Ash dieback and other tree pests and pathogens: dispersed risk events and the Social Amplification of Risk Framework

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Abstract

It is widely acknowledged within the risk literature that the mass media play a pivotal role in shaping information about risk events for audiences. Whilst some risk events reflect occurrences specific to particular times and locations, other risk events are more difficult to temporally and spatially situate as they are dispersed across years or months and are not constrained to particular geographic locations. Studies examining the relationship between the social amplification or attenuation of risks and their framing in the media have tended to focus on the former type of event. In this paper we explore the social amplification of risk in relation to ash dieback disease (*Hymenoscyphus fraxineus*), a tree health issue that attracted intense media attention in the UK in 2012, and characterise what we designate as a *dispersed risk event*. Drawing on the influential Social Amplification of Risk Framework (SARF), we present a frame analysis of UK national newspaper articles to assess the connection between media coverage of dieback and risk amplification, and the extent to which dieback coverage drew on other tree health issues and objects of media attention. Focusing particularly on the blame frame around dieback, the paper considers the implications of conceptualising dispersed risk events for the SARF and its amplification metaphor. Moreover, given that risk events such as dieback are often associated with policy shifts, we suggest that there is value for risk communicators and policy makers in broadening their focus to incorporate more of the 'history' of risk events in order to anticipate likely anchors of public and media attention.

Social Amplification of Risk Framework, risk event, frame analysis, media, ash dieback.

Introduction

Since the late 1980s, one of the most comprehensive tools available for exploring the relationships between media representation, risk communication and the social and individual processes involved in the perception of risk has been the Social Amplification of Risk Framework (SARF) (Kasperson *et al.* 1988; Renn *et al.* 1992; Rosa 2003). SARF's core thesis is that events related to hazards, communicated via channels such as the media, interact with psychological, social and cultural processes in ways that can intensify or attenuate the public perception of risk, subsequently shaping and influencing risk behaviour (Renn 1991). According to SARF, risk signals can become amplified through social processes to an extent that the public perception and response to a specific risk diverges from expert assessments (Kasperson *et al.* 1988). Such processes may have potentially deleterious secondary and tertiary effects, or 'ripples' (Sutton and Veil 2017).

SARF ascribes the mass media a 'pivotal role as a "station" relaying "signals" and constructing public representations of risk' (Murdock *et al.* 2003, p. 156); i.e. the salience of messages can be actively enhanced as they are filtered through the media, alongside an increase or decrease in the volume and nature of information available (Pidgeon and Barnett 2013). It has long been recognised that the mass media are central players in constructing and disseminating information and knowledge about risk to the public (Kitzinger 1999; Tulloch and Zinn 2011). The mass media has traditionally been viewed as the primary source of information that the public have about risks (Beck 2009) and the most important source with regard to environmental issues (Bengston and Fan 1999). Hence, the media frame how risks are made salient (Petts et al. 2001) and shape risk perception (Allan *et al.* 2010). According to Entman (1993), issue framing in the media performs four interrelated functions: defining problems, diagnosing the causes, and making moral judgements about the causes and suggesting remedies. These functions are most often connected to common cultural values and anchors,

and composed of both framing and reasoning devices (Gamson 1988; Van Gorp 2007). The concept of frames draws attention to the way in which the media shapes news items in terms of latent meaning structures (Van Gorp 2005), and directs attention to how latent meaning is invariably rooted in, and hence invokes, a broader, historical field of events. Rendering the historical field visible and exploring how representations of previous events are used to substantiate the existence and nature of current issues is a crucial step toward bringing SARF 'in line' with a contemporary media. This technologically dependent and complex media is radically different from when SARF was originally conceived (Sutton and Veil 2017) and facilitates, if not necessitates, reflecting on how contemporary journalistic practices are increasingly entangled with social media content. By its nature, social media means that past events and historical occurrences are always available to be drawn on to make sense of the present. Hence, understanding the ways in which the historical field is made present better enables communicators and policymakers to anticipate likely configurations of public and media attention.

While acknowledging the complexity of relations between both the psychological and social processes and the various actors which SARF considers, a 'risk event' is generally depicted as the start of the social amplification process; e.g. an accident or recognition of adverse effect (Renn *et al.* 1992). Indeed, the originators make clear in their response to initial critiques of SARF that 'the amplification process […] starts with either a physical event […] or a report of environmental or technological events…' (Kasperson 1992, p. 159). Whilst they acknowledge that 'social processes may transform, reconfigure or "reinvent" the [risk event, without altering the magnitude of its consequence]' (ibid. 164), this contention remains undeveloped. Moreover, while some risk events have been considered as occurrences specific to particular times and locations (Driedger 2007; Kasperson *et al.* 1988), others are more difficult to locate both temporally or spatially. Instead, they take place across years or months and may involve

multiple geographic locations. A factory explosion may be characterised in the former sense because it occurs across a short time span and is geographically localised, with a discrete and local population experiencing its immediate effects. In contrast, some events are less determinate, being socially and geographically dispersed and temporally protracted or even cyclical, e.g. 'environmental risk events' such as seasonal dengue fever or smoke haze (Ng *et al.* 2017). Prior to these events occurring, the risks remain latent. It is thus useful to consider what has to occur for these risks to become salient such that they have 'eventness' conferred on them (O'Carroll 2015). One might argue that the media is a crucial factor in this process. Given that the interplay of media and experience is complex and co-constitutive (Davis 2017), the media response actually becomes part of the event it reports on. Hence, establishing the boundaries of an event is somewhat arbitrary. According to (Žižek 2014), it is difficult if not impossible to differentiate the cause from the effect leading to the ascription of something as an 'event'. The authors of SARF have noted that the concept of an initiating event does not imply that a baseline of true risk exists; that 'risk is conceptualized partly as a social construct and partly as an objective property of a hazard or event' (Renn *et al.* 1992, p. 140). However, this explanation does not clarify how the subjective and objective properties of risk coincide such that 'eventness' can be conferred. Thus, where or what are the boundaries of an event, and where does it begin and end temporally, spatially and in terms of its effects?

Studies employing SARF to explore risk perception have tended to focus on 'discrete' events, e.g. hazardous waste spillages and train wrecks (Kasperson *et al.* 1988), rather than on occurrences that are diffuse, always-already historically rooted and that define a recursive and open, fluid [social] object (Mol and Law 1994). In this paper we characterise such occurrences as *dispersed events*. Bringing this notion to SARF, while ripple effects, for example, are seen as a consequence of the event, they are neither seen in a recursive sense, nor as historically retroactive; i.e. always rooted in and emanating from points in the past and always reshaping

that past as they ripple forward. Those studies that have attended to the history of an event tend to focus on similar occurrences of a type, exploring for example the manner in which risk perceptions around oil spills become anchored with specific occurrences (Leschine 2002), or time-series analyses of how newspaper attention to flu affects public reaction (Trumbo 2012). Hence, if some risk events are better thought of as dispersed, what are the implications for SARF and its application?

Aims

Situating our analysis in relation to SARF, the aim of this paper is to explore the notion of what we describe as a dispersed risk event around ash dieback disease, *Hymenoscyphus fraxineus*[1] in the UK, and its emergence as an object of media attention in 2012. We assess the connection between traditional media coverage of dieback and the extent to which that coverage drew on a broader and historical field of other issues and objects.

The paper unfolds as follows: First, we outline dieback, describing the trajectory and nature of media attention it garnered. Next, we reflect on dieback and its status as an event. We then outline our empirical work, a frame analysis of UK national newspaper articles, to situate dieback in relation to a broader and historical field of how the media have reported on other tree health issues in the UK. We argue that previous tree diseases are precursors of the way in which dieback was represented in the media in the sense that they were invoked in the reporting of dieback to warrant particular points. We highlight the salience of questions of 'blame' and their entanglement with dieback and other tree issues to outline the importance of exploring how contemporary understandings of risk events reveal and re-present historical concerns. We suggest that the visibility of the blame frame around dieback was in-part established by virtue of previous events being enrolled. Dieback is not only presented in a discourse of being 'the latest in a long line', but with the mismanagement of government as being the 'reason' why

this long line continues. Finally, we reflect on the implications for SARF of considering dispersed risk events.

Ash dieback disease in the UK

Ash dieback disease, first observed in Poland in the 1990s (Needham *et al.* 2016) and subsequently spreading widely in Europe[2], was first discovered in the UK in a Buckinghamshire nursery in February 2012. It had arrived from the Netherlands on a batch of imported ash saplings (Urquhart *et al.* 2017). Later in 2012, *H. fraxineus* was found on recent plantings of ash in several locations across Britain and in the wider environment in East England. Media attention to dieback in late 2012 was intense and attributed by some commentators as a significant driver behind the subsequent government response (Heuch 2014), and responsible for tree health becoming a major public concern (Woodward and Boa 2013). Whether we view risk as an objective property of the world, separate from our perception, or as a subjective reflection of the uncertainty around potentially deleterious outcomes and events, the increasingly complex interactions between different actors makes measuring and defining risk problematic (Aven *et al.* 2011). Thus, whilst *H. fraxineus* can be construed as an objective agent of risk, dieback as a risk event connotes a socially constructed state of affairs that draws in and on different actors and dimensions such as public and media attention, scientific knowledge and policy practice.

According to (Tomlinson 2016), media attention to dieback comprised four distinct stages: the discovery of dieback and its representation by the media as a significant threat, its spread to the wider environment, government action including a major summit and survey to establish the range of dieback and, finally, acceptance that it was too late to prevent its spread or eradicate it. The first of these phases witnessed the apportioning of blame against the government and plant health authorities, primarily for failure to enact legislation mitigating

against the import of dieback on ash stock (Fellenor *et al.* 2017; Tomlinson 2016). In the context of risk events, rhetorical and judicial framings and language are used to define the event and to allocate blame (Hart 1993). Blame is central to the political process (Hood 2008) and at a community level is a dominant form of explanation (Douglas 2003). How news is framed in terms of blame and responsibility, influences how people make decisions about how to act with regard to social problems (Iyengar 1994). Thus, it is not surprising that blame became entangled with dieback in the media.

From the SARF perspective, a risk event has certain features with the potential to ignite public concern. If we consider dieback as a risk event, it is useful to consider which of its features contributes to its event status. Risk signals are images, signs and symbols that constitute a text in such a way that a perception of risk evolves (Kasperson *et al.* 2003). The signal value of an event, i.e. what it foreshadows in terms of higher order impacts, systematically relates to characteristics such as its familiarity or novelty and how uncertain its consequences are (Kasperson *et al.* 1988). Signal value also relates to those features most likely to attract media attention (Pidgeon and Barnett 2013). These media triggers relate to, for example, blame, political conflict and the potential for widespread exposure to the risk. Such attributes are reflected in dieback's 'focal power derived from the perceived scale and nature of its impact, the initial attribution of blame on the government, the government's war-like response, and ash's status as a threatened native tree ' (Tomlinson 2016, p. 174).

Consideration of the way in which prior events affects future understanding of risk is usefully informed by work of Barnett and Breakwell (2003) on the 'hazard sequence'. The premise is that notifications about a risk or hazard, such as a government statement or media coverage, do not occur in isolation but instead involve a temporal sequence of related instances; i.e. a hazard sequence. The sequence of notifications about the hazard are made sense of in terms of existing

'hazard templates'; schema-like frameworks. A hazard template includes information about the hazard as well as the organisations and groups involved in managing it.

Extrapolating the hazard sequence to the blame levelled at the government around dieback, the template with which blame was interpreted might involve negative attributions about the competence of the government to manage such problems, based on their track record. In this case, the preceding record included the abortive public forest sell-off but also long-standing policies. Knowledge of the hazard template can therefore sensitise risk communicators to how subsequent notifications might be anchored and will be 'indicative of the potential for risk amplification' (ibid. 305). Analysing the broader historical field around risk events and how they are framed enhances how we understand the evolution of risk amplification. The hazard sequence goes some way down this path. We seek to extend this by exploring not only how the dieback event was constituted in the media with reference to historical tree health issues but also, in doing so, how these issues were themselves re-presented in light of dieback.

To recap and to formalise our aims, this paper addresses three questions:

- What was written about dieback in the mass media and how was it framed?
- How did dieback connect to historical tree health and other issues in the media?
- How were other tree health issues re-presented in light of dieback?

Methods

Data collection

Nexis[3] was used to collect all UK national newspaper articles addressing dieback from their first appearance in late 2012 until 31 December 2015. As each article was read, instances of other salient and tree health issues were noted. Nexis was then used to collect all articles pertaining to these tree health issues from the date of their first appearance in UK national newspapers until 31 December 2015 (table 1). All articles were retrieved in full as pdf files

and also as headline only Excel spreadsheets, from which we were able to record article volume across time.

Year	Oak processionary moth (*T. processionea*)	Phytophthora ramorum	Ash dieback disease (*H. fraxineus*)	Great spruce bark beetle (*D. micans*)	Chestnut leaf miner (*C. ohridella*)	Emerald ash borer (*A. planipennis*)
2000	0	0	0	0	0	0
2001	0	0	0	2	0	0
2002	0	9	0	6	4	0
2003	0	17	0	1	0	0
2004	0	15	0	0	0	0
2005	0	1	0	0	3	0
2006	6	2	0	0	25	0
2007	11	4	0	0	17	1
2008	10	12	0	1	19	0
2009	6	8	0	2	21	2
2010	6	10	0	1	18	0
2011	15	16	0	2	30	1
2012	36 (22)	46 (34)	507	10 (8)	35 (8)	5 (5)
2013	32	22	216	0	18	7
2014	23	2	38	2	9	1
2015	0	10	64	3	4	9
Total	**145**	**174**	**825**	**30**	**203**	**26**

Table 1: Annual volume for selected tree pests and pathogens newspaper articles. Figures in brackets indicate articles including the selected pest/pathogen *and* dieback.

Analytic approach

Given our aim of discerning the media framing of dieback as a 'dispersed' risk event, we opted for a framing approach because it facilitates the interpretation of articles at the level of symbolic devices and patterns as a coherent textual infrastructure, rather than merely in terms of content (Hertog and McLeod 2001). Consideration of a text's framing also enables consideration of the 'the complex interaction of texts with an active audience engaged in negotiating meaning' (ibid. x). Drawing on the work of Gamson (1988), Entman (1993) and Van Gorp (2007), we developed a matrix which enabled identification of frame elements, comprised of (1) framing

devices and (2) reasoning devices which deal with the justifications that account for such patterns (table 2).

Reasoning devices				**Framing devices**				
Problem	**(Causal) interpretation**	**(Moral) evaluation**	**Solution**	**Metaphors**	**Exemplars**	**Catchphrases**	**Depictions**	**Visual images**
It is not clear how far dieback will spread.	The lack of clarity of how far dieback will spread or how it got here leads to *precautionary measures* and the implication of specific vectors.	*When foresters condemn a tree as "past it", they are thinking about its timber value, not its biology.*	Despite uncertainty with the vector of spread, *"a ban on the import of ash trees will combat the threat of dieback"*	*The slow poisoning of a landscape left undefended by Government and complacency.*	*10 cases of the disease were confirmed in East Anglia*	*Ashmageddon*	*Disease which killed 90% of Danish ash trees is found to have spread to British countryside.*	Image of a healthy ash tree in a field of rape

Table 2: Frame matrix with exemplars (relating to a range of pests and diseases) extracted from media items.

With an initial focus on dieback, we extracted all textual elements that matched the devices in our framing matrix. This involved iterative reading of articles in chronological order, adopting a thematic-analytic style in that as we moved through the data and encountered new framing elements we would return to previous articles to ensure that we had not overlooked these, mirroring the iterative approach used to check codes. We then adopted the same approach, using the framing matrix, to extract relevant elements from all other tree heath articles.

To determine the most prolific frames, we assessed each column in our matrices in terms of the most frequent elements, summarising these in our own words. This facilitated the recognition of substantial shifts in frame across time. Some frame elements cluster together systematically in a specific manner, forming a pattern that can be identified across several texts in a sample (Kohring and Matthes 2002; Matthes 2009; Matthes and Kohring 2008). Hence, we also noted if matrix elements clustered together and, if so, gathered them together under a key descriptor such as ‘blame’, ‘spread’ and so forth and which could be discussed in a descriptive manner.

Results and discussion

Media attention to dieback during the peak period and key insights

Nexis returned 825 national newspaper articles (figure 1).

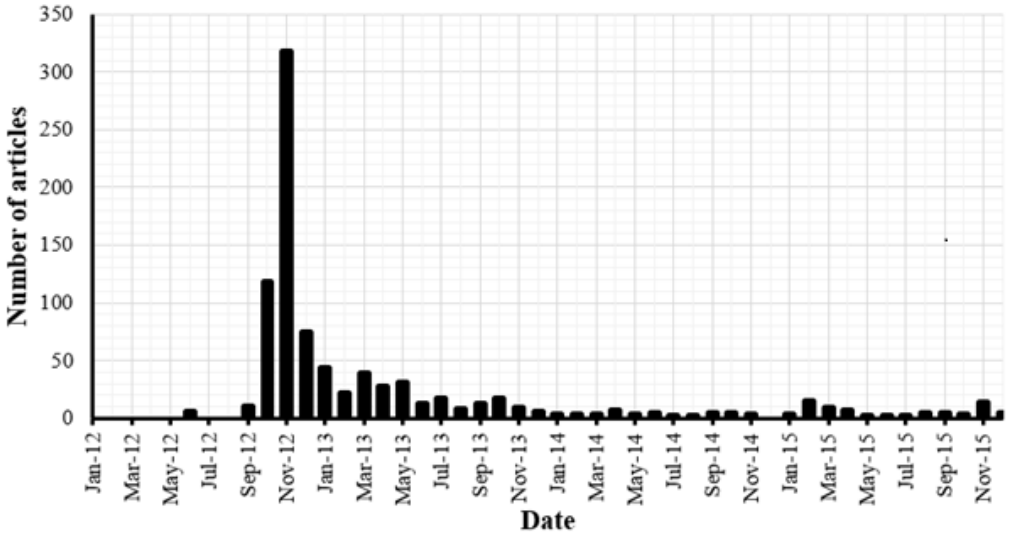

Figure 1. Monthly number of dieback articles in British national newspapers January 2012 – December 2015.

Articles about dieback first appeared in June 2012; five in total. No articles appeared in July or August, and ten in September. The number increased dramatically through October, peaking on November 2nd. By November 18th, numbers were declining, averaging less than five per day. Of the five hundred and seven articles that appeared in 2012, two hundred and twenty occurred between late October and mid-November. Figure 2 illustrates the daily coverage for the peak period and indicates not only the rapid rise and fall in volume of stories about dieback but also the day-to-day ebb and flow. This is situated against significant government notifications and events relating to dieback.

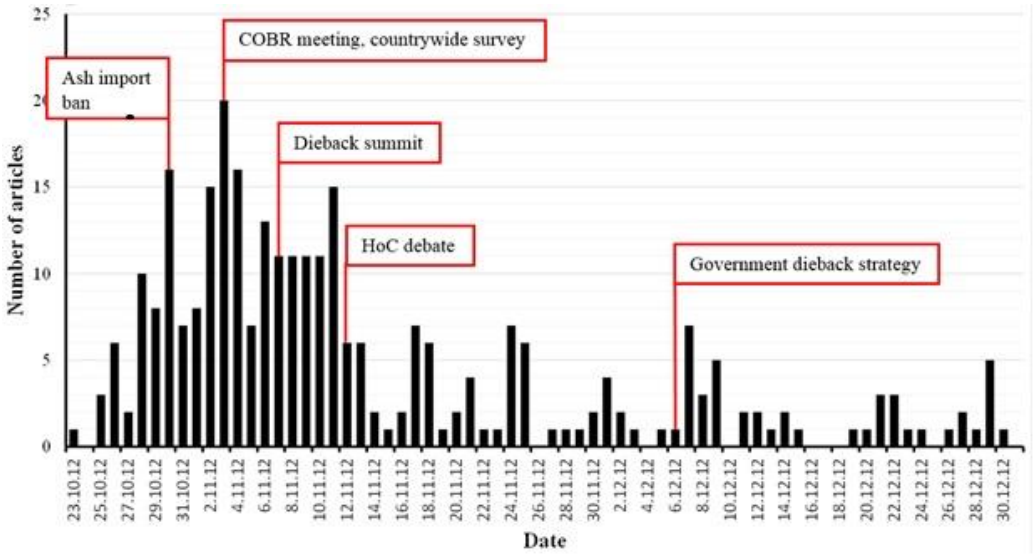

Figure 2. Daily number of dieback items in UK national newspapers and significant government action/notifications.

Early articles presaged the threat of the disease, describing its spread throughout Europe, and raising the issue of tree pathogens in general; such references increased in number alongside, or as part of, dieback articles. The 'relaxed' nature of UK import policy was noted and a key feature was that in 2009 the Horticultural Trades Association (HTA) had written to the UK Government asking for a ban on ash imports, to no avail[4]. In early October, articles reported that an ash import ban was likely by early November, and yet it was over a month until this was finally effected. By late October, articles were establishing causal frames around ministers 'hiding' behind EU laws to avoid imposing an earlier ban and, in relation to this, for example, bovine spongiform encephalopathy (BSE) was used to depict that EU countries could impose bans, as the French did to British beef during the BSE crisis. In late November it was reported that dieback in Ireland would affect production of hurleys. At this time, media interest had declined to a few articles per day apart from occasion spikes, e.g. in late December when it was reported that seventy thousand ash trees were imported and planted by the Forestry Commission (FC) after it was allegedly warned of the danger of the disease.

Albeit some temporal overlap between individual frames, a broad trajectory of framing was discernible: where dieback would 'spread' and its potential effects, what could be done to eradicate or 'fight' it and finally that it was 'too late' to prevent the spread. The frame of 'spread' was essentially characterised by the uncertainties around where dieback would spread and how fast, and coincided with uncertainties regarding whether the organism had arrived on plant imports or had been [wind] blown from Europe across the North Sea or English Channel. In terms of individual frames, the frame of 'fight' against dieback included specific material action that had or could be taken, such as cutting and burning trees, setting up protected zones, using specific pesticides. These intersected with a metaphorical deployment of the 'fight' frame. In line with Joffe (2011), it might be suggested that the metaphorical deployment of the fight against dieback interacts with concrete action and is entangled with other metaphorical representations which were apparent. These included 'invasion' and the otherness implied by framing device catchphrases such as 'close the borders' and depictions including Britain having a history of keeping out invaders. The significance of which is that it extends the framing of dieback by enrolling a wider field of issues. Eventually, the frame of 'too late' proliferated, i.e. that dieback would not be eradicated.

From the outset dieback was anchored to Dutch elm disease (DED), a pathogen which, since a renewed outbreak in the late 1960s, has killed most elm trees in many parts of the UK (Sansford 2013), with headlines in the run-up period to October 29th featuring emotive risk signals such as 'killer', 'disease' and 'spread'. These prefaced the depiction of the spread of ash dieback disease as inevitable, emphasising the consequences and underlining the extent to which the UK Government were already implicated in the problem.

The peak of media attention coincided with a cluster of high profile events, such as the ash import ban, around the beginning of November. As some scholars suggest, heightened media attention to an issue often attracts greater policy attention at the start of the issue cycle (Downs

2016). According to Hood (2007) governments demonstrate a 'negativity bias' in that negative attention, such as information about mismanaged affairs, produces greater impact on policy and resultant action than positive information. A sensitivity to negative media coverage and a reactive response to mitigate blame and maintain reputation can, potentially, lead to initial short term solutions and then longer term solutions as media attention fades (Yanovitzky 2002). This reflects what occurred with dieback, given, for example, the rapidity of the import ban after the onset of intense media attention and subsequent longer term policy changes affecting the plant health and biosecurity field, such as the UK plant health risk register (Baker *et al.* 2014).

Given that dieback is associated with a shift in tree-health policy, it is important to think about this in an evolving media context. Some events, dieback amongst them, can assume iconic status in both the public and policy consciousness. The newsworthiness of a story reflects the need to produce impactful articles, as well as the values of the journalists and audiences (Hughes *et al.* 2006). The types of event which might not only have an immediate news value but also effect rapid policy shifts tend to incorporate media triggers and risk signals which connect, for instance, to harm which can be linked to specific casualties and hence to specific media audiences (Alaszewski and Brown 2011). These were largely absent with dieback, despite media headlines depicting catastrophe and so forth. Thus, whilst the SARF literature represent 'events' in a relatively straightforward way, we suggest that they are better understood as composites of other [historical] issues. This understanding is appropriate for the tree-health policy-shifts attributed to dieback (Tomlinson 2016) given that 'the proximate origin [of] policy change varies from one case to the next […] when one starts to trace the history of a proposal or concern back through time, there is no logical place to stop the process' (Kingdon 2013, p. 73). Of note was that as we moved through the trajectory of dieback, the decline in prominence of frames ostensibly about dieback per se, e.g. how to fight it, gave way

to a more consistent concern with other tree health issues, the significance of which we now discuss.

Other tree-health issues

In relation to our second research question, how did dieback connect to historical tree-health and other issues in the media, we noted that articles often included references to other tree pests and pathogens (TPP). Most frequent were Oak processionary moth (*Thaumetopoea processionea*) (OPM)[5], ramorum (*Phytophthora ramorum*)[6], Horse chestnut leaf miner (*Cameraria ohridella*) (HCLM)[7], Emerald ash borer (*Agrilus planipennis*) (EAB)[8] and the Great spruce bark beetle (*Dendroctonus micans*) (GSBB)[9]. As illustrated previously in table 1, the number of articles per year for these TPP, pre-dieback, was low. During 2012, each separate TPP experienced a significant increase in number of articles; the exception being HCLM, which had demonstrated greater consistency since 2006 and hence a relatively moderate increase in 2012. In addition, in 2012, thirty four articles about dieback included mention of ramorum and twenty two included OPM. DED appeared in one hundred and eighty eight articles in 2012, anchoring dieback in one hundred and twenty five of these, but only twenty-seven in 2011. Media attention to HCLM increased in conjunction with the first appearance of OPM in the media in 2006 and then peaked with the later appearance of dieback, declining rapidly thereafter. The volume of articles about all TPP declined dramatically from 2013. Articles reporting dieback were also depicted with an ever-expanding range of threats to the environment from animal and plant species, including the grey squirrel; an invasive species present in the UK since the early 1900s. Unlike other TPP, HCLM was included in relatively fewer articles with dieback in 2012. This may reflect its salience in its own right, in terms of recurrent articles about the loss of conkers, anchored in terms of Britain's heritage of the game of conkers, and thereby making it of general interest, including other areas of media attention such as its suitability for citizen science campaigns (Pocock and Evans 2014).

TPP were often cited to establish frames around dieback, for example ‘ash dieback is just one of the threats laying siege to Britain's trees’[10]. Not only did dieback articles enrol other tree pests and pathogens but also the advent of dieback facilitated greater attention being paid to these other threats. It can be speculated that this reflects how media attention to an issue enhances the salience of similar issues and that media attention is usually transitory (Downs 2016; Kingdon 2013). Articles about other TPP proliferated in late 2012 because they served to establish broader frames through which dieback was reported, i.e. dieback was in part substantiated through these other pests and pathogens. Reference can be made here to the hazard template in that the template through which dieback was interpreted evolved from the framing of a tree health issue to one involving a broader existential threat.

It could be argued that the proliferation of articles about other TPP was unrelated to dieback or involved the discovery of new outbreaks of each given threat. However, the content of articles suggest otherwise. For example, the earliest GSBB articles, in 2001, enrol the pest as exemplar of one threat amongst many due to climate change. In 2002, all articles about GSBB represent its spread in the UK as necessitating timber movement restrictions. In subsequent GSBB articles these issues wax and wane. In 2012 GSBB articles rehearse similar framings as those from 2001 but with ash dieback added to the list of threats. Hence, not only can we conclude that the 2012 proliferation of media attention to GSBB was connected to dieback but also that the template for the broad threat of climate change and alien species existed at least ten years prior. Hence, the connections between dieback and other tree issues reflects the observation, with regard to SARF, that ‘understandings of dieback and its risks would not be developed in isolation and that it is useful to understand what other phenomena are being linked to and drawn upon [in its representation].’ (Pidgeon and Barnett 2013, p. 10).

Unlike other risk events, such as earthquakes and floods, dieback did not hinge on a discrete high profile event. Instead, other tree issues were drawn on, suggesting their significance in

anchoring dieback and that dieback was constructed from historical issues. Thus, the character of dieback as an 'event' is quite different from many other risk events. Its boundaries are blurred in the sense that if dieback was substantiated through these other pests and pathogens, we might be better placed thinking about it in terms of a risk that has been constituted from historical and latent issues. From the risk research perspective, this necessitates a reconsideration of the period across which an event occurs.

In summary, other tree pests and pathogens were drawn on in media articles. As such, dieback as a risk event needs to be considered in terms of a broader and historical field. Such consideration shifts our focus away from proximal issues in a way that enables us to trace the evolution of dieback and how the broader domain of tree health came to be represented in the media. Given that blame was a significant frame around the emergence of dieback in 2012, in the following section we consider how this frame evolved and how other events in tree health were implicated.

Blame

In relation to the SARF, blame is an explicit aspect of how risk perception connects to media coverage of an event (Kasperson *et al.* 1992). If the nature of blame is influenced by existing events and states then it is useful to explore the historical trajectory along which blame evolves. Blame is a dominant media trope and, according to Alaszewski and Brown (2011), disastrous events have become increasingly important partly because of the need to apportion blame for the failure to identify and prevent risk. While dieback does not constitute a risk in the same way as an earthquake or flood, it did attract media attention in terms of who or what was to blame for its introduction to the UK and a significant aspect of this frame implicated the burgeoning global trade in plant material. Yet prior to the emergence of dieback in 2012, the global plant trade was already an object of media attention, for example, 'Invasive species are finding their way to Britain in increasing numbers, largely because of the globalisation of the

timber trade'[11]. An explicit moral framing of tree imports, i.e. 'eco-disaster is inevitable if we import trees'[12], was also apparent. Global trade is implicated in the blame around dieback in that a significant element of media articles initially focussed on the governmental failure to institute an import ban on ash trees and saplings, which had been called for as early as 2009 (Heuch 2014). Hence, exploring the broader and historical field of articles with which dieback is connected reveals the dimensions of a blame frame[13] taking shape before 2009. We explore this frame by focussing on the tree pathogen, ramorum, and the pest, OPM, before turning to dieback.

Ramorum and blame

Unlike dieback, blame was not explicit around ramorum in early articles about it. Initially, it was reported that the UK could ban timber imports from the USA, but not from EU countries because existing trade regulations prevented this[14]. The cause of ramorum as originating elsewhere was explicit in that 'two of the diseased viburnum samples found at British nurseries were from the Netherlands'[15], but lacked direct implication of governmental failure. This is in contrast to the immediate and explicit framing of the ingress of *H. fraxineus*. In December 2003 the 'Dutch [were] blamed for oak disease'[16]. By 2004, blame had crystallised, for example, in how 'suspicion has fallen upon the Far East, with infected plants entering the UK via the booming trade in international plants'[17] and 'these blights are so successful because the international horticulture trade has introduced new pathogens to new hosts', i.e. a frame was emerging where blame could be apportioned to external sources. In this sense, it is interesting to reflect on the significance of blaming 'global trade' and the original site of TPP in terms of displacement. Positing the origin of the problem in 'the Far East', for example, can be thought of as displacing blame via a process of 'othering' and the subordination of other cultures (Maestas *et al.* 2008; Wachs *et al.* 2012), fitting with the broader framing of dieback as an existential threat seeking to breach UK borders. Blaming 'global trade' is also a process of

displacement whereby the individuals and organisations responsible for and enacting global trade are rendered abstract, in contrast to work which suggests that blame and responsibility framings in the media are often apportioned to individuals or organisations (Holton *et al.* 2012).

From the outset, a significant attribution made by the media concerned the uncertainty about where ramorum would spread, what it was likely to effect and the implications for nurseries. This uncertainty connected to implicit blame in that media articles explained how budget cuts were reducing the ability of scientists to correctly identify pathogenic species: 'no money to investigate differences between the European and American [ramorum]'[18]. An article from May 2002 included the moral evaluation that 'lack of money is damaging one vital group of specialist researchers who […] guard the biodiversity of the planet'[19]. Both a lack of funding and a lack of uptake on undergraduate plant pathology courses was seen as leading to a decline in the number of expert plant pathologists. Ten years later in 2012, the issue of plant pathology and funding manifested as a point of contention in the media with headlines repackaging the problem, this time as a solution for dieback: 'Research will keep Britain's trees healthy.'[20] Overall, the blame frame around ramorum not only incorporated proximal issues, such as plant imports, but also historical issues re-rendered, such as funding cuts in plant pathology training.

In summary, and in relation the question of how were other tree health issues re-presented in light of dieback, the issue of infected imports and blame was implicit early on but only crystallised later. Moreover, ramorum articles also raised the issue of funding and plant pathology research, reflecting the uncertainty in identifying the pathogen responsible for dieback. By the time dieback emerged in 2012, the blame frame around dieback was inevitable and represented a good fit for dieback, given the history of issues that informed it.

OPM and blame

Explicit and directed blame for the arrival of OPM when it first appeared in the UK in 2006 was not a feature of media coverage. It was reported that 'Britain's policies are based on trade so it does not often ban imports [since there is] no requirement for anybody to control the moth.'[21] The first explicit mention of blame occurs in 2007 when OPM is conflated with grey squirrels and DED, with a causal reasoning such that 'both could have been eradicated if the authorities of the day had done a better job early on.'[22] A further aspect of blame around OPM was the entanglement between the import trade and climate change. OPM appears with climate change in thirty-nine articles; fourteen of these also included dieback. OPM is depicted as arriving in the UK under its own volition 'after hitching a ride from Italy on some trees bound for a nursery.'[23] However, articles made it clear that the ability of OPM to gain a foothold in the UK reflected a more conducive climate caused by global warming. According to the FC pest risk analysis for OPM, climate change is regarded as increasing OPM's range, as is the trade in trees for instant landscaping. This 'official' information about OPM conveys the same themes as media coverage and is the type of resource that journalists draw on. In 2002, climate change is suggested as one cause for the increasing prevalence of TPP in the UK. The causal centrality of climate change is firmly established in 2009: 'the reasons for [pathogens] sudden arrival are complex but one single factor stands out: climate change.'[24] This suggests that the reality and the representation of environmental issues consist of interconnected challenges (Byhring and Knain 2016), i.e. the entanglement of trade and climate change. These became dimensions of the blame frame around dieback.

In summary and in relation the question of how were other tree health issues re-presented in light of dieback, blame was not explicitly attributed to oak tree imports bringing OPM into the UK when it first arrived in 2006 despite it being associated to tree planting as part of a development. One year later OPM had been conflated with other threats and the similar claim of governmental failure to act sooner, which eventually became a major attribution around

dieback, transforming OPM in the process to an existential threat and not the 'hairy invader' of early depictions.

Dieback and blame

When dieback emerged as an object of media attention in late 2012 a blame frame rapidly took shape reflecting government inaction with regards the failure to implement a precautionary ash import ban (Fellenor *et al.* 2017; Tomlinson 2016) . An attribution of responsibility framing is a common feature of news, especially in relation to crisis events (An and Gower 2009). This was the case with dieback, with explicit responsibility aimed at the UK Government having crystallised by mid-October: 'When the danger was first identified three years ago, the government response was that the disease was already too widespread to stop'[25] and 'if ash dieback spreads through Britain, Cameron's administration will be solely to blame.'[26] According to (Holton *et al.* 2012), the media may be expected to suggest who is responsible for solving issues and this was also apparent, although often entangled with responsibility; 'The Government is finally acting decisively against ash dieback disease – why not sooner?'[27] Blame also drew in different aspects of Government involvement, 'Growers blame spread of ash dieback on 'chaotic' grants'[28] and delegated blame to other organisations: 'the problem lies with […] with nurseries, and consumers, not caring about the provenance of the plants.'[29]

By late 2012, media coverage of other tree health issues and their convergence with climate change and global imports had for several years been acting to sensitise the media, setting the scene for some of the major attributions of blame around dieback. We conceptualise this not in terms of a linear and punctuated hazard sequence, but as a continual evolution involving a broader field of proximal and distal media issues. In terms of the causal reasoning which framing is predicated on, this means extending our analytic lens both 'synchronically' and 'diachronically', to understand the scope of an event. We can think of this in terms of the various dimensions of the blame frame having travelled through media articles across time.

Hence, the blame that evolved around dieback is multidimensional and can be traced historically via existing tree health issues. It also encompasses other phenomena that were apparent from our reading of media articles. These included the aborted public forest sell-off in England, foot and mouth disease (FMD), BSE, and human migration. For example, FMD is used in relation to dieback to anchor earlier failures in biosecurity. It is also used to frame ramorum in terms of an example of 'locking the stable door once the horse has bolted'[30]; i.e. the need for specific biosecurity practices for tree workers and the model of the Defra operation to identify and destroy infected trees.

A blame frame as a field was evolving many years before dieback. This is one aspect of thinking about dieback as a dispersed risk event that crystallised in this field during an era when the nature of the traditional media, in conjunction with publics empowered by new communication technologies, was transforming towards playing an even more active role in the political arena (Callon *et al.* 2009; Chadwick 2017). Dieback can be thought of as contributing to a policy shift in the domain of tree health, but this is more clearly understood if the historical and broader media context is taken into account. The mass media increasingly play a role in identifying disasters and providing a forum for converting local incidents into national scandals (Martin and Evans 1984), which brings us back to the role of blame. From this perspective, blame is part of the fabric of reporting disastrous events, rather than necessarily being particular to dieback in itself. In this sense it was inevitable that blame would characterise the framing of dieback. The role of the government for not instituting an import ban can be thought about as the frame 'surface', which is predicated on and yet occludes, or black-box's, the broader aspects of how the frame has evolved via issues such as TPP such as OPM.

In summary, figure 3, below, provides a timeline illustrating the specific tree pests and pathogens in the newspaper articles we explored and their respective key framings at different

points across time. As discussed above and of note is the convergence of individual TPP toward a general threat, ongoing anchoring with global warming and the problematisation of plant imports.

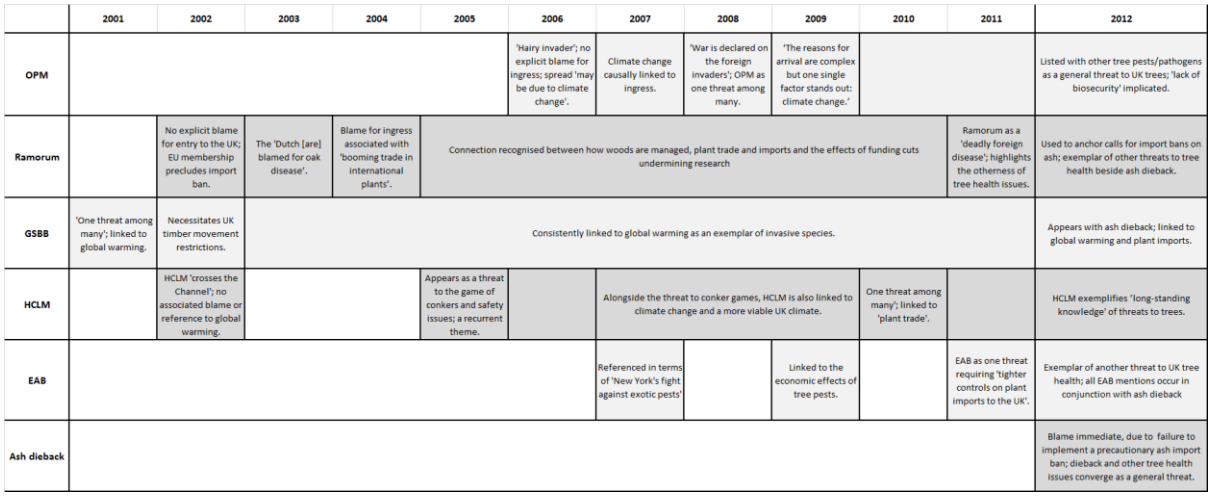

Figure 3. Timeline illustrating specific tree pests and diseases (TPD) in newspaper articles and key framings across time.

Conclusion and implications

In this paper, we have presented a frame analysis of media articles about dieback and have considered the implications of thinking about dieback as a dispersed risk event for the SARF. Key findings are, firstly, that with the advent of dieback we witnessed in the media a modest proliferation of articles about other tree pests and pathogens. We suggest that this proliferation was a result of other tree-health issues being drawn into dieback stories as a means of establishing the broader frames through which dieback could be reported. Secondly, many articles post-dieback represented a general threat of invasion to the UK from an amalgam of both plant and animal species. Dieback was substantiated through these other threats, with their own trajectories in the media, and this blurs the boundaries when thinking about dieback as an event in itself. Hence, exploring the broader field of tree-health issues that the media have attended to over recent years enables an understanding of the evolution of the blame frame around dieback, and how attributions such as governmental failure came about. Thirdly,

individual TPP such as OPM and ramorum were re-presented as an amalgamated threat, such that they lost aspects of their individual character and original framing.

In relation to the hazard sequence, it is useful to reflect on how dieback has affected the reporting of tree health issues in general. A change in the hazard template appears to be that tree health issues are now firmly framed as only part of a broader existential threat, which includes animals and other plants; i.e. the threat posed by any single invasive species is less salient than what 'invasion' signifies in general. Moreover, it is also interesting to consider how the hazard templates around tree health issues may continue to evolve or whether in fact there is nothing new to add. What kind of risk event might now further stretch and transform the template? For example, whilst we encountered a few articles about emerald ash borer, when, or if, this tree pest reaches the UK, will we witness the same degree of media attention as was afforded ash dieback and, if so, how will it be framed? This provides scope for future work.

In relation to our aim of exploring the notion of 'dispersed' risk events, thinking about dieback as an 'event' in itself means that the policy shifts around it involve a broader, historical field of other issues and concerns easily forgotten or obscured. While it is important to maintain the visibility of different actors and the various epistemic positions they represent (Rip 2003), some convergence of ideas is necessary so that different audiences can access them. This alludes to the manner in which the framing process invariably re-renders historical occurrences. Crucially, in this re-rendering there may be a tendency to overlook that 'history' involves a continual processes of construction, contestation and reification; that historical events are only unproblematic as a 'surface' or outcome. Thus, it is important for policymakers to bear in mind that past events *will* be drawn on, and re-rendered and enrolled in the construction and framing of present events. Hence, recognising the historical and dispersed nature of risk events has important implications for policymaking.

If issues that evolve over long periods of time are misrepresented as discrete and bounded events rather than are dispersed and linked to previous issues, policymakers may unexpectedly find themselves having to address much wider challenges arising from that broader set of causal actions. The consequences can be far reaching with varied knock on effects. For example, with ash dieback, had the government appreciated the potential convergence between expert recognition of the issue in 2009, historical analogues such as Dutch elm disease and the media/public response to biosecurity failure such as FMD, then they may well have instituted an import ban on ash saplings at a much earlier date. This earlier action may have avoided the intense negativity ascribed by the media and the erosion of trust from the plant trade sectors and publics. It could have encouraged an early start in the search for resistant ash for use in replanting or new planting schemes, which would reduce costs and add value in the long run. Indeed, the broader perspective/dispersed nature may also have been helpful in making the case for early action (including increased resources for surveillance to allow early detection and eradication of dieback resulting from airborne spore dispersal) and countering criticisms such as excessive regulation and constraint of trade; after all, the plant trade could have voluntarily have ceased to import plants. The wider recognition of biosecurity threats may now encourage collaborative government/sector action that might bode better for future control campaigns, like Emerald Ash Borer if, or when, it comes to the UK.

That greater heed should be taken of historical analogues of risk issues can be seen in the case of FMD, where direct comparisons can be drawn with ash dieback disease. For instance, despite an extensive FMD outbreak in the UK in 1967 that led to a large-scale inquiry with 'lessons to be learned', when a subsequent outbreak occurred in 2001, the government attracted negative media attention and accusations from the National Farmers Union that they had failed to respond with sufficient rapidity. A major factor shaping the spread of the epidemic was the dramatic increase in frequency and extent of movement of domestic stock that had occurred

since the experiences gained in 1967, and which was not immediately understood. However, there had also been a broader epistemological move from focusing on individual risk factors and disease ecology, to greater emphasis and understanding of the social and structural influences on health (Bailey *et al.* 2006). As such, taking a view of FMD as a [potential] dispersed risk event, one that drew in and on both proximal and distal experiences and knowledge, may have resulted in different outcomes in 2001. Indeed, lessons seem to have been learned. The 2001 outbreak resulted in much work being carried out to understand the social impacts and responses to FMD; not least to understand the impact on the wider rural economy and society and not just livestock keepers, as well as the development by Defra in 2004 of contingency procedures to be implemented in future outbreaks (Anderson 2008). Thus, when a further outbreak occurred in 2007, the response was rapid, the outbreak was contained and the media were less hostile.

Exploring dieback from within [historical] media articles enabled us to step back from dieback as an object and to consider how its attributes could be traced back through other tree-health issues and actors; metaphorically bracketing off the 'eventness' of dieback. Journalists make recourse to media templates when interpreting and presenting new events (Kitzinger 2000; 2004). Risk perception can be similarly influenced by sequential hazard notifications, most usually via the media and which also form part of a template by which risk perception is schematised (Barnett and Breakwell 2003). One aspect of the templates used by journalists is their enrolment of current events as evidence of an underlying persistent problem (Kitzinger 2000; 2004). From this viewpoint, the media attention to dieback can be thought of as representing existing problems in a translated form.

In relation to risk events and SARF, amplification results from a physical event or the recognition of an adverse effect interacting with psychological, social, institutional, and cultural processes and heightening perceptions of risk and shaping risk behaviour. For a risk

event, such as dieback, we suggest that the metaphor of amplification does not apply in the same way that it might to a more discrete event. Indeed, for public concern to develop around a potential risk issue, a discrete and initiating event such as an accident or disaster pertaining to the risk is not a necessary condition for concern to develop; as (Mazur 2016) outlines, with regard to the anti-fracking movement in the US. If, as we have attempted to demonstrate, the event in question can be thought of as a composite of historical concerns, then what is amplified, or attended to by the media in the present is the culmination of a long-standing if not ongoing process, rather than an immediate and localised response. The 'ripple' metaphor does not adequately capture this. We do not suggest that dispersed risk events differ in qualitative terms as such, but that it is instead a question of intensities and scale and that there is value in thinking about amplification as a continual process. As noted by Pidgeon and Barnett (2013, p. 3) 'lessons can be learned from the ways in which [such] risk issues develop, are handled and communicated.' It is important to keep visible the history around an event because assuming that risk events have a clear-cut beginning does not do justice to the social, cultural and political contexts within which the event occurs and is made meaningful by such contexts; contexts which are themselves subsequently re-shaped by the event.

The risk events which SARF-inspired studies have addressed tend to be spatially and temporally localised. Our analysis has demonstrated the value in allowing the analytic focus to incorporate more of the history of a risk event and viewing it as potentially blurred, socially, temporally and spatially diffuse and constructed from historical issues but always with the media providing a common infrastructure that gives 'publicity to positions and controversies' (Callon *et al.* 2009, p. 181). Considering events as dispersed and historically mediated in this way recognises the dynamic and fluid nature of social relations and risk objects and will help mitigate against a view of policy acting on a world where relations are static, inherently stable and hence incommensurate with reality.

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Notes

[1] We use 'dieback' to designate the attention to, and consequences of *H. fraxineus'*, ingress to the UK,
[2] H. fraxineus had not been identified until 2006 (Timmermann *et al.* 2011).
[3] Search terms, developed by reading extant literature, were (ash AND dieback) OR chalara OR (chalara AND ash) OR (chalara AND dieback) OR hymenoscyphus OR fraxineus. Duplicates were grouped.
[4] Prior to 2012 there had been no systematic surveillance for dieback in the UK (Sansford 2013), although the FC had been aware of the risk from dieback since 2008 and had discussed with the European Commission Plant Health Standing Committee whether an import ban might be necessary (HCDEB 2012). Given ambiguity with regard to the characterisation of the disease, specifically scientific confusion over the identification of the causal organism, it was assumed that dieback was related to the already endemic *H. albidus*. Hence imposing a ban would not be justified or be possible under EU law.
[5] Ramorum was first identified on nursery-grown rhododendron and viburnum in Germany and the Netherlands in 1993, and in 1995 on tanoaks (*Lithocarpus densiflorus*) and oaks in California (Vercauteren *et al.* 2011). It affects a range of plants, causing extensive damage or mortality. Many plants act as a host for the organism. In the UK, ramorum was first found in in 2002 and initially considered a threat to horticultural shrubs and native oaks. However, it later caused widespread mortality in commercial Japanese larch plantations. The first UK ramorum article appeared on January 11 2002 in response to its effects in California.
[6] OPM has been identified in practically all European countries and parts of the Middle East. OPM larvae pose a low level threat to human health via the immune response caused by exposure to the caterpillar's urticating hairs. (Rahlenbeck and Utikal 2015). The threat to oak trees arises through the caterpillars eating the leaves, leaving trees weakened and susceptible to attack from other pests. Media articles about OPM first appear in 2006. It was first identified in the UK on 20 imported fastigiate oaks (*Quercus robur* '*Fastigiata'*) planted in the car park of a housing development in Richmond.
[7] HCLM, first reported in Wimbledon in 2002 and subsequently spreading to most of England and Wales, causes extensive damage to horse chestnut tree leaves due to the sheer number of larvae, often resulting in leaves turning brown by mid-summer. (Pocock and Evans 2014). However, HCLM alone does not kill trees nor significantly affect their overall health.
[8] EAB is highly destructive to ash trees. While invasive in Europe and Northwest America, EAB is not yet present in the UK.
[9] GSBB damages and weakens trees when its larvae, laid under the bark, feed on the inner, woody layers. According to the FC, GSBB was accidentally introduced into the UK, most likely on timber, in 1982 and is now established in Wales and Western England.
[10] Observer, 25.11.2012
[11] Daily Telegraph, 9.1.2010

[12] Times, 3.11.2012
[13] A search of co-occurrence of 'dieback' with 'blame' or 'responsibility' or 'responsible' produced 117 articles. Given that the term 'blame' can be used in a rhetorical or literal manner, we did not assume that all 117 articles related to blame frames per se and instead used them to guide our reading and further searches.
[14] Daily Mail, 4.5.2002
[15] Daily Mail, 4.5.2002
[16] Times, 8.12.2003
[17] Guardian, 9.5.2004
[18] Times, 23.5.2002
[19] Times, 23.5.2002
[20] Times, 3.11.2012
[21] Daily Telegraph, 14.10.2006
[22] Daily Telegraph, 3.8.2007
[23] Daily Mail, 14.10.2006
[24] Sunday Times, 8.3.2009
[25] Times 28.10.2012
[26] Guardian 23.10.2012
[27] Telegraph 29.10.2012
[28] Guardian 2.11.2012
[29] Times 2.11 2012
[30] Times, 24.2.2004

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