

Likewise for the case of Spain, despite the high GVA from the forest sector especially before the crisis, the economic, recreational and environmental values of forests in Spain exceeded the value of the direct assets generated, according to the third National Forest Inventory (MAPA, 2020b, 2020a). In addition, although around 36% of the total land in Spain is covered with forest (World Bank, 2020) and 40% of the forest area is protected and included in the Natura 2000 Network (Pérez and De Linares, 2019), abandonment of rural areas has been trending for years, especially from the young population, despite the good (pre-crisis) economic productivity and contribution of the forest and agricultural sectors (Galindo-Pérez-De-Azpillaga, Foronda-Robles and García-López, 2013).

Another fruitful collation that highlights the importance of qualitative and quantitative data derives from the comparison between Ireland and Greece, both of which are at the bottom of the EU countries regarding the financial contribution of the forest sector in terms of GVA. Ireland has the second to last area of forest cover in the EU after Malta, and the lowest forest cover among the 5 cases. A closer look enriched with qualitative data would reveal that forestry has been relatively new to Ireland and has received a lot of attention and investment

from the authorities in the country's recent history (DAFM, 2014). Since 1990 the country has had the highest rate of (continuous) increase in forest expansion among EU Member States in terms of total forest cover percentage (World Bank, 2020; FAO, 2021), to the point that it is currently at its highest level in the last 350 years (Teagasc, 2017). Also, a national strategy was launched in 1996 to expand forest cover to 17% by 2030 and specified the need to adopt sustainable forest management principles for this goal (DAFF, 1996). The production of most forest related products, such as roundwood and industrial roundwood, sawnwood, and wood-based panels, has also increased since the early 1990s, although still remaining at the bottom half of the EU (Eurostat, 2023). In addition, Irish citizens (92%) have more strong, positive views for afforestation, while they also consider forests as an important part of traditional landscape of the Irish countryside (Upton, Dhubháin and Bullock, 2015), and that environmental and social forest values and services are more important than timber production (Howley, Ryan and Donoghue, 2011). On the other hand, the forest regime in Greece has been neglected persistently in the last decades and both forests and the forest sector hold a marginal role in the country's agenda (WWF Greece, 2008; Papageorgiou, Katetsos and Katsadorakis, 2012; Nantsou, 2014; Dasarxeio, 2016). The constantly declining economic productivity, contribution, and participation in the forest sector is manifested in the declining trend of log and ricin production since the 1950s (WWF Greece, 2010; Eurostat, 2023), and the intense urbanization (Kotzamanis, 2019; World Bank, 2024), with citizens considering forest fires and urban development as the main threats to forests (Chalikias, 2013; Kyriazopoulos *et al.*, 2013). At the same time, the first statistically based forest inventory for Ireland was completed in 2007 and the second in 2012, which shows that monitoring has become important in recent years (DAFM, 2014). Even though the state of Greece is responsible for the national forest cadastre since 1975 (article 24/1975), the cadastre has yet to be completed and Greece remains the only European country without a national cadastre (Geotopo Engineers, 2020), while the only National Forest Inventory in Greece was completed in 1992, covering 86.2% of the entire country, even though it started in 1963 (Ministry of Agriculture, 1992b; Dasarxeio, 2020).

3.4.2.1.2 Macro level: EU

The European Union (EU) does not have a common legally-binding forestry or forest management policy for all its member states. Thus, the responsibility for forests and forest

management, including the implementation of forest-related policies, is therefore primarily responsibility of each EU member state (Edwards and Kleinschmit, 2013; Nègre, 2020). The EU respects the principle of subsidiarity, but can provide a framework of action and available support for its member, while exercising forest-related competences with member states (European Commission, 2022a); some sources of support from the EU towards some forest-related activities exist, in coordination with member states, mostly through the Standing Forestry Committee (European Commission, no date).

The basic political charter for involvement in forest issues in the EU has been the Resolution on a Forestry Strategy, adopted in 1998 (European Commission, no date), while more recently, in 2021 the EU adopted the new EU forest strategy for 2030, which is a main component of the European Green Deal (European Commission, 2021b). Apart from the policy framework of the EU Forest Strategy, some regulations, directives, and policy tools are covered at EU level, such as the EU Nature legislation, the EU timber regulation, LULUCF regulation, the Renewable Energy Directive, the Rural Development Fund, the EU LIFE programme, and the Forest Reproductive Material directive (European Commission, 2022a).

At the same time, national forest policies are influenced by other EU policies indirectly (Krott, 2009), mainly through policies from other relevant sectors, e.g. agriculture or energy, such as the Common Agricultural Policy, the Water Framework Directive, nature protection policy, including Natura 2000, the Renewable Energy Directive (through biomass), as well as through international markets supported by the EU. Since the 1990s the EU has improved environmental policy and politics in its member states through legislative and funding opportunities (Kousis, 2004), while EU institutions have enabled a more active role for non-government actors in governance (Koutalakis, 2004; Kousis, 2013), and there are certain instruments that are explicitly designed for forest issues, such as the EU Forest Action Plan (2006) and the EU Forestry Strategy (1998- renewed in 2013). The environmental policy of the southern EU states, such as Greece, Spain, and Portugal has also been influenced through EU Structural Funds and strong legislative foundations (Eder and Kousis, 2001; Kousis, Della Porta and Jimnez, 2008).

The role of property rights and financial instruments in European countries are considered key in promoting and formulating policy goals related to the environmental discourse

(Nichiforel *et al.*, 2020). The general trend during the last 20 years has shown to reinforce and even expand landowners' individual rights, while preserving minimal rights for other categories of forest users (Nichiforel *et al.*, 2020). Such a trend usually enhances the move from a centralised command-and-control approach towards self-regulatory, market-based, and voluntary measures (Glück *et al.*, 2005). Markets and other economic governance instruments play a crucial role in the EU, through which the EU can become a regulatory force in the forest regime as well. By interpolating regulation in relevant environmental and forest-related markets, the EU can nudge states and actors towards a specific direction, both in economic and environmental governance. For example, the EU Timber Regulation (995/2010) lays down the obligations of operators who place timber and timber products on the EU market, in order to counter the trade of illegally harvested timber and timber products (European Commission, 2020b).

At the same time however, while environmentally sustainable management is expected from EU states, there is also pressure to reduce costs from the public sector, especially since the beginning of the financial crisis (Picot and Tassinari, 2017). In 4/5 of the case studies in this research there have been mandates for austerity through the Memoranda of Understanding (MoU) and SAPs that accompanied bailout deals for some of the EU states (Busch *et al.*, 2013; Botetzagias, Tsagkari and Malesios, 2018). This creates a situation where EU states need to be both efficient in the short term and sustainable in the long term in their forest regimes, which may not be achievable for EU states where the forest sectors are neglected, or not contributing enough financially. In such cases the state seeks to minimise the financial burden of a large public administration by limiting activities in monitoring, planning, or extension of public goods and services, moving towards a profit-seeking state forest administration (Jann, 2002; Krott, 2009).

With respect to the selected cases' economic governance, similar to the rest of the Eurozone members, the selected EU cases had limited available tools to counter the declining state of their economy (De Grauwe, 2011; Wagner, 2014). Due to Eurozone's institutional design, states did not have the ability to adjust their monetary policy (e.g. the ability to control interest rates and adjust the value of their currency (e.g. to boost their exports by devaluating their currency), as this was controlled by the European Central Bank (ECB). This was devastating for most of the selected cases, especially as the domestic demand

plummeted in many EU countries at the beginning of the crisis, with 4 of the 5 cases of this study still not having recovered back to the 2007 levels in 2019 [27] (Appendix 3.18). At the same time, some argue that precisely due to the EU and eurozone framework, the member states had no option but to save the indebted banks, which led to 4 out of 5 selected EU cases resorting to a bank bailout deal (Jackson, 2009; Schäfer, 2011), as opposed to other EEA states, such as Iceland, which had control of their own monetary policy, but not access to financial support from the EU regarding their indebted banks (Thorhallsson and Kirby, 2012), which may have played a role in their quick(er) recovery, despite allowing their banks to fail (Bergmann, 2014).

On one hand, the legal framework of the EU, and specifically Article 125 of the Treaty on the Functioning of the European Union, also referred to as the 'no bailout clause', aiming to ensure fiscal and market discipline and reduce risk-shifting among members states within the Union does not allow the Union or its member states to take on debts from other member states. On the other hand, the euro itself and the integrity of its banks were considered "too-big-to-fail" (Moghadam, 2014a) and the possibility of sovereign defaults or exit from the Eurozone of any Eurozone members would have unprecedented consequences for the monetary union and out of discussion (Reuters, 2010; Moghadam, 2014b). Also, the impact of monetary policies of the ECB is expected to have differential effects on all the eurozone members, due to the different economic development strategies of all the participating states, and may not always be suitable for all eurozone states at the same time, usually supporting the interests and the development of larger EU economies (Petrova, 2010).

Due to the pressing and unprecedented circumstances, the EU through different mechanisms and interpretations of the 'no-bailout clause' did offer bailout deals (Spiegel, 2011; Verhelst, 2011; Carthy, 2015; De Grauwe, Ji and Steinbach, 2017), which created tensions within the Union. Many have argued that bailouts were to save European banks and investors, and not to support the countries going through economic crises (Gore and Roy, 2012; Strupczewski, 2013; Arriaga e Cunha, 2014; Fazi, 2014, 2015; Fox, 2014; Symeonides, 2016), while specifically for the case of Greece, relevant research also supports that less than 5% of the bailout money went to the Greek fiscal budget (Rocholl and Stahmer, 2016). On the other

[27] Only Ireland was able to recover in 2015, while the remaining 4 cases have not yet recovered (in 2020)

hand, the idea that the bailout deals weakened the fiscal discipline also had some support (Jewkes, 2010), which is also referred to as the 'Northern view' (Gourchinas, Martin and Messer, 2018).

3.4.2.2 The role of the troika of lenders in the crisis management and the subsequent developments in the forest governance

Between 2010-2012 Portugal, Spain, Ireland, and Greece resorted to bank bailout deals for the first time since the beginning of the crisis (ESM, no date), as they were unable to save indebted banks or refinance their sovereign debt. States had different power and ability in negotiating the terms of their bailout agreements. Greece, Ireland, and Portugal had very little negotiating power and abided by harsh conditions, to which their respective conservative governments reacted through welfare cuts (Sacchi and Roh, 2016). On the other hand, Spain and Italy had considerably more bargaining power, considering the size of their economies, with Spain's bailout not incorporating any new austerity measures, as it was deemed that Spain had already embarked on tough budgetary restrictions on their own (Treanor, 2012) and Italy being deemed "too big to bail" (Elliott, 2011, no page) and not being subjected to direct bailout conditions (Kulish and Minder, 2012; Picot and Tassinari, 2017). Even if Italy did not resort to a bank bailout deal, the ECB and the European Commission (EC) (2 out of the lenders for the rest of the cases) played a role in influencing policy-making, through the purchase of government bonds from the ECB (Busch *et al.*, 2013).

All bailout negotiations between the governments and the lenders were accompanied with a variety of measures that would ensure some structural changes in the governance regime. These measures focused heavily on restoring and boosting economic growth and rationalise the national budgets, through austerity in the public sector in order to reduce national deficit, changes in regulation to facilitate and boost investment, and privatisation of public land and enterprises to increase revenues (Kousis, 2013; Diani and Kousis, 2014; Pedroso, 2014; Leschke, Theodoropoulou and Watt, 2015; Sacchi and Roh, 2016; Calvário, Velegrakis and Kaika, 2017). This has led to a reported increase in protests for environmental and forest-related issues since the beginning of the crisis, as forest regimes were often adversely affected by such policies, which shows the disappointment of the population and the mismatch of expectations from the governing and decision making authorities (Kousis, 2013; Lekakis and Kousis, 2013; Mendez, 2013; Apostolopoulou and Adams, 2015; Calvário,

Velegrakis and Kaika, 2017; Petrova and Prodromidou, 2019; campogalego.es, 2021). The sections below highlight ways that such policies affected and transformed forests, as they were manifested in different EU cases.

3.4.2.2.1 Changes in the existing regulatory framework and deregulation

Although initial changes in the regulatory framework that were included in the bailout deals SAPs referred mainly to the liberalisation of the labour markets in order to enhance competitiveness (Busch *et al.*, 2013), in many cases similar changes took place affecting the environmental and forest regulation and relevant protection mechanisms. Depending on the importance and role of forests, such changes took place to either boost economic profits and attract investment in the forests, aiming to increase short-term economic gains, or to safeguard and protect forest sustainability, as part of the country's long-term strategy of forests. Such changes in the regulatory framework, which were sometimes also accompanied by privatisation and/or austerity policies, had an impact on the management, targets, and capacity of forest-related bodies.

However, significant changes in the regulatory framework rework took place in different ways, aiming either towards decentralization of forest regime, or towards facilitating economic activity and investment by changing environmental regulations. Forest fires have played a role in the introduction and formulation of the forest policy, especially in the Mediterranean countries.

3.4.2.2.1.1 Administrative changes in the forest services towards decentralization

Some significant forest administration changes took place both in Italy and Greece since 2008, which affected the budget, responsibilities, and goals of the national forest services. In Italy the National Forest Service, specialized in protection of the national forestry heritage, environment, landscape and territory, was merged into another national unit, a national police force that is military in nature (Arma dei Carabinieri), whose focus was not related to the forest sector (Secco *et al.*, 2018). This created significant issues in the responsibilities, budget, and available tools (Secco *et al.*, 2018). In 2018 Law 34/2018 was introduced addressing the sector as a whole, although there is still absence of national forest owners associations (both private and public) large enough to be considered representative of the whole sector (Secco *et al.*, 2018). Cesaro *et al.* (2008a) and Secco *et al.* (2017) claim that

despite the governance changes since the beginning of the crisis, there haven't been many meaningful changes to the Italian forest legal framework, which would enable it to adapt to modern demands.

Greece adopted the the Kallikratis reform[28] in 2011, a major national administration decentralisation process, which affected the structure and responsibilities of the forest services. The Regional Forest Services passed on under the Decentralized Administrations, becoming the main actors of execution and implementation of the forest policy planned by the Central Service (General Directorate of Forests and Forest Environment)(ypeka, 2014; Ministry of Environment and Energy, 2021c). However, there were administrative weaknesses related to both the funds, overlapping responsibilities, and the number and the distribution of the staff of the forest services (ypeka, 2014). In attempt to resolve some of the issues that had risen from the 2010 decentralization process, the forest services of the Decentralized Administrations were restructured again in 2014 (ypeka, 2014).

3.4.2.2.1.2 Deregulating forest protection in order to attract economic investment

All EU states have adopted a national forest plan, and most have also specific laws in place offering protection to forests, limiting or prohibiting certain uses of the areas for environmental and social purposes (Forest Europe, 2011). Greece, Portugal, and Spain deregulated their forest regimes in the form of de/recharacterization of forest areas, in order to bypass the bureaucracy in some such situations, allow and enable economic activity, and attract economic investment in (formerly) forest areas.

Specifically, in 2015 Spain introduced article 5 of the new Spanish forestry law (Ley de Montes), which modified the Forest Act of 2003, allowing the use of burned forest/land to be changed, which under the previous law was not allowed for thirty years after a fire for the purpose of combating speculation (Pérez, 2015). In Greece, a similar law simplified the declassification process of forest areas in 2020 (4685/2020)(Goverment Gazette, 2020). Greece had introduced similar land recharacterization laws before 2008, e.g. Law 3208/2003 which was based on the Law 998/1979. Environmental groups, such as Ecologists in Action,

[28] Kallikratis is the common name of Greek law 3852/2010. It's the second major reform of the country's administrative divisions following the Kapodistrias reform (2539/1997). Discussed more in detail in Chapter 4.5.2.3.2

Friends of the Earth, Rios con Vida, Greenpeace, WWF and SEO / Birdlife, opposed the new law, and described the law as a tool for private benefit (Azzopardi, 2015; EFE, 2015).

In addition, certain policies in Greece and Portugal removed certain regulations to facilitate economic activity. In Portugal, the 2013 "Law of the Eucalyptus" (Law 96/2013) streamlined the establishment of eucalyptus plantations and facilitated private forest owners to plant this tree species (Nichiforel *et al.*, 2020). In Greece, a series of bills facilitated economic activity by loosening environmental regulations, e.g**.** Law 4178/2013, even inside protected Natura 2000 areas (Law 4014/2011)(Sbokos, 2018), while later on additional bills between 2014-2019 deregulated the environmental and forest regulation and protection, by changing the environmental license system[29], "treating it as an obstacle and not as a guarantee for a healthy environment and quality of life" (Ntatsou and Hasiotis, 2020, p.2). The new environmental laws introduced in 2020 and 2021 (4759/2020, 4685/2020, 4796/2021 (Α' 63)) brought further deregulation and privatization of the environmental licensing process (Chamber of Environment and Sustainability, 2020; Ntatsou and Hasiotis, 2020). The difference between the Greek and the Portuguese deregulation policies was that in Greece deregulation policies increased the power of private and international industry actors, without increasing social participation in the management of forest protected areas (Ntatsou and Hasiotis, 2020), while Portugal enhanced the role of private forest owners, a group which included both the industry and the public.

3.4.2.2.1.3 Introducing new regulations to protect the forests; the role of forest fires during the economic crisis

In Italy, Greece, Spain, Portugal, and Mediterranean countries in general, forest fires are thought to be one of the most important disturbances that will increase in future climate scenarios (Lindner *et al.*, 2010). They also tend to spark protests from the population which exert pressure to the governing authorities for their failure to protect the forests (Humphreys, 2004; Koutalakis, 2004; Chalikias, 2013; Mateus and Fernandes, 2014; Secco *et al.*, 2017, 2018; Munnion, 2020). The silver lining of forest fires in the Mediterranean

[29] For example some such policies increased activity international conglomerates to conduct seismic or other geophysical surveys and geological surveys in public areas without a license (specific to the petrol industry); reduced fees and licenses required for wind-energy parks above 150 MW; declassification from protection status of ecologically precious forest and coastal areas (Ntatsou and Hasiotis, 2020).

countries is that the states tend to adopt forest- and forest-fire-related policies soon after catastrophic fire events.

For example, in Greece the first forest action plan was introduced in 2019 and it addressed the national forest prevention policy, a year after a forest fire cost the lives of more than 100 people in 2018 (WWF Greece, 2019). In Portugal the National Plan for Forest Protection against Fires and the District Plan for Forest Protection against Fires were introduced after the huge forest fires in 2003 and 2005 (Valente *et al.*, 2015) while more resources, power, and responsibilities were given to municipalities, and private owners were also forced to perform preventive silvicultural works (Mendes, 2006). In addition, the establishment of forest intervention areas[30] through the Structural Reform of the Forestry Sector that gives more power to forest owners in the local and regional level, signified a change in mentality shifting away from the traditional bottom-up strategy (Reboredo, 2014). Portugal published new environmental regulations in 2019, (Decree-Law 11/2019, Decree-Law 12/2019, Decree-Law 13/2019, Decree-Law 14/2019), which were introduced after the huge forest fires in 2017 and 2018. These laws were introduced after a lot of criticism about the already deregulated regime and the lack of regulation regarding the plantation of flammable species (e.g. eucalyptus) for economic purposes, which facilitated the paper and pulp industry conglomerates in the country (Ames, 2017; Munnion, 2020). In 2014 in Spain, the Socio-economic Stimulus Plan for the Forestry Sector was published and implemented, 1,5 year after the large fires of 2012 (La Moncloa, no date), and fire-related regulations were amended in 2018, after the fire-wave in Mediterranean countries during the summer of 2017 (Mateo, 2018). In Italy, the national law and the Framework Program for the Forest Sector were declared in 2008, a year after one of the worst forest fires during the last 30 years for Italy (Maetzke and Cullotta, 2016; EFFIS, 2019).

Unlike the 4 cases in the Mediterranean region, Ireland does not experience large scale devastating forest fires, as they are common in drier regions. Crown fires rarely happen, but many young plantations are vulnerable to fire especially during spring and early summer (Forestry Focus, no date). Forestry is relatively new to Ireland**,** but has received a lot of attention and investment from the respective authorities. The Forest Act 2014 and the

[30] Zonas de Intervenção Florestal

Forestry Regulations 2017, both of which were introduced after the country had recovered from the 2008 crisis, have been very significant to the Irish forest regime in terms of protection and compliance of forestry operations with SFM principles, while there are also references to afforestation targets, showcasing the important role of the forests in their environmental regime (DAFM, 2014, 2020).

3.4.2.2.2 Austerity in public finances

Austerity of the public finances took place both in country level and the EU level. Austerity in the EU level has directly affected the budget allocated to the environment, which has declined after 2008. More specifically, the 2014–20 EU budget was the first to have been reduced in the EU's history, albeit one in which climate change spending was protected (European Commission, 2013; Burns and Tobin, 2016). This affects forestry and forest authorities directly, because of the contemporary reduction of Rural Development Programme funds (Secco *et al.*, 2017). In country level, austerity was translated into budget cuts from different forest-related services, or institutions that may affect forests. Austerity policies were met with mass demonstrations or strikes in all 5 countries (Busch *et al.*, 2013; Fraser, Murphy and Kelly, 2013; Diani and Kousis, 2014; Calvário, Velegrakis and Kaika, 2017).

Austerity has proved to be harmful to citizens and the economy, through their wages, social services, and public ownership, especially in the case of Greece (Busch *et al.*, 2013). The IMF has also admitted that extreme austerity has been harmful for the case of Greece (Elliott, Inman and Smith, 2013).

3.4.2.2.2.1 Different manifestations of austerity

Underfunding of forest services has been reported in all 5 cases during the period of the economic crisis, which has adversely affected the efficiency and operation of the forest authorities and had changed the power dynamics in the forest governance regime. Austerity was manifested differently in each regime, although there were some common patterns, such as cuts in operating expenses, decline in forest support schemes, budget cuts in fire protection, and reduced funding towards regional and municipal services related to forests in most cases.

In Portugal lack of funding and the need for adequate management of both activities and available financial resources have been identified as a hurdle in the forest services and

particularly the national fire system (Defesa da Floresta Contra Incedios) (Reboredo, 2014). Valente *et al.* (2015) claims that due to the high percentage of private ownership of the Portuguese forests, the lack of funding reduced the already limited options of financial incentives and mechanisms towards supporting forest management and intervention, which also hinders the implementation of forest policy.

Similarly in Greece, constant underfunding has taken place since 2008 towards forest services and the fire services (WWF Greece, 2008; Papageorgiou, Katetsos and Katsadorakis, 2012; Sarantis, 2016; Vorgias, 2018) with further cuts in funding for municipal forest and fire related services since the bailout deals (Sarantis, 2016). Lekakis & Kousis (2013) support that since the beginning of the crisis reduced government funding for operational expenses along with staff reduction from the civil service have also affected the effective operation of the forest ranger corps, who are responsible for forest protection and policing, including forest fires. Apart from the budget cuts, the introduction or increase of certain taxes were used to increase the state revenue, but in some cases they turned out to be harmful to forests and environmental quality. For example, the imposed increase in the price of heating fuel led to substitution of central heating oil with other fuel, especially wood or even dangerous materials including, for example, old furniture and plastics, which in turn led to smog over Greek cities (Gerasopoulos, 2013; Vrekoussis *et al.*, 2013; Voidakou, 2014); in particular, the toxic smog contained (PM2.5) particulate matter, sulfur dioxide, carbon monoxide and other harmful pollutants, as much as 12 times higher than acceptable levels (Foundation for Research & Technology, 2013).

Austerity has affected the Italian forest regime in multiple ways. First, certain forest-related policies had to adapt to the austerity measures. For example, Romano *et al.* (2012) highlight that the National Forest Plan (2008) introduced certain programming tools, without any financial provisions or support to the sector. Secco *et al.* (2017) lists a large number of economic, political, environmental and social factors that limit the forestry sector development in the three regions, some of which are linked to austerity policies, including: lack of funds distributed to regional and local levels, which halts investment in equipment, new productive activities, technology, and maintenance (e.g. roads); the uncertainty created by the crisis and the austerity in the public sector has been identified as the main hurdle for environmental promotion in different regions; eco-tourism is also hindered by the lack of

investment and maintenance in forest areas, combined with the effects of recession and rise in unemployment, which also reduces tourism; any problems with the network-based governance initiatives which involves local communities faced were exacerbated by the need to reduce public spending in the sector. In addition, public forest administrations have progressively reduced their resources, power, and functions, both nationally and regionally, while the private sector failed to fill the gap through public-private investments in the sector (Secco *et al.*, 2017).

The declining trend has been especially apparent in Ireland since 2010, when Ireland signed the bailout deal. Although the total expenditure towards forests had increased more than 500% between 1993 and 2007 (DAFM, 2021), for the period 2010-2016, there has been a declining trend in expenses towards afforestation; forest support schemes (e.g. forest roads-harvesting, woodland improvement, native woodland conservation, etc.); other capital expenses, such as forest inventory and reforestation; as well as towards current needs of the forest services (e.g. promotion, training, technical support, forest sector development through COFORD (Council for Forest Research and Development)) (Teagasc, 2017; DAFM, 2021). The declining trend in expenditure towards forests combined with the downturn in the domestic construction sector, which played an important role in the domestic market industry, led to a significant decrease in reforestation from both public and private sources, as well as in many underfunded forest-related services (Teagasc, 2017).

Similarly in Spain, where similar to Ireland, the crisis also set off a property bubble which led to a decline in their construction sector and market (Royo, 2020), investment in the forest sector from both the central government and regional administration (which had doubled between 2000 (€883.6 million) and 2009 (€ 1741.9 million)) started to decline and reached €873.3 million in 2014, and remained lower than €1bn annually until 2018 (MAPA, 2018).

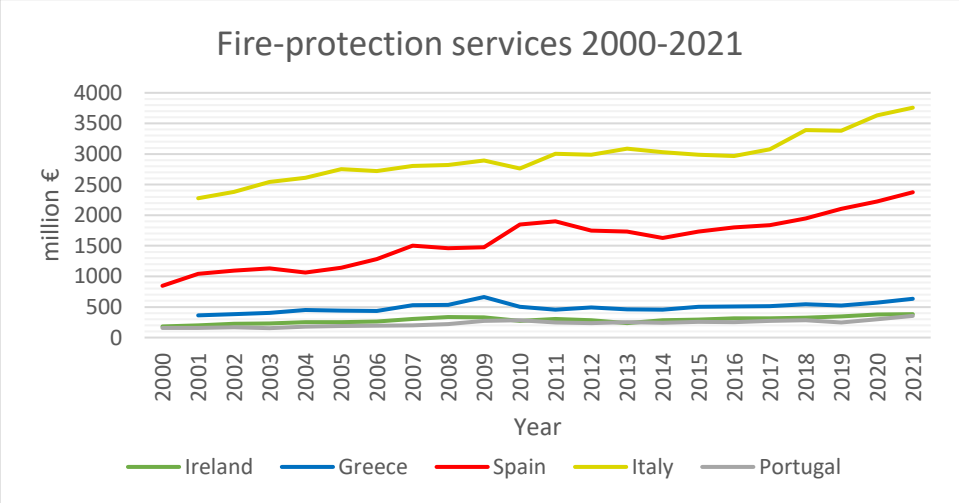
3.4.2.2.2.2 Lack of funds and Fire protection

Lack of funds has been linked in different ways to (the lack of) forest protection and appropriate management practices as well as forest fires, especially in the Mediterranean countries. With respect to the annual budget allocated towards forest fires, the vast majority of it is allocated towards forest fires extinguishing, with very little invested in fire prevention for both Spain (Valbuena-Carabaña *et al.*, 2010), Greece (Mitsopoulos, Raftoyannis and

Bakaloudis, 2015), Portugal (Reboredo, 2014), even if the fire policies, including the suppression and prevention efforts are established at the district level (Meira Castro *et al.*, 2020), Italy (Canepa and Drogo, 2021) [Also (Colomina and Peiteado, 2019) for all Mediterranean cases].

In Greece forest fires and increased illegal logging has been linked to the loose forest protection regime (Lekakis and Kousis, 2013). Although illegal logging had not been reported as a serious issue before the crisis, an increase was reported in 2011 (Lekakis and Kousis, 2013). In Italy the causes of forest fires are linked to institutional arrangements in the management of forest resources and forest-related funds, and to the governance system (Michetti and Pinar, 2019). Lack of leadership in governance coordination, agency instability, and poor understanding of fire management have been identified as the 3 main problems in Portuguese forest governance (Mateus and Fernandes, 2014), while forest mismanagement, deficient capacity of fire detection, insufficient funds, infrastructure and means to fight fires, the lack of coordination within and through institutions, farmland abandonment, and the presence of an illiterate and aged population in rural areas have also been highlighted as threats enhancing forest fire propensity (Valente *et al.*, 2015).

Figure 3.8 Government expenditure towards fire protection services in the selected EU cases 2000-2021



Source: (Eurostat, 2023)

The budget towards the fire protection services followed an increasing trend for all 5 cases before the crisis and even a few years after 2008. However, the budget for the protection services declined for all cases for at least one year after each country agreed to a bailout deal and the accompanying MoU, which included austerity measures in the public sector

(Appendix 3.24, Figure 3.8). The exception to this was Ireland that signed a bailout agreement in 2010, but had to deal with significant forest fires in 2010 and 2011 (European Commission, 2011) and decreased their respective budget in 2012.

Only in 2018, a year after many countries worldwide, including Portugal, Spain and Italy had experienced huge forest fires, that the annual budget matched the pre-MoU budget with the exception of Greece; Greece still hasn't reached the pre-bailout budget. Italy hadn't agreed to a bailout deal and their budget towards fire protection services remained stable between 2011-2017, while similarly to the rest of the cases it also increased in 2018 a year after the huge forest fires the country was affected by (Eurostat, 2023). Unions (EPSU) have also criticised that the cuts in human resources and the lack of renewal of material have had "a huge impact in the efficacy of fire services" referring to the cases of Spain and Portugal (EPSU, 2016), while some experts have also claimed that "in this regard, the economic crisis has caused the workforce to be cut, which could reduce fire extinguishing ability", referring to the case of Spain (attributed to Vanessa Moreno from (Climate News Network, 2014)).

3.4.2.2.3 Privatisation

Privatisation was pushed to the agendas of all 5 cases during the 2008- crisis, which was met with protests and demonstrations from civil society, some of which were successful in halting the privatisation processes. In Spain and Italy far-reaching privatisations took place under pressure from the ECB and international institutions (Busch *et al.*, 2013), while in Greece, Ireland, and Portugal, the bailout agreements were directly linked to extensive privatisation (Mercille and Murphy, 2015). Both Greece and Portugal introduced institutions, whose mission has been to facilitate the sales of public assets, including estates, forest and agricultural land; the Hellenic Republic Asset Development Fund (HRADF) was created in Greece in 2011 (more in Chapter 4.5.2.2.1, Appendix 4.11), while the Bank of Land ("Bolsa Nacional de Terras") was created in Portugal in 2012.

In Greece, apart from the direct privatisation of forest and agricultural land, ecologically significant and legally protected areas, many of which are inside or very close to designated Natura 2000 sites (Hellenic Ornithological Society, 2014; Nantsou, 2014; WWF International, 2014), there have also been efforts towards the privatization of the environmental permitting process and its monitoring process (WWF Greece, 2016, 2019). Significant mass protests

against the privatization of nature assets took place about the proposed expansion gold mine in the primeval forest of Skouries and its destruction (Apostolopoulou and Adams, 2015). In addition, starting after the first bailout in 2010, two 'fast-track' laws (Laws 3853/2010 and 3894/2010) were passed to accelerate public–private partnerships and attract strategic investments through fundamental derogations from environmental law, which opened up a route to "un-green grabbing" (Apostolopoulou & Adams, 2015, p.21). Although most of Portugal's forests had already been privately owned, the Common Land Law was revised on the 10th of July 2014, allowing more flexible utilisation of the common lands. This has been controversial for many civil groups, claiming that the Government wants to privatise the communal lands for profit, threatening the ecosystems' provision of goods and services, as well as the importance of these common lands to local populations (Feliciano *et al.*, 2015).

On the other hand, in Ireland the proposed sales of Coillte, the national forest company, and the trees' harvesting rights were met with opposition and protests from the population and had to be dropped in 2013 (Allen and O'Boyle, 2013; Mercille and Murphy, 2015). Similarly, in Italy discussion about privatisation of forests and forest services was not in the agenda at the beginning of the crisis, but the possibility of a privatisation process has recently emerged in different regions (Visentin, 2018). However, many have expressed concerns, protests and demonstrations have taken place about the alleged privatisation of the sector, and such privatisations plans have not yet realised (David, 2021).

Soon after the bailout agreement in 2012, both central and regional governments in Spain took on sales of public estates and land, including thousands of hectares of agricultural land, forests, and areas in national parks (Mendez, 2013) within the context of their efforts to raise money. A couple of examples are the sale 90-hectare estate in the Aiguamolls de l'Empordà park in Girona in 2012 from the regional government of Catalonia (Mendez, 2013), and the proposed sale La Almoraima, in the Alcornocales Natural Park in Cadiz, which has great environmental value and is owned by the Ministry of Environment (Meyer, 2013), but was met with protests (Mendez, 2013) and wasn't realised as the park was able to find funds and recover its debt (Minder, 2014).

3.5 Summary and discussion

The study took an exploratory approach towards forest governance developments in 10 countries from 2 regions during a large-scale financial crisis, namely the 1997 SE Asia financial crisis and the 2009 EU periphery financial crisis and focused on policies that were mandated by IFIs as part of the bank bailout agreements. Both financial crises in the SE Asia and the EU have been attributed to corporate governance and deregulation in the financial sector, similar to previous cases of financial crises that followed banking deregulation (Lindgren, Garcia and Saal, 1996; Gerdrup, 2003; Berghall and Perrels, 2010; Stiglitz, 2010a).

It aimed to identify patterns in the forest governance developments in both country clusters, in terms of both (i) the countries' pre-crisis forest regimes arrangements and (ii) policy developments that were part of bailout deals during the crisis period. The summary is divided in 2 sections, namely pre-crisis arrangements in the forest regime; and Crisis management period and the participation of IFIs in governance. Each section highlights different patterns and configurations of arrangements both within and across regions, and offers tailored suggestions based on the identified patterns found in these cases.

3.5.1 Pre-crisis arrangements in the forest regime

Forest regimes in both regions have been primarily state-led both before and during the financial crisis, with variations in public and private sector participation, regulatory and policy framework, economic contribution of the forest sector, and ownership of forest land. Several communities in the selected SE Asian cases still depended on forests for their subsistence before the 1997 shock, which may hint additional cultural values and higher levels of community participation in forests in SE Asia, compared to the EU cases.

In terms of the historical development of the role of forests in the selected cases, resource exploitation for economic growth led to issues such as deforestation and forest degradation in the selected Asian cases during the 20th century. All cases except for Indonesia addressed adverse trends in the late 20th century and have shown signs of recovery from deforestation, as well as decreased forest activity in economic terms, while Indonesia is the only country among the 5 selected with a declining forest cover trend since 1990[31]. In contrast, there is no

[31] Even though Korea's forest cover seems to follow a declining trend, the growing stock of forests follows an upward trend since 1973 when the 1st National Forest Plan was adopted (Appendix 3.11).

common pattern in the development of the forest regime among the EU cases for the late 20th and 21st century. Italy, Portugal, and Spain have been above the EU's average in terms of GVA of the forestry industry, while the industry has been almost non-existent in Greece and Ireland. Forests have been reportedly underutilised in Italy and Spain, neglected in Greece, while Ireland, with one of the smallest forest areas in the EU, has been investing in forest sustainability. The role of the EU as an institution played an auxiliary and nudging role, as any forest-related policies are not legally binding. The EU is involved in the forest governance development of its member states, through the EU forest and wider environmental regulatory frameworks, with a clear direction towards the reinforcement of individual property rights and towards a more deregulated, market-based regime, with voluntary and non-legally binding forms of policy control (Weale *et al.*, 2002; Nichiforel *et al.*, 2020).

Since the 1950s, countries in both regions introduced prudent environmental or economic regulations that targeted forests (e.g. banning logging in old growth forests - Philippines, complete logging ban in Thailand), or reforestation programmes (e.g. Thailand, Portugal, Spain, the Philippines, Malaysia, Korea) in order to halt or mitigate deforestation. The former targets more medium- and long-term restoration of forests, while the latter short /medium-term, but their adoption and application may play a role in periods of economic crisis. Although the budget towards reforestation programmes was affected from austerity policies in most cases, core sustainability regulations and policies that had been adopted in the past remained in place during the respective periods of financial crisis in all cases.

Further, countries with long-term sustainability strategies in their forest regimes seem to have had fewer adverse impacts from their respective financial crisis. This could be because slight adjustments may be introduced in periods of financial crisis, without compromising their core targets and functions, nor increasing the financial burden for the state. For example, forest decentralisation efforts in Thailand were supported in the 1997 constitution and the 8th development Plan (1997-2001), while Ireland, Portugal, and the Philippines introduced new forest-related policies in line with SFM principles during or shortly after the period of crisis, without compromising their existing long-term strategies for the forest regimes. On the other hand, the absence of long-term forest-related sustainability provisions or strategies may enable the adoption of new policies in the forest regime, which may be economically beneficial in the short-term, but unsuitable in the long-term, e.g. the case of

Greece from the EU, where many of the adopted policies aimed to enhance the economic contribution of forests and related sectors, but with adverse environmental outcomes (e.g. air quality, forest fires, decreased public participation), or Indonesia, whose forest sector had no relevant provisions and had to undergo radical transformations once the crisis hit the country and Soeharto resigned.

Finally, the economic contribution of the forest-related industry can be very important to both the state (e.g., GVA) and the public (e.g., employment, subsistence), regardless of whether a state deals with an economic/financial crisis. However, it is not sufficient to determine the forest regime's sustainability, development, importance to the state or the public, or success of institutions that partake in the forest governance. For example, while the forest sector has been profitable and important for the national economy of Portugal, Malaysia, and Indonesia, all countries had different forest governance arrangements in place before the crisis, adopted different policies during the crisis, and ended up with different and unique arrangements, goals, and roles for their forest regimes after their economic crises. Similarly, low economic contribution cannot predetermine the forest regime's importance, nor its development during an economic crisis. For example, the contribution of the forest sector in Ireland, Korea, Greece, has been low to insignificant, but again with different approaches to and developments in sustainability in their respective forest regimes, both before and during the economic crisis.

Suggestion(s): The adoption of sustainability regulations and strategies for the forest regime for both short- and long-term, combined with the development of forest-related structures and frameworks that enhance economic, social, and environmental forest characteristics and values, but don't rely only on state funding in the long run. For example, the existence of forest-related economic activity with realistic sector-wide targets and sustainable practices along with their frequent monitoring and evaluation may increase public participation in forest-related decision-making processes. Some targets can be modified in the short-term to create opportunities such as job or investment opportunities during a financial crisis or other 'emergency' to mitigate some of its adverse social impacts. Similarly, updated forest inventory and data would also ensure transparent processes, and would not be affected significantly, if funding is decreased for a short period.

3.5.2 Crisis management period and the participation of IFIs in governance

Among the selected cases, countries with prudent and conservative regulations in the financial sector can decrease the chance of a high magnitude crisis, or contagion from other countries. For example, both Malaysia and the Philippines had prudent regulations in place in their financial sectors and were the two least affected countries among the five selected cases in the SE Asia region. At the same time, European banks -mostly major ones- were dependent on the US financial sector and were exposed to the US market losses in asset-backed securities (Acharya and Schnabl, 2009; Song Shin, 2011; Mcguire and Von Peter, 2012). In addition, the monetary policy in the eurozone, which all 5 EU cases are members of, is handled centrally by the ECB, which gives fewer degrees of freedom to its member states in cases of economic or financial crises.

Many forest governance developments during the periods of financial crises in the selected 2 regions are linked to the participation of IFIs in the crisis management process. The IMF and the World Bank were the main IFIs in the SE Asia cases, and a joint EU-IMF team in the case of the EU. The policies included in the bailout deals focused heavily on safeguarding the financial sector and restoring economic growth, as well as rationalisation the national budgets, expressed mainly through austerity in the public sector, changes in regulation to facilitate and boost economic activity, and privatisation of public land, estates, and enterprises to increase revenues. Such policies may have been deemed appropriate in some cases, where the public sector was inefficient and indebted in the past, e.g. in Latin and central America, or the case of Indonesia where the market was controlled by oligarchs. However, the cases of the 1997 financial crisis in the SE Asia were not such cases in principle, as the economic crisis started from increased debt and overborrowing of the private sector and not the public one (Kim, 2000; Stiglitz, 2000). In such cases, the commonly promoted and imposed policies created additional problems, such as exposure to external risks and contagion through liberalisation and deregulation (Sachs, 1997).

A stable democratic political environment during a crisis period could enable decision makers to adopt a more coherent policy programme, while dealing with unrest and conflicts in the society deriving from the impacts of the economic crisis. Crisis-inflicted socio-economic impacts (increased unemployment, deprivation rate, poverty, etc.) can disrupt the political stability if they are not addressed early on. Further, the compatibility of the SAPs included in

bailout deals with the existing governance arrangements plays a significant role in the success of the policies, their acceptance by the both the public and governance actors, and the stability of the political environment (Kim, 2000; McCarthy, 2000; IMF, 2001). Sometimes, when policies are not compatible, or are deemed as harsh by the public, it can lead to unrest, changes in the political leadership, agenda, and priorities. For example, the impacts were severe during the 2009 EU economic crisis, and all selected EU cases saw their governments change in the elections after the economic crisis. While the SE Asia cases also eventually changed their governments, the Philippines and Malaysia had a more stable environment during the early stages of the crisis, allowing less urgency in their decision making and/or negotiations for the bailout deals.

Even though IFIs worked mainly within the economic governance, they have also affected the forest regimes in the states that they were involved in. In most cases, participation of IFIs in (forest) governance during the economic crisis led to a shift towards more decentralized regimes, as observed in both regions. It also aimed to increase the economic contribution of the forest-related regimes, through a combination of their commonly promoted policies, which has sometimes also had adverse environmental and social impacts. Furthermore, the two cases that did not resort to a bailout deal, Malaysia and Italy, seemed to have had more space and flexibility in the design and application of the crisis-management policies. Malaysia initially adopted measures similar to the ones usually suggested by the IMF to the rest of the cases, but quickly reversed austerity policies and was able to halt active privatization programmes; other SE Asia cases were also able to reverse austerity policies, but only after their governments changed. Italy was still influenced by the ECB, through the ECB's role in the market and purchase of government bonds, but still had more flexibility in policy making compared to the other 4 EU cases (Busch *et al.*, 2013).

Indonesia was the only case among the ten that completely transformed its forest regime with the involvement of IFIs, and got rid of the authoritarian, and clientelist aspects of the Soeharto regime. In some of the other cases, there were some significant developments in policy and funding, which affected the power and capacity of forest-related actors to perform their tasks. The goals of forest regimes also changed in cases where they had no concrete targets or strategy prior to the involvement of the IFIs. Patterns from the application of such policies are listed below and summarized in Appendices 3.26, 3.27, 3.28.

- Mandated austerity in the public finances has been evident in all selected cases, in which IFIs were involved in the crisis management process. The budget for forest-related authorities tends to come from the state budget, regardless of the ownership of private and public forest areas, or economic contribution of the forest sector, or other characteristics of the forest governance regime. In all cases, this translated into a decrease in personnel and funds in forest-related authorities, such as forest fire protection. Lack of funding for forest infrastructure and management have adversely affected eco-tourism, reforestation, and local communities as well (Valente *et al.*, 2015; Secco *et al.*, 2017; Teagasc, 2017).

- Privatization or forest land, forest-related assets, or even the environmental permitting and monitoring processes, attempted in all EU cases, along with Thailand and Indonesia, while only a few privatization programmes were actually realized, due to reactions from the civil society (Kousis, 2013; Azzopardi, 2015; EFE, 2015). The focus on privatization in the EU cases was so intense that Greece and Portugal had to create new institutions, whose mission has been to facilitate sales of public assets, which also includes forest and agricultural land, namely the HRADF (Greece) and the Bank of Land (Portugal). Privatization of forest-related land and assets is usually combined with environmental deregulation to allow greater scope of economic activity in forest areas, and therefore attract more investors. Unrest and even protests from such policies was evident in both regions, e.g. Thailand, Greece, Spain.

- Rework in environmental regulation affecting forests in the selected cases has aimed to prioritize the profitability of the sector over potential environmental or social values. This has been expressed through either administration changes in order to facilitate decentralization and reduce operating costs (e.g., the Philippines, Thailand, Greece, Italy), or environmental deregulation in order to facilitate and attract economic investment by offering a wider scope of activities in forest areas and/or fewer legislative bureaucratic costs (e.g. Greece, Indonesia, Spain, Portugal). On the other hand, environmental deregulation was not pushed in the agenda in cases that would not result in economic benefits, e.g., Ireland, due to the small forest land area, in combination with the economic significance of other sectors, such as pharmaceuticals, and information and communications technology (Ruane 2016).

Suggestion(s): In addition to safeguarding the financial sector, IFIs should monitor and review which (combinations of) policy tools have been beneficial or damaging in environmental and social regimes, as well as potential side effects and externalities from such policies, in order to minimize adversities and/or even boost environmental and social values, when possible. One such stand-out example is the policies used for the dismantling of the authoritarian

clientelist forest regime in Indonesia. Although the policies were beneficial in economic terms and enhanced public participation and more democratic processes, oil palm plantations, which were facilitated during this process, have become one of the leading causes of deforestation in the country and the whole region (Vijay *et al.*, 2016). Consultation with the academic community and local stakeholders would also be beneficial.

In addition, policies included in bailout deals should be designed and applied keeping in view each case's background and institutional framework and allow for flexibility in modifying or even reversing any policies in some cases, or they could damage social and environmental conditions and lead to unrest, disputes, and protests, which was often the case in most of cases, e.g., Greece, Portugal, Spain, Thailand, and Indonesia. For example, deregulation and austerity policies often received criticism, as their application increased hazards for local populations and the environment, or undermined local authorities from implementing and enforcing regulations (relevant examples from C. Burns *et al.* (2020), Lekakis and Kousis (2013), WWF Greece (2011, 2012), Pulhin (2002), Gellert (2005), Apostolopoulou and Adams (2015), Greenpeace (2013), and Holmes (2002)). The adoption of qualitative criteria, such as cultural characteristics, traditions, vulnerable groups in the population, or geographical and environmental characteristics, along with consultation with bodies from social and/or environmental regimes could offer a useful insight and input in these cases.

Finally, the adoption, commitment, and support towards sustainability provisions in the forest regime during periods of economic crisis has helped to mitigate some of the adverse effects of the crisis in both economic, social, and environmental terms, while their absence may have enabled adverse impacts on forests as side-effects. For example, Korea used their forest sector to absorb part of the crisis-induced unemployed, which they employed in forest restoration activities. Au contraire, in the Philippines there was increased pressure on forests from people in order to cover their subsistence needs.

3.5.3 Limitations of this study and areas to explore in the future

This study acknowledges that there are multiple variables that have played a role in the developments that took place in the selected cases, some of which may be unpredictable and not be linked directly to the policies that were considered in this chapter, such as climate change, market trends, culture, etc.. In addition, the existing relevant data and literature has

been limited and did not allow a more in-depth exploration of this topic. This is why, considering the constraints of this study in resources and time, this chapter adopted a more exploratory approach with respect to the developments in different forest governance regimes, where IFIs were involved in the financial crisis management processes. The findings should be interpreted with caution and cannot be generalized to reflect all similar cases of countries that have been through similar situations. Rather, they should be interpreted as descriptions, notions, or theories applicable within the specified setting of this specific study. Although the findings do not provide any definitive answers, the highlighted patterns do provide some insight and potential direction for further research and data collection.

In detail, some literature about forest regime developments in periods of economic crisis exists, but is usually country-specific, deals with certain aspects of the regime (e.g., trade), and it is not linked to specific policies nor governance transformations. Also, international open access databases provide only some key indices about the forest area and/or forestry production and trade, which do help to paint part of the picture, but not enough, if one is to research the topic more in depth, e.g., interactions or causal mechanisms. At the same time, other useful relevant data or information have been difficult or impossible to find, e.g., data about the status or funding (both state funding and external sources) of key actors and services in the forest regime, are not included in international or even national databases. Also, several key documents that describe the national institutional framework, or the de facto arrangements among stakeholders, or other social or environmental aspects of the forest regime have often been available only in the countries' official languages.

Finally, qualitative data has also been very limited in existing literature, but can shed more light on governance developments and transformations, and to evaluate certain developments with respect to the application of specific policies, which cannot be captured by quantitative data alone. For example, the application of deep-reaching austerity, deregulation, and privatisation policies in Indonesia can be justified by the riddance of the corrupt regime, but could be deemed unnecessary, harsh, or even damaging in other cases. Qualitative data could also enable space for further research and better understanding of forest governance transformations vis-a-vis specific policies, such as the reasons for (dis)approval of policies by stakeholders, and how certain policies affected their role.

4 The Greek forest governance actors perspective about the 2009 economic crisis developments in the Greek forest regime: A qualitative analysis

4.1 Introduction

Greece has undergone some significant transformation, as it resorted to bailout deals with external lenders to rescue its banking system multiple times since 2010, including the largest debt restructuring in history (McBride, Lizarazo and Sherlick, 2022). The bailout deals came together with multiple obligations on behalf of the Greek state, including austerity policies in the public sector, and changes in regulation that affected both social, economic, and environmental regimes. At the same time, the Greek forest regime seems to be neglected, with its forest economy remaining at very low levels for decades (Appendix 4.6, Figure 3.6), a decline in funding towards two of its major public actors, the national forest services and decentralized administrations (Ministry of Environment and Energy, 2015, 2016, 2017, 2018a, 2019, 2020b, 2021a; Ministry of Finance, 2023), as well as catastrophic forest fires in recent years (2021, 2023) (WWF Greece, 2019; Psaropoulos, 2021, 2023; Xanthopoulos, 2022; Rafenberg, 2023), while public participation in forest management and forest-related schemes is also on the decline.

Academic literature regarding the impacts of the 2009- economic crisis onto the Greek forest regime has been sparse and it tends to focus not on the forest regime exclusively, but on forests as part of the wider nature/environment field. The literature regarding the impacts of the 2009- crisis on different major forest governance regime actors in Greece has identified and quantified developments in the macro level (i.e. on a large, nation-wide or international scale or population, e.g. market performance, or industry exports), and the micro level (i.e. on a local or unit level or actor-specific, e.g. number of personnel or budget in specific forest authorities). However, the impacts on the links and connection between these two levels, or the context in which these developments take place may not be as clear [32]. For example, certain policies related to the 2009- economic crisis (e.g. austerity) may have had varied impacts for different actors, through different channels, which may have affected not only

[32] Chapter 2.4.1 (p.69) refers to the value of the analysis between the macro and micro levels, and how a more descriptive approach can complement data in the macro or micro levels.

individual bodies, but their cooperation with other actors, their role in the governance regime, as well as other aspects of the forest governance regime more broadly.

Bryman (2012) suggests that 'insiders' and 'outsiders' may have different perceptions regarding certain issues, due to the unique experiences of the 'insider' groups and communities. The insiders in some cases were able to offer unique perspectives, causal mechanisms, or explanations, based on their experience in specific contexts. Some examples include the cases of crime in communities (Foster, 1995); the role of working class women (Skeggs, 1994); the organisation and structure of hooligan groups (Armstrong, 1998). The rest of the chapter investigates the perspectives of the most relevant actors in the Greek forest governance regime ('insiders') regarding the developments that took place in the regime during or due to the 2009 economic crisis.

This chapter uses interviews to explore how and whether the 2009- economic crisis may have affected the capacity of separate major actors in the Greek forest governance regime. At the same time, it explores the context and circumstances in which certain forest regime actors, institutions, and their instruments have actually operated, structural power dynamics in the existing regime, as well as the actors' capacity to actually deliver their goals.

Major reforms in public administration in 2011 and 2022 (Chapter 1, p.15-6, Chapter 3.4.2.2.1.1) changed the structure of the forest governance, while the adoption of austerity and deregulation policies also affected the power dynamics in the regime. Today, state and public bodies are rendered as the main actors responsible for forest governance due to the combination of the de jure administrative responsibilities about forests, which fall mainly on the Greek state and decentralised public authorities; the legal responsibilities of governing forests being assigned mostly on state and public actors (*The constitution of Greece*, 1974); and the majority of forests and forest land in Greece being owned by the state (>74%), while the rest is comprised of municipalities (9%), the church (10%), or private owners (6.5%) (Ministry of Agriculture, 1992a)[33]. Not only do these actors directly influence the development of the forest regime and policy infrastructure through the formulation and

[33] The most recent national forest inventory in Greece was published in 1992 and unfortunately no up-to-date data have been available since. Even recent publications by Greek (Spanos *et al.*, 2015, 2021) or international (FAO, 2010, 2014) researchers and actors rely their data on that publication.

implementation of policies, but they have also been responsible to enforce and implement any relevant EU policies. For example, whilst the EC can allocate funds to particular (environmental) budget headings, expenditure is generally carried out at the Member State level (Burns and Tobin, 2016).

Spending cuts at national or regional levels, may affect how and whether public bodies may be able to enforce and implement different EU regulations (Lekakis and Kousis, 2013; Burns, Eckersley and Tobin, 2020). For the case of Greece, the economic adjustment programmes considered austerity in the public sector as a prerequisite for the bailout (European Commission, 2010, 2012; European Council, 2016), but it was up to state actors to determine how austerity would be applied (lay-offs, budget cuts, withdrawing investment, and from which areas). The imposed austerity is reportedly linked to lack in staff, equipment, and enforcement capability (Kousis, 2013; Lekakis and Kousis, 2013; Apostolopoulou and Adams, 2015; Sarantis, 2016), and may have affected the actors' capacity to implement or enforce EU or national environmental and regulations (more about the role of the EU with respect to environmental and forest policy in Chapter 1203.4.2.1.2), to maintain existing forest-related infrastructure or projects, or even respond to acute forest threats, such as forest fires (Lekakis and Kousis, 2013).

ENGOs are another active actor in the Greek forest governance regime and serve multiple roles. First, they contribute directly in the forest governance regime through various actions, such as research, educational campaigns (e.g. Hellenic Society for the Protection of Nature (2022)), working closely with the Forest Services (Spanos *et al.*, 2015), and promoting forest initiatives (e.g. WWF Greece (2022)). In addition, they try to fill the gaps between the other governance actors, i.e. between the EU and the state of Greece, or state/public actors and the citizens, for example by resorting to opportunities by EU environmental policy law or initiatives (e.g. EU LIFE), or through activism, and campaigns, in order to enhance the roles of citizens and organisations (Albanis, Galanos and Boskos, 2000; WWF Greece, 2018). They also try to ensure that all actors conform and enforce EU policies and laws, either by opposing to decision taken by decision-making bodies (Lekakis and Kousis, 2013; Apostolopoulou and Adams, 2015), protests, campaigns, or even resorting to complaints to the EU (7 ENGOs, 2005; Fernández, Font and Koutalakis, 2010). For example, large Greek Environmental NGOs have often resorted to the EU complaints procedure in order to trigger

the Commission's infringement proceedings to ensure that state and public actors are following the EU regulation; since 2009 Greece has been among the top 3 states with the most environmental infringements (European Commission, 2021a).

Similarly, ENGOs were also affected by public austerity policies, which led them to adapt to the new circumstances, but also sometimes change their goals and role in the forest governance. In detail, Petropoulos (2013) describes that the most common source of funding for Greek ENGOs had been government grants and private sponsorships from donors, who may not always pursue the same goals as them. However, in 2012 the state stopped funding NGOs following austerity policies, which significantly reduced their revenue (Sotiropoulos, 2014). At the same time, the EU promoted the social impact bonds, which are a form of 'pay for results' funding[34] (EPRS, 2014), which could allow (E)NGOs to apply for state funding in exchange for specific services, but it also increased their dependence on the state, marginalizing their assertive actions (Simiti, 2017).

Chapter structure: Section 4.2 below describes key methodological elements regarding the case study framework in combination with a qualitative research approach. Section 4.3 explains the theory, stages, and processes in the qualitative data collection. Section 4.4 reflects on the thematic analysis and data interpretation, as well as a step-by-step description of the processes used in the analysis (section 4.5). Finally, a summary of this chapter is available in section 4.6.

4.2 Methodology

This chapter draws upon a single case study, the case the Greek forest governance regime during the most recent economic crisis 2009- and uses qualitative research analysis (interviews) with a number of bodies that are relevant to the forest governance in Greece. This section describes the justification for using a (single) case study framework, as well as a qualitative approach for the single case study, and sampling strategies for qualitative data collection.

[34] "the repayment of the original investment and/or payment of financial return is dependent on the achievement of measurable social outcomes" (EPRS, 2014, p.4)

4.2.1 Case study framework

This chapter works with a case study framework. Certain elements of the theory behind case studies have also been described in chapter 3, which also adopted a (multiple) case study approach (section 3.2.1), and are not included in this chapter to avoid repetition.

Case studies are considered a great tool to create new theory from new qualitative evidence (Bennett, 2004; Eisenhardt and Graebner, 2007; Baxter and Jack, 2015) that this study relies on and support in-depth understanding, exploration, and analysis of a phenomenon, especially when the focus is on causal mechanisms, instead of the effects (outcomes) within particular cases or contexts (Bennett, 2004; Gerring, 2004; Ragin, 2009). A case study can explore the existing dynamics in a specific setting (Eisenhardt, 1989), and in exploratory strategies (rather than confirmatory) the case study method is often used to identify relevant (qualitative) variables (Bennett, 2004; Gerring, 2004). This fits this chapter, as it explores both how and why the Greek forest governance may have been affected by developments during financial crisis in the country (2009-), as well as the context and settings of key agents in the field, all of whom can add value by offering their own perspective on the topic (Byrne, Olsen and Duggan, 2012; Döringer, 2021).

This research uses a single case study, which is appropriate for describing social phenomena, explaining nuances in them, and addressing certain mechanisms that are related to the phenomena (Armato and Caren, 2002). Single case study is the best choice in cases where the researcher wants to study a single unit (person or group) (Yin, 2003). Sometimes the researcher is able to break down a larger case into smaller subunits, and analyse each subunit separately, across, and between (Dyer and Wilkins, 1991; Yin, 2014). They also allow for the exploration and discovery of a large number of relating/intervening variables (Bennett, 2004; George and Bennett, 2005). In terms of generalization, findings from single case studies can be generalized to theory and not the population (Mitchell, 1983; Yin, 2003; Bryman, 2012) and can be used for theoretical inferences (Fielding and Warnes, 2012).

In addition, a single case study framework was chosen as it is less expensive and less time consuming than a multiple case study one (Baxter and Jack, 2015). Single case studies can explore existing and new theoretical relationships and ideas, and well-suited to producing new theory (Dyer and Wilkins, 1991). Siggelkow (2007) also argues that single case studies

are better at describing the existence of a phenomenon richly. However, Yin (2018) argues that a researcher should have to make a strong argument in order to justify the choice of the case, in order to avoid criticism relating to bias or artefactual conditions surrounding the case. The single case of Greece in this study is justified on the basis of it being a revelatory case, as no previous similar case study research has taken place to identify the perspective of the national regime's most prevalent actors in Greece, any other EU state during the most recent economic crisis (2009-), or any other country during a major economic crisis. The descriptive information from this study alone can explore this uncharted territory, be revelatory, or even allow to create new theory.

More specifically, the case of Greece is treated as an embedded single case, as different subunits of the Greek forest governance are brought to question. Subunits offer the advantage of analysing data within each subunit separately (each body), between subunits, and across all subunits, which can better shed light to the case (Morgan, 2012; Baxter and Jack, 2015; Gustafsson, 2017). Qualitative information and data from the main actors in the forest governance in Greece, i.e. from within the regime itself – from its own eyes - offers a new perspective about the development of the forest governance regime and its bodies during the 2009 economic crises.

4.2.2 Qualitative research approach

Bryman (2012) asserts that qualitative research is concerned with social structures involved in a certain situation, while Winchester and Rofe (2010) claim that it can elucidate human environment and experiences within different conceptual networks/frameworks. Byrne *et al.* (2009,) claim that for topics related to policy and particularly about its implementation, such as the one that this study explores, qualitative approaches may be more adequate to address and capture underlying complex causation mechanisms. Furthermore, Betsill and Corell (2007) argue that qualitative research is particularly appropriate when it comes to addressing and assessing the influence of different actors such as subnational governments or non-state actors in environmental negotiations. Hochstetler & Laituri (2014) also note that the majority of literature on international environmental politics, including multi-level governance uses qualitative studies.

The preferred (qualitative) method for this study is interviews, which aim to get an insight in complex issues and exploring other people's experiences and enable researchers to gather data in a flexible manner. Robson & McCartan (2015) note that interviews also enable the researchers to study the natural language of the participants, which can add to the quality of the collected information. Even though interviews are often time consuming and require rigorous preparation to ensure that meaningful data are collected, they enable participants to share ideas more comfortably, and allow the conversation to take different paths with each participants, which can lead to different perspectives for the case. Interviews have previously been used by authors (Sevä and Jagers, 2013; Kochskämper *et al.*, 2016; Visentin, 2018; Burns, Eckersley and Tobin, 2020; Teichmann, Falker and Sergi, 2020) that studied environmental leaders, managers, or stakeholders in environmental governance, as this method is appropriate for studying differences and developments in specific bodies in governance. This fits the focus and scope of this study which is on the participants' views and experience about the development of forest governance and their organisation during the economic crisis.

One-on-one interviews were adopted due to certain constraints, the most important of which being the difficulty to bring all chosen participants together. Patton (2014) and Lofland & Lofland (1995) agree that one-on-one interviews are ideal for exploring in the mind and experiences of another human being, and that it is necessary to acquire social knowledge. The use of voice-recording tools and open-ended questions may create a flow in the conversation, which enables the interviewee to express their perspective unconstrained by other research findings, or the interviewer (researcher)'s opinions, and also talk about what they consider to be important (Dunn, 2010).

Interviews are also very compatible with a case study design. First, qualitative research is usually used to develop an understanding in an area, instead of statistically prove or disprove a certain hypothesis (Bryman, 2012; Robson and McCartan, 2015). Also, scholars such as Bryman (2012) and Baxter and Jack (2015) affirm that both frameworks (qualitative research/interviews and case study framework) allow the researcher to study (complex) phenomena in their own context and allow for better understanding of the circumstances and context in this specific setting. Third, they can be flexible in terms of adjustability and

modifications to the original plan/design when new discovery or new information during data collection arises (Yin, 2014).

The interviews in this study follow a semi-structured approach, which provide a combination between flexibility and structure during the interview, as the researcher relies on the interview guide/protocol (described later in section 4.3.3) that covers a list of questions or topics to be covered, while it allows for flexibility for the participant to answer in any way they prefer (Bryman, 2012; Creswell, 2012). An alternative approach would be unstructured interviews, where the researcher uses and has prepared very brief prompts before the interview, and are very similar in character to a conversation (Burgess, 1984), but was not chosen as this study has certain topics of interest that need to be covered. Bryman (2012) claims that if a researcher starts the investigation with a rather clear focus (and not just a general notion of what they want to research), then semi-structured interviews would likely be a good fit, in order to address the areas/issues the researcher has in mind. The structure provided by semi-structured interviews also allows for comparability across cases (Bryman, 2012) in multiple/comparative case studies or embedded single case studies.

In semi-structured interviews, questions should be asked to all interviewees in a similar manner, but there is also space for questions that may not be included in the guide to be asked if the interviewer picks on things said by the interviewees (Jacob and Furgerson, 2012). Literature (Bryman and Burgess, 1994; Holloway and Todres, 2003; Bryman, 2012) supports that open-ended questions are ideal as they allow for better exploration of the situation, the reasons behind it, and they can also elicit information rich answers. According to Bryman (2012), the limited structure and flexibility, which qualitative research tends to have, serves the researcher to be open and able to see things through the eyes of the others and it enhances the opportunity to actually reveal the perspectives of the participants. Flexibility also implies that the researcher should not delimit areas of enquiry too much by asking fairly general rather than very specific research questions.

However, the researcher should be aware that the limited structure and flexibility that qualitative studies tend to have may come at a cost. For example, if the researcher doesn't document clearly what they do and why, the lack of transparency can be interpreted as subjective or biased. Researchers including Bryman & Burgess (1994), Bryman (2012), and

Malterud (2001) propose that the researcher should document and explain a number of parameters relating to the selection of methods, participants, as well as qualitative data analysis, and results, which may often be unclear, and that the systematic collection, organisation and interpretation of data is essential for qualitative studies.

Another method-specific challenge is that the quality of the collected data, the analysis of the data, and the interpretation all rely on the skills, potential bias, and work of the researcher (Patton, 2002). Bias may create problems both in terms of the questions asked, elicited responses, as well as the interpretation of the responses, and concerns are raised especially in cases with lack of standardisation and transparency (Robson, 2002). To work around these issues the researcher could rely on open-ended questions, so that the respondents can have more room to express their views and can partly prevent or reduce bias during the interview (Creswell, 2012). In addition, a careful and structured approach to analysis can help to make sure that the interpretation of the analysis and the meaning that derives from it fit the data (Bryman and Burgess, 1994).

Finally, it can be extremely difficult to replicate a qualitative study, as the unstructured nature of different methods may depend on the researcher's familiarity, creativity, and intuition, and the participants' input may be affected by the researcher's characteristics (gender, age personality, etc) (Bryman, 2012).

4.2.3 Sampling strategies for qualitative data collection

According to Creswell (2012) the process of collecting qualitative data consists of 5 steps: (i) identifying the participants, (ii) gain access to them, (iii) considering the type of information and data that fits the research question, (iv) develop protocols and instruments for recording and collecting data, and (v) administer the data collection in an ethical manner. A similar structure is followed in section 4.3 below.

The sampling method in qualitative research is typically purposeful sampling, i.e., the participants are chosen on purpose to best help the researcher understand the phenomenon under research. Purposeful sampling fits qualitative research as it is used to develop an understanding and exploration of the phenomenon or case, but not to generalize to a population. Information-rich cases for an in-depth study are ideal for purposeful sampling, as they can illuminate different aspects of the case that is investigated (Patton, 2014, p.386-7).

Qualitative purposeful sampling strategies vary depending on whether they are employed before or after the data collection has started (Creswell, 2012; Patton, 2014; Miles, Huberman and Saldaña, 2020)). The sampling strategy for this research was chosen and employed before the data collection started; in other words, the interviews will take place with prepared material (e.g. questions). In particular, it adopts *theory or concept* sampling, in order to explore and discover elements and concepts that were key in the developments of the Greek forest governance in the period of economic crisis.

In terms of the number of interview participants, a typical sample in a qualitative research study is a few participants or sites, which is usually enough for the researcher to analyse the information provided by the participants and depict the case (Creswell, 2012). Although the number of participants in a research can play a role in the quality of the outcome, each additional interview participant offers less new information to the researcher, and increases the time and resources for data collection and analysis (Creswell, 2012). Malterud (2001) suggests that in some cases, depending on the topic and scope of the investigation, a smaller sample may be enough, as the findings will not be generalised to the entire population, but be interpreted as descriptions, notions, or theories applicable within the specified setting of that study.

4.3 Qualitative data collection

The interviews for this chapter were carried out with officials from bodies whose roles are important in the Greek forest governance regime. The choice of the bodies that would participate in the interviews depended on the structure and allocated responsibilities in the forest regime. This section describes who the interview participants are and how they were selected.

4.3.1 Identifying interview participants from the Greek forest governance regime stakeholders

The forest governance regime in Greece fits the paradigm of the multi-level governance (Hooghe and Marks, 2001; Bache and Flinders, 2004), as it employs different levels of forest governance, such as local (e.g. municipalities), regional, national, and supra-national (e.g. EU), as well as other non-state actors (e.g. NGOs, citizens, private sector) being involved in the regime. However, Greek private actors, a category that includes forest owners, industry,

or the public are not influential in terms of power, responsibilities, or forestland ownership, e.g. (Papageorgiou and Vogiatzakis, 2006). In addition, although the EU could play some role in the forest regimes of the EU states (e.g. section 3.4.2.1.2), it also considers that no EU body would have experienced direct impacts from the development of the economic crisis and crisis recovery management in Greece, and that at the same time no EU body could be responsible for the application of forest-related policies in the Greek forest regime. For these reasons, no EU body or private actors were considered for an interview for this chapter.

The main governance actors in the Greek forest regime are the national actors, as they are responsible for the formulation of the forest policies (mainly through the ministry of Environment), and their application (mainly through the Forest Services). Even if the forest governance regime underwent some significant changes in terms of structure during the last couple of years (intro), the responsibilities and power in the hands of national state and public bodies not only remain but are enhanced. The focus of this chapter is on some of the major Greek national state and public actors of the forest governance, how they developed and whether and how they have been affected by the economic crisis of 2009. The list of such bodies that are directly linked to the forest regime and whose members could potentially be useful interview participants for this chapter include:

i. The ministry of the environment, which are responsible for the formulation of the policies for the utilization and protection of the Greek forests.
ii. The national fire services, which have been responsible for the forest fires suppression since 1998, according to Law 2612/1998, but not the prevention of forest fires, which has remained the responsibility of the national forest services. The national forest services were responsible for both forest fire prevention and suppression, while the National Fire Service had a more auxiliary role in forest fires, between 1979 and 1998 (Law 998/1979).
iii. The General Secretariat of Civil Protection which undertakes the responsibility for planning, organizing, and coordinating actions for the prevention, preparedness, information, and response to natural disasters, such as forest fires, floods, etc. that cause emergencies (Law 3013/2002, article 6).
iv. The ministry of Interior Affairs, which is responsible for decentralized municipal and regional authorities, including the decentralized forest authorities until 2021.

In addition, decentralized actors (regional or municipal) have also been identified with significant responsibilities with respect to the forest regime. Two major bodies were identified as useful for this research:

v. Decentralised regional and municipal authorities, which have some responsibilities for forest areas in areas within the city plans, but have also had some common responsibilities for certain geographical areas with the forest services.
vi. The decentralised forest services, which are responsible for the application of the national policies in forests. The decentralised forest services administratively belonged under the ministry of interior affairs until 2021, when their administration was transferred under the ministry of Environment.

It is crucial that the majority of interview participants for this study comes from either national or decentralized actors, as the de jure administrative responsibilities about forests fall mainly on the Greek state and decentralised public authorities. Yet, apart from national and decentralized actors, this study considers ENGOs to be a very active actor in the Greek forest governance regime, as they tend to work both complimentary and critically with national state and public actors (look Intro). Among the different ENGOs, this research would only be interested in the views of the ones that have focused on forests as part of their mission, and not for occasional circumstances. Four (4) ENGOs were identified:

(i) WWF (The World Wildlife Fund) Greece
(ii) the Hellenic Society for the Protection of Nature (Ελληνική Εταιρία Προστασίας της Φύσης),
(iii) the Hellenic Forestry Society (Ελληνική Δασολογική Εταιρεία),
(iv) the Greek Biotope-Wetland Centre (Ελληνικό Κέντρο Βιοτόπων-Υγροτόπων (ΕΚΒΥ)).

Among the 4 identified ENGOs, members from WWF Greece, EKBY, and the Hellenic Society for the Protection of Nature have participated in the consultation for the Greek National Forest Strategy and have submitted proposals for the objectives, directions and actions per axis of the National Forest Strategy (Arktouros, Hellenic Society for the Protection of Nature, Hellenic Ornithological Society, Kallisto and WWF Greece, 2018; Arktouros, Hellenic Society for the Protection of Nature, Hellenic Ornithological Society, Kallisto, WWF Greece, *et al.*, 2018).

4.3.2 The list of the interview participants and settings

After identifying the potential bodies that would add value to this research through the interviews, the next action was to get in contact with them and gain access to them. The first step was to search in the websites of the interesting parties for contact details of their personnel or contact forms for the whole body, depending on the size and the role of the actor. The websites of the identified bodies offered either a contact form for communication purposes, contact details of specific staff members, or staff inventories.

The next step (Step 2) was to approach all selected potential participants, which amounted to sending them all a separate initial email or message in their communication forms with some brief information about the topic of the research, the focus of the chapter, why they were chosen, an enquiry about their willingness to participate and their availability, and my contact details. There was also a kind request to forward my message to relevant staff members, if the person reading the message could not be of help.

The third step was the 'negotiation' stage (Bryman, 2012). In all cases where the potential interview participants replied, they all had some questions regarding the research topic, methodology, and confidentiality aspects of the research, and in some cases some requests to participate in the interview. Their questions were happily answered in detail either by phone or email, accompanied by the participant information sheet (both in English and in Greek) in a follow up email. Two participants required the list of questions in advance; in these cases there was an agreement to send them a draft of the questions, but also explaining that more questions could be asked depending on their replies and the development of the interview. If the reply was positive, a third email would be sent, in order to arrange a meeting for the interview, taking into account any specific requests they may have expressed (eg. get the interview topics/questions in advance).

Ideally at least 2 senior members from each body would have been chosen to participate in the interviews, to enhance triangulation, but this was not the case with most actors. Even though the researcher contacted multiple senior members of staff from each body, in the cases that the members replied to the emails, they kindly directed me to the same member of staff, who in most cases eventually agreed to participate in the interview. This was possibly due to a combination of factors including (i) internal organization policies and arrangements

that designate certain staff members to deal with the public, (ii) the Covid 19 pandemic situation, taking into account both restrictions in place to safeguard public health and changes to working patterns and task arrangements, (iii) the lack of availability of senior members of staff due to the high workload in most bodies, which was also confirmed during the interviews. So, even though the interview participants were experts at the senior level in each body and their input has been very useful, since only one or two interview participants were interviewed from each body, their views may not be strictly representative for the body.

Given the small number of available options, consisting mainly of national public and state actors and ENGOs, the intended number of interview participants was between 4 (consisting of minimum 3 participants from the national and decentralized actors and 1 ENGO) and 6 (consisting of 4 participants from national and decentralized actors and 2 ENGOs). In the end participants from 5 forest governance bodies (3 from national and decentralized actors and 2 from ENGOs) were selected and agreed to participate in the study. In detail, the final list of participants consisted of:

1) Interview participant 1: Individual from Greek Biotope-Wetland Centre (EKBY) - ENGO

The Greek Biotope & Wetland Centre (or EKBY by its Greek initials) is a branch of the Goulandris Natural History Museum. EKBY was established in 1991 by the Museum following an application by the Greek Ministry of Environment, Physical Planning and Public Works, with funding from the European Union and WWF. Its overall objective is to promote scientific knowledge and renewable natural resource sustainability in Greece, the Mediterranean region, and the rest of Europe.

2) Interview participant 2: Individual from WWF Greece - ENGO

WWF Greece operates following European standards and is one of the most (if not the most) popular and active environmental NGOs in Greece, with more than 12.000 active supports nationwide. They have been active for more than 30 years in Greece through many workshops, projects, and actions, and they have actively participated in the consultation process for many national environmental policies.

3) Interview participant 3: Individual from Central Union of Greek Municipalities (KEDE) - Decentralized authority

The aims of the Central Union of Greek Municipalities are the promotion of the municipal and community self-government, the research of issues concerning self-government, the provision of data and information related to these issues, and supporting the cooperation among the Local Authorities Organizations. The benefit of interviewing KEDE instead of one or two municipalities is that KEDE represents all municipalities, and they can provide data and a perspective about common issues reported by/ for all or most municipalities, or common patterns. They are also aware of the variability of the municipalities' issues, situation, and development, regardless of their size, revenue, or other characteristics, which could have influenced the perspective of the representatives of isolated municipalities.

4) Interview participants 4 and 5: Individuals from the Hellenic Fire Service - National Public & State actor

The Hellenic Fire Service participates in dealing with any emergency that arises in times of peace or war, and in cooperation with the competent authorities and services, contributes to ensuring the national civil protection and civil defence. More targeted to this research, its mission includes the safety and protection of life and property of the citizens and the state, the natural environment and, in particular, the forest wealth of the country from risks of natural and technological disasters and other threats (Hellenic Fire Service, 2022). The participants were interviewed both separately (first stage) and together (second stage).

5) Interview participant 6: Individual from Ministry of Environment - National Public & State actor

Although most interviews took place in 2022, the interview with the ministry of environment took place in 2018 and the developments that took place later in time were not discussed in that interview. Even though further attempts were made to gain access to the same representative, or any other representative from the ministry of environment in 2022, in order to discuss the recent developments and progress since the last meeting, unfortunately these attempts were not fruitful.

One of the selection criteria for the interview participants was their long experience in their organization and their role. In terms of experience, all participants had years of experience in

their role and field, and had (upper/senior) management, or coordinating responsibilities in their bodies. In terms of expertise, all participants worked on either forest-related policy, or were educated foresters, except for the participant from KEDE, who nonetheless had the advantage of being able to provide very useful collated information and data about common patterns and perspectives for all municipalities in Greece regarding forest-related issues. This ensured that interview participants would be knowledgeable with both their organization and the post-2009 developments in the Greek forest regime through both their professional or academic experience.

After having agreed to an interview with the interview participants, the final step (Step 4) was to explore and finalize the interview settings with the interview participants and gain access to the agreed location. Among the interview participants, two (2) interviews were scheduled to take place online (EKBY, WWF Greece- via MS Teams), as either the participant was either too far, or had work-from-home style arrangements.

4.3.3 Protocols and instruments for recording and collecting data

A few protocols and instruments were used in this study to ensure that recording and collecting data would take place in an efficient and ethical manner.

4.3.3.1 Interview protocol

An interview protocol is the conversational guide that provides structure to the interview (Rubin and Rubin, 2012). Interview protocols are forms designed by the researcher, with the instructions for the interview process, questions that need to be asked and also allow space to take notes on the interviewee's responses. It is used by the researcher during the interview to have some structure during the interview and to remind of the questions that need to be asked. Interview protocols can enhance the transparency of a qualitative study, when reported appropriately and used as a systematic procedure for the recording of qualitative data (Creswell, 2012; Jacob and Furgerson, 2012).

The interview protocol for this study is available in Appendix 4.3 and follows a structure similar to the one suggested by Creswell (2012, p.226). It consists of 5 main parts, apart from the header:

i. Description of the event of the interview.

This part is meant to be filled by the interviewer on the day of the interview, in order to describe the time, place, and information of the interview participant.

ii. Provide information to the interview participant.

This part prompts the interviewer to inform the participant about the project, different aspects of the research and the interview, such as data handling and confidentiality. At the same time the interviewer is prompted to provide a printed participant information sheet to the interview participant, even though the participant information sheet has already been sent to the interview participant via email. Finally, ask the participant if they have any questions before the recording of the interview starts and ask for permission for recording the interview.

iii. Questions – Discussion.

This is the main part of the interview. The questions are described in the interview questions section below and a list of them is available in Appendix 4.1.

iv. Open floor to the interviewee.

Ask the participants if there are any other pieces of information or data that they would like to share, or elaborate on anything that they felt that wasn't covered adequately during the discussion/ questions part.

v. Thanking the participant for their participation and explain next steps.

This also includes letting them know about data handling, what the next steps are, how they can reach the interviewer/researcher or their supervisor if they have any questions or comments.

4.3.3.2 Recording protocol

Recording the data is an essential process in qualitative research (Lofland *et al.*, 2006). Qualitative researchers use data recording protocols to outline systematic procedures to ensure that high-quality data is collected and record information during data collection, either observations and interviews (Creswell, 2012). The process of recording the information can be either formal, e.g., audio recording and transcription of the conversation in a text file, or informal, e.g., taking notes. In either case a data recording protocol is

necessary for researchers to record information during interviews and structure the interview while taking notes (Bryman, 2012). This research used formal channels to record information, i.e., audio recordings and transcription of the recorded interviews in text files. Although some notes were taken during interviews, these were not to record information, but rather to keep note of some thoughts or links with parts of literature or other interviews for the analysis.

The initial recording protocol for this study involved the use of a mobile audio recorder, but after the first interview, both a mobile audio recorder and a digital audio recorder were used, in order to secure good quality of audio and to have a secondary recording device in case the battery of the first one died. In addition, two of the interviews were carried out via Microsoft Teams, both of which were recorded using the Microsoft Team audio recording service. After data collection had finished, the recorded files were then uploaded into Nvivo[35] and transcribed manually in Greek.

4.3.4 Interview Questions

The research questions were content-specific, in order to be relevant to the research topic, but they were neither too specific nor too generic (Dunn, 2010, p.110). The aim for the interview questions was to get information-rich answers and data, and at the same time get an insight about the development of the forest regime and specific bodies/actors from the participants' personal experience (Rubin and Rubin, 2012).

More specifically, the question topics were chosen with the aim to explore the impacts of the 2009 economic crisis in the Greek forest governance regime from the perspectives of its most considerable actors. This helped to identify both unique elements that may have affected each actor differently, as well as common elements that may have affected more than 1 actors at the same time. They also consider that many of the changes that took place in the Greek forest regime since 2009 were manifestations of the policies and overall direction that were adopted because of the 2009 economic crisis, such as austerity policies, environmental de/reregulation policies, or terms that were part of the bank bailout deals.

[35] NVivo is one of the most used software for qualitative data analysis (QSR International, 2024). Access to NVivo 12 Pro was granted through the university of Reading license agreement, which also justifies why this software was chosen over others.

However, they did not consider as given that all developments and changes were because of the crisis. For significant milestones or developments (forest regime or actor specific) that were linked to the economic crisis by the interview participants, interview participants were asked to provide relevant information and data (e.g. specific policies), and/or justify their statements that linked these changes to the economic crisis.

A balanced mix of questions, follow-up questions, and probes/prompts about certain research topics made up the question topics for the interviews (Rubin and Rubin, 2012). Each question topic had one main question; 3-5 follow-up questions that would be asked after the participants had answered the main question and would allow the exploration of specific aspects of the main question, if they were not addressed by the participant; and probes, which would encourage the participants to elaborate further on what they were discussing. Literature including (Bryman and Burgess, 1994; Bryman, 2012; Creswell, 2012; Jacob and Furgerson, 2012; Rubin and Rubin, 2012; Castillo-Montoya, 2016) helped to understand the importance and formulation of the main and follow-up questions, and the role of the probes.

The main question of the question topic was formulated in a broad and open-ended way, so that the interviewees could interpret it in a way that is more relevant to their experience and what they do and take it to different directions. For example, one such question about the challenges of their body during the economic crisis was formulated as “Tell me about/ What are the main challenges that [name of body] has faced since the beginning of the economic crisis?”, instead of asking them about specific challenges that were identified in the literature, e.g. “Have you faced x or y?”.

Follow-up questions aimed to cover different aspects of the topic, had they not been covered or discussed by the interview participant. Follow-up questions were formulated based on literature, or answers and suggestions from previous interviews about challenges in the regime. For example, follow-up questions about the question above would refer to potential challenges in terms of budget, policy, changes in the institutional framework, or lack of personnel, also by using open-ended questions, e.g. “What about changes in the budget?”. In some cases (unprepared) follow-up questions would address specific events, cases, examples, or policies that were addressed by the interview participants and were important and relevant to the research topic, e.g. “How did that policy [they had mentioned] affect

your organisation practically?" or "What changed since this policy was adopted?". Prompts to elaborate further and deeper on their answers were used both for main and follow-up questions, both verbally (e.g. 'Can you please elaborate on this?", "This sounds interesting", and with body language (nodding, facial expressions, etc.).

Even though all question topics were covered in each interview, there were variations in some questions, depending on the role and responsibilities of each participant/actor, or the development of the interviews. All question topics were based on literature and findings from previous chapters of this research and were relevant to both the research topic and the bodies that were interviewed, as suggested by Jacob & Furgerson (2012).

Five (5) question topics were formulated, namely (i) details about the specific body/actor, (ii) challenges for the body and the forest regime in general, (iii) opportunities for the future, or positive developments, (iv) the forest regime and collaboration with other bodies, and (v) the role of the public.

The first question topic, *(i) details about the specific body,* was used as an ice-breaker for the participants and also to get information about the relevance of the actor and their actions in the forest governance regime, in order to better assess their perspective.

The second question topic (ii) regarding *challenges for their organization and the forest regime since the beginning of the economic crisis* aimed to capture specific changes in the bodies' operations, standards, or outcomes that were related to changes in the budget of their body, or changes in the policy framework (e.g. C. Burns *et al.* (2020), C. Burns & Tobin (2016)). Even though not all interview participants were in their current role since the beginning of the 2009 crisis, the gravity of their input about this question topic relied on their knowledge (which can be verified by their seniority and responsibilities in their current role) about the current status, operations, issues, challenges of the organization they are employed in and the institutional framework for the part of the forest regime they operate in, some of which may have been formulated since the 2009 economic crisis.

Question topic (iii) about *opportunities and positive developments* was asked in a generic way, and there were no prompts about the time frame or a specific aspect of the forest regime. This was intentional so that the participants would express their opinions about what they considered to be a positive development, and interestingly there was an engaging

variety in the participants' answers and angles on the topic. Interview participants should be aware of the direction their organization is heading towards, including both short-term or long-term goals and challenges.

In question topic (iv) all participants were asked about changes in communication and collaboration among the responsible bodies in the regime in the forest regime, and other forest regime bodies they work closely with. Since the beginning of the crisis, there have also been changes in the institutional framework, e.g. some bodies were transferred under the ministry of Environment and Energy from decentralised authorities, which may have changed the collaboration among the different bodies (Chapter 4.5.2.3.2).

Question topic (v) captures the interview participants view and approach when it comes to the role of the public both in the Greek forest regime (more general) and the relationship with their organisation (specific). The different impacts and the contribution of the public in the development of the forest regime during cases of economic crises was one of the themes that was identified in chapter 3 (most clearly in 3.4.1.2.2). In addition, Chapter 5 takes into account the preferences of the public for potential investment in forests, and the comparison of the information and data between governance actors and the public can lead to some interesting points.

The order of the question topics was influenced by Jacob & Furgerson (2012) who suggest to start the interviews with the basics and questions that are easy to answer, in order to warm up the participant, and then move on to more challenging questions. For this reason, the first questions of the interviews would always be about the body the participant was employed at before moving on to specific questions about the economic crisis or the forest regime. For this, question topic (i) would only address the micro level, while question topics (ii) – (v) capture elements from both micro and macro levels, as well as the context in which the developments have taken place and (qualitative) elements that link the two levels, which has been one of the main goals of this chapter. Sometimes question topics (ii)-(v) would change order depending on the participant's answers during the interview, which is common in qualitative interviews (Bryman, 2012). The interview questions are available in Appendix 4.1.

4.3.5 Data collection

The data collection took place both in person and online (3 in person and 2 online) between September and October 2022, with the exception of the first interview with the ministry of the environment, which took place in February 2018. The online interviews (WWF, EKBY) were carried out via Teams and although there were a few instances of technical issues (slow wi-fi, interrupting connection), both remote interviews proceeded as scheduled and all questions were asked. In all in-person interviews (ministry, KEDE, Fire Service), access was granted at the reception of the building, after communication with the interview participants, while they required proof of my identity and the reason of my visit. They also provided visitor tags/Ids which had to be carried around inside the building. The interview with the Fire Services Representatives took pace in a meeting room, while the interviews with the representatives from the ministry and KEDE took place in the representative's office. Even though the same interview protocol was used both in the interviews that took place in person and online, I had the impression that participants that were interviewed in their working environment, i.e., office space, were a bit more relaxed and were willing to share more information and express themselves more freely.

The interviews were carried out in Greek and lasted between 40 minutes and 1 hour and 40 minutes. All interviews were recorded. In person interviews were recorded using either a digital recorder and/or a mobile phone recorder. The interviews carried out online were recorded using the recording service offered by MS Teams. Sometimes additional notes were kept in paper form in addition to the recorded conversation. The recorded files were then transferred to a password-protected personal computer, each in a separate folder titled as "interview # , date", format, e.g. 'interview #1 - 16/11/2022'.

All participants were sent the interview participant sheet before the interview, and were also provided with the same document printed before the interview started, in order to ensure their consent. This document described briefly but accurately background and research details, the selection process, participation terms, data storage, and a consent statement (Appendix 4.2).Before the interview started there would be some not-recorded chat, where there would be some introduction of ourselves and the topic, I (as the interviewer) would thank them for agreeing to participate, provide the participant information sheet, ask them if they are ready to start the interview. I used the interview protocol, so that I didn't neglect to

share important information with the interviewees, and to maintain some structure to the interview. The recording of the interviews started only after the participant's explicit consent.

The interviews explored major developments, or milestones that led to such developments related to the Greek forest regime and specific actors since the 2009 economic crisis. They enquired about the direction of developments in the interview participants' organizations, aspects of the forest regime they operated in and certain elements of the actors they cooperated with, which experienced and senior members of staff of these bodies would be expected to know and remember. The interviews would not require interview participants to remember specific data or temporal aspects of the developments that can be retrieved in databases. For instance, the interviews would enquire about whether there has been any change in the organization's budget since the beginning of the 2009 economic crisis (which the interview participant should be expected to know), and not necessarily the annual budget change after a specific law was introduced, although in many cases the interview participants would describe things with a lot of detail.

The semi-structured approach combined with open-ended questions encouraged the interview participants to talk about what they considered important or relevant. The questions and follow-up questions/prompts were framed in such a way which allowed the participant to take the question in several directions (e.g. "Tell me about ..", "Can you please elaborate on..". For instance, participants provided different angles when they answered the question about the challenges that their body faces/has faced since the beginning of the crisis. In cases when the interview participants referred to personal details about themselves of colleagues, or shared some information which they later asked me to not include in the project, those pieces of information were left out of the analysis, in order to respect our confidentiality agreement. In addition, there was no pressure of any kind towards the interview participants to answer any questions they didn't feel comfortable doing.

I used and applied 'basic counselling skills'(Jacob and Furgerson, 2012), including active listening, nodding, and facial expressions to make the interview participants feel heard and understood, and allow the interview participants to take up as much space as they needed. Sometimes this enabled the participants to expand on topics that this study had not considered previously, as well as occasionally elaborate on things that were not relevant to

the research topic. In the latter case I would allow the interview participant to conclude their thinking but would then kindly lead the conversation back to the research topic.

The interviews ended (as explained in the interview protocol which I used during the interview) with me asking the participants if they had any other information they would like to share, thanking the interview participants for their time and contribution, and explaining how I would proceed from there on, what they could expect after the interview, reminding them that they could get in touch with me or the research supervisor for any questions or comments until the designated date.

4.4 Thematic analysis and Data interpretation

4.4.1 The thematic analysis approach for analysing and interpreting qualitative data

This chapter uses thematic analysis to analyze the data. Thematic analysis has been one of the most common approaches to analysing qualitative data (Braun and Clarke, 2006; Bryman, 2012) and its goal is to identify patterns (themes) in the (qualitative) data, in order to address the research question or highlight specific areas in the research topic (Maguire and Delahunt, 2017). There is some flexibility in the approach, which should not create any issues with the analysis itself, if structured properly. Thematic analysis doesn't have identifiable origins, nor has it been outlined in terms of specific cluster of techniques (Bryman, 2012). Boyatzis (1998) describes this approach not as a specific method, but rather as a tool that can be used across different methods, while Holloway and Todres (2003) consider the process as a generic skill that can be used in qualitative analysis.

Coding or labelling is one of the most central processes to thematic analysis. It necessitates reviewing interview transcripts and/or field notes and assigning words or labels (codes) to pieces of text that seem to be of potential theoretical significance and/or information that stand out (Bryman, 2012; Creswell, 2012; Patton, 2014; Miles, Huberman and Saldaña, 2020). Bryman (2012) recommends that coding can be used both as part of the analysis, as a mechanism for thinking about the assigned meaning to the data, as well as reducing the amount of text/data that a researcher has to go through. However, even though coding is a very important step of the analytical process, it is not in itself analysis. The researcher should still evaluate the significance of the coded data, form connections and links between the

codes and reflect on the overall importance of the findings for the research questions that they drove the data collection.

Thematic analysis is based around the idea of creating codes from the (transcribed or notes) text to form descriptions and themes in the available data, and then narrowing and grouping the coded data down to a few core themes. A more detailed definition of a theme comes from Bryman (2012, p.580), who describes that "a theme is:

a) A category identified by the analyst through their data;
b) That relates to his/her research focus (and quite possibly the research questions);
c) That builds on codes identified in transcripts and/ or field codes;
d) And that provides the researcher with the basis for a theoretical understanding of his or her data that can make a theoretical contribution to the literature relating to the research focus."

Ryan & Bernard (2003) have suggested some techniques that can help to identify themes, namely repetition of topics; indigenous or local expressions (in vivo coding); metaphors and/or analogies; respondents' transition between topics; similarities and differences in how respondents may discuss the topic; linguistic connectors, i.e. words like 'because', or 'due to' to signify a causal connection; missing data, or reflect on what respondents are not saying; and theory related material.

Literature provides many suggestions regarding creating themes and coding the data, some of which provide a guide with the steps involved in coding the data. Some such guides have been proposed by (Braun and Clarke, 2006; Guest, MacQueen and Namey, 2011; Creswell, 2012; Maguire and Delahunt, 2017; Sheard, 2022). Most guides agree or propose a similar approach, which includes the following steps (briefly):

1. Get a sense of the whole – Explore the general sense of the data.
2. Consider what each person (participant/interviewee) is talking about.
3. Identify text segments and assign a key word or phrase that accurately describes the meaning of the segment.
4. Make a list of all the code words; group similar codes and discard redundant ones if the list is too large.
5. Go back to the data and check for any new emerging codes, and highlight words that support codes.
6. Identify 5 to 7 themes from grouping codes together. Themes are in principle codes aggregated together when they share a common thread.

One of the main advantages of thematic analysis is that it allows cases to be researched in depth, and therefore preserving the meaning, perspective, and relationship that each individual/participant articulates within the studied case (Flick, 2020), including both the within and across exploration for participants in the selected case. This process can be iterative, i.e., there can be a back and forth between the data, theory, and the analysis. This approach can be flexible in the definition of themes through codes (Bryman, 2012), and it can offer a rich representation of complex and large amount of data (Braun and Clarke, 2006).

However, researchers like Braun and Clarke (2006) and Bryman (2012) advise that there are also some tricky elements in this approach that may attract criticism, most of which derive from poorly conducted analysis or unsuitable research question, rather than the method itself. Starting with the flexibility of this approach, which, although allows for a wide range of analytic paths, makes the analysis difficult, due to the lack of specific theoretical and practical guidelines/checklist to follow, so that the researcher is unable to decide which data they should focus on (Braun and Clarke, 2006). Also, if the researcher doesn't develop a decent analytical narrative (specific points/anchors) then the analysis will look more like a description and summary of the text without any interpretation. The validity of the findings may also be compromised by the researcher's bias, which can be expressed in the interviewer's language (questions), which affects the participants' angle or interpretation of the situation , or the lack of coherence and consistency between the data and the reported codes and themes (Bryman, 2012; Javadi and Zarea, 2016). To overcome or mitigate the majority of these issues, literature (Attride-Stirling, 2001; Holloway and Todres, 2003; Bryman, 2012) suggests the researcher should be clear about their process, i.e. what, why, and how they are doing what they are doing in the analysis. By describing the steps of the process, assumptions, and the reasons behind it, the evaluation and comprehension of the study will be much easier, while the study may be easier to compare and collate with other related projects (Attride-Stirling, 2001; Bryman, 2012).

4.4.2 Steps taken to interpret and analyse data

4.4.2.1 Step 1 Preparing and organising the data for the analysis

In the early stages of the analysis after the data collection, due to the large volume of the information gathered, the available data was organised in separate folders, and duplicate

copies of all data were kept. These preliminary actions related to the systematic collection and organisation of the data were helpful to ensure that:

i) The data were easier to work with and more manageable, including both the workload and relevant files. For example, each interview could be looked at separately, before looking at reflective notes, and interview notes (where available) for each interview, and when all material for each interview were taken into account then the researcher could move on to the next. This made the development of codes and themes easier and more careful as the data was not mixed and the focus was clearer.
ii) It allowed space for experimentation with different variations of coding and themes of the data.
iii) The original files in their original forms would remain raw, as they were collected, and not mixed, including reflective notes, interview notes, and transcribed text.
iv) I could get familiar different applications that could help with the analysis, i.e. NVivo.

4.4.2.2 Step 2 Initial exploration of the data through initial coding

Once the data was organised in folders electronically, the next step was to transfer the data on to NVivo, where the transcription of all recorded interviews into text took place, going through the interview and the text at the same time. Data from all semi-structured interviews were transcribed verbatim to make sure that the transcription was accurate, which also allowed to reflect on the content of each interview. Dunn (2010) notes that the process of transcription allows the researcher to deal with the data again, and that immersion in the data provides some preliminary form of analysis. During the initial contact with the data, only some general notes about concepts that were especially interesting or significant were taken, as well as highlighting of some key words or phrases.

4.4.2.3 Step 3 Coding and Refinement

After all the data were transcribed and explored once, the data were reviewed again and the initial codes refined through a process of repeated examination, as suggested by literature (Bryman, 2012; Creswell, 2012; Hope, 2015). The initial coding of the data included segmenting, labelling, and highlighting the text, to form descriptions of different sections which provided some useful information and data.

With each additional readthrough, more codes and labels were added to the point where no more codes would emerge from the transcripts (theoretical saturation). New codes stopped

emerging after the process of coding had taken place 4 or 5 times per interview. Codes and labels were assigned to text that was as little as 1 sentence to as large as a group of paragraphs. Through the process of repeated examination, the codes were also refined to describe topics, processes, and ideas better (Braun and Clarke, 2006).

After the first 2-3 times, a list of all code words was created and collated with all interviews, in search of similar or opposite notions during the next subsequent 2-3 readthroughs. The code/node list was drafted both in paper and in NVivo. More than 60 different code names were identified from all interviews, some of which were renamed and refined after the subsequent readthroughs. Apart from codes, verbatim respondent quotations, or in vivo codes were also collected, in order to add value by revealing how respondents perceive and express their views and meanings through their own words, rather than the researcher's (Baxter and Eyles, 1997).

4.4.2.4 Step 4 Theme development

After the list of codes was compiled and no new codes would emerge from additional interview readthroughs, the process of developing themes started. Although the process seemed easy at first, due to having been through the interviews many times and having created a list of all words, theme development proved challenging as it required not only to group codes together, but to do so in a way to create a coherent and realistic story/ framework.

The initial stage of theme development consisted of collating codes throughout all available data, i.e. similar or contrary information and perspectives through all interviews. An important challenge during this stage was that many codes would fit in multiple themes. To overcome this issue the list of codes was then transformed into a coding manual, where each interview would have its own list of codes and potential themes. This helped with managing and handling the creative process of creating different themes for each interview, before getting codes and themes from all interviews together.

Additional means were used to help with the creative process of creating coherent interrelating themes, and therefore the visualization of the story, which is frequent in qualitative research (Miles, Huberman and Saldaña, 2020). Such means would comprise all themes to be written in post-it notes with the name of the theme on top of the paper and

the aggregated list of codes under it. These post-it notes would then be rearranged or aggregated in different groups to create different major themes, each of which would then be reflected in different colour both in post-its and NVivo. The initial list of themes (and post-it notes) consisted of minor themes, the aggregation of which led to major themes. During this process the initial list of themes were either used on their own (turning into major theme), or aggregated with other themes into a major theme, or were used to support the story for different major themes. This process continued until the final list of themes was reduced down to a number that could formulate a story supported and reflected in all interviews.

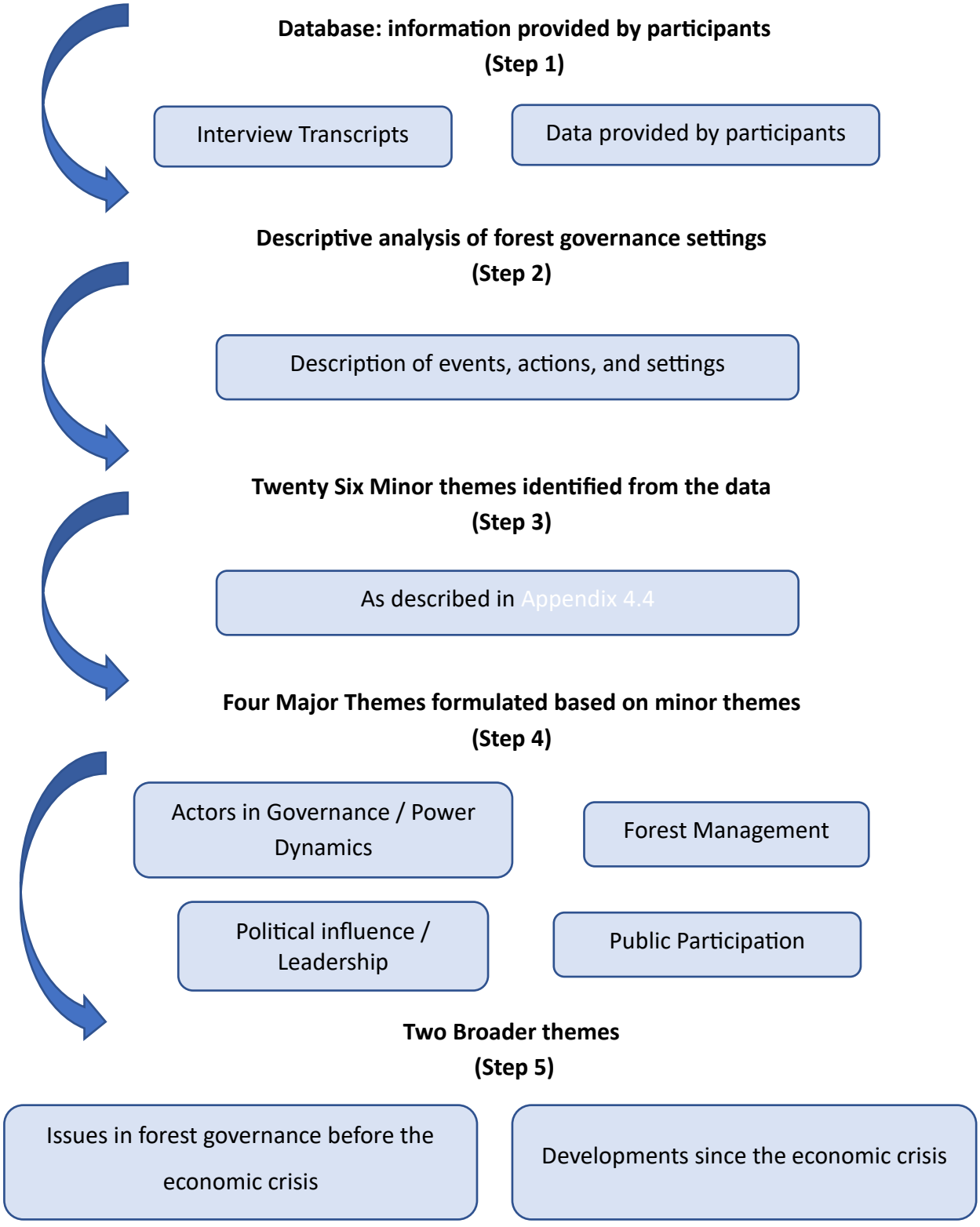
The final list of major themes included both ordinary themes, i.e., themes that I expected to find and were suggested by the literature (e.g. forest governance regime dynamics), and unexpected themes, i.e. themes that were not mentioned in the literature or suggested from other sources of data and information (nor mentioned previously in other chapters), such as certain elements of public participation, or change of direction for the forest regime). All major themes were supported by multiple perspectives, i.e., the information and perspectives provided by different interview participants.

Furthermore, some auxiliary lists of codes were developed, which did not classify as a separate theme, i.e., tell a part of the story, but helped with the understanding of the background of the other parts of the story. For example, one such list would contain all policies that the interview participants referred to during their interviews, and another one would encompass the participants' description of the structure of their organisation or the forest regime before/after the economic crisis. These auxiliary lists were used to enhance the significance and the realism of other major or minor themes, and help with the depiction of the theoretical and conceptual framework/model.

4.5 Analysis- Themes

The thematic analysis in this chapter was formulated in 5 consecutive steps, each of which refers to different levels/arrangements of collated information and data. Each step is a continuation of the previous step, and they are meant to represent the data using interconnected levels of themes, both minor and major, which start from elementary/early minor themes in the early steps to formulating more sophisticated themes in the final ones.

Figure 4.1 Steps of thematic analysis



Source: Own elaboration – *Content derived from data and codes during the analysis*

Figure 4.1 above depicts the steps of the thematic analysis in this chapter. Starting from the top, the first step of the analysis refers to collecting and working with all the raw information

and data shared by the interview participants. The raw data from the interviews was originally recorded in two recording devices and later transcribed verbatim. The transcription of the raw data generated the interview transcripts and also allowed for the identification of other (secondary) data, such as specific laws and webpages, etc., which were mentioned by interview participants, both of which are included in the 1st step of the analysis. In addition, secondary data from official databases and webpages (ministries or statistical authorities) were collated together with information that were shared with the interview participants, when such data were available, in order to enhance triangulation. Secondary data that were not shared by the interview participants, but were collated to the information they shared, are cross referenced in the Appendix and not directly in the analysis. For example, funding towards local administration was mentioned by some interview participants, but without providing numerical data; this data was explored by the researcher in official national webpages and databases in order to check and verify the interview participants' claim.

The second step is essentially the first level of coding, which took place by refining the data from step 1. While going through the transcript text and the secondary information offered by the interview participants, text passages, ranging from as small as a few words quoted by the interviewees to whole sections/paragraphs, were highlighted and added a tag (code) with the broad meaning of the passage, if the information offered was useful regarding the evolution and description of the Greek forest governance regime. At this stage, interview transcripts were analysed separately, and some passages of text might have not offered any valuable information, and were not highlighted nor added a tag, and were not used further during the analysis. At the same time others may include multiple meanings or may be linked to a variety of aspects of the evolution of the Greek forest governance regime during the period of the 2009 economic crisis. These text passages were attributed more than one tags/ codes if the meaning or concepts in that passage matched more than one areas of interest. In total, more than 360 codes were attributed to the text from all interviews combined.

Step 3 includes further refinement of the information from step 2 and narrowing down the number of attributed codes in the text. This is the second level of coding, and in practice it takes and organizes the attributed tags and highlighted text from all interviews into groups of similar ideas or concepts, producing smaller families of codes across all data, i.e. minor themes. In other words, each minor theme comprises a group of text passages with similar

notions retrieved from all interviews. In total, 26 minor themes were identified in this study, based on the data and information shared by the interview participants. These minor themes may not have been discussed in length in all interviews, but they relate to common ideas and concepts in most or all interviews.

In step 4 the major themes from the interviews are formulated based on the identified minor themes from step 3, which is displayed in Appendix 4.4. The four (4) formulated major themes refer to how policy affected four major areas of the forest governance. These are:

(i) *Actors in the governance & Power Dynamics*
It refers to the capacity of each actor separately to perform their tasks, their network and collaboration strength, and how changes in their power may have affected their goals and capacity to perform their tasks, as well as other actors to perform theirs.

(ii) *Political leadership*
This theme refers to the leading actor of the forest regime, i.e. the state actors and their role with the forest regime, with respect to legislation, responsibilities, direction, support, and goal setting.

(iii) *Public participation*
This theme refers to how the public's perception and participation in the forest regime has developed through policies and other changes in the governance.

(iv) *Forest management*
This theme is about administrative and economic aspects of the forest regime in Greece, such as economic activity, timber management, as well as scientific and technical aspects such as forest protection, and forest regulation (policy framework).

Even though each theme describes considerable policy-related changes and developments to each area of forest governance separately, different policies may have affected more than one areas (themes) of the forest governance at the same time, i.e. some policies may be applicable to more than one major themes.

Further two (2) broader themes were formulated, to further support the role of the economic crisis in the analysis, namely developments in forest governance before and after 2009, when the economic crisis started in Greece (Step 5), both of which are viewed through a reflection of all major themes. In other words, step 5 takes the 4 formulated major themes and looks into them from 2 different perspectives, i.e. the pre-crisis period and the crisis period. Even if the interview participants were not asked directly about the pre-crisis regime,

they all expressed that the developments following to the 2008 economic crisis were linked with or were dependent upon the existing conditions and status of the Greek forest regime and its continuous decline for decades before the economic crisis. These broader themes are illustrated in Figure 4.2 (before 2009) and Table 4.2 (since 2009). The analysis is based on this categorization, firstly focusing on the pre-crisis forest regime in Greece (section 4.5.1), and then examining the post-2009 developments (section 4.5.2), before moving to the current situation and the way forward (section 4.5.3).

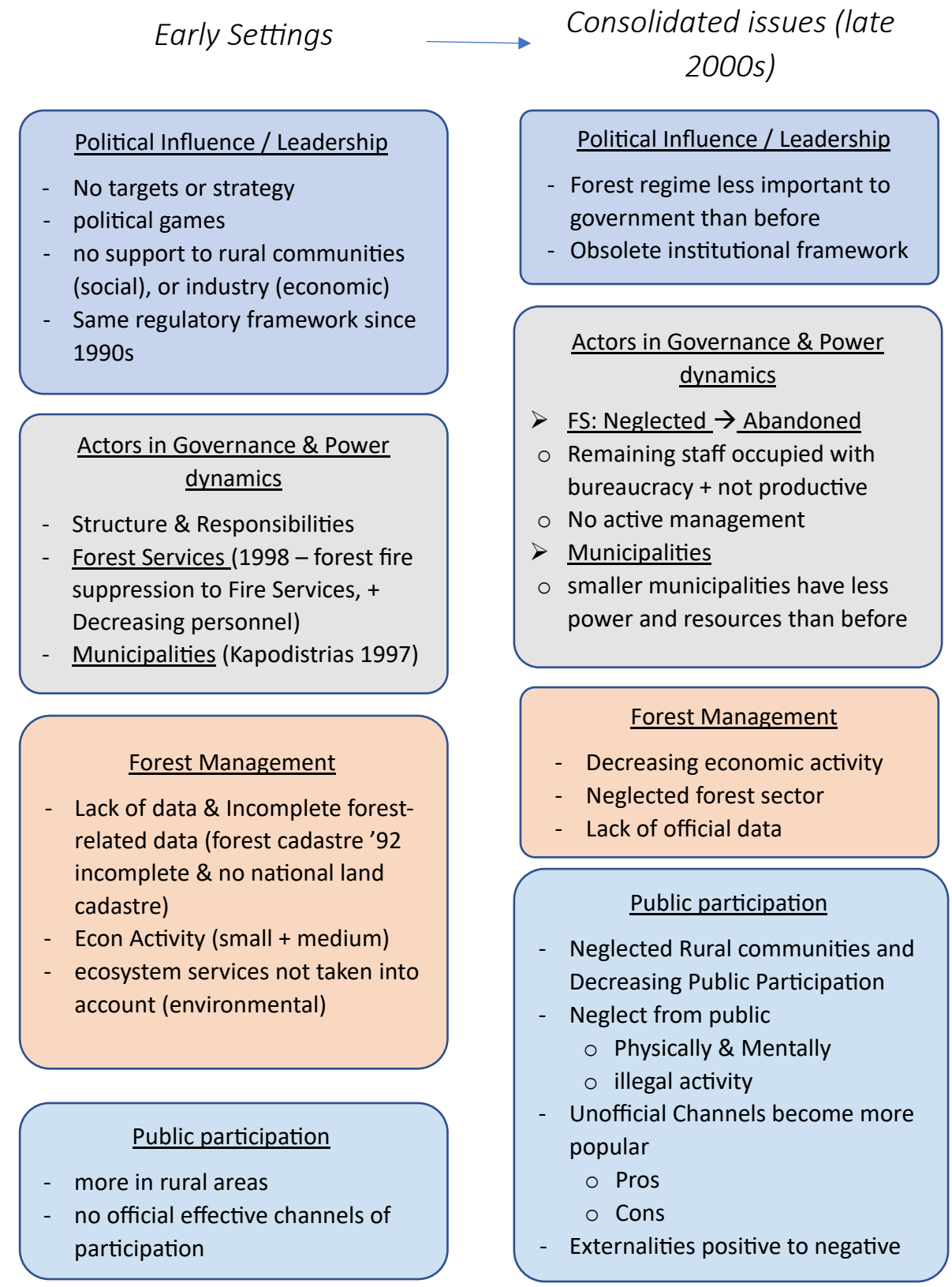
Due to the nature of the focus of this study, the analysis below intends to depict not only *what* happened, i.e. the development of the events and settings in the Greek forest governance, but more interestingly explain *how and/or why.* In other words, apart from the description of the major and minor (main and secondary) themes (*what*), the identified themes are connected to display both a chronology and sequence of events (*how/why*) that took place since the beginning of the economic crisis in 2008. The analysis can be read as a coherent narrative which leads from one finding to another linking all the themes together. In this study both the data and the analysis are qualitative. However, in some cases quantitative data and information were also collated with the data shared by the participants, in order to increase the validity of the findings. Such data are cross referenced in the appendix and not in the analysis directly.

4.5.1 Issues in the Greek forest governance regime before the 2009 economic crisis

The first broader theme refers to issues and aspects of the Greek forest governance regime that pre-existed the economic crisis, and were linked to or enabled the developments during the economic crisis. Different participants described different long-term conditions and neglected aspects of the Greek forest regime, and how certain aspects that have been neglected for years or decades can evolve into a *"pathogenicity"* that would not only be much more difficult to deal with, but would also create additional problems in the regime.

Figure 4.2 below illustrates the evolution of some aspects of the Greek forest regime from the early 1990s to before the 2009- economic crisis, in order to showcase how the conditions of the Greek forest governance regime evolved up to beginning of the economic crisis. Only elements of the forest governance regime that were addressed by the interview participants during the interviews are included in the figure below.

Figure 4.2 Pre-crisis Greek forest governance regime



Source: Own elaboration – *Content derived from data and codes during the analysis*

The left column describes elements that existed from as early as in the early 1990s, while the right column describes how these conditions may have turned into consolidated issues at the time the financial crisis erupted in Greece. Both the left and right column refer to the 4 major themes, each assigned to a different colour.

4.5.1.1 Political Influence / Leadership

The Greek forest regime has chronically been neglected by the political leadership. The support of decision makers at the national level started declining since at least the early 1990s, while officials often failed to acknowledge the environmental and social values that forests provided at both local and national levels. For decades the regime went on without targets, an active strategy or official plans for a sustainable forest sector or the communities that relied on it, until very recently when the Greek forest strategy was adopted (2018). Environmental values, such as carbon sequestration, biodiversity, recreation, and flood control have systematically been neglected from policy makers and governance leaders, focusing more on economic and productive aspects of forests (Interview Participants 1, 2).

In addition, politicians at either national or regional levels have used jobs in forest related authorities to gain popularity and votes in national and regional elections, without consideration for qualifications or suitability for forest-related roles and tasks. This was often the case in rural areas, when forest services were still a branch of the central government, before decentralization policies and administrative reforms took place in 1997 and 2010. Interview participants also commented on the majority of officials and decision makers' lack of active support towards the forest regime, regarding rural communities, forest economy, infrastructure or projects related to forest area. At the same time, any forest-related initiatives or projects kickstarted or designed at local levels from local authorities or interested parties were halted or stopped when such projects required the participation or approval or officials with higher levels of authority, such as the forest certification of the Mainalo forest in 2005, which was initiated at the local level, but was abandoned when it needed the approval of officials at higher levels (Interview Participants 1, 2), or diverting the supply of logs for power poles from the domestic market (East Pindos forest loggers) to foreign providers in neighbouring countries (Interview Participant 2).

As we get closer to the present day, the forest regime get progressively less important and attractive to the political leadership and decision makers, as the forest sector remains insignificant in terms of GDP contribution, the numbers of employed or directly related to the forest regime are either stagnant or declining, and more people are moving into urban centres (Appendix 4.7), which become more popular and attractive for employment compared to rural areas (Interview Participant 2).

4.5.1.2 Governance actors and power dynamics

During the 1990s the lack of state support towards the forest services was mainly expressed through the initial decline and later freeze in permanent staff recruitment for the Forest Services which started in the early 2000s, regardless of the retirement of the existing staff; the recruitment freeze lasted for 20 years until new permanent staff were promised to be recruited in 2022 (Ministry of Environment and Energy, 2022). The annually declining number of remaining staff had to undertake more workload, which in combination with declining funds enabled a situation where the remaining staff would be preoccupied more with bureaucratic processes and paperwork and less with the active management of the forests or relevant FM projects (Interview Participant 1).

> *"they got stuck in the office rather than being in the forests"*
> *(Interview Participant 1)*

To add to that, in 1998 the responsibility for forest fire suppression was transferred from the Forest Services to the national fire service, which had adverse consequences for the Forest Services and the forests. For example, in case of a forest fire the national Fire Services officially have to prioritize and commit human resources and vehicles towards preventing damage to human life and private property before the natural environment (Law 4662/2020)(Interview Participant 5); in contrast when the Forest Services were responsible for fire suppression, the natural environment was higher in their priorities, with the national Fire Services assisting when necessary towards saving and preventing damage to human life and private property (Interview Participants 2, 4, 5). The transfer of responsibility also led to a decline in the Forest Service's funds, personnel, and status (Interview Participant 2).

Major changes also took place in the local and regional level in the 1990s, that changed the forest-related responsibilities and funding of local and regional authorities. In 1994 law

2218/1994 was adopted to tackle the lack of resources that local authorities were facing, by essentially allowing regional authorities to take over the role that prefectures had played until then; however, even though the leaders and assemblies of the new authorities would be elected by the public, they would still be financially dependent on the central state (Interview Participant 6), [also (Kalimeri, 2018)].

Later, the government implemented the Kapodistrias reform (Law 2539/1997), aiming to enhance the role of the municipalities and promoting local development by reducing the number of local authorities from 5775 to 1034 through merging, and developing a decentralised state administration at regional level for the first time, the heads of which would be pointed by the government (Ioannidis, 2016; san simera information bank, 2020). Although the Kapodistrias reform helped to upgrade the local government structure and enabling economies of scale and enhancing local comparative advantages (Ioakimidis, 2000; Hazakis and Ioannidis, 2014), the state still had too much power and was still steering the wheel for local government authorities (Spanou, 2008; Kalimeri, 2018); as a consequence, Greece remained one of the most centralized countries in Europe, while municipalities and prefectures could not manage to efficiently coordinate their actions share their resources (Ioannidis, 2016; Kalimeri, 2018).

A combination of the state-dependent local governance authorities after the Kapodistrias reform (1997), the weakened role of the National Forest Authorities, the decreased public participation in the forest regime led to the Greek forest governance regime being very much state-led at the time when the economic crisis was manifested in Greece. The long-term lack of leadership on behalf of the state, expressed through the reactive mentality, the absence of a long-term forest strategy, and the lack of support towards the forest sector has transformed the neglected stakeholders into abandoned ones; abandoned forest services that “can’t cope with the workload or even perform their duties” (Interview Participant 3); abandoned rural areas both in terms of the forest sector and the local communities, who have started to “turn their back on forests and rural areas, both physically and mentally” (Interview Participant 1); empowered local authorities that are still state-dependent or influenced and can’t coordinate their actions or budget.

4.5.1.3 Forest management

The Greek forest regime has been showing signs of stagnation and neglect since the 1990s (Interview Participants 1, 6), and both social, economic, and environmental conditions started deteriorating since the late 1990s-early 2000s (Interview Participants 1, 2, 6). Neglect for data regarding the Greek forests has been a significant issue that affects multiple aspects of forest management and policy (Interview Participant 1). Lack of official data relevant to the Greek forest regime in is highlighted by the lack of an accurate and up-to-date National Forest Inventory and National Land Cadastre, as well as lack of provision of forest-related data to international databases, e.g. FAO (2005), or data based solely on estimations and questionnaires, which don't account for the variations in forest cover from forest fires, forest plantations, or other developments which may have changed the regime (e.g. World Bank (2023b) for the forest area national estimates, or FAO (2010, 2020).

An illustrative example is the only National Forest Inventory in Greece started in 1965 and was completed in 1992, hinting at signs of a chronically neglected regime. A characteristic example in this case has been that the first phase of the National Forest Census, which consisted of the data collection of different Greek regions, was completed in 1985, but the delivery of the whole project was delayed until 1992 due to lack of trained staff and equipment, e.g. computers (Interview Participant 1) [also (Ministry of Agriculture, 1992b; Dasarxeio, 2020)].

In addition, even though economic and productive aspects of forests received more attention compared to environmental or social aspects and values, forest-related economic activity in Greece had always been of small or medium scale following a decreasing trend since the late 1980s, with no large-scale exporting timber or furniture industry (Interview Participant 2) [also (Appendix 4.5)]. The lack of state support towards any aspect of forest economy, either primary or secondary (e.g. logging, non-timber forest products, industry) can justify the lack of economic growth in the forest sector.

4.5.1.4 Public participation

The public participation in the Greek forest governance has depended a lot more on interpersonal communication and unofficial channels in local communities (similar to participation and forest management in local commons in Chapter 2.3.2), rather that

established official channels of participation. This is due to the top-down structure of the Greek forest governance regime and explains why rural communities have been more active in participating in the forest regime, compared to urban ones, as rural communities often rely more on interpersonal communication in local networks of action, such as economic activity (e.g. forestry or agriculture), or council meetings (interview Participants 1, 2). The increased participation in rural communities compared to the urban areas can also be explained by the fact that small and medium-size economic activity, which the national forest economy mostly consists of, is found more frequently in rural areas, rather than urban ones. People relying on forests for their living, either for income or subsistence, have a significant incentive to participate in forest governance.

Although the main activities and focus of the public, forest authorities, and professionals in the forest economy may be different, their actual presence in forest areas has an external positive to the forests in different ways that are often not taken into account by the state authorities. Such externalities include maintaining or reporting infrastructure issues (e.g. roads, or flood protection projects), being vigilant for forest fires or illegal activities (e.g. illegal logging), working on small projects with their own expenses (e.g. building benches or water fountains in remote forest areas) or encouraging members of the local or neighbouring communities to participate in recreation activities in forests (e.g. hiking) (Interview Participants 1, 2, 4, 5) (similarly to local commons in Chapter 2.3.2). However, the lack of state support towards the forest sector, industry, and rural communities has led to a drastic decrease in both the rural population and forest-related economic activity[36], which had both direct and indirect effects, such as losing on the aforementioned positive externalities. Most of these positive externalities (see section 2.3.3) started to decline to the point of some of them were completely eliminated, or even turned to negative externalities (adverse external effect) in the long run (Interview Participants 1, 2, 5).

The combination of population decline, drop of economic activity in rural and forest areas, and the weakening of the role and power of the Forest Services had also had an adverse effect on public participation in the forest regime. One of the main channels of public

[36] the percentage of the total population living in urban centres reached approx. 75% in 2001 compared to approx. 58% 10 years earlier in 1991 (Hellenic Statistical Authority, no date)

participation in the Greek forest regime, the everyday official and unofficial communication with the staff from the National Forest Services deteriorated significantly from both ends, i.e., the weakening of the Forest services, and the shrinking of rural communities, whose livelihoods relied less on forests and forest areas (Interview Participants 1, 3).

In addition, the combination of neglected forest authorities with the lack of meaningful participation channels for the public has enabled and established unofficial channels of participation, where both forest authorities and the public may be more flexible and sometimes bypass rigid, outdated, and cumbersome regulations and policies to achieve their goals (Interview Participants 1, 2, 3) [also (Spanou, 2008)]. In many anecdotal cases, local forest authorities and local communities or even individuals could work together unofficially, bypassing official (sometimes bureaucratic) processes in order to achieve certain agreed actions or developments, for example by allowing the local community to maintain forest roads close to their property, or bypassing official processes to permit individuals to install a bench/rest area or a water fountain facility inside a forest area (Interview Participant 1). However, the lack of human presence in forests, either by forest officials, the public, or professionals has enabled space for illegal activities, such as illegal logging in many (unreported) cases.

4.5.2 Developments in the Greek forest governance regime since the beginning of the 2009 economic crisis

All participants acknowledged that since the beginning of the economic crisis in Greece in 2009, there has been an overall deterioration in the Greek forest regime, with the main adverse impacts being related to the decline and lack of funds and personnel, particularly for the Forest Services. These 2 main adverse impacts reportedly had a ripple effect on other areas of the forest regime. Changes in the policy framework were also reported as major significant developments since the beginning of the 2009 economic crisis both in the macro (large-scale patterns) and micro level (specific policies/laws). On the macro level, incoherent changes in the policy framework with respect to environmental deregulation, which may at times undermine policy enforcement (Interview Participant 1), as well as the weakened capacity of forest regime actors to perform their tasks, which leads to other actors undertaking tasks from other bodies – sometimes irrelevant to their defined tasks – (Interview Participant 4, 5) should be made prominent. In the micro level, Law 4280/2014,

which expands the areas of and facilitates large-scale economic investment in forest areas was also reported as one of the most significant developments since the beginning of the 2009 economic crisis, and the progress of the national forest cadastre were also pointed out as major developments (Interview participant 2, 6).

Table 4.1 below describes each interviewee's view about the main direct impacts of the economic crisis and the main issues of the Greek forest governance at the time of the interview. Most interview participants (Interview Participant 1, 3, 4, 5) recognized that many of the developments that took place during the economic crisis have had a cumulative effect in terms of duration, i.e. the longer a problem persists, the worse it gets, and in terms of combination with other effects and changes, i.e. the cumulative effect of a combination of issues is more difficult to deal with than with the sum of the same issues separately, as each issue has potentially significant spill-over effects on other areas or even other bodies.

Table 4.1 Direct answers from interview participants: Biggest effects of the 2009 economic crisis

	Biggest effect/development of the crisis
Interview Participant 1	- Lack of personnel (For all bodies but mainly for the forest services) - Passive & reactive management - Environmental Deregulation without coherent policy framework
Interview Participant 2	- Lack of personnel (For all bodies but mainly for the forest services) - Lack of funds (For all bodies but mainly for the forest services) - Forest cadastre in progress
Interview Participant 3	- Lack of personnel - Lack of funds
Interview Participants 4 & 5	- Lack of personnel (For all bodies) - Lack of funds (For all bodies) - Responsibilities from other bodies
Interview Participant 6	- Lack of personnel (primary) - Lack of funds (secondary) - Law 4280/2014, expanding the areas of economic investment in forest areas

Source: Own elaboration, based on interview participants answers

In addition, the situation has been aggravated by the long-standing lack of (accurate) relevant data and unclear forest property, which is highlighted by the absence of land/forest cadastre and up-to-date forest maps (Interview Participants 1, 2, 3, 6). Another example is the discontinuation of the annual reports for forest-related activities from the ministry of environment, energy, and climate change in 2014 (referred to 2011), aimed to inform the political leadership and interested parties about the current state of Greek forests [also (Ministry of Environment Energy and Climate Change, 2014)] (Interview participant 2).

The section below describes both the considerable developments in terms of the 4 major themes, their effects, as well as how the forest regime transformed. Even though all interview participants classified the overall impact of the 2009 economic crisis onto the Greek forest regime as negative, they also address how certain positive developments also took place since 2009. Table 4.2 below describes the developments that took place in the Greek forest regime since 2009, classifying them into 3 categories, namely positive, negative-new, and negative- deterioration for each of the 4 major themes.

4.5.2.1 Political Influence / Leadership

Soon after the economic crisis started in Greece, the government asked for the financial assistance of the European Central Bank (ECB), the IMF, and the European Union (EU) (the group is also referred to as the troika of lenders). The help offered by the troika to save the financial sector was accompanied by economic adjustment programmes, a set of policies and structural changes related to various sectors of the Greek economy.

Although all interview participants accepted that Greece did have commitments towards the troika of lenders, there were often no specific requirements about the application. For example, although austerity policies were agreed, the lenders did not dictate specific areas and actors, they should be applied onto, which comes down to the priorities of the government(s) to determine how these policies will be applied, to what degree, and over which bodies. Nonetheless, the political leadership justified the austerity policies based on the memoranda obligations and commitments, that resulted in declining funding and freeze in hiring new permanent staff towards the public sector, including the ministry, forest services, and decentralised administrations (Interview Participants 1, 2, 3, 6).

The most cited argument from the interview participants (Interview Participants 1, 2, 3, 4, 5) has been that since the beginning of the economic crisis, other public bodies, such as the police, the army, and partly the Fire Service, have had ample support in terms of personnel, funds, equipment, vehicles, etc., while bodies such as the Forest Services and municipalities have had their funds and staff decreased significantly. On the other hand, it was acknowledged, that should bodies like the army or the fire services not have been supported, it could have affected the national security and it would also have a noticeable political cost for the government(s), especially in the case of any unfortunate incidents related with these bodies, e.g. huge forest fires, or national security (Interview Participants 1, 2, 4, 5).

Interview participants 1, 2, and 5 expressed their concerns that the forest regime and the environment in general may be at the bottom of the political leadership's agenda, and may have used the economic crisis and the troika mandates as an excuse to not support forest-related public bodies, most notably the Forest Services, despite the huge issues and recent disasters they have faced.

The budget increase towards the Fire Services in the last few years (Appendix 4.10) due to the increased number of forest fires, combined with the sharp budget decrease towards decentralised administrations and the Forest Services (Appendix 4.8, Appendix 4.9) reflects the reactive approach that has been adopted by the political leadership that is in charge of the forest regime. The reactive view of focusing on fire suppression may have some benefits for the decision makers in terms of short-term popularity, as the public can directly recognise resources spent towards fire suppression (e.g. more firefighting aircrafts), while the same does not stand for fire prevention, which goes unnoticed by the public (Interview Participants 4, 5).

However, focusing on forest fire suppression only serves short-term damage-minimizing goals with unpredictable and uncertain outcomes instead of benefit maximizing long term sustainable outcomes. Even in a purely economic sense, investing in prevention may be less costly both short-term and long-term compared to emphasizing only in fire suppression (Interview Participants 4, 5).

Table 4.2 Major Positive and Negative Effects since 2009

	Negative		Positive
	New issues	Compounded issues	
Political leadership	• Follow lenders' mandates • Change in the direction & priorities	• Little support towards forest industry and rural areas - used crisis as an excuse	Verticalization of Forest Services
Actors in Governance & Power Dynamics	• New bodies that disrupt the forest governance regime with primary responsibilities of economic nature (HRADF) • Changes in institutional framework affect bodies' capacity to perform their duties • Bodies undertaking responsibilities from other bodies without respective changes in funding or personnel	• Deteriorating Funds & Personnel ➢ Forest Services, ENGOs, ministry, decentralized administration & municipalities • Weaker official network and collaboration among national actors	(as coping mechanisms) • Collaboration with other bodies that are not directly linked to the Greek forest regime • EU programmes & network
Forest Management	• Deregulation & Privatization led to disruption of institutional framework – incoherent/ without mention to environmental sustainability		• Forest Cadastre in progress (new policy) • Forest Strategy in place
Public participation	• De-reregulation to facilitate large investment in forests has brought unrest in local societies	• Deteriorating trust from public	

Source: Own elaboration, based on interview participants answers

Although funding towards fire prevention is indeed necessary, it does not guarantee a successful outcome, i.e., lack of fires, and even if it succeeds to prevent fires, the efforts and budget towards it may go unnoticed as there are fewer forest fires, or that they are taken under control faster (Interview Participants 2, 3, 4, and 5). In this sense, politicians may prefer to invest in fire suppression (i.e. Fire Services), which may boost their popularity in the short term, as budget spending is noticed and appreciated by the public, instead of fire prevention (i.e. local administration or Forest Services), which they will gain very little in terms of popularity or political games (Interview Participants 2, 3, 4, and 5).

> *The suppression afterwards [if there is no prevention] is many times more (expensive than), that is, the investment you make for prevention is in no way harmful. (Interview Participant 3)*

In addition, the leadership's change in perspective towards economic activity in the forest regime since the beginning of the economic crisis was also addressed. While both economic and environmental values and investment lacked support in the pre-crisis forest regime, the priorities of the regime's leadership have also changed since the beginning of the economic crisis, treating forests mainly through the market lens, aiming to maximize the potential revenue they can get out of forests, although in some cases this comes at the expense of the environmental values (Interview Participant 1, 2, 5). For example, although the forest-related economic activity has remained at approx. the same levels for the last 20 years (Appendix 4.5, Appendix 4.6), the current regime favours and facilitates large-scale investment and economic activity over small scale ones, which is manifested through environmental deregulation (e.g. law 4280/2014) (Interview participants 1, 2, 6), which have at times contributed to environmental degradation, as well as social conflicts in certain cases (e.g. Euboea, Chalkidiki).

On the positive side, a standing request of most forest governance actors for decades, namely the verticalization of the forest services under the ministry of environment (from the decentralized administrations which was before) was granted in 2021 (Law 4824/2021 (A' 156)). The verticalization of the forest services is considered very important for the Greek forest regime, as it gives space for more flexibility in support towards the forest services without compromising the requirements set by the troika in terms of austerity in the public sector (Interview participants 1, 2, 6).

4.5.2.2 Governance actors and power dynamics

Since giving the steering wheel to the troika in order to rescue the financial sector, there were considerable developments in the power dynamics of the actors forest regime, through structural changes, reformulation of the policy framework, budget adjustments, and introduction of new bodies, whose role was to facilitate the implementation of the Adjustment Programmes.

4.5.2.2.1 New powerful actor in the regime: HRADF

The Hellenic Republic Asset Development Fund (HRADF) was created in 2011, with the task to develop, privatize, and utilize the private property of the state, which has been assigned in accordance with the authorities of the country and the provisions of the Medium-term Fiscal Strategy Frameworks (Law 3986/2011). Although the Greek state had to be taken into account in cases where forest land, or land that contained forest areas was transferred to HRADF for its utilization, changes in environmental policy later on (e.g. Law 4280/2014 – section 4.5.2.3.1 below) enabled a greater variety of permitted operations and investment for economic purposes to take place in forest areas, especially for large-scale economic investment (Interview Participant 1).

In addition, since its creation in 2011, the HRADF has received funding from the state budget for projects and tasks that belonged to other public actors of the Greek forest regime, even though is legally a S.A. (société anonyme), does not belong to the public or wider public sector (HRADF, 2011) and "operates to serve the public interest, according to the rules of the private economy" (HRADF, 2011) (more in Appendix 4.11). This has occurred at a time that these bodies remain underfunded to the point that cannot perform certain tasks (Interview Participants 1,2). One such recent example is the "Forest Protection Plan" project, which included the cleaning actions and the development of studies regarding forest fire protection, in order to cover the gaps and the role of both the Forest Services and municipalities. The project amounted to €72 million (€50 million from the Recovery and Resilience Facility and 22 from the regular budget), and was directly assigned to HRADF (HRADF, 2022; Ministry of Environment Energy and Climate Change, 2022).

Nonetheless, there have been cases of privatization of public and forest land, where there were no adequate provisions or considerations for environmental aspects of the forest

regime. For example, apart from the privatisation efforts of forest and agricultural land, ecologically significant and legally protected areas, many of which are inside or very close to designated Natura 2000 sites (Tracha, 2013; Hellenic Ornithological Society, 2014; Nantsou, 2014; WWF International, 2014; Pavlaki, 2016), there have also been efforts towards the privatization of the environmental permitting process and its monitoring process (WWF Greece, 2016, 2019) (material suggested by interview participant 2).

4.5.2.2.2 Austerity: Funds and Personnel

The most addressed issue that deteriorated since 2009 has been the decline and lack in funds and personnel for all bodies, and especially for the Forest Services, which all interviewees consider an underpowered key actor that can't perform the key tasks it has been assigned to. Since forests have been an area governed mainly by state or public bodies, the actors' power depends on and is reflected by the support they get from the state and/or the government. Although austerity policies have been implemented in various aspects and bodies of the public sector, bodies related to the environmental sectors (e.g. forests, marine) have been hit very hard since the beginning of the crisis (Interview Participant 2). For example, The Forest Services, which are the main responsible body for forest hazard and fire prevention, had its personnel levels drop by 53% and its budget by 80% in the last 20 years (Interview Participant 2) [also (WWF, 2022)]. Apart from the halt in the recruitment of permanent and trained staff since the early 2000s (Ministry of Environment and Energy, 2022), their funding has systematically been significantly lower than the necessary funding the Forest Services have been requesting (Interview Participant 2) [also (Appendix 4.8)].

Decentralized administrations and municipalities have also been affected by austerity policies, which took place in the same timeframe as the local administrative reforms in 2011 (Kallikratis - also a prerequisite in the first Adjustment Programme (European Commission, 2010)). The combination of austerity policies in the public sector towards local (including both regional and municipal) authorities (Appendix 4.9), with the transfer of responsibilities and power from state to local authorities, without adequate concomitant funding and statutory powers, deteriorated the capacity of local authorities to cope with the increasing number of responsibilities and regulating local affairs (Interview Participant 3) [for the case of Greece (Ioannidis, 2016; Kalimeri, 2018); and reference to section 2.5.1.1 (p.69) with

similar cases from (Ostrom and Ostrom, 1977; Ostrom, 1990; Dietz, Ostrom and Stern, 2008)].

In addition, lack of personnel has restrained not only day-to-day operations related to forests, but also seem to have a ripple effect on exploring and taking advantage of a wide range opportunities, such as collaboration with other municipalities and bodies, national, EU, and international funding opportunities, and under-absorption of resources in favour of forests (Interview Participant 3). Despite the large needs in terms of staff, equipment, and forest management projects, staff either do not have enough time or resources to apply for such opportunities, as they may be invested in other operational activities, and/or do not have the necessary skillset or help to apply for such opportunities, e.g. language barriers, formal procedures - online and offline forms, and/or may not even have the necessary number of staff to deliver the outcomes from such opportunities, and/or due to lack of relevant data to support the requested documentation (ibid.) (Also Appendix 4.12).

Decentralised administrations and municipalities have a wide variety of areas under their responsibility and control, which they have to manage with this budget, taking into account that their tasks and responsibilities rapidly multiplied and diversified the last couple of years due to covid-19 (Interview Participant 3). Similarly, the ministry of environment, energy and climate change has also been affected by the austerity policies in the public sector; their staff shortage (194 employees in 2010 compared to 82 in 2018 (Interview Participant 6)) is also aggravated by the remaining aging staff who need to deal with a variety of environmental areas and issues (ibid). The declining trend for funds and staff which has been highlighted during the interviews with respect to decentralized administrations, forest services, the ministry, but not for the Fire Services (Appendix 4.8, Appendix 4.9, Appendix 4.10).

> *"There is no staff renewal. There is a big problem. The first [problem] is understaffing. Of course, there is also the issue of funding, but […] it's not easy to manage the budget, when you don't have staff"*
> *(Interview participant 6)*

Despite the funding increase towards the Fire Services in the last few years, the Fire Services still has needs and demands that are not addressed adequately. For example, during 2021 and 2022, the increase in budget of the Fire Service was driven by the cost of firefighting aircrafts that were used for fire control. At the same time, there are still vehicles that

reportedly don't get regular and necessary maintenance, while official service reports make a case for double the number of existing staff in order for the Fire Service to be able to fully and efficiently cope with all its responsibilities during the fire season (May – October), when on the ground staff is often reported to be overworked (Interview Participants 4, 5).

4.5.2.2.3 Externalities from Austerity policies: Weakened network and collaboration

The lack of staff and resources for these bodies has put an additional burden on the collaboration and network among the forest regime actors (Interview Participants 1, 2, 3). For example, even though communication channels exist between the Forest Services and municipalities, and data and information are exchanged often, as there are some common areas of responsibility, often neither of them can help the other in practical tasks due to lack of staff (Interview Participant 3). Many underpowered actors, such as small municipalities or remote forest service offices rely on the personal influence and network of their experienced staff to reach out for resources and help, or to overcome some bureaucratic barriers (Interview Participant 2, 3).

In addition, the lack of personnel and resources in core actors has been so severe that in some cases they don't have the capacity to perform some core tasks, and other bodies in the regime come in to unofficially undertake these responsibilities (Interview Participants 3, 4, 5). For example, fire services have committed vehicles and personnel in cases ahead of predictions for snow in big cities (Athens) to patrol the roads, under the umbrella of civil protection, even though the responsibility falls with the regions and municipalities (Interview Participant 5). This issue was significantly aggravated due to the Covid-19 pandemic crisis, as key actors in the forest regime, such as the municipalities and the fire services were called to cover gaps in the healthcare regime, with fire service personnel undertaking the responsibility to help with the covid-19 tests and certificates at ports of entry in the country (airports, border controls), and municipalities committing personnel and venues for covid-19 testing and tracking (Interviews Participants 3, 4, 5).

> *"[…] the Fire Services come to cover weaknesses of other agencies. That is, if the ministry of Health was robust, we (the Fire Services) wouldn't need to help with covid"*
> *(Interview participant 5)*

Yet, there have been efforts from the state to work around the austerity policies, which are often expressed by outsourcing tasks to other bodies (Interview Participant 1). Even though outsourcing some tasks can potentially help to reduce the actors' workload, outsourcing main tasks to other bodies has also had negative effects to the bodies, whose tasks are redirected to other bodies. For example, the remaining staff of the ministry or the Forest Services had to invest more time to monitor the processes that were assigned to external contractors (including forms, contracts, etc.) leaving them less time to do their tasks, something they were already struggling with (Interview Participant 1). In addition, by not funding and manning the relevant public bodies, whose staff already had the experience to deal with the tasks and instead assigning their tasks to external bodies and contractors, the public forest-related bodies missed the opportunity to use the allocated funds and equipment for other body-related activities (ibid.). Furthermore, the forest-related public authorities had to deal with mistakes made by the external contractors that had undertaken their tasks, e.g. mistakes in forest maps that both the ministry and the forest services would be responsible for, use in other tasks, and had to amend, which increased the cost both in terms of money and working hours (ibid.). Finally, supporting the public forest-related bodies with funds or personnel, even for short-term projects would morally support the remaining staff, who instead may feel distrusted and abandoned by the state for many years (Interview Participants 1, 2).

4.5.2.2.4 Coping mechanisms

The coping mechanisms of the Greek forest governance actors varies depending on their structure and capacity for outreach, i.e. how many people are employed in each body, and network and collaboration opportunities that is outside the Greek forest governance regime. For example, many small or remote municipalities or remote forest services offices, which are small and don't have access to collaboration or help from the outside, often rely mainly on the personal effort, experience, and personal network of the remaining staff (e.g. former colleagues working in the ministry to inform them about specific opportunities, or professionals who are willing to help or collaborate for a smaller fee).

On the other hand, some bodies that do have the capacity for outreach and collaboration with other bodies and can afford to assign a few staff members to the effort, looked to enhance their collaboration with international actors that are relevant to their activities.

Such collaborations can offer help in terms of financial aid, expertise, or even human resources, as well as a variety of opportunities through EU programmes. For example, WWF Greece enhanced their collaboration with and got financial help from WWF Japan, WWF Belgium, and WWF Australia (Interview Participant 2); many municipalities and KEDE have developed partnerships with other municipalities in the EU, in which they exchange information and good practice in a wide variety of issues, as well as seeking for funding opportunities through EU development programmes (Interview Participant 3); many municipalities that could afford to assign a few staff members to the effort have also benefitted from the Antonis Tritsis programme, adopted in 2020, which aims to enhance collaboration among bodies in the local and regional level by sharing and modernizing resources and infrastructure (ibid.); apart from collaborations through the EU Civil Protection Mechanism, the Greek Fire Services have developed partnerships with Fire Services from non-EU countries (e.g. Qatar, Israel), where they exchange knowledge and human resources in mutually beneficial programmes (Interview Participants 4, 5).

4.5.2.3 Forest Management

Apart from the forest economy's contribution to the national economy, some positive externalities also usually arise from labour-intensive forest-related economic activity, such as increased vigilance for illegal activities (logging, arson), and forest fires, road and path maintenance, stronger collaborations and communication between local communities and forest-related authorities (e.g. exchanging information, consultation for projects, informal solutions to issues, etc.) (Interview Participants 1, 2, 4, 5). As economic activity has remained stable at very low levels since 2000 or even declined since 2015, in terms of both output of forestry and connected secondary activities and GVA (Appendix 4.5, Appendix 4.6), the value of the aforementioned positive externalities also started to decline to the point they were even eliminated in many cases (Interview Participants 1, 2, 4, 5). The pressure put on the political leadership to generate revenue as suggested by the memoranda of understanding may justify that the most significant changes in terms of forest management took place in the direction of utilizing the forests for profit.

In detail, the most notable developments have been the turn towards attracting large economic investment, which was highlighted earlier (4.5.2.1) was facilitated by certain policies and most notably the acceleration of the national land cadastre; the Kallikratis

administrative reforms, which was a prerequisite for the 1st Memorandum of Understanding between Greece and the lenders, aiming to reduce operating costs and wage bill; and the adoption of the 1st National Forest Strategy, which is considered a huge step towards implementing sustainable forest management (Interview Participants 1, 2, 6).

4.5.2.3.1 Deregulation, Privatization, and the acceleration of land cadastre

Interview Participants 1, 2, and 6 pointed out the progress in the acceleration for the development of an accurate land cadastre, which had been a standing request for many years, and has also accelerated the development of a national forest inventory parallel to the land cadastre, which hasn't been updated since 1985 (Interview Participant 1)(Ministry of Agriculture, 1992b). Even though this development is at the core of the Greek forest regime and, this development was introduced for economic reasons, as a direct pre-requisite from the lenders in the second adjustment programme that accompanied the bail-out loan (European Commission, 2012), in order to assure legal security for potential large economic investment, which would be impossible without clearly defined maps and property rights (Interview Participant 2).

With a land cadastre in place, the utilization of private property and assets would also enhance the privatization of state's property expressed mainly through the HRADF, including land in or around forest areas. Privatization efforts in combination with deregulation policies have enabled significant changes and alterations of the actions and investment allowed in forest areas. In particular, Law 4280/2014 modifying articles 45-61 of Law 997/79, which has been the institutional law about the operation of the Forest service, practically legitimizes a larger number of changes and operations in forest areas, when it comes to economic investment, which may not be necessarily forest-related (Interview participant 6). In practice, this has enabled (usually large-scale) non-forest-related economic investment in forest areas, e.g. wind turbines or large-scale tourist resorts, which interfere with and disrupt both the local society and nature (Interview Participants 1, 2, 4, 5).

> *"they do it [the forest maps] purely for financial reasons, for investment reasons. On the other hand, of course, it also benefits us because we will have forest maps for administrative purposes"*
> (Interview Participant 2)

Some such cases of capital-intensive economic investment, i.e. rely on heavy equipment, such as solar panels or wind turbines, in or around forest and agricultural areas, have created issues with other governance actors, e.g. the Fire Services or municipalities. For example, in the event of a fire in the facilities or in forest areas close to such facilities, the Fire Service have often dealt with unknown to them toxic substances (liquids dripping from the equipment), which may compromise their health (Interview Participant 4). They also had to manage their available resources and personnel in such a way that they would secure the integrity of the investment before attending to fires in forest areas (Law 4662/2020) (ibid.). In some anecdotal cases, if they had limited resources for a certain area, this would mean that they would have to commit most (if not all) their resources to the safety and integrity of the investment, and very few to the forests (Interview Participant 4).

4.5.2.3.2 Kallikratis administrative reforms

The 1st Memorandum of Understanding between the lenders and Greece required Greek authorities to undertake brave reforms in order to moderinze its public administration system (interview participant 6), specifically referring to "legislation reforming public administration at the local level, notably by merging municipalities, prefectures and regions with the aim of reducing operating costs and wage bill." (European Commission, 2010, p.60). These efforts on behalf of the Greek state, which were also used to delegate power and responsibilities away from the state actors, were manifested through the Kallikratis administrative reforms (Law 3852/2010). However, despite the efforts to officially support and enhance the autonomy of the decentralized administration, law 1954/2022 introduced government appointed secretaries in charge of Decentralized Administration services, practically undermining their political autonomy (Interview Participant 3).

Furthermore, as the Kallikratis administration reforms coincided with austerity policies in the public sector, the transfer of responsibilities and power from state to local authorities was not accompanied by adequate concomitant funding and statutory powers, which deteriorated the local authorities' capacity to cope with the increasing number of responsibilities and regulating local affairs (Interview Participant 3)[Also(Ioannidis, 2016; Kalimeri, 2018)].

Further problems reported to be linked with the Kallikratis reforms refer to the lack of specific administrative or spatial criteria regarding the amalgamation of some municipalities, which led to the creation of some municipalities that are too big to handle, which also nudges local administrators (mayors) to pay more attention and look after larger more urban areas, and not rural areas, as more voters come from urban areas (interview participants 1) (Also (Ioannidis, 2016)). In some (anecdotal) cases (interview participant 1) mayors may use funds from community forests or associations in rural areas towards projects in urban areas and not back towards the rural community and forest areas (interview participant 1).

4.5.2.3.3 The National Forest Strategy 2018-2038

The adoption of a National Forest Strategy for the first time in 2018 (OGG B' 5351) with a long-term horizon 2018-2038 was another very significant development for the Greek forest regime since 2009 (Interview Participants 1, 2, 6). It has been accepted among the interview participants that the adoption of a national forest strategy has been a very significant way forward, especially in terms of forest economy, climate change, forest ecosystem protection, and international and EU policies (which are also the strategy's 4 vertical axes (for more information (Ministry of Environment and Energy, 2018b, no date)).

However, there have been some concerns about application of the strategy, given the lack of personnel, funds, and resources for the main actors who will need to undertake new responsibilities and may need to adopt changes in their institutional framework (Interview Participants 2, 3) (Also Appendix 4.13). The implementation of the national forest strategy is not at risk due to its complexity or ambitious targets, but because difficulty in implementation of policies has been a persistent issue in many cases in nature-related regimes, including forests, precisely due to the lack of resources (Interview Participant 2)

4.5.3 Public Participation & the role of the public in forest governance

Changes in policy, financial restraints, and chronic lack of state support have been the main reasons behind the deterioration of public participation in the forest governance regime and rural decrepitude since 2009. The drop in public participation has been more evident in rural areas, where local communities have historically been more active and present in the forest regime (Interview Participants 1, 2). The drop is expressed physically through the decrease of the rural population, which has been an ongoing trend since the 1990s, and has persisted

since the beginning of the economic crisis in 2009 (ibid.)(Also, Appendix 4.7); and mentally with an increasing distrust towards official forest related bodies and authorities, as well as a less active stance against large scale economic investment in forests (Interview Participants 1, 2).

Firstly, the existing channels for public participation are very limited and the input of the public or other bodies like ENGOs is often limited to comments on the official drafts, instead of public consultation, especially for significant policies and projects in regional and national levels (Interview Participants 1, 2). The situation is different for small projects at the local level, where personal communication among the members of the community is more often and personal influence more significant (Interview 1).

> *"Essentially, you don't get the right to consultation. Also, the whole issue in our country is that the legislation does not start at the grass roots. They deliver something ready and then tell you "this is it and comment on it""*
> *(Interview Participant 2)*

Secondly, by changing the legal framework to facilitate large scale investment, and increasing the range of economic activity allowed in forest areas (4280/2014), many people who live in forest related or agricultural activities or are employed in such areas felt that their livelihoods are not important (Interview Participants 1, 2). The contrast in terms of flexibility of the policy framework between large scale economic investment in forest areas and small-scale investment for local economic forest-related or agricultural activity was another point raised by the interview participants. For example, anecdotally livestock farmers in remote rural and forest areas have often been denied permits to extend power supply so they can set up milk coolers, which can help with their production, but at the same time environmental regulation has changed to allow large investments, such as wind turbines and PV farms in the same areas (Interview Participant 1).

> *""My land where I live is taken from me without asking me, without offering me... they offer you some crumbs, supposedly compensatory but they are balderdash. […] what I understand" they say, "is you are kidding me""*
> *(Interview Participant 1)*

On a similar note, a change in the public's mentality was also observed by some interviewees, with respect to environmental protection, when it comes to large-scale

economic investment. While for example, many groups and activists in local societies argued against large-scale economic investment, such as wind farms in mountain forest areas (Interview Participants 1,4,5) (Also supported by Argenti & Knight (2015)), given that their livelihoods were very dependent on the local natural resources to sustain their livelihoods, including tourism, agriculture and forestry, and animal husbandry (Interview Participant 1)[Also (Lekakis and Kousis, 2013)].

Anecdotal data (Interview participants 4,5) suggests that local communities close to forest areas that are appropriate for such investment feel powerless to protect the natural environment and have become more conciliatory, in order to save at least part of the forests from forest fires, especially after the huge forest fires that took place in Greece in 2021, with reports linking forest fires to the installation and operation of wind turbines in burnt land (Ioakeimidou, 2022).

> *[…] you live near a forest area, you protect it, and 5, 6, 7 years ago you filed lawsuits against those who want to put up wind turbines. Now you are afraid that they will burn it [the forest] down to put up a wind turbine, so you are much more flexible both as a society and towards the one who will have to make the decision. "Install a wind turbine, so at least we don't get burned"*
> *(Interview Participant 5)*

Participants were also asked regarding the role of the public in the Greek forest governance regime. What is interesting for this question is the variety of perspectives and angles on the subject, which albeit different, they are not contradicting (Appendix 4.14). This can be interpreted based on each actor's relationship with the public, taking into account their areas of responsibility and action, and how the public operates in those areas. Unfortunately, the question was not asked to the representative from the ministry due to lack of time, and a follow-up interview was not possible in 2022.

All interview participants that were asked this question agreed that the public has been sidelined from the forest governance, but at the same time they are also not actively pursuing to participate in it, because it is often very difficult to do so (Interview Participants 1,2,3), This may be because the forest governance in Greece has been following a top-down approach for decades, which may have made citizens feel excluded, disappointed, and powerless to change things, their voices not heard by the decision makers, or even made

them distrustful towards official bodies in some cases. Another perspective was that there is a significant portion of the general public that is indifferent to the different economic, environmental, and social values of the forest (Interview Participants 1,2,4,5), which can be attributed to the neglected role of forests in the economy, society, and lack of environmental education in general.

> *"This is where we have a serious problem. In that the society (the public) has no official say in how the forest service decide to manage an area."*
> *(Interview Participant 1)*

In addition, the interest and capacity of the public to participate in the forest governance regime has declined since the beginning of the economic crisis, because forests, and the environment in general, have dropped in their priorities, as socio-economic issues have become more pressing, such as unemployment, poverty, living situation, etc., which may also be perceived as barriers to participate in the forest governance, e.g. donations or subscriptions to organizations (Interview Participants 1,2,3).
With this into account, those who do participate have settled to a more passive role, and their most usual channels of participation are through their membership in an ENGO (which usually involves donation fees), or as volunteers in groups in local areas. In both cases their contribution is very useful, but limited in the scope of decision making processes) (Interview Participants 2,3).

> *But it is also a bad governance culture. This governance is not transparent, it is not open. […] When you pass amendments overnight fast track. Well, this does not mean that you practice good governance. And many aspects of forest legislation and forest management have been passed in recent years like this, with this logic.*
> (Interview Participant 2)

Finally, although the role of volunteers is greatly appreciated by different stakeholders (Interview Participants 3,4,5), especially in periods when most forest governance actors are understaffed, there have been concerns that the majority general public are engaged only when forest fires are a trending topic, which can be attributed to their lack of environmental awareness and forest protection (Interview Participants 4,5) (Similar to the case of Italy – Chapter 3.4.2.1.1 (Secco *et al.*, 2018, p.2)) . On the other hand, even if few citizens try to participate in the governance regime, for example through volunteering, their contribution

can sometimes make a difference in terms of social and environmental values added to the forest area. Such actions can sometimes complement the actions of official actors, for example by making the forest area more accessible to other citizens (signs, benches, trails, etc.) or reducing hazards, e.g. by removing trash from forest areas.

4.5.4 Current situation and moving forward

Having discussed the developments that took place both before and after 2009, the following section (a depicting table of which is available in Appendix 4.15) summarizes the perspectives of the interview participants regarding the current situation in the Greek forest regime in terms of the major issues that it currently (2022-3) faces, and the next positive steps in order for the Greek forest regime to move forward towards a more sustainable regime.

4.5.4.1 Current major issues in the Greek forest regime

The most commonly cited issue by all interview participants (1-6) has been the lack of staff and funds in forest regime bodies, with the forest services being the primary example. Lack of staff was considered more pressing than lack of funds (even though more funds could be used to hire more permanent staff), because forest related tasks are usually labour intensive, and staff are usually versatile when it comes to their tasks and responsibilities. Even though the Kallikratis administrative reforms aimed to create a more decentralized forest regime, the capacity of the bodies to support it has been under a lot of pressure as it coincided with austerity policies, which reduced their available resources (Ioannidis, 2016; Kalimeri, 2018).

The lack of accurate and up-to-date data has been another issue that can take many forms and have different areas of effect in the forest regime. One of the most presented examples (Interview Participants 1,3,4) that the lack of accurate forest maps and land cadastre, which may lead to tensions between local communities, investors, and the state when it comes to the forest property regime, or reduce the capacity of relevant bodies to enforce policies, when they can't ensure whether the land is considered forest land.

The lack of forest-related economic activity, along with its potential indirect external benefits (increased presence in forests, vigilance for forest fires, maintenance of roads, etc) was brought up and discussed in detail by most interview participants. In addition, part of the revenue from forest-related economic activities (e.g. from taxes) can be channelled towards

the forest services to create a more autonomous and decentralized forest regime, whose revenue would come from the forest regime itself or through the Green Fund, instead of the state budget (Interview Participant 1,2).

Finally, most interview participants (Interview Participants 1,3,4,5) expressed how they would like to see the public be more actively involved, and how bottom-up forest regime policies end up becoming very successful and crucial to the sustainability of the forest regime. Unfortunately, the current regime relies on top-down policies, where the public and public groups of interest such as ENGOs are excluded practically even from consultation processes, and raises concerns about the participation and collaboration among the different bodies, especially the role of the public.

4.5.4.2 Active and Passive developments in the forest governance regime

The developments in the forest governance regime since the 2009 economic crisis are interpreted as a combination of the (neglected) status of the Greek forest sector and forest governance regime at the time when the crisis started (and the conditions leading to it - Chapter 4.5.1) with the measures adopted by the Greek government in order to save the financial sector. Looking at the neglected status of the Greek forests along with the recommendations from the interview participants, it is clear that passive neglect (not actively letting forests stand with no human interference, but not paying enough attention to what is going on) is something that participants of the Greek forest governance regime would like to improve. A forest regime with a more active forest economy, greater public participation, and a sound(er) institutional framework, which are the main recommendations of the interview participants, would enable more and different policy options for its development and utilization, in periods of economic crises (See Chapter 3).

At the same time, given the power asymmetries, due to the state power and the size of the economic pressures from the economic crisis, and the power of the EU bodies, Greece had very limited room for negotiations and political manoeuvring during the bailout negotiations with the troika (Armingeon and Sacchi, 2015; Sacchi and Roh, 2016), which essentially meant that policies were mandated to the Greek state in exchange for their financial sector bailout (Moschella, 2016, 2017). This angle would support that dealing with economic crises has been a lot more pressing than the development and progression of the forest regimes and

that actors that are responsible to deal with economic crises (such as international financial institutions), are much more powerful than the ones related to national forest regimes (local or national bodies, private sector industry, or the public) (see Chapter 3). Many events in the forest regime were put in motion due to the economic crisis; more specifically, many were either initiated or mandated as prerequisites for the bailout loans; for example the progress of the land cadastre, the Kallikratis administration reforms, and austerity in the public sector were all included in economic adjustment programmes that accompanied the bailout loans (European Commission, 2010, 2012).

In turn, as these changes were imposed urgently to save the financial sector, and did not take place with focus on specific elements of the forest regime, the respective lack of provisions for the transition in the (neglected) Greek forest regime enabled certain (mainly negative) externalities to arise, especially in cases when governance structure and power dynamics change without a corresponding change in the policy and regulatory framework (see Sections 2.3.2, 2.3.3). For example, urgently applied and mandated changes in responsibilities, power, and funding were not efficiently and adequately allocated among the actors participating in the Greek forest regime, which left some bodies significantly underpowered to do their role, which increases the pressure in other actors in the regime.

This perspective enables the observations in this analysis to be viewed within a new framework, namely a framework based on active and passive developments. In this case, active developments would derive from policies specifically aiming to facilitate or enable these developments, while passive developments were formulated indirectly, as externalities (See section 2.3.3) arising either from policies that targeted other areas of the forest regime (other forest-related policies), or other areas of the governance (e.g. economic policies that were not related to the forest regime), and/or passively with no new policies facilitating the developments.

In this context, even though there is significant interaction there is a lot of interaction among the 4 major themes and they cannot be seen or analysed completely in isolation from each other, another broad division/categorization can take place; major themes relating to (i) actors in governance & power dynamics and (ii) forest management can be seen as active, i.e. they originate from policies that addressed and actively changed or enabled changes in

these 2 specific areas, and were introduced by decision makers involved in the governance regime. On the other hand, the developments regarding Political Leadership, and public participation have been mostly passively formulated, i.e. no specific policies were introduced to specifically facilitate or enable the developments in these 2 major themes. Table 4.3 describes the distinction between active and passive post-2009 developments with respect to the 4 major themes that were identified in the analysis, along with some elements that support this distinction.

Table 4.3 Post-2009 elements of Active and Passive developments

Active elements	**Forest Management** - Changes in preferences of economic activity (small/large scale) - Environmental policy re/deregulation - Forest cadastre in progress	**Actors – power dynamics** - EU troika - New bodies: HRDAF TAIPED - Kallikratis administrative reform - Austerity Changed the funding towards forest-related actors
Passive elements	**Political Leadership** - Following troika mandates - Used crisis as an excuse - Reactive mentality	**Public participation** - Abandoning rural areas - Mentality

Source: Own elaboration, based on interview participants answers

4.5.4.3 Moving forward

The interview participants' input on the desired developments for the future of the Greek forest regime derived both from their direct answers on the respective question topic 3, but also throughout the interview if interview participants discussed a specific issue and then referred to a potential fix or improvement of that situation.

All interview participants agreed that supporting and enhancing the forest economy would be extremely important for the future of the forest regime. This refers to economic activity and investment that is related to and dependent on forests, such as forestry, eco-tourism, and not just any economic activity that takes place inside but is not related to forests, e.g. wind farms, or mining. Even though both can contribute to the GDP, provide local

communities with jobs, and offer incentives to reduce hazards in forests (e.g. forest fires), the latter often also preserves or even enhances forests' social and environmental values and ecosystem services (Interview Participants 1,2).

In addition, supporting forest services, one of the forest regime's most important actors, was also highlighted by all interview participants (1-6). Understanding that the lack of funding towards the public sector is very difficult to change soon, at least for environment-related bodies, the interview participants praised the verticalization of the forest services under the ministry of environment, but advocated for further support with more permanent educated staff that can undertake current pressing tasks, and at the same time also be able to commit and help with the long-term strategy of the forest sector, as well as help other actors in the regime, e.g. municipalities, fire services (Interview Participants 2,3,4,5).

Furthermore, after years of various developments in the forest regime, including changes in policy, large-scale forest fires, changes in actors' dynamics, etc. a better defined policy framework with clearly defined responsibilities, roles, and tasks, as well as a proper dataset about forests (accurate up-to-date data, forest cadastre, forest maps) will offer some solid groundwork, on which all relevant actors and bodies can rely on and build better partnerships on, as well as allow for more channels of public participation (Interview Participant 1,3). Combined with the recent national forest strategy, a clearly defined framework can also prevent politicians from using the forest regime for political gains or games, which may have been the case in the past.

Finally, engaging the public is another priority that can offer multiple benefits in the forest regime in the following years, in terms of both reducing negative externalities, such as accidental forest fires, and enhancing positive externalities, such as getting more social and environmental values from forests both in rural and urban areas (Interview Participants 2,3,4,5,). In addition, incorporating environmental education in schools and teaching people about the different ecosystem services and values, environmental protection, as well as climate change can shift the public's mentality to be more active and engaged, compared to their current passive role in the forest governance regime (Interview Participants 4,5). This can also introduce and promote the debate regarding the human-nature interaction to the public and help them explore and understand the complexities that exist in the regime, as

well as dismantle many misunderstandings and misconceptions of the past, such as the no-touch ecology narrative that was promoted in the past (Interview Participants 4,5).

> *"I believe that a mistake, which is also an issue for foresters and in general, was that there was such a large reference to ecology and in general to environmental protection in such a way that it reached to the point of becoming something completely sterile and something completely untouchable - We shouldn't touch this. For me this is over"*
> (Interview Participant 5)

4.6 Summary

This chapter examined the development of the Greek forest regime since the beginning of economic crisis in 2009, through the lens of the most important actors in the regime. Representatives from five major bodies of the Greek forest regime were interviewed, namely the ministry of environment, EKBY, WWF Greece, the Fire Services, and the Central Union of Greek Municipalities (KEDE).

There were two main limitations/challenges in this chapter. The first challenge and limitation was the number of available interview participants. Only one or two senior members of staff were interviewed from each body, as, given the circumstances at the time of preparation of this chapter (Covid restrictions, lack of staff in the regime, high workload), there were no available additional members of staff to participate in the interviews. Even though the current analysis provides some very useful insight and perspectives on the research topic, additional input from more senior members of staff would have enhanced our understanding. The second challenge came from the nature of the methodological, which could lead to the analysis becoming or being interpreted as subjective or biased if the process and the reason behind it are not documented adequately. To overcome this challenge, this chapter provided lengthy and detailed descriptions and justifications of the methodology, the processes and protocols used, step by step description of the analysis, as well as tables and figures in text, and multiple pieces of additional information in the appendix to explain in detail all aspects of the research and analysis.

The findings of the thematic analysis helped to determine two broader themes, namely (1) Developments and issues in forest governance before the economic crisis, and (2) Developments and issues since the economic crisis. This first broad division highlights how

the historical development of the Greek forest regime prior to the crisis has played a role in the available options after the economic crisis. Additionally, 4 major themes were identified during the analysis, namely (i) Political Leadership, (ii) Governance actors and power dynamics, (iii) Forest Management, and (iv) Public Participation, all of which are related to different policies and changes both before and after 2009, i.e. within the 2 broader themes.

In particular, the Greek forest regime has shown signs of neglect for years prior to the economic crisis of 2009. Such signs include the lack of relevant and up-to-date data and institutional framework, very low levels of forest-related economic activity, and the lack of a national strategy/direction. In terms of the developments that took place since 2009, there has been an overall change in direction in the forest regime, towards a more market driven approach, with the state adopting a more reactive role, while also encouraging increased participation from private investors.

This change in mentality and strategy is manifested mainly though significant drop in funds and personnel of public and state forest-related actors, environmental deregulation to attract economic investment combined with the introduction of HRADF to facilitate the process, the Kallikratis administrative reforms, and the focus on suppression rather than prevention when it comes to forest management. These changes taking place in a state-driven regime that always relied on a top-down approach also affected the capacity of the relevant actors to perform their tasks, as well as the power dynamics and collaboration amongst the actors in the regime.

Finally, it is accepted that the adoption of the National Forest Strategy has been a good step forward, but without supporting the relevant actors, most notably the Forest Services, an up-to-date institutional framework, and without enhancing the national forest-related economic activity, its implementation may be at risk.

5 The preferences of the citizens in Athens Metropolitan Area towards economic investment in nearby forests: A Discrete Choice Experiment

5.1 Introduction

Financial investment is planned to be directed towards supporting the Greek environmental and natural resource regimes, according to the National Energy and Climate Plan with reference to the 2030 energy and climate policy objectives (HMEE, 2019). At the moment approx. € 310 million mainly from European funds are aimed at reforestation of more than 500.000 stremma[37] in Greece overall, as well as recreation infrastructure and fire protection improvement using new technologies in both Attica and Thessaloniki[38] during the current decade (2020-2030) (Ministry of Environment and Energy, 2020d). In addition, €50 million from the Recovery and Resilience Facility (European Commission, 2022b) are available for forest clearing and firefighting projects in 2022 (approved in 2021) (Ministry of Environment and Energy, 2021b), while through different running projects and programmes from the Green Fund more than €45 million will be channelled towards forest protection, existing and new projects (e.g. Forest Protection and Upgrading Program, Program for Protected Areas, Natural Environment Program with Innovative Actions, LIFE 2020)(Green Fund, 2020; Ministry of Environment and Energy, 2020a).

Despite the increased funding towards forests, reports from WWF highlights the inability to absorb available resources, as project completion reaches only 25% of the budget, while the majority of the funds for 2021 were directed towards suppression of fires (82%) and only 18% was directed towards prevention or other projects and actions, such as vegetation management or early warning equipment (WWF Greece, 2021a). Furthermore, WWF Greece and the Mediterranean Institute for Investigative Reporting have raised questions about the lack of transparency with respect to the management of state resources and funds for the prevention and suppression of forest fires (WWF Greece, 2020, 2021c, 2021b). Specifically, they have indicated that the distribution of resources and responsibilities of the state bodies

[37] Stremma is a unit of land area commonly used in Greece. 1 stremma = 1000m^2

[38] Recreation infrastructure in Attica will include informational signs, maintenance and creation of paths and trails for hiking and cycling, sightseeing spots, accessible trails for disabled people, support for voluntary teams in Ymittos, Penteli, and Parnetha forests (Ministry of Environment and Energy, 2020d)

has been one of the major concerns of the Greek forest regime, along with lack of legislation continuity, absence of a unified long-term strategy, and implementation and enforcement of the forest fire protection measures (WWF Greece, 2021b).

Forests and trees in urban environments can have an important role in providing ecosystem services, e.g. biodiversity increase, aesthetics, mitigation of stormwater runoff (Cavanagh and Clemons, 2006), air quality (Nowak *et al.*, 2018), and are considered fundamental components of the Urban green infrastructure providing employment, fuel, and timber for the local population (Bottalico *et al.*, 2016). Increased public participation is also essential to good forest governance. It helps to bring out a variety of uses for forests through a balanced integration of the multiple social demands towards public forests, as well as to enhance the social acceptance of the decision-making authorities, while it also meets society's needs and concern for increased efficiency, transparency and accountability with respect to public forest-related actors' activities (FAO, ECE and ILO, 2000). Increased public participation is essential to good forest governance. It helps to bring out a variety of uses for forests through a balanced integration of the multiple social demands towards public forests, as well as to enhance the social acceptance of the decision-making authorities, while it also meets society's needs and concern for increased efficiency, transparency and accountability with respect to public forest-related actors' activities (FAO, ECE and ILO, 2000). Unfortunately, due to the absence of an updated forest cadastre, there is no official accurate information about the forests surrounding the Athens Metropolitan Area (AMA), which could offer the reader useful context about the current status and needs of the forests.

Citizens of the Athens Metropolitan Area (AMA)- Attica (and Greece in general) have faced pressures both regarding the economy and the environment. With respect to environmental pressures related to forests, air pollution in AMA has been identified as a serious issue by many (Foundation for Research & Technology, 2013; Gerasopoulos, 2013; Vrekoussis *et al.*, 2013; Voidakou, 2014). In addition, there have been many cases of forest fires ((Lekakis and Kousis, 2013; Ferrara *et al.*, 2018; WWF Greece, 2019)) and floods (Bathrellos *et al.*, 2016; Diakakis *et al.*, 2017), both of which have led to loss of welfare, property, and in many cases human lives, apart from the obvious environmental damages.

The adverse impacts of air pollution have been highlighted (Landrigan and Fuller, 2012; Landrigan *et al.*, 2018), and even more during the SARS-CoV-2 pandemic, as air pollution is an important cofactor increasing the risk of mortality from COVID-19 (Comunian *et al.*, 2020; Pozzer *et al.*, 2020). At the same time there has been evidence that trees and forests in urban areas can have a positive influence on urban air quality, depending on numerous factors, including the area of trees and forests, the structure of forests (urban or rural), and the type and composition of pollutants in the air to name a few (Cavanagh and Clemons, 2006; Bottalico *et al.*, 2016). In turn, this filtering function that forests provide can contribute to improve air quality and decrease some negative impacts on human health (Nowak *et al.*, 2014, 2018; Landrigan *et al.*, 2018).

Greek citizens also felt economic pressures since the beginning of the crisis, which can be witnessed in terms of inability to face unexpected financial expenses (Appendix 5.15), drastic increase in severe material deprivation rate (Appendix 5.16), decrease in household spending (Appendix 5.17), increase in poverty (Appendix 5.18), and an increase in unemployment (Appendix 5.19). More urbanised regions in Greece, including AMA, were often more disadvantaged during the period of crisis 2008-2014 (Christofakis, Gaki and Lagos, 2019).

This chapter deploys a choice experiment (CE) survey to investigate citizens' preferences towards economic investment in forests in AMA, and specifically regarding environmental goods services related to forests. At the same time, it estimates the economic value (WTP) that citizens put on environmental forest non-market goods and services, at a time when they feel pressures from both ends.

Chapter structure: Section 5.2 describes the methodology and justification of using a choice experiment (CE); section 5.3 refers to the CE survey design, with the determination of the attributes, the experimental design, and the development of the questionnaire; the model determination is found in section 5.4; section 5.5 includes the analysis of the survey; and a brief summary with relevant policy recommendations is in section 5.6.

5.2 Methodology

5.2.1 Eliciting economic value of environmental non-market goods

Before diving into eliciting economic value of environmental non-market goods, it would be useful to describe economic value. The total economic value consists of (i) the use value, (ii)

the non-use value, and (iii) the option value, all of which offer some utility to individuals (Pearce, 1993; Adger *et al.*, 1994). Use values include direct and indirect values; direct use values result from direct/current use of resources or services, including both consumptive (e.g. timber, water) and non-consumptive uses (e.g. scenic view, recreation, etc.); indirect use values derive from indirect use of resources, i.e., the resource adds value to another resource or service we use/interact with (e.g., improved water quality/ quantity, climate regulation, etc). Bequest value and existence value comprise the non-use values. Bequest value describe the utility/satisfaction of maintaining certain resources or assets for future generations (e.g. natural heritage or cultural heritage); existence value describes the utility of knowing that a certain environmental resource (including organisms, whole areas such as the Amazon rainforest or the Antarctica) exists. Finally, option value results from having the option or right to use a resource or an asset or its services in the future (Smith, 1983)

There are two broad approaches when it comes to eliciting economic value to environmental non-market goods; *revealed preference methods* and *stated preferences methods*. Revealed preference refers to observation of preferences that are revealed by actual market behaviour (traded goods in order to infer values of non-market goods) and can therefore only capture the use value or the option value of a good in question. Stated preferences on the other hand, can also rely on hypothetical scenarios and/or hypothetical markets to capture the economic value of certain attributes/characteristics of a good, which allows for capturing the total value of a good including use, non-use, and option values (Hanley, Mourato and Wright, 2001; Holmes and Adamowicz, 2003).

However, there are many forest goods that often have no markets and therefore no explicit prices, such as biodiversity, clean air, underground water regulation, etc.. Assigning economic value to such goods or services can help with optimizing the allocation of scarce resources, in order to maximize social welfare. Stated preferences methods therefore suit this research, as many forest attributes don't have a clear price, nor a market, and the objective is to elicit citizens' preferences in forest management from potential investment in forests.

The main techniques for stated preference methods are *Continent Valuation (CV)* and *Choice Modelling (CM)*. They are both survey-based methods that use hypothetical markets and ask decision makers (respondents) to state their preferences. The differences lie on how each

method elicits a price or value for the goods or services in question. CV allows the estimation of consumer preferences, using a hypothetical market which defines the good, the institutional context in which the good can be provided, as well as the way it can be financed (Mitchell and Carson, 1989). Respondents are then asked about the price they would be willing to pay (WTP) or accept (WTA) for the hypothetical good or service either through an open-ended response, a dichotomous choice, double bounded choices or price ladders (Mitchell and Carson, 1989; McLeod and Bergland, 1999; Venkatachalam, 2004).

In CM, instead of naming a price for the good, respondents are asked to choose among a few options, each of which describes the hypothetical good in question through a bundle of attributes (characteristics/aspects) with different levels of these attributes. This is in line with Lancaster's approach on consumer theory, according to which utility derives from the good's attributes, rather than the good itself (Lancaster, 1966) and similar to Pareto's concept of ordinal utility mentioned in Chapter 2.2.2. Some of the CM methods that have been used in forest or environmental non-market valuation include Contingent Ranking (Garrod and Willis, 1997, 1998; Mourato, 2014), Best-Worst scaling (Louviere, Flynn and Marley, 2015; Tyner and Boyer, 2020), Contingent Rating (Álvarez-Farizo and Hanley, 2002), and Paired Comparisons (Johnson and Desvousges, 1997). The most commonly used CM method in forest and environmental non-market valuation is the Discrete Choice Experiment (Adamowicz *et al.*, 1998; Bateman *et al.*, 2002; Hoyos, 2010; Mariel *et al.*, 2021).

DCEs are considered easier and more direct for the respondents, compared to the ranking and rating methods, as individuals may experience difficulties in ranking and rating all the alternatives (Louviere, Hensher and Swait, 2000; Bennett and Blamey, 2001). DCEs allow for the estimation of relative trade-offs of attributes (Mangham, Hanson and McPake, 2009; Carson and Louviere, 2010), and can be used for both quantitative and qualitative data, as well as marginal values of attributes, which may be helpful to policy makers, when different policy scenarios or changes in policy are possible, should the attributes are relevant to their requirements (Hanley, Wright and Adamowicz, 1998; Kjær, 2005).

Importantly, they offer quantitative measures of trade-offs among attributes, and when a monetary attribute is included, they can be used to estimate the individual's WTP for a

change in attribute levels; this provides estimates for compensating or equivalent variation[39] (Hicks, 1939) (section 2.2.3.1). It allows for the estimation of relative trade-offs of attributes (Mangham, Hanson and McPake, 2009; Carson and Louviere, 2010), and can be used for both quantitative and qualitative data/attributes. As DCEs provide estimates for the indirect utility function we can calculate the WTP for gains or WTA for losses for any combination of change in attribute levels (Holmes, Adamowicz and Carlsson, 2017).

5.2.2 Comparison between CM and CV

Post 2000 CM has been more popular than CV in environmental studies (Adamowicz, 2013)**,** as many advantages have been identified in literature, e.g., measuring the marginal value of various characteristics (attributes) of environmental programmes and projects (Hanley *et al.*, 1998) , or mixing socio-economic with environmental attributes (Rolfe, Bennett and Louviere, 2000). For more information please look at relevant literature, Hanley *et al.* (1998), Hanley *et al.* (2001), Haghani *et al.*, (2021), Rolfe *et al.* (2002), Ready *et al.* (1996) and Bennett and Blamey (2001)).

However, CM come with a set of challenges, including the following:

1. Both CMs and CVs are stated preference techniques, and therefore there are concerns about hypothetical bias and strategic behaviour (external validity). CEs may be more prone to hypothetical bias, but mitigation techniques exist and have the potential to compensate for this bias (Hensher, 2010; Fifer, Rose and Greaves, 2014; Haghani *et al.*, 2021).
2. Consideration should be given to the experimental design and the choice of attributes and levels, as the cognitive difficulty in considering alternatives with multiple attributes may be high (Holmes, Adamowicz and Carlsson, 2017). In simple terms, the outcome, i.e. welfare estimates obtained with CE, is sensitive to study design.
3. The theory behind experimental design is more complex and, a solid understanding of basic design principles is necessary to create an experiment (Holmes, Adamowicz and Carlsson, 2017).
4. Similarly the commonly used econometric models for CEs are more complex relative to CV and require advanced programming and econometric skills to operationalize (Holmes, Adamowicz and Carlsson, 2017).

[39] Hicks (1939) introduced the concepts of compensating and equivalent variation, while describing changes in individuals' utility due to market/ price changes. In welfare economics, compensating variation refers to the monetary adjustment that can offset the market/ price change, to bring back the consumer's initial utility after the change. Equivalent variation refers to the monetary adjustment that changes the consumer's utility equal to the level that would occur if the changed had taken place.

However new software programmes and tools which have also developed along with the theory and practical needs to create and operationalize a CE have also developed and offer help with the experimental design, econometric analysis, and data collection (points 3 & 4).

Johnston *et al.* (2017) suggest 3 main considerations for researchers to help them choose between CV and CE: whether respondents view the good/service in question as a whole or as separable into individual attributes; whether total or marginal values are needed for decision making; whether and how the framing of the valuation task may impact an individual's understanding of the task. Between the 2 main stated preference techniques, DCE (CM) was preferred for this study over CV. Along with Johnston's considerations, this is also due to the CE's ability to estimate multiple changes for selected attributes; these estimates could further be used to elicit more information, such as individual WTP for each attribute and scenario; the good is much better understood when broken down into individual attributes; both marginal and total values are needed for decision making.

5.2.3 The Random Utility Approach-Model

CM (and DCE) is based on the random utility model (RUM) (Thurstone, 1927; McFadden, 1974). The random utility model describes the utility of a choice to consist of two components, an explainable (systematic) component and unexplainable (error) component. Individuals may assess the available options based on both the information that is presented to them and on information other than what is shown to them. The utility function for each respondent under the RUM framework may be expressed as:

$$U_{i,j,t} = V_{i,j,t} + \varepsilon_{i,j,t} \qquad (1)$$

Where $U_{i,j,t}$ is individual j's utility of choosing the alternative i in task t, $V_{i,j,t}$ represents the deterministic measurable/explainable/observable component of utility (of individual j for the alternative i in task t), and $\varepsilon_{i,j,t}$ is a stochastic element that captures the effect of unobserved influences on individual j's choice.

The deterministic component $V_{i,j,t}$ can be expressed in a way that includes elements associated with the alternative i in task t ($X_{i,j,t}$) and some socio-economic elements of each individual j (S_j). The deterministic component $V_{i,j,t}$ can thus be expressed as:

$$V_{i,j,t} = v_{i,j}(X_{i,j,t}, S_j) \quad (2)$$

, with X_i being the vector of characteristics (attributes) of alternative *i*, and S_j the vector of individual characteristics of individual *j*, such as gender, income, age, etc:

$$S'_j = (s_{1,j}, s_{2,j}, \dots, s_{L,j}) \quad (3)$$

, where l denotes all observed characteristic of individuals (l= 1, 2, …, L).

Looking at the attributes k, we can assume that one of them is usually a monetary attribute (p) k = 0, 1, 2, …, p, …, K. The attribute vector for alternative i in task t can then be expressed as:

$$x'_{i,t} = (-p_{i,t}, x_{i,1,t}, x_{i,2,t}, \dots, x_{i,K,t}) \quad (4)$$

Now we can express the deterministic component of the utility as:

$$V_{i,j,t} = -\beta_{0,j} p_{i,t} + \sum_{k=1}^{K} \beta_{k,j} x_{i,k,t} \quad (5)$$

In which $\beta_{k,j}$ is the are the marginal utilities of individual j from attribute k.

The equation below describes the probability that the individual j selects the alternative i in task t is:

$$P_{i,j,t} = Prob(Max(U_{1,j,t}, \dots, U_{N,j,t}) = U_{i,j,t}) = \frac{\exp(V_{i,j,t})}{\sum_{i=1}^{n} \exp(V_{i,j,t})} \quad (6)$$

Now we define:

$$b_{k,j} = a_k + \sum_{l=1}^{L} \gamma_{k,l} s_{l,j} \quad (7)$$

$$\text{and } b'_j = (b_{0,j}, b_{1,j}, \dots, b_{K,j})$$

which in its simplest case with no observed characteristics of individual k is $b_{k,j} = a_k$

In addition, assuming an individual maximizes their utility when making a choice, and the individual j is faced with choosing between 2 mutually exclusive alternatives i and z (each described by a vector of elements X_i), from their perspective they will choose alternative i over z only if:

$$U_{i,j,t} > U_{z,j,t} \Rightarrow v_{i,j}(X_{i,j,t}, S_j) + \varepsilon_{i,j,t} > v_{z,j}(X_{z,j,t}, S_j) + \varepsilon_{z,j,t} \; ; \; \forall z \in C \quad (8)$$

for C containing all alternatives in the choice set

Once the stochastic term is included, no certain prediction can be made, which allows probabilistic statements about choice behaviour. An important property of CM is that differences in utility between alternatives determine the choice probabilities, and not absolute levels of utility. The probability of a consumer choosing alternative i over z (or a choice set containing competing alternatives) can be written as

$$P_{i,z,t} = P[U_{i,j,t} > U_{z,j,t}] \Rightarrow$$

$$\Rightarrow P_{i,z,t} = P[v_{i,j}(X_{i,j,t}, S_j) + \varepsilon_{i,j,t} > v_{z,j}(X_{z,j,t}, S_j) + \varepsilon_{z,j,t} \; ; \; \forall z \in C] \quad (9)$$

$$\Rightarrow P_{i,z,t} = P[v_{i,j}(X_{i,j,t}, S_j) - v_{z,j}(X_{z,j,t}, S_j) > \varepsilon_{z,j,t} - \varepsilon_{i,j,t} \; ; \; \forall z \in C] \quad (10)$$

We see that individual j will choose i over z, if the difference in the deterministic part exceeds the difference in the error part. One can also observe that respondent specific socio-economic characteristics (S_j) remain the same across alternatives and can be eliminated of the model. Even though (8) implies that there has to be a difference between attribute levels in contesting alternatives (so that we can elicit the preference parameters for the attributes), some attribute levels could be equal in some of the choice sets (Holmes, Adamowicz and Carlsson, 2017).

5.2.4 Estimation Models

An initial classification of Discrete Choice models can take place according to the number of available alternatives, i.e. Binomial choice models (dichotomous), if there are only 2 available alternatives, or Multinomial choice models (polytomous), if there are 3 or more available alternatives in the model. Our experiment uses 3 alternatives (explained below in section 5.3), so focus in on the multinomial choice models. The multinomial logit model (MNL) has

been one the most widely used models in the field of DCEs, but mixed logit (ML) which is a generalisation of the MNL, has gained popularity the recent years and offers some advantages when compared to the MNL. The Multinomial Probit (Daganzo, 1979) could also be considered, but it is based on the assumption of multivariate normal distributed random errors which greatly increases computational complexity and cost.

This study employs the ML. The reasons for this are that the ML works around the 3 limitations of the MNL, as it allows for random taste variation, correlation in unobserved factors over time, and unrestricted substitution patterns (Train, 2003), and it can capture a greater amount of true behavioural variability in choice making (Hensher and Greene, 2003). In addition, ML has successfully been employed in various aspects of studies similar to this one, related to outdoor and forest recreation (Train, 1998; Murdock, 2006; Zandersen, Termansen and Jensen, 2007; Tu, Abildtrup and Garcia, 2016), landscape and forest conservation and creation (Birol, Karousakis and Koundouri, 2006; Campbell, 2007; Scarpa, Campbell and Hutchinson, 2007; De Valck *et al.*, 2014; Weller and Elsasser, 2018), and climate change (Layton and Brown, 2000; Layton and Levine, 2003). Both MNL and ML are described briefly below.

5.2.4.1 The Multinomial Logit Model

Different probabilistic choice models can be derived based on the assumptions about the distribution of the random error term (Equation 9). It is usually assumed that in a Random Utility model, the errors are independently and identically distributed with a Type 1 extreme value (Gumbel) distribution. The MNL derives from a logistic distribution resulting from the difference between 2 Gumbel distributions (McFadden, 1974).

In equation (7) the MNL assumes $b_{k,j} = \beta_{k,j}$

Scale parameters do not affect the utility of the models, but may affect the comparison among different models, or when different datasets are pooled (Train, 2003). This happens because the different estimated parameters of different datasets (in comparison) are confounded with their respective scale parameters/factors (Swait and Louviere, 1993).

MNLs treat the alternatives as independent (Independence of irrelevant alternatives), which implies that the relative probabilities being selected over other alternatives remain unaffected when other alternatives are introduced or removed. The MNL requires that each

of the attribute coefficients (the marginal utilities) are fixed or fixed when conditioned on the characteristics for the individual. The ML allows for the attribute coefficients to have a random distribution.

5.2.4.2 The Mixed Logit Model

The ML model (also called as random coefficients) is a generalised extension of the MNL, which can also be used in the context of discrete choice models (McFadden and Train, 2000). As stated above, the ML preserves the structure outlined above but does not require v or μ to be either fixed or conditionally fixed given the characteristics used to describe preferences.

While the MNL assumes that $b_{k,j} = \beta_{k,j}$ in (7), the ML generalises this model by assuming that there is some distribution which:

$$\beta_j \sim f(\beta_j | b_j, \Omega) \qquad (11)$$

, where f() reflects a distribution that is dependent on b_j(usually the mean), and Ω a matrix that determines the variance and covariance.

We can include all preference parameters as a matrix β, β=(β_1, β_2, ..., β_j) and observe that the distribution is conditional of the parameters α={α_k}, γ={$\gamma_{k,l}$}, S={s_j}, and Ω, there is a known conditional distribution for β :

$$\beta \sim f(\beta | \alpha, \gamma, \Omega, S) \qquad (12)$$

The ML probability is a weighted average of the logit formula evaluated at different values of β, with f(β) as the mixing distribution (weights by the density f(β)). While the ML still holds the assumption of independence of irrelevant alternatives at the individual level, it relaxes the assumption at the aggregate level, which MNL is strict about. Independence of irrelevant alternatives requires the error components of different alternatives to be correlated. The inability of MNL to deal with heterogeneity may result in inferior model specification, invalid conclusions, or spurious test results (Louviere, Hensher and Swait, 2000; Train, 2003). ML can better account for heterogeneity (Audibert, He and Mathonnat, 2013) and also account for possible correlation over repeated choices from the same individual (Algers *et al.*, 1998).

Hensher & Greene (2003) claim that as ML is less restrictive in their behavioural assumptions, it aligns more with reality than most DCE with the assumption that individuals have their own systematic and random components for each alternative in their choice sets. In addition, ML can capture a greater amount of true behavioural variability in choice making, and it also increases the possibility of eliciting different sources of heterogeneity in choice making associated with the mean and variance of the systematic and random components (ibid.). However, the cost of these advantages is that ML requires better quality data (compared to MNL), as it offers an extended framework that enables the capture of information with respect to behavioural variability in choice making (Hensher and Greene, 2003).

5.2.5 Likelihoods for the data

We can use y_{ikt} to note the choice of individual k in task t as 1 if they choose option i, or 0 if they don't. The probability that person k makes their observed choices is (6)=>

$$P_j = \prod_{t=1}^{T} \prod_{i=1}^{N} P_{i,j,t}^{y_{i,j,t}} \qquad (13)$$

And the probability that all individuals (K) make their observed choices then is:

$$Prob = \prod_{j=1}^{J} P_j = \prod_{j=1}^{J} \prod_{t=1}^{T} \prod_{i=1}^{N} P_{i,j,t}^{y_{i,j,t}} \qquad (14)$$

For the MNL function (14) above is the likelihood function (L), as β is a deterministic function of α, γ, S, as well as the observed choices Y ($y_{i,j,t}$) and attribute levels X = $\{x_{i,j,t}\}$.

MNL
$$L(\alpha, \gamma; S, X, Y) = \prod_{j=1}^{J} \prod_{t=1}^{T} \prod_{i=1}^{N} P_{i,j,t}^{y_{i,j,t}} \equiv f(Y|\beta, X) \qquad (15)$$

However, for the ML we need to integrate out β:

ML
$$L(\alpha, \gamma, \Omega; S, X, Y) = \int f(Y|\beta, X) f(\beta|\alpha, \gamma, \Omega, S)\, d\beta \qquad (16)$$

5.2.6 Debates about CE methods

A large part of the debate about CEs focuses on the design of choice experiments; however, Louviere *et al.* (2011) argue that much of this debate has to do with the different assumptions that researchers make to derive design results. Although some such assumptions are often expressed in technical terms, their implications in applications are not always clearly communicated, and some researchers with different backgrounds may lack the technical ability to go through the details of a technical paper.

Similarly, when it comes to statistics literature there is often a divide between researchers that either make strong assumptions about the model and those that work with the weakest of assumptions (Louviere, Pihlens and Carson, 2011). One such debate is about the Bayesian – Frequentist debate; briefly, the main idea behind the frequentist approach is that the probability of an event is the proportion of that event in the long run, while the Bayes theorem combines the prior probabilities and the likelihood from the data to get the posterior probability of the event (Vancsó, 2009; Smid *et al.*, 2020).

Both the Bayesian and the Frequentist approaches depend on the likelihood of seen data, which implies the chance that each possible parameter value produced the data observed data. The likelihood function is:

$$L(\theta|data) = f(data|\theta) \quad (17)$$

Where θ is the unknown variables, data is the observed data, data=(x_1, x_2, …,x_n).

5.2.6.1 The Frequentist approach

The frequentist approach considers the parameter θ an unknown but fixed quantity, and it doesn't take into account prior beliefs on the parameter, which means that only the information from the sampling data is relevant for interpretation. The confidence interval is in terms of repeated sampling, while the probability of obtaining more unlikely data than the ones observed under a given null hypothesis is expressed by the p-value. Ben-Akiva & Lerman (1985) describe that given the likelihood of any given sample of observations, since the observations are drawn randomly from the population, the likelihood of the sample is the product of the likelihood of the individual observations when observations are independent.

With this approach, choice models are often estimated based on the maximum likelihood approach, which result in the estimation of the variable coefficients of the utility function; this approach is typically called 'maximum likelihood estimation' (Louviere, Hensher and Swait, 2010). This method rests on the idea that any given sample could be developed by different populations, and that it is more likely to derive from one population than another. Therefore, the maximum likelihood estimates are the specific set of population parameters, which generate the observed sample more frequently (Louviere, Hensher and Swait, 2010).

To get our estimated parameters (θ), as per the name of the approach, all we need to do is find the parameters that yield the maximum of the likelihood function (17):

$$\hat{\theta} = arg\max_{\theta} \hat{L}(\theta|data) \,, \qquad (18)$$

where argmax is an operation that finds the argument that gives the maximum value from a target function.

For the case of MNL the frequentist estimation aims to maximise (15) $L(\alpha, \gamma; S, X, Y)$ through α and γ, and for the case of ML (16) $L(\alpha, \gamma, \Omega; S, X, Y)$ by choosing α, γ, Ω. The latter is more complicated, as (16) cannot be expressed as a closed form and requires simulation and/or other methods to maximise. Techniques such as the use of Halton Sequences (e.g. Monte Carlo simulations) have been developed to make such simulations more efficient.

5.2.6.2 The Bayesian approach

The Bayesian approach does not aim to maximise the likelihood function (ML or MNL) like the frequentist approach does, but instead it seeks to simulate the posterior distribution. It focuses on the subjective probability taking into account prior predictions and the credible intervals are in terms of subjective uncertainty. It considers the parameter θ as a random variable with a certain probability distribution (prior), which represents previous (a priori) beliefs before looking into the data from the sample.

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)} \qquad (19)$$

➔ $$P(\theta|data) = \frac{P(data|\theta)P(\theta)}{P(data)}, \quad (20)$$

where P(θ) is the prior, $P(\theta|data)$ the posterior, $P(data|\theta)$ the likelihood, and $P(data)$ is the normalising constant or the evidence. Note the prior P(θ) is not related to the sample, and with this approach, the prior distribution is updated based on the likelihood function through the Bayes' theorem (Bartolucci and Scrucca, 2010). As the normalising constant assures that the posterior distribution integrates to 1, the above equation can be written as an expression of the posterior distribution being proportional to the likelihood function times the prior distribution (Train, 2003):

$$P(\theta|data) \propto P(data|\theta)P(\theta) \quad (21)$$

In simple terms, the probability that we ascribe to a certain value for the parameters after seeing the sample (the posterior), is the probability that we ascribe to it before engaging with the sample (prior), times the probability (likelihood) those parameter values would result in the observed choices.

Also, the mean (a Bayesian point estimation of θ) is often used to summarize/ describe the posterior distribution of the parameter (Train, 2003). The mean of the posterior is:

$$\bar{\theta} = \int \theta P(\theta|data)\, d\theta\,, \quad (22)$$

where $\bar{\theta}$ stands for the value of θ, which minimizes the expected cost of the analyst being wrong about θ, if the cost of error is quadratic in the size of the error (Train, 2003).

For the ML the posterior obeys:

$$f(\alpha, \gamma, \Omega|Y, S, X) \propto L_{ML}(\alpha, \gamma, \Omega; YS, X) f(a, \gamma, \Omega) \quad (23)$$

, where $f(\alpha, \gamma, \Omega|Y, S, X)$ the posterior and $f(a, \gamma, \Omega)$ the prior for the parameters α,γ,Ω. The proportionality (∝) is of limited use if one seeks to simulate the posterior, because the likelihood ($L_{ML}(\alpha, \gamma, \Omega; YS, X)$) needs to be calculated by simulation, i.e. is not of a closed form. However, in Bayesian Estimation we can observe that we have a posterior that includes the latent variables in the form:

$$f(\alpha, \gamma, \Omega | Y, S, X) \propto f(Y|\beta, X) f(\beta|\alpha, \gamma, \Omega, S) f(a, \gamma, \Omega) \quad (24)$$

Note that $f(Y|\beta, X)$ comes from (20), $f(\beta|\alpha, \gamma, \Omega, S)$ comes from (14), and $f(a, \gamma, \Omega)$ can be specified by the researcher. That means that everything on the right hand side can be expressed explicitly as a distribution, i.e. have an explicit form, and thus all three quantities can be stated in a computer program (such as STAN) and the posteriors for α,γ,Ω, and β can be simulated. It is common in Bayesian Research to report summary statistics for this posterior such as the mean, standard deviation, etc..

This study works with Bayesian methods which offer a useful approach to estimating the ML model (Huber and Train, 2001; Balcombe, Chalak and Fraser, 2009). To start with, Bayesian methods can incorporate prior knowledge in such a way that it would not be possible classically, which may be beneficial both computationally and from an economic analysis perspective. Classical methods may also interfere with inference, as ML can be weakly identified in some regions (or nearly non-identified) of the parameter space. However, if the priors don't dominate the data, they can limit or eliminate the propensity of parameters 'straying' into such nearly non-identified regions (Balcombe, Chalak and Fraser, 2009). In addition, ML's likelihood function may be multimodal; inference based on analysis at one mode, and curvature of the likelihood at that mode may be misleading (ibid.). Also, under specific conditions Bayesian estimates will approach maximum likelihood estimates, and the standard deviations and the standard errors derived from a classical procedure will tend to be similar (Balcombe, Chalak and Fraser, 2009). Finally, Bayesian model averaging can be performed.

On the other hand, there may be some drawbacks when using Bayesian methods: model comparison using Bayesian models is enabled by the computation of the marginal likelihood, which can be difficult in practice (although simple in principle); classical methods can and have allowed mixing random and fixed coefficients, which does not typically happen with Bayesian methods, as allowing for some fixed parameters require additional steps (Balcombe, Chalak and Fraser, 2009). The evolution of software development has played a role in mitigating these drawbacks.

The use of the priors has been another point of debate regarding Bayesian methods, especially when there is no prior information available. The thought is that if there is no prior information available, then the priors should be uninformative (useful discussion by (Syversveen, 1998; Price, 2003; Pettigrew, 2016; Northrup and Gerber, 2018)). There is a distinction between 'informative' priors, when there is a large literature behind, and 'uninformative' or 'non-informative' priors, when there isn't one, even though the names can be misleading as such variables do offer little information (Box and Tiao, 1992). 'Uninformative' priors have minimal effect on the final inference with respect to the data (Bernardo and Smith, 1994). When the prior mean is uninformative, the result obtained for the mean with the likelihood estimation and the posterior mean will be more or less similar (Van de Schoot *et al.*, 2014). A prior distribution is a choice made by the researcher; it is not a state of the world or nature, nor a hidden variable (Robert, 2001). The nature of statistical inference implies that there are no proper or best answers, i.e. there is not a best variable/prior one should use (at least before observing the data) (ibid.).

In this study, the mixed logit (ML) using Bayesian methods is employed to examine the preferences of the citizens in Athens Metropolitan Area towards economic investment in nearby forests. Bayesian methods are also chosen for practicality as it is easier to develop new parameters with Bayesian given the available software, and also a mixed logit model using Stan is not as easily done with Frequentist methods.

5.3 Choice Experiment Survey design

The main design stages of the survey consisted of (1) the identification of attributes & levels, (2) the experimental design and the finalisation of the choice sets and (3) the development of questionnaires and data collection. There was a constant process of back and forth between the different stages, in order to balance theory, practice, and feedback in each stage, all of which are incorporated in the final design of the survey. This process was based on and inspired by Hoyos (2010), who focused on environmental valuation with discrete choice experiments. The same article provided valuable information about the design of the different stages of the CE survey of this research. Similar processes – design stages have been recommended in literature as well (Hanley, Mourato and Wright, 2001; Bateman *et al.*, 2008; Holmes, Adamowicz and Carlsson, 2017).

Non-market valuation surveys tend to include topics and concepts that the respondents may not be familiar with (Champ, 2003). Interviews and pilot tests were deployed to help with the design and improvement of the CE survey design, in order to take into account the respondents baseline knowledge of the specific concepts and overall topic, as well as other factors which may affect the overall complexity of the survey and the respondents behaviour.

5.3.1 Pilots

It's become common practice to employ different qualitative methods to improve the survey design and the meaning and quality of the results from valuation studies (Powe, Garrod and McMahon, 2005). Pilot tests and post-pilot discussions were used in this study to help with the design of the questionnaire and refine the choice experiment survey. Both methods have been popular in surveys relating to non-market valuation, as sometimes the respondents may not be familiar with the topics in such surveys (Champ, 2003), which therefore allow the researcher to better comprehend the respondents' baseline understanding and knowledge of the survey topic and potential complexity factors, which may interfere with their choice behaviour.

One of the main objectives of the preliminary pilot surveys and follow-up discussions was to finalise the list of attributes and levels that could decently describe an improvement with respect to forest conditions. This research relied on the existing relevant literature to find a starting point to describe the attributes and levels but had also had to take into consideration the public perception of which of the attributes were important and which levels would be meaningful for each chosen attribute. In other words, the combination of pilots and post-pilot discussions was important to ensure that the chosen attributes and levels could not only be supported by literature, but that they were also relevant to the respondents (Adamowicz and Louviere, 1998; Bennett and Blamey, 2001)

The process included first the exposure of the respondents to the questionnaire (pilot) and observing their reactions and comprehension during each part; and second a post-survey discussion about their impressions of the questionnaire. The following questions were asked to all respondents in the pilot survey, and there was also room for additional comments in the end, if they wished to make any additional suggestions, or highlight elements they liked or disliked.

1) Do you consider this survey easy or difficult to understand overall?
2) Is there something that seemed to be difficult to understand?
   Please reply separately for each of the below:
   - Topic description
   - Description and understanding of attributes and levels
   - Choice cards
3) How could I improve it? How would you present it?
4) For the case of cost (tax), which level would you consider deterrent? Your answer may be higher or lower than the ones provided.
5) Which of the attributes listed did you consider as the most and least important or relevant to your answers? Are there any other attributes/elements that you would have liked to see in the survey, i.e. if the relevant authorities decide to invest in forests in AMA, what change or improvement would you like to see?
6) Do you have any comments or suggestions for improvement? You can Introduce new elements or remove existing elements.

If respondents did make some comments or suggestions, there may have been additional follow up questions for me to understand their points clearly.

The pilots took place twice during August-September 2021 in Syntagma square, and Ilioupoli square. In both cases the sample size was 15 (30 in total). In addition, the final version was also tested once through a pilot study with a sample size of 10 one day before the data collection, to ensure that the design is decent.

The role of the pilot study and the discussions were to discover which data collection procedures or elements of the design could be modified, improved, or redesigned, in order to enhance respondents' comprehension of the study as well as efficiency in data collection. In particular, the preliminary studies in this research were helpful in terms of:

1) Increased familiarity with using Qualtrics and trying different settings of the application, observing how respondents interacted with it, and modifying it to make it easier for the respondents to use. For example, introducing images combined with the text, and creating and introducing an index (a laminated A3 sheet) with information about the attributes and their levels, as respondents could not go back to look at all the available levels.
2) Trying out different ways of the survey presentation, ranging from not talking to the respondent at all and allowing them to read through all the text and details, to introducing and describing everything. Also, the use of wording and the description of the choice scenarios were examined to determine if they needed to be reworded.

During the data collection, only some information was described, including the introduction of the survey and the attribute and level specification, while the respondents read the remaining pages, including the questions, themselves. If respondents had additional questions, clarifications were provided.

3) Getting an understanding of whether the respondents felt engaged or bored in which part(s) of the survey; this helped to finalise the number of choice cards per respondents to 8, as more than 10 or 12 choice cards could disengage some respondents. Similar to point -2- above, it provided a better understanding of whether I should describe which parts to the respondents. It also helped with getting an understanding of how long the data collection would take per respondent and improving both the survey design and my approach to make data collection as efficient as possible.
4) Some observations and suggestions from respondents were incorporated in later versions of the survey. For example, the levels of some attributes had to be modified so that they were more meaningful to respondents. Specific changes are described below in sections 3.1.1 - 3.1.5.
5) Some attributes were considered and recommended during the pilots, such as number of staff in the forest-related services, number roads-trails in forests, and new signs, introduction of refreshment areas. The pilot allowed me to try to incorporate 3 of these attributes into 1 in the final version of the pilot and survey (5.3.2.3 Infrastructure for recreation opportunities below).
6) Finally, it helped the researcher to get a better understanding of how respondents may understand and conceptualise the valued good and the different levels of the attributes; get a better awareness of the respondents thinking process as well as their motivation in their answers; and to explore the public acceptability of the survey in terms of valuation.

5.3.2 Stage 1: Attributes & levels

Following the CM theory and applying it to forest regimes, i.e., seeing forests as a bundle of goods for the needs of this research, utility derives from the utility respondents get from different forest attributes. The attributes chosen for this CE survey were chosen based on: i) how common they are in relevant literature, i.e. DCEs in forest related contexts taking into account the scope of this research, which relates to economics and environmental governance; ii) how relevant they are for the case of Attica and AMA in Greece, i.e. different socioeconomic and environmental conditions and needs, which was also tested during the pilots; iii) the availability of relevant information and data, to accurately quantify their levels.

Numeric values written in words and symbols are preferred to pictures/graphics, as they usually lead to more consistent answer patterns, and more accurate interpretation of

attribute levels, and more accurate attribute level estimates (Veldwijk *et al.*, 2015). In addition, pictures and symbols were also used combined with both text and numbers, which has been claimed to aid comprehension (Mangham, Hanson and McPake, 2009). Different combinations of text, number, and symbols were tested during the pilots and a combination of all 3 seemed to be the easiest to understand.

The choice experiment will present to the sample (respondents) combinations of different variables (attributes) to choose among, each of which will have different range scales (levels). All the attributes are presented below, along with their respective levels, and refer to changes taking place in forests/forest areas in the Attica region, where the CE survey takes place. The attributes and their levels are based on the feedback from the pilot surveys and adjusted so that they are as clear and simple as possible. The levels were also chosen to be realistic and possible if policy measures were to take place (Bennett & Blarney 2001).

In the field of healthcare, where the use of CE is also popular, Marshall *et al.* (2010) reviewed published literature between 2005 and 2008 in order to identify recent applications of conjoint analysis, and found that most surveys used 6 attributes (minimum 3 and maximum 16 attributes). They supported that this number is sensible as it large enough to capture the criteria on which people base their preferences, and at the same time not too large to complicate the task for the respondents. This study uses 5 attributes, described below.

5.3.2.1 Number of planted trees - Forest cover increase

Forest cover area has been a very common attribute when it comes to CE in forest-related contexts. Forest cover area can be used to research and capture respondents' preferences related to both direct socio-environmental benefits and values [e.g. Yao *et al.* (2014), Giergiczny *et al.* (2015), Varela *et al.* (2017a)] and ecosystem services and bequest values, e.g., Diafas *et al.* (2017). In addition forest cover has been used in CE surveys both for urban green spaces, e.g., H. Kim *et al.* (2020)), and national forest park contexts, e.g., Wang *et al.* (2014). This suits the geographical area of focus, which comprises of different forests, including recreational, national parks, Natura 2000 conservation areas, etc..

During the period 2001-2011 1.562.804 new trees were planted in Attica through reforestation (Ministry of Environment and Energy, 2014)[40]. This corresponds to 142.073 newly planted trees per year on average[41]. Investment will lead to an increase in the number of trees planted per year, through purchasing more trees, and employing more professionals to work on reforestation.

There are 5 available levels of increase of the number of planted trees per year:

i. **20% increase**, corresponding to approx. **170.000 trees per year**
ii. **40% increase**, corresponding to approx. **200.000 trees per year**
iii. **60% increase**, corresponding to approx. **227.000 trees per year**
iv. **80% increase,** corresponding to approx. **255.000 trees per year**
v. **No increase (Status Quo - SQ),** corresponding to approx. **142.000 trees per year**

The initial levels for this attribute were 20%, 30%, 40%, 60% increase of the number of trees planted. However, during the pilots the new levels (20%, 40%, 60%, and 80% increase of the number of planted trees) were established, as having equal increase levels was easier for the respondents to understand. The levels were realistic, as based on the available data similar numbers of trees had been planted in earlier years (e.g. 248.800 in 1997, 230.000 in 2011).

Also, both the increase percentage and the absolute number of trees were displayed to the respondents. During the pilots, many respondents could not comprehend the magnitude of the levels, or the difference between the levels very clearly, even the extremes (e.g. 170.000 and 227.000 trees). To work around this issue, the respective increase percentage was included next to the number of trees planted/reforested every year, and the number of the current situation for the *no-choice/status quo (SQ)* option.

5.3.2.2 Forest fires decrease

Researchers have used forest fires from both a prevention (Farreras and Mavsar, 2012) and forest area burnt (Varela, Jacobsen and Mavsar, 2017) perspectives in choice experiments in the Mediterranean region (Spain). This attribute stands for the prevention of forest fires in AMA, in terms of the decrease in forest area burnt in the area. It can capture both the

[40] Although it would be great to have the most up to date data, the most recent ones available on the official ministry website are for 2011, released in 2014 (ypen.gov.gr, 2020)

[41] Min. 25.200 in 2004, max. 230.000 in 2011.

bequest (non-use) and option value of forest resources, as it refers to the utility/satisfaction of maintaining certain resources or assets for the future and also the option of using it in the future through preserving it.

With respect to policies related to forest fires since the beginning of the economic crisis (approx. 2007) Greece has focused on fire suppresion rather than preventive measures minimizing the adverse impacts of socioeconomic drivers on wildfires (Xanthopoulos, 2007; Sapountzaki *et al.*, 2011; Ferrara *et al.*, 2018). The annual burnt forest area in Attica in the last 20 years 2000-2020 has been approx. *19.401,64 stremma (1.940 hectares)/* year (Greek Fire services, 2021). Attica has been the most fire-affected region in the country (Ministry of Environment and Energy, 2020c). However, in August 2021 alone more than 231.000 stremma (23.100 hectares) of forests were burnt in Attica (EFFIS, 2021). The huge forest area burnt in August 2021 were unfortunately far from the available levels for this attribute.

However, due to the complexity of forest fire management, fire suppression alone is not sustainable long term and additional focus on prevention can be both beneficial in environmental terms and cost-efficient (Mavsar, González Cabán and Varela, 2013). For example, *investment in* personnel for data collection and analysis or increased patrols (Sletnes, 2010; Kemper, 2020), in technology (e.g. drones) (DJI Enterprise, 2021), land-use planning and management (van Butsic, Kelly and Moritz, 2015; Kemper, 2020), infrastructure and equipment (Sletnes, 2010), and increased participation of stakeholders and local communities (Kemper, 2020) can help with both fire suppression and prevention.

Although it is difficult to predict the exact magnitude of forest fires, due to variables such as climate change, unpredictability of environmental weather and conditions, random events, etc., investment in the above areas can yield 4 available levels of improvement:

- ***i)*** ***10% improvement,*** *corresponding to approx. 2000 fewer stremma/year burnt, i.e.,* **17.500 stremma** of forests burnt per year on average
- ***ii)*** ***20% improvement,*** *corresponding to approx. 4000 fewer stremma/year burnt, i.e.,* **15.500 stremma** of forests burnt per year on average
- ***iii)*** ***31% improvement,*** *corresponding to approx. 6000 fewer stremma/year burnt, i.e.,* **13.500 stremma** of forests burnt per year on average
- ***iv)*** **No change (SQ)** corresponding to approx. **19500 stremma** of forests burnt per year on average

Similar to the number of planted trees, respondents responded better when both the improvement was expressed both in absolute numbers (number stremma of burnt area) and percentage (% improvement). The levels initially were 10%, 20%, and 30%, but many respondents in the pilots commented that they would have preferred more uniformity in numbers (2000/4000/6000 stremma) rather than percentages (10%/20%/30%).

5.3.2.3 Infrastructure for recreation opportunities

Recreational benefits is one of the many potential social (use) values deriving from the existence of forests. Different aspects of recreation have been used in CEs related to forests. Due to the wide variety of potential forest-related recreational opportunities and infrastructure available in literature, this study relied on both relevant literature and the pilots to create a meaningful attribute with measurable and understandable levels. The following four areas of investment towards recreation are considered both as popular by the respondents in the pilots and the most relevant in the literature:

-  Bins and cleanliness (Wang, Wei and Lu, 2014; Andrea *et al.*, 2020)
-  Informational signs, Maintenance of Paths and trails for hiking and cycling (Wang, Wei and Lu, 2014; Giergiczny *et al.*, 2015; Japelj *et al.*, 2016; Nielsen, Lundhede and Jacobsen, 2016; Varela, Jacobsen and Mavsar, 2017; Andrea *et al.*, 2020)
-  Benches, Kiosks and picnic areas (Giergiczny *et al.*, 2015; Japelj *et al.*, 2016; Vásquez and de Rezende, 2018; Tavárez and Elbakidze, 2019; Andrea *et al.*, 2020)
-  Parking area and a small refectory/cafe (and toilets) close to the forest (Luca Cesaro, Gatto and Pettenella, 2008; Valasiuk *et al.*, 2018; Andrea *et al.*, 2020; Kim *et al.*, 2020; Tyrväinen *et al.*, 2020). Investment not inside the forest so that it doesn't disturb the ecosystem and change the forest's character.

During the pilots, different potential forest-related infrastructure opportunities were presented to the respondents, each one representing a separate attribute. Specifically the five attributes presented to the respondents in the first pilot were (i) the existence of a small refectory (binary); (ii) benches and kiosks (binary); (iii) informational signs was initially presented (not binary); (iv) standing spaces with binoculars (binary); (v) number of employees for security and maintenance (not binary). However, the data for the existing

levels (status quo) was not easy to find or define quantitavely, and the respondents' comprehension about these attributes was not very clear in the first pilot.

Andrea *et al.* (2020)'s study, which used bundles of attributes, provided inspiration for the formulation of the levels of this attribute after the first pilot . There were also unofficial conversations with forest-related organisations, bodies, and groups of volunteers, which helped to finalise the final form of this attribute. Thus this attribute that incorporates some of the most popular infrastructure was introduced in the second pilot, which worked around both issues. The bundles/levels used in the survey were the ones that were used in the second pilot (described below).

Although there is a large number of potential combination from the four areas of investment in recreation described above, only four possible combinations are available for participants to choose from. This aims to simplify and help respondents to understand the potential areas of investment (and also the analysis). The 4 available combinations (bundles/levels) are:

1) **Improved maintenance of existing infrastructure:**

- ✓ Bins and cleanliness
- ✓ Informational signs, Maintenance of Paths and trails for hiking and cycling

2) Improved maintenance of existing infrastructure AND introducing additional recreation infrastructure:

- ✓ Bins and cleanliness
- ✓ Informational signs, Maintenance of Paths and trails for hiking and cycling
- ✓ Benches, Kiosks and picnic areas

3) Improved maintenance of existing infrastructure AND introducing additional recreation infrastructure AND provision of additional services:

- ✓ Bins and cleanliness
- ✓ Informational signs, Maintenance of Paths and trails for hiking and cycling

- ✓ Benches, Kiosks and picnic areas
- ✓ Parking area and a small refectory/cafe (and toilets) close to the forest

4) No improvement (SQ)

This attribute aims to capture the value and citizens' preferences towards recreational opportunities in forests in Attica, and each level offers something distinct. The description below derived from the post-pilot discussion form the second pilot, as well as discussion with volunteers from Ymmitos forest-mountain (SPAY).

- The 1st level offers some benefits mainly to people who already visit forests such as cleanliness and more information about flora and fauna species in signs; this may lead to local visitors caring for the forest more, i.e. support and inclusion of local volunteers and organisations; increase awareness about forests and potential threats, such as fires, illegal dumping, illegal logging, air pollution, etc. (from signs); in turn these may help to discourage illegal activities in the long term (illegal logging) and potentially some improvement with fires, due to the cleanliness (removal of fuel and sources of fire ignition), as well as the improved access due to maintenance of trails, and increased presence of local visitors.
- The 2nd level builds on the benefits of the first level and also adds more recreational infrastructure, which can help to attract more people or groups who live or are settled nearby; support the creation of environmental groups (official or unofficial) that visit forests (e.g. bird watching, pet owners); and also provide space for learning opportunities such as nature experience, environmental education, gardening, (e.g. school visits).
- The 3rd level offers special infrastructure for organized recreational areas and attract people from other areas and not just locals, family daily trips, large group trips, more urbanised recreation.

Despite the logic behind these levels, citizens/respondents could potentially interpret each level to offer different advantages and disadvantages and assign diffferent levels of value to each level. Also, investment in such opportunities is not prohibitive in terms of project management (cost,time,quality) and has already taken place in smaller scale in Ymittos forest-mountain, with the contribution and participation of volunteers (SPAY).

5.3.2.4 Attribute: Regional taxes (Payment vehicle)

The inclusion of payment vehicle as an attributes helps to estimate the economic value that citizens put on forest non-market goods and services (WTP), as well as the estimation of

relative trade-offs of attributes (Mangham, Hanson and McPake, 2009; Carson and Louviere, 2010).

In the scenario presented to the participants, the cost for the investment in forests is covered from a combination of EU funds[42] and an increase of municipal taxes. The increase in the municipal taxes is what the respondents are expected to pay and it should only be used towards the investment in forests towards the attributes described above (1-3). The last part had to be stressed during both the pilots and the data collection as many respondents lacked confidence and trust in the government and regional government's mechanisms, ability, and transparency towards the efficient use of tax revenue. Using tax as a payment vehicle involves equity concerns; a possible alternative that has also been used in literature, donation-based fees, involves concerns of free-riding and 'purchase of moral satisfaction' (Kahneman and Knetsch, 1992).

Using regional/municipal taxes as the payment vehicle in forest-related CE surveys has been quite common in literature, as it is considered easily understandable by the respondents (Horne, Boxall and Adamowicz, 2005; Czajkowski, Buszko-Briggs and Hanley, 2009; Varela, Jacobsen and Mavsar, 2017; Kim *et al.*, 2020) For the case of forests in Greece, using municipal/regional taxes as a payment vehicle is justified taking into account (i) the public nature of the good; (ii) the public ownership of the vast majority of Greek forests (including AMA area); (iii) the (complicated) responsibility structure including many different public authorities, e.g. forest services, ministries, municipalities, prefectures, and fire department; and (iv) the direction towards decentralised administration (public and forest), since the adoption of the Kallikratis programme (Law 3852/2010) in 2011.

As the scenario includes levels of all 3 attributes (more trees planted, fire suppression and prevention, and infrastructure for recreation) the cost should cover all the necessary expenses for the materialisation and maintenance of the attributes during the selected period of investment. This includes fair wages of staff for initial research about which

[42] According to the National Energy and Climate Plan (HMEE, 2019), which is financially supported by European funds, financial investment will be directed towards supporting the Greek forest regime.

attribute is most appropriate for which forest[43]; the cost of equipment and material necessary for each investment [44]; fair staff wages for both the materialization and the maintenance of the attributes (e.g. water tanks, trails, benches, etc.) during the selected period of investment. There are 5 levels available for the participants to choose from:

1) €48/year (€4/month) per person
2) €84/ year (€7/month) per person
3) €120/ year (€10/month) per person
4) €180/ year (€15/month) per person
5) SQ no payment

During the first pilots of the survey, different expressions of the cost were used, presenting the levels per month, per year, or the total amount. During the second pilot all 3 presentations were included, which made it easier easier for respondents to understand and comprehend.

The four levels introduced to the respondents were finalised after the second pilot. Respondents were asked questions specifically about the taxes, e.g. 'what is the highest levels of tax you would be willing to pay?', 'did you consider any level of tax deterrent regardless of the attributes accompanying it?'.

All levels were modified and finalised after the pilots and the post-pilot discussions. The initial levels were (i) €24/year (€2/month) per person, (i) 48/ year (€4/month) per person, (iii) €84/ year (€7/month) per person, and (iv) €120/ year (€10/month) per person, with (v) SQ no payment. Some questions in the post-pilot discussions which helped with the modification were 'what is the highest levels of tax you would be willing to pay?', 'did you consider any level of tax deterrent regardless of the attributes accompanying it?', 'what do

[43] For example, more investment towards recreational infrastructure could be more preferable in the forest of Kaisariani in Ymittos mountain, while more trees planted would be more appropriate in Penteli forest or Sounio forest-natural park, while also taking into account the recent forest fires in Parnetha forest and whether it would be suitable/appropriate to plant trees immediately after the forest fires. Other examples would be which type of trees could be planted in which forests, which areas to introduce picnic areas or to find a space for parking lot, or which fire prevention tool/mechanism would be more suitable for each forest given its geomorphology.

[44] E.g., saplings and trees to be planted, drones, vehicles, water tanks, benches, etc.

you think the minimum payment could/should be for the citizens to pay, should an investment take place in the forests in AMA/Attica?'.

The minimum cost per month, €48/year (€4/month) per person, was considered as feasible and not expensive by any participants in the pilots. The maximum level, €180/ year (€15/month) per person was considered expensive and deterrent by a few, especially compared to the cost of life and the wage of the respondents, but at the same time it was also regarded as reasonable/fair in some tradeoffs; in other words, even though they could not afford it themselves, they expressed that it is a fair price/tax for what the investment is supposed to offer.

In addition, during discussion with WWF members from the direct dialogue team in Athens, they explained that the minimum monthly financial support subscription for WWF is €15/month (which is equal to the maximum level of the payment attribute in this study) can provide important environmental benefits (research, tree planting, advocates for environmental issues and pressure to politicians, etc.). They also explained that even though not everyone can afford this price, there have been many who are willing to contribute to their cause, even during the period of the economic crisis, which meant that this level was not unrealistic.

5.3.2.5 Time commitment

The notion of time commitment has been introduced relatively recently in DCEs in different fields, and it is usually used in the sense of period duration. For example, in the field of healthcare it usually takes the form of the duration of therapy or duration symptoms/side-effects (Mühlbacher *et al.*, 2017), or protection duration from specific medication or vaccination (de Bekker-Grob *et al.*, 2010; Wong *et al.*, 2018). In environmental and forest-related regimes, when DCEs include the element of time in the sense of period duration, they often refer to contract duration as they target farmers as respondents, trying to elicit their WTA. For example, Vorlaufer *et al.* (2017) and Balderas Torres *et al.* (2013) addressed contract duration for Payments for Ecosystem Services (PES) to enhance or protect forests, targeting respectively smallholder farmers in Zambia, and landowners and ejido-landowners in Mexico respectively. Similarly, Arifin *et al.* (2009) targetted farmers to elicit their preferences in community forestry contracts towards forest protection in Indonesia.

DCEs that have used a time variable attribute in research in forest regimes tend to address specific focus groups/ forest actors, but not the general public. For example, Foundjem-Tita *et al.* (2013) addressed illegal activities in the Congo basin forests and applied a DCE targeting Non-Timber Forests Products traders. In their experiment they included the duration of the exploitation permit for Non-Timber Forests Products as one of the attributes in the experiment, with only 1 alternative (3 years) to the SQ (1 year). In addition, Kelly, Germain, and Mack's DCE (2016), aimed to create the profile of the family forest owners in NYC watershed using mail survey. They used commitment periods of 30, 50, and 99 years with respect to different conservation program scenarios the respondents took part in or wanted to participate, but the result found time commitment to be not a significant attribute.

This research builds on the existing literature, but gives a different role to the time commitment attribute. Firstly, the time commitment element is combined with the payment vehicle to elicit the WTP instead of a WTA of the respondents. The research targets the general public in selected geographical areas and not specific target groups in the forest regime in total. In addition, professionals in the forest regime (e.g. farmers or traders) may be more familiar with the time-duration attribute, as they may have dealt with such contracts before; citizens on the other hand may not be as familiar and may have different ways to interpret the time variable, as they may have different levels of awareness for forest-related issues and policies, and time preferences.

Vásquez & de Rezende (2018) used time with respect to the delay in reaching the targeted level of water quality in a choice experiment regarding lake restoration. They used the time variable with respect to the time lapse that leads to a final outcome (total period), contrary to the majority of the found literature that focuses on the time duration. This current research builds on both perspectives and aims to use the time commitment attribute in a way that can incorporate both the time duration and the final outcome (total period).

Furthermore, while time commitment in this research is an attribute itself, it also describes the period the respondents want to commit to their preferred alternative, i.e. other attributes. Although this was challenging to deal with (models determination in section 5.4 and analysis in section 5.5), time element in combination with a payment vehicle (taxes) allowed the respondents to treat it in 3 different ways (and the researcher in 4 different

ways, taking into account covariates in one of the models), namely as a multiplier for the annual tradeoff, as a total cost for the total benefits, or enabling them to discount the payments for future benefits.

The levels of time commitment are all expressed in years. They are described and presented to the respondents as the number of years that they would like their choice-set to be active for. In this period the respondents commit to both the provisions (the first 3 attributes) and to paying the municipal taxes for the same number of years.

Levels:

1) Four (4) years
2) Eight (8) years
3) Twelve (12) years
4) No commitment – SQ (0 years)

These levels were elicited during the survey design and pilot survey stages. The initial levels were 2, 4, and 7 years, but during the pilot stages, many of the respondents neglected the attribute and saw no large difference among the levels. In addition, the final levels resemble the 4-year period between elections and it gave respondents in the pilots that their choice can have an impact similar to elections (feedback from pilots). They also allow for and nudge the respondents to think about forests and forest governance in both short- medium-, and long-term, and not only on ephemeral solutions to temporary issues. Furthermore, the levels of the other attributes (nr. of trees, forest fires, and recreational infrastructure, increase in taxes) are realistic and attainable for all levels of time commitment, while it can take into account any changes in the governance regime that may stall the materialisation of the investment.

5.3.3 Stage 2: Experimental Design

Once the attributes and the levels of the environmental good (forests) were determined, they had to be paired into alternatives and structured into choice sets (Bennett and Blamey, 2001). An experimental design allows for controlling and manipulating the attributes and levels, in order to test which parameters may influence respondents' utility. The total number of attributes and levels can influence the model, its parameters, and the overall success/efficiency of the choice experiment (Mariel *et al.*, 2021). Given the constraints of this

study, such as the cost of the survey, the available time, as well as complexity for the respondent and the length of the questionnaire, a successful stated preference survey has to frame questions in a way that generates the maximum amount of information (Carlsson and Martinsson, 2003).

Choosing an experimental design for a DCE (or conjoint analysis) to maximise orthogonality and balance is often considered a common goal (Lusk and Norwood, 2005). Balance demands that each level of each attribute occurs equally frequently, and therefore has the same statistical power. Orthogonality would demand the least correlation among the attributes. Having 5 attributes, each with 4, 3, 3, 4, 3 levels respectively, there are 432 possible combinations of choice sets. Although a full factorial could have statistical advantages, such as balance, it is simply not practical nor cost effective, if not impossible to administer the huge amount of surveys required for a full factorial (Louviere, Hensher and Swait, 2000).

One of the most popular methods to decrease the number of choice sets in a CE is the use of an orthogonal fractional factorial design. As the name indicates a fractional factorial would require the selection of a fraction of the full factorial, in order to estimate any particular effects of interest as efficiently as possible, but that would also involve some loss of statistical information (Louviere, Hensher and Swait, 2000). Blocking combined with a fractional factorial design could reduce the number of choice sets even further (ibid.). Similar to a full factorial design, orthogonality, i.e. ensuring that all included attributes in the design are not correlated is one of the main objectives/characteristics of the fractional factorial design.

However, many researchers have developed and used another class of designs when it comes to experimental designs, which aims at statistical efficiency, namely optimal[45] designs. Although they allow for correlations between attributes, they are statistically efficient, and their objective is to optimise the amount of information that can be obtained from the selected choice sets (Hensher, Rose and Greene, 2005). One of the limitations of creating a D-optimal is that it requires the knowledge of the utility parameters, which is however not typically available before the study. In order to work around this constraint, researchers (and particularly marketing researchers) have made the critical assumption that if designs are

[45] Or D-optimal (design-optimal). D-optimal and optimal design may be used interchangeably in this study.

good for general linear models, they should also be good for nonlinear models, such as conjoint analysis (CE) (Kuhfeld, 2002, p.79). In addition, Carlsson & Martinsson (2003) found in the field of healthcare that optimal designs based on prior information could generate more accurate welfare estimates than orthogonal fractional factorial designs. In the field of environmental economics, Lusk & Norwood (2005) found that designs incorporating attribute interactions generated more precise estimates. A D-optimal design also fits well with our mixed logit estimation using Bayesian methods.

A D-optimal design with 32 choice sets was created with the help of software (Anaconda, Jupyter notebook version 6.3.0). A larger number of choice sets can better cover the space of potential attribute level combinations (Mariel *et al.*, 2021). As the number of choice sets is large and most respondents would resent responding to 32 choice cards, the choice cards were randomly assigned to different respondents by blocking different sets. *All 32 choice cards are available in Appendix 5.2.* Blocking practically introduces a new orthogonal column to the design, whose attribute levels are then used to divide the design (Hensher, Rose and Greene, 2005). In total 4 blocks, each with 8 choice sets were created and were randomly presented to the respondents. The combination of using a blocking strategy together with a fractional factorial are used to reduce complexity for respondents (ibid.).

Each choice set/card consists of 3 alternatives, namely 2 alternatives options and an opt-out/ status-quo option, which describes the current state of forests, in terms of the attributes. Zhang & Adamowicz (2011) found that between choice sets with 2 or 3 alternatives, the larger the number of alternatives, the more increased the complexity. The inclusion of SQ choices are recommended by some state-of-the-art choice experiment design guidelines and literature (Louviere, Hensher and Swait, 2000; Adamowicz and Boxall, 2001; Bennett and Blamey, 2001). They are considered to actively reflect preferences, and not just the lack of interest towards other choice sets (Kjær, 2005; Carson and Louviere, 2010; Hoyos, 2010), as it doesn't force participants to choose among options they consider worse than the current situation.

An example of a choice card is available in Appendix 5.1.

5.3.4 Stage 3: the development of questionnaires and data collection

5.3.4.1 Questionnaire structure

Using Mariel *et al.* (2021 p.9-10) as a guide, the structure of the questionnaire consists of the following 6 distinct parts, in this specific order:

1) Introduction: A short description and explanation about the survey, including my and my supervisor's contact details in case the respondents have any questions or want to withdraw their answers.
2) Warm up -behavioural questions (4), to ensure that respondents understand tasks (Carson *et al.*, 1994) and get relaxed with participating in the survey. The questions referred to their recent visits to forests in or outside Attica during the last year[46], and their estimate about citizens and the state's care towards forests.
3) Description panel: This section describes the environmental good in terms of its attributes and levels, along with the symbols for the attribute levels. I also had a printed and laminated A3 paper with all the attributes and their levels in order to remind the respondents if they asked about the attributes or the levels and to avoid any confusion, as some respondents thought they had to learn and remember the attributes and their levels.
4) The Choice experiment tasks; each respondent was given 8 choice cards to answer (randomly generated from a larger set of 32). I verbally reminded them that each card was independent of the others, i.e. each choice set should be perceived independently (as a new case).
5) Two question on their attitudes were included after the choice tasks, in order to help to explain part of the heterogeneity. Only 2 post-choice-tasks questions about attitudes were included, one related to the recent forest fires of summer 2021, and the other related to their income change during the last 8 years, in order to try to capture both environmental and economic influences/pressures. However, more questions were considered (such as which attribute they considered the most/least important, personal or social norms), but were not included in order to keep the survey as short as possible
6) Questions about demographics
7) 'Thank you for your help'.

5.3.4.2 Data collection

According to the most recent 2011 census, Attica is inhabited by around 3,8 million people, the vast majority of which is within the borders of AMA (Hellenic Statistical Authority, 2011). Appendix 5.3 depicts the different suburbs and Appendix 5.4 an aerial map of AMA. From the originally collected sample of 412 respondents, 25 protest responses were removed from the

[46] The questionnaire took place during autumn 2021. Due to the global pandemic, there were some restrictions in movement for some months in the year prior to the questionnaire.

final sample, leaving a final sample of 387 respondents. Protest responses are identified as those when the respondent chose the SQ option in all 8 choice sets, and showed protesting attitude during the introduction of the questionnaire, i.e. criticised the research and the topic while offering no constructive feedback about how to improve it, starting to complain about politics or religion, but not related to the topic of the survey or the research, or considered the survey to be a poll of political purposes, even though I kindly explained my research and my survey's topic and field.

Unfortunately, due to space and time limitations of the survey, there was no additional written question asking the respondents who always chose the status quo option why they did it. However, during the data collection, protest-responders were asked why they always chose the SQ choice. The majority admitted that it was due to financial reasons and/or they were not happy or content with the current forest regime conditions and that improvement is needed in forests, but they know that the state neglects the forests. Despite this, they stated that they either lacked trust towards the state and/or the tax system's efficiency and reciprocity (even after they were reminded that this is a hypothetical scenario). In addition, many stated that a proportion of the existing state tax revenue should go towards forests, without asking citizens to pay more, and that even if taxes have increased in the last few years, they have seen no improvement in forests.

The survey took place in 2 different groups of suburbs, using a stratified random sampling (Neyman, 1934), with each of the two groups to represent the 2 distinct strata, in the same population. The selection used the environmental quality and quantity, as well as the population density in each area as the criteria to assign different areas/municipalities in each group. The area of living (suburb) will be used as a covariate in the analysis, along with other personal characteristics, including age, income, profession, gender. My hypothesis is that people who live in different suburbs of the same region (AMA), may have different preferences with respect to investment in forests, depending on the proximity to and the access to forests, as other socio-environmental attributes of the suburb, such as population density in their suburb. Relevant observations have been made by Marre *et al.* (2015), who observed substantial differences between 2 areas that were geographically close and shared some characteristics in terms of environment and populations, while they confirmed that

some socio-economic and cultural contexts, as well as the status of the environment may play a crucial role.

Group 1 consists of municipalities in Central Athens, Piraeus, and the Western suburbs, the vast majority of which are considered urban or industrial, and are on average more densely populated and more industrialised (e.g. the harbour of Piraeus and the industrial zone in Aspropyrgos), compared the nothern, southern, and south-eastern suburbs (Group 2), where there are comparatively more suburban areas (Hellenic Statistical Authority, 2011). In addition the northern, southern, and south-eastern suburbs (group 2) have more direct access to forests and forest areas, as they are closer to mount Ymittos-Kaisariani aesthetic forest, mount Penteli, and the national parks of Sounio and Parnetha (Geodata.gov.gr, 2020). Most of the green areas and all the major forests in the AMA are depicted in Appendix 5.4.

In recent relevant survey research, Vásquez & de Rezende (2018) used a sample of 401 households in a choice experiment regarding lake restoration, Kelly *et al.* (2016) received 407 completed surveys, albeit self-completed as they chose to use mail surveys, while (Vorlaufer *et al.*, 2017) collected 320 collected questionnaires in their CE addressing duration for Payments for Ecosystem Services (PES), and (Andrea *et al.*, 2020) aimed to collect 400 respondents in a CE researching views and perceptions about the urban forest infrastructure and services in Komotini, Greece. Other CE surveys targeting specific regime actors, such as farmers or landowners [e.g. (Arifin *et al.*, 2009; Balderas Torres *et al.*, 2013)] usually use a much smaller sample, which can however be representative of the local population or conditions. In CEs using Bayesian d-efficient or d-optimal designs for mixed logit estimation, Tu *et al.* (2016) used a sample of 180 respondents in a study about urban green spaces and peri-urban forests, Giergiczny *et al.* (2015) in a study regarding public preferences for forest structural attributes using computer-aided web interviews (CAWI) collected a sample of 1000 respondents, and de Valck *et al.* (2014) in their study about the benefits of clearing forest plantations to restore nature, collected 440 responses from a survey managed by a marketing firm.

The sample size for this survey is 387 participants. 199 of them were from group 1 (‘centre’) and 188 from group 2 (‘suburb’). More details about the sample characteristics in section 5.5.1. The surveys were administered by the interviewer (me) face to face. During the data

collection process, I visited different municipalities in both groups, asking pedestrians and bystanders if they wanted to participate in the survey. Participants had to be over 16 and in order to be able to participate in the survey and they were also asked if they lived or worked in the specific area/suburb.

After agreeing to participate, I explained to the respondents some information things about my research and the survey, which are also mentioned in the 1st page of the survey. I used 2 tablets and a laminated A3 page with the attributes and their levels. The survey was in electronic form (Qualtrics) and the answers were saved automatically after each survey was completed. No personal data were collected, and the answers were confidential and anonymous. All responses were anonymised, and participants were assigned a randomly generated unique 4-digit ID, which they can/could use to retract their answers. My and my supervisor's emails were also presented in the first page of the survey, in case the participants wanted to contact us for whichever reason. There was also a combined information/consent sheet supplied on the first page of the survey, including information about the series of measures that were followed to ensure safety (both mine and the participants') due to the COVID-19 pandemic.

Reflecting on the challenges regarding such surveys, Skarupova (2014) and Fielding *et al.* (2016) listed internet access, especially in remote areas, sampling strategies (e.g. misrepresentation of convenience sampling), and software solutions to new challenges as the main challenges that a researcher may face. In this survey I used mobile data to cover the needs of the data collection and overcome the first obstacle. The sampling strategy was not based on convenience sampling, but on stratified random sampling. Finally, data collection was facilitated by Qualtrics, which had enough features to cover the needs of this survey, and no additional packages were required. Computer-assisted data collection for surveys allows for easier, quicker, and cheaper data gathering (Determann *et al.*, 2017; Abdel-All *et al.*, 2019). Some other commonly highlighted advantages of computer-assisted surveys include advanced design features, reduction in errors, and the possibility of using tablets or smartphones, which can facilitate data storage (Skarupova, 2014; Abdel-All *et al.*, 2019).

5.4 Model determination

The involvement of different levels of the time commitment attribute in the choice sets allows for studying the respondents perceptions with respect to the different time frames, and particularly the discounting of the attributes' values in these different time frames. Discounting refers to valuing future actions and consequences less than current ones; this includes factors that may diminish any expected utility generated by a future action, such as uncertainty, risk, or changing preferences. The discount rate is thus the rate or percentage by which utility loses its value as time goes forward. Discounting is not the same as time preferences, which refers to the preference of immediate over delayed utility (Frederick, Loewenstein and O'Donoghue, 2002).

There is no unambiguous answer regarding whether discounting should or should not be applied, as we cannot be sure about the respondents thinking with respect to benefits and costs in different time frames, discounting, or time preferences. On one hand, some respondents may have indeed taken into account some uncertainties in their decision making, either in macro- (e.g. the ongoing economic conditions in Greece) or micro- (personal developments or circumstances) levels, which can justify the discounting of values. This would also make sense from an economic point of view, if the respondents are assumed to be rational decision makers. On the other hand, we can't dismiss the case, where some respondents also consider that the experiment took place at a specific point in time, and that they considered simple monthly, annual, or total payments that were considered at this particular point in time, or that the decision makers would confound the time commitment with the accrued benefits, i.e. the longer the commitment the more the benefits.

Similar observations have been made in literature, e.g. Marre *et al.* (2015) when performing a DCE about coral reef ecosystem protection, where they recognise both the pros and cons of discounting of values in their CE, or Pienaar *et al.* (2014) who studied Community Based Natural Resource Management (CBNRM) programs in Botswana, and argued that since the programs varied in duration (more than 1 year) and they used a cash payment in their CE, it would be both possible and appropriate to estimate personal discount rates derived by the respondents' observed choices, and specifically its present value, or in other words the discounted value of the sum of the costs and benefits over time.

5.4.1 Reparameterisations

The outline in section 5.2.6.2 above has expressed the model in what has been termed "preference space", where parameters β_j represent the marginal utilities for the parameters in hand. This approach however can exhibit problems in calculating WTP estimates whereby the WTP for attribute j for individual k is

$$WTP_{k,j} = \frac{\beta_{k,j}}{\beta_{0,j}} \quad (25)$$

In order for this to be stable, $\beta_{0,j}$needs to have a bounded distribution (>0), and even then, it can be unstable if $\beta_{0,j}$ has a tendency to be close to 0. Because of this, one common way to control for this instability is to use a reparameterization for which the WTP becomes that parameters that are estimated directly, rather than through a secondary calculation. This requires exchanging (5) for the equation below:

$$V_{i,j,t} = \beta_{0,j}\left(-p_{i,t} + \sum_{k=1}^{K}\beta_{k,j}x_{i,k,t}\right) \quad (26)$$

The subsequent explanations still follow as above. In this case however, $\beta_{k,j}$ doesn't represent marginal utilities anymore, but WTP, which offers 2 benefits. First parameterising the function can be more stable this way. Second, any reasonable expectations that we may have about the possible ranges of WTP can be expressed in the priors for the parameters, whereas in preference space before this was more difficult.

The specification of the systematic utility in (26) above is often referred to as "WTP space". The vast majority of applications use either preference space or WTP space[47]. Nonetheless, the models can be generalised further by adding additional parameters; in particular an extended model is considered for which people consider the stream of payments $p_{i,t,\tau}$ for R periods (starting at 0), but with discounting. In this case we have a total payment of $\sum_{\tau=0}^{R-1} p_{it\tau}$ but which is discounted with a rate of τ_j. The systematic utility then is:

$$V_{i,j,t} = \beta_{0,j}\left(-\sum_{\tau=0}^{R-1} p_{i,t,\tau}(1+\tau_k)^{-r} + \sum_{k=1}^{K}\beta_{k,j}x_{i,k,t}\right) \quad (27)$$

[47] In the "preference space" parameters are expressed in units of utility and then we can compute the WTP by dividing the parameters by the price parameter. In the "WTP space" parameters have units of WTP (Cran.r-project, no date; Train and Weeks, 2005)

$$= \beta_{0,j}\left(-p_{i,t,\tau}\left(\frac{1+\tau_k+\left(\frac{1}{1+r_k}\right)^{R-1}}{\tau_k}\right)+\sum_{k=1}^{K}\beta_{k,j}x_{i,k,t}\right)$$

The parameter τ_k can then be estimated for each individual where this systematic utility is used to define the likelihood.

Finally, the full specification in (7) potentially introduces new parameters since each WTP or preference parameter can respond differently to each characteristic. A more parsimonious approach is to condition the total WTP on these characteristics so that all WTPs are scaled up and down proportionally. This can be achieved by specifying:

$$V_{i,j,t} = \beta_{0,j}\left(-p_{it\tau}\left(\frac{1+\tau_k+\left(\frac{1}{1+r_k}\right)^{R-1}}{\tau_k}\right)+\sum_{k=1}^{K}e^{\gamma'(s_k-\bar{s})}\beta_{k,j}x_{i,k,t}\right) \quad (28)$$

So that γ is a vector of parameters that indicate whether the WTP increases or decreases with respect to that characteristic. Here the $\beta_{k,j}$ retain their interpretation as mean WTP at $s_j - \bar{s}$.

In this chapter, 4 versions of the model are estimated.

Model 1 and Model 2 are based on (26), where the length of commitment is treated as an attribute. For these models characteristics of the individuals are not employed (i.e. γ=0). Models 3 and 3.1 below are based on (27) and (28). The models are the same, but model 3.1 takes into account certain characteristics of the population, such as age, education, income, etc. and model 3 doesn't. In the models below, T is the time commitment in years, p is payment per year and x's are the levels of the other attributes, U is utility, and e is a iid gumble error (stohastic element).

Model 1

Payment per year is treated as the cost and the committment period is treated as a standard attribute:

$$U = \rho(-p + \beta' x + \gamma T) + e \quad (29)$$

In this model it is anticipated that γ<0 as having to pay an annual (or monthly) amount over a longer period would have a negative utility. The *WTPs (β)* in this model are for yearly payments.

Model 2

The total payment over the time commitment (annual cost * years) is treated as the cost

$$U = \rho(-pT + \beta' x + \gamma T) + e \quad (30)$$

In model 2, it is anticipated that γ>0, since the total payment being spread over a longer period would have positive utility. The *WTPs (β)* in this model are for the total payment.

Model 3

In model 3, payments are considered to be discounted by respondents, subject to an internal discount rate *r*

$$U = \rho\left(-\sum_{t=1}^{T} p(1+r)^{-t} + \beta' x\right) + e$$

$$= \rho\left(-p\,\frac{1+r-\left(1\frac{1}{1+r}\right)^{T+1}}{r} + \beta' x\right) + e \quad (31)$$

In this model we expect the discount rate to be 0 < r < 1. The WTP *(β)* for this model can be considered as the Net Present Value of attributes, e.g. the amount that people would pay for a one off payment in the first period.

To help improve our understanding about the variation in preferences across respondents, the following socio-demographic characteristics were included into the utility function in model 3.1: education, age, income, area of living, and number of visits to forests in Attica.

5.5 Results

5.5.1 Sample characteristics

The demographics of the sample are presented in Table 5.1. Appendix 5.5 describes the population-level figures for 2020 for comparison. The majority in the sample are men

(53.5%), between 16-44 (70%), educated at either professional (18.35%), university (41.34%), or postgraduate (16.02%) level, and living in the centre of Athens (51.42%) instead of the suburbs (48.57%). With respect to their occupation, they are mainly private employees (44.44%) or freelancers (21.45%), with more than 72% of the respondents earning less than **€**1500 per month, while income changes during the last 8 years have been distributed almost equally (decreased income 33.08%, same 30.75%, increased income 36.17%).

Table 5.1 Demographic characteristics of the sample

Gender	**Male** 207 - 53.5%	**Female** 180 - 46.5%		
Suburb	**Centre** 199 - 51.42%	**Suburb** 188 - 48.57%		
Age	**16-24** 69 - 17.82%	**25-34** 120 - 31%	**35-44** 85 - 21.96%	**45-54** 55 - 14.21%
	55-64 22 - 5.68%	**65+** 35 - 9.04%	**No answer** 1 - 0.2%	
Education	**Middle school** 13 - 3.36%	**High school** 81 - 20.93%	**Professional Training** 71 - 18.35%	**University** 160 – 41.34%
	Postgraduate university 62 – 16.02%			
Income	**€0-€499** 63 – 16.28%	**€500-€999** 123 -31.78%	**€1000-€1499** 95 – 24.55%	**€1500-€1999** 48 – 12.4%
	€2000- 3000 19 – 4.9%	**€3000+** 11 – 2.84%	**No answer** 28 – 7.23%	
Profession	**Private** 172 – 44.44%	**Public** 40 – 10.34%	**Freelancer** 83 – 21.45%	**Uni Student** 34 – 8.79%
	Pensioneer / Rentier 28 – 7.23%	**Unemployed** 25 – 6.46%	**Other** 4 – 0.77%	
Income change during the last 8 years	**Decreased a lot** 64 – 16.54%	**Decreased a little** 64 – 16.54%	**Remained the same** 119 – 30.75%	**Increased a little** 92 – 23.77%
	Increased a lot 48 – 12.4%			

Data source: DCE Experiment analysis

As regards to the respondents' relation to forests (Table 5.2), the majority had either never visited a forest (28%) or visited a forest in Attica fewer than 6 times (45.22%), and 57.36% had visited a forest outside Attica during the last year. In addition, the vast majority of the respondents consider that citizens care more about forests than the state, with more than

70% of the respondents rated citizens' interest towards forests as average (2/5 -37.2% and 3/5 - 34.36% in a scale 0-5) and more than 83% rated the state's interest towards forests as low-below average (0/5 - 26.1%, 1/5 - 30.23%, 2/5 - 27.4%).

Table 5.2 Sample characteristics - Relation to forests

Forest visits in last year	**No visits (0) 109 – 28.16**	**<6/year 156 – 45.22%**	**Approx. 1/month 57 – 14.73%**	**Approx. 1/week 39 – 10.07%**
	Approx. >1/week 26 – 6,72%			
Forest visits outside Attica in last year	**Yes** 222 – 57,36%	**No** 165 – 42,64%		
Citizens' care scale 0-5	**0** 11 – 2,84%	**1** 46 – 11,87%	**2** 144 – 37,2%	**3** 133 – 34,36%
	4 44 – 11,37%	**5** 9 – 2,32		
State care scale 0-5	**0** 101 – 26,1%	**1** 117 – 30,23%	**2** 106 – 27,39%	**3** 54 – 13,95%
	4 6 – 1,55%	**5** 3 – 0,77%		

Data source: DCE Experiment analysis

5.5.2 Data analysis

All models were coded and estimated in R (R version 4.1.1) with the help of RStan. The Stan codes are available for review in the Appendix (Appendix 5.20, Appendix 5.21, Appendix 5.22). Stan is a probabilistic programming language for specifying statistical models and RStan is the R interface to the Stan C++ package (R Bloggers, 2019).

Presenting each respondent was with 8 choice sets allowed for the distributions of both the separate individuals and the population to be calculated. Table 5.3, Table 5.5, Table 5.8, and Table 5.10 are for the estimates for the whole population. The respective plots are illustrated in Appendix 5.6, Appendix 5.8, Appendix 5.10, and Appendix 5.12. The standard error in the mean (sem) in these tables refers to the error resulting from having finite simulations of the posterior distribution. The standard deviation (sd) in these tables broadly corresponds to what in classical/frequentist models would be referred to as the standard error associated with the sampling distribution of the mean.

Similarly, Table 5.4, Table 5.6, Table 5.9, and Table 5.11 (illustrated in Appendix 5.7, Appendix 5.9, Appendix 5.11, and Appendix 5.13 respectively) refer to the distribution in the individual estimates (each respondent). For these tables the sem (standard error of the mean) should be interpreted differently from the tables showing the mean (mentioned in the above paragraph). Here the sem corresponds to the standard error that would be obtained by taking each of the means for each indivdual and treating it as an observation. The standard deviaton gives/is the associated standard deviation for each of these observations and represents how dispersed the individuals are across the population.

The probability levels in each of the tables give the probability mass of the associated parameter to the right of zero (positive). While in the population-wide cases these have a loose correspondance to frequentist p-values, they should strictly not be interpreted as such. For the individual estimates, these represent the proportion of the sample that is estimated to have a mean WTP to the right of zero. As such it has little or no correspondance with a classcial p-value.

In short, the results show that respondents consider that an increase in the number of planted trees, a decrease in forest fires, and infrastructure towards recreation opportunities do have a positive value, as the coefficients are positive in all 4 models. This means that in terms of the changes, respondents consider the proposed changes to have a positive utility and would like to see the changes taking place in terms of either increase in forest cover, and decrease in forest fires, and additional recreation facilities in forests. With respect to the time period, as anticipated time is perceived to have negative utility when annual payments amount over a longer period (model 1), and a positive when total payment is considered and it is spread over a larger period of time (model 2).

SQ manifests the value respondents put on the current situation compared to the proposed alternatives. The negative value in all models shows that no matter how we perceive the payment (annual, total, discounted), respondents consider the existing situation worse than the proposed alternatives; any (negative) value shows the price respondents would be willing to pay to avoid the current status (SQ).

Comparing the 4 models, as expected, the estimate values from model 1 are the lowest, as the payment vehicle is expressed in terms of annual payments. Estimates from model 2 are

the highest, because it refers to total cost for all years. The estimates from model 3 and 3.1, i.e., the discounted total payment, are between models 1 and 2. The discount rate in model 3 and 3.1 is used to help find the present value of future payments. As expected, the discount rate is 0<r<1; r=35% for both the mean and individual estimates in models 3 and 3.1.

Model 1

Table 5.3 Model 1 – Population-wide estimates

	mean	*sem*	*sd*	*median*	*5%*	*95%*	*Pr>0*
Trees	0.6303	0.0006	0.0577	0.6313	0.5347	0.7235	1.0000
Fires	0.9474	0.0005	0.0429	0.9583	0.8623	0.9961	1.0000
Inf1	38.6622	0.0590	5.2761	38.5395	29.9866	47.2998	1.0000
Inf2	45.3889	0.0559	5.0029	45.3113	37.2481	53.5320	1.0000
Inf3	56.4485	0.0574	5.1303	56.4710	48.0768	64.9788	1.0000
Cplus4	-8.8291	0.0318	2.8438	-8.8412	-13.4873	-4.2256	0.0021
Cplus8	-30.3538	0.0396	3.5396	-30.3600	-36.0786	-24.6394	0.0000
SQ	-81.8936	0.0595	5.3190	-81.8290	-73.3372	-90.6160	0.0000

Data source: DCE Experiment analysis

Table 5.4 Model 1 - Individual Estimates

	mean	*sem*	*sd*	*median*	*5%*	*95%*	*Pr>0*
Trees	0.6918	0.0213	0.4194	0.7434	-0.0883	1.3016	0.8992
Fires	0.9687	0.0022	0.0442	0.9720	0.8889	1.0472	1.0000
Inf1	39.5502	0.7399	14.5558	38.6657	17.5593	67.5170	1.0000
Inf2	45.7927	0.2879	5.6630	46.4223	37.1864	54.6686	1.0000
Inf3	57.5322	0.6041	11.8837	56.6185	39.3057	77.9515	1.0000
Cplus4	-8.9438	0.4612	9.0731	-8.6050	-24.3451	6.0011	0.1395
Cplus8	-31.5063	1.1226	22.0845	-33.5279	-66.2463	6.9213	0.0982
SQ	-86.8372	1.6435	32.3306	-101.7432	-112.9554	-8.7804	0.0439

Data source: DCE Experiment analysis

Starting with model 1, the WTP estimates refer to annual payments for the baseline period of 4 years. In model 1 the entire distributions for population-wide[48] estimates *'trees', 'fires', 'inf1', inf2', 'inf3'* are positive >0 (Pr>0 = 1) (Appendix 5.6). Similarly, the distributions for most individual[49] estimates are also positive (Pr>0 = 1), with the exception of 'trees', where

[48] For all models (1,2,3,3.1): We consider the population as one unit (with multiple people that have exactly the same preferences), for which we get a posterior distribution.

[49] For all models: Each individual may differ (hierarchical model), and may not necessarily have the same estimates with the population, as each individual has their own WTP. We estimate the individual WTP, by mapping each individual's posterior distribution.

almost 90% (0,8992) of the distribution is in the positive (Appendix 5.7). These attributes are perceived positively/offer positive utility.

Sem is low for both mean and individual estimates, meaning low dispersion/variability among individuals in the population. In addition, the standard deviation (the distance from the mean as a positive number) is 0,0577 for the population-wide estimates and 0,4194 for individual estimates. The difference in magnitude makes sense as it is normal for individual estimates to be more diverse and less homogenous than the population estimates.

Similarly, for *'fires'* the WTP is 0,9474 (population-wide) and 0,9687 (individual), which means that the population would be willing to pay €0.9474 (individuals €0,9687) for a 1% improvement (decline in the number of burnt forest area) compared to the current situation (approximately 19.500 stremma – 1.950 ha. of forest land burnt). The sd is 0,0429 for the population-wide and 0,0442 for individual estimates, with the 5% and 95% quantiles at 0,8623 (5%) and 0,9961 (95%) for the mean estimates and 0,8889 (5%) and 1,0472 (95%) for the individual estimates.

The mean WTP for '*Inf1'* is 38,6622 (population estimates) and 39,5502 (individual estimates), which implies that the population is willing to pay €38,6622 (€39.5502 for individual estimates) per year to attain the first bundle/level of Infrastructure for recreation opportunities for a year. Furthermore, the mean WTP for '*inf2'* and '*inf3'* are 45,3889 and 56,4485 respectively for population estimates and 45.7927 and 57.5322 respectively for individual estimates. This means that the population would be willing to pay €45,3889 (€45.7927 for individual estimates) in a year to get the second bundle/level of infrastructure for recreation opportunities, and €56,4485 (€57.5322 for individual estimates) for the third bundle/level of infrastructure for recreation opportunities.

'*Cplus4'* and '*Cplus8'* describe the time preferenes for 8 and 12 years respectively, considering 4 years as the base level (Cplus4: 4+4=8, Cplus8: 4+8=12). Most of the distribution is on the negative side of the axis (Pr>0 = 0.0021 for Cplus4 and =0 for Cplus8 in the mean estimates, and Pr>0 = 0.1395 for Cplus4 and =0.0982 for the individual estimates). This mean that the vast majority of the respondents and the population considers additional periods of commitment to have negative utility. This is expected as model 1 considers the payment vehicle in annual payments and additional periods would mean additional

payments (extra cost), which the respondents would like to avoid. Both for individual and mean estimates *Cplus4* > *Cplus8*, which means that *Cplus4* is more preferable to *Cplus8*, i.e. respondents would prefer shorter periods of commitment, when the annual cost is considered to be the payment vehicle. Similarly, the *SQ* is negative in both mean [-81.8936 with Pr>0 =0] and individual [-86.8372 with Pr>0 =0.0439] estimates. This implies that the current situation (status quo) is considered worse than the alternatives presented to the sample and that they would be willing to pay to avoid it. Finally, as expected the sd for the mean estimates is smaller than the sd in the individual estimates.

Model 2

Model 2 considers the total payment (years*annual tax) for the provisions as the payment vehicle. In model 2 (Appendix 5.8, Appendix 5.9), similar to model 1, estimates for *'trees', 'fires', 'inf1', 'inf2'*, and '*inf3'* are positive at both individual and population levels, but the magnitude is different (larger) compared to model 1. The mean WTP for '*trees'* is €3,0853 (5% percentile at 2.1045 and 95% at 4.0450) for the population and €3,4727 (percentiles: 5%: -5.5218; 95%: 11.5740) for individual estimates, meaning that the population on average would be willing to pay €3,0853 (or €3,4727 for individual estimates) for the whole period of commitment to see a 1% improvement/increase in the number of trees planted annually compared to the status quo. The mean estimates at the population level for '*fire'* are 3.5326 (percentiles: 5%: 2,6035; 95%: 4,4516) and 7.1705 (percentiles: 5%: 6,0843; 95%: 8,4005) at the individual level. Simply, this means that the population would be willing to pay on average approx. €3 to see a 1% increase in the number of annually planted trees and approx. €3.5 for a 1% decrease in the annually burnt forest area (€3,4 and €7.2 at individual level).

Table 5.5 Model 2 – Population-wide Estimates

	mean	*sem*	*sd*	*median*	*5%*	*95%*	*Pr>0*
Trees	3.0853	0.0065	0.5855	3.0950	2.1045	4.0450	1.0000
Fires	3.5326	0.0063	0.5651	3.5443	2.6035	4.4516	1.0000
Inf1	308.5261	0.6546	58.5495	309.4995	210.4503	404.5023	1.0000
Inf2	353.2627	0.6318	56.5065	354.4261	260.3471	445.1565	1.0000
Inf3	343.4643	0.6327	56.5874	344.0450	250.6388	435.7227	1.0000
Cplus4	250.3349	0.3453	30.8806	251.6230	198.2882	300.2436	1.0000
Cplus8	408.3071	0.4304	38.4947	408.1695	344.9228	471.2318	1.0000
SQ	-629.4802	0.6242	55.8322	-628.5412	-722.9002	-538.4474	0.0000

Data source: DCE Experiment analysis

Table 5.6 Model 2 - Individual Estimates

	mean	*sem*	*sd*	*median*	*5%*	*95%*	*Pr>0*
Trees	3.4727	0.2712	5.3349	3.7886	-5.5218	11.5740	0.7106
Fires	7.1705	0.0333	0.6548	7.1754	6.0843	8.4005	1.0000
Inf1	316.6349	7.9456	156.3084	320.5459	72.8938	620.1042	0.9871
Inf2	356.6010	3.0258	59.5241	360.3980	271.0570	449.1848	1.0000
Inf3	350.6523	5.9817	117.6733	337.6359	166.2097	536.3219	1.0000
Cplus4	253.1000	3.6039	70.8980	258.0515	142.0516	370.4590	1.0000
Cplus8	425.4030	11.5992	228.1827	418.5959	44.3448	814.1235	0.9819
SQ	-677.4476	18.3340	360.6714	-832.4313	-989.0396	185.6595	0.0646

Data source: DCE Experiment analysis

As the payment vehicle in this model is the total payment and not the annual payment (as in model 1), the time commitment is perceived to have positive utility, as it can be paid in more instalments (years of time commitment). Both distributions are on the positive side of the axis; at population level Pr>0 =1 for both *Cplus4* and *Cplus8*; at individual level Pr>0 =1 for *Cplus4* and Pr>0=0,9819 for *Cplus8*. *Cplus4*<*Cplus8* in both the individual and population estimates, which implies that the respondents consider larger periods of commitment to offer positive utility – they prefer to pay the total payment in more instalments. The *SQ* is negative (Pr>0=0) in both population-wide and individual estimates in model 2 too. The total payment the population would pay to avoid the status quo is €629,4802 (5% percentile: -722,9002; 95%: -538,4474) or €677,4476 at individual level (-989,0396 and 185,6595 respectively for the 5% and 95% percentiles).

Models 3 and 3.1

Models 3 and 3.1 below consider the discounted total payment over the years of time commitment as the payment vehicle. Therefore, there is no separate time commitment period estimate (Cplus4, Cplus8), but it incorporated in the other WTP estimates. Instead, the discount rate is calculated in these 2 models. The difference between the two models is that model 3.1 also considers population characteristics, while model 3 doesn't. Model 3.1, which includes the effects from the population characteristics, is not very different from model 3, which doesn't. This is in line with the effects of the covariates (Table 5.7, Appendix 5.14), which is notable, but not very large. Table 5.7 describes the effect of the population characteristics (plots in Appendix 5.14). Education and income appear to have a positive

effect on WTP, i.e. people with either higher education and/or more income are more likely to pay more for the forest investments proposed, while age appears to have a negative effect, i.e. as age increases, people were willing to pay less for investment in forests, i.e. younger people were more willing to pay more for investment in forests.

Living in more densely populated and urban areas also appears to have a positive effect on WTP, meaning that people that live in such areas are more likely to pay more for the respective investment in forests compared to people living in the suburbs. Finally, the number of visits seems to have a slight positive effect, i.e. people who visited forests in Attica more frequently were more likely to pay more for the described changes.

Table 5.7 The effects of population characteristics - Covariates

	mean	*sem*	*sd*	*median*	*0.05*	*0.95*	*Pr>0*
Education	0.0474	0.0005	0.0378	0.0474	-0.0147	0.1090	0.8962
Age	-0.0267	0.0004	0.0271	-0.0271	-0.0707	0.0190	0.1642
Income	0.0216	0.0003	0.0241	0.0212	-0.0180	0.0615	0.8143
Centre	-0.1604	0.0010	0.0793	-0.1614	-0.2896	-0.0315	0.0220
Visits	0.0615	0.0004	0.0340	0.0618	0.0059	0.1180	0.9665

Data source: DCE Experiment analysis

Below are the tables for both population and individual estimates. Similar to models 1 and 2, estimates are positive for ‘trees’, ‘fires’, ‘inf1’, ‘inf2’, and ‘inf3’ are positive at both individual and population levels in both models 3 (Appendix 5.10 population/mean estimates; Appendix 5.11 – individual estimates) and 3.1 (Appendix 5.12 – population estimates; Appendix 5.13 – individual estimates).

Table 5.8 Model 3 – Population-wide Estimates

	mean	*sem*	*sd*	*median*	*0.05*	*0.95*	*Pr>0*
Trees	1.9513	0.0048	0.3707	1.9573	1.3297	2.5471	1.0000
Fires	6.3401	0.0080	0.6159	6.3360	5.3407	7.3762	1.0000
Inf1	142.1594	0.6467	50.0905	139.0951	65.8891	228.7729	1.0000
Inf2	177.1750	0.6419	49.7216	174.0065	101.0414	261.3388	1.0000
Inf3	180.9638	0.6472	50.1315	178.2005	102.3752	265.1469	1.0000
SQ	-455.1982	0.7544	58.4385	-456.2312	-551.3136	-359.0435	0.0000
r_mu	0.3490	0.0003	0.0267	0.3474	0.3078	0.3951	1.0000

Data source: DCE Experiment analysis

Table 5.9 Model 3 - Individual Estimates

	mean	*sem*	*sd*	*median*	*0.05*	*0.95*	*Pr>0*
Trees	2.1070	0.2193	4.3132	2.0636	-5.0805	9.0822	0.6641
Fires	6.6566	0.0877	1.7262	6.6324	4.0039	9.6531	1.0000
Inf1	142.7941	2.8970	56.9912	139.4009	51.9478	242.1596	0.9922
Inf2	177.8125	2.0910	41.1351	176.8575	114.2142	243.6957	1.0000
Inf3	182.1834	3.5630	70.0926	170.8512	75.2549	295.4404	1.0000
SQ	-475.3482	13.8659	272.7750	-579.6470	-748.2535	94.7924	0.0698
r_ind	0.3500	0.0014	0.0284	0.3543	0.3030	0.3897	1.0000

Data source: DCE Experiment analysis

Table 5.10 Model 3.1 – Population-wide Estimates

	mean	*sem*	*sd*	*median*	*0.05*	*0.95*	*Pr>0*
Trees	1.9701	0.0049	0.3790	1.9787	1.3286	2.5756	1.0000
Fires	6.5295	0.0080	0.6161	6.5310	5.5127	7.5584	1.0000
Inf1	142.2487	0.6631	51.3599	144.5650	52.8822	221.4005	0.9993
Inf2	175.4205	0.6550	50.7359	178.3546	87.0695	254.4544	1.0000
Inf3	179.9037	0.6445	49.9196	182.0332	92.4445	256.4553	1.0000
SQ	-458.6704	0.7277	56.3681	-459.4712	-551.0192	-366.4529	0.0000
r_mu	0.3515	0.0004	0.0274	0.3496	0.3104	0.3976	1.0000

Data source: DCE Experiment analysis

Table 5.11 Model 3.1 - Individual Estimates

	mean	*sem*	*sd*	*median*	*0.05*	*0.95*	*Pr>0*
Trees	2.1286	0.2113	4.1574	2.0538	-4.6665	8.8558	0.6667
Fires	6.8164	0.0782	1.5390	6.7858	4.5321	9.4905	1.0000
Inf1	142.9158	2.7727	54.5451	139.8592	55.3848	238.7652	1.0000
Inf2	175.9842	2.0879	41.0730	175.3446	109.8478	241.7946	1.0000
Inf3	181.2641	3.6234	71.2816	170.4827	71.7589	298.9617	1.0000
SQ	-480.0141	14.3285	281.8744	-586.7405	-763.8314	116.3146	0.0698
r_ind	0.3523	0.0014	0.0281	0.3555	0.3072	0.3919	1.0000

Data source: DCE Experiment analysis

The population is willing to pay on average €1,95 (Appendix 5.10) (or €1,97 if we consider covariates as well - Appendix 5.12) *in the current period* for a 1% increase in the number of annually planted trees in Attica *for the whole period of the investment/time commitment*. In

model 3, the respective estimates for '*trees'* at the individual level are 2.1070(€) with Pr>0=0.6641, and quite similarly in model 3.1, the mean WTP at individual level is €2.1286, with Pr>0=0.6667 (Appendix 5.11, Appendix 5.13). Similarly, the population is willing to pay €6,3401 and €6,5295 according to model 3 (top right plot in Appendix 5.10) and 3.1 (top right plot in Appendix 5.12) respectively for a 1% decrease in annual burnt forest land. On individual level, the willingness to pay is approximately €6.65, or €6.81 (if we consider the effects of covariates).

In addition, at population level, all 3 levels of infrastructure for recreation opportunities offer positive utility population-wide (Appendix 5.10 and Appendix 5.12 respectively). The respective individual mean WTP for '*Inf1', 'Inf2', 'Inf3'* are estimated €*142.7941, €177.8125, €182.1834 in model 3 are €142.9158, €175.9842, €181.2641 in model 3.1, again with* almost all (individual distributions being entirely on the positive side of the axis Pr>0 =1 (Appendix 5.11, Appendix 5.13). Since *Inf1<Inf2<Inf3* in both models, respondents consider the 1st level (bins and cleanliness, and informational signs, maintenance of paths and trails for hiking and cycling) to offer positive utility but less than the 2nd level (which offers additional benches, kiosks and picnic areas in addition to everything else level 1 offers), and in turn level 2 to provide less utility than the 3rd level, which offers a parking area and a small refectory/cafe (and toilets) close to the forest on top of everything else.

In models 3 and 3.1 the time commitment period is used to find the discounted total payment, and therefore there are no separate estimates for the time commitment. Instead, the discount rate, which is used to help find the present value of future payments, is calculated. The discount rate r ('r_mu' for the mean and 'r_ind' for individual estimates) is expected to be 0<r<1, depending on the perceived level of risk or uncertainty from the respondents. If the respondents perceive that there is high risk in this investment, then r is expected to be high; if the perceived potential risk is minimal, then r is expected to be closer to 0. The risk doesn't have to derive from the investment in itself, but from other factors that are present when the investment takes place, e.g. uncertainty regarding the capacity of the responsible body to complete the investment, uncertainty about the future because of the economic crisis, to name a couple of factors. The discount rate *r*=35% in both models 3 and 3.1, which is implies a relatively moderate levels of risk regarding the potential areas of investment and/or uncertainty about the future.

The *SQ* is negative in mean and individual estimates in both model 3 and 3.1 (Pr>0=0 in both models). The total payment the population would pay in 1 payment to avoid the status quo for the whole period of commitment is €455.1982 in model 3 and €458.6704 in model 3.1.

5.6 Summary and policy implications

The purpose of this chapter has been to determine the preferences of the citizens of AMA with respect to a potential investment in forest areas in AMA, as financial investment is planned towards forests (Green Fund, 2020; Ministry of Environment and Energy, 2020a, 2020d) from state and EU authorities, and there are both economic and environmental pressures on Greek citizens.

The attributes used in this survey were (i) the number of newly planted trees in forests, (ii) a % decrease of forest fires, (iii) infrastructure for recreational opportunities, (iv) a payment vehicle – municipal tax, so that WTP estimations would be possible, and (v) a time commitment attribute. These attributes manage to capture all use (direct – infrastructure, indirect – number of planted trees), non-use (bequest- decrease in forest fires), and option values of forest resources. Including commitment period as a separate attribute allowed for 3 different interpretations with respect to the payment vehicle, and thus different estimations with respect to WTP. One considered the payment vehicle to be annual payments; one considered the total cost (annual payments times the period of commitment); and one that considered the discounted values of payments. In total 4 versions were estimated from the 3 interpretations, with model 3.1 incorporating personal characteristics (covariates) as well.

The results of the data analysis confirmed that attributes (i), (ii), (iii) provide positive utility to the citizens of AMA, while the regional taxes negative. The time commitment period had negative utility when the payment vehicle was considered to be annual payments, as respondents did not want to pay more annual payments, and positive utility if the total cost was considered as the payment vehicle, as respondents could break down the total payments in more instalments.

Comparing the 4 models, as expected, the estimate values from model 1 are the lowest among the others, as the payment vehicle is expressed in terms of annual payments; estimates from model 2 are the highest, because it refers to total cost for all years; and the estimates from model 3 and 3.1, which refers to the discounted total payment, are between

models 1 and 2. The discount rate in model 3 and 3.1 is used to help find the present value of future payments. As expected, the discount rate is 0<r<1 r=35% for both the mean and individual estimates in models 3 and 3.1. The discount rate in models 3 and 3.1 r=35% implies that there may be relatively moderate levels of risk regarding these potential areas of investment and/or uncertainty about the future. This can be explained by both the effects of the economic crisis, which can increase the uncertainty levels, and the benefits that are delivered from forest-related investment, which don't seem to be perceived high risk.

The estimates are not directly comparable as the estimates for attributes '*trees'* and '*fires'* refer to a % improvement, while the estimates for infrastructure *('inf1' 'inf2', 'inf3'*) describe the WTP for investment in the respective areas of recreation infrastructure (not a % improvement). The WTP estimates may be a little high, but the respondents answered based on their awareness and preferences about the forests at the given time. Deteriorating forest conditions and/or huge damages in forest areas do affect the society, the economy, and the environment, part of which is expressed though the respondents' opinions. The respondents were not affected solely by the huge forest fires, but possibly by the chronic neglect of forests in Attica, which has led to air pollution, floods, and forest fires, and in turn to loss of welfare, property, and in many cases lives, apart from the obvious environmental damages.

Between the 2 estimates that refer to a % improvement, '*fires'* are valued higher that '*trees'* in all models both in individual and mean estimates. This can be attributed to the recent (at the time of the data collection) catastrophic forest fires and also to the fact that forest fires have been a serious threat every summer for many years. In addition, the impact of the financial crisis can also be considered as a plausible explanation, as citizens may not have been willing to pay to enhance reforestation in AMA at a time when they are facing economic difficulties and pressures themselves. Different levels of infrastructure for recreational opportunities were also valued positively, meaning that citizens would be willing to pay to see such infrastructure investment take place. Another possible explanation to reflect the high valuation of the estimate is that the data collection took place during the second year of the Covid-19 pandemic, and citizens in Greece had faced strict lockdown measures the previous 2 years, which limited their everyday activities, but allowed them to visit forest, parks, and green areas for recreation (covid19.gov.gr, 2022; Ministry of Marine Affairs and Insular Policy, 2022).

The findings are consistent with previous relevant studies. Giergiczny *et al.* (2015) found that forest management targeting recreational value is not incompatible with forest management designed to protect biodiversity, and that even when forests are managed for biodiversity purposes, they are also likely to attract visitors. Kim *et al.* (2020) found that even though both ecosystem services and infrastructure facilities offer positive utility in Japan, ecosystem services were preferred over those from facilities in an urban environment context.

Preferences for forest management and investment in forests are context specific. The data collection of this study took place during September-November 2021, a couple of months after the catastrophic forest fires of summer 2021 (EFFIS, 2021), during the covid-19 pandemic, and under certain macroeconomic conditions. Although the estimates should not be read at absolute level, i.e., citizens are willing to pay x amount for y provisions, they do offer some valuable information about the valuation of these attributes. As such they can offer some insight about the population's priorities in terms of which aspects of the forest regime they want the funds to be directed towards, or what they think the forests in AMA lack or could be improved in. This is timely with the scheduled financial investment towards the forest regime from Greek and European Funds. For example, between the 2 estimates that refer to a % improvement, '*fires'* are valued higher that '*trees'* in all models both in individual and population estimates. This could suggest that citizens would get more utility if they saw investment towards reducing forest fires than increasing the number of planted trees (both in % terms).

The geographical location of this study covers forests surrounding AMA, which are different in terms of their nature, the way citizens can interact with them (aesthetic, recreational, national parks, Natura 2000 conservation areas), and their needs. Considering all bundles of infrastructure for recreation opportunities were valued positively and relatively high, and that fewer than 30% of the sample had not visited a forest in AMA during the year prior to the data collection, it is likely that citizens who already visit forests would like to get more recreational value out of the existing forests in AMA, which they currently don't. Investment towards different bundles of infrastructure in each forest, depending on its nature, needs, and proximity to urban centres, is something that according to this study would offer positive utility to the population of AMA and the authorities could investigate more into.

6 Summary, Conclusions, and Policy recommendations

The aim of this thesis was to investigate and identify developments inside forest governance regimes during economic crises and specifically vis-à-vis policies adopted during the crisis period. Existing literature has not looked on trends in countries from different economic crises/periods, nor has it looked into the perspective of national forest governance regime stakeholders to explore this gap. Due to the limited research on this topic, this thesis has been primarily exploratory in nature and addressed the phenomenon from different, yet interdependent approaches, including both primary and secondary research chapters.

The secondary research chapters aimed to examine both early theory and more recent literature. In short, chapter 2 briefly introduced some key elements of the theoretical background for the relationship between forest governance and economic crises. Chapter 3 addressed the historical perspective and identified patterns in forest governance developments through a comparative case study investigating 10 countries from 2 regions during a large-scale financial crisis (1997 SE Asia and 2009 EU periphery crises).

The two primary research chapters focused on the perspectives and input of different forest governance actors through qualitative and quantitative methods respectively. Chapter 4 interviewed five of the most prominent bodies in the Greek forest governance regime regarding developments since the beginning of the crisis and its effects on the regime; the chapter used thematic analysis and identified 4 major areas of developments in forest governance since the beginning of the crisis, as well as the role of pre-crisis longstanding governance issues that may have contributed to these developments. Finally, Chapter 5 explored the preferences of the citizens of AMA with respect to investment in forest areas through a choice experiment survey, and estimated their valuation for specific forest attributes, while also examining some basic elements of the public's relationship with forests in the area, considering both the economic and environmental pressures the public has experienced since 2009.

6.1 Key findings and policy recommendations

During economic crises multiple changes often take place in governance, ranging from change in governments, new policies, socio-economic conditions, actors, etc., most of which have the potential to affect forests and their governance. This is most often the case when

IFIs are involved in the crisis management processes, through bailout deals that are accompanied by a set of policies whose aim is to stimulate the (private) national economy and reduce budget deficits in order to restore confidence in the international investing community.

Pre-crisis forest governance arrangements

The development of forest governance regimes during periods of economic crises happens within a highly dynamic environment, with multiple parameters and elements that can affect its direction and outcome. Nonetheless, a common thread in this thesis has been the importance of the forest regime status (governance arrangements as well as environmental conditions) before an economic crisis starts. This is because new policies will be adopted during an economic crisis, some of which may target or be tangent of the forest regime, and the forest status sets the background on which any new policies will be applied. Thus, it has the potential to affect developments in forests during economic crises, with respect to both qualitative (what type/degree/ direction) and quantitative (number of available options) characteristics of policies adopted during the period of the crisis.

It is worth pointing out that the formulation/identification of the two broader themes during the thematic analysis of the interviews in Chapter 4*, i.e. (i)* Developments and issues in forest governance before the economic crisis, and (ii) Developments and issues since the economic crisis, was unexpected; the interviews aimed to explore to challenges and opportunities regarding both the interview participants' organizations, the forest regime in general since the beginning of the economic crisis in 2009.

In terms of forest governance, which this thesis focused on, the adoption of a long-term strategy and implementation of sustainability provisions in a country's forest governance regime seemed to be a good indicator about how much the forest regime would be (adversely) affected during the economic crisis, regardless of the economic contribution of the forest-related industry. Regimes with a coherent institutional framework and strategy for forests seem to have had fewer adverse effects and side-effects in their forests during their

respective economic crisis[50]; some were even able to use forests without compromising their sustainability to mitigate some of the adverse socioeconomic impacts of the economic crisis, such as unemployment, poverty, and social cohesion, regardless of the size of their forest sector industry. However, the economic contribution of forest-related industry alone [either high (e.g. Portugal, Malaysia, and Indonesia) or low (Ireland, Korea, Greece)] was not a good indication of forest regime developments during crisis periods. The lack of long-term goals, governance strategy, direction, or coherence enabled policies that focus on economic values to dominate over social or environmental values to be adopted during the economic crisis.

Policy recommendation:

National forest governance stakeholders:

Major actors and stakeholders in forest governance regimes should intensify their efforts to adopt and support both short-term and long-term realistic plans in their forest regimes, which should refer to both environmental, social, and economic values and aspects of the forest. Such efforts should be supported by and include relevant authorities in the local, regional, and national levels, in order to ensure a sustainable future for forests. It would be preferable for these efforts to take place during non-crisis periods, in order to limit the volatility in developments and decision making, which may accompany the instability the state will face during the economic crisis.

Common impacts of bailout policies on forest governance regimes

In the cases examined in this study, the policies included in bailout loan deals offered by IFIs aimed at stimulating private investment and reducing national budget deficits, in order to revive the financial sector and restore confidence in the international investing community. These policies often came in the form of austerity policies, privatisation, and changes in regulation to facilitate the targets mentioned above, and reflected arguments from the Chicago school about the minimal state role and a more laissez-faire government policy. Even though most adopted policies targeted at specific economic or social developments, some of them also affected forests both directly (e.g. underfunded forest authorities due to funding

[50] On a tangential note, the same principle seems to be true for the financial sector, with countries that had active forethoughtful provisions in place in their banking sectors were able to manage the early stages of the economic shocks better than the ones that didn't (e.g. Malaysia and the Philippines among the SE Asia cases).

cuts in the public sector) and indirectly, in cases where externalities were not addressed (e.g. lack of support towards decentralization efforts, or admin changes to reflect new structures in forest regime).

Among the policies adopted during economic crises, austerity policies seem to have affected forest governance regimes negatively and greatly. Forest regimes are for the most part state-led regimes, and depend on public finances and personnel for their development. Such policies are often applied as budget cuts for specific actors and services and tend to affect key actors in the forest regime, such as forest services or fire services, adversely, and manifests in multiple ways for each actor. For example, budget cuts for forest authorities may translate in both personnel cuts and gaps, which tend to result in negative outcomes in forest infrastructure and management, specific programmes and projects (e.g. reforestation), as well as secondary effects in eco-tourism, and local communities. Also, many of the countries examined in this thesis reduced the budget of their fire services, some of which also experienced catastrophic forest fires during or shortly after this development; however, further research is needed, in order to establish a cause-effect mechanism. Further, despite economic pressures from the crisis, the public still values forest services highly, and would like to see further investment in forest management (forest fires, planted trees, and infrastructure).

Other targets included bailout deals have led to changes in regulation or deregulation in the forest regime, often manifested as administrative changes or deregulating environmental standards/policies. Such policies have tended to enhance decentralization in the forest regimes, and increase profitability (cut spending, increase investment) in the forest sector, although they often enable adverse environmental and social side-effects/ externalities, e.g., Indonesia and Malaysia linked to oil palm plantations. The impact of such policies varies on a case-by-case basis and more in-depth research could unravel further patterns. Privatization policies that were included in bailout deals were not for the most part forest-specific and left to the discretion of the governments; privatisation attempts were pushed in forest regimes for both forest land and services both in the 1997 SE Asia crisis but mostly in the 2009 EU periphery crisis, but were met with protests and reactions from civil society, many of which were successful to reverse such policies, and did not affect forest governance regimes to a great extent.

Policy recommendations:

Governments and IFIs:

Policies included in bailout deals should be tailored to fit each country's governance regime and consider both short-term and long-term developments. Special attention should be given to austerity policies, as they tend to affect forest governance regimes greatly when applied. Consultation with key actors, national stakeholders, ENGOs, the public, and researchers should be taken seriously and used to identify and mitigate potential externalities and side effects.

While the analysis of national forest-related economic and environmental data can be useful to some extent, this research considers it necessary to explore and understand developments for both quantitative and qualitative elements in forest governance regimes; these include actors involved, regulatory framework and targets, power dynamics, cultural characteristics and public participation, environmental conditions, etc.. This can help to identify mechanisms in play that can be unique in each country, as well as drivers for developments in the forest regime both during crisis and non-crisis periods.

National forest governance stakeholders:

National forest strategies and plans should aim to address and promote the role of non-state actors, such as the public and industry, which can increase the resilience of forest regimes during crises; this can help to limit the forest governance regime's dependency on the state, and the subsequent uncertainty it will face during crisis periods.

The combination of austerity and decentralization policies in forest governance regimes should be monitored closely to ensure effective transfer of power and responsibility. There is risk that if decentralization efforts are not supported, the newly promoted decentralized actors may not be able to cope with the newly assigned responsibilities.

Leadership, data, and governance direction

In some cases, a vacuum in leadership and direction in forest governance is created during economic crises, for example due to the absence or lack of support towards the national forest strategy, or degrading the role of key actors in the forest regime, due to either pre-crisis conditions or due to policies adopted during the crisis. In these cases, the direction of

the forest governance may conform to the targets of actors that operate outside of it and reflect their interests, such as IFIs, who are a prominent actor during economic crises. Under the current paradigm, IFIs advocate for stimulating the economy and focus on the economic values that can translate into an increase in GDP, as a way out of the crisis, also affecting policies that affect the forest regime.

However, forests' economic values (i.e., values that can be estimated, captured and contribute to the GDP) may often be prioritized over forests' environmental or social values, which don't contribute directly to the GDP. This may happen due to either (i) the difficulty to estimate in economic terms, such as biodiversity, air quality, or the existence of forests itself, and/or (ii) the lack of accurate and up-to-date information about the environmental and social attributes of forests. Countries such as Korea, Malaysia, Ireland, and Portugal, whose forest regimes have different roles and goals, relied on accurate and up-to-date data to design policies and specific targets with regard to forests in their environmental and economic development plans and forest-related policies both during periods of economic crisis and not.

On the other hand, when decision makers neglect (actors that advocate for) environmental and social values in favour of (small) gains in economic value in the forest regime, declining trust towards both the forest and overall governance and participation in the forest regime may be manifested. Both primary research chapters pointed out that lack of transparency (e.g. in decision making - the use of resources) and accountability (e.g. political games) in such cases intensifies such developments, which has the potential to escalate to conflicts and protests related to the forest regime.

<u>Policy recommendations:</u>

National forest governance stakeholders and international institutions:

Keeping and updating meaningful quantitative and qualitative data records for forest governance, including both economic, social, and environmental indicators, and data about actors involved in the forest regime. Such data can be used to inform leadership about the direction of forest governance and goal setting, both before, during, and after economic crises.

This can also help to evaluate projects and policies that were adopted during economic crises. By accounting for all economic, social, and environmental values (both direct and external costs and benefits), especially when years have passed since the adoption of policies and projects, and considering long terms outcomes, can also help to enhance accountability and public participation and trust in forest governance.

6.2 Limitations of the study

The limitations identified in this study were addressed within each chapter respectively, in terms of both the methodology, data collection and use, generalizability of the results, as well as other challenges that were encountered that may have affected or influenced the outcome or interpretation of the analysis. One of the biggest limitations to the researcher's opinion has been the lack of relevant available data and previous research on this topic, which was relevant for all chapters, and limited the extent and potential of this study. It is however encouraging that a few countries have invested in purposeful data collection and management, as this means that such practices are attainable and can be adopted by other states.

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Appendices

Appendix Chapter 2

Appendix 2.1 John Stuart Mill: On Liberty

> *"That principle is, that the sole end for which mankind are warranted, individually or collectively, in interfering with the liberty of action of any of their number, is self-protection. That the only purpose for which power can be rightfully exercised over any member of a civilised community, against his will, is to prevent harm to others. His own good, either physical or moral, is not a sufficient warrant." (Mill 1859 p.13)*

Appendix 2.2 John Stuart Mill: Principles of Political Economy with some of their Applications to Social Philosophy

> *"A population may be too crowded, though all be amply supplied with food and raiment. It is not good for man to be kept perforce at all times in the presence of his species. A world from which solitude is extirpated is a very poor ideal. Solitude, in the sense of being often alone, is essential to any depth of meditation or of character; and solitude in the presence of natural beauty and grandeur, is the cradle of thoughts and aspirations which are not only good for the individual, but which society could ill do without. Nor is there much satisfaction in contemplating the world with nothing left to the spontaneous activity of nature; with every rood of land brought into cultivation, which is capable of growing food for human beings; every flowery waste or natural pasture ploughed up, all quadrupeds or birds which are not domesticated for man's use exterminated as his rivals for food, every hedgerow or superfluous tree rooted out, and scarcely a place left where a wild shrub or flower could grow without being eradicated as a weed in the name of improved agriculture. If the earth must lose that great portion of its pleasantness which it owes to things that the unlimited increase of wealth and population would extirpate from it, for the mere purpose of enabling it to support a larger, but not a better or a happier population, I sincerely hope, for the sake of posterity, that they will be content to be stationary, long before necessity compels them to it". (Mill 1848 p.532-533)*

Appendix 2.3 Alfred Marshall on financial institutions

> *"the evils of reckless trading are always apt to spread beyond the persons immediately concerned [...] when rumors attach to a bank's credit, they make a wild stampede to exchange any of its notes which they may hold; their trust has been ignorant, their distrust was ignorance and fierce. Such a*

rush often caused a bank to fail which might have paid them gradually. The failure of one caused distrust to rage around others and to bring down banks that were really solid; as a fire spreads from one wooden house to another until even fireproof buildings succumb to the blaze of a great conflagration. In fact panic succeeded panic at intervals of about ten years […]. Some of the worst of these evils had indeed been stopped by the law of 1775, which prohibited the issue of bank notes for less than £5". (Marshall 1929, p. 305)

Appendix 2.4 Alfred Marshall quotes on natural resources

"[…] an excessive demand for a thing may cause its sources of supply to be destroyed, and thus render scarce any joint products that it may have: for the demand for wood on the part of the ironmakers led to a relentless destruction of many forests in England." (Marshall 1890, p. 227)

"But Nature's opportunities cannot long retain their present large generosity; for the world is small. Science may indeed enable a fairly vigorous life to be maintained in tropical regions, which have hitherto proved fatal to high energies: but ere very many generations have passed, the limitation of agricultural and mineral resources must press heavily on the population of the world, even though its rate of increase should receive a considerable check." (Marshall 1919, p.13)

Appendix 2.5 Irving Fisher quote on natural resources and population

"The problem of the conservation of our natural resources is therefore not a series of independent problems, but a coherent, all-embracing whole. […] If our nation cares to make any provision for its grandchildren and for its grandchildren's grandchildren, this provision must include conservation in all its branches–but above all, the conservation of the racial stock itself". (Fisher, 1909, p.743)

Appendix 2.6 John Maynard Keynes: National Self-Sufficiency (Keynes, 1933)

"For the minds of this generation are still so beclouded by bogus calculations that they distrust conclusions which should be obvious, out of a reliance on a system of financial accounting which casts doubt on whether such an operation will "pay." […] The same rule of self-destructive financial calculation governs every walk of life. We destroy the beauty of the countryside because the unappropriated splendors of nature have no economic value. We are capable of shutting off the sun and the stars

because they do not pay a dividend.[…] Or again, we have until recently conceived it a moral duty to ruin the tillers of the soil and destroy the age-long human traditions attendant on husbandry, if we could get a loaf of bread thereby a tenth of a penny cheaper." (Keynes, 1933, p.763-4)

Appendix 2.7 "The Rio Declaration on Environment and Development." (principle 15)

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. (UNCED, 1992, p.3)

Appendix 2.8 Excludability and rivalry of forest goods and services

	Rival	**Non-rival**
Excludable	**Private** (logs of wood, wooden furniture)	**Quasi-public/ Club/ toll goods** (Organised paid tours in forests for sightseeing)
Non-excludable	**Open Access/ Common** (Access to public forests, trees in the forest)	**Public** (air, water retention, carbon sequestration)

Private goods are goods that are both excludable, i.e. they have a price which may exclude some from obtaining it, and rival, the consumption of the same good/product from many users is impossible. Respectively, open access goods are non-excludable (they don't have a price – anyone can use them), but are rival as there is a limit to how many people can use the same resource at any one time. Club goods are non-rival and excludable, i.e. there is a price for a good/service, but the use of a good/service doesn't prevent other from using the same good/service. Finally, public goods are non-excludable and non-rival, which means that everyone can use such goods if they want to, as there is no price to exclude some users and the use of a good from a user doesn't prevent other users from obtaining or using the same good or service.

For example, trees in a public or community forest may be considered an open-access good, i.e. rival and non-excludable[51], as paying for the good is irrelevant to the access to it, but the consumption from one or more people may restrict the access of the good from other people. But once some trees of the same forest are cut down by a lumberjack, these trees are then considered a private good (rival and excludable), i.e. not everyone has access to it, as they are then owned by the lumberjack and can be traded in the market for a price.

Appendix 2.9 Externalities Paradigm & illustration with figures

In order to reflect on the externalities that derive from the activity of firms operating in forest environments, I will use the concepts of *Social Marginal Cost* (SMC) and *Social Marginal Benefit* (SMB), which describe the cost and benefit respectively that society bears from different activities.

SMC consists of the *Private Marginal Cost* (PMC) and the *External Marginal Damage* (XMD) (SMC= PMC + XMD). PMC reflects the costs the firm undertakes in order to produce one unit of the good and it reflects the supply curve in the free market, as the producers consider only their own costs. XMD reflects costs that are associated with the production of the good that affect/are imposed on other stakeholders, members of society, or the environment, but are not paid by the producer. SMC is then considered the total costs paid by both the producer and the society for the production of 1 extra unit of the good. This is depicted in Appendix Figure 1 below.

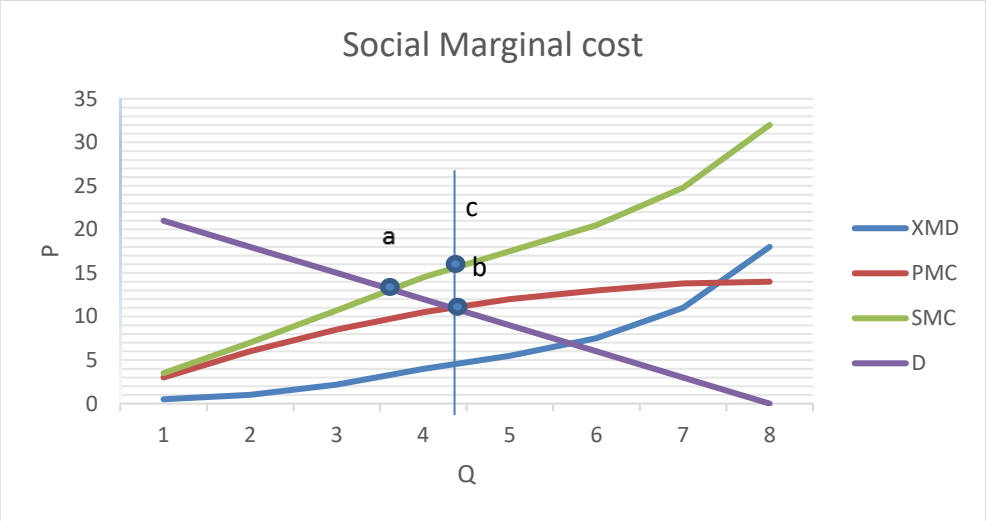
In the case below constant supply is used to facilitate and simplify the diagram[52]. Point a, where the supply curve meets the PMB, is the market equilibrium in a theoretical free market. Point b is where the equilibrium would have been if the positive externalities were incorporated in the function and taken into account in the price and quantity. An example is the price premium for certified products, where the consumer also pays for other quality characteristics which may not be apparent in the product itself. The surface of the area abc is the welfare loss (deadweight loss) for not taking into account positive externalities (as before

[51] A good is excludable when paying for it may restrict the access to it. A good is rival when consumption from one or more consumers restricts others from having the same good. Both attributes are independent of one another (Ostrom and Ostrom, 1977).

[52] The firm's production and output will not be constant, especially if the firm is the first one to enter a neglected forest and sector, and during a period of crisis.

with external damages). Again the surface abc can be calculated in a theoretical model, but it would be extremely difficult to be precise in defining the positive externalities and their value/price.

Appendix Figure 1 Externalities, equilibria, and social efficiency – Social Marginal cost

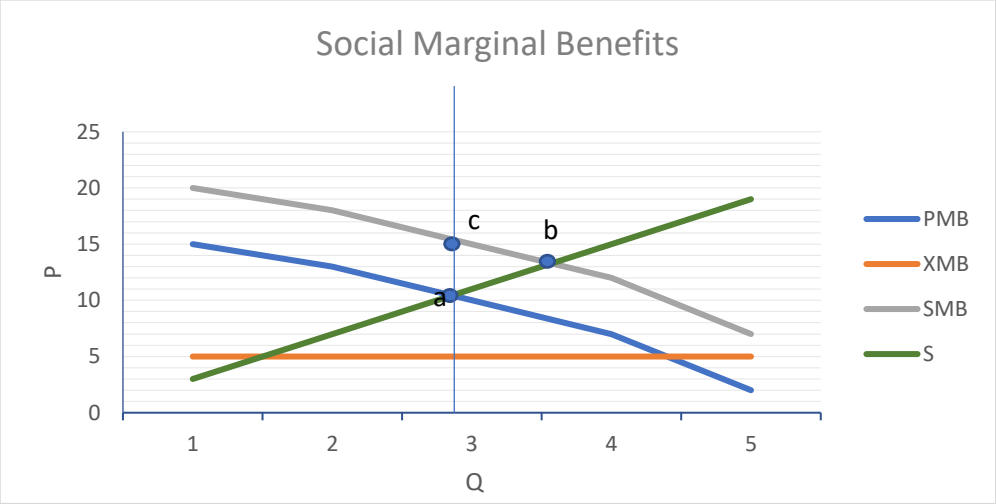


Source: Own elaboration

Similarly, *Social Marginal Benefits* (SMB) consist of *Private Marginal Benefits* (MPB), which reflect the private benefit of using/consuming 1 extra unit of the produced good and *External Marginal Benefit* (XMB), which are benefits that are associated with the production of an extra unit, but are not accounted/paid for by any party (SMB = PMB + XMB). XMB is considered a *positive externality,* as the production has a positive impact to a third party, or the society, which is not associated with the production, and is not paid for by any party. This is depicted in Appendix Figure 2 below.

In this below case constant demand (D) is assumed to simplify the figure. There are 2 points that are noteworthy in the above figure. Point b, where the demand curve meets the PMC (the supply curve), is the market equilibrium in a free market. Point a, where the demand curve meets the SMC, is supposed to reach social efficiency, as all costs, both private and external are taken into account. Theoretically, the welfare loss (deadweight loss) of not internalizing the externality (taking into account the external costs in the price) can be estimated, by estimating the surface abc, where the value of the social cost > the private cost, but in practice it is not possible to include all externalities and estimate their value precisely.

Appendix Figure 2 Externality, Equilibrium and social efficiency



Source: Own elaboration

Although in natural resource regimes and particularly in forest regimes, production is often associated with negative externalities, such as pollution and resource depletion, and consumption with positive, such as clean air, some positive externalities may also exist that are associated with the production, as well as negative ones associated with consumption. For example, a firm that operates in a forest, such as a logging firm may offer increased protection from illegal activities or vigilance for forest fires, which are beneficial to the local society, while too many visitors at a forest may create congestion. Taking this into account, we can see that both production and consumption of goods and resources have net marginal externalities, either positive or negative, depending on the aggregate value of both positive and negative externalities for each case[53].

It is important to make clear that although XMD is considered a *negative externality,* as it has a negative impact to a third party that is not associated with the production of the good, without any compensation, we should acknowledge that some positive externalities may also exist that are associated with the production. The same applies for XMB (as it is described above); although it is described as unaccounted benefits for the society that arise with the

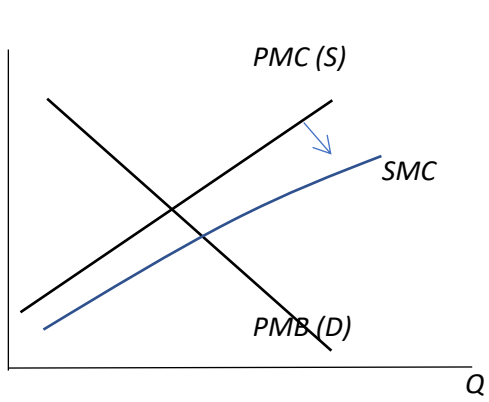
[53] This would transform the respective definitions to SMB = PMB + NXMB for the case of consumption and SMC = PMC + NXMD for the case of production.

consumption of a good, we have to also see that there might be additional damages for the society from the consumption of certain goods.

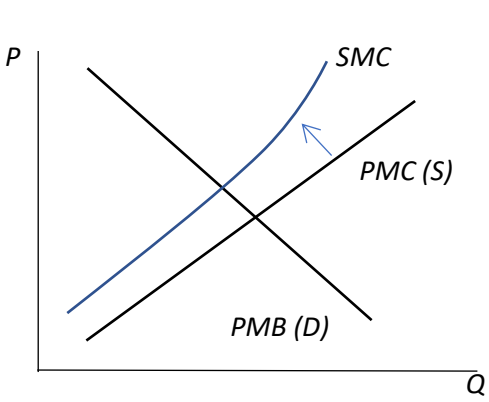
Taking into account that both positive and negative externalities may arise from both production and consumption of a good or service, we have:

a) Production externalities – positive (external marginal benefits of production - XMB)
b) Production externalities- negative (external marginal damages of production - XMD)
c) Consumption externalities – positive (external marginal benefits of consumption - XMB)
d) Consumption externalities – negative (external marginal damages of consumption - XMD)

Appendix Figure 3 Production externalities

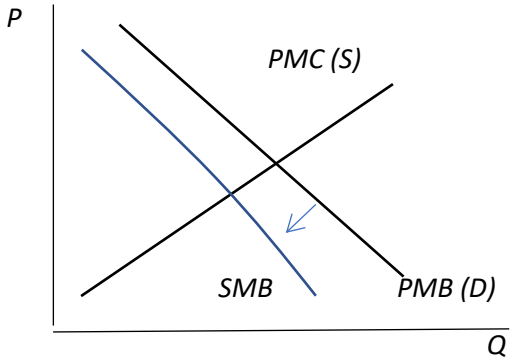


(a – positive production externalities)

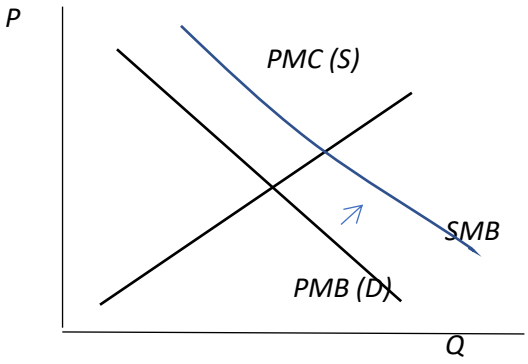


(b – negative production externalities)

Appendix Figure 4 Consumption externalities



(d – negative consumption externalities)

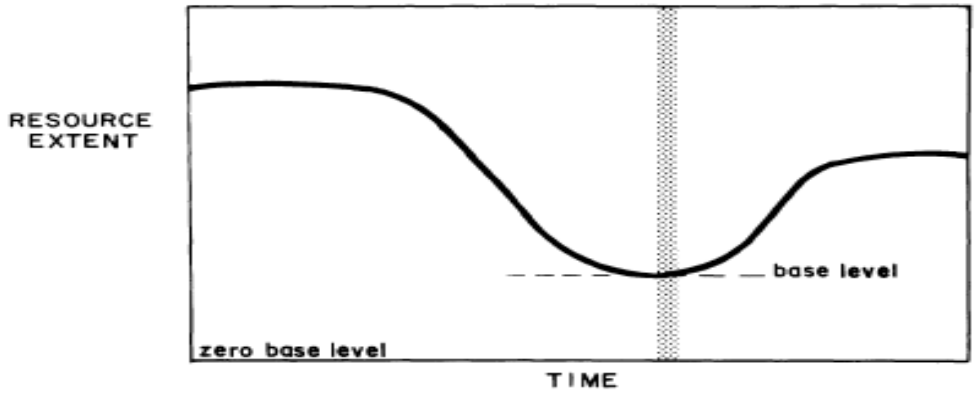


(c – positive consumption externalities)

Appendix Figure 3 and Appendix Figure 4 above depict how the above mentioned curves would move for each of these externalities.

Appendix 2.10 Forest Transition

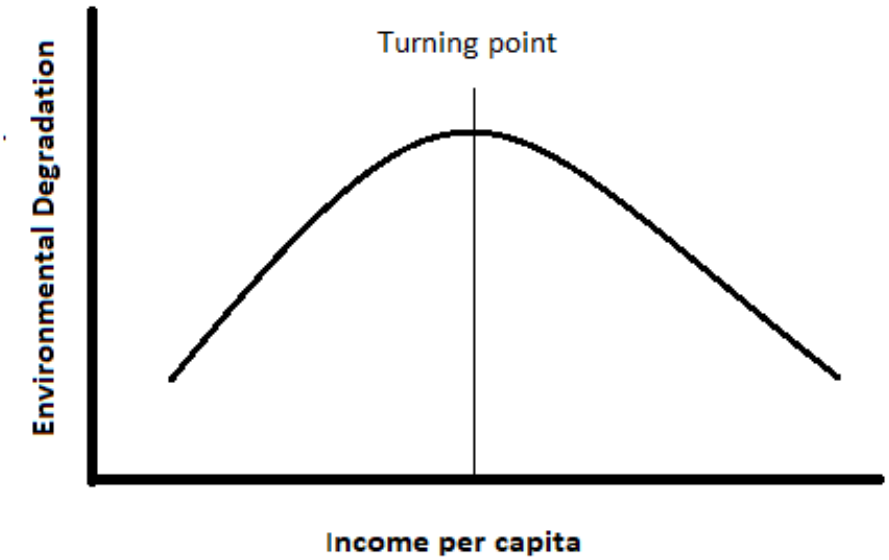
The figure below presents the shape of forest cover during a forest transition. For the first half of the U shape the forest cover declines and after it reaches the base level, it starts increasing again.



Source: (Mather, 1992)

Appendix 2.11 Environmental Kuznets curve

The figure below depicts the shape of the hypothesized Environmental Kuznets curve; during the first half as income/capita increases so does environmental degradation but at declining rates and after the turning point environmental degradation declines as income increases.



Appendix Chapter 3

Appendix 3.1 Case Overview SE Asia

	Crises and impacts on economy	State reaction to the 1997 crisis	Developments in forests during and after the 1997 crisis
Thailand	The country achieved uninterrupted positive GDP growth rates since 1961 It was the first country in the region that experienced a financial crisis and later spread to other countries through contagion • <u>1996-7 economic crisis</u> -The economy started to slow down in 1996 and in 1997 the currency depreciated by approx. 77% - GDP declined by 2.8% in 1997 and by 7.6% in 1998 -Unemployment increased to 3.4% in 1998 compared to only 0.87% in 1997 -Income inequality improved slightly in 1998 and 1999, but started declining from 2000 to 2011	1997: -The government turned to IMF for help - IMF offered a $16.7 billion loan accompanied by a policy reform package, including privatisation of state and domestic firms, liberalisation, fiscal austerity, deregulation, and decentralisation, as well as full guarantee of both creditors and depositors - IMF got wrong forecasts and have misjudged the severity of the recession 1999: - the government announced a fiscal stimulus package - GDP growth rates turned positive again after 1999	**<u>Economic developments:</u>** -The forest sector has not played an important role in the country's development historically; especially after 1989 when logging was banned. - Imports of wood products declined, while exports slightly increased -Plantation development declined sharply after 1997, due to lack of funding to the RFD and financial incentives to the private sector **<u>Environmental developments:</u>** - Forest cover has shown signs of increase from 1997 to 2000 - Imposed austerity and the lack of government funding to different forest-related programmes may have burdened their development. - Forest protection was reportedly not affected by austerity - Increased pressure to forests from families moving to the countryside due to the crisis **<u>Social developments:</u>** - The new constitution of 1997 served as a basis for

			decentralisation and enhanced public participation in forest and environmental regimes - More people moved to the countryside and increased collection of forest products as coping mechanisms - The crisis led to a change in government, which used forests for their political agenda
Indonesia	No previous economic crises with constant economic growth since the early 1960s • <u>1997 economic crisis</u> - Currency devaluated 80% - GDP declined 13% - Unemployment followed an upwards trend from 4.86 in 1996 to 11.24 in 2005 - Political and social instability - Economic inequality dropped slightly until 2000 and then followed an increasing trend On top of the existing structural problems of Soeharto's authoritarian regime: - Lack of transparency	1998: Soeharto resigns 1999: - First freely elected government and help from IFIs - Neoliberal approach (SAP & loan deal with World Bank and IMF, market liberalization, decreasing social spending) - The country returned to positive economic growth rates in 1999 - Successfully ended the monopolistic regime of the forest sector, and rationalized state budgets - The response policies failed to address environmental and social problems and concerns from the previous authoritarian regime	**<u>Economic developments:</u>** - Investments in oil palm plantations increased and palm oil exports increased dramatically since 1998. - Plywood exports declined down to ¼ in volume and ½ in value between 1997 and 2003 **<u>Environmental developments:</u>** -Mix of policies created incentives for vast growth of oil palm plantations and land clearing, which contribute to deforestation (Gellert 2005) - Unsustainable methods of forest conversion in the 2000s. - Huge forest fires in 1997 - Continuous loss of forest cover **<u>Social developments:</u>** -Unemployment increased continuously since 1997 up to 2005 - Increased number of unchecked conflicts among local societies

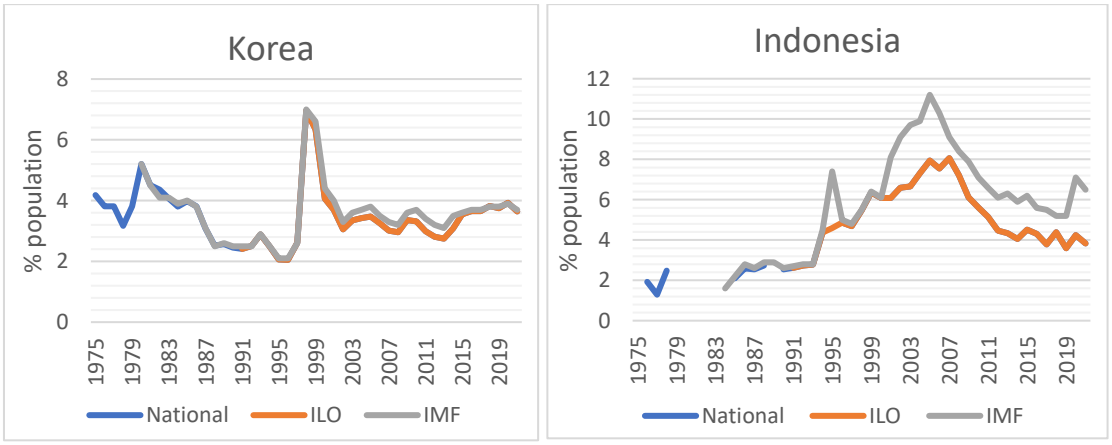
	- Corruption, collusion, nepotism (KKN) - Cronies controlling the timber sector		and forest stakeholders due to economic and political reasons -Riddance of the authoritarian regime
Philippines	Previous economic crises: • <u>1983-1985 debt crisis</u> -GDP decline rates at 7.3% in 1984 and 1985 -deficit and the external debt started to grow -terms of trade deteriorated, and inflation started to rise • <u>1988-91 recession</u> -GDP decline 1988-1991 (-0.5% in 1991) -deficit and inflation increased • <u>1997 economic crisis</u> -GDP dropped -0.57% in 1998 -inflation reached 10.4% in 1998 -unemployment increased to 10.1% in 1998 -Improved income distribution	Philippines undertook prudent policies in the financial sector to deal with the 1983-5 and 1988-91 crisis, which mitigated some of the adverse impacts of the 1997 crisis 1997: - Loan agreement with IMF and World Bank - SAP included trade liberalization, fiscal deregulation and spending/investment cuts - the Philippines was comparatively the least affected country (at least in economic terms) in the region from the 1997 economic crisis 1998: The country went back to positive GDP growth rates	**<u>Economic developments:</u>** -Roundwood and lumber production remained at low levels -Roundwood and lumber trade decreased even further until 2000 **<u>Environmental developments:</u>** - Forest cover continued to show signs of increase - Public sector austerity burdened reforestation efforts, the majority of which were/are undertaken by the state - More decentralised forest governance and enabled enhanced public participation -Logging bans (1985/1992) and relevant environmental regulations were not affected by deregulation policies **<u>Social developments:</u>** -School drop-outs impeded social capital formation, which is needed for the country's sustained growth, which could also potentially lower the pressure on forests (Cagalanan, 2015)
Malaysia	Previous economic crises:	Malaysia rejected IMF's assistance in 1997	**<u>Economic developments:</u>**

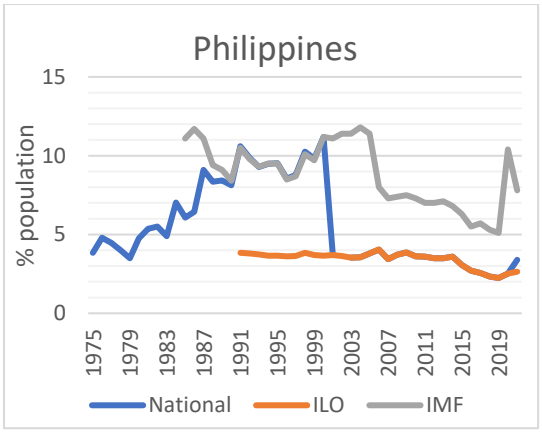
	• <u>1985-6 economic crisis</u> - trade deteriorated by approx. 20% - GDP contracted by 1,6% in 1985 - unemployment doubled from less than 4% to 8% • <u>1997 economic crisis</u> - GDP declined 7.4% in 1998 - Unemployment reached 3.4% in 2001 from 2.4% in 1997	<u>3 stages of crisis management</u> *1) Sept – Nov 1997* -The government attempted to reassert its national control over economic policymaking *2) Nov 1997 – Feb 1998* -The state declined IMF's help but adopted similar policies *3) March 1998 – end of crisis* -The government adopted a procyclical fiscal policy -The government introduced capital and currency controls Counter-crisis policies were complementary to and compatible with the medium-term 5-year economic plans and long-term 10-year plans (IMPs)	- Log production dropped significantly after 1997, but increased again after 2001 - Oil palm planted area and palm oil production increased **<u>Environmental developments:</u>** - Forest cover loss rate was much lower compared to previous decades; Signs of forest transition after 2005 - Biodiversity protection and focus on sustainability since 1989 were not affected by the economic crisis. **<u>Social developments:</u>** - Employment in wood-related industries to almost half from 1997 to 2002 (Department of Statistics Malaysia, 2015)
Republic of Korea	• <u>1980 economic crisis (oil prices crisis)</u> -GDP declined -1.7% -Unemployment reached 5.2% - deteriorated balance-of-payments • <u>1997 financial crisis</u> -GDP declined -5.47% -Unemployment increased more than	In December 1997 IMF assisted Korea with a bailout package of $58.3 billion -The government maintained the 'strong won' policy, adopted in the 1990s - The authorities failed to respond quickly to the situation, especially with respect to the magnitude of debt from the private sector - Large number of corporate bankruptcies in 1997,	Many of these developments coincide with the start of the 4th National Forest Plan **<u>Economic developments:</u>** - Forest tending programs were used to reduce unemployment especially in rural areas since 1998 - Forest-sector related imports fell significantly, while exports increased slightly after 1998 **<u>Environmental developments:</u>**

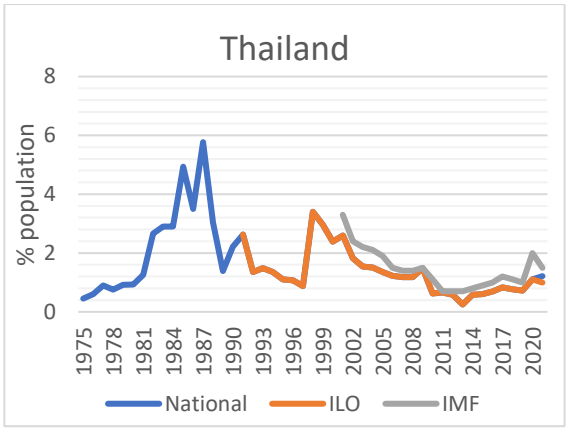
	double to 6.9% - Property-related crime rates increased by 60% - Equity of income distribution deteriorated	including 7 of the top 30 chaebols which faced insolvency - The IMF instructed a tight monetary policy, austerity, privatisations of state enterprises, closure of insolvent financial institutions, raising interest rates sharply, fiscal contractionary adjustments, economic reforms in the financial sector, the corporate sector and the labour markets, and generating a surplus in 1998	- Forest cover loss rate continued shrinking, but tree growing stock continued increasing - Biodiversity protection and focus on sustainability since 1989 were not affected by the economic crisis. **<u>Social developments:</u>** - Citizens, NGOs, and enterprises got more involved in governance after the 4th National Forest Plan (1998-2007) - increased decentralized administrative power and local self-governing power -Enhanced benefits from forests (e.g. recreation)

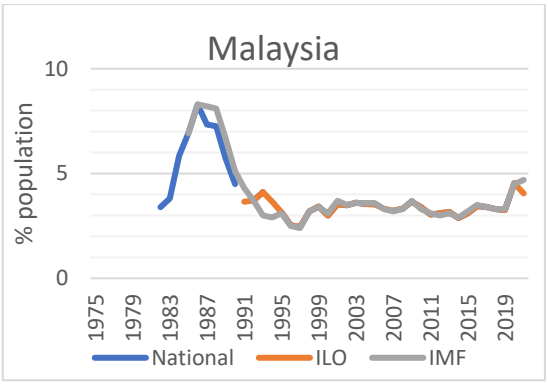
Source: Based on case studies

Appendix 3.2 Historical Unemployment (% Total Population) SE Asia cases 1975-2021



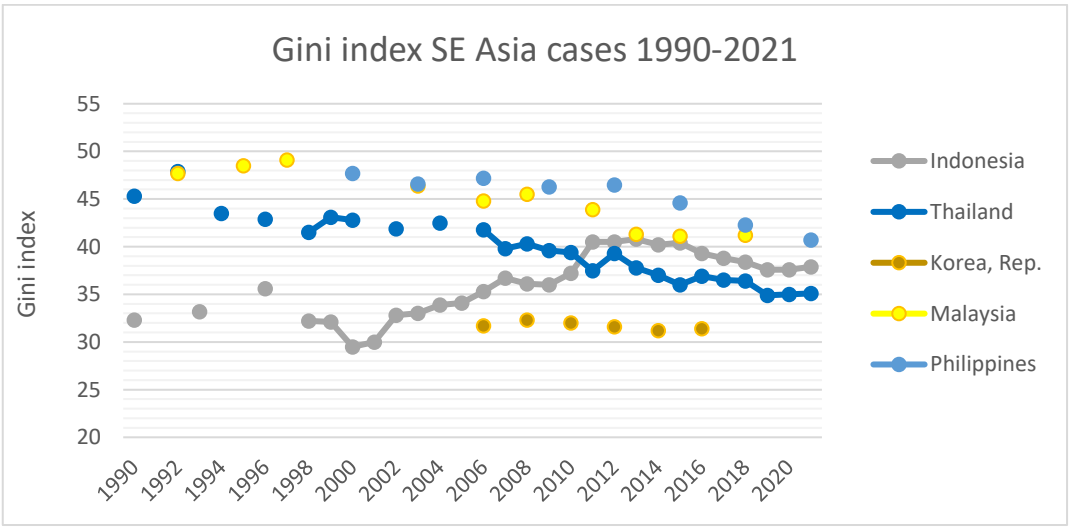






Source: National and ILO estimates from (World Bank, 2024) *and IMF from* (IMF, 2023)

Appendix 3.3 Gini index SE Asia cases

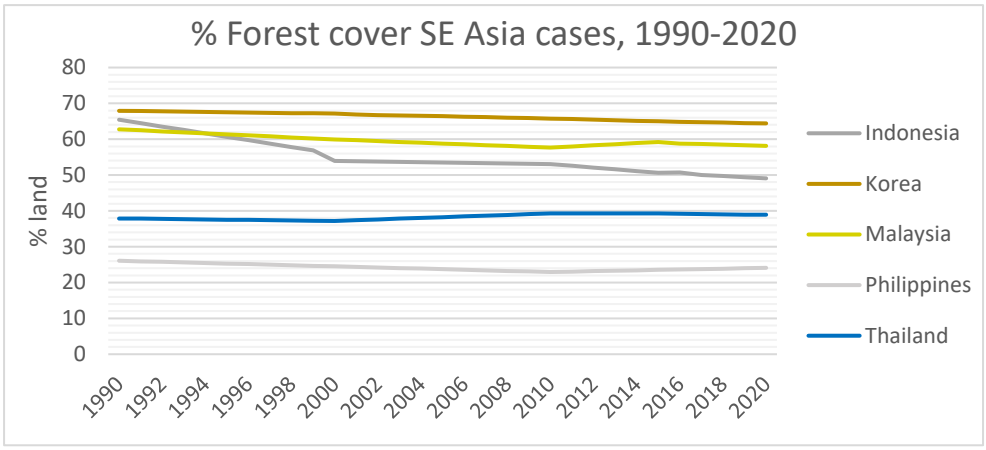


Range of Vertical axis modified to 20-55, to highlight changes.

Time series starts at 1990. Sporadic data for previous year are also available, but not included.

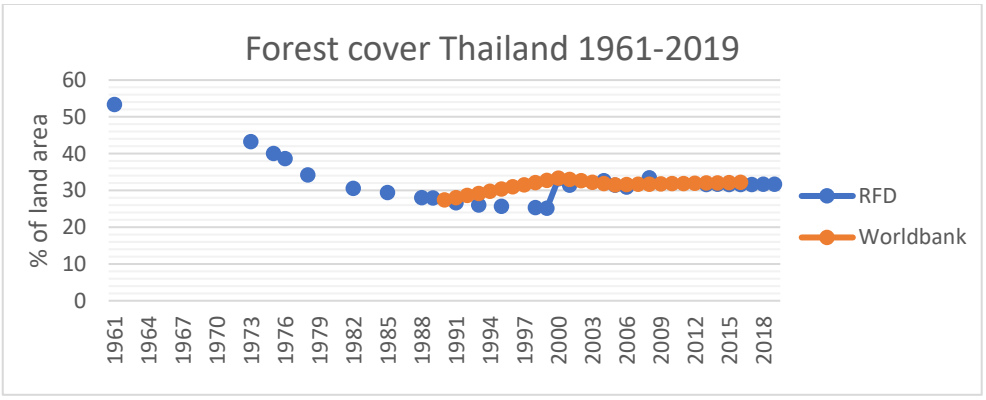
Data source: World Bank Open Data (World Bank, 2024)

Appendix 3.4 % Forest cover, all SE Asia cases, 1990-2020



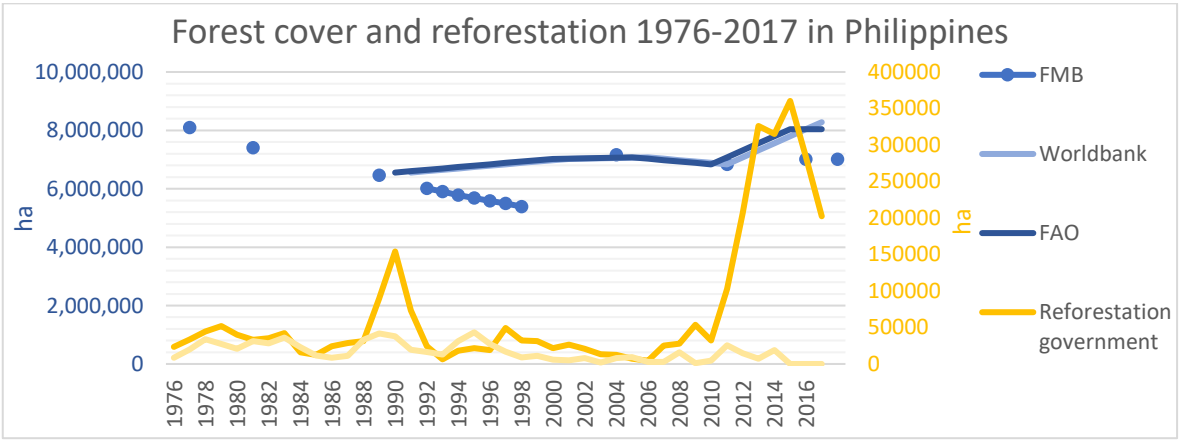
Data available until 2020. Data source: World Bank (2023)

Appendix 3.5 Forest cover Thailand 1961-2019, RFD, WB



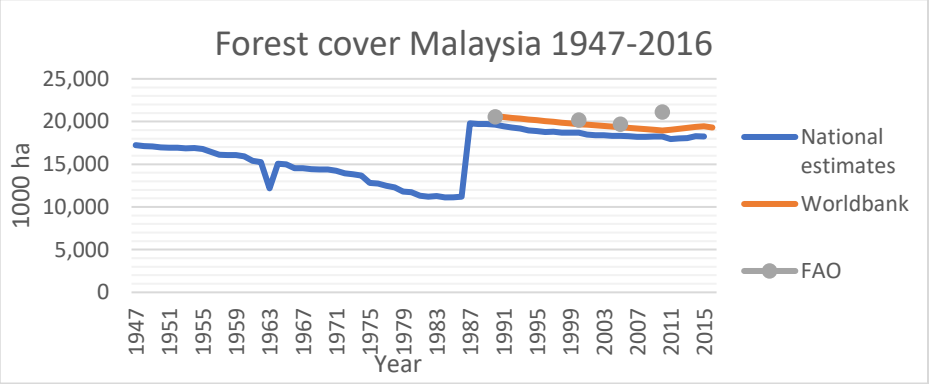
Data from forestry statistics of the Royal Forest Department of Thailand (RFD, 2020) *and the World Bank (2020)*

Appendix 3.6 Forest cover and government reforestation 1976-2017 in the Philippines



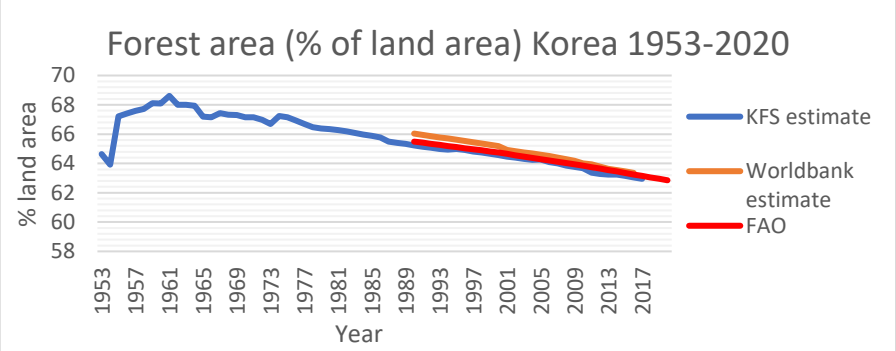
Source: Data from the Philippines Forestry Statistics (Forest Management Bureau, 2018)*, the Worldbank* (2020)*, and FAO* (2021).

Appendix 3.7 Forest cover Malaysia 1947-2016



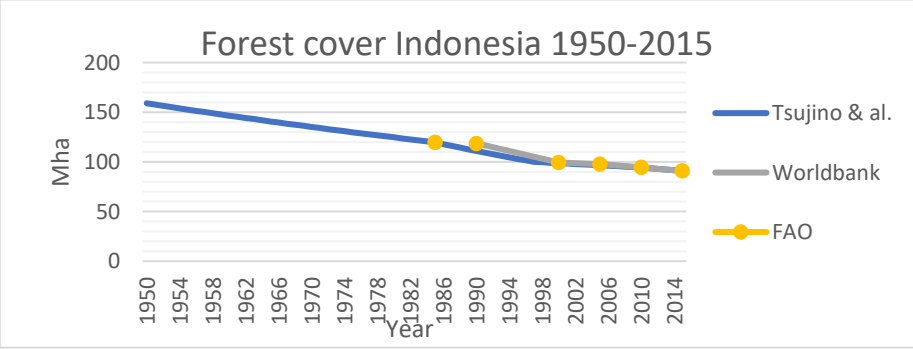
Source: Data for the national estimates come from the Department of Statistics Malaysia (2015)*, World Bank* (2023b)*, and FAO* (2015)
Note: Only the regions of Peninsular Malaysia and Sabah are included for the period 1947-1986. Data for Sarawak were not available. All three regions are included after 1987

Appendix 3.8 % Forest cover Korea 1953-2020



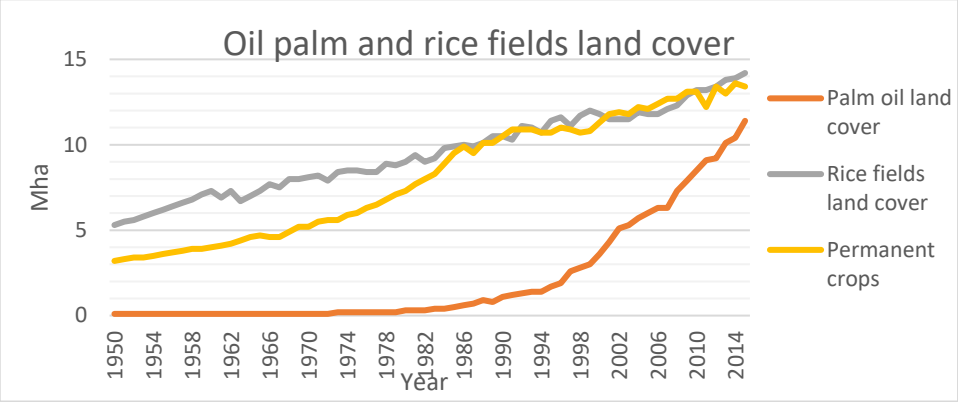
Data source: World Bank (2020)*, FAO* (2023)*, and the Korean Forest Service* (2018)

Appendix 3.9 Forest cover Indonesia 1950-2015



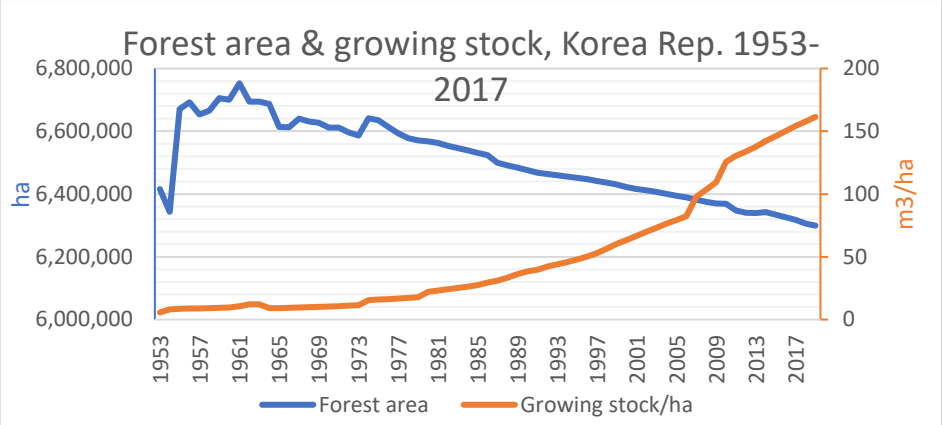
Source: Data from Tsujino *et al.* (2016)*, Worldbank* (2020)*, and FAO* (2020)

Appendix 3.10 Land cover for permanent crops, rice fields, and oil palms in Indonesia, 1950-2015



Tsujino et al. originally include oil palm in permanent crops in the research, but in Appendix 3.10*, oil palm cover is subtracted from the permanent crops category and is presented separately.*
Source: All data from Tsujino et al. (2016).

Appendix 3.11 % Forest area and growing stock Korea 1953-2017

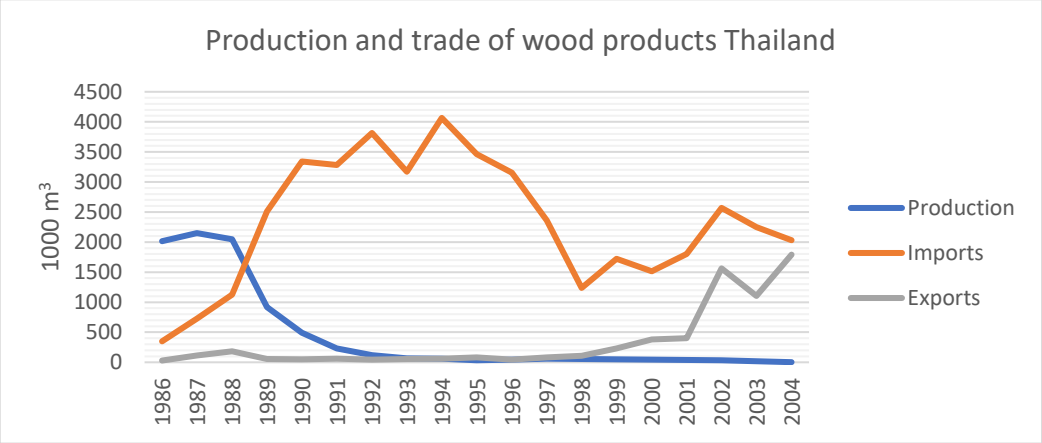


Data source: (Korea Forest Service, 2022)

Appendix 3.12 Number of workers in wood-based industries - Malaysia

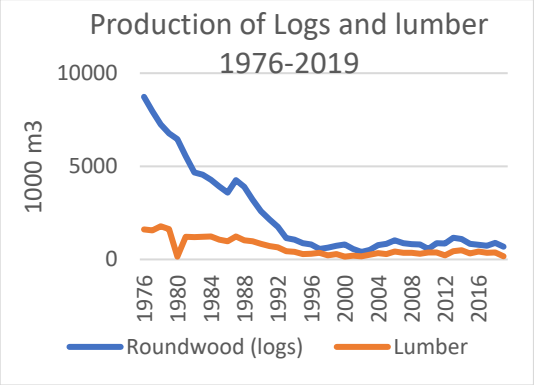
Data source: (Department of Statistics Malaysia, 2015)

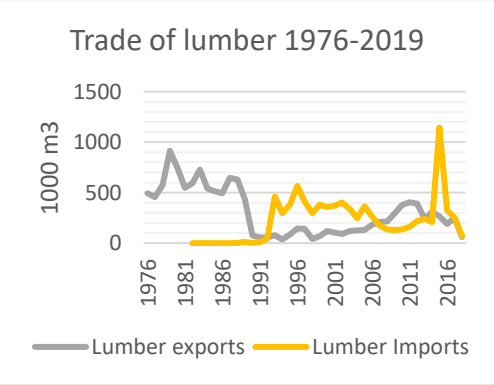
Appendix 3.13 Production and trade of wood products in Thailand

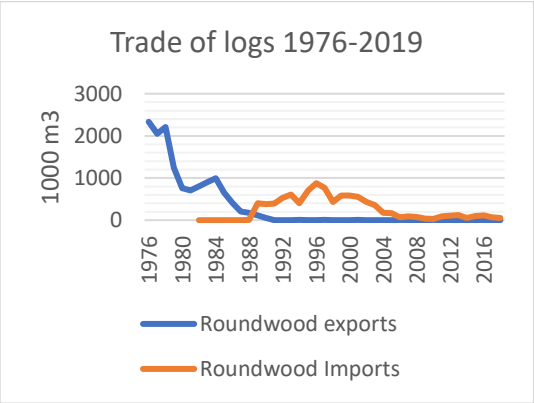


Source: Data from forestry statistics of the Royal Forest Department of Thailand (RFD, 2020)

Appendix 3.14 Forest sector - the Philippines 1976-2019

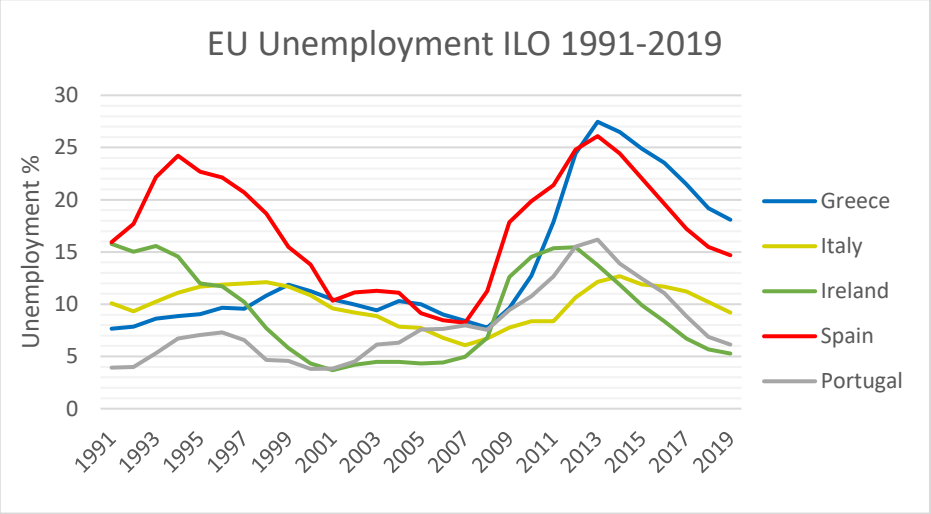






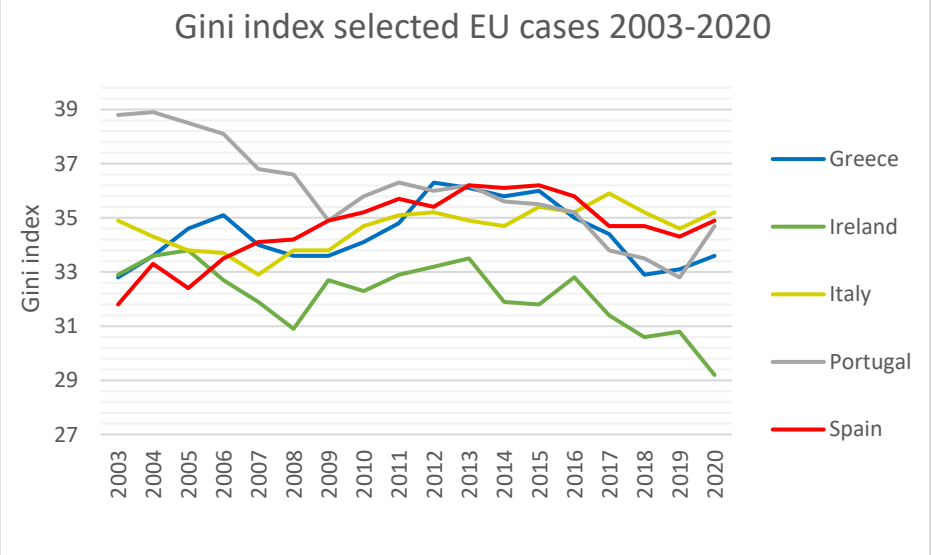
Source: Data from various issues of the Philippines Forestry Statistics (Forest Management Bureau, 2018)

Appendix 3.15 Unemployment EU cases 1991-2019



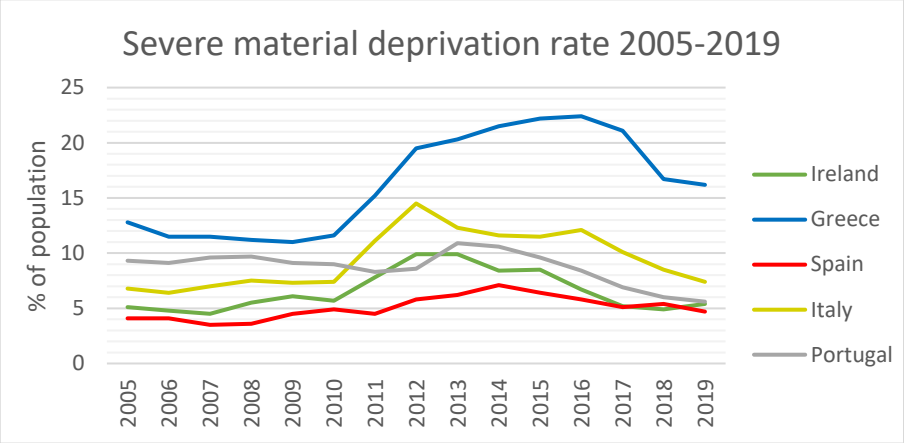
Data source: World Bank Open Data (World Bank, 2024)

Appendix 3.16 Gini index of the selected EU cases (2003-2015)



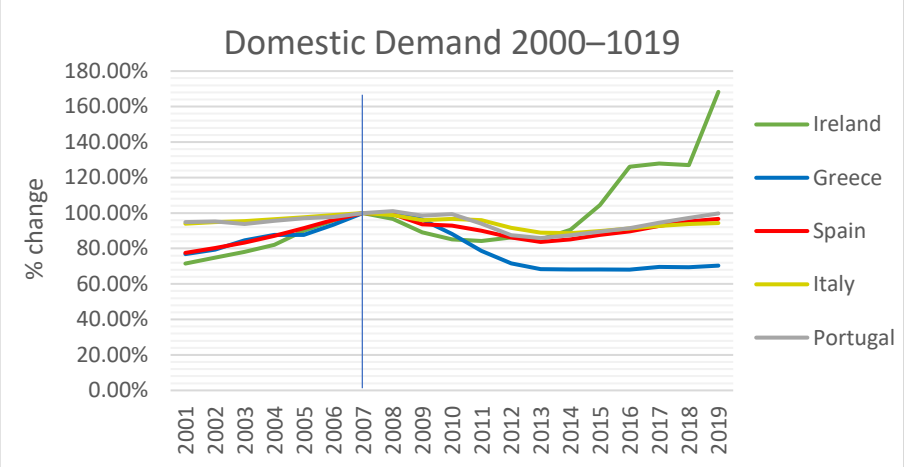
Range of Vertical axis modified to 25-40, to highlight changes. Time series starts at 2003. Sporadic data for previous year are also available, but not included.Data source: World Bank Open Data (World Bank, 2024)

Appendix 3.17 Severe material deprivation of the selected EU cases (2003-2019)



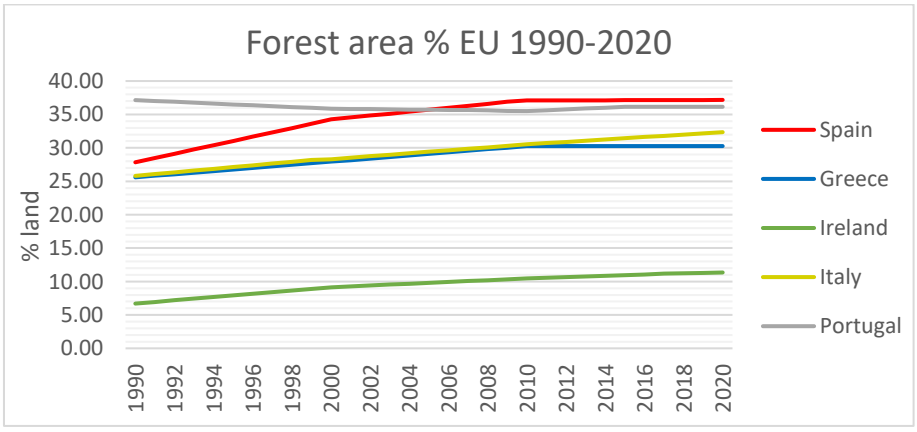
Data source: Eurostat (Eurostat, 2023)

Appendix 3.18 Change in domestic demand in the EU cases 2000-2019 (base year=2007)



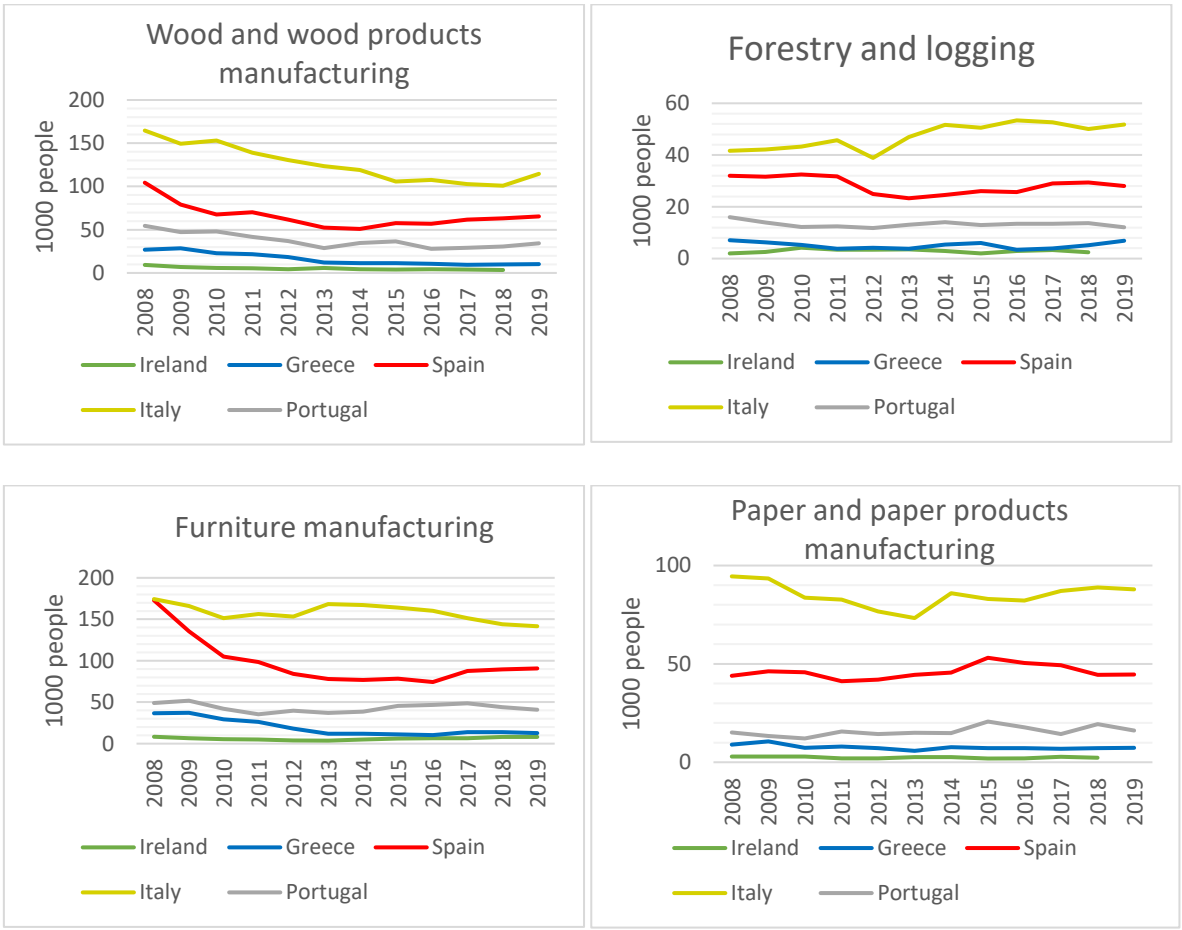
Data source: European Commission (European Commission, 2020a)

Appendix 3.19 Forest cover, all EU cases, 1990-2020



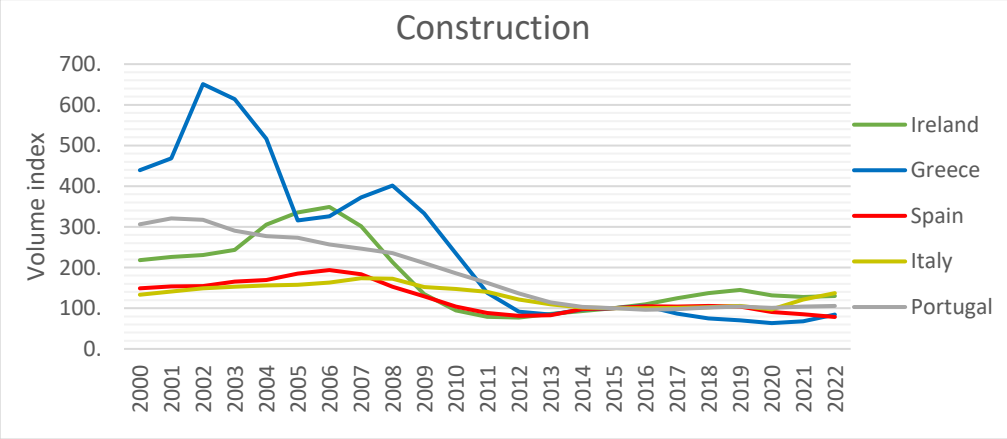
Data source: World Bank (2023) *coincides with* (FAO, 2023)

Appendix 3.20 Employment in wood-related sectors in the selected EU cases, 2008-2019



Data source: Eurostat database (Eurostat, 2023)

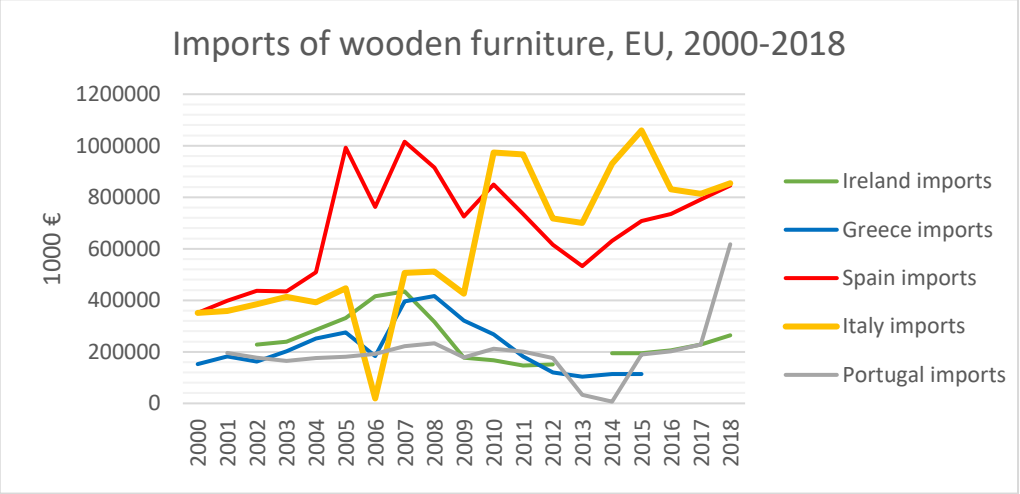
Appendix 3.21 Production in construction in the selected EU cases, 2000-2022

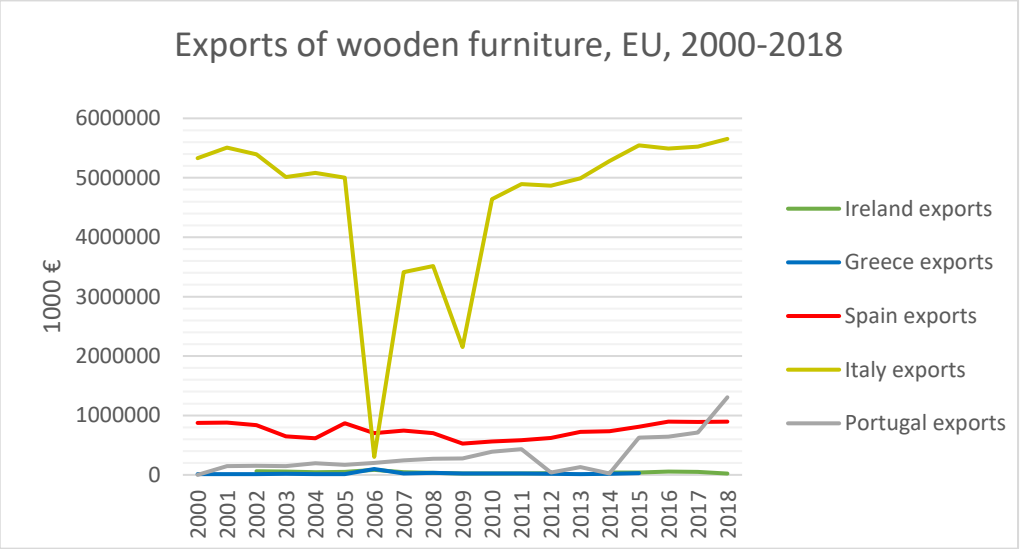


Base year = 2015 | Calendar adjusted data, not seasonally adjusted data

Data source: Eurostat database (Eurostat, 2023)

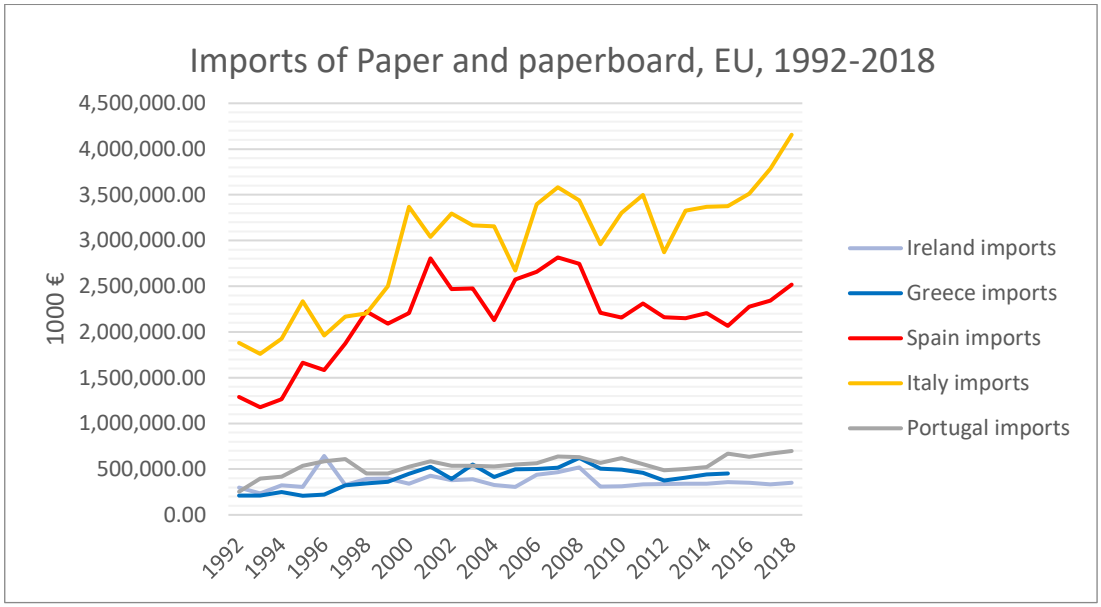
Appendix 3.22 Trade of wooden furniture in the selected EU cases, 2000-2018

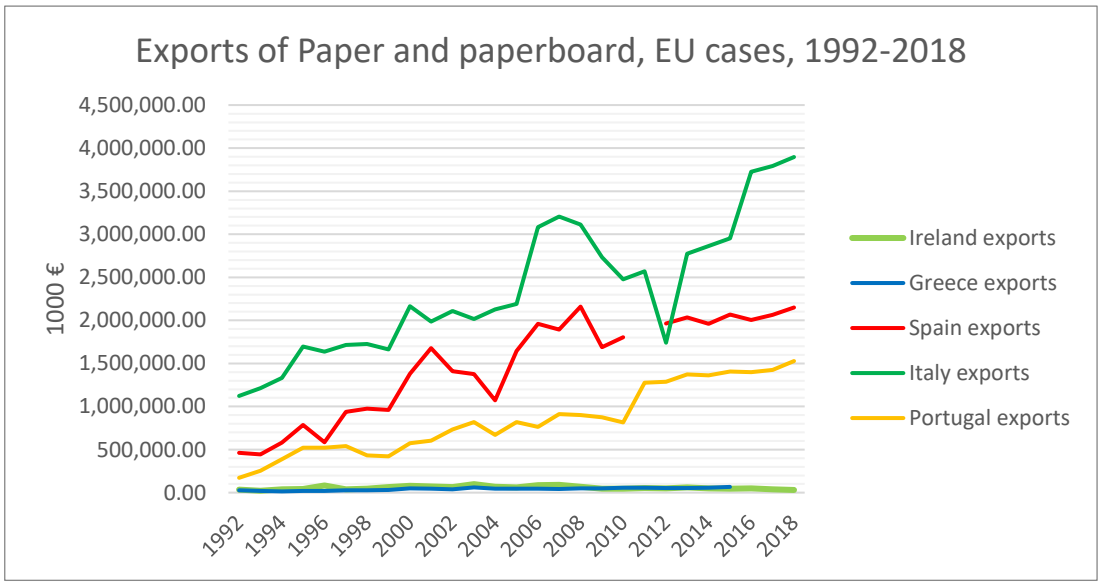




Data source: Eurostat database (Eurostat, 2023)

Appendix 3.23 Trade of paper and paperboard in the selected EU cases, 1992-2018





Data source: Eurostat database (Eurostat, 2023)

Appendix 3.24 Budget towards fire protection services 2001-2019

	IRELAND	GREECE	SPAIN	ITALY	PORTUGAL
2001	198.6	363	1,044.00	2,277.00	157.4
2002	227.7	385	1,096.00	2,381.00	166.8
2003	228.3	402	1,130.00	2,545.00	153.8
2004	251.2	450	1,063.00	2,612.00	179.3
2005	252	440	1,142.00	2,754.00	188.8
2006	262.8	436	1,280.00	2,722.00	196.2
2007	302.7	531	1,500.00	2,807.00	198.4
2008	335	536	1,459.00	2,821.00	217.9
2009	313.5	663	1,475.00	2,892.00	271.8
2010	**271.2**	**503**	1,846.00	2,762.00	283.4
2011	**327.5**	456	1,902.00	3,006.00	**244.9**
2012	302.5	**491**	**1,749.00**	2,988.00	235.9
2013	262.2	460	1,730.00	3,086.00	251
2014	290.9	455	1,630.00	3,030.00	239.1
2015	282.9	**502**	1,735.00	2,990.00	255.5
2016	310.9	510	1,802.00	2,967.00	254
2017	314.2	512	1,837.00	3,075.00	274
2018	347.4	543	1,948.00	3,273.00	374.6
2019	359.6	522	2,077.00	3,301.00	381.6

Note: Years in bold show the years each country agreed to a bailout

Data source: Eurostat (2020b)

Appendix 3.25 Pool of cases that experienced financial crises between 1995 and 2015

The financial crises between 1995-2015:

1. Mexican Peso Crisis (1994-1995). *(IMF bailout)*

Although there were broader economic elements involved, the 'tequila crisis' was triggered by problems within the financial sector, such as collapse of financial institutions, vulnerabilities of the banking sector, and contagion on financial markets (Stallings and Studart, 2003)

2. Asian Financial Crisis (1997-9) – Thailand, Indonesia, South Korea, Malaysia, Hong Kong, and Taiwan. (IMF bailout deals in some cases)

The financial crisis originated from Thailand, and it quickly spread to other South-eastern Asian countries through their financial sectors.

3. Russian Financial Crisis (1998). *(IMF bailout)*

Some causes for the 1998 Russian financial crisis include the lack of transparency, inadequate regulation, and poor risk management of the national financial sector, the financial liberalization, fiscal imbalances and external shocks (the 1997 SE Asian crisis) (UNCTAD, 1999)

4. Ecuadorian Financial Crisis (1999-2000). *(IMF bailout)*

IMF identified relevant macroeconomic trends in the 1990s, such as reduced margin for fiscal policy, monetary policy downfall, and increasing dollarization, and financial liberalization and boom and bust cycle as the roots of the 1999 Banking Crisis in Ecuador (Jácome, 2004)

5. Colombian Banking Crisis (1998-2000). (no bailout deal)

A fast increase in the number and percentage of unproductive assets in the national financial sector, along with the dramatic drop in the sector's net worth in 1997 and 1998 have been identified as precursors to the 1998 Colombian banking crisis (Arias, 2000a). Contagion in the financial sector from external shocks, inadequate risk management, currency devaluation, collapse of financial institutions, and weak financial governance were identified as the main causes of the 1999 financial crisis (Arias, 2000b; Darío Uribe and Vargas, 2019)

6. Uruguayan Banking Crisis (2002-2003). *(IMF bailout)*

This banking crisis was attributed to bank runs, weak regulation and monitoring of the banking sector, high exposure to risky assets, as well as loan portfolios with exposure to the Argentinian economy, which also underwent a banking crisis some years earlier (Plaza and Sirtaine, 2005).

7. Argentinian Financial Crisis (1998-2002). (IMF bailout)

Some of the causes of the 1998 financial crisis in Argentina include the reforms in the Argentinian financial sector in the 1990s, which pegged the currency to the US dollar; lack of risk management practices in the banking sector; liquidity problems combined with non-performing loans; bank runs and capital flight; lack of structural reforms in the economy combined with macroeconomic imbalances (lack of competitiveness); and public unrest and political instability (Saxton, 2003; Teubal, 2004; Undurraga, 2015). Corruption in the banking and financial sector, including tax avoidance schemes and money laundering were also included as causes for the financial crisis in the aftermath (BBC, 2001).

8. Turkish Financial Crisis (2001). (IMF bailout)

A combination of factors led to the severe financial and economic crisis in Turkey, including: vulnerabilities in the banking sector, such as poor financial and corporate governance, lack of risk management practices, and high number of non-performing loans; large debt and public deficits; political instability; and lack of confidence in the market after external shocks in other economies (Ozkan, 2005; Dufour and Orhangazi, 2009; Yurdakul, 2014). It resulted in the collapse in the Turkish Lira and stock market crash, which had further implications in the national social structure and economic interests (Dufour and Orhangazi, 2009).

9. The Global Financial crisis (2008-). (several cases of bailout)

Accumulated weaknesses in the US and the global financial system, including lack of prevention mechanisms for systemic risk, lack of transparency and disclosure of risks, lack of adequate national, cross-institutional, and international regulation, and ineffective coordination among relevant authorities, were some of the main reasons that led to the global financial crisis in 2007-8 (Sacasa, 2008). The spark was the unethical, improper, and toxic lending practices from the financial sector in the US, i.e., subprime mortgages (Duca, 2013).

10. The European periphery economic crisis (2009-). (Greece, Ireland, Italy, Spain, Portugal). (IMF/ troika bailout in most cases)

The eurozone crisis, or the European sovereign debt country, where several sovereign states of the periphery, including Greece, Ireland, Italy, Spain, and Portugal, were unable to repay government debt, or bailout indebted banks (Lane, 2012; Mercille and Murphy, 2015).

11. Cypriot Banking Crisis (2012-3). (IMF/ troika bailout)

The banking crisis was the result of very poor regulation and supervision by the Central Bank of Cyprus (David Lascelles, 2013), high number of non-performing loans in the two largest commercial banks. Other secondary reasons are tied to the banking sector and the real estate sectors (Georgiou, 2023).

12. Slovenian financial crisis (2012-4). (No Bailout)

Weaknesses in the banking sector (non-performing loans,lack of risk management and inadequate transparency and corporate governance), high number of state-owned firms, including banks, the ripple effect from the eurozone crisis were some of the reasons that were responsible for the 2012 financial crisis in Slovenia (IMF, 2012b; Podvršič and Schmidt, 2018).

Appendix 3.26 Policy Overview from both regions: Changes in regulation

CHANGES IN REGULATION	
SE Asia	**A. <u>Included in bailout SAP agreements</u>** *Led to more decentralized regimes in* Indonesia, Thailand, Philippines. **B. <u>Not included in bailout deals (Malaysia)</u>** Introduced new environmental and forest-specific policies in order to fortify and develop their forest and wider environmental regimes. Changes in forest related policies also contributed to *a more decentralized regime.* Changes in Regulation did not affect 4/5 countries much, but had a significant impact in Indonesia's forest regime: Helped to get rid of cronies from the state-controlled regime; Ended of the monopoly of Apkindo; Freed the export market and replaced the export taxes on logs and other taxes on timber with a resource rent tax; and rationalized the Reforestation fund and auctioning permits. Vastly Increased oil palm plantations to the point that it started contributing to deforestation.
EU ***(Highlighted examples mostly in the mediterranean countries)***	**A. <u>Included in bailout SAP deals</u>** *Increased the decentralization of forest regimes*. It was used to facilitate economic activity and investment, and to reduce budgets. It was Opposed by civil society and NGOs. *Changes in regulation and/or Administrative changes* in the forest services (e.g. consolidating). Changes in forest regulation and decentralization were not accompanied by relevant changes in budgets to support new initiatives; *Created significant issues in the responsibilities, budget, and available tools* (e.g. Italy, Greece). **B. <u>Not included directly in bailout deals</u>** (but in the same direction of neoliberalism/market-focused governance) De/recharacterization of forest areas in order to attract economic investment (Greece, Portugal, and Spain). Loosening environmental regulations to attract investment increased the power of different actors (public and private forest owners – Portugal, private investors – Greece). **C. <u>Reactive approach to forest fires</u>** New regulation to protect forests after forest fires in mediterranean countries.

Appendix 3.27 Policy Overview from both regions: Austerity

AUSTERITY	
SE Asia **(Short-term)**	Most countries quickly stopped or reversed austerity (Thailand in 1999, Korea, Malaysia in 1988). Forests in countries with active forest plans and provisions in place were affected less (Korea, Malaysia). Korea increased spending directly in forests helped to mitigate crisis impacts. Malaysia increased public spending to protect vulnerable groups, so the changes in population's coping mechanisms did not add any significant pressure on forests. - **Direct Negative Effects** Funding towards environmental and forest protection and conservation declined in all cases as forest governance regimes were mostly state-led. Negatively affected forest-related authorities, actors, and schemes (reforestation, plantations, incentives) (Thailand, Indonesia, Philippines) and *caused problems while dealing with fires (Indonesia)* - **Direct Positive Effects** Helped to rationalise national budget and fight elements of corruption in the forest sector in Indonesia. - **Indirect Effects** Lack of funds towards social protection during crisis increased pressure to forests to cover subsistence needs (Thailand, Philippines),or even led to conflicts that became internal security threat and affected forest policy reforms (Indonesia)
EU **(Long-term)**	Manifested in both the EU level and national levels: EU level: directly affected the budget allocated to the environment, which affected forestry and forest authorities directly, because of the reduction of Rural Development Programme funds. Country level: Unique manifestations in each country, but with some common patterns, *including budget cuts from different forest-related services and operating expenses, decline in forest support schemes, and reduced funding towards regional and municipal services related to forests*. *Affected the national fire systems*. The budget for the protection services declined for all cases for at least one year after each country agreed to a bailout deal. Vast majority of these budgets were allocated towards extinguishing forest fires, not fire protection in all Mediterranean cases. In turn, underfunding of forest services, adversely affected the efficiency and operation of the forest authorities and had changed the power dynamics in the forest governance regime. Austerity policies were met with demonstrations or strikes in all 5 countries.

Appendix 3.28 Policy Overview from both regions: Privatisation

PRIVATISATION	
SE Asia	In most cases privatisation *policies caused unrest in society regarding forest-related efforts, some of which were stopped due to protests*. Privatisation policies did not affect the forest regime significantly in most cases, except for Indonesia. *Indonesian Bank Restructuring Agency* was created to help with the privatisation processes Indonesian Bank Restructuring Agency planned to sell most forestry assets in 5 years, at approx. 15-20% of their value. 14 forest plantation firms consolidated.
EU	Privatisation and accelerating public–private partnerships were pushed to the agendas of all 5 cases during the 2008- crisis, which were met with protests and demonstrations from civil society, some of *which were successful in halting the privatisation processes*. Greece, Ireland, and Portugal, the bailout agreements were directly linked to extensive privatisation. Spain and Italy far-reaching privatisations took place under pressure from the ECB and international institutions. Privatisation targeted forest related public estates and land, including areas in Natural parks (Spain), national forest company (Ireland), ecologically significant and legally protected areas, many of which are inside or very close to designated Natura 2000 sites, and the national the environmental permitting process and its monitoring process (Greece). Greece introduced the *Hellenic Republic Asset Development Fund, and* Portugal *the Bolsa Nacional de Terras*; 2 actors created to facilitate the sales of public assets, including estates, forest and agricultural land.

Appendix Chapter 4

Appendix 4.1 Interview Questions

1) Organisation specific

What is the main role of your organisation in the forest governance regime?

Has the role of your organisation/body changed since the beginning of the 2009- crisis?

*Possible follow ups: after initial response, check also the following:

- Budget
- Policies
- Responsibilities & targets
- Other [their suggestions]

2) Challenges

What are the most important challenges for your organisation now and what has it been during the period of the 2009- crisis?

{Possible follow ups: Why? How? How did you try to/ would you tackle it and what would you need to do it? }

3) Opportunities

What are the main opportunities for your organisation in the next 5-10 years?

{Possible follow ups: -collaborating with other bodies/sectors? Collaboration with other countries/EU? Is there a plan/target for it?}

4) Forest regime and Collaboration

Who are the main government/non-government actors in the regime you work with? Has this changed in the last 10 years? How? Why?

{Follow ups: Are there any structures / policies enabling good communication and cooperation?}

5) Role of the public

What is the role of the public in the area of focus of your organisation/agency (case specific – e.g., forest fire protection/ reforestation/ biodiversity, etc.)?

{Follow ups: Channels of public participation? - De jure and de facto? -illegal activities? - complaints? }

Background and research details

I am a PhD student at the University of Reading. This research project aims to find out links between economic crises and forest governance.

As part of my dissertation/thesis I am conducting research into both the government and non-government actors in forest governance in Greece. I am interested in exploring the impacts of the most recent economic crisis in Greece (2009-) in government actors and their capacity to perform their responsibilities, along with changes that took place during the economic crisis (started in 2008) which may have affected the government bodies in different ways.

Why have you been selected to participate?

To undertake this research, I am currently contacting officials from various government agencies related to the forest governance in Greece, such as the forest fire services, municipalities, ministries, etc, and ENGOs, whose work is very relevant to forest governance in Greece. I would like to invite you to participate in an in-depth interview taking place either online at a platform of your choice (zoom, skype, Teams, etc.) or at your office, which will take approximately 1 hour of your time. You have been selected as you are a member of a body whose work is very relevant to forest governance in Greece, and I am interested in discussing how different government bodies have been affected during the period of the most recent economic crisis (starting 2009-). You are encouraged to freely express your opinions and please be assured that your views are valued and that there are no right or wrong answers to the questions asked.

Participation in the project

Participation is entirely voluntary and you are free to withdraw from the interview at any time you feel uncomfortable or unwilling to participate, and you do not have to specify a reason. Any in-part or total contribution can be withdrawn up until the point at which the data is aggregated before 31/12/2022. After 01/01/2023 it will not be possible to withdraw your contribution from the results of the research. If you wish to withdraw, please contact e.kodosakis@pgr.reading.ac.uk (details below), quoting the reference at the top of this page. The reference will only be used to identify your questionnaire/interview transcript and will not reveal any other information about you.

Data storage

I will store your name and email address so that I can contact you until December 2022, if I need to ask follow up questions. Your name and email address will be linked to your original responses by means of a keyed spreadsheet held separately. This spreadsheet and contact details will be password protected and the password known only to me and my supervisor, and will not be shared with any third parties. The spreadsheet will be kept on my password protected PC and will be destroyed at the end of my degree (possibly around September 2023). Your name and email address will not be published as part of my research. As all data is presented in aggregate format it will not be possible to identify any individuals from their responses.

The discussion will be audio or video recorded if you agree, and the anonymised transcripts of the audio recordings will be used by myself only. Once transcribed the original recording will be deleted. Your anonymity will not be compromised as only the reference number above will be used to identify the transcript.

If at any stage you wish to receive further information about this research project please to not hesitate to contact e.kodosakis@pgr.reading.ac.uk before 01/06/2023. The findings will be written up into my thesis and possibly published in academic journals. This will not affect your anonymity.

All data I collect will be stored securely electronically on a password-protected computer or in hard copy version in a locked cupboard.

Consent statement

By participating in this interview, you are acknowledging that you understand the terms and conditions of participation in this study and that you consent to these terms.

This research project has been reviewed according to the procedures specified by the University Research Ethics Committee, and has been given a favourable ethical opinion for conduct.

Thank you very much for taking time to take part in this survey!

Contact details

Evangelos Kodosakis - Email: E.Kodosakis@pgr.reading.ac.uk

School of Agriculture, Policy and Development, Agriculture Building, Earley Gate, Whiteknights Road, PO Box 237, Reading RG6 6AR, United Kingdom

Or alternatively you can contact my supervisor

Professor Kelvin Balcombe - Email k.g.balcombe@reading.ac.uk

School of Agriculture, Policy and Development, Agriculture Building, Earley Gate,

Whiteknights Road, PO Box 237, Reading RG6 6AR, United Kingdom

Appendix 4.3 Interview Protocol

Project: Developments in forest governance during the economic crisis

[1]

Time of the interview:
Date:
Place:
Interviewer:
Interviewee:
Role/position of the interviewee:
[2]

Explain to the interviewee:

(i) The purpose of the study – Give participant the printed information sheet
(ii) Individuals and sources of data to be collected
(iii) How do I handle the data to protect confidentiality
(iv) How long it is expected to take
(v) Ask their permission to use the tape recorder

[3]

Questions (same as list of interview questions above):

1) Organisation specific

What is the main role of your organisation in the forest governance regime?
Has the role of your organisation/body changed since the beginning of the 2009- crisis?
How? Why?
Possible follow ups: after initial response, check also the following:

- Budget
- Policies
- Responsibilities & targets
- Other [their suggestions]

2) Challenges

What are the most important challenges for your organisation now and what has it been during the period of the 2009- crisis? What about forest governance overall?

{Possible follow ups: Why? How? How did you try to/ would you tackle it and what would you need to do it? }

3) Opportunities

What are the main opportunities for your organisation in the next 5-10 years?
{Possible follow ups: -collaborating with other bodies/sectors? Collaboration with other countries/EU? Is there a plan/target for it?}

4) Regime and Collaboration

Who are the main government/non-government actors in the regime you work with? Has this changed in the last 10 years? How? Why?
{Follow ups: Are there any structures / policies enabling good communication and cooperation? Any problems in the regime? Does it affect your body?}

5) Role of the public

What is the role of the public in the area of focus of your organisation/agency (case specific - e.g. forest fire protection/ reforestation/ biodiversity, etc.)?
{Follow ups: Channels of public participation? - De jure and de facto? -illegal activities? - complaints? }

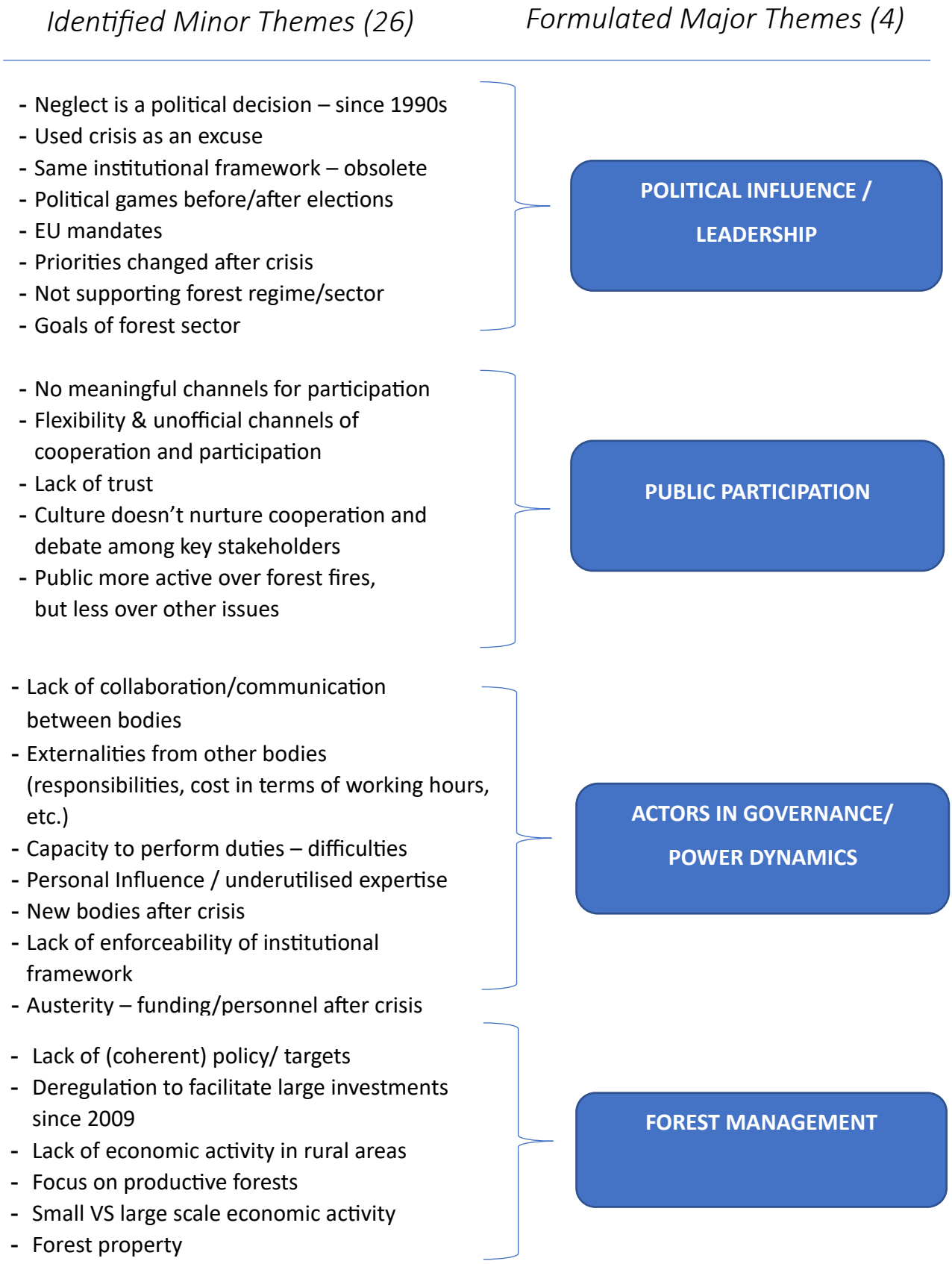
[4]

Open floor. Let the interviewee express anything they would like to, even if it was asked during the interview or not

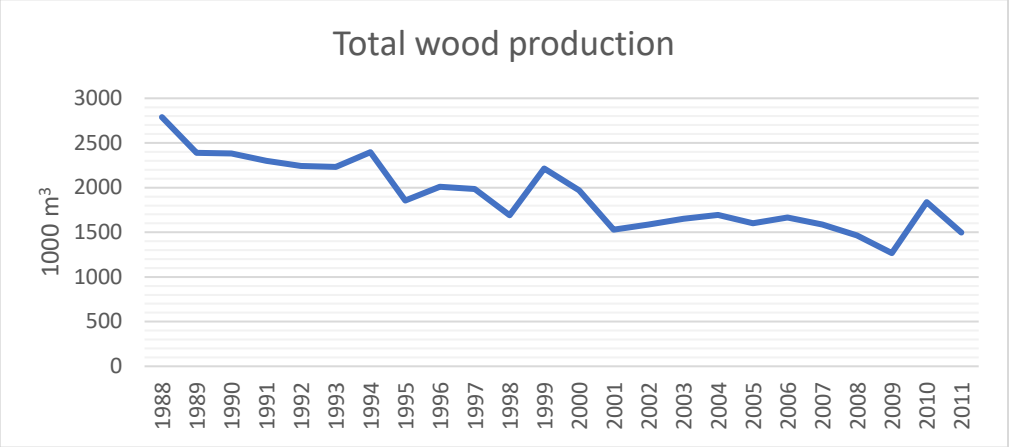
[5]

Thank the individual for their participation & describe what they should expect in the future (e.g. how to work with data, published articles, etc.).

Appendix 4.4 Formulation of major themes from minor themes

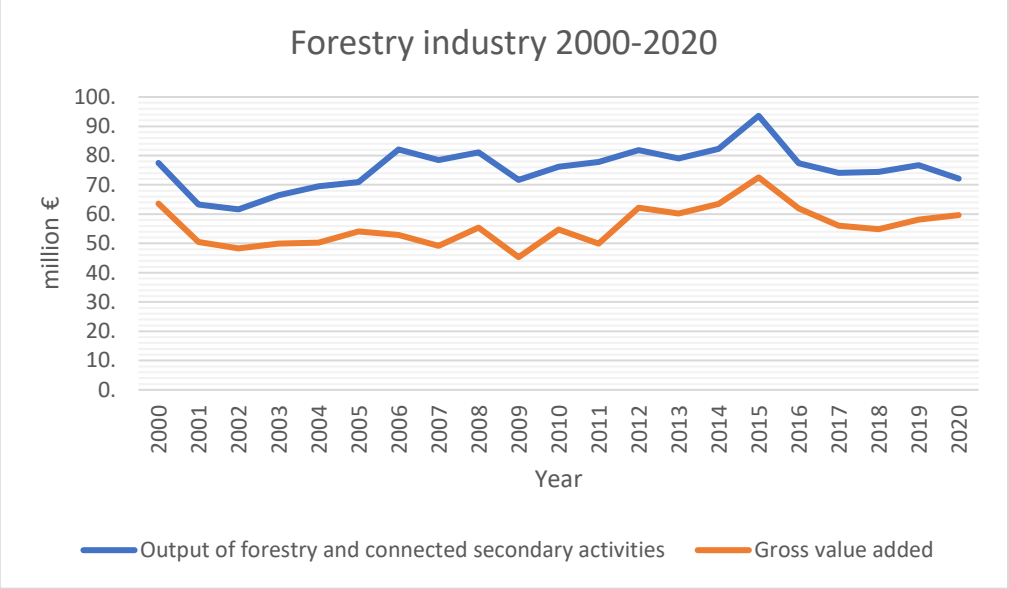


Appendix 4.5 Total Wood production in Greek forests 1988-2011



Data Source: (Ministry of Environment and Energy, 2014)

Appendix 4.6 GVA Forestry Industry Greece 2008-2019

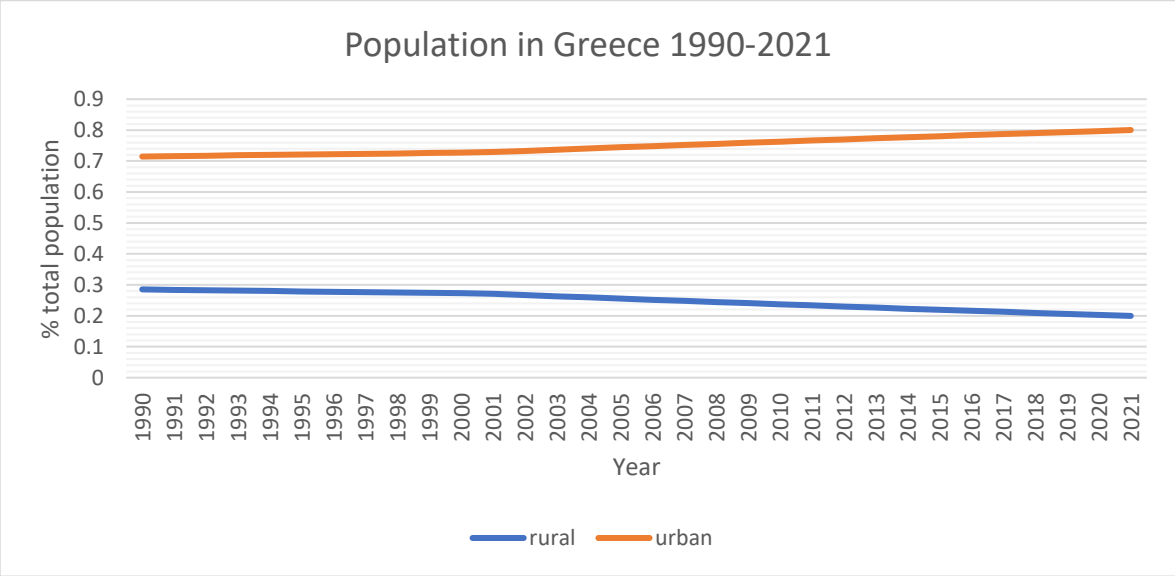


Source: (Eurostat, 2023)

In detail, the Greek forest industry has been at the bottom 5 among the EU countries, with an average of approx. €58 million in terms of Gross Value Added (GVA), and €78 million in terms of output of forestry and connected secondary activities for the period 2009-2020 (after the beginning of the economic crisis), (Eurostat, 2022). For comparison, the average GVA for the 31 countries with available data in eurostat's database has been approx. €851 million per year in terms of GVA and approx. €1740 million per year in terms of output of

forestry and connected secondary activities for the decade 2010-2020 (Eurostat, 2022).

Appendix 4.7 Urban and rural population in Greece 1990 - 2021



Source: total population, urban population, rural population by (World Bank, 2024)

In detail, while the total population in Greece is following a decreasing trend since 2010, rural population is also following a decreasing trend, both in absolute numbers and as a % of the total population; at the same time the urban population has remained approximately the same since 2010 in numbers, after decades of continuous increase, but still following an increasing trend, given the decline of the total population in the country. The urbanization has been so intense that almost 75% of the country's population living in urban centres in 2018, was concentrated mainly in the country's 2 metropolitan areas of Athens and Thessaloniki (Kotzamanis, 2019). Although there may be variations in medium- and low-density areas, especially if these areas are concentrating tourism activities, it is found that "recent spatial re-distribution of Greek population was driven by distinct socioeconomic factors" (Salvati, 2018)(p.105).

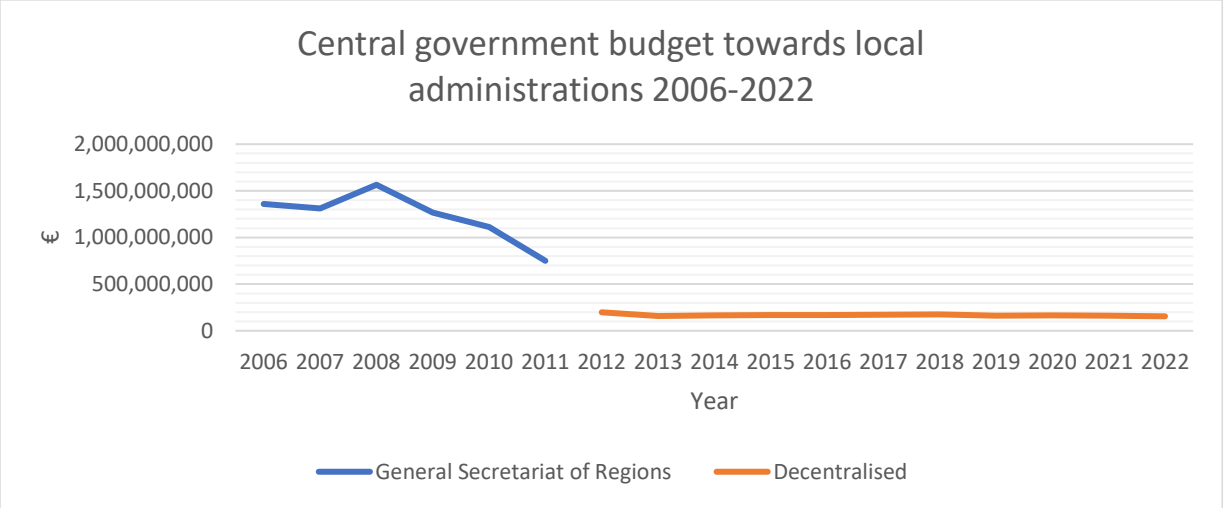
Appendix 4.8 Forest Services Funding towards "preventative measures for fire protection"

The table below presents the requested and approved funding towards the prevention of fire protection, which refers to various forest fire protection projects and works, such as road maintenance and upgrading, and equipment maintenance, etc..

	Requested funding (million €)	*Approved funding (million €)*
2015	-	1.550
2016	14.944	1.854
2017	14.778	1.617
2018	15.447	1.635
2019	16.313	1.600
2020	16.468	2.000
2021	17.696	1.700

Source: (Ministry of Environment and Energy, 2015, 2016, 2017, 2018a, 2019, 2020b, 2021a)

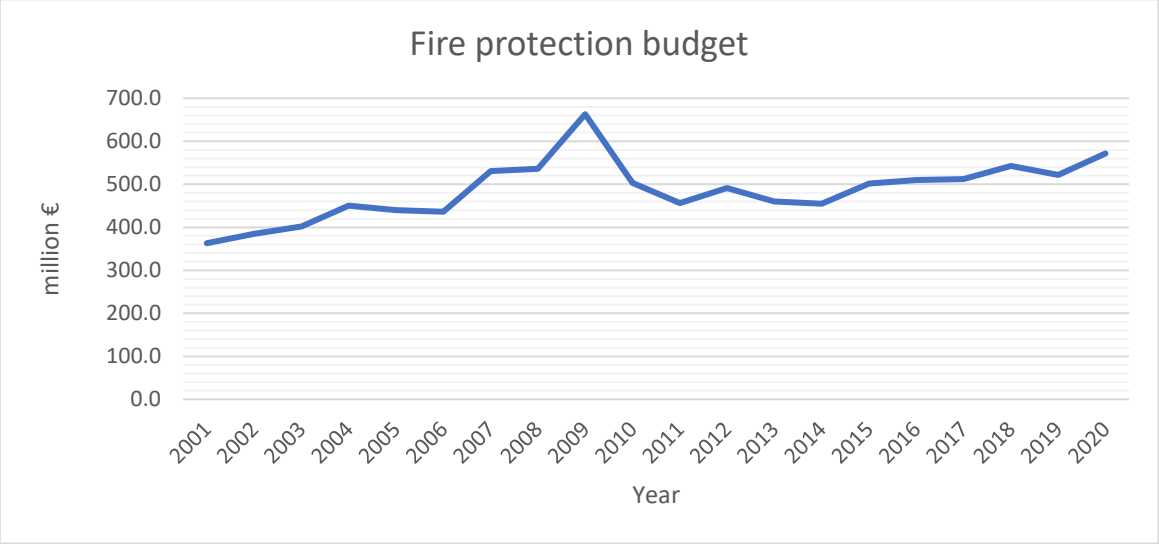
Appendix 4.9 Central government funding towards local administrations 2008- 2022



Source: (Ministry of Finance, 2023)

The figure above depicts the central government funding towards local (including both regional and municipal) authorities from 2006 to 2022. We see a drop in funding towards the General Secretariat of Regions from €1.565 million in 2008 to less than half €750 million in 2011 (Ministry of Finance, 2023). After the Kallikratis administration reforms in 2011, decentralised administrations, which took the place of the regions in the previous regime, started with funding of approx. €198 million continuously declining down to appox. € 154.9 million in 2022 (Ministry of Finance, 2023).

Appendix 4.10 Greek Fire Protection Budget 2001-2020



Source: (Eurostat, 2023) General government expenditure by function (COFOG): Fire-protection services

below depicts the budget trend towards Fire protection paid by the state between 2001 and 2020. This budget is not specific to forest fires but total fires in the country; data specific to the forests do not seem to exist. From this budget, the majority of the budget towards forest fire protection was spent on fire suppression, rather than fire prevention; especially for the period 2016-2020 83.95% of the total state budget spent on forest fire protection was spent on fire suppression and 16.05% only on fire prevention (WWF, 2022) – at the same time the UN suggests a distribution where the 45% of the total budget goes towards fire prevention, 35% fire suppression, and 20% on restoration (United Nations Environment Programme, 2022). Even though the data is not available in eurostat yet, the Greek state greatly increased its budget for fire protection both in 2021 and 2022, mainly due to the large forest fires that took place in 2021.

Appendix 4.11 HRADF

Part of the development and utilization of the state private property is the privatization of its assets (HRADF, 2011), and the main efforts of privatization of public property and assets have been channelled through HRADF since. The HRADF is considered a strategic partner for the Greek state, working together for outcome and utilization of the private assets of the state (attract investment, produce wealth, enhance economy's potential, strengthen the country's international credibility).

Further, since 2016 it consolidated together with the Hellenic Financial Stability Fund (HFSF), Hellenic Public Properties Co. (HPPC) and 5G Ventures Société Anonyme (5G Ventures SA) into the The Hellenic Corporation of Assets and Participations S.A. (HCAP) (Law 4389/16), whose members have full legal immunity for civil or criminal liability for their decisions (Law 4411/2016, article 20 which modifies Law 4389/16) (HRADF, 2011).

Appendix 4.12 Fund absorption from local and regional bodies

For example, even though €49.8 million have been approved through the National Strategic Reference Framework 2014-2020 (NSRF – Regional Operational Programmes 2014-2020), by April 2022 only €26.5 million were absorbed (absorption rate 53.29%) (WWF, 2022). At the same time only 51.5% of the available resources (€817.5 million) from the thematic objective 5 of the Common Strategic Framework about climate change and risk were contracted and are in the process of being implemented by April 2022 (WWF, 2022).

Appendix 4.13 Direct quotes from interview participants regarding National Forest Strategy

"[…] the national [forest] strategy falters in implementation. In order to proceed with the implementation, you must have political will, money, and the necessary personnel"
(Interview Participant 2)

"The first step to implement a policy is to give the money.
You tell him "do these tasks",
-"How do I do them?""
(interview participant 6)

"How will the issue be implemented in Greece? And in order to implement something, resources are unfortunately needed. Both in human resources and money"
(Interview Participant 3)

The role of the public (Q5)

Interview Participant 1	- Many citizens feel disappointed. - The public may feel powerless. - Distrustful towards official bodies - The public could and should be more active
Interview Participant 2	- Public is less active than before – Decreasing participation - Other issues are more important to the public, e.g. low wages, unemployment, economy - The public considers the economic crisis to be more important than the environmental one
Interview Participant 3	- Increasing participation in actions organised by municipalities, including volunteers (e.g. planting trees, or removing trash from forest areas) - The new generation is more active, more hopeful - They should demand more. - The public should have a more active role on their own. - Personal view: Would prefer a bottom-up approach
Interview Participants 4,5	- Lack of environmental awareness and forest protection from the general public. - The majority may show they care (act, write, etc.) when forest fires are a current issue. - Volunteers have been very helpful

Appendix 4.15 The Greek forest governance in 2022: Biggest Issues and the way forward – Interview Participants answers

	Biggest issues	Way forward
Interview Participant 1	- Lack of data & Forest property - Neglect from central government - Neglected economic activity - Weak Forest services (funds and personnel) - Weak collaborations & communication among actors and public	- Small- & medium- scale economic activity: forestry, livestock, tourism (+ externalities) - Active FM - More permanent personnel - Forest cadastre
Interview Participant 2	- Lack of long-term planning - Economic activity - Capacity for policy enforcement & forest property - Weak Forest services (funds and personnel)	- Economic activity / forestry, agriculture, beekeeping, tourism, - Evaluate ecosystem services
Interview Participant 3	- Forest property - Capacity for policy enforcement - Lack of funds - Lack of personnel - No economic activity	- Bottom-up approach. - continuity in actions (different governments) - Clearly defined responsibilities and improved collaboration channels - Change in the mentality of the public
Interview Participant 4 & 5	- Public's stance/ lack of understanding/ awareness and participation - Forest property - No economic activity - Weak Forest Services (funds and personnel)	- Support forest services - Economic activity in forests - Education -LT - Move away from No-touch ecology
Interview Participant 6	- Lack of data - Forest property - Lack of personnel	- Verticalization of forest services (It took place in 2022)

Appendix Chapter 5

Appendix 5.1 Example of choice card

The following choice card is an example of a choice card, which was presented to the respondents.

	Επιλογη 1	**Επιλογή 2**	**Καμία απο τις 2**
Αριθμός φυτευθέντων δέντρων	Αύξηση 20% (170.000 φυτευθέντα δέντρα / έτος)	Αύξηση 80% (255.000 φυτευθέντα δέντρα/ έτος)	Καμία αλλαγή (142.000 φυτευθέντα δέντρα/ έτος)
Πυρκαγιές δασών	Βελτίωση 20% (15.500 στρέμματα / έτος ανά μέσο όρο)	Βελτίωση 20% (15.500 στρέμματα / έτος ανά μέσο όρο)	Καμία αλλαγή (19.500 στρέμματα / έτος)
Υποδομές για αναψυχή	✓ Κάδοι και καθαριότητα ✓ Συντήρηση δρόμων, μονοπατιών και ενημερωτικές πινακίδες ✓ Παγκάκια, χώροι πικ-νικ ✓ Χώρος στάθμευσης οχημάτων και μικρό αναψυκτήριο	✓ Κάδοι και καθαριότητα ✓ Συντήρηση δρόμων, μονοπατιών και ενημερωτικές πινακίδες ✓ Παγκάκια, χώροι πικ-νικ ✓ Χώρος στάθμευσης οχημάτων και μικρό αναψυκτήριο	(Καμία βελτίωση συντήρησης ή επιπλέον υποδομή για αναψυχή)
Περίοδος δεύσμευσης	8 χρόνια	4 χρόνια	(καμια δέσμευσή)
Κόστος	€7/μήνα ανά άτομο (€84/έτος - Σύνολικό κόστος €672)	€10/μήνα ανά άτομο (€120/έτος - Σύνολικό κόστος €480)	(κανένα επιπλέον κόστος)

Appendix 5.2 All choice sets

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	4.0	20.0	10.0	3.0	12.0
option3	15.0	60.0	21.0	2.0	12.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	4.0	20.0	21.0	3.0	12.0
option3	10.0	60.0	21.0	1.0	4.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	10.0	60.0	31.0	2.0	12.0
option3	4.0	20.0	10.0	3.0	4.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	7.0	80.0	10.0	2.0	12.0
option3	7.0	60.0	31.0	2.0	4.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	4.0	80.0	10.0	3.0	12.0
option3	7.0	80.0	31.0	1.0	4.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	4.0	20.0	31.0	1.0	8.0
option3	7.0	60.0	10.0	3.0	12.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	4.0	60.0	31.0	1.0	12.0
option3	4.0	80.0	10.0	3.0	8.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	10.0	60.0	31.0	1.0	12.0
option3	10.0	80.0	10.0	2.0	4.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	7.0	80.0	10.0	1.0	4.0
option3	4.0	20.0	21.0	3.0	8.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	10.0	80.0	21.0	1.0	8.0
option3	4.0	20.0	31.0	3.0	12.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	10.0	80.0	10.0	1.0	12.0
option3	15.0	60.0	31.0	3.0	8.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	4.0	40.0	10.0	3.0	12.0
option3	10.0	60.0	21.0	2.0	8.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	7.0	20.0	31.0	1.0	4.0
option3	15.0	80.0	31.0	2.0	4.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	10.0	80.0	21.0	3.0	4.0
option3	7.0	20.0	21.0	1.0	8.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	10.0	80.0	10.0	2.0	12.0
option3	10.0	60.0	31.0	3.0	4.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	7.0	40.0	31.0	3.0	4.0
option3	10.0	80.0	10.0	1.0	12.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	15.0	60.0	31.0	3.0	12.0
option3	10.0	80.0	21.0	3.0	4.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	7.0	20.0	31.0	1.0	8.0
option3	10.0	80.0	21.0	1.0	4.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	7.0	20.0	31.0	3.0	4.0
option3	7.0	40.0	10.0	1.0	12.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	7.0	40.0	21.0	3.0	4.0
option3	4.0	20.0	31.0	3.0	12.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
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option2	0.0	0.0	0.0	0.0	0.0
option3	10.0	80.0	31.0	1.0	4.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	10.0	40.0	31.0	2.0	12.0
option3	10.0	80.0	10.0	2.0	12.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	4.0	40.0	21.0	3.0	4.0
option3	7.0	60.0	21.0	1.0	12.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	10.0	80.0	10.0	2.0	4.0
option3	7.0	20.0	31.0	1.0	12.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	10.0	80.0	10.0	3.0	4.0
option3	7.0	40.0	31.0	3.0	12.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	4.0	20.0	31.0	1.0	8.0
option3	10.0	80.0	10.0	2.0	4.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	7.0	80.0	31.0	1.0	4.0
option3	7.0	80.0	10.0	3.0	12.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	4.0	40.0	21.0	1.0	12.0
option3	7.0	80.0	10.0	2.0	4.0

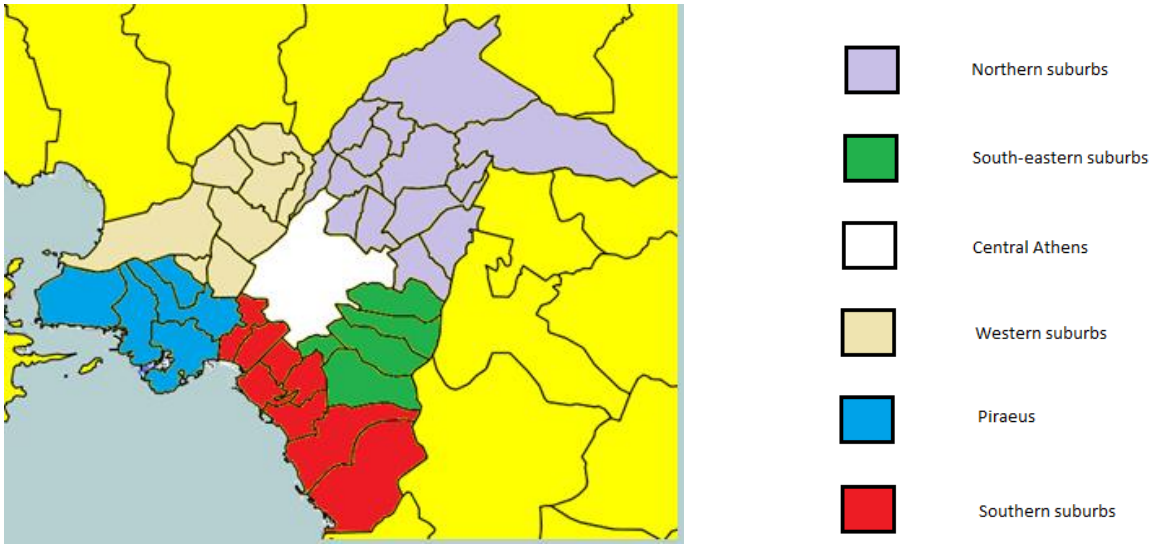
	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	7.0	80.0	10.0	3.0	8.0
option3	7.0	40.0	31.0	1.0	4.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	10.0	60.0	31.0	1.0	12.0
option3	10.0	60.0	31.0	1.0	4.0

	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	10.0	80.0	31.0	1.0	12.0
option3	7.0	60.0	10.0	1.0	12.0

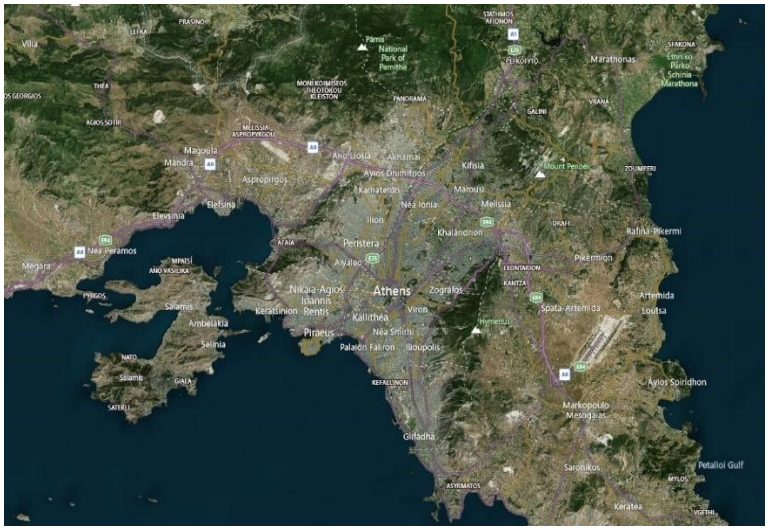
	Payment	Trees planted	Fires	Infrastructure	Time Commitment
option1	0.0	0.0	0.0	0.0	0.0
option2	7.0	60.0	31.0	1.0	4.0
option3	7.0	80.0	10.0	1.0	12.0

Appendix 5.3 Municipality limits and suburbs in AMA



Source of picture: (Geodata.gov.gr, 2020). Colour modification and memo on the right created by me.

Appendix 5.4 Aerial map of AMA area



Source of picture: www.bing.com/maps/

Gender	**Male** G| 48.6% A| 47.8%	**Female** G| 51.4% A| 52.2%		
Gender *(2021 census)*	Male G| 48.**9**% A| 4**8**.**2**%	Female G| 51.**1**% A| 5**1**.**8**%		
Suburb	**Total Attica** 3,828,434	**Athens Central Regional Unit** A|1,029,520 – 27.5%	**Northern Sector Regional Unit – Athens** A|592,490 – 15.8%	**Western Sector Regional Unit – Athens** A| 489,675 -13%
	Southern Sector Regional Unit – Athens A| 529,826-14.1%	**Regional Unit Eastern Attica** A|502,348 – 13.4%	**Regional Unit Western Attica** A|160,927-4.2%	**Regional Unit Piraeus** A| 448,997 – 12%
Suburb *(2021 census)*	**Total Attica** 3,814,064	**Athens Central Regional Unit** A|1,002,212 – 26.3%	**Northern Sector Regional Unit – Athens** A|601,163 – 15.7%	**Western Sector Regional Unit – Athens** A| 478,883 - 12.5%
	Southern Sector Regional Unit – Athens A| 529,455-13.8%	**Regional Unit Eastern Attica** A|518,755 – 13.6%	**Regional Unit Western Attica** A|165,540 - 4.3%	**Regional Unit Piraeus** A| 448,051 – 11.7%
Age	**16-24** G|1,040,616 – 9.9% A|361,030 – 9.7%	**25-44** G|2,675,890 – 25.3% A|1,000,085 – 26.7%	**45-64** G|3,002,752 – 28.4% A|1,079,102 – 28.9%	**65+** G|2,359,718 – 22.3% A| 779,514- 20.8%
Age *(2021 census)*		**20-39** G|2,309,697– 22% A|878,461 – 23%	**40-59** G|3,139,368– 29.9% A|1,190,080– 31.2%	**60+** G|3,086,715– 29.4% A| 1,058,275- 27.7%
Education	**Middle school** G|1,870,320 – 17.7% A|436,405 – 11.7%	**High school** G|2,952,900 – 28% A|1,0620222- 28.4%	**Professional Training** G|695,000-6.6% A|337,100- 9%	**University** G|1,874,000- 17.7% A|800,300- 21.4%
	Postgraduate university G|334,200-3.1% A|228,000 – 6.1%			
Income	**€0-€499** G|410,265 – 20%	**€500-€999** G|898,820-43.9%	**€1000-€1499** G|417,035-20.3%	**€1500-€1999** G|156,645 – 7.6%

	€2000- 3000 G|109,487-5.3%	**€3000+** G|58,773-2.8%		
Profession People over 15	**Private** G|2,421,396-65% A|970,901-67%	**Public** G|743,765-20% A|282,995 – 19.5%	**Freelancer** G|1,118,000 – 12.3%	**Uni Student** G|914,5421 – 10% A|366,474 -11.4%
	Pensioneer / Rentier G|2,043,800-22.5% A|672,500-20.1%	**Unemployed** G|754,982-16.3% A|240,400-14%		

Notes:

G| stands for data for all Greece. A| stands for data for Attica/AMA.

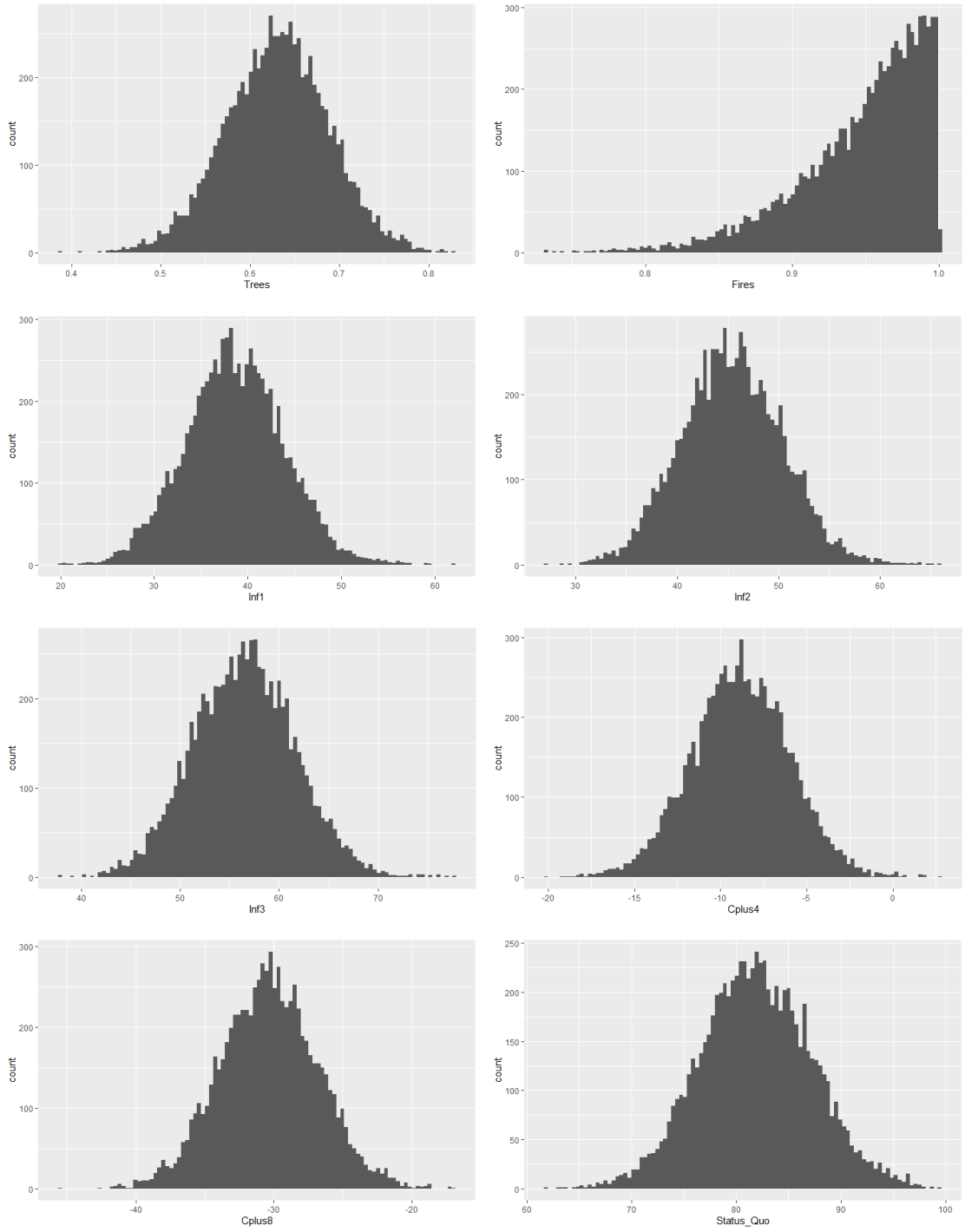
Only data for Gender, Age, and Suburb were available in the 2021 census (Hellenic Statistical Authority, 2023).

The income index refers to private sector (not all sectors) labour wages for 2020 (Ergani, 2021); No other source of information was found regarding all sectors; The mean gross earnings for 2018 in Greece was € 1446/month (Eurostat, 2023).

The suburb index and the number of private and public sector employees refer to 2011 (Hellenic Statistical Authority, 2011)

All other values refer to 2020 (Hellenic Statistical Authority, 2022)

Appendix 5.6 Model 1 Population-wide Estimates

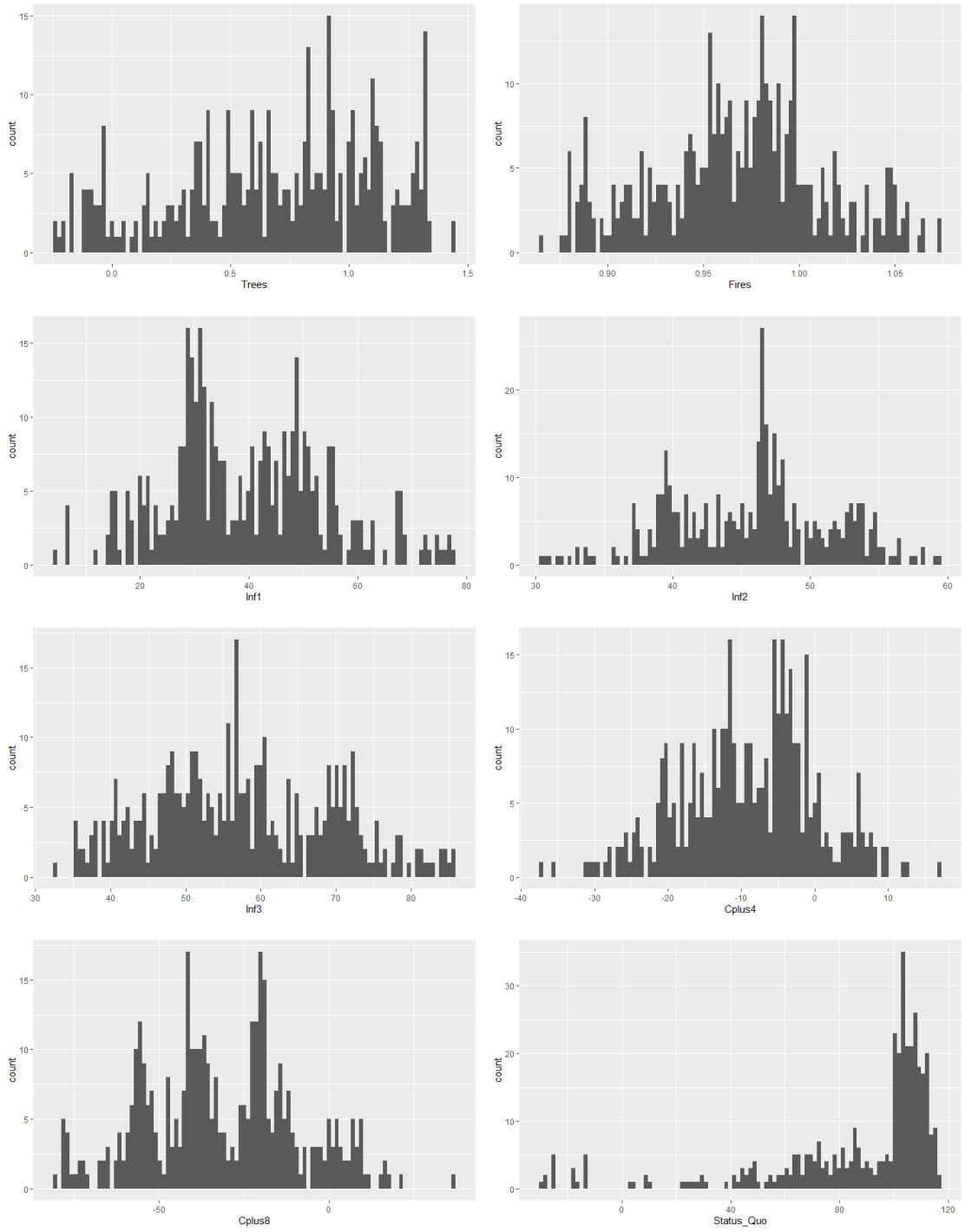


Notes:

Pr>0 =1 for 'Trees', 'Fires', 'Inf1', 'Inf2', 'Inf3'. The whole distribution for these population-wide estimates is positive.

Pr>0 = 0 for 'Cplus8' and 'SQ'; The whole distribution for these 2 attributes is negative. Pr>0 =0.00021 for 'Cplus4'

Appendix 5.7 Model 1 Individual Estimates

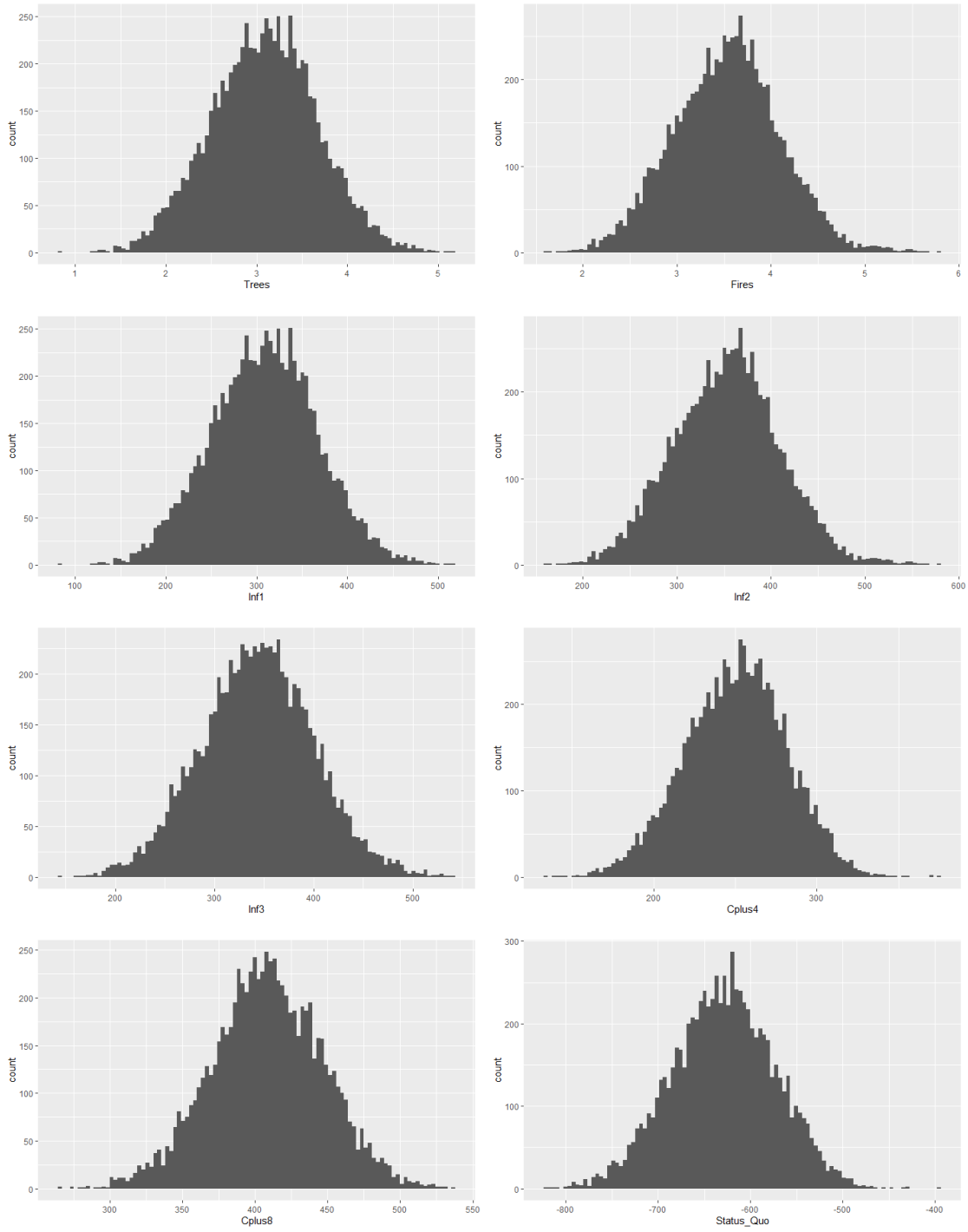


Notes:

Pr>0 =1 for 'Fires', 'Inf1', 'Inf2', 'Inf3'. The whole distribution for these attributes is positive, and all attributes offer positive utility to all respondents. Pr>0 = 0.899 for 'Trees'.

'Fires' have the lowest sem=0.0022 and sd=0.0442 among attributes, i.e. the least dispersed individuals across the population. SQ has the highest sem=1.6435 and sd=32.3306 among the attributes, i.e. the individual are quire dispersed across the population.

Appendix 5.8 Model 2 Population-wide Estimates

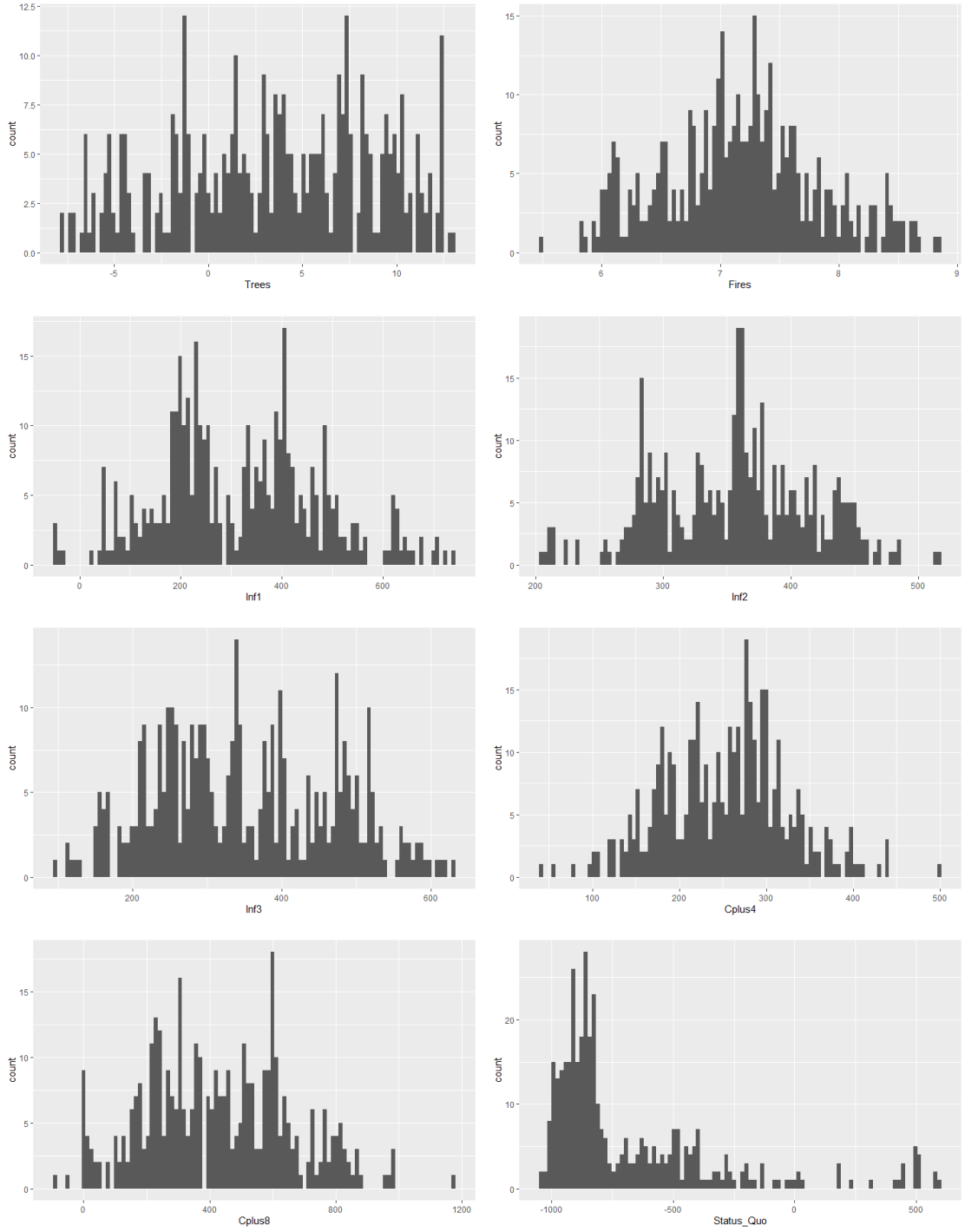


Notes:

Pr>0 =1 for 'Trees', 'Fires', 'Inf1', 'Inf2', 'Inf3', 'Cplus4', and 'Cplus8'. The whole distribution for these population-wide estimates is positive (to the right of zero).

Pr>0 = 0 only for 'SQ. The whole distribution is on the left of zero, showing no positive utility for the population.

Appendix 5.9 Model 2 Individual Estimates

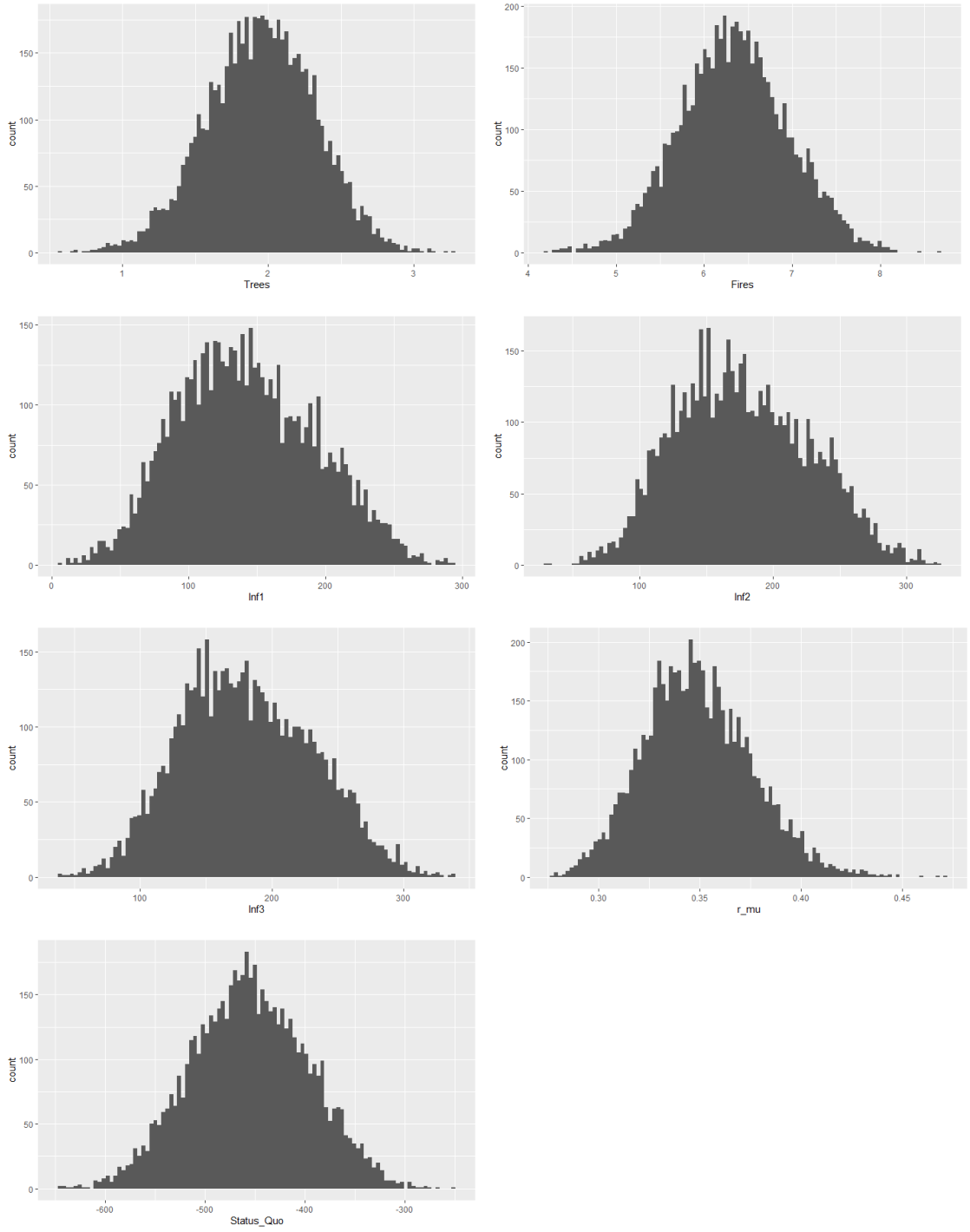


Notes:

Pr>0 =1 for 'Fires' 'Inf2', 'Inf3', 'Cplus4'. The whole distribution for these attributes is positive, and all attributes offer positive utility to all respondents. Pr>0=0.987 for 'Inf1' and Pr>0=0.9819 for 'Cplus8'.

'Fires' have the lowest sem=0.0333 and sd=0.6548 among attributes, i.e. the least dispersed individuals across the population. SQ has the highest sem=18.334 and sd=360.6714 among the attributes, i.e. the individual are quite dispersed across the population.

Appendix 5.10 Model 3 Population-wide Estimates

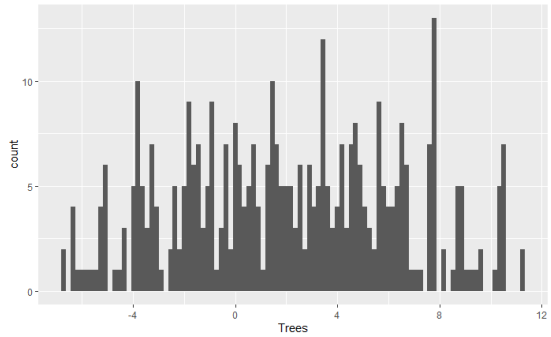


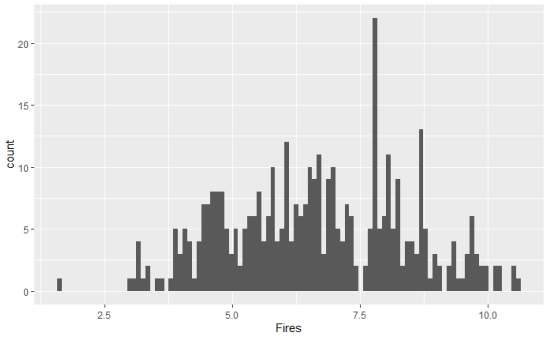
Notes:

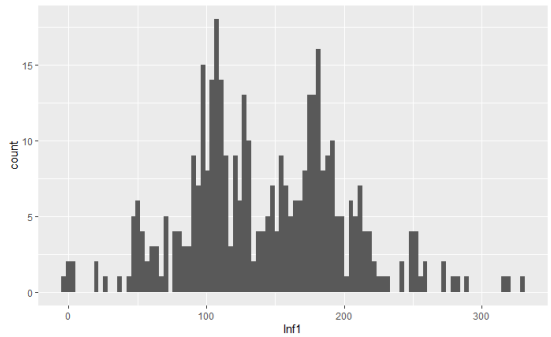
Pr>0 =1 for all attributes, except for 'SQ'. The whole distribution for these population-wide estimates is positive, and all attributes offer positive utility. Pr>0=1 for 'r_mu' as by definition 0<r<1.

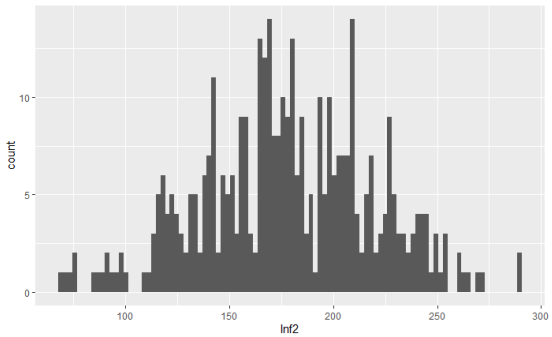
Pr>0 = 0 only for 'SQ', meaning no positive utility for the respondents. The whole distribution is on the left of zero.

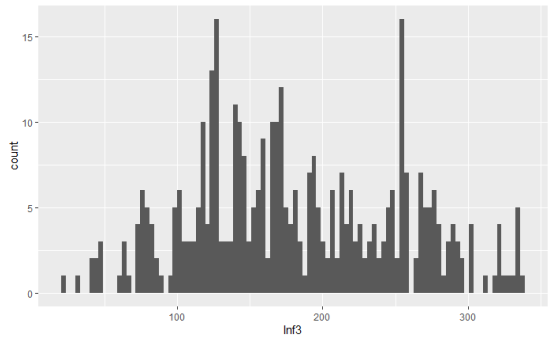
Appendix 5.11 Model 3 Individual Estimates

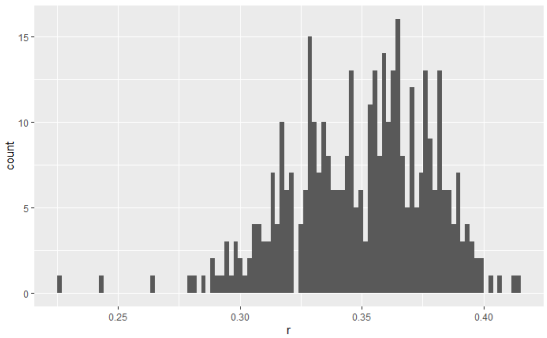


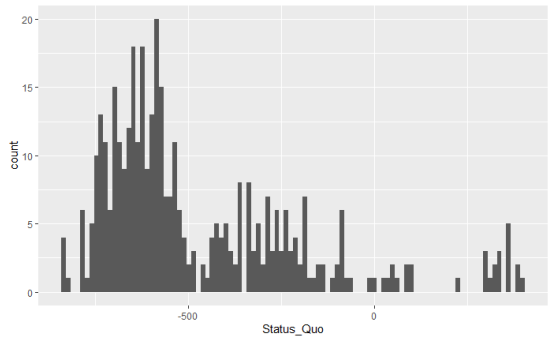








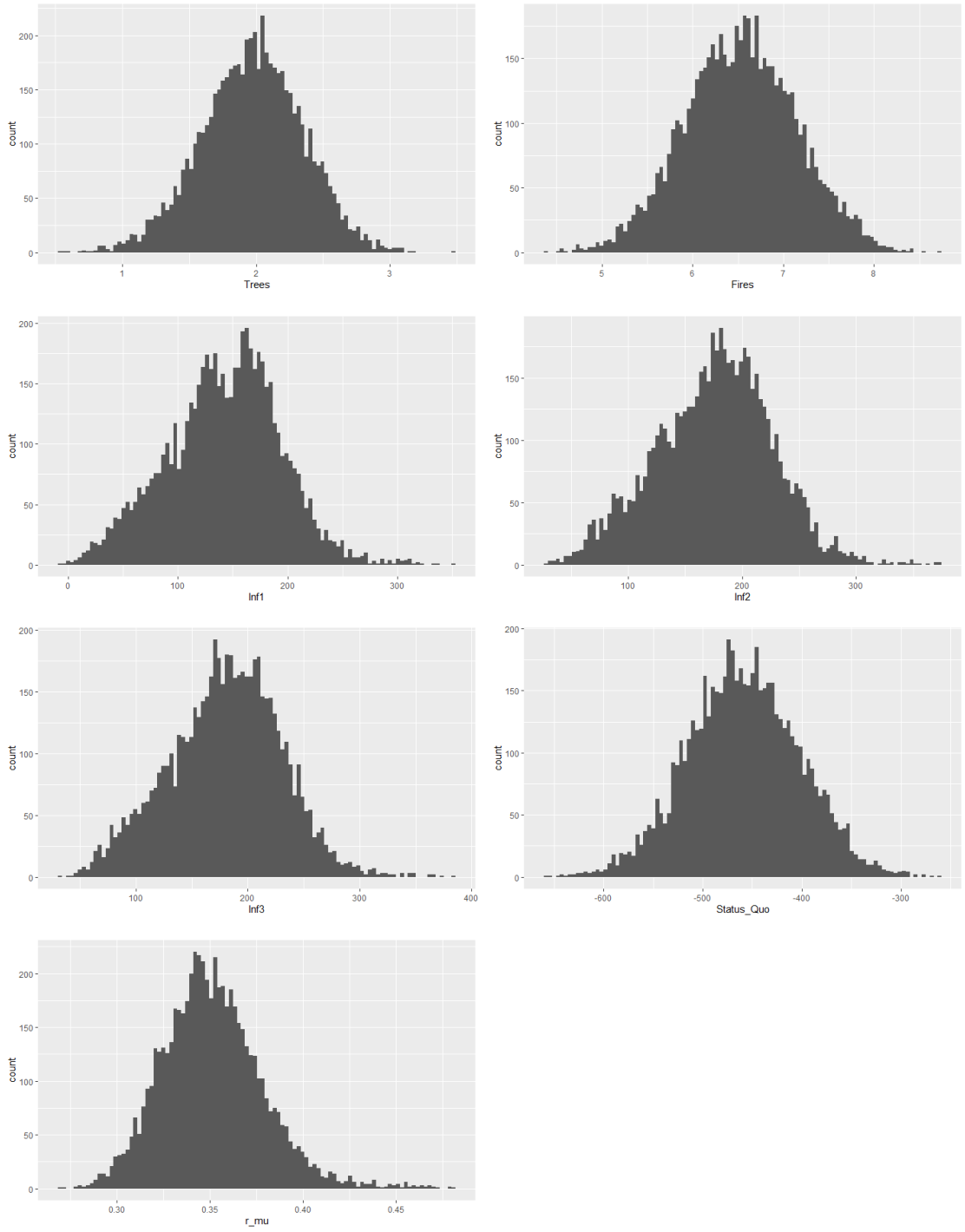




Notes:

Pr>0 =1 for ‘Fires’, ‘Inf2’, ‘Inf3’. The whole distribution for these estimates is positive, and they offer positive utility to all respondents. Pr>0=1 for the discount rate ‘r’, as by definition 0<r<1. Pr>0=0.99 for ‘Inf1’. ‘Trees’ is quite disperse from the mean, with mean=2.1, sd=4.3132, and Pr>0=0.664. Among all attributes, ‘Fires’ has the lowest sem=0.0877 and sd=1.7262.

Appendix 5.12 Model 3.1 Population-wide Estimates

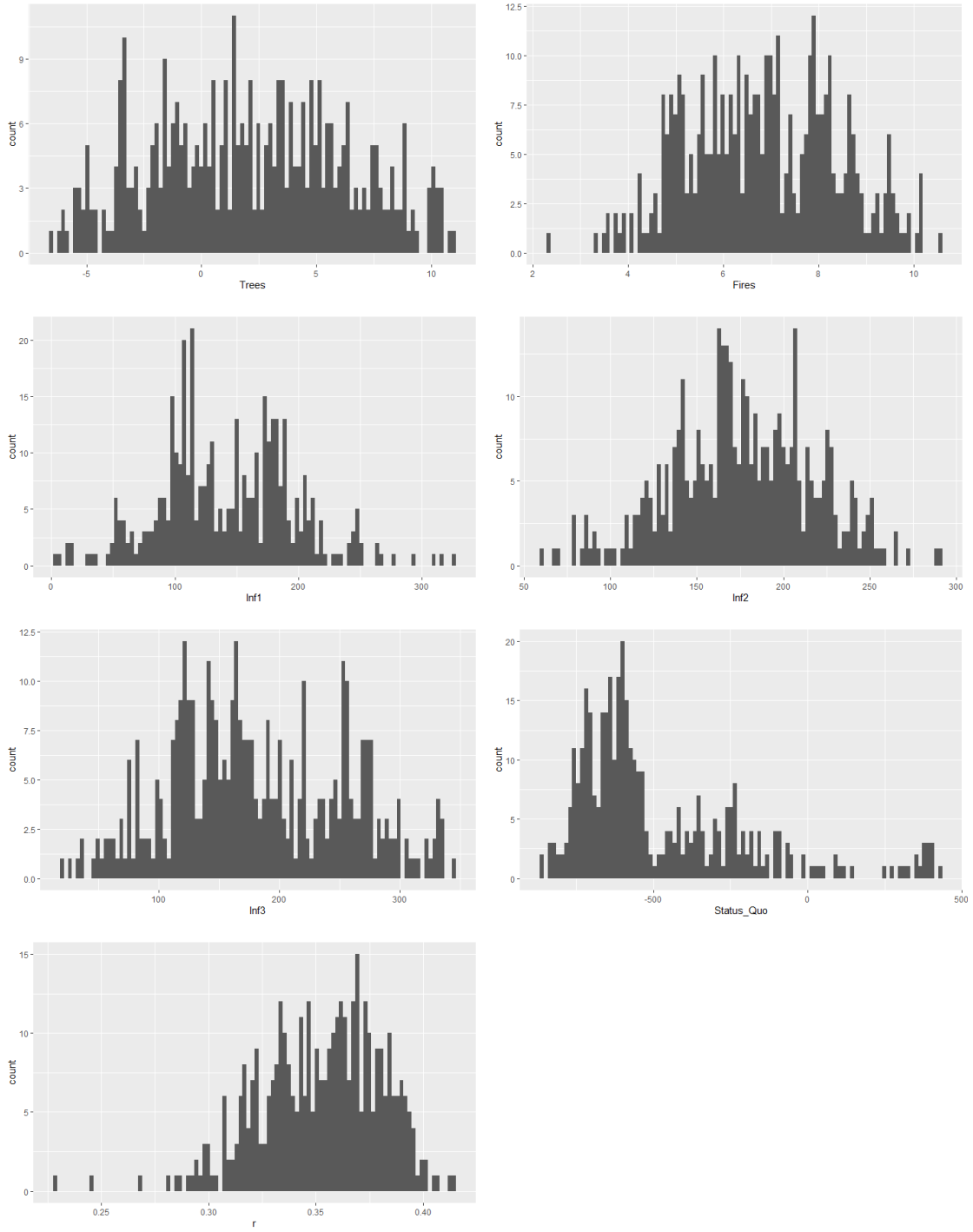


Notes:

Pr>0 =1 for 'Trees', 'Fires', 'Inf2', 'Inf3'. The whole distribution for these population-wide estimates is positive, i.e., they offer positive utility. Pr>0=1 for 'r_mu' as by definition 0<r<1. Pr>0=0.999 for 'Inf1'.

Pr>0 = 0 only for 'SQ'The whole distribution is on the left of zero, hinting no positive utility for the respondents.

Appendix 5.13 Model 3.1 Individual estimates

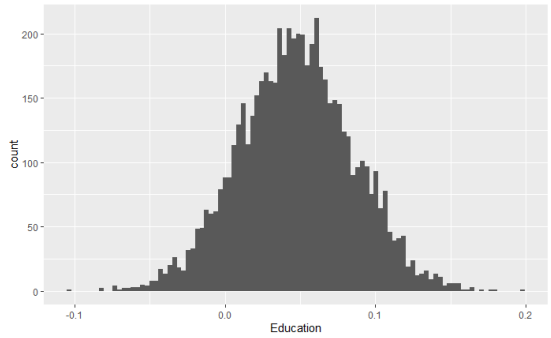


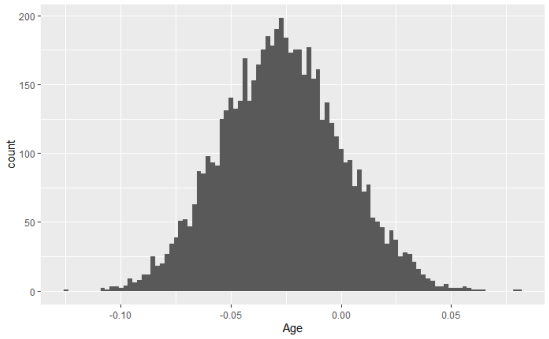
Notes:

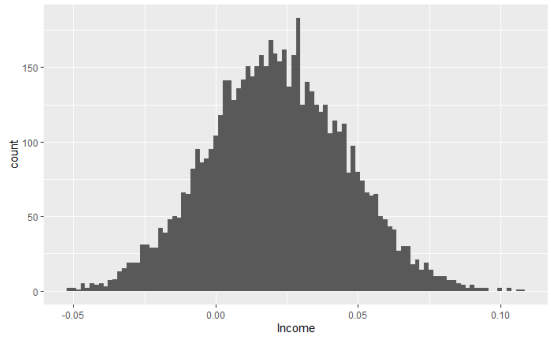
Pr>0 =1 for 'Fires', 'Inf1', 'Inf2', 'Inf3'. The whole distribution for these estimates is positive, and they offer positive utility to all respondents. Pr>0=1 for the discount rate 'r', as by definition 0<r<1.
Among all attributes, 'Fires' has the lowest sem=0.0782 and sd=1.539.

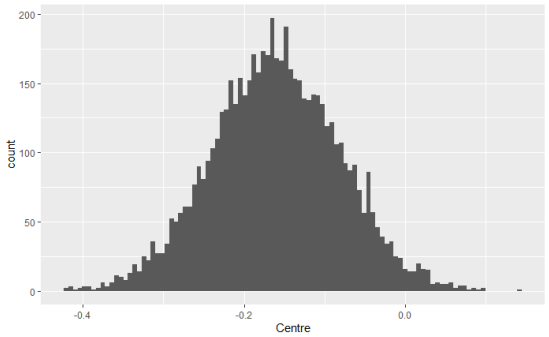
Appendix 5.14 Covariates

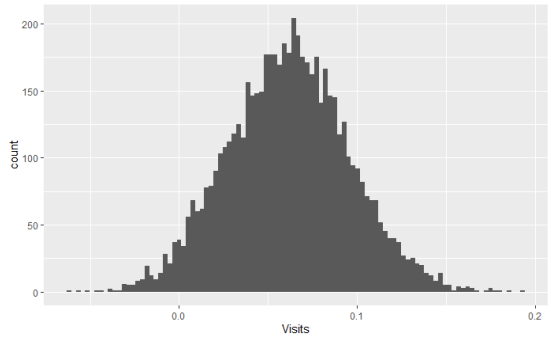
Plots for the covariates in model 3.1. Also described in Table 5.7 The effects of population characteristics – Covariates. Analysis in text,p.245-6.







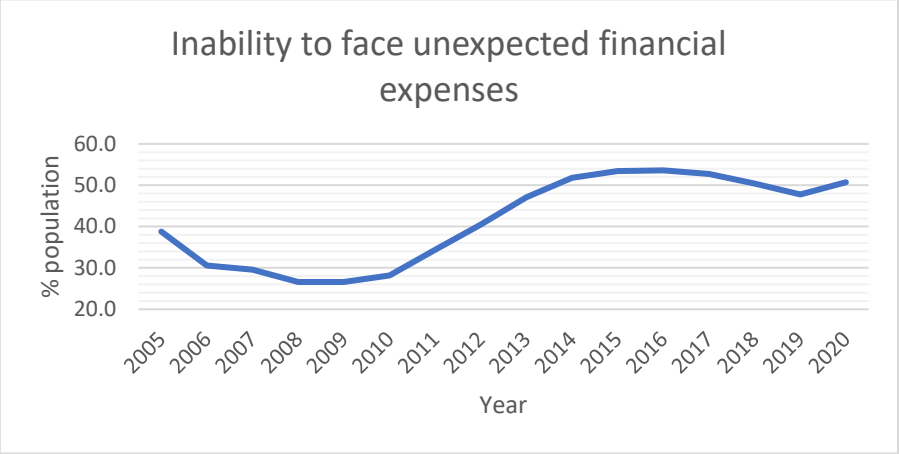




Notes:

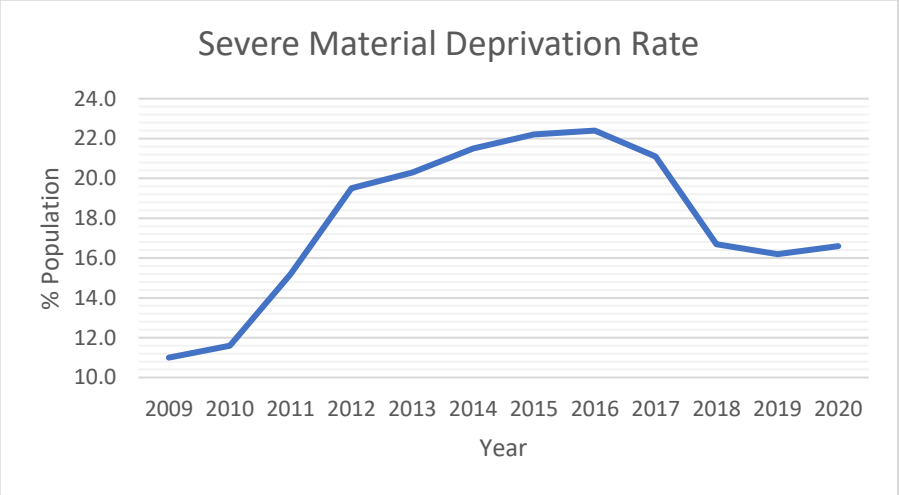
Among all attributes, ‘Income’ has the lowest sem=0.0003 and sd=0.0241, and ‘Centre’ the highest sem=0.001 and sd=0.0793.

Appendix 5.15 Inability to face unexpected financial difficulties



Source: (Eurostat, 2023) - Inability to face unexpected financial expenses - EU-SILC survey

Appendix 5.16 Severe Material Deprivation Rate 2009-2020

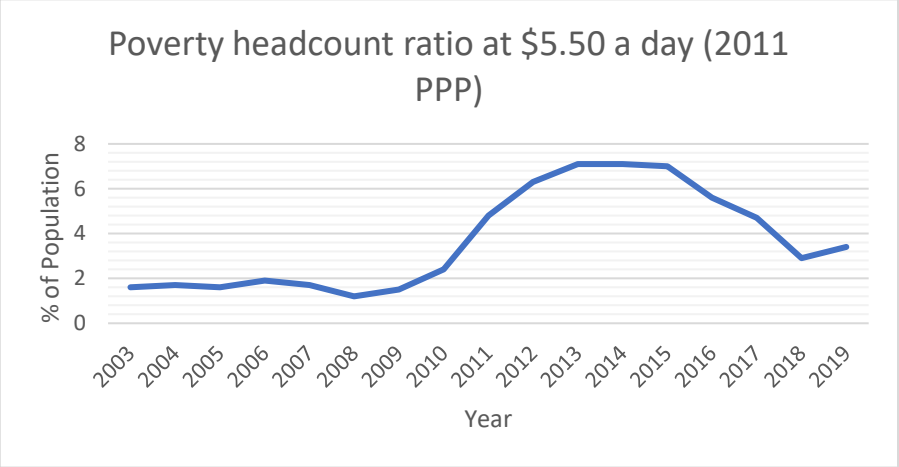


Source: (Eurostat, 2023) - Severe material deprivation rate

Appendix 5.17 Household spending 2005-2020

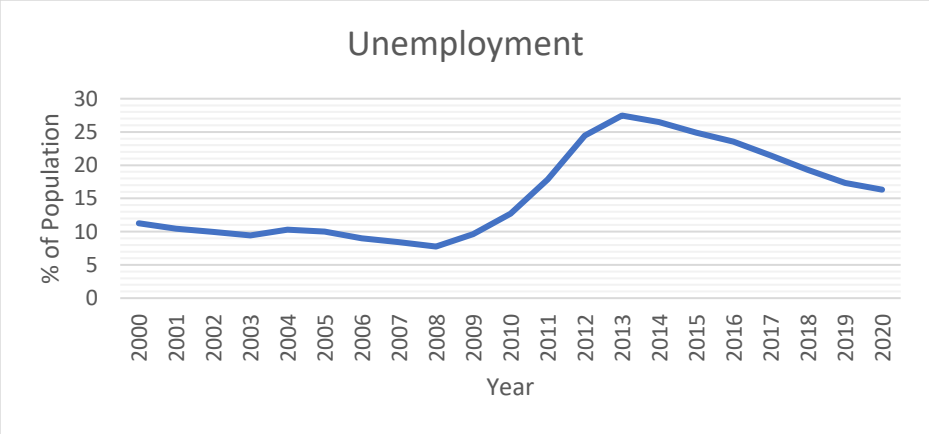
Source: (OECD, 2022) - Household spending

Appendix 5.18 Poverty headcount ration at $5.5/day 2003-2019



Source: (World Bank, 2024)

Appendix 5.19 Unemployment 2000-2020



Source: (World Bank, 2024) - ILO estimate

Appendix 5.20 Models 1 & 2 STAN code

```
//The price coefficient is negative price/100,
//Therefore coefficient of 1.8 corresponds to a 180 euro payment per year for a 1 unit change
in the attribute.
//Therefore as the data is scaled this would a 100% improvement in trees and fires.
//The restriction on the dummy is that the increase to that level is worth 180 Euro per year

data {
int<lower=0> N;      //total number of people
int<lower=0> T;      // total number of observations
int<lower=0> M;      //number of choice sets
int<lower=0> K;      //number of attributes
int<lower=0> ids[T]; //group id
int y[T];
row_vector[K] x[M,T];
real alpha_mean;           //Priors for the mean log of the price coefficient
real<lower=0> alpha_sigma; //Priors for the standard devation of the log of price coefficient
real beta_mean[K-2];      //Priors for the mean of beta
real<lower=0> beta_sigma[K-2]; //Priors for standard deviation of beta
real theta_mean;           //Priors for the mean of the last coefficient
real<lower=0> theta_sigma; //Piors for the standard deviation of the last coefficient
real<lower=0> a[K-2];     //Gamma Priors for the beta coefficients, 1st param
real<lower=0> b[K-2];     //Gamma Priors for the beta coefficients, 2nd param
real<lower=0> a_alpha;    //Gamma Priors for the price coefficient, 1st param
real<lower=0> b_alpha;    //Gamma Priors for the price coefficient, 2nd param
real<lower=0> a_theta;    //Gamma Priors for the ASC, last variable in data set, 1st param
real<lower=0> b_theta;    //Gamma Priors for the ASC, last variable in data set, 2nd param}}
parameters {vector<lower=-1.8,upper=1.8>[K-2] beta[N];           // N K-vectors
vector<lower=-1,upper=1>[K-2] beta_mu;               // means for beta
vector<lower=0.5>[K-2] beta_ivar;                    // var parameters for beta
real<lower=-2,upper=3> alpha[N];
real<lower=-1,upper=2> alpha_mu;
real<lower=0.5>alpha_ivar;
real<lower=-1.8,upper=1.8> theta[N];
real<lower=-1,upper=1> theta_mu;
real<lower=0.1>theta_ivar;  }
transformed parameters {   vector[M] mu[T];
    vector[K] coef[N];
    real beta_std[K-2];
    real alpha_std;
    real theta_std;
    alpha_std=1/sqrt(alpha_ivar);
    theta_std=1/sqrt(theta_ivar);
    for(k in 1:K-2) {beta_std[k]=1/sqrt(beta_ivar[k]);}
    for(n in 1:N)
       {
        coef[n,1]=exp(alpha[n]);
        coef[n,2:K-1]=exp(alpha[n])*beta[n];
        coef[n,K]=exp(alpha[n])*theta[n];
        }
    for(t in 1:T)
    { for(m in 1:M) {mu[t,m]=x[m,t]*coef[ids[t]];}}}
model { alpha_mu ~   normal(alpha_mean,alpha_sigma);
alpha_ivar ~ gamma(a_alpha,b_alpha);
theta_mu ~   normal(theta_mean,theta_sigma);
theta_ivar ~ gamma(a_theta,b_theta);
for(k in 1:K-2){
    beta_mu[k] ~ normal(beta_mean[k],beta_sigma[k]);
    beta_ivar[k] ~ gamma(a[k],b[k]);}
for(n in 1:N)
{  alpha[n]  ~ normal(alpha_mu, alpha_std);
   theta[n]  ~ normal(theta_mu, theta_std);
   for(k in 1:K-2) {beta[n,k] ~ normal(beta_mu[k], beta_std[k]);} }
   for(t in 1:T) {
        y[t] ~ categorical_logit(mu[t]);}}
generated quantities { vector[T] log_lik;
for (t in 1:T){log_lik[t]=log_softmax(mu[t])[y[t]];}}}
```

Appendix 5.21 Model 3 STAN code

```
functions {real discf(real r,int n) //the discounting function
        { real z; {z=(1+r-(1/(1+r))^(n-1))/r;} return z;}}
data {int<lower=0> N;      //total number of people
int<lower=0> T;      // total number of observations
int<lower=0> M;      //number of choice sets
int<lower=0> K;      //number of attributes  But NOT including the price
int<lower=0> ids[T]; //group id
int y[T];
row_vector[K] x[M,T];
int d[M,T];            //The time period
real p[M,T];           //The price coefficient
real alpha_mean;           //Priors for the mean log of the price coefficient
real<lower=0> alpha_sigma; //Priors for the standard devation of the log of price coefficient
real beta_mean[K-1];      //Priors for the mean of beta
real<lower=0> beta_sigma[K-1]; //Priors for standard deviation of beta
real theta_mean;           //Priors for the mean of the last coefficient
real<lower=0> theta_sigma; //Piors for the standard deviation of the last coefficient
real<lower=0> a[K-1];     //Gamma Priors for the beta coefficients, 1st param
real<lower=0> b[K-1];     //Gamma Priors for the beta coefficients, 2nd param
real<lower=0> a_alpha;    //Gamma Priors for the price coefficient, 1st param
real<lower=0> b_alpha;    //Gamma Priors for the price coefficient, 2nd param
real<lower=0> a_theta;    //Gamma Priors for the ASC, last variable in data set, 1st param
real<lower=0> b_theta;    //Gamma Priors for the ASC, last variable in data set, 2nd param}
parameters {
real<lower=.02,upper=0.9> r_mu;  //The discount factor
real<lower=.01,upper=1>  r[N];     //The discount factor
vector<lower=-1.8,upper=1.8>[K-1] beta[N];           // N K-vectors
vector<lower=-1,upper=1>[K-1] beta_mu;               // means for beta
vector<lower=0.5>[K-1] beta_ivar;                    // var parameters for beta
real<lower=-2,upper=3> alpha[N];
real<lower=-1,upper=2> alpha_mu;
real<lower=0.5>alpha_ivar;
real<lower=-1.8,upper=1.8> theta[N];
real<lower=-1,upper=1> theta_mu;
real<lower=0.1>theta_ivar;  }
transformed parameters {
    vector[M] mu[T];
    vector[K+1] coef[N];
    real beta_std[K-1];
    real alpha_std;
    real theta_std;
    real disc[M,T];
    alpha std=1/sqrt(alpha ivar);
    theta_std=1/sqrt(theta_ivar);
    for(t in 1:T){for (m in 1:M){disc[m,t]=discf(r[ids[t]],d[m,t]);}}
    for(k in 1:K-1) {beta_std[k]=1/sqrt(beta_ivar[k]);}
    for(n in 1:N) {
        coef[n,1]=exp(alpha[n]);
        coef[n,2:K]=exp(alpha[n])*beta[n];
        coef[n,K+1]=exp(alpha[n])*theta[n];}
    for(t in 1:T){
        for(m in 1:M) {
            mu[t,m]= p[m,t]*coef[ids[t],1]*disc[m,t] + x[m,t]*coef[ids[t],2:K+1];}} }
model {alpha_mu ~   normal(alpha_mean,alpha_sigma);
alpha ivar ~ gamma(a alpha,b alpha);
theta_mu ~   normal(theta_mean,theta_sigma);
theta_ivar ~ gamma(a_theta,b_theta);
r_mu ~ normal(0,.1);
for(k in 1:K-1)
{ beta_mu[k] ~ normal(beta_mean[k],beta_sigma[k]); beta_ivar[k] ~ gamma(a[k],b[k]);}
for(n in 1:N) {alpha[n]  ~ normal(alpha_mu, alpha_std);
   theta[n]  ~ normal(theta_mu, theta_std);
   r[n]      ~ normal(r_mu,0.1);
   for(k in 1:K-1) {beta[n,k] ~ normal(beta_mu[k], beta_std[k]);} }
    for(t in 1:T) {
        y[t] ~ categorical_logit(mu[t]);}}

generated quantities { vector[T] log_lik;
for (t in 1:T){log_lik[t]=log_softmax(mu[t])[y[t]];}}
```

Appendix 5.22 Model 3.1 STAN code

```
functions {real discf(real r,int n) //the discounting function
        { real z; {z=(1+r-(1/(1+r))^(n-1))/r;} return z;}}
data {int<lower=0> N;      //total number of people
int<lower=0> T;      // total number of observations
int<lower=0> M;      //number of choice sets
int<lower=0> K;      //number of attributes  But NOT including the price
int<lower=0> Q;      //The number of categorical attributes
int<lower=0> ids[T]; //group id
int y[T];
row_vector[K] x[M,T];
int d[M,T];            //The time period
real p[M,T];           //The price coefficient
matrix[N,Q] Z;         //The categorical variables
real alpha_mean;           //Priors for the mean log of the price coefficient
real<lower=0> alpha_sigma; //Priors for the standard devation of the log of price coefficient
real beta_mean[K-1];      //Priors for the mean of beta
real<lower=0> beta_sigma[K-1]; //Priors for standard deviation of beta
real theta_mean;           //Priors for the mean of the last coefficient
real<lower=0> theta_sigma; //Piors for the standard deviation of the last coefficient
real<lower=0> a[K-1];     //Gamma Priors for the beta coefficients, 1st param
real<lower=0> b[K-1];     //Gamma Priors for the beta coefficients, 2nd param
real<lower=0> a_alpha;    //Gamma Priors for the price coefficient, 1st param
real<lower=0> b_alpha;    //Gamma Priors for the price coefficient, 2nd param
real<lower=0> a_theta;    //Gamma Priors for the ASC, last variable in data set, 1st param
real<lower=0> b theta;    //Gamma Priors for the ASC, last variable in data set, 2nd param}
parameters {
real<lower=.02,upper=0.9> r_mu;  //The discount factor
real<lower=.01,upper=1>  r[N];     //The discount factor
vector<lower=-1.8,upper=1.8>[K-1] beta[N];           // N K-vectors
vector<lower=-1,upper=1.8>[K-1] beta_mu;              // means for beta
vector<lower=0.5>[K-1] beta ivar;                    // var parameters for beta
real<lower=-2,upper=3> alpha[N];
real<lower=-1,upper=2> alpha_mu;
real<lower=0.5>alpha_ivar;
real<lower=-1.8,upper=1.8> theta[N];
real<lower=-1,upper=1> theta mu;
real<lower=0.1>theta_ivar;
vector[Q] gama;}
transformed parameters
{   vector[N] w;
    vector[M] mu[T];
    vector[K+1] coef[N];
    real beta_std[K-1];
    real alpha_std;
    real theta_std;
    real disc[M,T];
    alpha_std=1/sqrt(alpha_ivar);
    theta_std=1/sqrt(theta_ivar);
    for(t in 1:T) {for (m in 1:M){disc[m,t]=discf(r[ids[t]],d[m,t]);}}
    for(k in 1:K-1) {beta_std[k]=1/sqrt(beta_ivar[k]);}
    w=exp(Z*gama);
    for(n in 1:N){
        coef[n,1]=exp(alpha[n]);
        coef[n,2:K]=exp(alpha[n])*beta[n]*w[n];
        coef[n,K+1]=exp(alpha[n])*theta[n]*w[n];}
    for(t in 1:T) {
       for(m in 1:M){mu[t,m]= p[m,t]*coef[ids[t],1]*disc[m,t] + x[m,t]*coef[ids[t],2:K+1];}} }
model { alpha_mu ~   normal(alpha_mean,alpha_sigma);
alpha_ivar ~ gamma(a_alpha,b_alpha);
theta_mu ~   normal(theta_mean,theta_sigma);
theta_ivar ~ gamma(a_theta,b_theta);
r_mu ~ normal(0,.1);
gama~normal(0,1);
for(k in 1:K-1){
    beta_mu[k] ~ normal(beta_mean[k],beta_sigma[k]);
    beta_ivar[k] ~ gamma(a[k],b[k]);}
for(n in 1:N) {  alpha[n]  ~ normal(alpha_mu, alpha_std);
   theta[n]  ~ normal(theta_mu, theta_std);
   r[n]      ~ normal(r_mu,0.1);
for(k in 1:K-1) {beta[n,k] ~ normal(beta_mu[k], beta_std[k]);} }
  for(t in 1:T) { y[t] ~ categorical_logit(mu[t]);}}
generated quantities { vector[T] log_lik;
for (t in 1:T){log_lik[t]=log_softmax(mu[t])[y[t]];}}
```