Burning Issue: The Future of Civil Protection in the European level

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Abstract

This research examines the relationship between increased fire risk due to climate change and a state's engagement in the Union Civil Protection Mechanism's (UCPM) fire suppression efforts. Using the UCPM as a case study, it leverages quantitative data on fire risks and UCPM contributions and qualitative policy document analysis to understand this relationship. The study finds a positive link between heightened fire risk and amplified contributions to the UCPM. The outcomes emphasize the role of risk perception in global disaster cooperation and underline the need for efficacious risk communication in shared frameworks such as the UCPM. The study also advocates for exploring other variables like economic capability, geographic proximity and institutional factors. These findings have both theoretical and practical implications, enhancing comprehension of global cooperation dynamics and informing UCPM policy interventions.

Introduction

The unprecedented wildfires that consumed more than 8,600 km² across Europe in 2022, an area roughly one fifth of the total land area of the Netherlands, underscore the urgent necessity for efficacious forest fire prevention and management strategies (Joint Research

Centre (European Commission) et al., 2022). Annually, the European Environment Agency (EEA) highlights the escalating severity of wildfire damages, which imperil human lives, the environment and most importantly climate change mitigation efforts (European Environment Agency, 2021). Confronted with the challenge of increasingly frequent wildfires attributable to climate change (Moreira et al., 2020), European governments and communities are striving to develop and implement effective strategies to address this issue.

Established to coordinate responses to disasters, including forest fires, throughout Europe, the Union Civil Protection Mechanism (UCPM) has been complemented by the creation of a European reserve of additional capacity dubbed the "rescEU reserve" (*RescEU*, n.d.). Yet, the issue of free-riding behaviour complicates this collaborative approach to disaster response.

The concept of free-riding behaviour emerges when individuals or countries, driven by rational self-interest, benefit from a public good or service without making proportionate contributions. This behaviour has significant implications in the context of public goods produced by collective action, such as, fire suppression.

Free-riding behaviour within the European Union (EU) could see some member states, particularly those less exposed to fire risks, contributing less to shared firefighting resources. These countries might prioritize their own domestic issues, assuming that others, particularly high-risk countries, will take on a larger share of fire suppression responsibilities.

However, this assumption may lead to an unequal distribution of responsibilities, potentially overburdening high-risk countries and stretching their resources thin. Furthermore, it may compromise the collective firefighting capacity of the EU, particularly the effectiveness of mechanisms like the UCPM and rescEU.

Such free-riding behaviour, besides resulting in preventable destruction and loss of lives in high fire risk countries in the Mediterranean could also intensify climate change impacts

caused by wildfires in the future. If countries do not contribute proportionately, the collective ability to respond quickly and effectively to wildfires might be compromised, leading to a more severe future of wildfire damage.

In this context, it becomes essential to ask: "How do fire risk levels influence EU member states' cooperation in the provision of fire suppression?"

Answering this research question, this project scrutinizes the influence of fire risk levels on the contributions and collaboration of EU member states in providing fire suppression within the purview of the UCPM and rescEU. The objectives of this research are multifold. Firstly, it aims to deepen the understanding of how escalating fire risk impacts the provision of fire suppression within the context of UCPM and rescEU. Secondly, it will employ hypothesis testing informed by the Global Public Goods theory (Kaul et al., 2003). This study also intends to enrich societal discourse by providing insights into the effectiveness of UCPM and rescEU in mitigating the impact of wildfires on climate change and aims to guide policymakers and stakeholders in developing more robust strategies for forest fire prevention and control.

Employing a qualitative methodological approach, this study utilizes process tracing and within-case analysis, concentrating on the events in 2017 that culminated in rescEU's establishment in 2019 and analyzes significant empirical data pertaining to the cooperation of member states within the UCPM framework.

Literature Review

This review, will explore how fire risk levels influence EU member states' cooperation in fire suppression and the broader landscape of international disaster cooperation, highlighting its increasing significance due to the intensifying global natural disasters.

International disaster cooperation is increasingly significant due to the escalating number and intensity of global natural disasters (Bendell, 2022; Birkmann & Welle, 2016)). Yet, how this broad framework applies to specific scenarios, such as the interaction of risk perception and cooperation in EU fire suppression efforts, remains an open question. Research indicates that successful international disaster cooperation hinges on factors such as trust, effective communication and capacity-building (Ansell et al., 2010; Boin & Rhinard, 2008). Furthermore, scholars underscore the need for strong governance structures and coordination mechanisms to enhance disaster response efforts (Comfort et al., 2004).

The EU is very active in international disaster cooperation efforts (Boin et al., 2014). Within the EU, the level of cross-border cooperation differs significantly across regions due to a variety of factors that enable effective collaboration (Sousa, 2013). It involves collective action by member states to achieve common goals. According to Hix and Hoyland (2022), EU cooperation can be perceived as a complex web of relationships, collaborations and alliances. These are created to tackle the multifaceted challenges encountered by the EU as transboundary crises (Boin et al., 2014).

Wildfire management and fire suppression efforts have become increasingly important due to the rising threat of wildfires caused by climate change (Jolly et al., 2015). The EU has recognized the need for a coordinated response to this growing risk and has established the UCPM and later the rescEU initiative to address the challenges of wildfire management across member states (European Commission, 2019).

The bedrock of EU cooperation lies in the interdependence of its member states. It stems from the realization that certain issues are more effectively addressed collectively than individually (Tallberg, 2002). EU cooperation manifests in various policy sectors like economic integration, security and environmental policy, extending beyond disaster management (Noferini et al., 2020; Renard & Biscop, 2010; Smith, 2004)

One of the most significant outcomes of EU cooperation is economic integration. It led to the creation of the single market, the Eurozone and fostered economic stability across the region (Baldwin & Wyplosz, 2012; Chang, 2010). The single market eradicated trade barriers among member states, propelling trade and economic growth (In 'T Veld, 2019; Pelkmans, 2006). Moreover, the establishment of the Eurozone unified national currencies into a single currency, boosting economic interdependence among member states (Grauwe, 2018).

Moving into the realm of peace and security, EU cooperation's achievements are evident. Since its establishment, the EU has been instrumental in maintaining European peace. It received the Nobel Peace Prize in 2012 in recognition of its efforts. The organization's endeavors in conflict resolution and promotion of democratic values have made a significant impact (Ludlow, 2017; Skara, 2014; Stoicheva, 2019; Telò, 2005).

EU cooperation has also made strides in environmental policy and disaster management. Collaborative efforts have been made to tackle climate change, reduce carbon emissions and manage natural disasters (Guterres, 2022; Quevauviller, 2022; Zhou, 2022). Forest fires, in particular, have emerged as a pressing concern, given their contribution to carbon emissions and potential for environmental damage (Bowman et al., 2013). Despite the significant challenges, strategies have been developed focusing on prevention, detection and suppression measures (Cumming, 2005; San-Miguel-Ayanz et al., 2013).

In the context of disasters, the UCPM stands as an exemplary cooperative framework. Established by the EU in 2001, the UCPM aids manber states during disasters, including forest fires. The UCPM promotes cross-border cooperation and enhances response capacities through resource sharing, coordination and training (Ansell et al., 2010; Boin et al., 2014). While it has proved successful in areas like information exchange, joint training exercises and resource-sharing, the mechanism encounters challenges such as bureaucratic complexity and free-rider problems (Sandler, 2015; Widmalm et al., 2019)

This review of the relevant literature has identified that the deficits in the cooperative framework of the UCPM became glaringly apparent during the tragic events of 2017. A series of devastating fires swept through Portugal, resulting in the loss of 66 lives (Bugge, 2017). The UCPM's response to this crisis fell short of expectations as numerous member states were concurrently facing similar disasters, thus stretching its resources and capacity thin (Parker et al., 2018). This incident exposed a significant lapse in the EU's adherence to the Treaty on the Functioning of the EU's solidarity clause (Art. 222), which obligates the EU and its member states to assist members in need. Such a failure to uphold this vital clause risks undermining the trust among member states, a key component of their mutual relationships.

The effectiveness of cooperative frameworks such as the UCPM is driven by a myriad of factors. Prior research has sought to unravel the determinants of successful cooperation in disaster management, often focusing on factors such as communication, trust and capacity-building(Ansell et al., 2010; Boin et al., 2014). Despite this understanding, knowledge around how these dynamics interplay with the perception of fire risk within EU member states during instances of forest fire suppression remains incomplete.

Fire suppression is a complex process influenced by various factors, including risk perception. Although it is known that fire risk levels can significantly influence disaster response strategies, there remains an incomplete understanding of this relationship: how these risk levels directly correlate with the degree of cooperation in fire suppression among EU member states. A key element in understanding the previous is the concept of fire risk, which typically refers to the probability of fires occurring and their potential severity (Laneve et al., 2020; Pagnon Eriksson et al., 2023). Various factors contribute to shaping fire risk levels, including weather conditions, vegetation and topography (Cruz et al., 2003; Moritz et al., 2012). Regular assessments of fire risk are vital to reduce the negative impacts of fire (Chuvieco et al., 2010). Fire risk assessment plays a critical role in shaping preventative measures in fire management. High-risk areas may be targeted for interventions such as fuel reduction, firebreak establishment and fire safety education (Calkin et al., 2014; Sakellariou et al., 2019). Thus, understanding fire risk enables proactive fire management, aiming to reduce both the likelihood and severity of fires.

Despite the breadth of existing literature on disaster cooperation and fire suppression strategies, less attention has been given to the specific role that fire risk levels play in influencing cooperation among EU member states in fire suppression. This calls for a deeper theoretical understanding of the mechanisms that link fire risk perception and cooperation. Moreover, how fire risk assessments guide strategic planning and implementation of fire management practices and how these strategies are integrated into cooperative frameworks, also warrants further exploration.

In the forthcoming theoretical framework section, existing theories and models related to disaster cooperation, risk perception and fire suppression will be reviewed and synthesized. This theoretical basis will then serve to guide the investigation into the role of fire risk levels

in shaping EU member states' cooperative behaviors in fire suppression and to develop hypotheses for the study.

Theoretical Framework

Climate change, by amplifying the frequency and severity of wildfires (Jolly et al., 2015), serves as a central element in dictating the urgency for wildfire management and fire suppression efforts. This fundamental influence of climate change not only escalates fire risk but also calls for a collective and harmonized response. The EU, cognizant of the wildfire threat intensified by climate change, has implemented mechanisms such as the UCPM and the rescEU initiative to counter these challenges (European Commission, 2019). Climate change impact diverges across member states, thereby leading to variations in fire risk levels and influencing their contributions to fire suppression efforts within the UCPM and the rescEU initiative. The Global Public Goods(GPGs) framework, within this context, lends valuable insights into the dynamics of EU member states' cooperation in responding to climate change-induced wildfire risks. This framework elucidates the challenges inherent in providing global public goods under the umbrella of climate change, such as the potential for free-riding behaviour and highlights the mechanisms that can spur greater cooperation among member states with varied fire risks and incentives.

To address the previous research problem, I deploy a theoretical framework encompassing the GPGs approach, aggregation mechanisms for public goods and the Collective Action Theory.

The GPGs approach asserts that certain goods and services, including fire suppression, bear global implications and necessitate international cooperation for effective provision (Kaul et al., 1999). Fire suppression is viewed as a global public good due to the potential global consequences of wildfires for public health but most important, climate change. Forest fires contribute to climate change by releasing large amounts of carbon dioxide(CO2) into the atmosphere and by destroying trees that would otherwise absorb CO2, leading to a net increase in atmospheric CO2 levels (Bowman et al., 2013; Flannigan et al., 2012).

Moving deeper into the subject matter, it is crucial to understand the concept of 'fire risk'. Fire risk is conceptualized as a multifaceted factor encompassing various aspects like the probability of a fire occurrence, potential severity of the fire and the vulnerability of the affected area. Aspects such as climate, vegetation, human activity and land-use patterns feed into fire risk, contributing to the likelihood of fire ignition, its potential to spread and inflict damage (Adger, 2006; Blenkinsop & Fowler, 2007; Chuvieco et al., 2010; Hernandez-Leal et al., 2006; San-Miguel-Ayanz et al., 2013).

Cooperation, on the other hand, is construed as the actions and contributions of EU member states towards fire suppression within the UCPM. This collaboration encompasses financial support, provision of equipment, sharing of information and deployment of personnel for firefighting and disaster response efforts (Börzel & Risse, 2005; Honarmand & Rhinard, 2020).

With these definitions, the study seeks to comprehend the relationship between fire risk and cooperation, particularly how an increase in the experience of fire risk might influence the contributions of EU member states towards fire suppression. Existing literature suggests that states respond differently to shared challenges based on elements like their level of risk exposure (Du et al., 2012), economic strength (Wei et al., 2014) and political priorities (Fink

& Redaelli, 2011). Hence, it is plausible to presume that fire risk levels may impact the contributions of EU member states towards fire suppression efforts within the UCPM and the rescEU initiative.

The GPG framework, in conjunction with these considerations, allows us to delve deeper into the dynamics at play within EU member states' cooperation. This understanding thereby allows us to identify the obstacles associated with providing global public goods, such as the likelihood of free-riding behavior. Simultaneously, this approach offers insights into potential mechanisms that can stimulate increased cooperation among member states. This amalgamation of perspectives offers a nuanced understanding of how the experience of increased fire risk among EU member states influences their contributions to fire suppression.

To probe further into the challenges and dynamics of providing fire suppression as a public good, I draw on the work of Rhinard et al. (2013), who identify four types of aggregation mechanisms for public goods, each with its own set of cooperation hurdles. These mechanisms are briefly defined as follows.

Summation goods are the most prone to free-riding, as their provision depends on the sum of all participants' contributions. Single best-shot goods are less likely to experience free-riding because the good's quality is determined by the best individual contribution. Threshold goods have a moderate likelihood of free-riding, as the benefits are experienced once a cumulative quantity surpasses a certain level, making it safer for partners to contribute. Finally, weakest link goods are the least likely to face free-riding, as the good relies on the least adequate contribution, with all partners being negatively affected by non-cooperation.

Rhinard et al.(2013) describe fire suppression as a threshold public good at the state level, which can only be experienced once a cumulative quantity of the good surpasses a certain level. For example, when a member state experiences a large fire, provided that its capacities

are not surpassed by the threat level, its civil protection mechanism responds by sending the aircraft and firefighting teams required to aggressively put out the fire (Curt & Frejaville, 2018). This is the most effective way to respond and even a slight increase in fire suppression capabilities can have a considerable impact in terms of decreasing the amount of annual burned areas (Khabarov et al., 2016). However, the provision of fire suppression at the European level differs from that at the state level (Morsut & Kruke, 2020; Parker et al., 2019). Prior to the creation of rescEU, when the UCPM was activated to respond to a forest fire, the European Resource Coordination Center (ERCC) requested help from all member states that had the capacity to respond. The following responses were rarely tailored to the specific needs. In short, the responses comprised simply by what was available at the moment.

With the creation of rescEU, the ERCC, a central hub for coordinating emergency assistance and responses to natural and man-made disasters, can supposedly always count on specific fire suppression resources to be available, but it cannot guarantee that they will be sufficient. In this context, I conceptualize "protection against forest fires" or fire suppression within the UCPM as a summation good. Summation goods are experienced when the good is equal to the sum of participants contributions (Rhinard et al., 2013). With this type of aggregation technology, which is defined by what each member state contributes, the temptation to free-ride is very high. Parker's (2019) research is in a way confirming this assumption. After surveying a large number of national civil protection instrument officials, the results indicated that national institutions are perceived as more effective. Thus, while fire suppression in the context of a state might be considered a "threshold good" (Rhinard et al., 2013), in the current EU institutional arrangements, the provision of fire suppression is turned

into a "summation good" which creates implications about the importance of the effect of free-riding.

In an attempt to further understand the motivations and obstacles EU member states face when considering their contribution to fire suppression as a public good, this research draws on the Collective Action Theory (Olson, 1971). This theoretical lens suggests that individual entities, EU members in this case, may not act in alignment with their collective interest in the provision of public goods, succumbing to the temptation to benefit from others' contributions without actively contributing themselves, a phenomenon termed ‘free-riding’. Given that fire suppression falls under the category of a summation good within the EU framework, the temptation for free-riding is substantial. This inclination could consequently lead to a shortfall in the provision of this critical public good. Following this discussion, a mechanism is outlined (Figure 1) through which climate change influences EU members’ contributions to fire suppression, illustrating the interaction between Global Public Goods and Collective Action theories.

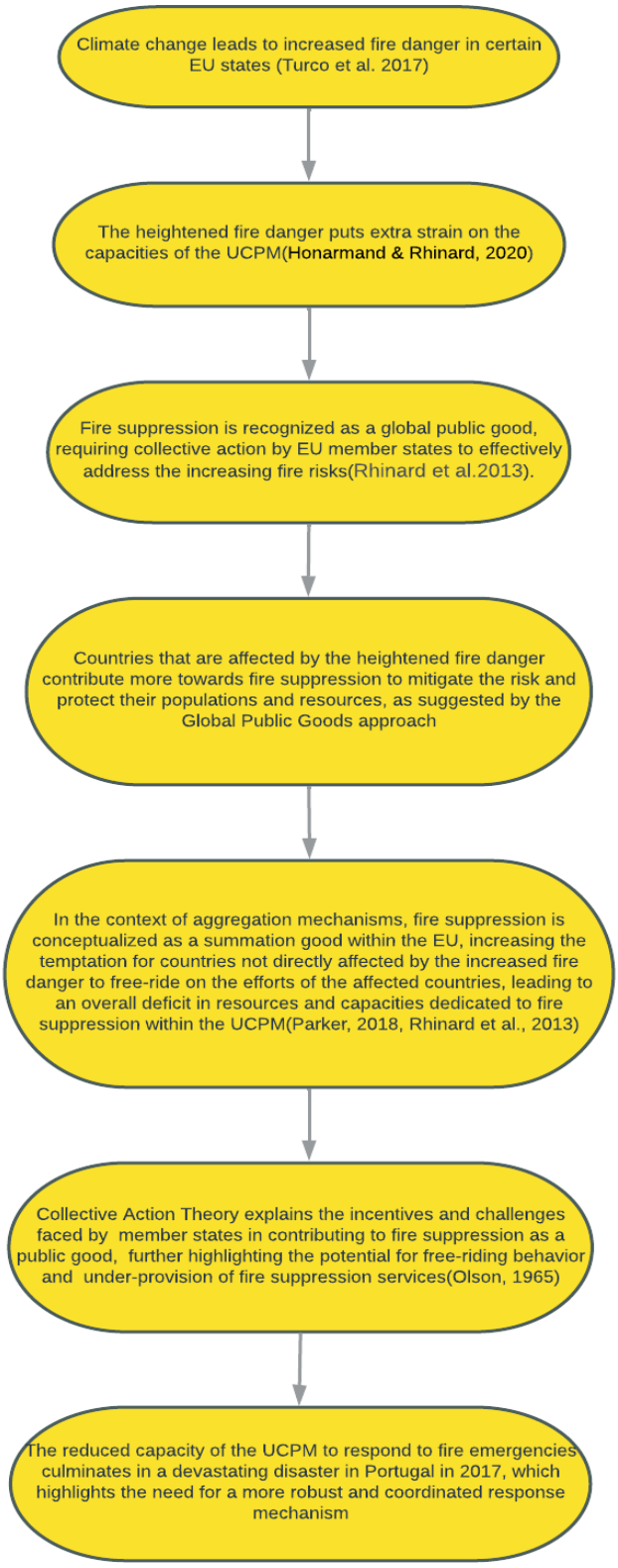


Figure 1

The mechanism depicted in Figure 1 provides the basis for the series of hypotheses this research will explore. This systematic approach will facilitate a comprehensive understanding

of how climate change-induced fire risks and public goods provision influence EU member states' cooperation in wildfire management. To test the causal mechanism through a process tracing approach, a series of hypotheses that correspond to the mechanism have been developed:

H1: Climate change has led to increased fire danger in certain EU states.

H2: The heightened fire danger has placed extra strain on the capacities of the UCPM.

H3: Countries affected by the increased fire danger have increased their contributions towards fire suppression within the UCPM to mitigate the risk and protect their populations and resources.

H4: Countries not directly affected by the increased fire danger have chosen to free-ride on the efforts of the affected countries, leading to an overall reduction in resources and capacities dedicated to fire suppression within the UCPM.

Research Design

The dual objectives of this research are to explore the potential link between increased fire risk and EU member states' contributions to fire suppression under the UCPM and to test these theories using a process tracing approach. This section details the research design, justifying the methodology, data collection techniques, hypothesis testing strategies and case

selection rationale. Employing both qualitative and quantitative secondary data sources, the research aims to assess the proposed causality and offer valuable insights.

The design ensures test-retest and inter-rater reliability, referring to the consistency of results over time and between different data collectors (Barakso et al., 2013). Data triangulation is achieved using a variety of sources, including EU policy documents, scholarly articles and newspapers (Carter et al., 2014). Though not perfect, this method enhances the credibility of the findings and the research integrity.

Following Beach and Pedersen's (2013) process tracing methodology, this study employs the theory-testing approach to uncover causal inferences stemming from theoretical assumptions within the case. The method is chosen for its ability to "invoke an epistemologically justified conceptualization of causation" (Waldner, 2015, p.239). By selecting the entire history of the UCPM as a case, this research enables a comprehensive understanding of the theory's applicability in the context of theory-testing process tracing (Beach & Pedersen, 2013; Bennett, 2008).

Operationalization

This research will operationalize the key variables, increased fire risk and EU member states' contributions to fire suppression, using two primary sources: The European Fire Database and the European Response Coordination Centre (ERCC) maps. The European Fire Database, managed by the Joint Research Centre (JRC) within the European Forest Fire Information System (EFFIS), is a comprehensive collection of forest fire information assembled by EU Member States and other European countries. This database provides the "Common Core," a uniform dataset established under Regulation EEC No 804/94 and continued under the Forest Focus regulation (EC) No 2152/2003. The use of the European

Fire Database is advantageous because it facilitates a systematic and consistent approach to understanding fire risk across different countries, ensuring that the information is current, comparable and relevant. The database contains data on fire frequency, severity and of course size across the EU member states over a defined time period (*EFFIS - European Fire Database*, n.d.). This will help in quantifying and comparing fire risk levels in different regions, which forms the independent variable of increased fire risk in this study.

However, the limitation of the European Fire Database is that it only includes data from 22 countries (*EFFIS - European Fire Database*, n.d.). This may result in gaps in the understanding of the fire risk across all EU member states. Nevertheless, it represents the most comprehensive and reliable dataset available for this research project.

The dependent variable, EU member states' contributions to fire suppression, will be operationalized using the European Response Coordination Centre (ERCC) maps. These maps offer insights into the UCPM responses to forest fires and wildfires since 2016, including identification of responding countries, means of response as well as resources deployed during specific fire events (*Maps*, n.d.). This data provides a concrete measure of the contributions made by individual EU members.

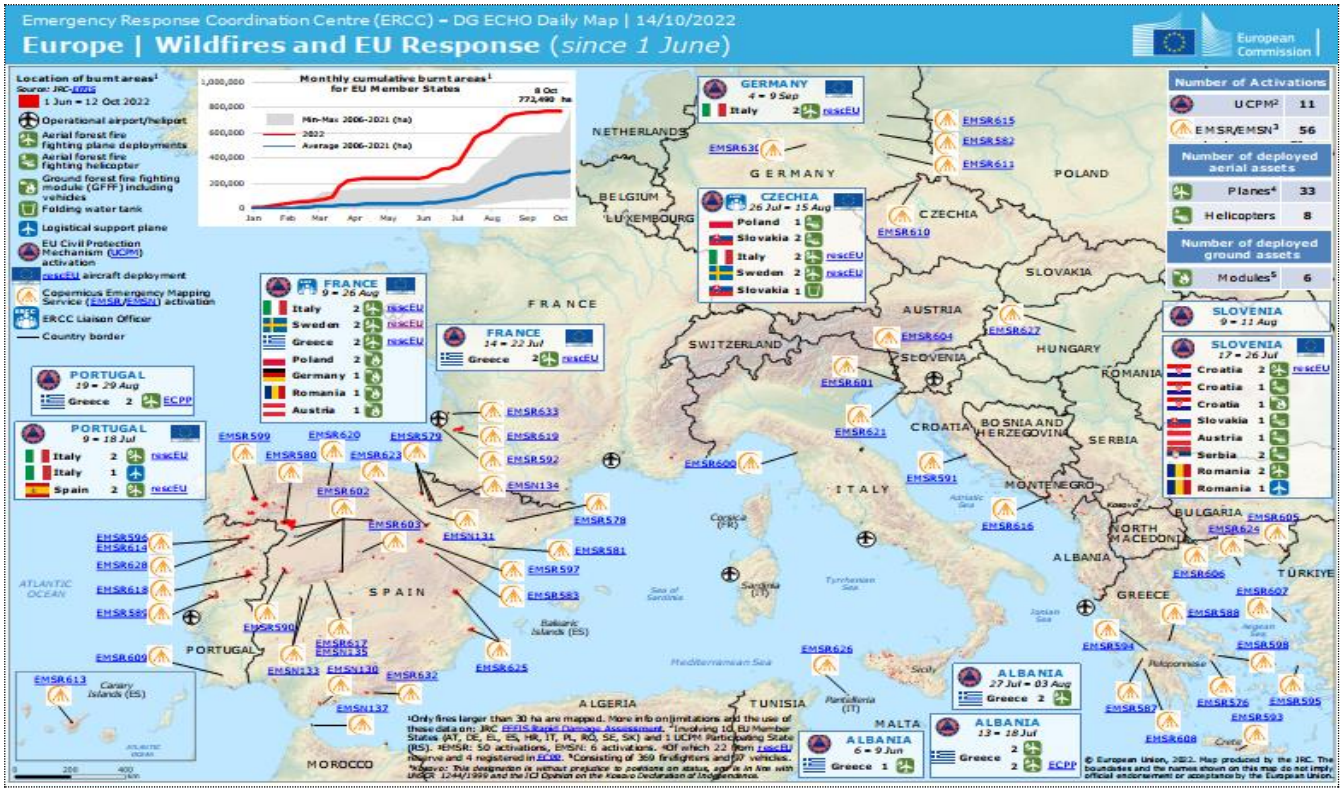


Figure 2, Examples of an ERCC Map

However, it should be noted that the ERCC maps only offer data from 2016 onwards, which may limit the study's ability to track historical trends or patterns in member states' contributions to fire suppression in the last seven years. Despite this limitation, the ERCC maps represent a robust data source for understanding recent contributions and responses to fire suppression.

The combination of these sources will provide a comprehensive picture of the relationship between the main variables. The insights derived from these sources will be instrumental in advancing the understanding of fire risk management within the EU.

Variable	Data Source	Operationalization	Strengths	Limitations
Increased Fire Risk	European Fire Database (EFFIS)	Analyse frequency, severity and size of wildfires over specified time period. Use maps to visually represent fire risk levels.	Systematic and uniform data, current and comparable	Only includes data from 22 countries
EU Member State Contribution to Fire Suppression	European Response Coordination Centre (ERCC) Maps	Identify responding countries and quantify resources deployed (firefighter teams, aircraft, equipment) during specific fire events.	Detailed and recent data on contributions to fire suppression efforts	Only offers data from 2016 onwards

Case Selection

The selection of the entire history of the UCPM as the case for this investigation adheres to a typical case design (Kunitake et al., 2008), as it represents a standard instance of EU member states' contributions to fire suppression efforts in response to increased fire risks. This case was chosen for its potential to provide insights into the causal mechanisms and assumptions that underpin this cooperation scenario within the framework of the EU.

The longitudinal nature of this case, spanning the inception of the UCPM to the present, allows for a thorough exploration of multiple instances where member states responded to forest fires. This enables a nuanced understanding of the factors influencing their involvement in fire suppression efforts over time. Such a comprehensive and context-sensitive analysis is vital to process tracing, enhancing its capacity to reveal causal links between variables (Beach & Pedersen, 2013; Yin, 2009)

One of the key benefits of this case selection is its ability to elucidate the practical application of the theoretical framework within real-world situations. By scrutinizing the

dynamics of the UCPM, the research will generate insights into how member states cooperatively address increasing fire risks, thereby enriching the capacity to understand their collaborative strategies within the EU framework.

Despite the potential limitations of single case studies, notably their constrained generalizability (Yin, 2009), this study argues that the UCPM case can serve as a robust model for understanding the causal mechanisms involved in the production of fire suppression. While its findings may not be universally applicable, they are expected to inform future research on similar initiatives within the EU or other regional contexts. Furthermore, the meticulous analysis of the UCPM case may produce lessons transferrable to other research projects attempting to understand the production of global public goods.

Data Analysis and Collection

After outlining and justifying the chosen research design, another crucial element to be considered during the implementation of the analysis is the data collection and analysis techniques. To investigate the proposed causal relationship , Collier's framework for assessing evidence for each hypothesis will be utilized. This framework aids in evaluating the strength of evidence supporting each hypothesis, considering the degree of certainty and the potential for alternative explanations (Collier, 2011). First, the hypotheses will be assessed. The suggested mechanism must be 'disassembled,' and evidence must be gathered for each step in the chain, ultimately leading to the overarching causal mechanism (Beach & Pedersen, 2013). While testing alternative causal processes cannot fit within the context of this thesis. The proposed causal mechanism can be tested through Collier’s causal inference tests in order to provide stronger evidence for a causal relationship while also weakening the rest of the alternative explanations. Finding evidence that pass the smoking-gun test would be ideal for this. This test requires the identification of cases where a change in the independent

variable (fire risk levels) leads to a clear and almost immediate change in the dependent variable (contributions to fire suppression). Instances where an increase in fire risk in a member state is followed by a substantial increase in their contributions to fire suppression efforts would offer compelling evidence for the proposed causal relationship. However, this is by no means enough to disprove alternative explanations for the observed patterns (Collier, 2011).

Analysis

As previously noted, this analysis utilizes a theory-testing process tracing approach to probe the connection between increasing fire risk and cooperation around fire suppression in the context of the UCPM. The investigation begins by crafting a detailed narrative and timeline, effectively delineating the sequential connection between climate change and high fire risks (George & Bennett, 2007). Adhering strictly to the established research design, a methodical examination of the empirical evidence is undertaken to uncover the determinants that steer EU member states' behavior.

H1: Climate change has led to high fire danger in certain EU states.

Research increasingly identifies climate change as a critical element exacerbating wildfire risks in numerous EU nations. Consequences of climate change such as rising temperatures, prolonged drought seasons and unpredictable precipitation patterns have created conditions ripe for escalating wildfire threats, particularly around the Mediterranean region.

The linkage between climate change and wildfire risks was only beginning to be acknowledged in the scientific community around the 1980s and 1990s (Flannigan et al., 2000). However, in 2003, Europe experienced a heatwave of an unprecedented scale. This event led to a surge in wildfires, particularly in countries located in the Mediterranean region, thereby underlining the consequences of the changing climate (Schär et al., 2004). A study by Moriondo et al. (2006) uncovered how the interplay of climatic and socio-economic factors was intensifying fire hazards in the Mediterranean area, resulting in landscapes dominated by flammable shrublands.

The previous, was further reinforced by Moreira et al. (2011), who emphasized the heightened fire risks in Mediterranean countries compared to other countries. Turco et al. (2018) provided a bleak projection for the region, suggesting a 40-100% increase in burned areas in Mediterranean Europe under global warming scenarios of 1.5-3°C. This study further accentuated the link between climate change and high fire danger in this region. Recent years have seen several large-scale wildfires in EU states, such as Portugal (2017), Greece (2018, 2021) and Spain (2019). These disasters have claimed hundreds of lives and have caused extensive environmental damage, including the destruction of vast expanses of forest and the loss of numerous species. This escalating situation underscores the acute fire danger in these regions and the urgent need for effective mitigation measures.

Currently, according to the Joint Research Centre, Portugal, Spain, France, Italy and Greece, countries primarily surrounding the Mediterranean, account for 85% of the total burned area in Europe. This statistic emphasizes the immense consequences of wildfires in these specific EU states, further substantiating the link between climate change and the high risk of wildfires.

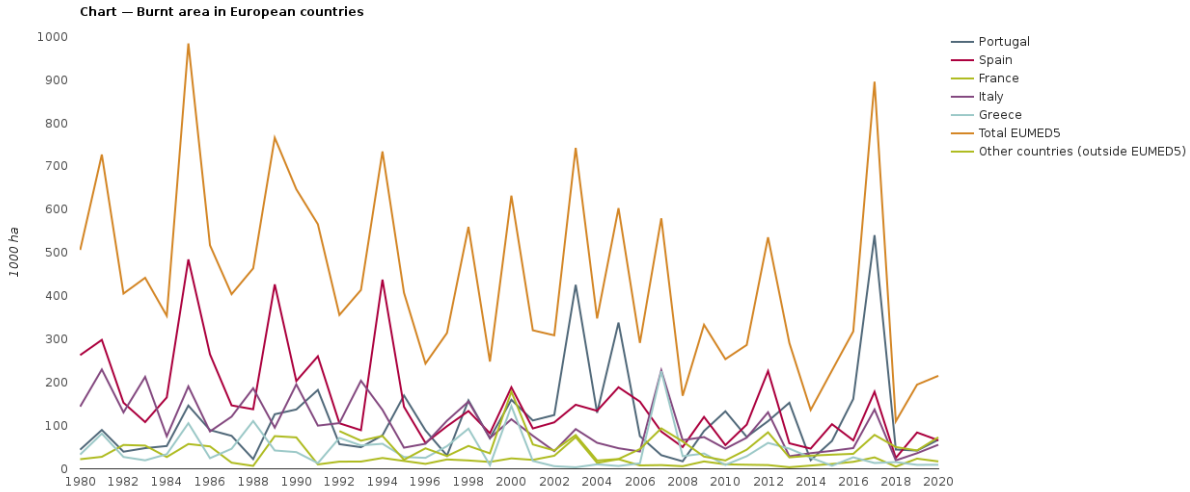


Figure 3. Burned area in European countries (EEA, n.d.)

The previous discussion demonstrates the causal link between climate change and high fire danger in certain EU states. The various pieces of evidence presented serve as straw-in-the-wind tests, each individually pointing towards the connection between climate change and increased fire danger in certain EU states, particularly those in the Mediterranean region. While no single piece of evidence may be decisive on its own, the combined weight of these findings significantly supports the hypothesis that climate change has indeed led to increased fire danger in specific EU states. By passing multiple straw-in-the-wind tests, the hypothesis gains credibility and provides a compelling argument for the role of climate change in exacerbating wildfire risks in the Mediterranean and other vulnerable regions within the EU.

H2: The heightened fire danger has placed extra strain on the capacities of the UCPM.

The heightened fire danger has indeed placed strain on the capacities of the UCPM, as demonstrated by the increase in requests for assistance through the UCPM in response to devastating wildfires. In 2022 alone, the UCPM was activated 11 times by 6 countries

requesting planes, helicopters and firefighters(Joint Research Centre (European Commission) et al., 2022). This was the second year with the most requests to the Mechanism over the last decade. This strain is further supported by the latest edition of the European Commission's Annual Report on Forest Fires in Europe, the Middle East and North Africa (2021) which emphasizes the severity of the fire danger in recent years “the high frequency and intensity of wildfires in the summer puts our fire-fighting services under unprecedented conditions of fire danger, with aerial firefighting often losing its effectiveness and ground firefighting difficult or impossible”. The report notes that three of the worst fire seasons on record took place in the last six years, providing further evidence of the growing demands placed on the UCPM due to heightened fire risks.

The reduced capacity of the UCPM to respond to fire emergencies was made strikingly clear during the devastating disaster in Portugal in 2017, which claimed the lives of 66 people (Holroyd M., 13/09/2022), underlining the necessity for a more robust and coordinated response mechanism. The European Commission had identified the capacity gaps in the EU's ability to respond to disasters, specifically in the area of forest fire fighting planes, in the report "From the Commission to the European Parliament and the Council on progress made and gaps remaining in the European Emergency Response Capacity (17.2.2017)." The report discussed events during the summer of 2016, when forest fires in Portugal revealed the operational necessity of having more forest fire fighting planes available in the EERC pool.

Another piece of evidence supporting the hypothesis comes from the proposal "Decision of the European Parliament and of the Council amending Decision No 1313/2013/EU on a Union Civil Protection Mechanism.". This proposal, back in 2013, recognized “the significant increase in the numbers and severity of natural and man-made disasters in recent years and in a situation where future disasters will be more extreme and with and longer-term

consequences". To address this, the Commission proposed the creation of the ERCC and its pool of resources.

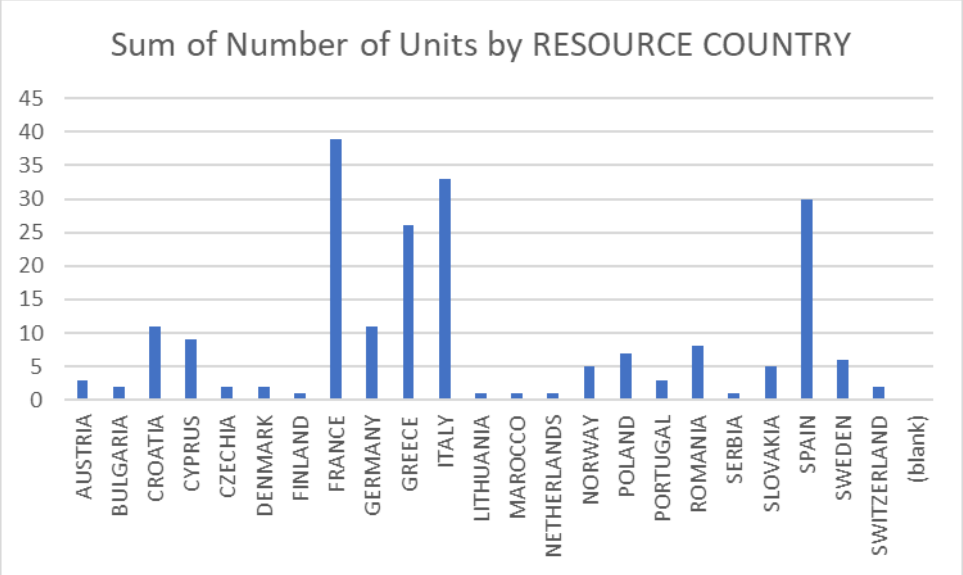
To sum up, the analysis presents evidence that, when viewed through the lens of Collier's straw-in-the-wind tests, offers support for the hypothesis that the heightened fire danger is placing extra strain on the UCPM. Individually, these pieces of evidence, the growing number of assistance requests and the prevalence of extreme fire seasons in recently, contribute to the overall plausibility of the hypothesis. Collectively, they constitute a convincing argument that underlines the urgent need for the UCPM to address the rising issues connected with wildfire management and mitigation in the EU. As a result, the analysis strengthens the case for this hypothesis, highlighting its significance and relevance to the broader issue of climate change.

H3: Countries affected by the increased fire danger carry most of the weight of the contributions towards fire suppression within the UCPM to mitigate the risk and protect their populations and resources.

In order to collect evidence for this hypothesis, ERCC maps dedicated to wildfires and forest fires were analyzed. Each map contained one or more cases were the UCPM was activated to respond in either of those two instances mentioned previously. Even though data about all the activations of the UCPM for this type of events would serve the purpose of this thesis better, the available maps come from 2016 to 2022. These maps contained several types of information, about the country that requested the activation of the mechanism and the event that caused it, the countries that responded to the activation by sending resources, the type of resources, which, most commonly, included forest fire fighting planes (FFFP),

forest fire fighting helicopters (FFFH), ground forest fire fighting modules (GFFF) and logistical support planes (LSP). In rare occasions, forest fire advisory teams (FFAT) and emergency remote piloted aerial systems (ERPA) were utilized in the response as well. Each of these types of assistance provided through the mechanism will be referenced as “units” for the rest of this analysis.

These data were carefully compiled in a dataset. Their analysis revealed that the countries that are affected the most, as was previously discussed: Portugal, Spain, France, Italy and Greece were responsible for 57.94% of all help provided through the mechanism. Particularly France, Spain, Italy and Greece were in the top of the list when it comes to contributions through the UCPM. This percentage however becomes less shocking considering that these five countries’ GDP amount to around 45 to 50% of the total EU GDP (*World Bank Open Data*, n.d.).



Another piece of evidence in favor of the proposed hypothesis, would be the case of Sweden's interaction with the UCPM in light of its increasing fire risk, particularly in its southern regions.

The previous observation is supported by research conducted by Yang et al. (2015), which predicts an increase in the severity and frequency of forest fires in this part of the country due to climate change. The researchers found that, under the influence of rising temperatures and changing precipitation patterns, southern Sweden's fire regime is likely to intensify.

This prediction has been taken seriously by Swedish officials, who have been lately exhibiting a different attitude towards contributing to the UCPM. This change came after a significant fire in 2014, in Västmanland. The fire, one of the most devastating in the country's history, destroyed nearly 13,000 hectares of forest and forced the evacuation of over 1,000 people. It was so intense that it required international assistance, with firefighting resources mobilized from across Europe. The 2014 event exposed the urgent need for improved fire risk management and suppression efforts in Sweden (Deutsche Welle, 08/05/2014).

In 2018, Sweden was again plagued by a series of large wildfires exacerbated by an abnormally hot summer. Sweden had to call for international assistance once more, including water-bombing planes, to help combat the flames (Watts, 2018). The assistance provided by the UCPM constituted the largest force ever assembled (Reliefweb, 2018). The severity of these fires underscored the escalating fire risks facing Sweden, particularly in the context of climate change.

A study by Krikken et al. (2021) provided an important insight into these events. It acknowledged a potential positive role of global warming up to the 2018 forest fires in Sweden and projected a more robust increase in the risk for such events in the future. This

projection aligned with the earlier study by Yang et al. (2015), which anticipated an increased fire risk in the southern part of Sweden.

Following the unprecedented wildfires in 2018, in response to the help received, Sweden, alongside five other European countries, spearheaded the establishment of the 'rescEU reserve'. The creation of the rescEU reserve in 2019 was the first time Sweden contributed six firefighting helicopters. This marked a notable shift in the country's engagement with the UCPM. Prior to the 2018 fires, Sweden had never responded to any UCPM calls for assistance in fire-related incidents, at least within the scope of available data. However, after the establishment of the rescEU reserve, Sweden has participated in firefighting efforts in three distinct instances: in Greece (3/8-30/8 2021), Czechia (26/7-15/8 2022) and France (9/8-26/8 2022).

This shift in Sweden's engagement with the UCPM in response to increased wildfire risk provides compelling evidence that aligns with the 'smoking gun' test. This test requires identification of clear instances where a change in the independent variable (fire risk levels) leads to a near-immediate change in the dependent variable (contributions to fire suppression). Sweden's increased contributions to the UCPM following escalating fire risks in the country meet this criterion. Passing the smoking gun test has implications for the alternative explanations. While these cannot be entirely ruled out, the direct, observable link between increased fire risk and heightened cooperation in the Swedish case significantly weakens them. The strength of the observed causal mechanism in this context provides a robust counterpoint to any alternative hypotheses.

In conclusion, the evidence presented in this analysis have passed the “straw in the wind” and “smoking gun” tests which provides support for the hypothesis that countries affected by increased fire danger carry most of the weight of contributions towards fire suppression

within the UCPM. However, this evidence does not fulfill the criteria for the hoop test, as it does not sufficiently weaken alternative hypotheses. For instance, alternative explanations could involve the economic strength of these countries, since these five countries account for the majority of the EU GDP. Other potential explanations could stem from political or diplomatic factors that influence the distribution of contributions within the UCPM.

H4: Countries not directly affected by the increased fire danger have chosen to free-ride on the efforts of the affected countries, leading to an overall reduction in resources and capacities dedicated to fire suppression within the UCPM.

First and foremost, the previous analysis of the ERCC maps showcases that only five out of the 27 member states of the EU, which contribute to the UCPM, were responsible for providing 57.94% of all help through the mechanism. This leaves the remaining 22 countries, which have either small areas affected by the increased fire risk or are not affected at all, contributing just 42.06% of all assistance. This significant disparity in the distribution of help provided suggests a degree of free-riding behavior among the countries that are less affected by the heightened fire risk.

One country too big to miss in the dataset was Germany. Despite having the largest economy within the EU, Germany's contribution towards collective fire suppression efforts is notably small when compared to other countries with large economies. Germany with 4,26 trillion in GDP (*World Bank Open Data*, n.d.), was responsible for 11 “units” of resources provided through the mechanism in separate instances. Interestingly, despite Germany having the largest economy in the EU, it's outpaced in fire suppression contributions. France, the second-largest economy, has contributed 39 “units” of resources, while Croatia, a country

facing significant fire risk annually, matched Germany's contribution level. Remarkably, Croatia, a country that faces increasing fire risk because of its proximity to the Mediterranean, accomplishes this with an economy that's more than 60 times smaller than Germany's with a GDP of around 69 billion (*World Bank Open Data*, n.d.).

Considering the disparity between Germany's economic standing and their contributions towards collective fire suppression efforts, Nivolianitou and Synodinou's (2011) examination of the organization and management of emergency response in Greece may provide some relevant insights. The study made clear that the dynamics of emergency management are nuanced and often dictated by a variety of logistical and operational factors. These can include resources availability, the specific expertise and capacity of emergency response organizations and the prioritization of emergencies on a national level. Even though the study draws heavily on the Greek context, their findings may hold relevance for other European countries, such as Germany or other countries that do not face significant fire risk.

It could be possible that, despite Germany's robust economy, it doesn't contribute more to the UCPM due to factors that are less tied to its economic power. These could include, for example, an internal prioritization of resources towards other types of emergencies, a lack of specialized knowledge or resources needed for effective wildfire suppression, or perhaps a reliance on other European states that are more frequently affected by wildfires and thus have more expertise in that area. It is important that future research further explores this dynamic by examining these aforementioned factors in more detail.

Furthermore, the findings of the Interim Evaluation of the Union Civil Protection Mechanism for 2014-2016 reveal a "capacity gap" in resources, specifically in aerial forest firefighting modules using airplanes and helicopters (European Commission, 2017, p. 17). While the report acknowledges good progress towards achieving the EERC initial capacity

goals, the presence of a capacity gap underscores the challenges and stress experienced in this area of resources.

The evidence provided in this analysis suggests a potential free-riding behaviour. The fact that only five member states are responsible for 57.94% of all help provided through the mechanism indicates that the remaining 22 countries, which are either minimally affected or not affected by increased fire risk, contribute just 42.06% of the total assistance. This evidence, combined with the findings of the Interim Evaluation of the UCPM, which identified a capacity gap in aerial forest firefighting modules, serves as straw-in-the-wind evidence for the hypothesis.

Conclusion

The previous analysis explored four hypotheses concerning the connection between climate change, wildfire risks and the UCPM response within the EU. The first two hypotheses confirm that climate change exacerbates wildfire risks, predominantly in Mediterranean EU states and that these intensified fire threats burden the UCPM, as indicated by growing assistance requests and evident capacity shortfalls in disaster response.

Hypotheses H3 and H4 delved into the contribution dynamics within the UCPM. The data demonstrated that nations most affected by fire risks, including Portugal, Spain, France, Italy and Greece, provided the bulk of resources for fire suppression, as suggested by H3. Conversely, H4's proposition that countries less threatened by fire risk contribute less, potentially free-riding on others' efforts is supported by the comparatively smaller contributions from nations with lower fire risks, despite their economic strength. Collectively,

the analysis underscores the intricate interplay between climate change, wildfire risks, UCPM strain and the diverse contributions of EU states to fire suppression efforts.

In conclusion, this study offers compelling evidence supporting the main thesis by revealing a positive link between heightened fire risk and increased contributions to the UCPM. These results enrich the understanding of how fire risk levels influence cooperation among EU nations, notably in fire suppression. They shed light on the link between heightened fire risk and increased contributions to UCPM, adding depth to international disaster cooperation discourse. The results also spotlight disparities in UCPM contributions, suggesting the potential for free-riding and illuminating the need for equitable responsibility sharing. By highlighting that successful disaster management cooperation extends to risk perception, the findings pave the way for future research and effective policymaking, thus filling a significant gap in the literature.

Future research avenues abound in the wake of these findings. While the results offer a vital insight, it's clear that the intricacies of cooperative fire suppression endeavors within the UCPM derive from various influences. Economic capacity, geographic proximity and institutional factors stand as alternative explanations deserving of deeper investigation. Delving into these variables will enrich the comprehension of nations' unique contribution patterns towards fire suppression efforts. Subsequent studies might also consider how the UCPM could incentivize countries with lower fire risk levels to elevate their collective contributions, potentially curbing free-riding tendencies. Indeed, this concern stretches well beyond EU fire suppression. Facing differentiated risk amidst environmental collapse, societies worldwide must strive for cooperation before the repercussions of collective action or inaction overtake them.

The knowledge this thesis hopes to contribute to the field of international cooperation in disaster response is in line with this pursuit. This thesis has highlighted the role of risk perception in shaping countries' contributions to collective fire suppression efforts. This insight has implications not only for managing fire risks but also for other areas of disaster response and climate change adaptation. It calls for a reassessment of how risk is communicated and understood within international frameworks like the UCPM and provides the basis for more targeted policy interventions.

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