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Framing Environmental Disasters for Nonviolent Protest: A Content Analysis

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ABSTRACT

This article presents a content analysis of news coverage of three environmental disasters: the 2014 Mount Polley mine leak, the 2010 Deepwater Horizon oil spill, and the 2011 Fukushima nuclear disaster. The aim is to better understand how political actors talk about industrial environmental disasters in their aftermath. Since most people understand dramatic events through news media, an examination of post-disaster media framing may begin to shed light on the variation of public response after disasters. Specifically, the findings challenge some prevailing assumptions about nonviolent protest mobilization and prompt a further investigation of the role of uncertainty in political participation.

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Globally, environmental protests have been on the rise. Climate strikes, demonstrations against "dirty" energy production, and protests against the destruction of biodiversity are but a few that have recently made the news headlines. Protests sometimes follow damaging environmental disasters, but more often, disasters fail to trigger large-scale protest movements (e.g. Flores & Smith, 2013). Since most people form opinions about dramatic events through news media, an examination of media framing[1] in the aftermath of environmental disasters may begin to shed light on this variation in public protest response.

The principal aim of this study is to expand our understanding of how different framing actors talk about environmental disasters in their aftermath. The presence of specific types of frames in the post-disaster news coverage in cases of disasters with varying public response may also indicate protest (de)mobilizing potential of such framing. To examine this potential, I conduct a content analysis of news media coverage of three major industrial environmental disasters[2] linked to varying scales of post-disaster protest: the 2014 Mount Polley mine leak, the 2010 Deepwater Horizon oil spill, and the 2011 Fukushima nuclear disaster. The content analysis considers both the tone of coverage and different frames, including disaster impacts, moral and emotional appeals, and industry positions.

There is, of course, a difference between reading the news, willingness to protest, and participation in protest. This analysis neither can nor aims to address all these factors as many of them are likely structural or individual. At this stage, the analysis is descriptive as it seeks to uncover patterns in the media coverage of environmental disasters linked to a diversity of post-disaster protest response.

While they do not suggest causality, my findings challenge established assumptions about the frames that may be necessary for large-scale protest mobilization. The analysis points to a lesser

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role of frames frequently believed to play a significant role in (environmental) protest – especially environmental frames and frames linked to emotions. This study also highlights the need for further examination of the role of uncertainty in political participation.

Disasters in framing research

The literature on media content after disasters tends to focus on disasters from natural hazards (e.g. Albrecht, 2021; Bohensky & Leitch, 2014; Houston et al., 2012). There has been a smaller interest in analyzing the prevailing narratives in the aftermath of industrial environmental disasters, which are a different type of phenomenon. Studies of industrial disaster framing tend to be of two types. On the one hand, scholars are interested in the presentation of specific types of information after disaster events. These studies have identified the types of frames that frequently appear in post-disaster news coverage, namely destruction, economy, and blame frames (e.g. Anderson & Marhadour, 2007; Friedman, 2011; Pantti & Wahl-Jorgensen, 2011; Tomkiv et al., 2016). Some have also identified factors that affect frame appearance in news coverage, including geographic scope of news media and proximity to disaster event (Molotch & Lester, 1975; Turcotte et al., 2017). These types of descriptive studies lack potential links to the intended or actual behavior of the recipients of frames.[3]

On the other hand, scholars investigate the role of news coverage of disasters in policy making. In this context, disasters are frequently understood as "focusing events" or "sudden, attention-grabbing events that help politically disadvantaged groups to push through messages suppressed by dominant groups" (Birkland, 1998, p. 53). At the core of this literature is the desire to understand how disasters change domestic policy agendas, not how they encourage or discourage public protest, although the two are connected (e.g. Birkland, 1998; Birkland & Lawrence, 2009; Bishop, 2014). Destructive or otherwise costly events like major oil spills, for example, may gain widespread public attention quickly and there is generally little convincing that activists must do about the need for a policy solution (Crow et al., 2017; Thistlethwaite et al., 2019).

Protest mobilization, however, requires a different set of conditions from those needed for policy change. Media framing of the issue at hand is an especially pertinent one (Cooper, 2002), understudied in the context of industrial environmental disasters and environmental protest. My research thus aims to identify the prevailing frames and tone of post-disaster news coverage and link the use of such frames and tone to political actors who may attempt to maintain or disrupt post-disaster public order. To this end, I pose three main research questions:

RQ1: What frames and tone dominate news coverage after environmental disasters?

RQ2: How do frames and tone vary by framing actor?

RQ3: How much space do specific framing actors get in news coverage after disasters?

Answering these questions may reveal (de)mobilizing frames or patterns that are unique to environmental disasters. Furthermore, an examination of media framing after environmental disasters may have implications not only for crisis communication but also post-disaster political stability. Communication of ill-preparedness for example, may decrease public trust in government, while communication of uncertainty may affect information seeking (and thus potential susceptibility to disinformation). It is thus important to know how frequently these types of frames appear in the post-disaster news coverage. The amount of space that specific political actors get in the media after disasters and the frames they use reveal both the degree of access and the choice of political strategies in disaster communication.

While my study cannot causally link specific frames to protest behavior, it goes further than previous descriptive studies in evaluating potential impacts of framing – its comparative design allows for an examination of patterns between the appearance of (de)mobilizing frames and observation of the size of post-disaster protest. In other words, the varying scales of protest in the examined

disaster cases are indicators of the (de)mobilizing potential of specific types of frames, tone, and actors who use them. The following theoretical framework discusses these expectations in detail.

Framing industrial environmental disasters: theoretical framework

The agenda-setting literature explains how some issues become salient enough for the public to demand government action (e.g. Kingdon, 2014; McCombs & Guo, 2014). Crucial in this process is activists' role in shaping the public opinion through the news media (Johnston & Noakes, 2005). Environmental interest groups, for example, strive to attract media attention to disseminate specific types of frames to achieve their aims, including mobilization for protest (Corrigall-Brown, 2016). Extensive coverage of a specific issue by the media increases that issue's salience and thus the public sense of urgency to act (Thistlethwaite et al., 2019).

In the disaster aftermath, political actors frequently frame disasters in particular ways for "political positioning" (Pelling & Dill, 2009). The media reporting of disaster events shapes public perceptions of relevance of that event as well as the public understanding of both the event and its solutions, and public willingness to act upon these solutions (e.g. Malone et al., 2000). The portrayal of disasters in the news coverage therefore has consequences for human decisions such as injury prevention or participation in public protest (Clegg Smith et al., 2007). In the aftermath of disasters linked to varying degrees of protest we should see frames that both encourage and discourage potential mobilization (depending on the framing actor involved and given the post-disaster political environment). I elaborate on this assumption in my theoretical expectations below.

Expectations: frames and tone

Broadly speaking, the most typical frames in public discourses can be organized into five thematic categories: responsibility, human interest, morality, economy, and conflict (Semetko & Valkenburg, 2000). Two additional types of frames are also likely to occur in the news after industrial environmental disasters: environmental frames and industry frames linked to the public discourse concerning the relevant industry.

First, responsibility frames assign responsibility for the problem's cause to an individual, group, or government. These types of frames are a common feature of the post-disaster dynamic where assignment of blame is a principal task performed by political actors, often activists (e.g. Javeline, 2003). Framing actors may blame some level of government for the disaster, for example by suggesting that the government's pre-existing practices were inadequate. Corporations and governments are more likely to employ "the vernacular of damage control" (Olson, 2008, p. 163): excuses and justifications. The former is about denying – partially or fully – one's responsibility. The purpose of the latter is to create "an alternate political reality" in terms of reframing the undesirable issue in a more favorable light (McGraw, 1991, p. 1137).

Second, the human interest frames are meant to trigger an emotional response; they often put "human face" on the problem at hand, dramatizing it in order to make the problem more personal. Emotions affect the ways in which people process frames, and specific emotions shape individual's choice to act (Druckman & McDermott, 2008). Emotionally charged frames are therefore likely to be present in the post-disaster framing dynamics. For example, framing actors may discuss the private lives of affected individuals and use metaphors or anecdotes to generate feelings of sympathy or anger (needed for potential mobilization).

Morality frames are the third category of common frames. Their purpose is to place the problem in the religious context or make some moral or ethical prescriptions. Framing actors may refer to the notions of ethics, the right or wrong, and various social norms. In a post-disaster environment, actors may attempt to blame the event on God or claim that the event was impossible to prepare for. The narratives about damage are therefore placed outside of human control, deflecting blame from the governmental and corporate actors (Button, 2002).

Fourth, economic frames emphasize the economic dimensions of the problem, often in terms of economic impacts on individuals, groups, or country. These frames present material gains or losses and various trade-offs (Karlberg, 1997). After an industrial disaster, economic frames may focus on the economic losses (or benefits) of the industrial activity that caused the disaster or emphasize the economic impacts of the disaster itself.

Fifth, conflict frames reflect varying degrees of conflict between individuals, groups, or institutions. These frames' main characteristics are dichotomy (i.e. the problem is framed from a perspective of two distinct, mutually exclusive, stereotypical camps) and extremism (i.e. dramatization of conflict through emphasis on extreme statements and actions; it includes insults, accusations, or angry expressions) (Karlberg, 1997). In the post-disaster dynamics, such frames may also include accusations of government and/or corporate cover-ups or various relevant wrong doings.

The sixth type of frames likely to appear after industrial disasters are environmental frames. In this context, environmental frames are likely to emphasize harmful environmental impacts of the disaster, including the immediate damage and possible ongoing or future harm. In general, the damage could be framed in two ways: as natural, for example through comparisons of the industrial disaster to natural processes, or as human caused. The former way of framing "naturalizes" the disaster and removes it from human responsibility, making it seem inevitable (Perrow, 1984). The latter links the disaster damage to the human factor – either to the specific circumstances of the event or to a broader trend (e.g. industry focus as a whole or climate change narratives).

Lastly, some aspects of the national energy policies are also likely to be reflected in post-disaster framing. These can be viewed through the lens of long-time public discourses with three sides with opposing narratives: pro-industry, anti-industry, and neutral/indifferent. Appendix 1 presents these industry-specific frames as well as the remaining six types along with a series of questions used to evaluate the frames' presence or absence in the news coverage. This approach to frame identification helps focus attention on the key features of each frame. The questions have been adapted from Semetko and Valkenburg (2000) and Giannakopoulos (2013).

This research also evaluates the tone of frames after environmental disasters because tone is likely to stir up or dampen specific emotions linked to willingness to protest. Tone is generally positive or negative, but some studies have developed more nuanced tone measures in newspaper coverage. In this study, the descriptors of tone were adopted from Brunken (2006) and Giannakopoulos (2013) and adjusted to better reflect the post-disaster environment: (un)successful, (un)prepared, (un)reliable, obscure/informative, (un)certain, and (un)relatable. In news coverage, tone is captured in statements by framing actors, including journalists.

The (un)successful tone refers to the government's and/or company's handling of the disaster. A successful tone, for example, is reflected in references to a speedy response with proper cleanup procedures. The (un)prepared tone conveys the preparedness for either that particular disaster or similar disasters or disasters in general. References to weak regulations, for example, suggest lack of preparedness. The (un)reliable tone refers to government's or corporate actor's degree of trustworthiness and dependability. The obscure/informative tone is linked to the framing actors' (un)willingness to provide information on the disaster. The (un)certain descriptor goes a step further – it captures the use of uncertainty framing through, for example, specific words (e.g. potentially, probably) that denote uncertainty. Lastly, the (un)relatable descriptor captures framing attempts to relate (or not) the disaster to the public. Details on the operationalization of specific types of tone are available in Appendix 1.

Expectations: framing actors

After industrial disasters, three political actors are likely to be the predominant producers of frames: activists, governments, and the responsible corporations. In the framing process, communication moves from the political elites to the media to the public, with the news media serving as a principal conduit for (and influencer of) framing competition (Klar et al., 2013).

Activists tend to use diagnostic, prognostic, and motivational frames to focus blame, propose solutions, and provide rationale for participating in a movement (Benford & Snow, 2000). To be effective, frames must resonate with their audiences. Since the public tends to accept rather than resist the status quo, activist frames in the media frequently aim to "break the frames of quiescence" (Johnston & Noakes, 2005, ch. 1). The extant literature suggests that emotional and sometimes the closely related injustice frames are crucial in these efforts (e.g. Van Troost et al., 2013; Rodgers, 2010). After disasters, activists are thus likely to be linked to blame, human interest, morality, environmental, and industry frames (as well as negative tone).

With respect to the other two framing actors, after a disaster, corporations would want to control damage, re-stabilize their public image, and maintain the policy status quo (Breeze, 2012). Because disasters draw public attention to apparent policy failures, one of their consequences is the erosion of public trust in the government. Therefore, government frames will likely be constructed to serve government's primary interests: to remain in power, prevent a decline in its legitimacy, and implement policies in line with government's preferences. Government interests are unlikely to be homogeneous. Inter-agency differences, divisions between legislative and executive interests, and tensions due to federalism, for example, may result in different framing efforts among different government actors. Government and corporate frames would likely focus on blame (assignment or denial), conflict, economy, and industry positions (as well as both positive and negative tone).

The following section presents the cases, procedures, and findings from a content analysis used to evaluate these theoretical expectations.

Content analysis

The primary purpose of this content analysis is to assess the types of frames and tone that different political actors produce after environmental disasters linked to varying protest responses. To this end, I have selected three cases: the 2014 Mount Polley mine leak, the 2010 Deepwater Horizon oil spill, and the 2011 Fukushima nuclear disaster. The Mount Polley disaster was a tailings pond spill that polluted the environment in British Columbia, Canada. A small public protest occurred a week after the disaster. The Deepwater Horizon disaster was a massive oil spill off the coast of Louisiana in the Gulf of Mexico. The disaster caused widespread environmental damage that motivated medium-size protests across the United States. The Fukushima disaster was a meltdown of a nuclear power plant in Japan with devastating environmental impacts. Public responses to the event differed across the world, with notable large-scale protests in Germany. More detailed case descriptions are provided in Appendix 2.

Three criteria guided the case selection. First, these disaster events occurred within a few years of one another, which allows for controlling for some structural conditions such as broader social, political, economic, and technological environments. Second, they generated substantial media coverage, which makes them data-rich cases. Third, they were followed by varying sizes of protest – from small and localized after Mount Polley to medium-size protests after Deepwater Horizon to mass protests in Germany after the Fukushima disaster.

All three disasters were widely publicized in respective domestic news coverage. While the media landscapes differ in these three cases, the Canadian, American, and German news media have had a strong influence on environmental issues in public discourse. There are also well-established environmental movements with broad public support in all three countries. Anti-industry movements are also present in all three cases. In Canada, the anti-mining movement has been closely linked to indigenous concerns (Keeling & Sandlos, 2009). The US anti-fossil fuel movement, while present for decades, has been gaining political traction since the early 2000s, and the anti-nuclear movement has been influential in Germany since the 1970s (Cheon & Urpelainen, 2018; Koopmans & Duyvendak, 1995).

By focusing on the German rather than Japanese news coverage, the Fukushima case not only allows for an examination of prominent large-scale protest (as opposed to the smaller protest in

Japan), but it also increases the breadth of the analysis. The German case is the only one of the three where the disaster did not occur but given my interest in the media coverage of the event rather than specific physical impacts, the German case is suitable for analysis and in fact allows for the largest variation on the protest size. Of course, the proximity to a disaster as well as domestic social, political, or economic conditions are likely to influence public opinion. However, the global consumption of news and especially of reporting on dramatic events means that domestic framing of distant disasters is still likely to have a political impact. This reasoning is also in line with Birkland's (1998, pp. 54–55) idea of the "communities of interest" whose members may be located far away from the disaster but may still fear the possible harm, which would contribute to the sense of urgency and their calls for action.

Data sources and coding

Using LexisNexis Academic, I have collected all available newspaper articles produced after the disaster, using the keywords Mount Polley, Deepwater Horizon OR (BP AND oil spill), Fukushima. The time period began with the day of the disaster and ended with the disaster's first anniversary. This is likely to cover all significant protest events that occurred in the immediate disaster aftermath and before the recovery period.

The initial sample included all relevant articles in any newspaper pertaining to the cases in national contexts – Canadian, US, and German for Mount Polley, Deepwater Horizon, and Fukushima, respectively. The initial sample was then reduced to publications with highest readership, both national and regional for the Canadian and US coverage. Specifically, I have kept articles in any of the nine major Canadian newspapers: *the Globe and Mail, Toronto Star, Montreal Gazette, Halifax Chronicle, Calgary Herald, Vancouver Sun, Winnipeg Free Press,* and *La Presse*. I have also included articles in major newspapers close to the disaster zone such as *the Prince George Citizen* as well as major provincial newspapers (e.g. *the Province*).

Similarly, I have kept articles appearing in major national and regional US newspapers, including *USA Today, the New York Times, the Wall Street Journal,* and others. I have also included the largest newspapers (by circulation) in the states affected by the disaster such as *the Dallas Morning News, Houston Chronicle,* and others.

Since in Germany the local and regional press is more important than national newspapers (Kleinsteuber & Thomass, 2007), I applied different exclusion criteria, eliminating the Swiss press and some smaller publications from the broader sample. Along with major regional and local newspapers (e.g. *Berliner Zeitung, Spiegel*) the dataset contains the main national papers in Germany, including *Welt* and *die Tageszeitung*.

Across the three cases, the total population was 1549 articles (543 about Mount Polley, 329 about Deepwater Horizon, and 677 about Fukushima). This sample was reduced one more time to allow for hand coding of the articles – a random sample of approximately a third of the articles yielded 537 texts (200 about Mount Polley, 111 about Deepwater Horizon, and 226 about Fukushima).[4] The list of the newspapers included in the sample is in Appendix 2.

The articles were coded by two trained coders (see Appendix 1 for coding scheme) and intercoder reliability test was conducted by randomly selecting 10% of the articles from the sample. Intercoder reliability scores (Krippendorff's alpha)[5] for the frames, tone, and framing actors are provided below in Tables 1 and 2. The scores suggest a suitable level of intercoder agreement. All coded data

Table 1. Krippendorff's alpha for frames and associated framing actors.

	Blame assign.	Blame denial	Human interest	Moral.	Econ.	Conflict	Env.	Pro-industry	Anti-industry	Neutral
Frame	0.836	1	1	1	0.856	0.864	0.959	1	0.912	0.848
Actor	0.844	1	1	1	0.864	0.864	0.864	1	0.912	0.848

Table 2. Krippendorff's alpha for tone and associate framing actors.

	Management	Preparedness	Reliability	Info provision	Uncertainty	Relatability
Tone	0.864	1	0.792	1	1	1
Actor	1	1	0.792	1	0.864	1

were analyzed using descriptive statistics. The results of the analysis are presented and discussed below.

Results: frames and tone

Three types of frames dominated the post-disaster news: blame assignment, economy, and environment. These types of frames are present in all three cases, but their prevalence is not equally strong (see Table 3 below). For example, environmental frames have a much stronger presence in the Canadian case than in the other two cases. Yet, since the post-Mount Polley protest was minimal, environmental frames may not be a significant protest motivating factor – at least not in the Canadian context. In Germany, however, environmental frames were most prevalent after the Fukushima disaster.

It may be useful to look at different aspects of the dominant frames more closely. Environmental frames, for example, may have greater mobilization potential if they emphasize the scale of damage. However, sending competing messages (e.g. the damage is large vs. minimal) could have a dampening effect due to the resulting uncertainty (Johnson & Tversky, 1983). Similarly, economy frames are likely to have mobilizing potential if they emphasize negative economic impacts but may be less effective if they employ pro-industry narratives. Lastly, blame assignment frames are likely to be effective in mobilization if there is only a small number of factors to blame. Having too many scapegoats is likely to result in uncertainty, which may have a dampening effect on mobilization. Appendix 3 (Table 9) presents a breakdown of the frames into several dimensions and their respective incidence in the post-disaster news coverage. Below I focus on the three predominant frames: blame, economy, and environment.

After the Mount Polley disaster, blame assignment was the second most prevalent frame (after environment). Blame was predominantly assigned to two actors – the BC Liberal Party in power at the time and the Imperial Metals Corporation (the owner of Mount Polley) where the former was in a sharper focus. For example, in one article executive director of Sierra Club noted: "The Mount Polley Mine disaster in the Cariboo reminds me of the thoughtless approach to mining and pollution in Third World countries."[6] After the Deepwater Horizon disaster, blame assignment was also the predominant frame. Although, in this case, multiple companies took part in blame assignment and deflection. For example, BP and its main contractors Transocean and Halliburton were accused of "a suite of bad decisions" and "a culture of complacency."[7] In Germany, the blame assignment frames after the Fukushima disaster were somewhat different – mostly the focus was

Table 3. Incidence of frames in disaster news coverage (in percent, rounded).

Frame	Mount Polley (N = 183)	Deepwater Horizon (N = 99)	Fukushima (N = 206)
Blame assignment	43	56	18
Blame denial	8	12	0.5
Human interest	14	2	12
Morality	4	3	4
Economy	26	35	30
Conflict	11	14	14
Environment	66	38	39
Pro-industry	4	1	5
Anti-industry	3	9	17
Neutral	7	5	4

Note: N = number of articles analyzed. The percentage of specific frames is based on the total number of sampled articles for each case. Most articles contained multiple frames.

on the inadequacy of the existing practices when it comes to nuclear energy, which is expected given the strength of the German anti-nuclear movement. Overall, there was little confusion about the direction of blame in all three cases.

The incidence of frames emphasizing disaster's economic costs was approximately the same for all cases. The German framing actors, however, focused on the economic consequences of environmental damage and on post-Fukushima policies about twice as much as the Canadian and American framing actors (see Appendix 3, Table 9). The environmental frames were not conflicting to a large extent in any of the cases. The predominant focus was on the scale of environmental damage, and the incidence of damage minimizing was small.

Although the incidence of the remaining frames is low, a closer look at them reveals several unexpected patterns. There was a surprising shortage of both industry frames and the linking of disasters to broader environmental themes to, for example, call for climate action or addressing environmental degradation. Similarly, there was no assignment of dramatic labels in any one of the cases, and the emphasis on dichotomies was rare. The case comparison also reveals that human interest frames and narratives meant to evoke emotions (specifically with respect to the environment and economy) had the highest incidence in the case with the smallest size of post-disaster protest. After Mount Polley, many human interest stories centered on the ordinary locals worried about their family, their homes, and their uncertain future.[8]

The post-disaster tone was mostly negative in all three cases (see Table 4 below). In the Mount Polley and Deepwater Horizon news coverage, the predominant tone was linked to lack of preparedness and uncertainty surrounding the disaster. The highest incidence of any negative tone type was uncertainty – 28% after the Fukushima disaster. In specific contexts, communication of unpreparedness and uncertainty may have implications for individuals' trust in government and political participation.

Results: framing actors

Linking post-disaster frames to framing actors raises two questions. First, how well are specific actors covered in the news media? Second, of all statements that framing actors make in the

Table 4. Tone of news coverage (incidence in percent, rounded).

		Mount Polley (N = 183)	Deepwater Horizon (N = 99)	Fukushima (N = 206)
Negative				
	Unsuccessful	10	12	18
	Unprepared	25	19	3
	Untrustworthy	18	6	9
	Obscure	9	7	12
	Uncertain	26	16	28
	Relatable	5	10	17
Neutral				
	Response	43	50	35
	Management	7	9	1
	Reliability	3	2	2
	Information	2	0	3
	Uncertainty	1	0	8
	Relatability	0	0	2
Positive				
	Successful	2	8	2
	Prepared	2	1	1
	Trustworthy	1	0	1
	Informative	3	3	5
	Certain	4	0	2
	Unrelatable	3	0	2

Note: N = number of articles analyzed. The percentages are based on the total number of sampled articles for each case. Most articles contained multiple types of tone.

news, which ones do they tend to use more often? Answering the first question allows for a comparison of the prominence of actors in the news coverage. It, however, does not reveal what frames each actor is more or less likely to use. Answering the second question does just that. Table 5 below provides an overview of the news coverage of specific framing actors. The incidence of frames that these actors used in the disaster aftermath is in Appendix 3 (Table 10).

Activists were featured very little in the post-disaster news coverage of Mount Polley, Deepwater Horizon, and Fukushima – 11%, 7%, and 3% of the time, respectively. This finding is in line with the literature on the protest paradigm, which is a pattern of media reporting characterized by the coverage in support of the status quo and the lack of coverage of "outsiders" (or those challenging the status quo) (Brown & Harlow, 2019). In the aftermath of the Mount Polley disaster, of all statements that activists made, most contained blame assignment (33%), followed by environmental frames (24%). After Deepwater Horizon most activist frames were environmental (45%) and against the industry (18%). Here, the complete lack of blame assignment frames in activist statements is surprising. After Fukushima, 56% of all activist statements in the news contained conflict frames (accusing), followed by anti-industry frames (22%) and environmental frames (11%). Activists did not use human interest and economy frames at all after Deepwater Horizon and Fukushima, only after Mount Polley (5% incidence for both frame types).

With respect to government frames, the results reflect diverse interests among different levels of government. In the case of Mount Polley, of all their statements in the news media, local government assigned blame 21% of the time and focused on economy (15%) and environment (33%) – this reflects aboriginal groups' concerns about the impacts of the disaster on their communities. The provincial government denied blame in 27% of their statements. Of all framing actors, the provincial government was the most likely target of accusations by other actors, which is not surprising, given the localized impacts of the disaster. The federal government, while featured very little in the news, focused predominantly on blame assignment.

Similar dynamics between lower and higher levels of government is apparent in the Fukushima case. Most of the statements made by the local government in Germany focused on accusations, blame assignment, environment, and anti-industry narratives. The German federal government statements were more mixed, with most containing blame assignment, economy, and industry frames. The inter-governmental dynamics was not evident after the Deepwater Horizon spill – the US federal government assigned blame 26% of the time, while other levels of government were not represented in the coverage at all.

Statements from companies were also not well-covered in the post-disaster news. After Mount Polley and Fukushima, the companies were featured only 5% the time (compared to 28% after Deepwater Horizon). As expected, they focused mostly on blame and economy frames; yet, surprisingly, 20% of corporate frames after Fukushima and 50% after Mount Polley were environmental. At a closer look, however, these environmental frames were mostly the responsible company's reporting on the state of the environment after the disaster. In case of Mount Polley, the company

Table 5. Percentage (rounded) of framing actors covered in the post-disaster news.

Framing actor	Mount Polley (N = 183)	Deepwater Horizon (N = 99)	Fukushima (N = 206)
Journalist	77	59	67
Activist	11	7	3
Government (total)	49	29	20
Local	18	0	2
Provincial/state	28	1	1
Federal	3	28	17
Company	5	28	5
Expert	28	24	7
Other	30	9	5

Note: N = number of articles analyzed. The percentages are based on the total number of sampled articles for each case. Most articles contained multiple framing actors.

sometimes appeared to minimize the perception of damage, for example through claiming the affected water was "very close to drinking water."[9]

The full results from the tone-actor analysis are available in Appendix 4. Activist tone was negative in all three cases. The tone of corporate frames tended to be positive except for information provision and uncertainty (i.e. companies used obscure and uncertain tone). After Mount Polley, the local government's tone was predominantly negative, which aligns with previous findings. The provincial government was mostly neutral or positive – exceptions are the use of negative tone when it comes to information provision and uncertainty. After both Deepwater Horizon and Fukushima, the federal government employed mostly negative tone. This points to the only significant difference in tone-actor dynamics across cases: the federal government's use of negative tone is linked to cases of medium- and large-size protests. I explore the implications of these results in the discussion section below.

Discussion and conclusion

The aim of this study was to expand our understanding of how different framing actors talk about environmental disasters in their aftermath. To this end, I conducted a content analysis of the news media coverage of three major environmental disasters: the Mount Polley mine leak, the Deepwater Horizon oil spill, and the Fukushima nuclear disaster. These disasters were followed by varying sizes of nonviolent public protest. The study's comparative design allows for an examination of potential (de)mobilizing frames in the context of environmental disasters.

The content analysis considered both the tone of coverage and different frames, including economic and environmental concerns, moral and emotional appeals, and industry positions.

The findings challenge some prevailing views of environmental activist behavior, and specifically the use of environmental and emotional framing for protest mobilization. Specifically, the analysis offers four main takeaways.

First, environmental frames are likely not a significant factor behind the size of post-disaster protest, at least at the framing stage. While in some contexts environmental frames may motivate protest in issues like pollution or GMOs (Deng & Guobin, 2013; Plows, 2008), they do not seem to be the deciding factor in motivating larger protests after environmental disasters. After Mount Polley, environmental frames were predominant in the news coverage, but the post-event protest was very small. This is surprising given that environmental damage is an easy focal point that could motivate emotional response and thus protest.

Even more obvious motivating frames are missing in the post-disaster media frames – framing actors are, for some reason, not linking environmental disasters to the bigger discourse of the environment and energy production or environmental protection in general. In countries like Canada, where environmental protection and energy production frequently clash in public discourse, the omission of such link from framing after industrial environmental disasters is puzzling. Thistlethwaite et al. (2019) found a similar lack of broader themes linked to flood disasters in Canada. My analysis reveals that this pattern holds across the US and German news coverage, as well.

Furthermore, the lack of dramatic labels and dichotomies in these three cases is in glaring contrast to public discourses surrounding climate change and environmental protection, and especially in the United States (Bolsen & Shapiro, 2018). Perhaps major environmental shocks like these disasters distract from the otherwise ongoing industry-environment discourses instead of serving as fuel or lightning rods. Such possibility forces us to reexamine disasters as catalysts that open windows of opportunity for political actors to push through their agendas.

Second, the case comparison reveals that some frames that in theory should be significant in protest mobilization – specifically narratives meant to evoke emotions – have a smaller presence in cases with medium or large protests. Like with environmental frames, the Mount Polley case with small post-disaster protest has the highest incidence of human interest frames. After

Fukushima and Deepwater Horizon, other frames were much more common in the news. This suggests that although emotional frames may be important mobilizing factors in some contexts, they are neither emphasized nor seemingly necessary for larger protest after environmental disasters. Such finding challenges the long-standing assertion that emotional frames are a crucial element of protest mobilization and prompt further research to the conditions and contexts in which emotional frames may be an effective tool for (environmental) protest.

Third, one possible explanation for the varying sizes of post-disaster protest, suggested in part by the tone-actor analysis, rests on the mobilizing potential of uncertainty. The incidence of the uncertain tone (as well as closely related obscure tone) is comparable between the Mount Polley case (small protest) and Fukushima case (large protest). This leads to two different conclusions: uncertainty is likely not the main protest mobilizing factor, or uncertainty has two opposing effects that likely manifest under different conditions. The latter alternative is theoretically more appealing as it aligns with extant research. While uncertainty has not been a frequently studied aspect of the protest mobilization process, the extant literature suggests that uncertainty has mixed effects on people's beliefs, attitudes, and willingness to act (Gustafson & Rice, 2020). Effects of uncertainty on protest may be case-specific and may be better assessed through, for example, experimental methods.

Fourth, while the relatively low incidence of activist frames in the post-disaster coverage may be explained through the protest paradigm (as described earlier), the lack of some types of frames in those that made it into the news is surprising. Activists did not use blame assignment in the Deepwater Horizon case, and human interest frames only after Mount Polley. After Deepwater Horizon, most activist frames in the news were environmental. One explanation could be that these activists, assuming that their intent was to mobilize the public, preferred environmental frames to focus on the scale of the emergency, bring attention to the urgency and thus evoke some emotional response. Other explanations may be structural and specific to the American social, political, and economic conditions at the time.

Even in cases with larger protests, activist framing was sparse, which raises questions about the role of mobilization elites in protest. If a mobilizing frame is present in the news coverage, does it matter who its source is? Perhaps the alignment of government frames and protesters' attitudes – like in the cases of Deepwater Horizon and Fukushima – signals a possibility of success for protesters (with respect to the ability of protest to effect change). Policy change depends in part on a formulation of a clear policy solution, which gives hope that mitigation of similar future events is in human capacity (Crow et al., 2017; Thistlethwaite et al., 2019). The same may be true for public protest as the social movements literature suggests (e.g. Pinard, 2011). Expectation of success as a protest motivation is an established theoretical aspect of protest mobilization, but one that may need to be more closely examined empirically.

There are two main limitations of my study. First, without additional data (e.g. from interviews) it is difficult to gauge framing actors' intentions and the effectiveness of specific frames on the target audience. Still, the study's comparative design allows for observations of actual behavior after the framing of specific events appeared in the media (while keeping in mind that factors other than framing are crucial in protest mobilization). Second, my findings may be influenced by both my choice of analytical time period and my focus on print/online news sources. My analysis does not trace how specific frames and tone changed within the studied year from the onset of the disaster. Since frames change over time, this type of temporal analysis could bring more insights into the (de)mobilizing potential of post-disaster frames. My focus on print/online media may have also influenced some of my findings. For example, Thomas et al. (2016) found that human interest frames are more common in television coverage of disasters – this may be one possible reason behind the shortage of human interest frames in the news coverage in my disaster cases.

While industrial environmental disasters may create a social dynamic that somewhat differs from other environmental emergencies, the generalizability of my findings can be evaluated in at least two ways. First, the role of environmental and emotional frames as well as uncertainty may

be further examined in the context of protest after disasters from natural hazards and other contingencies. Second, the study's scope conditions may be altered or expanded to include instances of protest after industrial environmental disasters in non-democratic states or non-Western democracies.

Given the increasingly polarized and disillusioned public (at least in Western societies), the pervasive presence of uncertainty in political life, and the growing urgency of environmental problems, studying the mechanisms and outlets for public discontent is vital for well-functioning democracies. Understanding how and under what conditions major environmental disasters and other contingencies encourage or dampen protest mobilization opens opportunities for peaceful resolution of social conflict and easing of social discontent. Examining the use of framing after environmental disasters may shed more light on public interest in other environmental crises, including the loss of biodiversity and the impacts of climate change.

Notes

1. A frame is a message that provides meaning to events based on receivers' pre-existing schemas (Gamson & Modigliani, 1987).
2. These are disasters from human-made hazards that primarily affect the environment.
3. A notable recent exception is the study by Thomas et al. (2016) that combines a descriptive analysis of media frames with examining audience interpretation (but not impacts on behaviour) of those frames.
4. During hand coding some articles were then omitted if deemed irrelevant.
5. Krippendorff's alpha is a conservative measure of intercoder agreement that accounts for chance agreement (Lombard et al., 2002).
6. *Times Colonist.* (2014, August 7). Inadequate monitoring led to tailings breach. https://www.timescolonist.com/opinion/letters/inadequate-monitoring-led-to-tailings-breach-4612275
7. Mufson, S. (2010, November 10). Experts, rivals blast BP's practices. *Washington Post*, A, A04.
8. Luymes, G. (2014, August 25). Mount Polley-area residents weigh in on mine spill. *Times Colonist.* https://www.timescolonist.com/bc-news/mount-polley-area-residents-weigh-in-on-mine-spill-4612911
9. Moore, D. (2014). B.C. orders mine to plug toxic tailings release. *Global News.* https://globalnews.ca/news/1493713/b-c-orders-mine-to-plug-toxic-tailings-release/

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Data availability statement

The data supporting the findings of this study are available within the article and its supplementary materials. Some data are available from the corresponding author upon request.

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