Particularizing adaptation to non-predominant hazards: A history of wildfires in County Donegal, Ireland from 1903 to 2019

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Abstract

Recent years have seen a historical turn in research on disaster risk reduction and climate change adaptation. This has included a call for historical research that particularizes adaptation in specific locations. This paper responds to this call by using newspaper archives to construct a history of wildfires in County Donegal, Ireland. This study goes beyond existing research that particularizes adaptation, by using this history as a lens through which to evaluate current adaptation policy. In doing so it uncovers problematic mismatches between the experience of local communities living with wildfire hazards and current climate change adaptation policies. National adaptation policy in Ireland presents uncontrolled wildfires as a largely new and unfamiliar hazard that requires innovative management approaches. However, newspaper archives reveal that local communities have adopted a variety of adaptive practices for wildfire hazards for over a century, and that these practices have coevolved with shifting economic, social, and cultural contexts. This paper also introduces the concept of non-predominant hazards, that is hazards that are often overlooked, forgotten, or neglected. Historical research on non-predominant hazards can play an important role in making visible trajectories of adaptation for such hazards. This study also points towards how deeper particularization studies that examine the long-term usage of specific adaptation practices can also be used to test the effectiveness of these practices through time, and to offer lessons for contemporary adaptation. These results have implications for disaster risk reduction and climate change adaptation to non-predominant hazards in a variety of contexts.

Highlights:

(1) New knowledge of adaptation in the past can inform current policy and practice.
(2) National adaptation policy in Ireland presents wildfires as a new hazard.
(3) Newspaper archives show that wildfires have been common for over a century.
(4) How communities adapted to past hazards offers important lessons for the present.
(5) Historic hazards research can broaden the range of adaptation options available.

1. Introduction

In recent years the importance of the synergies between disaster risk reduction and climate change adaptation have been increasingly recognised (Booth *et al.,* 2020; Garcia-Acosta, 2017; Solecki *et al.,* 2011) while there has also been a growing focus on historically informed research within both fields (Adamson *et al.,* 2018; Garcia-Acosta, 2017; Schenk, 2007; Walshe *et al.,* 2020). This historical turn has been driven by a growing concern about the impacts of current and future hazard events on human societies, and by the increasing accessibility of digitised archival materials (Veale *et al.,* 2017). Researchers have constructed improved datasets and chronologies of past weather and climate (Labbe *et al.,* 2019, Mateus *et al.,* 2020; Nash *et al.,* 2016), explored differing human experiences and interpretations of weather and climate events (Adamson, 2012) and examined adaptation in the past to consider what lessons this can offer for contemporary society (Adamson, 2014; Rohland 2019; Rohland 2018). While much of the work on historic climates and hazards has remained divorced from the present (Adamson, 2014), there is an increasing recognition that research on human-environment interactions in the past allows for better understandings of the complex relationships between local communities and their environments (Adamson *et al.,* 2018). Despite this recognition and calls for research that particularises and contextualises adaptation to inform current and future decision-making (Adamson *et al.,* 2018), few studies have directly linked an analysis of adaptation in the past to contemporary adaptation policy and practice. This study addresses this gap by examining wildfire hazards in County Donegal, Ireland from 1903 to 2019, and evaluating current climate adaptation policies in Ireland in the context of this history. It provides new information on the frequency of wildfire events in the north west of Ireland, their impacts on local communities, the types of adaptive practices undertaken through time, and the various groups and individuals who have engaged in adaptation. It also uncovers problematic mismatches between this history and current climate change policies. These mismatches offer important lessons for climate adaptation and disaster risk reduction in other contexts.

Despite the growing literature exploring disaster risk reduction and climate change adaptation through history, the question of whether we can in fact learn from the past remains the subject of ongoing debate (Schenk, 2015). A distinction can be drawn between the questions of whether societies learn from their experiences of past disasters, and whether academic researchers can learn from analyses of past hazards. While there is a divergence of opinion on the ability of individuals or societies to learn from past disasters (Schenk, 2015) and a recognition that the relationships between memories of past events and current practices are often complex (Garcia-Hernandez *et al.,* 2019; Garde-Hansen *et al.,* 2017; Walshe *et al.,* 2020), many scholars offer optimistic assessments of the value of knowledge produced through academic analysis of human interactions with climate and hazards in the past. Schenk (2015, p. 88) suggests that analysing historic disasters allows for the identification of "long term social mechanisms, specific types of processes and recurrent structures for dealing with disasters" and that this knowledge has the potential to offer useful guidance in current and future decision-making. Van Bavel and Curtis (2016) propose that records of past disasters allow for the use of history as a laboratory through which to tests hypotheses in a way that is not possible in the present, while Mitchell (2011) suggests that an examination of past changes in understanding of or responses to hazards can offer a useful means of broadening the range of options available for contemporary and future decision-making. Pfister (2009) also argues that the effectiveness of human responses to hazards and disasters can only be assessed through long duration studies that span decades or centuries. This recognition of the value of historical perspectives for informing contemporary decision-making has led to an increasing focus on linking the past to the present in the study of both hazards and disasters (Garcia-Hernandez *et al.,* 2019;

Mitchell, 2011; Walshe *et al.,* 2020) and climate change adaptation (Adamson, 2014; Rohland 2019; Rohland, 2018).

Repeated experience of the same hazard can play a crucial role in shaping patterns of societal adjustment over time (Bankoff, 2009; Bankoff, 2003; Pfister, 2009; Mauelshagen, 2007, Rohland, 2019). The literature on both historical perspectives on climate adaptation and historical approaches to hazards more generally has often focused on hazards that can be described as predominant, that is hazards that occur repeatedly in particular locations and that come to dominate hazards policy and practice, academic research, and public consciousness of hazard in that location. Examples include studies of hurricanes in New Orleans and the Caribbean (Rohland 2019, Rohland 2018; Schwarz, 2015) and river flooding in parts of Australia, New Zealand, Europe and the United States (Cook, 2019; Parsons *et al.* 2019; O'Neill, 2006; Rohr, 2013). Over extended periods of time repeated interactions between these hazards and human societies can produce distinct cultures of hazard and disaster (Bankoff, 2009; Bankoff, 2003; Mauelshagen, 2007). However, other hazards may remain overlooked, neglected or forgotten despite repeated occurrences and significant impacts. For example, drought hazards in Ireland have been forgotten or overlooked (Murphy *et al.,* 2020; Murphy *at al*., 2017). In this paper hazards that are forgotten, neglected or overlooked in a particular location are described as non-predominant hazards. For such hazards their forgotten or overlooked histories can lead to inaccurate assumptions about past and present levels of exposure, vulnerability and adaptive capacity. When significant events associated with climate related non-predominant hazards occur, it is sometimes mistakenly assumed that they represent new and unfamiliar hazards that require innovative management solutions. This occurs in a context where hazards management and disaster risk reduction priorities are increasingly situated within climate change adaptation policies.

Despite, or perhaps because of its increasingly ubiquitous use in studies of the human dimensions of climate variability and change, the term adaptation has been defined in a variety of different ways (Smit *et al.,* 2000). While most definitions of adaptation focus on some form of adjustment to change, adaptation has been viewed as a reactive or anticipatory, as well as autonomous or planned (Smit *et al.,* 2000). It can consist of bottom-up actions initiated by individual actors or a set of top-down institutionally led policies or actions (Fujisawa *et al.,* 2015). Researchers have also increasingly recognised that climatic changes and their impacts interact with other process of social, cultural, political and economic change (Leichenko and O'Brien, 2008; O'Brien and Leichenko, 2000) and that adaptation decision-making is shaped by these wider contexts (Lennox, 2015; Meerow, 2017).

While the definition of adaptation used in the IPCC reports focuses on climate stimuli as the main driver of adaptative decision-making and conceptualizes adaptation as adjustment to a wide suite of climate changes, this definition is of limited use for historically informed studies of adaptation (Rohland, 2019). It fails to recognise that the development of adaptation programmes and policies may be more heavily influenced by local historical contexts than by global agendas on climate change (Lindegaard, 2020). Rohland (2019) proposes an approach to historical studies of adaptation that is both broad (in that it includes a wide variety of adjustments and responses to hazard, regardless of whether these were prompted by new knowledge of climatic changes or not) and narrow (in that it focuses on responses to a particular hazard in a specific location, rather than climatic changes more generally). She argues that the choices made regarding the management of risk and hazard are often neither rational nor determined by environmental conditions but are instead shaped by the complex interactions of constantly changing socio-economic and environmental contexts (Rohland, 2019). Consequently "adaptive practices are always embedded in those sociocultural-natural contexts and they change together with those contexts. In other words,

adaptive practices coevolve with environment and society over time" (Rohland, 2019, p.208). Examining adaptation in this way requires a focus on a specific type of hazard in a particular location over an extended period of time (Rohland, 2019). Focusing on adaptation to an individual hazard rather than to a wider range of climate impacts allows for the study of a more specific set of practices (Rohland 2018). It also allows for a recognition that adaptation is locally specific (Adamson, *et al.,* 2018) both because the history of climatic hazard events in a particular region can differ significantly from similar nearby regions (Rohr, 2006) and due to differences in social, economic, political and cultural contexts (Adamson, *et. al,* 2018; Lindegaard, 2020). Nuanced analysis of the histories of events, vulnerabilities and adaptations in particular places can provide a baseline for current and future adaptation (Adamson, *et al.,* 2018).

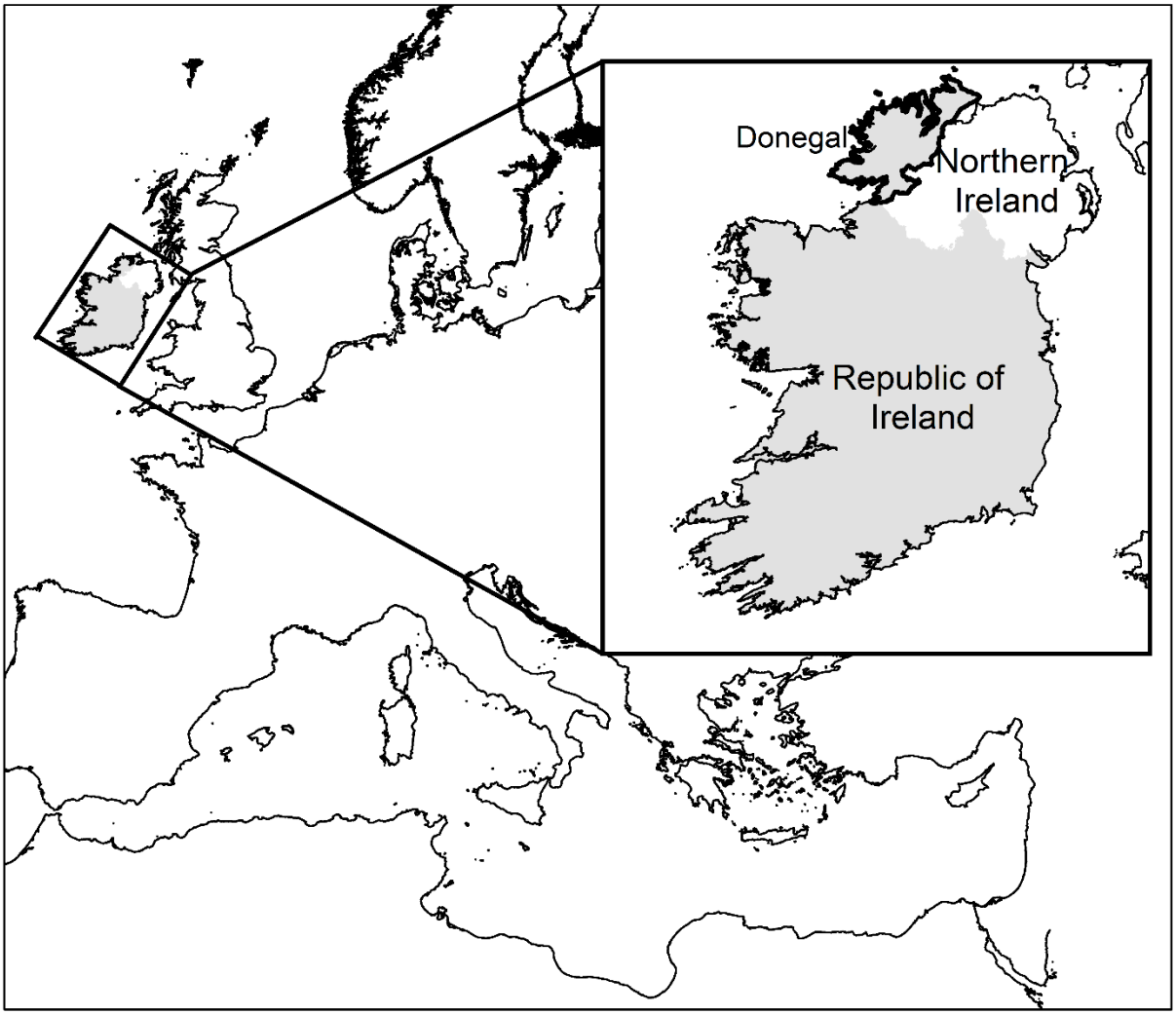
In order to understand adaptation, it is necessary to examine what is being adapted to and who is doing the adapting, as well as how and why they are doing so (Smit *et al.,* 2000). This paper adopts a narrow focus on what is being adapted to, examining a single climate related hazard and its impacts, but defines the range of adaptive practices broadly to include any adjustments aimed at reducing the frequency or intensity of wildfire events or their impacts. It focuses on examining who was engaging in these practices, what practices they were engaging in, and how these were linked to wider social, economic, political and cultural contexts, considering both institutional driven top-down actions, and individual bottom-up adjustments.

The remainder of the paper is structured as follows. Sections 2 and 3 outline the case study location and the methods used. Section 4 presents the results of the study, beginning with an overview of trends in the frequency of wildfire events. This is followed by an examination of adaptation practices through time that considers; who was engaging in adaptation as well as how and why they were doing so. The co-evolution of adaptation to wildfire hazards with changing social, economic, political and cultural contexts is traced through three time periods: 1903-1949, 1950-1989, and 1990-2019. The presentation of results concludes with an overview of current national and local climate change adaptation polices. Section 5 discusses the results exploring mismatches between contemporary national climate adaptation governance and local lived experiences of wildfire hazards.

2. Case Study

Wildfires in Ireland are chosen as the case study for this research as in the context of north western Europe they represent an example of a frequently recurring non-predominant hazard. Wildfires also represent an important case for particularising adaptation as wildfire induced losses have been increasing in many regions globally and it is recognised that wildfire hazards are the product of very complex sets of human-environment interactions (Moritz, *et al.,* 2014). Climate variability and change is just one of many drivers that shape the contexts within which wildfire events occur. Few research studies of wildfires in Ireland have been published and those that have generally adopt a quaternary science perspective (Hawthorne and Mitchell, 2018; Hawthorne and Mitchell, 2016). This study addresses a gap in the literature by providing new data on the frequency of wildfires over the past century and on human-environment interactions related to wildfire hazards. County Donegal (see Figure 1) was chosen as the case study location within Ireland as it is one of a number of locations where wildfires have occurred frequently within the last decade. Satellite data has been used to identify eleven hotspot clusters across Ireland where wildfire events have occurred most frequently since 2011, and two of these hotspot clusters are located within County Donegal (Department of Agriculture, Food and the Marine, 2019).

Figure 1. Location of County Donegal.



County Donegal is located on Ireland's north west coast and its climate is heavily influenced by its maritime location, with the county experiencing more extremes of rainfall and wind than the rest of Ireland (Hickey, 2013). Annual rainfall totals range from 850mm in the driest years to in excess of 1400mm in the wettest years on record (Hickey, 2013). Rainfall varies across the year with April and May consistently the driest months (Hickey, 2013). The weather station at Malin Head has a mean rainfall of 63.1mm in April and 56.9mm in May (Met Eireann, undated). Precipitation records show a high level of variability but no clear long-term trends (Hickey, 2013). Donegal also experiences some of the windiest weather in western Europe with similar conditions to western Scotland and Norway (Hickey, 2013). Mean monthly wind speeds range from 19 knots in January to 12.3 knots in July with the strongest winds between November and March (Met Eireann, undated). Both mean wind speeds and the frequency of gales have been decreasing since the 1990s as climate change leads to a northern shift in storm tracks (Hickey, 2013). Temperatures in Donegal are similar to the rest of Ireland (Hickey, 2013). Mean daily maximum temperatures range from 8.1 degrees Celsius in January to 17 degrees in August (Met Eireann, undated).

The county is dominated by upland areas with the highest peaks of the Derryveagh and Blue Stack Mountain ranges reaching to over 600m in height. These areas of the county are characterised by blanket bog and heath habitats featuring heather, moor grasses and other heath and bogland vegetation (Department of Culture, Heritage and the Gaeltacht, 2019). Coniferous forestry plantations are also common with Sitka Spruce the dominant species. While contemporary fire

regimes in Ireland remain understudied, the causes and consequences of fires in similar peatland and moorland habitats in Britain are contested, with debates about the extent of prescribed burning in upland areas and its ecological impacts (Brown, *et al.* 2016; Davies, *et al.,* 2016a; Davies, *et al.,* 2016b; Douglas, *et al.,* 2016). However, it is recognised that heather and gorse habitats can be fire adapted ecosystems where fires can assist with regeneration and seed germination (Gazzard, *et al.,* 2016; McMorrow, 2011). There is an absence of reliable evidence on the causes of wildfire events in Britain but it is assumed that many are trigger by human activity including prescribed burns that grow into uncontrolled fires, arson, and accidental fires triggered by discarded cigarettes or barbecues (McMorrow, 2011). A similar pattern of fire triggers is likely to be responsible for wildfire events in Ireland.

3. Methods

This study adopts two methods, one to examine the history of wildfire events and societal adaptation to them through time, and the second to examine current policy in order to compare the assumptions underpinning those policies with the historical context. Newspaper archives can provide rich qualitative and quantitative data and have been used to study a range of hazards and climates in different contexts and locations including rainfall variability and drought in southern Africa (Nash, *et al.,* 2019; Nash, *et al.* 2016), drought in Ireland (Noone, *et al.,* 2017), tropical cyclones in Mauritius (Walshe, *et al.,* 2020) and daily weather in London (Hulme and Burges, 2019). This study draws on local newspapers that have been digitised in the Irish Newspaper Archive (www.irishnewspaperarchive.com). Data is drawn from three newspapers, *Donegal News* [DN] (1903-2019), *Donegal Democrat* [DD] (1919-1998, 2015-2019) and *Derry Journal* [DJ] (1914-1924, 2015-2019). Systematic searches of the newspaper archive were undertaken using 25 keyword search terms (see Box 1). Following sorting to remove duplicates and results from outside the study area, positive hits were sorted into two types; a listing of news reports describing wildfire events and a listing of other items related to wildfires. This second list included court cases, fire prevention adverts, editorials, letters and opinion pieces. The remaining files were then coded with the assistance of NVivo 11 qualitative analysis software. NVivo allows for easier management of large data sets (Fitton and Moncaster, 2018) and it has been used for the analysis of newspaper reports (Amundsen, 2015; Devitt and O'Neill, 2017), interview transcripts (Amundsen, 2015; Eakin, *et al.* 2010; Fox-Rogers, *et al.* 2016, Rouillard, *et al.* 2014) and a wide range other texts including policy documents, laws, official publications and secondary literature (Albright, 2011; Amundsen, 2015). Coding focused on three thematic areas: (1) Narratives and knowledges (how the causes of fires were reported), (2) Values, threats and impacts (how the impacts of fires were reported) and (3) adaptation practices (what adjustments were undertaken and by whom). This coding was carried out over multiple steps that combined the use of both themes identified in advance and inductive codes that emerged from reading the data (Clarke *et al.*, 2016; Braun and Clarke, 2006).

Box 1. Key Word Search Terms Used in this Study.[1]

Gorse fire	Mountain fire	Heath NEAR burn
Heath fire	Vegetation fire	Furze NEAR burn
Heather fire	Moorland fire	Mountain NEAR burn
Bog fire	Hill fire	Whins NEAR burn
Bogland fire	Bush fire	Moorland NEAR burn
Forest fire	Brush fire	Bog NEAR burn
Furze fire	Heather NEAR burn	Gorse NEAR burn
Wildfire	Forest NEAR burn	Vegetation NEAR burn
Wild fire		

The second method was an analysis of current national and local climate adaptation and hazards management policy documents to assess the extent to which these considered wildfire hazards and the adaptation options they present for wildfires. Current policy documents were identified through general internet searches and searches of relevant government websites. Following these searches, a short list of relevant documents was compiled (See Table 1). These documents were then imported into the NVivo 11 software where key word searches were used to locate all content related to wildfires and their management. These were then coded using inductive coding.

Table 1. Policy Documents Analysed.

Document Title	Author Organisation	Focus	Year
Agriculture, Forest and Seafood Climate Change Sectoral Adaptation Plan	Department of Agriculture, Food and the Marine	National	2019
Biodiversity Climate Change Sectoral Adaptation Plan	Department of Culture, Heritage and the Gaeltacht	National	2019
National Adaptation Framework	Department of Communications, Climate Action and the Environment	National	2018
Donegal County Council Climate Adaptation Strategy	Donegal County Council	Local	2019
Land and Forest Fires Working Group Recommendations	Land and Forest Fires Working Group	National	2011
Prescribed Burning Code of Practice	Department of Agriculture, Food and the Marine	National	Unknown

While the main methods of data collection for this study were the systematic searching and analysis of newspaper archives and the examination of policy documents, additional background research was also undertaken when prompted by information provided in the newspaper reports or the policy documents. This included examining legislation related to wildfires and the burning of vegetation, the history of state involvement in forestry and peat extraction, and the history of firefighting services in Ireland.

While the main focus of this paper is the qualitative analysis of socio-environment interactions related to wildfire hazards, a basic quantitative overview of fire event frequency was also compiled.

[1] These searches also returned partial matches.

Any attempt to illustrate quantitative trends is subject to a number of caveats owing to the nature of the data. The most obvious limitation is that it cannot be assumed that trends in media reporting of wildfires are identical to the occurrence of fires. The level of detail provided in the newspaper reports also varies greatly. To derive an estimated total number of wildfires per year the following principles were applied. All clearly reported individual events were counted. When reports indicated that a specific number of fires had occurred this was included in the tally for that year, even if the report did not provide more specific information on all of these events. When the reports used vague terms such as "multiple fires" this was counted as one event, as it is impossible to determine how many separate wildfires were being described. This conservative approach means that the total number of fires that took place was probably higher than the numbers discussed below.

4. Results

The one hundred and sixteen years of newspaper reports analysed in this study provide a rich dataset of human-environment interactions related to wildfire hazards in County Donegal. Section 4.1 below provides an overview of the whole period from 1903 to 2019, outlining trends in the reporting of wildfire events in local newspapers as well as trends in the frequency of wildfires and their impacts. This is followed by a more detail examination of three time periods: 1903-1949 (Section 4.2), 1950-1989 (Section 4.3) and 1990-2019 (Section 4.4). Each of these sections outlines three interrelated issues; (1) knowledges and narratives about the causes of wildfires, (2) reporting of threats and impacts associated with wildfires, and (3) adaptation practices undertaken. This is followed by an overview of current national and local adaptation policies in Section 4.5.

4.1. Wildfire trends (1903-2019)

Wildfires of various types have featured regularly in newspaper reports from County Donegal for over a century (See Figure 2). Over 1,100 wildfires were reported between 1903 and 2019. Reporting of wildfires was infrequent prior to the 1930s but increased significantly between 1950 and 1990. From 1990 to 2010 reporting of wildfires decreased, before increasing again between 2010 and 2019. Large numbers of wildfires were reported in some recent years including 300 in 2011 and 161 in 2013. The reports also illustrate a wide spatial distribution throughout all areas of the county and a clear seasonal pattern. Although most common in rural areas, fires were sometimes reported close to or within urban settlements, although these were successfully extinguished without major impacts. In March 1971 a fire was reported as threatening houses and the local hospital in Dungloe (DD, 26/3/1971), while in 2017 a vegetation fire was reported on a vacant site in Letterkenny (DN, 23/7/2017). While fires were reported in every month except November, a clear fire season is evident with the majority of fires occurring in the months of March, April and May (See Figure 3). This is a shorter fire season than that outlined in national policy documents which describe a fire season running from February to September (Department of Agriculture, Food and the Marine, 2019). This seasonality is likely to reflect the role of climate as a driver of wildfire events as fires peak in the driest months and decline as average rainfall increases and wind speeds decline. Vegetation growth cycles are also likely to be influential in creating this seasonal pattern as fires decease following new growth in late spring and summer.

Figure 2. Total number of newspaper items related to wildfires per decade.[2]

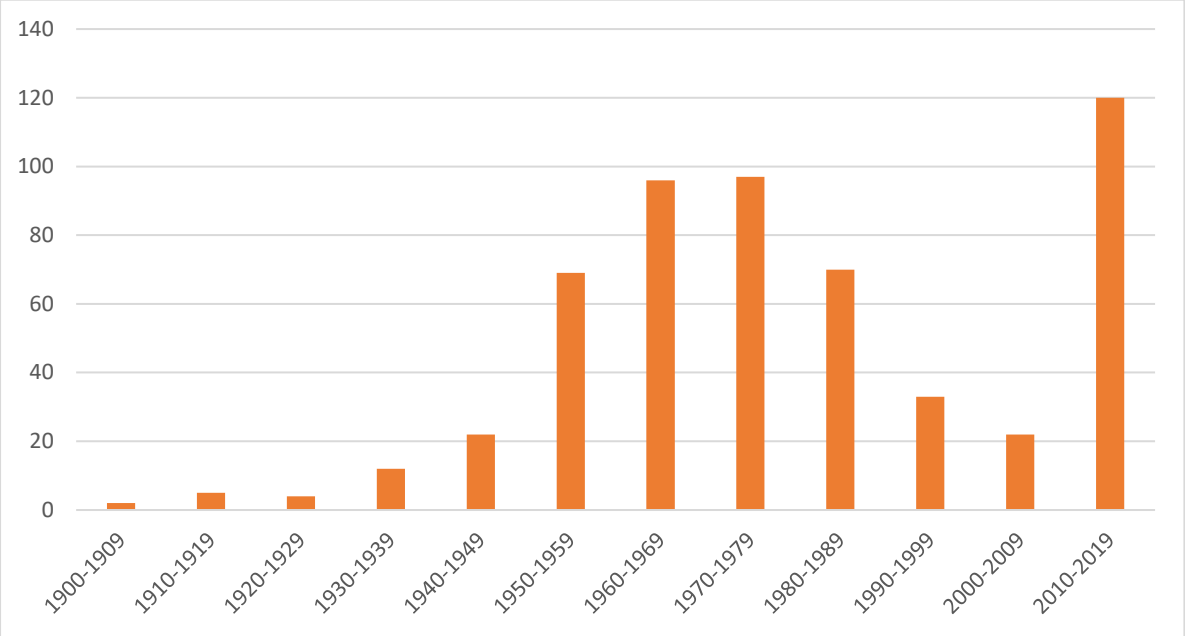
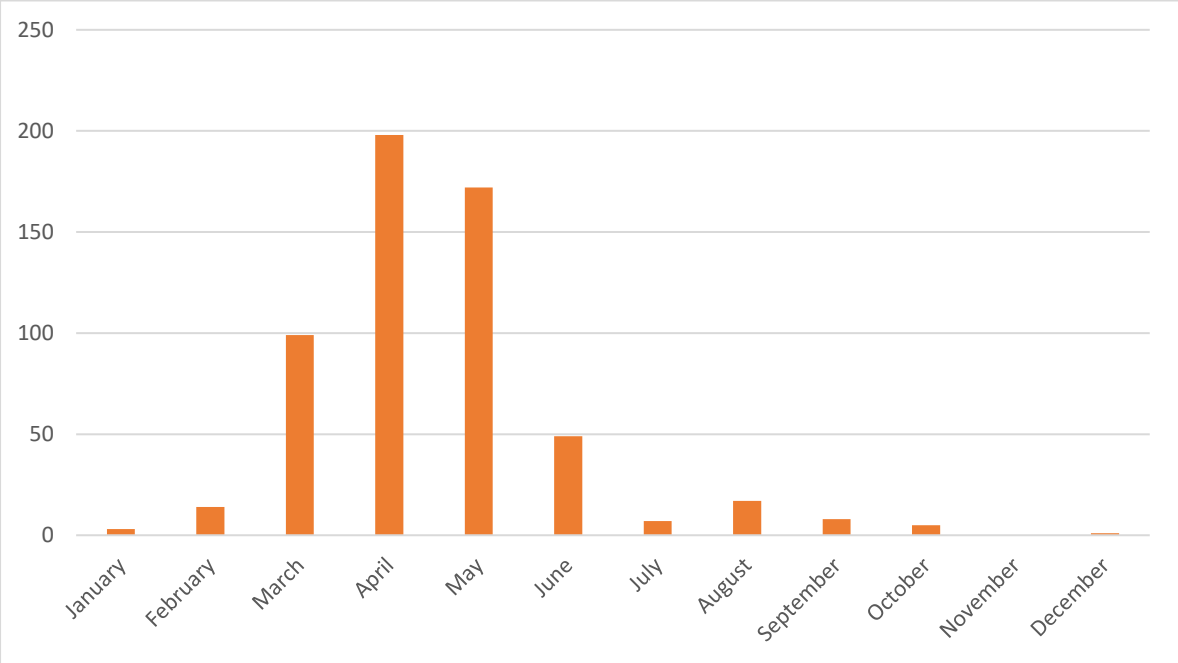


Figure 3. Total number of wildfires reported in each month between 1903 and 2019.[3]



Newspaper reports of wildfire events often reported both direct impacts (what was damaged or destroyed by the fire) and threats (what was at risk of damage or destruction but was ultimately spared either as a result of firefighting efforts or natural influences such as fire quenching rainfall or

[2] Newspaper items includes news reports, opinion pieces, letters, notices and adverts.

[3] This graph excludes a report of 300 fires spread over the end of March and beginning of April in 2011 and a report of 50 fires spread over a similar time period in 2017 as it was not possible to determine how many of these fires occurred in each month.

a change in wind direction). Impacts reported included damage to forestry plantations, damage to houses, burning of grazing lands, deaths of farm animals, deaths of wild animals and birds, and destruction of habitats (see Table 2). There were no reports of human fatalities and few reports of injuries. The newspaper reports also provide an overview of the spatial extents and duration of fire events although the variation in the level of detail in the reports makes it difficult to compare events in this way. What is clear is that the wildfires reported have ranged from small events lasting a matter of hours, to larger fires that burned for days (see Table 3).

Table 2. Wildfire impacts and threatened impacts reported in local newspapers.

Category	Impacts and Threats	Number of Reports	Years Reported
Forestry	Plantations threatened	48	1955-2016
	Plantations burned	34	1957-2018
Agriculture	Farm animals threatened	4	1956-1974
	Farm animals killed	5	1942-1980
	Fences/ditches burned	8	1938-1996
	Grazing land burned	18	1908-1980
	Farm buildings threatened	5	1962-1979
Peat/turf production	Domestic turf threatened	21	1946-2013
	Domestic turf burned	33	1938-2003
	Commercial production threatened	5	1952-1973
Houses and other buildings	Houses threatened	63	1936-2019
	Houses damaged or destroyed	5	1982-2019
	Hospital threatened	1	1971
	School threatened	2	1965-1982
	Church threatened	1	1960
	Oil tanks threatened	3	1969-2002
Infrastructure	Electricity poles/ wires threatened	8	1959-1977
	Telegraph poles/wires threatened	1	1963
Game sports	Game birds lost or habitats destroyed	21	1917-1974
Wildlife	Wild animals/birds lost or habitats destroyed	34	1946-2016
Transport	Vehicles burned	2	2003-2019
	Collision caused by poor visibility	1	1956
	Dangerous driving conditions & roads closed	3	1973-2019
	Filling station threatened	1	2002
Injuries	People injured	2	1956-1996

Table 3. Selected examples of reports describing the extent or duration of wildfires.

Source	Event Date	General Location	Description
Donegal Democrat	April 1971	Glenveagh	*"Thousands of acres of mountain grazing burned fiercely on the Drumfin – Glenveigh mountains last weekend and upwards of 100 men fought the fire for days before getting it under control."*
Donegal Democrat	May 1985	Dungloe	*"About 3000 acres of bog and scrub were burned"*
Donegal Democrat	April 1921	Ballyshannon	*"Several acres of heather were burned" "the fire lasted for about 8 hours"*
Donegal News	July 1989	Fanad	*"The fire which locals claimed was started maliciously raged for six days"*
Donegal News	May 1962	Pettigo	*"A seven mile front burned on Carrickaholten mountain where a hundred men toiled for almost twenty four hours to get it under control"*
Donegal News	May 1936	Killygordon	*"About 1000 acres of mountain grazing were burned"*

In the following three sections, a more detailed examination of reporting of wildfire events is provided covering three time periods. Each section outlines the ways in which the causes of wildfire events were described, the threats and impacts reported, and the range of adaptation practices that were implemented to manage wildfire hazards and their impacts. Newspaper reports across all three time periods place a strong emphasis on human activity as the dominant trigger of wildfires. However, the type of human activities to which blame was attributed varied through time, sometimes emphasising accidental triggers such as discarded cigarettes or prescribed burning going out of control, but emphasising malicious intent at other times. Reporting of threats and impacts has also changed through time, often reflecting shifting economic development priorities, or other changes in social, cultural and political contexts. Adaptation practices have focused both on efforts to prevent fires from occurring, and on fighting fires that did occur. However, the mix of practices used and the actors involved has varied through time (see Table 4). A wide range of different actors have participated in firefighting efforts and despite an increasing professionalisation of the response through an emphasis on trained firefighters, untrained local volunteers have consistently participated in firefighting throughout the past century. Legal mechanisms designed to try to prevent fires have also been used throughout the time period examined in this paper. However, the focus of what these legal tools were designed to protect has changed through time, reflecting the shifting contexts within which wildfire events have occurred. Newspaper reports also show varied and intermittent usage of other adaptation practices including education and information campaigns designed to try to reduce the frequency of accidentally trigged fires.

Table 4. List of adaptation practices reported in local newspapers.

Type	Adaptation Practices	Years Reported
Fire fighting	By fire brigades/fire service	1945-2019
	By army	1974-2011
	By local volunteers	1936-2019
	By forestry workers	1956-2011
	By local landowners	1941-2019
	By police	1918-1977
	By other groups	1960-1989
	Cross border co-operation (fire brigades from Northern Ireland)	1962-1996
	Helicopters to direct ground firefighting	1977-1980
	Helicopters to drop water	2011-2019
Legal actions	Civil litigation for financial loss from fires	1903-1976
	Criminal prosecutions under relevant legislation	1916-1985
Education or information	Newspaper adverts or notices	1950-2012
	Colour coded fire warning alerts	2018-2019
	Fire warning signs	1956
	Announcements at church services	1958
Evacuations	Evacuations of houses	1971-2019
	Evacuations of farm animals	1936-2015
Other	Fires allowed to burn out	1936-1980
	Deployment of fire watchers	1956-1971
	Monitoring of weather forecasts	1957

4.2 Game birds and security concerns (1903-1949)

Between 1903 and 1949, only 45 newspaper items related to wildfires were found. All of these were either reports of wildfire events or reports of fire related court cases. While many of these reports did not provide a large volume of detail on the wildfires or their causes, these reports did not describe fires in ways that suggested they were viewed as unusual. A variety of interpretations of the causes of wildfires were presented with malicious burning or careless discarding of matches or cigarettes sometimes presented as the cause. Dry and windy weather conditions were often reported as having aided the spread of the fires.

While a range of threats and impacts were reported during this time including threats to houses, threats to sheep, and impacts on grazing land, the dominant concern was the loss of game birds and their habitats. For example, in 1917 the Derry Journal carried a report on a court case where Lord Leitrim sought compensation of £100 for the fire damage caused to heath and heather on lands in Mulroy used by grouse, alleging that the fire had been started maliciously (DJ, 6/6/1917). Other examples included a fire of unknown cause near Ballyshannon in 1936 which was reported to have destroyed vegetation that provided cover for game birds (DN, 28/3/1936) and a fire near Pettigo in 1938 that was reported as having caused serious destruction of game (DN, 14/5/1938).

During the early decades of the twenty century adaptation practices focused on a range of legal tools aimed both at fire prevention and providing compensation for financial losses resulting from fires with a clear human trigger, as well as on some attempts at firefighting. Pursuing financial losses through the courts in the aftermath of wildfires appears to have been a prominent adaptation in the

early decades of the 20th century. Attempts to modify behaviour through legal prohibitions on burning have been a common fire prevention strategy in Ireland, reflecting an assumption that many damaging fires result from planned burns by farmers that grow into uncontrolled wildfires. These legal strategies highlight how fire prevention practices were often closely linked to the political or economic concerns of the time. Some of the earliest reports of prosecutions for lighting fires emerge between 1916 and 1918 reflecting the security priorities of the British Administration during a time of war in Europe and rebellion in Ireland. In 1916 a resident of Inch Island was charged for lighting heather fires that could have served as a signal, landmark or guide (DJ 20/3/1916) while in 1918 a number of fires were reported in the Fanad district in contravention of the Defence of the Realm Act (DN 23/3/1918), war time legislation in force at the time. The Game Preservation Act of 1930 which aimed to prevent uncontrolled fires by introducing restrictions on burning during certain times of the year, clearly reflected the social and economic importance placed on game sports during this time. In May of 1931 the *Donegal News* carried a report of the first criminal prosecution under this legislation where both the defendant and the judge noted that they had been previously unaware of the legislation (DN, 3/5/1931).

Reports from the early years of the 20th century illustrate that efforts to fight fires were also common but often somewhat ad-hoc in nature. Newspapers reported firefighting efforts being led by police forces, the Royal Irish Constabulary prior to Irish independence in 1922, and An Garda Síochána from then onwards. Local volunteers were also reported as assisting with firefighting. The first reports of a local fire brigade responding to wildfires did not emerge until 1945 and this reflects the national expansion of firefighting services. Prior to the enactment of the Fire Brigades Act of 1940, fire brigade services in Ireland were confined to cities and large towns with only 24 fire appliances in the entire country (Westmeath County Council, undated). The outbreak of World War II prompted an urgent review of firefighting capabilities and the new act mandated local authorities to establish fire brigades within their areas (Westmeath County Council, undated). Newspaper reports also illustrate that alternative responses were sometimes used when firefighting proved ineffective or impossible. For example, when a fire near Glencolmcille in 1936 could not be extinguished by local volunteers, farmers evacuated their animals from the path of the flames and the fire was allowed to burn itself out (DN 5/13/1936).

4.3. Economic development priorities (1950-1989)

During the period from 1950 to 1989 newspaper reporting of wildfire events increased significantly, with 332 newspaper items related to fires during this period. A diverse range of causes of wildfires were reported during this time. Fire incidents were sometimes linked to wider socio-economic conditions, such as in 1974 when it was suggested that recent wildfires resulted from higher oil prices leading to increased harvesting of turf from bogs as a cheaper source of domestic fuel (DD, 20/4/1974). However, the dominant narrative in the reporting throughout this period was that wildfires were caused by the carelessness of various groups of people including farmers, and bog workers. Deliberate burning by farmers as a land use management strategy for the removal of unwanted vegetation was also a persistent theme in the reporting of fires as it was assumed that many fires were the result of planned burns getting out of control. Malicious intent as a cause of fire became a more prominent feature of reporting after 1970. This increased focus on malicious fires at this time may be linked to Donegal's location as a border county and the commencement of 'The Troubles' in Northern Ireland. The dominance of narratives of malicious or accidental human triggers of fires contrasts with the reporting of the relationships between fires and weather or climate. While reports of wildfires events often include reporting of the prevailing weather conditions at the time,

these are rarely presented as the cause of the fire. Weather was presented as having created the conditions for a fire to spread more easily but not as the primary cause of fires which was attributed to human agency. Two reports dating from 1959 (DD, 29/5/1959) and 1975 (DD, 30/5/75) acknowledge that intense sunlight could trigger fires but this was viewed as a very rare occurrence.

After 1950 reporting of the impacts and threatened impacts of wildfires on forestry plantations, peat bogs and electrical infrastructure became more common (see Table 2). Trends in reporting of forest fires illustrate the influence of national government policy in shaping local concerns and values. No newspaper reports of forest fires were found prior to 1950 but these became common between 1950 and 1990. Reporting often focused on the economic damage caused by forest fires and on the firefighting efforts undertaken by forestry workers. A typical report from 1962 describes a fire near Castlefinn as follows, "but for the heroic work of the firefighters, who were in grave danger of being severely burned themselves, thousands of pounds worth of damage would have been caused" (DD, 4/5/1962). The increased reporting of forest fires coincided with a new focus on forestry in national government policy. The Forestry Act of 1946 provided a new legal framework for forestry in Ireland and the first national afforestation programme commenced in 1948 (Department of Agriculture, 2008).

Newspaper reports of fire threats and impacts on turf harvesting from peat bogs become common between the 1950s and the 1970s. Reporting of fire impacts on peat production also appears to have been shaped by the national context in which government policy emphasised the natural resource potential of bogs. While the Turf Development Board had been founded in 1934 with the remit of stimulating private peat production, it was renamed Bord na Móna in 1946 and took on a much wider role with direct state involvement in the development of bogs for a variety of purposes (Bord na Móna, undated). In Donegal turf was harvested as fuel, both by individual landowners and in a Bord na Móna facility near Glenties. Impacts and threats to both private turf harvesting and the Bord na Móna site were regularly reported between 1950 and 1970, with the threats that wildfires presented to turf harvesting often directly linked to the economic development potential of bogs. Bog fires also received editorial attention with the Donegal News noting in 1958, "We take this opportunity of congratulating Bord na Móna on the splendid service it is rendering to the nation by its effective campaign against fire in the bog. Handling a great national industry, Bord na Móna is rightly vigilant to see that avoidable peril shall not intrude to waste and lay useless the great fuel-producing areas that give our people so much power and wealth" (DN, 26/4/1958).

Reports of wildfires damaging or threatening electricity supply infrastructure first appeared in the 1950s and continued to feature until the 1970s. This focus also reflects wider economic development priorities. Much of this electricity infrastructure was new, as towns in Donegal were connected to the national grid in the late 1940s and early 1950s, while the transformative national Rural Electrification Scheme was implemented in Donegal between 1948 and 1961 (ESB Archives, undated). Fire impacts on agriculture were also regularly reported, particularly when large areas of grazing land were impacted. It is notable that prior to the 1980s there were no reports of houses being damaged by wildfires, although they were frequented reported as being under threat during fire events. The impacts of fires on wildlife and habitats were also mentioned regularly throughout this period, illustrating that such concerns predated recent environmental movements. The years after 1970 also saw a decline in reporting of fire impacts on game birds. It is not clear why this decline took place but it may be that social and cultural changes led to decreased interest in game shooting. It is also notable that some reports in the 1970s and 1980s show the emergence of increasingly complex interpretations of wildfires. When generally reported as a threat to be prevented, some newspaper reports suggested that controlled burning was essential to supporting

game bird habitats. The last report referring to game birds and fire in 1983 suggested that game bird populations were declining due to a lack of fires needed to encourage new heather growth.

Although the reports for the years between 1950 and 1989 show that a range of adaptation practices were used (see Table 3) they also illustrate a continued to focus on firefighting (by a variety of groups including fire brigades, police, farmers, forestry workers, armed forces and local volunteers) and fire prevention through behaviour modification (new legislation and advertising campaigns). Following their emergence in the latter half of the 1940s, from the 1950s onwards reporting of wildfires regularly mentions the role of local fire brigades in fighting fires. The 1950s also saw the emergence of forestry workers as regular participants in firefighting efforts while the role of the police also evolved. Members of An Garda Síochána continued to participate in firefighting until the late 1970s. However, since then there have been no reports of their involvement in firefighting and they have been instead been reported in other roles such as traffic management near fire scenes. Many newspaper reports of fires also noted that local volunteers assisted with firefighting. Untrained volunteers continued to participate in firefighting throughout this period.

In addition to firefighting, efforts also focused on encouraging changes in behaviour through information campaigns, and on enforcing change through the enactment and enforcement of legislation. Prohibitions on burning as a form of land use management were included in a number of pieces of legislation including the Forestry Act 1948 which imposed restrictions on burning within one mile of a forest. This added to existing restriction that had been imposed in the Forestry Act 1928 and the Game Preservation Act 1930. Restrictions were also included in the Wildlife Act 1976. From the 1950s through to the 1980s both the *Donegal Democrat* and the *Donegal News* carried numerous reports of court cases resulting in prosecutions for illegal burning under the Forestry Act. No reports of such prosecutions were found after 1985. This lack of newspaper reports before 1950 or after 1985 suggests that although this legal tool was available throughout this time, its enforcement has depended on the economic priority attached to forestry.

Advertisements aimed at preventing wildfires first appeared in the early 1950s. In the 1950s the message focused exclusively on the danger of accidental fires caused by discarded matches or cigarettes, or poorly extinguished meal fires. By the late 1960s the message continued to emphasise these dangers but also urged farmers to exercise caution if engaging in burning for land use management purposes. Adverts warning of the dangers of forest fires were also published regularly after 1950. Most adverts were published by the state agency responsible for forestry beginning with the Department of Lands in the 1950s. During the 1980s notices regarding the danger of forest fires were also published by the Fire Prevention Council. The FPC was established in the late 1970s and was made up of representatives from the Department of the Environment and the insurance industry (DD, 25/7/1980). The involvement of the insurance industry is likely to reflect an increasing concern regarding the financial losses resulting from forest fires. Like the Bord na Mona advertisements, many of the forest fire warnings focused on the threat of fires caused through carelessness. The rules regarding burning close to forests were frequently cited, although it is notable that many of the adverts emphasised that burning by farmers within one mile of a forest could be permitted if sufficient notice was given to allow forestry workers to assist in ensuring that the forest was not endangered. This seems to have been an attempt to balance the needs of farmers to use burning as a land use management tool with the protection of forests.

4.4 Changing priorities and contested values (1990-2019)

Coverage of wildfire events in local newspapers appears to have declined sharply after 1989 with only 55 newspaper items related to wildfires found between 1990 and 2009. However, from 2010 onwards coverage of wildfire events increased significantly with 120 items related to wildfires found for the period 2010 to 2019. From 1990 to 2019 careless and malicious burning remained the dominant wildfire cause reported. It is notable that although newspaper reports in recent years suggested that the frequency of fire events was increasing, climate change was never mentioned in newspaper reports as a potential contributory factor. It was assumed that human behaviour is responsible for any changes in fire frequency. In a 2011 editorial (DD, 6/5/2011) fires were presented as events that have always been a part of rural life, but it was argued that they were becoming more frequent as a result of the activity of arsonists and farmers who engage in illegal burning. While this editorial acknowledged that recent weather had been exceptionally dry it did not link this to climate change. Although attribution of fires to human carelessness remained a consistent theme throughout this time, there are noticeable differences in the types of carelessness reported compared to earlier decades. Prior to the 1980s newspaper reports often included concerns that fires were a consequence of meal fires lit by outdoor workers. This has not been mentioned as a concern in recent years as the practice of outdoor workers lighting meal fires has become less common. Concerns that discarded cigarettes or matches could trigger fires was also a common aspect of reporting prior to the 1990s but has not been mentioned in more recent reports, perhaps due to the impacts of anti-smoking public health campaigns.

Since the 1990s there has also been a clear change in emphasis in the types of threats and impacts reported. Reporting of the impacts of fires on forestry plantations began to decline in the 1990s and although still mentioned in some reports of fires, few fire prevention adverts relating to forests appear to have been published from then on (See Tables 2 and 3). The 1980s saw a significant restructuring of state involvement in forestry in Ireland (Department of Agriculture, 2008). Since 1989 new afforestation has been pursued almost exclusively by the private sector with state involvement limited to managing existing forests. Newspaper reporting of threats to forests from fires appears to have declined once new afforestation became an exclusively private enterprise. This is despite forest area in Ireland increasing from 352,000 hectares in 1989 to 671,000 hectares in 2016 (CSO, 2018). Reporting of bog fires in local newspapers in Donegal also declined during this period. This is likely to be linked to the closure of the Bord na Móna site in Glenties.

Damage to houses and other buildings as a result of wildfires remains rare but it has been presented as an increasing concern in recent years. In 2011 the *Donegal News* quoted the Chief Fire Officer for the county stating that houses were increasingly threated by wildfires due to development in at risk locations (DN, 22/4/2011). Newspaper reporting of wildfire impacts also illustrate emerging conflicts between the competing values of different stakeholders. As mentioned earlier a concern for the impacts on fires on wildlife is not new. However, opinion pieces and letters with a wildlife conservation focus have become more prominent in recent years. These have often accused famers of engaging in burning outside of the permitted time periods or allowing fires permitted for land use management purposes to get out of control. Newspaper reports illustrate that within the last twenty years farmers have been presented by different stakeholders as villains (responsible for fires), victims (suffering loss as a result of fires) and heroes (using farm equipment to help fight fires).

During this period a range of adaptation practices were described in newspaper reports (See Table 3). However, some shifts in emphasis were evident. While firefighting efforts continued to feature prominently in reports there was significantly less emphasis on advertising campaigns, and much less coverage of legal cases or legislation. While fire brigades have remained the primary fire fighters

since 1990, the importance of local volunteers in assisting with firefighting has also remained a prominent feature. This may be due in part to the rural locations where many fires take place. It also reflects the fact that when major outbreaks occur the Donegal County Fire Service may find its resources stretched as the service consists of around 150 part time retained fire fighters (Donegal County Council, undated). While local community firefighting efforts have been commonly reported for almost a century these have often been uncoordinated and feature untrained locals with no firefighting equipment. It is only in recent years that the role of untrained volunteers has been given more critical attention in newspaper reporting. This focus has been driven by one local politician who has been reported as making repeated calls for the establishment of local responder units that would be trained and equipped to serve as an initial response to wildfires (DN 30/4/2010). These calls for a more formalised volunteer firefighting units appear to have gone unanswered. Reporting of fires in recent years also suggests a growing expectation that other forms of support for firefighting should be provided by the state. Although there have been few reports of the use of aircraft in firefighting, a seven hour delay in the arrival of an Air Corps helicopter to assist in fighting a fire in 2019 prompted local criticism (DN 26/4/2019).

In contrast to the period prior to 1990 the use of newspaper adverts to raise awareness of the dangers of accidentally triggering wildfire events appears to have declined significantly between 1990 and 2019. While this could reflect changing adaptation practices, it may also reflect the increased availability of other channels of communication such as the emergence of local radio stations since the early 1990s. While few adverts and notices were found between 1990 and 2015, since 2016 a number of notices have been published by the Department of Agriculture in association with a new colour coded fire warning system. These notices have emphasised the need for all landowners and rural dwellers to be vigilant to prevent fires, and have encouraged forest owners to ensure that measures such as fire breaks have been installed and properly maintained. These notices have also emphasised the prohibition on burning between March and August established by the Wildlife Act. While these notices emphasise these legislative prohibitions on burning, no reports of prosecutions for illegal burning were found during this time period. While prosecutions may have taken place and not been reported, it seems likely that this absence of reporting may reflect a change in enforcement of legal prohibitions on burning.

4.5 Current Adaptation Policy

National adaptation policy for Ireland is set out in the National Adaptation Framework published in 2018, as well as in sectoral plans prepared by government departments and local plans prepared by county councils. Wildfire hazards receive little attention in the overall National Adaptation Framework which focuses largely on floods and storms. The most extensive treatment of wildfire hazards within national policy is provided in the Agriculture, Forest and Seafood sectoral plan. Wildfires (described as uncontrolled fires) are identified as one of 18 priority impacts of climate change for the agriculture and forestry sectors. The chief consequences mentioned are damage to forests, farmland, peatlands, risks to humans and animals, and air quality. Fires are presented as a new and somewhat unfamiliar hazard in Ireland that has recently emerged as a challenge due to a combination of climate change and shifting land uses. The plan emphasises a lack of data about fires and the need to draw on international expertise due to the unfamiliar nature of the hazard. A range of adaptation measures are proposed including: (1) expert training of firefighters based on knowledge exchange with countries in southern Europe and North America, (2) use of prescribed burning, (3) the establishment of local fire management partnerships (4) use of adverts to change mindsets among farmers and encourage fire vigilance among a range of stakeholders and (5)

prosecutions for illegal burning. The report acknowledges that the relationships between climate drivers and wildfire hazards are complex but that climate change combined with changing land use practices is likely to lead to an increased risk of fires.

Local adaptation policy for County Donegal is set out in the Donegal County Council Climate Adaptation Strategy published in 2019. This document outlines a range of climate related hazards for Donegal including sea level rise, drought, floods and storms. Like its national counterparts the focus of this document is on predominant hazards such as flooding and storms, and a range of adaptation measures are proposed to manage the risks and vulnerabilities presented by these hazards. Wildfires are briefly mentioned on three occasions in the document but no specific adaptation plans for this hazard are outlined. In contrast to these few mentions of wildfires, floods and flooding appear over two hundred times throughout the document. It is clear that in both national and local climate adaptation policies, wildfires are a non-predominant hazard that is largely overlooked. When wildfire hazards are discussed they are generally presented as a relatively new and largely unfamiliar hazard.

5. Discussion

These results highlight two main issues that merit further discussion. The first is the mismatches that they reveal between the assumptions underpinning climate change adaptation policies pertaining to wildfires hazards, and the lived experiences of human engagement with wildfires in local communities in Ireland. The second is the co-evolution of adaptation practices with changing social, economic, cultural and political contexts through time, and the lessons that illuminating this past experience can offer for contemporary adaptation to wildfire hazards in Ireland, as well as for overlooked or neglected climate related hazards in similar contexts.

Recent calls for historically informed research that can particularize adaptation have emphasised how such research can establish a base line knowledge of local experience with a hazard through time (Adamson *et al.,* 2018). This history of wildfires in County Donegal illustrates the importance of establishing such a baseline knowledge, particularly in the case of what can be called non-predominant hazards, that is hazards that have been overlooked, neglected or forgotten in contemporary hazards and climate policies, academic research, or public consciousness of hazards. It is clear that contemporary national adaptation policy proceeds on the assumption that wildfires are a new and relatively unfamiliar hazard in Ireland, and that local communities and hazards management institutions have little experiential knowledge of them. However, the history presented in local newspaper reports presents a radically different picture of wildfire hazards in Ireland. It illustrates that wildfires have been a recurring hazard that have been a regular feature of life in rural Ireland for over a century, and that a range of adaptation practices have been deployed in order to manage the threats they have presented.

This illustrates that historically informed research can challenge contemporary assumptions and understandings of hazards. Current national adaptation policy assumes that Ireland must draw on experience from other locations where wildfires are thought to be more common. While this emphasis on international knowledge exchange is a welcome development in line with international disaster risk reduction strategies (UNISDR, 2015), it neglects to consider long term local experience of wildfire hazards that can offer its own important lessons. As both climate adaptation and disaster risk reduction increasingly promote international knowledge exchange, the example of wildfires in Ireland illustrate that there is a danger that this approach can overwrite existing local histories of

human-environment interactions. While some of the adaptations proposed in the national policies are indeed new in an Irish context, some of the others suggested have a long history of previous use in Ireland. This mismatch highlights the specific importance of improved historical knowledge of non-predominant hazards. Previous studies that use historical approaches to particularize adaptation have largely focused on hazards that can be described as predominant, for example studies of hurricanes in New Orleans (Rohland, 2019) and flooding in New Zealand (Parsons, *et al.,* 2019). In doing so such studies have often highlighted the important role of historical research in illustrating the emergence of problematic path dependencies that continue to constrain climate adaptation and disaster risk reduction strategies today (Adamson, *et al.,* 2018; Parsons, *et al.,* 2019). However, for non-predominant hazards such as wildfires in Ireland, the opposite of path dependencies may be a more significant concern. Rather than being constrained by decision-making trajectories established in the past, for non-predominant hazards contemporary adaptation policy may attempt a complete rupture from the past, ignoring the knowledge and resources already available to assist adaptation. The results of this study illustrate the importance of local histories in providing contextual knowledge that could be integrated with comparative knowledge and experience transferred from elsewhere. Thus, historical studies that particularize adaptation to specific hazards in particular places have an important role to play in global disaster risk reduction efforts by contextualising comparative knowledge. Local institutional structures such as the fire management partnerships proposed in Ireland's national adaptation policies may offer a means of facilitating this integration of local and comparative knowledge.

Adaptation practices can coevolve with socioeconomic and environmental change over extended time periods (Rohland, 2019). The history of wildfire hazards in Donegal illustrates how the wildfire impacts that were reported in local newspapers, the sectors and groups impacted by wildfire events, the actors involved in responding to fire events, and the practices used to manage fires were all closely linked to shifting social, economic, and political contexts. This coevolution was shaped by the intersections between knowledges (assumptions about the causes or drivers of a hazard) and values (what is seen as at risk of loss or damage as a result of the hazard). Wildfire hazards have been viewed in different ways by diverse actors and in different time periods. At various times they have been understood as threats to state security, game sports, economic development, and environmental conservation goals. These shifts through time illustrate that adaptive practices and who undertakes them cannot be separated from wider social, cultural and economic changes. The current framing within national policy of wildfires as a climate change induced challenge can be seen as the latest phase in this process of co-evolution. Due to the emphasis on the future in climate change policy, the past history of wildfires has been overlooked and forgotten, leading to incorrect assumptions about past, present and future wildfire risks, vulnerabilities and adaptive capacities. The co-evolution of adaptation with changing contexts has also been influenced by the degree of societal agreement on adaptation goals. Over the past one hundred and sixteen years there appear to have been periods of relative cohesion in adaptation to wildfire hazards. During these times the newspaper reports present a picture of general agreement among what would now be described as stakeholder groups, regarding the assumed causes of fires, the land uses, infrastructures and communities most vulnerable to them, and the adaptation practices that ought to be used. This cohesion was strongest when it aligned with national economic development priorities such as the expansion of forestry or the exploitation of peat bogs. These periods of cohesion are likely to have been particularly important in shaping the adaptation practices implemented. For example, the willingness of local volunteers to join with forestry workers, fire brigades and others in efforts to fight forest fires may be reflective of a shared understanding of the value of forestry and the need to protect it from fire damage. Whether this apparent cohesion is reflective of reality at the time or the

product of selective reporting is unclear. However, what is clear is that newspaper reports from recent years suggest a period of much greater contestation and disagreement in which difference stakeholder groups have adopted a variety of assumptions about knowledges, values, and appropriate adaptation practices. The values underpinning adaptation strategies and practices should not be taken for granted, as they have shifted alongside changing social, economic, and political priorities. Exposure and vulnerability to climate related hazards is also interconnected with processes of social, cultural, economic and political change (Leichenko and O'Brien, 2008; O'Brien and Leichenko, 2000) and adaptation priorities can change in line with these shifting contexts. Adaptation is also almost always a political process in the broadest sense (Eriksen, *et al.,* 2015) involving decisions that may prioritise the interests of some groups or individuals at the expense of others and may involve choices between different adaptation priorities and associated practices that can produce winners and losers (Leichenko and O'Brien, 2008). Careful consideration of the political nature of adaptation is needed in developing and implementing adaptation strategies. In the formation and implementation of wildfire hazards management strategies, it is essential that these diverse views are openly considered and debated. It is not clear that this diversity of viewpoints has been considered in the drafting of current national policies.

The co-evolution of adaptive practices through time has been visible not only in the implementation of adaptation practices, but also in changes to who was engaged in adaptation. This is most obvious in changes to participation in firefighting through time. Due to the absence of trained fire fighters, prior to the late 1940s wildfires were fought entirely by the voluntary efforts of other groups including the police, farmers, and local residents. Following the establishment of fire brigades during the 1940s, their involvement in the fighting of wildfires has increased substantially. This has resulted in a shift in roles for some groups. It is notable that since the emerge of fire brigade services, the role of An Garda Siochana (police) has changed from firefighting to supporting roles such as traffic management. However, a range of other groups have continued to be involved in firefighting. This has included local residents, farmers, forestry workers, and members of the defence forces. Forestry workers participating in firefighting efforts was first reported in the 1950s and featured regularly in newspaper reports of fires in the following decades, but by the 1990s forestry workers were rarely mentioned in newspaper reports of fires. This likely reflects the rise and subsequent decline of the importance attached to forestry.

It is also notable that recent newspaper reports continue to highlight the important roles of farmers and other untrained local volunteers in firefighting efforts. Although these efforts have often been uncoordinated and ad-hoc in nature, with communities rallying to respond when a fire occurs, the newspaper reports also suggest that these reactive voluntary firefighting efforts have often been successful in protecting properties. This aspect of the history of adaptation to wildfires in Donegal offers important lessons for contemporary policy and practice. Current national policy seems to presume that only state firefighting services will be involved in firefighting and ignores the roles that a diverse range of other groups have played in firefighting. Issues such as health and safety concerns and insurance liabilities may play some role in the apparent reluctance to acknowledge the role of untrained volunteers. However, their exclusion represents an overlooked opportunity to enhance community resilience by drawing on the experience and willingness of local communities to assist in firefighting. Local volunteers provided with training and equipment could represent a means of enhancing the effectiveness of a community adaptation that has been present in an ad-hoc way for over a century. This represents a clear example of a mismatch between the assumptions underpinning hazards governance and climate adaptation policy at the national level, and the local experiences of communities living with wildfire hazards. In the case of firefighting, the laboratory of history (Van Bavel and Curtis, 2016) suggests that the inclusion of a wider range of voluntary actors

in firefighting efforts can be a successful strategy for reducing the losses caused by wildfire events in rural communities.

The history of adaptive practices illustrated in the newspaper reports also points to the potential for using the past as a laboratory to test other strategies for future use. Several of the adaptation practices proposed in current national policy have a long history of use in Ireland, although this history and the lessons it may offer are not acknowledged in current adaptation policies. The use of legal prosecutions to try to discourage burning is one such strategy. Despite their use over many decades, it is unclear whether these legal prohibitions were an effective means of reducing the overall frequency of fires or their impacts, as wildfires remained a frequent occurrence throughout the decades when the reporting of prosecutions in local newspapers was common. Additional research to investigate this further would be required if appropriate sources can be found to do so. While such a detailed analysis of the impact of fire prevention legislation was beyond the scope of this paper, the use of historical methods to particularize adaptation can be developed to extract more specific insights from the past. The potential for such research is dependent on the availability of historical primary sources but in many contexts the documentary evidence available is rich, and oral histories can also be included to further enrich knowledge of time periods within living memory. This points towards the potential for developing two types of historically informed research on particularizing adaptation. The first is studies that particularize adaptation to a single hazard in a particular location or region by examining the breath of adaptation practices that have been used through time, and this paper represents an example of such research. However, the results of this study also point towards the need for a deeper form of particularized adaptation research that would build upon the first by focusing on a specific practice or set of practices, to evaluate the consequences of their use through time in particular locations. Such deeper particularization studies have the potential to further enrich knowledge on adaptation, and to provide practical lessons for climate change adaptation and disaster risk reduction.

6. Conclusions

This research has used a historical perspective to particularize and contextualise adaptation to wildfire hazards in County Donegal Ireland. It has gone beyond existing historical research on adaptation by using this history as a lens through which to evaluate current climate change adaptation policy. In doing so it illustrates how the insights offered by a historical analysis can serve both to critique current policy and practice, and to offer alternatives. It highlights three main conclusions that offer both important practical lessons for adaptation to wildfire hazards in Ireland, and more generalisable insights that are applicable to adaptation to neglected, forgotten, or overlooked climate related hazards in other contexts.

The first of these is the contribution that historically informed research on non-predominant hazards can make to adaptation knowledge and practice, and in particular the ways in which it can provide essential context for climate change adaptation and disaster risk reduction strategies that draw on international knowledge exchange. Much of the existing historically informed research literature focuses on hazards that have occurred repeatedly and that can be described as predominant, that is hazards that have come to dominate hazards policy, research, and public consciousness in that location. This study highlights the importance of also using a historical perspective to particularize adaptation to hazards that have been frequently recurring over extended time periods but can still be described as non-predominant, that is hazards that remain neglected or overlooked. Previous studies that particularize adaptation have rightly emphasised the capacity of historical research to

illuminate the deep historical roots of path dependencies that can continue to constrain decision-making. However, this study of a non-predominant hazard highlights a different challenge, the dangers that the assumptions that underpin contemporary policy can represent a rupture from the past lived experience of local communities. The use of historical research to particularise adaptation can ensure that the rich lessons that the past can offer for current and future adaptation are integrated into policy and practice, rather than being overlooked or forgotten.

The results presented in this paper also point towards how research that particularizes adaptation can be developed further to assess the effectiveness of adaptation practices, based on the evidence provided by their usage through time. Two types of studies that particularize adaptation can be undertaken, those that provide a broad overview of human-environment interactions related to specific hazard, and those that undertake a deeper evaluation of a specific adaptation practice or set of practices. This paper has provided an example of the first type of particularization but points to the potential for the second. In the context of wildfires in Ireland additional in-depth historical research could explore the effectiveness of practices such as legal prohibitions on burning or voluntary firefighting, to provide a stronger evidence base for how these practices might contribute to reducing wildfire impacts in future.

Finally, the data presented in this paper also confirms how historically informed research can illuminate the complex ways in which adaptation practices co-evolve with shifting social, economic, political, and cultural contexts. For over a century, wildfires have been reported in local newspapers in the north west of Ireland through the lens of prevailing economic, political, social, and cultural priorities. In different time periods fires have been viewed as a threat to game sports, afforestation programmes, the development of peat bogs, the expansion of the national electricity grid, wildlife and ecosystems, agriculture, and housing. At times they have also been presented as an accepted part of rural life, with burning acknowledged as a legitimate land use practice that had to be balanced against other priorities. Shaped by these shifting interpretations and understandings of wildfire hazards, a variety of adaptation practices have been deployed by a wide range of different actors. This history illustrates the importance of recognising the social, cultural, political, and economic contexts within which adaptation practices develop, and the implications of these for current and future adaptation to climate related hazards.

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