

Framing flood events

An in-depth qualitative frame analysis of Dutch media reporting the 2021 flood in Limburg



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SUMMARY

This thesis investigates the framing of the July 2021 flood event in Limburg, Netherlands, within media articles. The research uses a qualitative content analysis based on Entman's (1993) definition of frames to identify distinct problem evaluations, causal interpretations, moral evaluations and recommended solutions. By illuminating obscured perspectives within news media, the research aims to understand how the Dutch media frames the issue of pluvial flooding post-shock event, moreover contributing to the academic discourse on shock event framing. In addition, each framing category is further divided in referencing to one or more of the 4 layers as defined in the Multi-layered safety (MLS) approach. The concept has been explored in recent years in the Dutch Flood Risk Management (FRM) (Most et al., 2017). These studies concluded that the multi-layered safety approach is suitable for developing an area-specific risk approach to enhance flood resilience sustainably. The goal here is to provide a framing analysis that reveals which MLS layers are made more salient in the post-flood debates relating to Dutch FRM. Therefore, displaying what effect the flood has had on the framing of problem definitions, causal interpretations, moral evaluations, and treatment recommendations to the public.

Keywords: framing, Flood Risk Management (FRM), media, Multi Layered Safety (MLS), Limburg flood event.

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List of Abbreviations

Multi-Layered Safety = MLS

Flood Risk Management = FRM

1. INTRODUCTION

1.1 Dutch FRM policies and shock events

Dutch society depends on the vast amount of flood prevention infrastructure that previously has been built by the government (Wiering, 2019; Kaufmann & Wiering, 2022; Kuks, 2023). However, the undeniable rise of climate change has brought some extreme weather events that are challenging these infrastructures to this day (Vink et al., 2013). Extreme rain events have made the risk of pluvial and fluvial flooding higher and higher (Wilby & Keenan, 2012). These flood events can be seen as a focussing (Kingdon, 1984) or as shock event when impactful enough (Wiering, 2008; Birkland, 1998). They can function as triggering events that actuate policy development (Johnson et al., 2005; Penning-Rowsell et al., 2006). It challenges the status quo and fuels the discourses around safety, resilience, and climate change.

For example, until the 1990s, the Dutch government applied defensive measures against floods, such as dikes and barriers (Baan & Klijn, 2004; Neuvel & van den Brink, 2009; Pötz et al., 2014). However, due to major river floods in 1993 and 1995, it started to embrace a more risk-based approach (Kuks, 2023; Ritzema & Van Loon-Steensma, 2018; Woltjer & Al, 2007). Landscape values, nature conservation and sustainable land-use planning started to grow and influence the FRM policy (Avoyan & Meijerink, 2021). For instance, dike reinforcement projects in the 1980s and 1990s started to include sustainable nature values (Warner et al., 2013). Moreover, major investments have been made from 1998 until 2018 to develop water corridors for resiliency along the main rivers (“Room for the River Programme”, 2019). In 2009, the ‘Multi-Layered Safety’ (MLS) approach was introduced in the Dutch National Water Plan (Ministry of Public Transport and Water, 2009). Consisting of three layers this approach involves preventive structural measures, resilient spatial planning, and addresses evacuation and disaster management (Kaufmann et al., 2016a; Van Buuren et al., 2016; van Herk et al., 2014).

1.2 The flood of a century

Then 14 July 2021 happened: heavy rainfall occurred across several European countries resulting in significant flooding of river systems in Belgium, Germany, and the Netherlands (Lehmkuhl et al., 2022). This event is one of the largest flood disasters in Western Europe since decades. The river Meuse reached in its peak a water discharge of 3.260 m³ water per second exceeding the last big flood event in the winter of 1993 by around 100 m³ water per second. (Westenbrink, 2021). Measures taken by the Maaswerken program resulted in lower water levels along many parts of the Meuse during the flood of 2021 compared to previous

flood events (Expertise Netwerk Waterveiligheid, 2021). Yet, at certain measurement locations such as in Eijsden, eik, and Well village, water levels during the event were higher than those of 1993 and 1995. The larger water buffers and floodplains ensured the relative safety of the people (Deltaprogramma, 2022). However, damages in Limburg alone were estimated to be between 350 – 600 million euros, being mostly physical damage to houses and businesses, business interruption, damage to infrastructure and crop losses (Task Force Fact Finding Hoogwater, 2021). To this day, many residents have not financially recovered from this event.

1.3 Shockwaves through government and media

The 2021 flood event of Limburg got much attention from the media even years after the disaster had run its course. Traditionally, media has often limited itself to descriptive reporting when covering environmental hazards (Escobar & Demeritt, 2014; Gavin et al., 2011; Wilkins, 2000). However, studies on the framing of flooding in the media have shown that the reporting of external hazards, such as flood events, is becoming increasingly contested (Devitt & O'Neill, 2017). For instance, Escobar & Demeritt claim that analysis of media coverage has shown that political debate about flooding policy has intensified in recent years, *“as has scrutiny of those agencies, public and private alike, responsible for managing it”* (Escobar & Demeritt, 2014, p.15).

Besides, notions of resilience are widely discussed within the Dutch flood risk governance domain. The transformation from full control of river systems to Room for the River based approaches (Wiering & Arts, 2006) and the integration of the multi-layered safety approach within the Delta Programme can attest to that (Stive & Veerman, 2008). Additionally, Liefferink et al. (2018) note a shift from flood defence to more initiative-taking, preventive actions, and flood preparation within a broader, integrated approach to water management. *“This shift is reflected in the increasing responsibilities of spatial planning, insurance agencies, and other related sectors”* (Liefferink et al., 2018, p.285). However, Dutch flood risk governance remains heavily focused on flood defence, despite emerging signs of change. The adoption of innovative management approaches is hindered by a "technical lock-in" where strong institutions, legal frameworks, and public expectations reinforce the reliance on traditional flood defence infrastructure (Liefferink et al., 2018). This dominant defence approach continues to be the prevailing discourse in water management (Kaufmann et al., 2017). Nowadays the Dutch FRM and its river system is facing increasingly extreme weather such as the Meuse and now also its tributaries have demonstrated, sparking a debate in the FRM domain.

For instance, after the 2021 flood event the Dutch government even set up an

evaluating policy board advising new policy responses for Limburg its rivers system (see Beleidstafel wateroverlast en hoogwater, 2022). The policy board recommended updating FRM strategies based on the MLS approach with as goal to enhance resilience against floods and future extreme weather events. Yet, policy ambitions regarding MLS remain voluntary and nonbinding which brings into question if any shifts in the techno-centric approach to flood resilience will ever happen (Van Buuren et al., 2016). Additionally, media frames are important as they can simultaneously influence policy and decision-makers by reflecting public opinion as influenced by individual's normative frames (Gamson & Modigliani, 1989). Questions were asked such as "Why did it happen?" "Who is to blame?" and "How can we prevent this from ever happening again?" How these questions have been answered may shine a light on what Dutch society sees as important in the context of water resilience post flood. However, interpreting such a complex issue must be approached systematically and grounded in theory, which in and of itself can be a challenge.

1.4 Research aim

This study explores how the 2021 Limburg flood event was framed in Dutch newspaper articles to uncover what media frames are made more salient in the context of MLS. The goal of the analysis is to provide a comprehensive analysis that contributes to the ongoing debate of flood resilience in Dutch society. The research will utilize a text-based interpretative, qualitative content analysis approach, incorporating Entman's frame theory (1993) to examine how media articles have framed the flood event, and displaying the overall discussion of causes, problems, blaming, and solutions in a systematic manner and grounded in theory.

Evaluating the salience of media frames related to the MLS layers in the context of the 2021 Limburg flood can clarify how Dutch flood risk management (FRM) problems, interpreted causes, blames, and possible solutions are framed in public discourse. Furthermore, this analysis can aid planners and policymakers in developing more targeted responses that can be communicated more effectively to the public.

1.5 Research question and sub-questions

Therefore, the primary question arising from the research aim is:

How was the 2021 Limburg flood event framed within Dutch news media in relation to the Multi-Layered Safety (MLS) approach?

To answer the main question the following three sub-questions are asked:

1. What dominant frames emerged in Dutch newspapers regarding the causes, problems, moral evaluation and solutions of the 2021 Limburg flood event?

- **Aim:** To identify and analyse the key narratives in Dutch media about the flood, focusing on how the causes, impacts, moral evaluations and solutions were portrayed. This helps in understanding the major themes and concerns highlighted by the media in response to the event.
- **Hypothesis:** The media coverage will prominently feature immediate flood prevention measures, disaster response efforts, and long-term climate resilience, reflecting the immediate and ongoing concerns of the affected communities.

2. How salient are the principles of the Multi-Layered Safety (MLS) approach in the media frames related to the 2021 Limburg flood, particularly regarding traditional flood defences versus alternative strategies?

- **Aim:** To evaluate how media coverage aligns with the MLS approach, focusing on whether it emphasizes traditional flood defences (Layer 1) or alternative strategies such as resilient spatial planning and disaster management.
- **Hypothesis:** Media frames will emphasize traditional flood defences but will also reflect newer MLS strategies like resilient spatial planning and proactive disaster management.

3. What are the implications of the media framing of the 2021 Limburg flood for public discourse in the context of flood risk resilience debate in Limburg?

- **Aim:** To assess how the media framing of the flood event might influence the public discourse on flood resilience.
- **Hypothesis:** The Media framing highlights MLS principles that suggest a shift in the flood resilience debate for Limburg from just flood prevention to more mitigating, disaster management and Climate-resilient recovery.

This approach provides a comprehensive framework for analysing how the flood event has shaped media narratives and its implications for flood risk management, ensuring that the study addresses both the media's portrayal of the event and its broader possible impact on public perception.

1.6 Societal and Scientific Relevance

Societal Relevance

In general, water safety is a fundamental issue in the Netherlands when looking at their history of flood defence (van Buuren et al., 2016; Mostert, 2006; Orr et al.,

2007; Verkerk & Van Buuren, 2013). Given the growing frequency and severity of extreme weather events due to climate change, understanding how media frames the flood event provides insight into how public perceptions are shaped. This knowledge helps in assessing how different narratives about flood risk, resilience, and management are communicated to and interpreted by the public. Additionally, identifying which aspects of flood risk management (e.g., traditional defences vs. innovative strategies) are most salient to the public helps in understanding public priorities and concerns.

Scientific Relevance

Scientifically, this study contributes to the growing body of literature of framing of exogenous shock events in news media (e.g. Bohensky & Leitch, 2014; Devitt & O'Neill, 2017; Kaufmann et al., 2016b) . The research evaluates the salience of different media frames, which advances understanding of how specific aspects of environmental events are emphasized. This contributes to the theoretical discourse on the mechanisms through which media frames influence public perception. It offers a novel application of Entman's frame theory (1993) to explore how news media frames flood events and resilience strategies. By focusing on the four layers of the Dutch multi-layered safety approach, this study provides a structured and systematic analysis of how various aspects of flood risk management are prioritized in public discourses.

Furthermore, the use of a qualitative content analysis approach to examine media framing provides methodological insights into how complex environmental issues are analysed and interpreted. This adds to the body of knowledge on qualitative research methods in media studies and environmental communication.

Lastly, the findings from this study can serve as a basis for comparative research on media framing of similar events in different contexts or for comparative studies with policy framings to further uncover interplay between media, public perception, and policy-making. This broadens the scope of research on how environmental issues are framed across various media landscapes.

1.7 Reading guide

The upcoming chapters will explain in sequence the theoretical framework, methodology, results, the discussion of those results, conclusion and a critical reflection on this research. The theoretical framework consists of describing the concepts of shock events, resilience and an extensive literature review on framing theories and perspectives. Thereafter, the frame theory of Entman (1993) and subsequently the Dutch MLS approach (to enhance flood resilience) will be operationalised followed by a brief explanation and presentation of the conceptual model. Next the chapter on methodology will discuss the underlying philosophy, strategy, and methods followed by a clarification of the reliability and validity of this research. The subsequent results chapter will be split up in sub-chapters starting with the 'Causal framing' chapter that then will go through each of the most salient causal frames found in every layer of the MLS approach starting from one and ending with 4 followed by "Other". Each of the layer chapters are split up in frames found in the media articles. In the ensuing "Discussions" chapter we will further delve into the interpreted meanings of the frames and address the implications and limitations of the results followed by recommendations for further research. Finally, we will present the conclusions of the research.

2. Theoretical framework

This chapter will discuss the theoretical concepts that are relevant for this research. This will be done through a literature review of the following concepts: shock events, framing, resilience, and multi-layered safety. Additionally, the relevant theories for this research are chosen and justified. Lastly, the conceptual model of the research is presented followed by the operationalisation.

2.1 Shock events

The concept of focusing events was first introduced by John Kingdon in his multiple stream's framework. Kingdon (1984, 1995) describes focusing events as sudden, attention-grabbing occurrences that highlight policy problems and open policy windows. These events can catalyse the convergence of problem, policy, and political streams, facilitating policy change. Birkland (1997, 1998) further refines this concept, defining focusing events as sudden, relatively rare occurrences that are harmful or suggest potential harms, affecting a specific geographical area or community, and becoming known to policymakers and the public almost simultaneously. Kingdon's (1984) framework emphasizes the role of policy entrepreneurs, who invest time, energy, and resources to link policy solutions with problems and political opportunities. These entrepreneurs can leverage focusing events to advance their agendas, utilizing the heightened attention to promote policy change. The multiple streams approach is thus concerned with understanding how issues gain prominence, how they are framed, and why certain ideas become influential at specific times (Penning-Rowsell et al., 2017).

Research on focusing events has demonstrated their significant impact on policy agendas. Baumgartner and Jones (2010) and Busenberg (2001) provide evidence that impactful focusing events can elevate issues on policy agendas and lead to the formation of new institutions. Major flood events can also be seen as a focussing event while it can direct attention towards floods as a political and societal problem and trigger change, however they do not necessarily have to move policy or institutions in another direction in the long run (Wiering et al., 2018). Flood events can just as well lead to consolidation of policies and strengthen the position of hegemonic policy elites (Boin *et al.*, 2005, 2008; Rosenthal & 't Hart, 2012). Albright (2011) provides an example from Hungary, where a partnership leader used a flood event to secure financial resources and foster dialogue on flood issues, demonstrating the potential of focusing events to catalyse policy change. Furthermore, flood events are often seen as strengthening the discursive turn towards 'Space for Water' in many countries (Wiering, 2008; Meijerink, 2008; Kaufmann *et al.*, 2016a).

While the literature provides valuable insights into the role of focusing events,

several methodological and theoretical weaknesses need to be addressed. DeLeo et al. (2021) critique Kingdon's definition of focusing events as imprecise and inductive. They argue for Birkland's (1997) definition, which specifies the suddenness and harm associated with these events, offering a more precise framework for analysis. Furthermore, Kaufmann et al. (2016b) propose the term "shock event" and argue that focus events occur when there is potential harm, even if no actual harm has happened. In contrast, shock events emphasize that the event has already occurred and has had a tangible impact on the media and policy entrepreneurs making it a more accurate term. A shock event serves as a starting point for assessing the effects it has caused. In this research, the term "shock event" is used instead of "focus event" because the floods have already occurred and impacted the media and sparked policy debates. In this research, it also serves as a basis for understanding the influence of shock events on discourse in flood resilience in news media articles.

2.2 Resilience

The concept of resilience originates from ecology (Vis et al., 2003). In 1973 Holling defined resilience as "a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations and state variables" (p.14). To this day the concept has spread over many fields of science, ranging from engineering, to geography, ecology, health science, law, psychology, sociology and many others (Alexander, 2013; Matyas & Pelling, 2014; Quinlan et al., 2016; Folke, 2016; Meerow et al., 2016; Nunes et al., 2019; Ribeiro & Gonçalves, 2019). Each discipline gives the concept its own twist which has resulted in a conceptual and practical divergence (Vis et al., 2003). In addition, a historical shift from engineering resilience, to ecological resilience, to socio-ecological resilience has been observed in the literature as which perspective of resilience thinking is seen as dominant (Adger, 2000; Carpenter et al., 2001; Walker et al., 2004; Folke, 2006, 2016; Brand & Jax, 2007; Cote & Nightingale, 2012; Nunes et al., 2019).

Firstly, engineering resilience, being a mechanical conceptualisation, uses the term for how fast something can recover its shape and size after being under strain or stress (quick recovery to equilibrium) (e.g. Pimm, 1984). Secondly, there is ecological resilience which came from the work of Holling (1973) defining it as an interplay between disturbances (e.g. shocks), conservation, renewal, and multiple equilibria. "This paradigm introduced principles such as buffering, homeostasis, and redundancy, which reduce the impact of disturbances." (Vis et al., 2013, p.2). Lastly, socio-ecological resilience shifted the paradigm to the interplay between humans and ecosystems (Adger et al., 2005; Folke et al., 2005; Folke, 2006, 2016; Carpenter et al., 2001; Walker et al., 2004; Cote & Nightingale, 2012). This approach

included principles such as self-(re) organisation, adaptiveness, and learning (Vis et al., 2013).

Now in the context of FRM De Bruijn & Klijn (2001) applied resilience as strategies for FRM in which the focus is on reducing impacts of floods by “living with floods”, instead of the traditional “fighting them” strategy. This is where the providing space to the river approach comes from. Wardekker (2021) implies that safety standards must be differentiated based on land use and spatial planning; and the consequences of floods have to be taken into account. While areas can be considered more resilient if the less valuable parts are flooded prior to more valuable parts. In this case a resilient FRM strategy considers a comprehensive approach with measures to reduce impacts, through designing warning systems and evacuations plans and the application of relevant spatial planning and building regulations. In addition, measures to speed up recovery, like damage compensation regulations and insurances, should also be considered (Kaufmann et al., 2016b). They assume that a shock event can facilitate a shift toward different forms of resilience. *“A shock event can increase resilience by either accelerating a diversification of strategies or an adaptation of the dominant existing strategy.”* (Kaufmann et al., 2016b, p.12).

2.3 Different Perspectives on Framing

“Frame analysis is an analytical approach within the constructivist tradition that addresses not only the construction of meaning, but also the roles of actors in such processes.” (Björnehed & Erikson, 2018, p.1). It has been used to investigate individual actors’ cognitive and psychological frames (Kühnberger, 1998; Levin, Schneider & Gaeth, 1998); framing in social movements (Benford & Snow, 2000; Gamson, 1988; Morris & Mueller, 1992; Snow and Benford, 1992); and framing of ideas and discourses in fields of research such as media and communications (De Vreese, 2012; Entman, 1993; Scheufele, 1999). Audiences use frames to understand and discuss issues, journalists craft compelling stories, policymakers define options and make decisions, and experts simplify and persuade (Nisbet, 2009).

While reviewing the literature the nature and usefulness of frames are mostly debated in Communication Studies and Media Studies (as summarized by Entman, 1993; Scheufele, 1999), Sociology and Political Science (van Dijk, 2023). Sullivan (2023) further argues that all the disputed definitions of “frames” in these fields can be traced back to Goffman’s sociological definition of frames (see Goffman, 1974). Additionally, followers from Goffman delineate three distinct types of frames (semantic, cognitive, and communicative) as corresponding to language, thought, and communication.

‘Semantic frames’ are structured conceptual representations that define a specific type of situation, object, or event, along with its associated participants

and props (Ruppenhofer et al., 2016). Andor (2010, p. 158) calls them “linguistic frames” as they are specifically coded in—or “evoked by”—lexical units or other features of linguistic form and differentiates them from cognitive frames. The latter pertains background understandings needed for making sense of things that happen around us (Andor, 2010). Moreover, outside Linguistics, scholars have identified cognitive frames and communicative frames as two distinct types of frames. For instance, Kinder & Sanders (1990, p. 74; 1996, p. 164) differentiate between cognitive frames as “internal structures of the mind” and communicative as “embedded in political discourse.” Additionally, Entman (1993) differentiates the “information-processing schemata” within individual minds from the “attributes of the news itself” (1993, p. 7). Thus, distinguishes cognitive frames from the communicative frames that influence them.

It is important to note the interconnectedness of the three types of frames discussed here. Semantic frames are linked with cognitive frames and contribute to communicative frames (Sullivan, 2006, 2013, 2017). For instance, communication relies on our ability to think, and much of it involves language (Steen, 2008). Thus, cognitive frames are essential for both semantic and communicative frames. When conveying a cognitive frame, it can activate that frame in others' minds. The chosen cognitive frame's structure, along with elements influencing communication, forms a communicative frame. Each communicative frame includes one or more cognitive frames, while every semantic frame represents only a part of a cognitive frame. Therefore, only focussing on the lexical aspects of the media (e.g. ‘semantic frames’) limits the ability to capture the broader, contextual nuances, as they do not account for the situational and contextual elements that influence how messages are interpreted and understood in different settings.

Moreover, “*communicative frames arise when cognitive frames are encoded in language, art, or another medium, causing the cognitive frames to be created or activated in someone else's mind.*” (Sullivan, 2023, p.6). Therefore, although studying cognitive frames of individuals would yield interesting results (e.g. Chong & Druckman, 2007; Druckman, 2001; Goffman, 1974; and Tversky & Kahneman, 1981; Kühnberger, 1998; Levin, Schneider & Gaeth, 1998) the sheer volume of media sources available makes an individual-level analysis impractical and potentially unrepresentative. Flood events, particularly those of significant scale, are covered by a vast array of news outlets, each producing numerous articles, reports, and broadcasts.

On the aggregate-level, scholars have analysed the framing of flood events from different perspectives. Some focus on analysing policy change or discourse (e.g. Kaufmann et al., 2016b; Meng et al., 2019; Vink et al., 2013), while others only analyse framing in news media (Devitt & O’Neill, 2017). Researchers such as Vink et al. (2013) uses Schön & Rein’s (1994) reflection approach to understand decision-

making priorities and public policy framing in FRM. Yet, this approach mostly focusses on policy disagreements and controversies which is not the main goal of this research. Additionally, Meng et al. (2019) borrow Hulst and Yanow's (2016) perspective on the framing analysis, which is based on Schön & Rein framework but adds not only the way issues are framed but also the intertwining of framing and frame-makers' identities, and the meta-communicative framing of policy processes. Therefore, this theory is not suitable for the thesis, as it is too complex and requires analysing framing at the individual cognitive level. Furthermore, Kaufmann et al. (2016b) use Snow and Benford's (1988) core framing tasks to identify and analyse the activities of different actor coalitions framing a shock (flood) event. This framework has some overlap with Entman's approach as Snow & Benford also define the process of framing the problem, responsible actors to blame and proposals of general solutions in the form of concrete policy options. Snow & Benford (1988, 1992; Benford & Snow, 2000) are concerned with the role of framing in social movements, examining how they create and use frames to mobilize support, articulate grievances, and construct collective identities.

Admittedly, their framework would have also for this research. Yet, Entman's framework has been selected while the theory is more generally used, addressing frames in media and communication. It is commonly used to analyse media content (e.g. Devitt & O'Neill, 2017) and its effects on public opinion, policy debates, and cultural understanding. Tewksbury and Scheufele (2009, p. 24) argue that the most effective frames are those that convey all four elements described by Entman (1993, p. 52). Therefore, the literature study has indicated that that Entman's framework is ideal for analysing the media articles in response to the 2021 shock (flood) flood event. His theory allows for a thorough analysis of how the flood event is portrayed in textual media sources, considering the salience of communicated frames. The following operationalisation chapter will go into more detail of what this all entails.

2.4 Operationalizing Entman's Approach

Frames have four key framing functions according to Entman (1993): defining problems, diagnosing causes, making moral judgments, and suggesting remedies. The primary objective in determining textual meaning should be to identify and describe frames. In his words: "*Frames, then, define problems-determine what a causal agent is doing with what costs and benefits, usually measured in terms of common cultural values; diagnose causes-identify the forces creating the problem; make moral judgments-evaluate causal agents and their effects; and suggest remedies-offer and justify treatments for the problems and predict their likely effects.*" (Entman, 1993, p.52).

He further explains that a content analysis that incorporates framing theory

would avoid treating all positive or negative terms as equally important and influential. Often, coders sum up all messages they perceive as positive or negative and draw conclusions about the dominant meanings. This approach neglects to measure the salience of elements in the text and fails to assess the relationships between the most prominent clusters of messages—the frames—and the audience's schemata. Without a framing paradigm, content analysis may produce data that misrepresent the media messages most audience members are receiving (Entman, 1993).

This study uses Entman's framing theory (1993) to identify and analyse the activities of different causal agents. The following definition is used: *"An Agent is responsible for having intentionally performed an Act or for being the or a primary instigator behind the Act. There is often a sense of negative evaluation of the Agent for having done so."* (Ädel et al., 2023, p.8). Therefore, causal agents can be defined as people, groups, institutions, or even non-human entities. For example, the entity "extreme weather" is a causal agent and is framed as instigating the event "a major flood" which resulted in "millions in damages" (negative effect).

Each key framing function will be further operationalized below:

Problem definition frame

Entman explains that the problem definition framing function consists in "Defining effects or conditions as problematic" (Entman 2003, p.417); and that frames "define problems- determine what a causal agent is doing with what costs and benefits, usually measured in terms of common cultural values." (Entman 1993, 52). This research defines a problem as "a situation, person, or thing that needs attention and needs to be dealt with or solved" (Cambridge Dictionary, n.d). Therefore, indicators for this frame would include:

1. **Identification of Adverse Effects or Conditions:** Articles or documents highlighting negative impacts such as property damage, loss of life, displacement of residents, economic losses, and environmental degradation.
2. **Emphasis on Problematic Situations:** Statements focusing on the severity of the flood, the extent of the damage, and the immediate need for attention and action.
3. **Reference to Cultural Values:** Discussion of how the flood affects commonly held values, such as community safety, economic stability, and environmental preservation.

For example:

- Headlines or sections stating, "The devastating flood has caused widespread damage to homes and infrastructure."

- Sentences mentioning the flood as a significant problem requiring urgent intervention, e.g., "The recent flood disaster has left thousands homeless and caused millions in damages."

Causal interpretation frame

Entman tell us to "identify the forces creating the problem" (Entman 1993, 52). The interpretation seeks to explain why the problem exists and how different variables or entities are connected to its occurrence. This study uses a general rule for identifying the diagnose causes framing function (cf. Sturdza, 2018): IF there is a negative AGENT, a negative EVENT and a negative OBJECT or EXPERIENCER assigned to the problem definition function, THEN the corresponding text can be identified as the diagnose cause framing function. In this case indicators for this frame would include:

1. **Identification of Causes:** Texts explaining the reasons behind the flood, such as heavy rainfall, poor infrastructure, climate change, or deforestation.
2. **Linking Variables:** Statements connecting distinct factors contributing to the flood, like inadequate drainage systems or insufficient flood management policies.
3. **Assignment of Blame or Responsibility:** Articles or documents pointing to specific entities, such as government agencies, local authorities, or environmental conditions, as responsible for the disaster.

For example:

- Sentences describing the heavy rainfall as the primary cause of the flood, e.g., "The unprecedented rainfall overwhelmed the region's flood defenses."
- Explanations linking deforestation and urbanization to increased flood risks, e.g., "Rapid urbanization has reduced the land's natural ability to absorb rainwater."

Moral evaluation frame

According to Entman, the moral evaluation framing function is a process of "Conveying a moral judgment of those involved in the framed matter." (Entman 2003, 417). This frame evaluates causal agents and their effects (Entman, 1993). Additionally, Entman provides an example from the coverage of the terrorist attacks on September 11, 2001: "the moral judgment condemned the agents of this assault as evil;" (Entman 2003, 417). In Entman's example, the moral evaluation is assigned to the "evil" agents via the preposition "as." The moral evaluation framing function has been operationalised in terms of whether something is judged positively or negatively. Therefore, if a causal agent instigates something negative towards someone or something deemed positive it is identified as the moral evaluation frame. For this frame indicators would include:

1. **Judgment of Actions or Entities:** Texts conveying positive or negative judgments about the actions of specific individuals, organizations, or policies.
2. **Use of Valence Terms:** Positive or negative terms used to describe the actions or inactions of causal agents, such as "negligent," "heroic," "irresponsible," or "commendable."

For example:

- Sentences criticizing the government's response, e.g., "The government's failure to invest in flood defences is inexcusable."
- Statements praising local volunteers, e.g., "Local volunteers showed remarkable bravery and selflessness during the flood."

Treatment recommendation frame

Lastly, Entman describes this frame to *"offer and justify treatments for the problems and predict their likely effects."* (1993, p.53). This pertains to the proposed or recommended actions, policies, or solutions presented in response to the identified problem. It outlines the strategies, interventions, or approaches that are suggested to address the issue effectively. This interpretation plays a crucial role in shaping public opinion by influencing perceptions of the feasibility, desirability, and potential effectiveness of specific courses of action. Hence, indicators of this frame would include:

1. **Proposed Solutions or Actions:** Articles or documents outlining specific measures to address the flood, such as building new infrastructure, implementing better flood management practices, or increasing funding for disaster preparedness.
2. **Evaluation of Proposed Measures:** Texts assessing the potential effectiveness and feasibility of the recommended actions.
3. **Policy Recommendations:** Suggestions for changes in policy or practice to prevent future floods and mitigate their impacts.

For example:

- Sentences recommending infrastructure improvements, e.g., "Investing in modern flood defences is essential to protect the community from future disasters."
- Statements proposing policy changes, e.g., "The government should implement stricter zoning laws to prevent construction in flood-prone areas."

See the codebook for a further in-depth standardisation of the coding process.

2.5 Operationalizing Dutch FRM “Multi-layer safety” approach

To further align with the concept of integrated FRM promoted by the European Floods Directive, MLS was integrated into Dutch policy (2007/60/EC) (De Moel et al., 2014; Hartmann & Spit, 2016; Hoss et al., 2011; Kaufmann et al., 2016a; van Herk et al., 2014). The concept of MLS was introduced in the 2009 National Water Plan as part of a sustainable water safety policy aimed at mitigating floods originating from the main water system (Most et al., 2017). This approach operates on three distinct 'layers' (National Waterplan, 2009, p.6). The initial layer primarily focusses on flood prevention measures, with the objective of minimizing the occurrence of flooding. The second layer is dedicated to mitigating the impact of a flood through the realization of spatial planning. Moreover, the third layer is focused on enhancing the (organizational) preparedness for potential flooding events. This is referred to as disaster management.

MLS is founded upon a risk-based approach, addressing both the probabilities and potential consequences of flooding. Over the past few years, the concept of MLS has been extensively explored in the Netherlands through initiatives such as area pilots and test scenarios (e.g. Oranjewoud & HKV, 2011; Van Buuren et al., 2015). Furthermore, between 2013 and 2015, three MIRT studies were also conducted in Dordrecht, IJssel-Vechtdelta, and Marken. These studies collectively concluded that the MLS approach is well-suited for developing region-specific risk management strategies. Consequently, becoming an integral part of the Delta Program and the NWP 2 (National Water Program) of 2016-2021.

Following the waterlogging and high-water levels in the Netherlands in the summer of 2021, the Minister of Infrastructure and Water Management established the Policy Board for Waterlogging and High Water (Overlegorgaan Fysieke Leefomgeving, n.d.). This board aims to evaluate the waterlogging situation in Limburg and assess its implications for policy. Its goal is to learn from the situation in 2021 and to better prepare for the consequences of periods of extreme rainfall throughout the Netherlands in the future (Beleidstafel wateroverlast en hoogwater, 2022). Consequently, the Policy Board has introduced an additional layer: 'climate-resilient recovery' post-flooding (Layer 4). Additionally, within the framework of the four layers, a foundational layer of 'water awareness' is defined. It is described as the cornerstone guiding through information assimilation how the Netherlands should prepare for and respond to waterlogging situations. This base layer does play a vital role in the flood resilience debate. However, this research defines water awareness as “a flood consequence limiting layer” (layer 2) as it strives for the same goal as layer 2: to limit damage and societal disruption if a flood would occur. For logistical reasons, this change would also limit the number of chapters per framing category, helping to keep the analysis concise and manageable.

Thus, the model of MLS used by the Policy Board for the entire watershed consists of:

- **Layer 1:** Prevention. Limiting the likelihood of floods and waterlogging.
- **Layer 2:** Consequence limitation. Minimizing damage and preventing societal disruption as much as possible in the preparatory 'cold phase' of crisis management and disaster response, through climate-resilient design of the living environment.
- **Layer 3:** Crisis management. Minimizing societal disruption during a crisis ('hot phase').
- **Layer 4:** Climate-resilient recovery. Which means that during the recovery process after a disaster, considerations are made for climate change and the demands it places on structures, such as buildings (Rijksoverheid, 2023b, p.32). Traditionally, the focus after a disaster has been on quickly restoring the old situation: rebuilding as it was, in the same location. Although a new concept, climate-resilient restoration is advised by the government to be incorporated into insurance policies and regulations.

Figure 1 Multi-layered safety



This research will use these layers and interpret them as variables for the analysis: Quotes that are coded as **Layer 1** must refer to measures related to reducing the likelihood of a flood to a specific level or reference types of measures such as:

- Reducing the failure probability of defences, through methods such as dike reinforcement, raising, and combating piping.
- Constructing new embankments and/or dikes.
- Delta dike or "breach-proof" dike.
- Lowering hydraulic loading (e.g., Space for the River solutions, adjusting discharge distribution).
- Forelands/Building with Nature solutions.

Layer 2 relates to measures that only mitigate flood damages or societal disruption. In this case, types of measures include:

- Influencing flood progression (compartmentalization)

- Adaptive building practices (elevating structures, building on pilings, waterproof and flood-resistant construction, floating structures, amphibious housing).
- Protecting critical infrastructure.
- Building to support crisis management (evacuation routes and refuge areas).
- Risk zoning, avoiding/prohibiting construction in high-risk areas.

Furthermore, **Layer 3** relates to measures aimed at enhancing flood disaster management during a flood event crisis. Thus, types of measures would include:

- Improving crisis management (disaster plans, evacuation drills, enhancing risk awareness).
- Enhancing planning, informing residents, and conducting training.
- Developing shelters, extra-wide evacuation routes, evacuation planning, and ensuring an adequate supply of emergency response resources.
- Developing an adaptive evacuation strategy (optimal combination of horizontal and vertical evacuation) with an associated communication strategy.

Then there is **Layer 4** (Climate-resilient recovery). This layer has lots of overlap with “Layer 2”, as it also is about mitigating the negative impacts of a flood or waterlogging. However, the key distinction here is the time and place as this layer exclusively refers to after flood restoration measures for infrastructure like buildings instead of mitigating measures that are introduced before a flood event/crisis has occurred. In this case, types of measures would include:

1. Climate robust recovery measures from damage for both private property, such as homes or commercial buildings, and public property, such as roads, locks, and pumping stations.
2. Considerations for insurance matters and government compensation after the flood event.
3. Government induced building regulations.

Lastly, if none of the above layers are relevant the text is coded as “**Other.**”

Overall, this operationalisation has been used to create codes to group and analyse frames within news articles related to the shock (flood) event (see 3.3.1 Data collection). See the codebook for a further in-depth standardisation of the coding process.

2.6 Conceptual model

Based on the above-mentioned literature, the following analytical framework has been developed as seen in Figure 2. This framework shows the various elements of the framing of the flood event in Limburg. These frames are defined and analysed using Entman's (1993) framing theory, focussing on causal interpretation, problem definition, moral evaluation, and treatment recommendation frames. Each frame is further divided in referencing any one of the four layers as defined in the MLS approach. If none of the four layers were identified in a frame the coded frame would be grouped in the "Other" section. Therefore, providing a framing analysis that reveals which MLS layers are made more salient in the media articles (in response to the 2021 flood event) in the context of problem definitions, causal interpretations, moral evaluations, and treatment recommendations. Thus, providing a comprehensive analysis that displays insights in the definition of resilience in the Dutch news media post-flood.

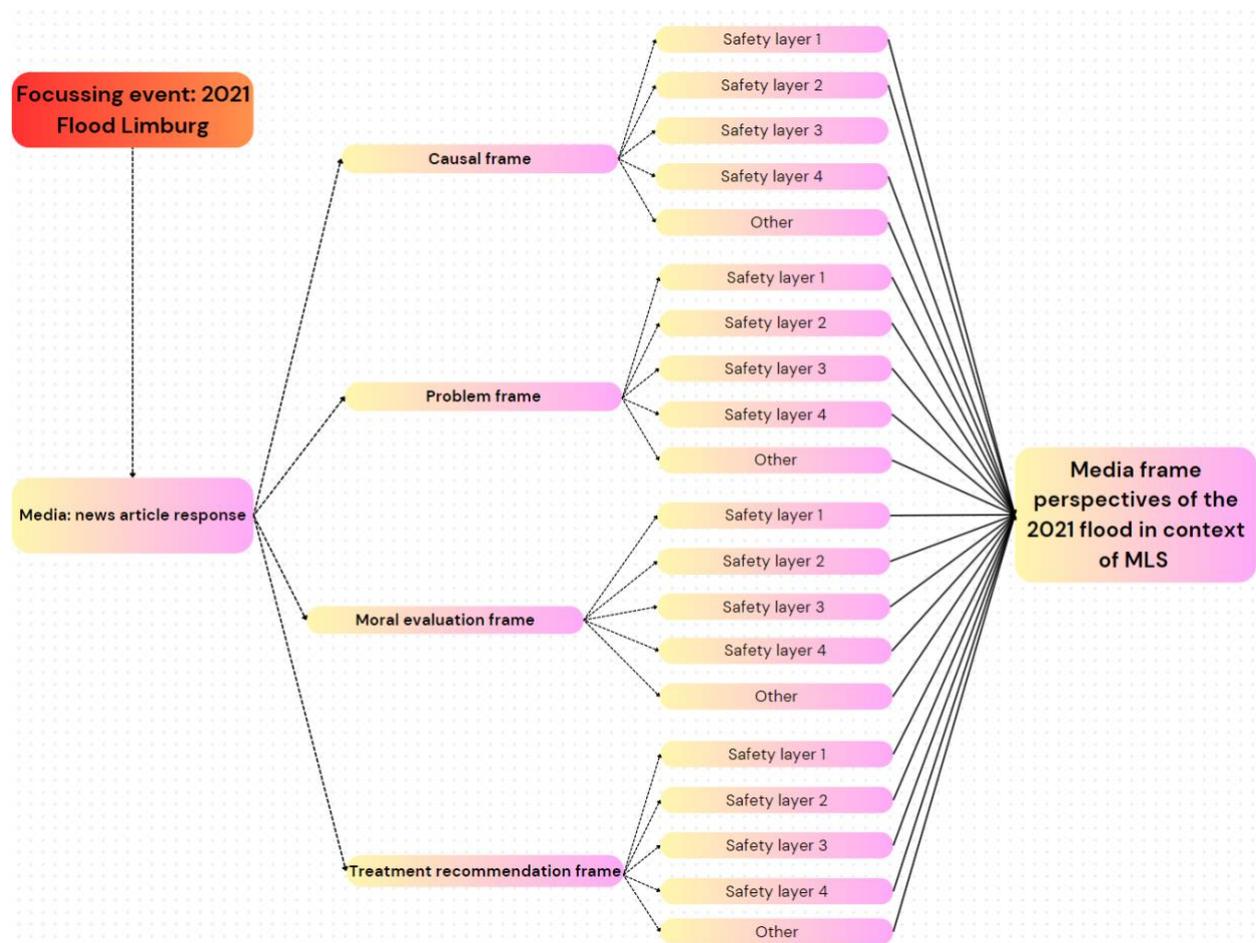


Figure 2 Conceptual model

3. Methodology

This chapter outlines the specific strategies and procedures that will be used to conduct the study. The research strategy, sampling techniques, data collection methods, data analysis procedures, and validity and reliability will be clarified.

3.1 Research philosophy

There are four primary research paradigms: positivism, post-positivism, critical theory, and constructivism. In this study, which examines floods in the Province of Limburg and the framing in Dutch media, the constructivism research paradigm is employed. Constructivism posits that reality is socially constructed, meaning that our understanding of the world is shaped by social, cultural, and historical contexts. This paradigm emphasizes the importance of exploring how individuals and groups interpret and construct their realities, making it especially relevant for research focused on framing and narrative analysis. The reasons for this are explained below.

The primary aim of this study is to explore how the 2021 Limburg flood event is framed within Dutch news media. Framing deals with how events are interpreted, presented, and understood by different actors. In addition, the research is not seeking to uncover an objective truth about the flood event itself but rather to understand how the media construct their narratives around it. Constructivism recognizes that media content is not merely a vehicle for transferring information but is also shaped by journalistic routines, external pressures, and active audience processing, which all contribute to the construction of social reality (Neuman et al., 1992; McQuail, 2005).

The research employs a text-based interpretative, qualitative content analysis approach, which aligns well with the constructivist paradigm. This method involves analysing the content of media to uncover the underlying themes, narratives, and frames. Constructivism supports this approach by emphasizing the subjective nature of these interpretations and the social processes through which they are formed. The framing process, within this constructivist lens, incorporates various levels of journalistic production and the interpretive frameworks of audiences, highlighting the dynamic interaction between media content and its reception (Scheufele, 2000).

The thesis is concerned with how the concept of resilience is constructed and understood within the context of flood risk governance. Resilience, in this sense, is not just a technical term but a socially constructed concept that varies depending on the perspectives of different stakeholders. Constructivism is well-suited to exploring these varying constructions, recognizing that the meaning of resilience is shaped by the social, cultural, and historical contexts in which it is discussed. This approach contrasts with other paradigms, such as agenda-setting and priming, which tend to focus on the effects of media content on public opinion without fully accounting for the interactive process of social reality

construction (McCombs & Shaw, 1972; Iyengar & Kinder, 1987).

Furthermore, constructivism acknowledges the importance of context in shaping how events are understood. The research considers the influence of past events, such as the 2021 Limburg flood, on the evolving discourse around flood risk governance. This approach is consistent with constructivism, which emphasizes the role of historical and social context in shaping the current framing of resilience. The constructivist view allows for the exploration of how media frames are influenced by broader cultural and societal structures, making it a comprehensive approach for this study (Van Gorp, 2007).

The primary research question and sub-questions focus on how the flood event is framed in terms of resilience and the Dutch multi-layered safety approach. Therefore, this paradigm best aligns with these goals, as it allows for an exploration of the meanings and interpretations that different actors attach to the event and its aftermath. Again, the research does not aim to establish an objective truth about the event but to understand the various ways in which it has been framed by media sources. Thus aligning itself with the constructivist emphasis on the role of framing in constructing social reality and influencing public perception (Shoemaker & Reese, 1996).

On the contrary, Positivism emphasizes quantitative methods, hypothesis testing, and the discovery of universal laws. While positivism is effective for research focused on objective measurements, such as the statistical analysis of flood occurrences or the quantification of flood damages, it is less suitable for studies requiring an understanding of subjective perceptions, interpretations, and meanings. This research, which explores how flood events and resilience are framed in media articles, finds positivism inadequate because it does not account for the subjective nature of framing and interpretation. In addition, Post-positivism could be applicable to research that seeks to uncover patterns or trends with an awareness of contextual influences. However, given the emphasis on subjective framing and interpretative analysis in this study, post-positivism may still be too rigid for fully capturing the nuances of media narratives. Furthermore, Critical Theory seeks to uncover hidden power relations and aims to empower marginalized voices. While critical theory could be relevant if the research aimed to explore how power dynamics influence flood risk governance or media representations, the primary focus of this study is on understanding different framings and interpretations rather than directly challenging or deconstructing power structures.

Overall, the constructivist paradigm is the most suitable for this research because it aligns with the focus on framing, interpretation, and the social construction of resilience in the context of flood risk governance. Constructivism supports the qualitative methods employed in the study and allows for a deep understanding of how different stakeholders construct their narratives around the 2021 Limburg flood event. This paradigm will enable the researcher to systematically analyse the media articles, uncovering the various ways in which the event has been

framed and the implications of these frames for Dutch flood risk governance. By choosing constructivism, the research stays true to its aim of exploring the subjective interpretations and social constructions that shape the discourse on flood resilience. This approach is not limited to the cognitive effects of media content but also considers the broader cultural and societal factors that influence how these frames are created and understood (Nelson et al., 1997; Price & Tewksbury, 1997).

3.2 Research strategy

Reese (2007, p. 10) argues that a qualitative approach to framing analysis is essential to avoid the simplistic categorization of media texts and discourse based solely on size or frequency. He emphasizes that frames are inherently qualitative constructs, requiring an understanding of the meanings embedded within the internal relationships of texts. Simplifying these meanings into quantitative measures would obscure their complexity.

Hence, this study is a desk-research which uses a text-based interpretative, qualitative content analysis approach incorporating Entman's frame theory. This involves analysing textual data such as media articles, providing a structured and systematic approach for identifying and interpreting 'frames' in such data.

3.3 Research methods

3.3.1 Data collection

The Netherlands has 5 major nationwide newspapers: De Telegraaf, De Volkskrant, Het AD, NRC (handelsblad), and Trouw. Besides that, the Netherlands consists of regional newspapers. In this case 'De Limburger' was chosen, as this newspaper is produced in the province where the flood event took place. Using the database of LexisNexis the choice was made to only include the digital newspapers ending on '.nl' as this option showed the same articles, but without producing any duplicates in the list. Furthermore, the articles from NRC.nl and NRC Handelsblad were included as both sources produced different but relevant articles. The search timeline was limited to a span of 3 years starting at the flood event on July the 13th 2021 until the end of July the 13th 2023 to see if the flood event still had any significance in the short term and long term. All articles had to include the following words: 'Limburg', 'water', 'overstroming' (flood) or 'hoogwater' (high water). This set of search words generated as many articles as possible but also ensured enough relevancy to the topic of interest. In addition, optional words like 'wateroverlast' (water nuisance), 'zomer' (summer) or 2021 were also highlighted to further pinpoint pertinent articles. In the end a total of n=267 articles were generated referencing the 2021 flood event in Limburg.

3.3.2 Data Analysis

According to Reese (as cited in D'Angelo & Kuypers, 2010, p. 18), qualitative frame analysis focuses on the cultural and political elements of news frames, examining how they utilize a collective set of social meanings. Gitlin (1980, p. 303) suggests that qualitative analysis strives to capture the intricate nature of media artifacts. Additionally, Connolly-Ahern and Broadway (2008, p. 369) describe qualitative frame analysis as a method involving thorough and repeated engagement with a text, taking a comprehensive view to identify frames. They further explain that this type of analysis looks at the key terms and metaphors within the text, determining what is included in the frame as well as what is omitted, acknowledging that the most frequently repeated words in the text may not necessarily be the most significant (*ibid.*).

That is why this study follows a qualitative news frame analysis methodology, which is a systematic approach for identifying, categorizing, and interpreting the frames within news media. The analysis was conducted in a series of methodical steps to ensure rigor and consistency throughout the process (*cf.* Linström & Marais, 2012). Below, the phases of the analysis are detailed.

Phase 1: Multiple Readings and Descriptive Notetaking

The first step in the data analysis involved multiple readings of the collected news articles. This phase was critical in familiarizing with the content and context of the material. During these readings, descriptive notes were taken, capturing the overall tone, notable themes, reoccurring patterns, and any preliminary observations about the framing of the subjects under study. This step aligns with Alozie's (2005) approach, which emphasizes an initial broad engagement with the material to form a comprehensive understanding of the content.

Phase 2: Identification of Themes, Frames, and Categories

Following the initial readings, the next step was a more focused analysis aimed at identifying specific reoccurring themes, frames, values, and topical categories within the textual data. This phase involved a second reading where the newspaper articles were coded starting with coding frames according to Entman's framing theory. Thereafter, coded frames were further examined and coded based on their relation to any MLS FRM strategy (*i.e.* flood prevention, flood mitigation, crisis management, and climate-resilient recovery, other).

The goal was to uncover the dominant narratives and framing devices used by the media outlets in question, as well as to identify any secondary or less prominent frames that contributed to the overall discourse.

Phase 3: In-Depth Interpretation

The final phase of the analysis involved an in-depth interpretation of the

identified frames. This process required a thorough examination of the content to understand the underlying meanings and implications of the frames. This step was guided by the conceptual framework and research questions, ensuring that the interpretation was both relevant and grounded in the theoretical foundations of framing analysis.

Identifying Frames

The identification of frames was conducted through a dual focus on both the "how" and "what" of framing. The "how" involved using Wimmer and Dominick's (2006) constant comparative technique, which consists of the following steps:

1. Comparative assignment of incidents to categories or frames.
2. Elaboration and refinement of categories or frames.
3. Searching for relationships and themes among categories or frames.
4. Simplifying and integrating data into a coherent theoretical structure.

This method ensured that the analysis was systematic and that the frames identified were consistently applied across the dataset.

The "what" of identifying frames involved analysing the text for symbolic devices or signature elements embedded within the news stories. There are five such devices that signify the uses of frames: metaphors, exemplars, catchphrases, depictions, and visual images (Gamson & Lasch, 1983; Gamson & Modigliani, 1989).

3.4 Reliability and validity

On the basis of reliability the following issues have been identified: Tankard (in Reese et al., 2001, p. 98) criticizes qualitative framing analysis, pointing out that it can lead to a subjective process of frame identification, where researchers might define frames in a stereotypical or conventional manner. Furthermore, D'Angelo and Kuypers (2010, p. 37) argue that a qualitative approach can be difficult when clear categories are not readily apparent and "an easy coding scheme for sorting textual units is not evident." They further critique this approach for being time-consuming, as an inductive frame analysis must be conducted before establishing a list of frames (D'Angelo & Kuypers, 2010, p. 104).

One major threat to validity in qualitative frame analysis is the operational definition of frames. D'Angelo and Kuypers (2010, p. 46) note that researchers often "reinvent the wheel" when defining news frames. Similarly, Klandermans & Staggenborg (2002, p. 62) highlight challenges in data collection, analysis, and presentation of results in frame analysis. The initial challenge lies in defining concepts, as distinctions between news frames can be unclear, while the subsequent challenge involves verification and evidence. Keeping this in mind,

the following steps were taken.

Reliability

To ensure reliability the theoretical framework together with the methodology were expanded upon in detail. Each category/code has been defined on a systematic basis to ensure consistency across the coding and analysing process (see codebook). Therefore, this study can be replicated by others. To further systematize the analysis, the software Atlas.ti was used. In addition, to increase reproducibility this research focused on the most dominant frames, i.e., the frames that appeared most frequently in quotations, in the media analysis.

Validity

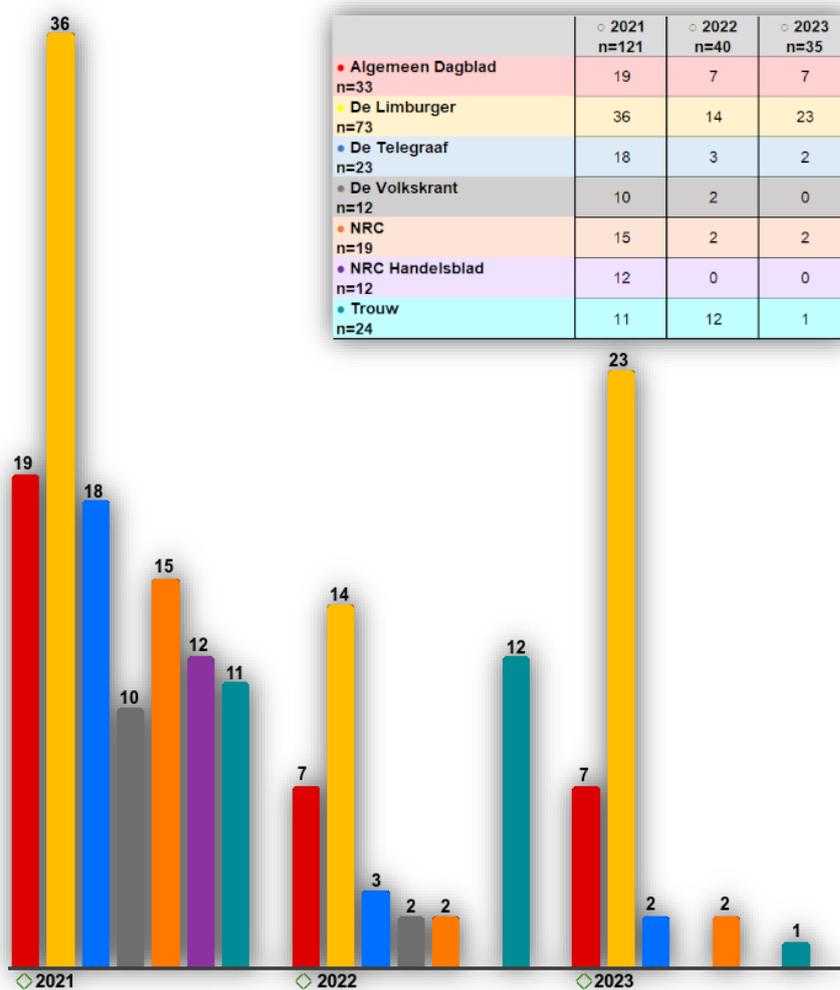
To increase validity this research used multiple different media news outlets as the sources including three of the biggest national newspapers, namely “De Volkskrant”, “Het AD” and “De Telegraaf”. Naturally, “De Limburger” is included, which is the regional newspaper and the region where the flood took place. Moreover, articles from Trouw, NRC and NRC Handelsblad were included to increase the number of relevant articles in the dataset. Furthermore, a comprehensive literature study was conducted to make sure each step in defining and interpreting frames was backed by theory. The literature study also made sure that no reinventing of the wheel (D’Angelo and Kuypers, 2010) occurred when defining news frames. The use of the MLS approach to further categorize frames ensured that each frame was clearly distinguished from the others.

As the interpretation of textual information is prone to bias, I will be reflecting on my own biases and assumptions throughout the research process in a transparent manner. These are discussed in the discussion chapter and reflection.

4. Media Analysis Results

The content analysis was performed on 266 articles from which 70 articles were manually filtered as not relevant. These articles were mostly descriptive in nature, reporting the disaster and updating the progression without formulating any relevant frames. Some of these articles did have frames but they were not related to the 2021 flood event. Others only mentioned the 2021 flood as a call back, with no frame attached to it or these referred to the situation in Germany and Belgium. Moreover, a few articles were simply outliers that contained the search terms but did not report on the 2021 flood event. Thus, in total n=196 relevant articles. Figure 3 shows the articles per media source and per year.

Figure 3: Article frequency per source and year



The shock event was still present in the analysed media articles across the different sources after two years. Although the total of news articles with relevant frames were cut by 81 articles after 2021, the decline in relevant articles flattened from 2022 to 2023 with only 5 articles less. Logically, the provincial (local) news media had the most articles written across all three years. This was followed by

the Dutch mainstream media “het Algemeen Dagblad”, and “De Telegraaf”. Thereafter, “NRC” produced a similar but less persistent article frequency per year. Furthermore, “De Volkskrant” together with “NRC Handelsblad” had the least articles. Lastly, the newspaper “Trouw” had notably more relevant articles in 2022 to in relation to 2021.

The following chapter will present the results found in the media articles starting in sequence with the problem definition, then the causal identification, moral evaluation and ending with the treatment recommendation frames. Within each of these framing categories the safety layers are represented from layer 1 to layer 4 and ending with the “Other” category if present. Each of those chapters will describe the reoccurring frame themes that were found in these layers with a brief explanation and example of those frames. Finally, the most dominant frames per layer are concluded, i.e., the frames that came up most often in quotations.

4.1 What problems does this flood reveal?

To reiterate, Entman (1993) defines the problem frame as an aspect of media discourse that influences how issues are presented to the public and how it shapes their perceptions and understanding. Media outlets strategically emphasize certain dimensions of an issue while downplaying others, thereby guiding audience interpretations of the problem's urgency and significance. This selective portrayal not only informs public discourse but also influences the perceived need for a solution or response. In the context of the Limburg flood event, problem framing encompasses several key reoccurring frame themes (see Table 1).

<i>Table 1. Problem definition frames and referencing layers</i>	● Layer 1 N=23	● Layer 2 N=7	● Layer 3 N=13	● Layer 4 N=24	● Layer "Other" N=52
○ Problem: Climate Change Urgency N=43	-	-	-	-	43
○ Problem: Insurance Challenges and Disputes N=16	-	-	-	16	-
○ Problem: Only Flood prevention is complicated in Limburg N=12	12	-	-	-	-
○ Problem: Current flood protection standards are too low N=11	11	-	-	-	-

○ Problem: Increasing Frequency and Severity of Extreme Weather Events N=9	-	-	-	-	9
○ Problem: Government Compensation Issues N=8	-	-	-	8	-
○ Problem: Infrastructure Vulnerability and Strategic Planning N=7	-	7	-	-	-
○ Problem: Criticism of Emergency Response and Management Failures N=7	-	-	7	-	-
○ Problem: Coordination and Leadership Issues in Crisis Management N=6	-	-	6	-	-

4.1.1 Problem Definition Frame: Layer 1

In total n=23 quotes referenced problem definitions related to layer 1 in the context of the flood event. Further analysis provided 2 reoccurring themes:

1. Only Flood prevention is complicated in Limburg (n=12)
2. Current flood protection standards are too low (n=11)

1. Only Flood prevention is complicated in Limburg

The theme "Only Flood Prevention is Complicated in Limburg" underscores the challenges posed by the region's geographical and environmental characteristics, particularly in South Limburg. These complexities make conventional flood prevention measures insufficient or impractical, hinting to more comprehensive approaches to mitigate flood risks.

For instance, Limburg's hilly terrain significantly complicates flood prevention efforts:

- *"An additional problem in the Limburg hill country is that all the water that falls in the higher areas quickly flows to one point: the lowest. 'This creates dangerous situations, with higher flow rates,' says Van Heeringen. In South Limburg, several water storage facilities have been built since the turn of the century. These are meant to prevent all the water from rushing down the mountain at once after a heavy rainstorm. However, they are not able to withstand the extreme amounts of water we are now experiencing." (AD/Algemeen Dagblad.nl., 2021, July 16)*
- *"It will be quite a challenge to create more space for streams in the South Limburg hilly landscape. There are already four hundred 'rainwater buffers,' excavated basins at the bottom of slopes that temporarily collect rainwater during heavy showers. 'They are almost invisibly integrated into*

the landscape. But we can't keep building them endlessly, or else you'll get a lunar landscape,' says the WL executive." (De Volkskrant.nl, 2021, November 1)

These quotes highlight the difficulties of managing flood risks in a region where water from higher elevations rapidly accumulates in lower areas, creating high flow rates and increasing flood risks. The first quote emphasizes the insufficiency of existing water storage facilities in dealing with extreme rainfall, framing the issue as a significant challenge due to Limburg's steep topography. The second quote illustrates the limited space for expanding flood prevention infrastructure, such as rainwater buffers, further complicating the situation. These spatial constraints make it difficult to implement traditional flood prevention measures effectively.

2. Current flood protection standards are too low

The theme "Current Flood Protection Standards Are Too Low" reflects a widespread concern that existing flood management infrastructure and policies in Limburg are insufficient to handle the increasing frequency and severity of extreme weather events. This frame theme is evident in discussions surrounding the effectiveness of siphons, retention basins, and dikes, as well as broader dissatisfaction with current water management practices. The following analysis highlights the critical need for reassessing and enhancing flood protection standards to prevent future disasters.

One of the most salient examples of inadequate infrastructure is the siphon at Bunde:

- *"Work is also underway to increase the discharge capacity of the siphon at Bunde, which leads the Geul under the Julianacanal to the Meuse. Two years ago, this turned out to be a significant bottleneck." (De Limburger, July 5, 2023)*
- *"Three of the five tubes of that siphon were clogged with branches and wreckage. There should have been a wood catch upstream. They have been cleaning those tubes for weeks now. No one had paid attention to it before, Rijkswaterstaat and the Water Board point fingers at each other. Regarding water management, there is little coordination." (De Telegraaf, December 26, 2021)*

These quotes highlight significant issues at the siphon in Bunde, emphasizing its limited capacity and the lack of proper maintenance. The first quote frames the siphon as a critical "bottleneck" during floods, suggesting that current standards and infrastructure are inadequate. The second quote underscores the mismanagement, pointing to clogged tubes and poor coordination between Rijkswaterstaat and the Water Board as factors that exacerbated flooding. These quotes illustrate the broader theme of inadequate flood protection standards,

particularly in relation to infrastructure maintenance and management.

Several quotes stress the necessity of raising flood protection standards and improving planning to cope with future challenges, for instance:

- *“Let this be a new warning: we must prepare for more extreme conditions than we previously thought possible. This could involve raising dikes and giving rivers even more space to cope with the greatest problems during high water levels.” (De Volkskrant, July 18, 2021)*
- *“But acting governor Johan Remkes recently also judged that heavy dike reinforcement is indeed necessary ... Raising dikes less would also have a less significant impact on local residents ... Lowering the safety standard would lead to a flood not once in a hundred years, but once in thirty years. With all the misery that currently entails.” (De Limburger, July 17, 2021)*

The first quote serves as a direct call to action, urging preparation for more extreme conditions than previously anticipated. The recommendation to raise dikes and create more space for rivers indicates a recognition that current flood protection standards are too low. The second quote highlights the potential consequences of lowering safety standards, emphasizing that doing so would significantly increase flood risks. These quotes underscore the urgent need to reassess and raise current standards to prevent future disasters.

Overall, the problem definition frames related to layer 1 identifies key themes related to the challenges of flood prevention in Limburg, with 23 quotes highlighting two main concerns: the complexity of flood prevention in Limburg due to its unique geographical characteristics and the inadequacy of current flood protection standards. The first theme emphasizes how Limburg's hilly terrain and limited space complicate traditional flood prevention measures, making it difficult to manage the rapid accumulation of water and increasing flood risks. The second theme underscores widespread concerns that existing flood protection standards and infrastructure are insufficient to cope with the increasing frequency and severity of extreme weather events. The analysis of these themes reveals a pressing need for less traditional approaches to flood management in Limburg, particularly in light of the 2021 flood event, which exposed significant weaknesses in both preventive measures and existing infrastructure.

4.1.2 Problem Definition Frame: Layer 2

Infrastructure Vulnerability and Strategic Planning

In total n=7 quotes referenced problem definitions related to layer 2 in the context of the flood event.

This theme reflects the necessity of forward-looking strategies to ensure that both existing and future infrastructure can withstand the increasing threats posed by climate change, such as rising sea levels, sinking soil, and more frequent extreme weather events. One of the central issues highlighted in this theme is the need for greater awareness and preparedness among both the public and private sectors. For example, Marjolijn Haasnoot, a climate researcher at the Deltares research bureau, emphasizes in an article the long-term implications on infrastructure in the Netherlands, stating:

- *"A large part of the Netherlands can be flooded, partly from the sea and partly from the rivers. Many things we build have a long lifespan: preferably a hundred years or more. This means that you have to look far ahead." (De Limburger.nl, 2021, September 6)*

This quote exemplifies the problem of insufficient foresight in infrastructure planning. While there is recognition of the long lifespan of infrastructure, the statement underscores the urgent need to integrate climate risk assessments into the planning and construction processes.

In addition, another critical issue is the ongoing investment in high-risk areas, despite the known dangers. The following quote illustrates this concern:

- *"There are many plans to build even further in deep polders, such as the Zuidplaspolder, at six meters depth. And even after the floods in Limburg, there was talk again of building in the floodplains near Arnhem." (De Limburger.nl, September 6, 2021)*

This statement highlights the short-sightedness of continuing to invest in infrastructure in areas that are highly susceptible to flooding. The deep polders and floodplains mentioned are particularly vulnerable due to their low elevation and proximity to water bodies. The costs of such investments could include not only the financial burden of repairing and reinforcing infrastructure after flooding but also the potential loss of life and property. Strategic planning must involve a thorough reassessment of these investments, prioritizing safety and resilience over short-term gains. This tension between development goals, such as housing expansion, and environmental limitations is another significant aspect of this theme. As seen in the statement:

- *"Not everywhere along the water can be built anymore—that there may even be demolition—could clash with the housing task. 'The energy transition, the agricultural transition, the rural area transition: we all have to fit our ambitions into the same space. But water and soil are guiding. That is the new adage.'" (De Limburger.nl, July 7, 2023)*

This quote captures the conflict between the demand for new housing and the reality of environmental constraints. The acknowledgement that "water and soil are guiding" reflects a shift in planning priorities, where environmental factors take precedence over development ambitions. The costs of disregarding these constraints could lead to increased vulnerability to flooding and other hazards,

while adhering to them may require difficult decisions, such as limiting construction in certain areas or even demolishing existing structures.

Overall, the theme of “Infrastructure Vulnerability and Strategic Planning” underscores the issue of long-term resilience and immediate needs. The 2021 flood event has put into question building infrastructure in flood risk areas. This requires not only technical solutions but also a shift in mindset towards sustainability and foresight in all aspects of planning and development.

4.1.3 Problem Definition Frame: Layer 3

In total n=13 quotes referenced problem definitions related to layer 3 in the context of the flood event. Further analysis provided 2 reoccurring themes:

1. Criticism of Emergency Response and Management Failures (n=7)
2. Coordination and Leadership Issues in Crisis Management (n=6)

1. Criticism of Emergency Response and Management Failures

This frame theme encompasses the various ways in which the handling of the flood disaster in Limburg has been perceived as inadequate by affected residents, officials, and other stakeholders. Issues such as poor communication, delayed warnings, insufficient preparedness, and the overall failure of authorities to effectively manage the crisis are highlighted. For example:

- *"Hearing the water on the ground floor of your house sloshing. Zero communication. And having no idea if the water will rise even further. René Paulssen (69) from Valkenburg experienced the floods that hit Limburg hard in mid-July up close. He wasn't in panic. 'But it was frightening.'" (AD/Algemeen Dagblad.nl, February 18, 2022)*
- *"At café-restaurant De Boei, a few hundred meters towards the village, Vincent Paczek is trying to rebuild his business. He is angry with the municipality for not informing him about how high the water would rise and, especially, what he should do when the water comes." (de limburg.nl, August 5, 2021)*

These quotes are coded under this theme because it vividly captures the experience of residents during the flood who suffered from a lack of communication and information. The absence of updates and guidance during the critical moments of the flood led to fear and uncertainty, highlighting the failures in emergency communication. Moreover:

- *"We have been left too much to our own devices during the flood. That's the feeling prevailing in the municipality of Gulpen-Wittem. Various affected residents feel abandoned by the municipality and water board,*

while the municipality, in turn, feels overlooked by the water board." (de Limburger.nl, July 26, 2021)

This quote exemplifies the perceived abandonment felt by residents who expected more support from the authorities. The mutual blame between the municipality and the water board further underscores the failure in coordinated response efforts, making this a salient example of the theme.

In short, these quotes collectively paint a picture crisis response issues framed by highlighting miscommunication, delayed actions, and a lack of coordinated efforts, leading to widespread criticism and a sense of abandonment among those affected by the floods.

2. Coordination and Leadership Issues in Crisis Management

This theme highlights issues such as poor communication, lack of preparedness, insufficient coordination among authorities, and the overall failure of the safety system. The frame underscores the authorities as not adequately managing the flood disaster, leading to significant criticism from residents, officials, and experts alike. For example:

- *"There is no coordination; Korsten is right." This is a reference to the group of specialists led by emeritus professor Arno Korsten, who recently analysed in a report to the province that there is insufficient coordination. Korsten advocates for a Delta Commissioner for the Maas River basin. The safety system does not work here because there is neither proper supervision nor oversight, the committee also concludes. Neering adds, 'Not because people aren't working. The problem is that Rijkswaterstaat apparently does not, or not sufficiently, communicate with the water board, such as about the siphon. Rijkswaterstaat has outsourced the maintenance, not realizing that high water does not adhere to a maintenance schedule.'" (De Limburger.nl, September 29, 2021)*
- *"During the flood two years ago, it became evident that communication with people in the disaster area was well below par. It was unclear which authority people should turn to for information, and many messages turned out to be inaccurate." (De Limburger.nl, July 5, 2023)*

These quotes emphasise the problem of poor communication during the flood. The confusion over which authority to contact and the dissemination of inaccurate information are indicative of the broader failures in disaster communication and management. However, the first quote also introduces a problem in the management of the river Maas (aka Meuse). The lack of oversight and supervision in this case refer back to the first layer, being flood prevention.

In summary, this frame collectively illustrates the various dimensions of the criticisms levelled against the emergency response and management of the flood disaster in Limburg. The reoccurring issues of poor communication, lack of

coordination, and conflicting interests among authorities highlight the systemic failures that undermined the effectiveness of the disaster response.

4.1.4 Problem Definition Frame: Layer 4

In total, n=24 quotes referenced problem definitions related to layer 4 in the context of the flood event. Further analysis identified two reoccurring themes:

1. Insurance Challenges and Disputes (n=16)
2. Government Compensation Issues (n=8)

1. Insurance Challenges and Disputes

The theme "Insurance Challenges and Disputes" highlights the significant difficulties faced by flood victims in dealing with insurance companies. These challenges include disputes over coverage, insufficient payouts, and the broader issue of insurance companies not adequately addressing the needs of those affected by extreme weather events.

One major issue is the ongoing disputes between flood victims and their insurers. Many victims experienced significant delays and rejections of claims, leading to heightened frustration and financial strain. For instance:

- "A considerable number of flood victims have faced significant delays in their insurance claims. Some claims have been rejected outright, leaving victims struggling to recover financially." (AD/Algemeen Dagblad.nl, July 16, 2021)
- "Insurers have offered payouts that are often insufficient to cover the full extent of the damages experienced by flood victims. This has resulted in ongoing disputes and dissatisfaction among those affected." (De Volkskrant.nl, November 1, 2021)
- "The process of dealing with insurance companies has been marked by prolonged negotiations and frustration, with many victims questioning whether their policies are adequate for extreme weather events." (De Telegraaf, December 26, 2021)

Additionally, the quotes reveal a growing difficulty in insuring against extreme weather events. This inadequacy of insurance coverage has exacerbated the financial burden on flood victims, who often face additional hardships due to insufficient support from their insurers.

2. Government Compensation Issues

The theme "Government Compensation Issues" centres on the problems and shortcomings related to government compensation for flood damages. This includes bureaucratic delays, inadequate compensation amounts, and difficulties in accessing necessary funds.

One significant issue highlighted is the slow and complex process of receiving compensation from government funds. Many flood victims have faced delays in

receiving financial support due to bureaucratic inefficiencies and complicated application procedures. For example:

- “The bureaucratic hurdles involved in accessing government compensation have resulted in significant delays, with many victims still waiting for financial support months after the flood.” (De Limburger, July 5, 2023)
- “Despite promises of aid, the amount of compensation provided by the government has often been deemed insufficient by flood victims, who struggle to cover their damages fully.” (De Volkskrant, July 18, 2021)
- “Victims have reported extensive delays and a lack of clarity regarding the compensation process, leading to additional stress and uncertainty during their recovery.” (De Telegraaf, December 26, 2021)

The analysis of government compensation issues underscores the need for more effective and streamlined processes for providing financial support to flood victims. Improving the efficiency and adequacy of compensation mechanisms is crucial for ensuring that individuals and communities can recover more effectively from flood events.

Overall, the problem definition frames related to layer 4 reveal significant challenges in both insurance and government compensation areas. The insurance challenges theme highlights the difficulties victims face with inadequate coverage and disputes, while the government compensation issues theme focuses on bureaucratic delays and insufficient support. Addressing these problems is essential for improving recovery efforts and ensuring better support for flood-affected individuals.

4.1.5 Problem Definition Frame: “Other”

In total, n=52 quotes referenced problem definitions related to layer “Other” in the context of the flood event. Further analysis identified two reoccurring themes:

1. Climate Change Urgency (n=43)
2. Increasing Frequency and Severity of Extreme Weather Events (n=9)

Climate Change Urgency

The "Climate Change Urgency" frame is the most reoccurring problem definition frame which emphasizes the increasing severity and frequency of extreme weather events due to climate change. It underscores the tangible and immediate impacts of climate change such as the flood event has shown, transforming it from a distant concern into a present-day reality that demands urgent attention. For example:

- *"Well, deep down, we know. The climate is changing, and the weather is becoming more extreme. In July, a gigantic 'rain bomb' exploded over South Limburg, East Belgium, and western Germany, resulting in severe floods, dozens of deaths, and enormous material damage." (AD/Algemeen*

Dagblad.nl, December 12, 2021).

- *"Experts describe the extreme rain and flooding in the Netherlands, Germany, and Belgium as an enormous wake-up call. Professor Aerts from VU University says, 'I thought climate warming would lead to this happening in forty, fifty years. But it's happening now.' Van Heeringen from Deltares adds, 'After the floods of '93 and '95, the Meuse was extensively addressed, and we stopped building in the floodplains, allowing us to escape relatively unscathed. Let this be a new warning: we must prepare for more extreme conditions than we previously considered possible.'" (De Volkskrant.nl, July 18, 2021)*

These quotes frame recent extreme weather events as a clear and present danger, emphasizing that the impacts of climate change are occurring much sooner than anticipated. They highlight the urgent need for preparation and adaptation in the face of increasingly severe conditions, reinforcing the connection between climate change and the escalating severity of weather patterns.

Increasing Frequency of Extreme Weather Events

The "Increasing Frequency of Extreme Weather Events" frame highlights the growing regularity and unpredictability of extreme weather conditions, emphasizing how these events are no longer rare occurrences but are becoming part of the new normal without referencing climate change. The unpredictable nature of these events, coupled with their growing frequency, poses significant challenges for infrastructure, safety, and property values.

For example:

- *"We are seeing more floods during periods you wouldn't expect. Take the massive rainstorm in the summer of 2021 in South Limburg, the Ardennes, and the Eifel," says John van Tilburg, water safety advisor at Brabantse Delta. "We have models with hundreds of thousands of storms, but that was a rainfall wave that was unrecognizable in any model. Specialists said: what happened in Limburg couldn't happen. And yet it happened" (AD/Algemeen Dagblad.nl, January 29, 2023).*
- *"After the devastating floods in large parts of Limburg and neighboring countries last week, it has become clear once again that such situations will occur more frequently in the future. What are the consequences for house prices in the (ever-growing) risk areas? Historically, buyers are willing to pay more for a home by the water, but with the associated growing risks of flooding, it is questionable whether water has only a positive effect" (NRC.nl, August 3, 2021).*

- *"There is a lack of imagination. We cannot now imagine the weather extremes that are going to happen, let alone think about how to respond to them. We could hardly comprehend how much rain could fall in a short time before the floods of 2021. We will not only see more extremes but also more extreme extremes" (De Limburger.nl, January 16, 2023).*

These examples illustrate framing of awareness and concerns surrounding the increasing frequency and intensity of extreme weather events.

Overall, both the "Climate Change Urgency" and "Increasing Frequency of Extreme Weather Events" frames underscore the growing awareness of the escalating risks posed by extreme weather phenomena. While the "Climate Change Urgency" frame directly links these events to the broader issue of climate change, emphasizing the need for urgent action to mitigate its impacts, the "Increasing Frequency of Extreme Weather Events" frame focuses more on the immediate, tangible challenges that these events present, without necessarily referencing climate change.

4.2 The flood was caused by multiple factors

Causal frames identify the root causes of a problem (Matthes & Kohring, 2008). Due to the complexity of the endogenous shock event, no single root cause was identified. Instead, newspapers described an accumulation of factors that compounded each other. In this case, the media highlighted certain causal factors more frequently than others (see Table 2).

<i>Table 2. Causal interpretation frames and referencing layers</i>	● Layer 1 N=11	● Layer "Other" N=55
○ Cause: Climate change N=48	-	48
○ Cause: High water level due to rain N=7	-	7
○ Cause: Infrastructure limitations and failures N=11	11	-

4.2.1 Causal Interpretation Frame: Layer 1

Infrastructure limitations and failures

During the media analysis, n=11 quotes referencing Layer 1 were identified. These news articles highlight issues with flood defence infrastructure during the 2021 flood event. Specifically, several articles noted that certain infrastructure did not function properly or failed due to the extreme volume of water. A common point of failure mentioned was the siphon at Bunde, which lacked sufficient discharge

capacity, exacerbating the flood in the region. This siphon channels the Geul river under the Julianacanal to the Maas, but it was identified as a bottleneck, leading to water overflow and inundation. Additionally, blockages from debris and sediment in the siphon pipes further contributed to the flooding.

For example:

- "Deltares also suspects that the siphon under the Julianakanaal to the Meuse did not function optimally; two openings seemed to flow less, there were blockages of the openings due to carried wood and debris, plus possible deposition of silt or other sediment in the 76-meter-long siphon pipes themselves. However, the water levels were such that even with a well-flowing siphon, the area would still have been underwater. The capacity of the siphon is simply too limited. Due to the high-water level in the Meuse, the water could not flow smoothly through, causing congestion" (De Limburger.nl, 2022, May 12).
- "First to the siphon that carries the water from the Geul under the Julianakanaal. The underpass could not handle the amount of water in July, causing the Geul to overflow here as well" (De Limburger.nl, 2021, September 29).
- "The situation in Limburg was very extreme. Due to prolonged rainfall, the water in the river was very high, and all water storage areas were full. The rainwater had nowhere to go, causing even villages and cities to be submerged" (NRC Handelsblad.nl, 2021, August 7).

In short, these examples illustrate the critical role that infrastructure limitations and failures, particularly with the siphon at Bunde, played in exacerbating the flood event.

4.2.2 Causal Interpretation Frame: Layer "Other"

In total, n=55 quotes referenced causal interpretations related to layer "Other" in the context of the flood event. Further analysis identified two reoccurring themes:

1. Climate Change Urgency (n=48)
2. Increasing Frequency and Severity of Extreme Weather Events (n=7)

Climate change

The analysis has shown that the causal interpretation and problem definition are closely connected to climate change. Most quotes framed the flood event as a consequence of climate change and within such frames climate change was identified as a problem. This causal interpretation frame was identified as the most reoccurring theme. Here are some examples:

- *"Due to the warming climate, the air near the ground warms more strongly, can hold more moisture, and becomes more unstable. And this*

situation can persist longer due to climate changes, resulting in extreme rainfall peaks." (De Telegraaf.nl, 2021, July 15)

- *"This flood is a wound inflicted on us by the climate problem, but also an opportunity to address our foundations." (NRC Handelsblad, 2021, July 31)*
- *"In recent years, we are experiencing increasingly frequent tropical downpours. The warming of the earth undoubtedly plays a significant role in the story. The warmer it is, the more water evaporates from the sea. Rain falls more often in extreme showers, like this summer in South Limburg." (AD/Algemeen Dagblad.nl, September 11, 2021)*

High water level due to rain

This frame theme highlighted that the unprecedented nature of the flooding in Limburg, Belgium, and Germany, was caused by a combination of factors, including record-breaking river flow rates and extreme rainfall (n=7). Some quotes made a comparison with a more recent near flood event in Limburg and described why the river did flood in 2021. For example:

- *"Meteorologist Jaco van Wezel explained that the extreme rainfall resulted from a combination of factors, including a stationary low-pressure area over Germany, leading to repeated showers forming a front over the region." (De Telegraaf.nl, 2021, July 15)*
- *"In July, much more rain fell, and the water level rose even faster. 'The big difference with then is that the Maas River is currently at a low level,' says Donners, who lives high and dry on the Cauberg. 'In July, the Maas was also high, which prevented the Geul from draining its water.'" (De Volkskrant.nl, February 7, 2022)*

Overall, the analysis reveals a strong connection between the causal interpretation and problem definition frames. The flooding in Limburg was often framed as a direct consequence of climate change, emphasizing the increasing severity and frequency of extreme weather events. This theme was the most reoccurring, underscoring the perception that climate change as the underlying cause of the flood event. Additionally, the "High Water Level due to Rain" frame highlighted the unprecedented nature of the flooding, attributing it to a combination of extreme rainfall and record-breaking river flow rates. This frame also drew comparisons with past events to illustrate how various factors contributed to the severity of the 2021 floods. The findings suggest that both frames are intertwined with one and another.

4.3 Negative and Positive Judgement

To recap, the moral evaluation framing function is a process of "Conveying a moral judgment of those involved in the framed matter." (Entman 2003, 417). This

frame evaluates causal agents and their effects (Entman, 1993). The following frames were found that assigned negative or positive judgement to causal agents. Table 3 shows the identified frames per layer.

<i>Table 3. Moral evaluation frames and referencing layers</i>	● Layer 1 N=10	● Layer 3 N=16	● Layer 4 N=16
○ Moral_E: Negative Judgement N=36	3	14	16
○ Moral_E: Positive Judgement N=10	7	2	-

4.3.1 Moral Evaluation Frame: Layer 1

In total n=10 quotes were identified with the moral evaluation frame in the context of layer one. These evaluations reflect on the effectiveness and shortcomings of flood management strategies and infrastructure, shedding light on the perceived responsibilities and failures in addressing flood risks.

Negative Judgement

Only a few quotes (n=3) expressed a clear dissatisfaction with the flood management efforts and decisions, reflecting a critical view of the relevant authorities:

Inadequate Measures and Responses

- "But it particularly bothers the resident of Heerlen that, in his view, the municipal government and the water board do too little to prevent waterlogging. Even though the board has strengthened and enlarged water buffer De Dem in the meantime. Heerlen would actually increase the risk of new waterlogging by not blocking the construction of houses in the street. This reduces the water retention capacity of the area, according to Geelen." (De Limburger.nl, July 7, 2023)
- "Now that Rijkswaterstaat reports that the water level of the Meuse is back to normal, it is tempting to return to business as usual. But Limburg has escaped a disaster and then there are also questions to answer. Big questions, for example about the "Maaswerken" project, the program to fortify the Meuse dikes against extremely high water levels. Why didn't Limburg manage to arm itself against the consequences of heavy rainfall everywhere on time? Because in Brabant, Gelderland, and South Holland, the dikes have been strengthened since the flood of 1995 and the rivers have been widened. There were no serious problems there." (Trouw.nl, July 27, 2021)

These quotes highlight a critical stance towards flood management strategies and decisions. The first quote criticizes the municipal government's and water board's actions, specifically the failure to prevent new construction that compromises water retention capacity. The second quote questions the adequacy of regional flood defenses compared to other areas that have strengthened their flood protections. Both reflect a negative judgment about the effectiveness and timeliness of flood management efforts, suggesting that existing measures were insufficient or poorly executed.

Positive Judgement

In contrast, several quotes (n=7) reflect a positive evaluation of flood management measures and programs, emphasizing their success and importance:

Effective Flood Protection Measures

- "The dike reinforcements that have held back the water in many places are becoming an increasingly important part of the story of South Limburg."
- "We can postpone the dike reinforcement for ten years. Yes, that can go well. A good example is the unexpected flooding in Limburg, two years ago. Measures for protection against high water in the Meuse had just been completed, keeping the situation along the river manageable. Imagine what would have happened there without the dike reinforcement..." (AD/Algemeen Dagblad.nl, March 18, 2023)

These statements emphasize the positive impact of flood protection infrastructure, particularly dike reinforcements. The first statement acknowledges the significant role of these reinforcements in managing flood risks, while the second highlights the crucial timing of these measures, which helped prevent a more severe flood outcome. Both quotes reflect a positive evaluation of ongoing and completed flood protection efforts, recognizing their success in mitigating flood impacts.

Recognition of Effective Flood Management Programs

- "Furthermore, existing programs are being accelerated and executed more intensively. This includes... most importantly, striving for more space for streams and small rivers. The conviction among decision-makers is that previous programs to provide more space for rivers like the Meuse have prevented even greater disasters." (NRC.nl, November 2, 2021)
- "'We want more space for the streams and attention to water safety,' says Josette Van Wersch, board member of Waterschap Limburg (WL), in the 'pop-up store' of Bistro Beleef, a Valkenburg catering establishment still closed due to water damage. 'After the major floods of 1993 and 1995, the national project Space for the Rivers started, creating overflow areas and side channels. This bore fruit in July, keeping the problems in the Meuse manageable. We now ask the State for a similar project: space for the streams.'" (De Volkskrant.nl, November 1, 2021)

These quotes positively assess flood management programs, particularly those focusing on increasing space for rivers and streams. The first statement praises the effectiveness of these programs in preventing major disasters, while the second highlights the success of the "Space for the Rivers" project in managing flood risks and advocates for continued and expanded efforts. Both reflect a positive evaluation of flood management strategies, emphasizing their proven effectiveness in mitigating flood damage.

In short, the moral evaluation frame in Layer 1 offers a small mix of positive and negative judgments on flood management strategies and infrastructure. Interestingly, while there are only a few negative evaluations, they sharply criticize the perceived shortcomings in flood prevention and response, such as inadequate measures by local authorities and delays in reinforcing flood defences. On the other hand, there is a stronger emphasis on the positive, with more quotes celebrating the success of flood protection efforts, particularly the effectiveness of dike reinforcements. This suggests a general acknowledgment of progress and success in flood management, even though some critical voices point out areas where improvements are still needed.

4.3.2 Moral Evaluation Frame: Layer 3

Negative Judgment

Quotes referring to disaster management had some negative evaluations attached to some frames (n=14).

Criticism of Authorities' Failures and Inadequacies

The Limburg floods triggered intense scrutiny over the response and preparedness of various authorities. One poignant aspect of this narrative is the perceived lack of effective communication and timely action by authorities. Residents like René Paulssen, who experienced the flood firsthand, recall moments of fear amplified by a complete lack of communication from authorities. The distressing scenario of hearing water flood his home without any guidance or updates encapsulates the broader sentiment of abandonment felt by many. This criticism is echoed by Jaap Douma, who expresses frustration over the authorities' prolonged discussions and inaction, urging them to stop "talking and evaluating" and instead, take necessary measures before disaster strikes again.

An example of the criticism directed at specific authorities can be seen in the following quotes:

- *"Residents of the Limburg municipality of Meerssen accuse water managers of not responding adequately to last year's flooding. Missing cooperation, insufficient administrative control, and inadequate information at Rijkswaterstaat have exacerbated the consequences of the floods, according to them." (NRC.nl, 2022, July 21)*

- *"Victims of the flood disaster criticize the evacuation. The call to flee was unclear and did not reach everyone. Panic, fear of looting, or disbelief about the water made people reluctant to leave. And for residents near the Geul, the evacuation came too late, when the area was already under water." (De Limburger.nl, 2023, January 16)*

These quotes reflect the deep dissatisfaction with the response efforts, emphasizing the lack of coordination, poor communication, and inadequate measures taken by the authorities. The recurring theme is one of failure to protect and adequately inform the public, leading to heightened consequences of the flooding.

Positive Judgment

Only two frames were coded with a clear positive judgement related to disaster management (n=2).

Recognition of Effective Action and Coordination

Despite the criticism, these positive judgments acknowledge the efforts of various regional bodies in managing the crisis effectively.

This can be seen in the following quotes:

- *"Rutte said he was 'impressed' by how the Veiligheidsregio's in Limburg 'handled things.'" (De Telegraaf.nl, July 18, 2021)*
- *"Midden- en Noord-Limburg zijn de afgelopen dagen tijdens het hoogwater van de Maas 'door het oog van de naald gekropen.' Dat zei voorzitter Antoin Scholten van de Veiligheidsregio Limburg Noord zondagavond. Dat het goed is afgelopen is volgens hem mede te danken aan de vele vrijwilligers, de militairen van Defensie en medewerkers van het waterschap." (NRC.nl, July 19, 2021)*

These quotes highlight the recognition of the effective and coordinated efforts by local authorities, volunteers, and military personnel, who worked together to mitigate the disaster's impact. The praise acknowledges the dedication and competence displayed during the crisis, reflecting a positive moral evaluation of their actions.

In summary, the moral debate in context of Layer 3 surrounding the Limburg floods is characterized by a mix of negative and positive moral evaluations. The criticisms focus on communication failures, lack of coordination, and specific oversights by authorities, while the praise acknowledges the efforts of local and regional bodies in preventing a more severe disaster.

4.4.1 Moral Evaluation Frame: Layer 4

The negative evaluations of causal agents (n=14) stem from the perceived failures and shortcomings of both insurers and government authorities in their responses during the aftermath of the disaster. These evaluations are characterized by feelings of betrayal, injustice, and a sense of abandonment by those who were expected to provide support in a time of crisis. Below, the aspects that contribute to these negative judgments are explored.

Perceived Betrayal by Insurers

One key factor contributing to the negative evaluations is the perceived betrayal by insurance companies. Victims who had diligently paid their premiums for years found themselves without the financial support they had been promised. For example, a flood victim expressed their frustration by stating, "You pay the top price for fifteen years, and then your house is flooded, and you don't get a penny!" (AD/Algemeen Dagblad, July 24, 2021). This quote reflects the deep sense of injustice and moral outrage, as the victims felt that the insurers had failed to uphold their end of the agreement, leaving them financially and emotionally vulnerable.

Another example comes from the criticism directed at foreign stock-market insurers like Lloyds, Chubb, and VLC, who refused to pay out millions in damages. One observer harshly criticized these actions, stating, "Prevo is not shy about expressing dissatisfaction with the actions of three stock insurers after the flood... It is a shame that this can happen in the Netherlands" (De Limburger, August 13, 2021). This quote underscores the moral and ethical failure attributed to these insurers, as their refusal to compensate the victims was seen as a significant wrongdoing, exacerbating the suffering of those affected.

Inadequate Government Response

The government's role in the aftermath of the floods also attracted negative moral evaluations, primarily due to the perceived inadequacy and unfairness in the distribution of compensation. For instance, the frustrations with the Disaster Relief Compensation Act were poignantly captured by one victim who remarked, "That haggling over money was even worse than the flood itself" (De Limburger, July 7, 2023). This quote highlights how the bureaucratic challenges and delays in receiving compensation were seen as more distressing than the flood, suggesting a profound failure on the part of the government to provide timely and effective support.

Another critical evaluation comes from the perceived unfair treatment of different regions and types of entrepreneurs by the government. A farmer criticized the government's compensation approach, stating, "It's incomprehensible to see how the Netherlands makes distinctions between different entrepreneurs, and then also between regions where the same

floodwater has flowed through" (De Telegraaf, August 16, 2021). This quote reflects a sense of injustice and unfairness, as the government's actions were seen as inconsistent and discriminatory, further alienating those who were already struggling to recover from the disaster.

Overall, these negative evaluations are driven by the perceived failures of insurers and the government to fulfil their responsibilities, leaving flood victims feeling betrayed, abandoned, and unfairly treated. The quotes illustrate the depth of dissatisfaction and moral outrage, emphasizing the ethical concerns surrounding the responses to the Limburg floods.

4.4 What Limburg needs right now

Media framing, as described by Entman (1993), involves the treatment recommendation frame, which essentially concerns proposed actions or solutions in response to identified problems. In the context of the Limburg floods, treatment framing encompasses several key dimensions, each shedding light on different approaches to addressing the challenges faced by the affected communities and the Dutch FRM (see Table 4).

<i>Table 4. Treatment recommendation frames and referencing layers</i>	● Layer 1 N=31	● Layer 2 N=13
○ Treatment_R: Change agricultural land use near rivers N=1	1	-
○ Treatment_R: Infrastructure Improvements & Water Management N=8	8	-
○ Treatment_R: Mindset change (no more building in flood risk areas) N=13	-	13
○ Treatment_R: More space for River and its tributaries N=5	5	-
○ Treatment_R: Raise regional water safety norm in Limburg N=1	1	-

○ Treatment_R: Upstream/International Cooperation N=9	9	-
○ Treatment_R: Urban climate adaptation to water N=7	7	-

Identifying distinctly framed recommended solutions was for some layers not easy as most of them only focussed on the problem identification. However, this analysis only coded solutions if they are clearly stated as suggestion that changes the current situation with some form of instruction on how to do so. In this case some treatment recommendation frames were very specific then others which were more grouped. This resulted in only finding reoccurring frames in layer one and two. Within the other three categories non or only very specific treatment recommendation were found that could not be identified as a clear reoccurring treatment recommendation frame. The following sub chapters will describe the coded frame themes per designated MLS layer.

4.4.1 Treatment Recommendation Frames: Layer 1

In total n=31 quotes were coded recommending solutions for flood protection issues. Starting with two of the least significant frames. Firstly, only one frame recommends the changing of agricultural practices around the Geul River to increase the water holding capacity of the landscape. As mayor of Valkenburg Daan Prevoo suggest restricting *"the cultivation of corn, beets, and potatoes. These crops don't retain water. The water flows too easily into the Geul."* (NRC.nl , July 20, 2021). The second quote refers to Marja Hilders representing the Water-Stop.nu Foundation advocating for a higher regional flood protection norm in the South of Limburg. Thereafter, n=5 quotes were found advocating for more space with three quotes specifically advocating for giving the smaller rivers and streams more space.

For example:

- *"'We want more space for the streams and attention to water safety,' says Josette Van Wersch, board member of Waterschap Limburg (WL), in the 'pop-up store' of Bistro Beleef, a Valkenburg catering establishment still closed due to water damage. 'After the major floods of 1993 and 1995, the national project Space for the Rivers started, creating overflow areas and side channels. This bore fruit in July, keeping the problems in the Meuse manageable. We now ask the State for a similar project: space for the streams.'" (De Volkskrant.nl, November 1, 2021)*

In addition, two quotes only recommend river expansion without specifically referring to the river its tributaries.

An example of one of those quotes is:

- "We managed to get through it relatively unscathed this time, but it was a close call. Water safety is viewed as a choice, not as a mandatory requirement we must meet... The plans to make Limburg water-resistant are there, they say, with the focus on river expansion. Ron Agtersloot: 'You will have to dust off those plans for a moment. But fundamentally, they can be implemented as they are.'" (De Limburger.nl, December 4, 2021)

Next up is the "Urban climate adaptation to water" frame theme (n=7). The recommended solutions in these quotes are focused on implementing infrastructure changes and water management strategies to prevent future flooding in an urban environment, specifically in Valkenburg. These recommendations include considering international examples like high-water tunnels, height-adjustable bridges, and bypasses, as well as integrating local innovations such as wadis and advanced water flow systems in urban and rural planning. For example:

- "Solutions applied abroad, such as a 'high-water tunnel' or height-adjustable bridges, are being considered. Building in the Heuvelland will indeed have to change in the future." (De Limburger.nl, February 22, 2022).
- "Dutch cities already have the task of becoming climate-resistant in this regard. Think of ways to temporarily store rainwater. She mentions, for example, wadis: low-lying grass fields that flood to form wide ditches during high water." (De Volkskrant.nl, November 5, 2021).

The second most salient treatment recommendation frame (n=8) named "Infrastructure Improvements & Water Management" and the general frame theme of the coded quotes revolves around treatment recommendations aimed at improving existing flood prevention and water management infrastructure to better protect against future flooding. The focus is on identifying weaknesses in the current system, learning from past events, and implementing specific actions to strengthen flood defences and increase water retention capabilities.

For instance:

- "The retention basin between Horn and Buggenum can never capture the predicted amount of water. Rijkswaterstaat should have raised the inlet of that basin as early as 2015, so that it only fills up at a late stage." (De Limburger.nl, February 11, 2022).
- "But acting governor Johan Remkes recently also judged that heavy dike reinforcement is indeed necessary ... Raising dikes less would also have a less significant impact on local residents ... Lowering the safety standard would lead to a flood not once in a hundred years, but once in thirty years. With all the misery that currently entails." (De Limburger.nl, July 17, 2021)

Lastly, the most salient frame (n=9) in the context of flood prevention was "Upstream/International Cooperation." This frame emphasizes the necessity of cross-border collaboration to effectively manage and prevent flooding in the Limburg region. Given the shared water systems between the Netherlands,

Belgium, and Germany, the recommendations within this frame highlight the importance of upstream interventions and international partnerships to mitigate flood risks.

For example:

- *"More cooperation with Belgium and Germany is also necessary, according to Frenken, because part of the solution lies there. 'Establishing buffers there is more efficient and cheaper than in the Netherlands.'" (De Limburger.nl, July 29, 2021).*
- *"To protect especially the Heuvelland and the Roer basin as well as possible against the risks of flooding, measures should be taken upstream across the border." (De Limburger.nl, May 31, 2023).*

These quotes collectively represent the core of the "Upstream/International Cooperation" frame, which advocates for collaborative, cross-border efforts as essential to addressing the challenges of flood prevention in the Limburg region. By involving neighbouring countries in the planning and execution of water management strategies, this approach aims to create a more resilient and integrated system that can better withstand the weather events.

Concluding, 31 quotes were coded recommending solutions for flood prevention issues. Two of the least significant frames include the suggestion to change agricultural practices around the Geul River to improve water retention and the advocacy for a higher regional flood protection norm in South Limburg. Five quotes emphasized the importance of creating more space for rivers and streams, advocating for overflow areas and side channels similar to the "Space for the Rivers" project. The "Urban Climate Adaptation to Water" frame (n=7) highlighted the need for infrastructure changes in urban areas, such as high-water tunnels and wadis, to prevent future flooding, particularly in Valkenburg. The second most salient frame (n=8), "Infrastructure Improvements & Water Management," focused on strengthening existing flood defences and increasing water retention capabilities. Lastly, the most prominent frame (n=9) was "Upstream/International Cooperation," which emphasized the necessity of cross-border collaboration with Belgium and Germany to manage and prevent flooding, advocating for upstream interventions and international partnerships to mitigate shared water risks.

4.4.2 Treatment Recommendation Frames: Layer 2

Within the context of MLS layer 2, only one frame theme was found and coded as "Mindset Change: No More Building in Flood Risk Areas". This frame (n=13) emphasizes the need for a significant shift in how society approaches urban development, particularly in regions vulnerable to flooding. The key argument of this frame is that continued construction in high-risk areas exacerbates flood risks, undermines water management efforts, and jeopardizes long-term safety. This perspective advocates for a re-evaluation of current planning practices, urging governments, developers, and citizens to prioritize environmental considerations and climate resilience in land use decisions.

This mindset shift is driven by the recognition that traditional approaches to managing water—such as controlling and redirecting it—are becoming increasingly unsustainable in the face of climate change. Instead, the focus is shifting towards adapting to water by strategically avoiding construction in flood-prone areas, preserving natural water retention capacities, and considering the long-term impacts of new developments.

For example, a quote from Delta Commissioner Peter Glas highlights the need for future urban planning to account for rising sea levels and sinking soil, particularly in low-lying areas like the Randstad: *"Netherlands must start thinking about where the cities of the future can be located... Building up the low-lying Randstad makes sense from the demand for new houses. But due to a rising sea level and a sinking soil, the chance of flooding, water nuisance, and drought increases. Since houses remain standing on average fifty to a hundred years, and roads and facilities often even longer, we must take that into account now"* (De Limburger, January 7, 2023). This quote emphasizes the importance of foresight in urban planning, suggesting that continued development in vulnerable areas is short-sighted and potentially disastrous in the long term.

Another example reflects concerns about building in deep polders and floodplains, even after recent flood events in Limburg: *"But I also see that various investments are made in places where I wonder: is that wise? There are many plans to build even further in deep polders, such as the Zuidplaspolder, at six meters depth. And even after the floods in Limburg, there was talk again of building in the floodplains near Arnhem"* (De Limburger, September 6, 2021). This quote underscores the persistence of risky development practices despite clear evidence of the dangers they pose, highlighting the need for a decisive change in mindset.

Overall, the "Mindset Change: No More Building in Flood Risk Areas" frame advocates for a paradigm shift in land use planning, calling for a move away from traditional development in flood-prone areas and towards more sustainable, climate-resilient approaches.

5. Discussion

This chapter discusses the research, focusing on the interpretation of results, research limitations, and implications.

5.1 Interpretation of the results and theoretical implications

The 2021 Limburg flood presented a significant opportunity to assess how Dutch news media frame flood events, particularly in the context of the Multi-Layered Safety (MLS) approach. The MLS framework advocates for a combination of traditional flood defences (Layer 1), resilient spatial planning (Layer 2), and disaster management (Layer 3). This discussion critically examines the study's findings, focusing on the dominant frames identified in the media, the salience of MLS principles, and the implications for public discourse on flood risk resilience in Limburg.

5.1.1 Dominant Frames Referring to the 2021 Floods in Dutch Newspapers

The analysis of Dutch newspapers revealed several dominant frames concerning the causes, problems, moral evaluations, and solutions related to the Limburg flood. However, the frequency and emphasis of these frames varied, highlighting a complex narrative landscape. Entman's (1993) framing theory provided a robust framework for dissecting how the 2021 flood event was communicated and understood in public discourse.

Causal interpretations: Climate change emerged as the most recurrent and salient causal interpretation, with 48 quotes directly attributing the flood event to climate change. Media coverage frequently framed the flood as a consequence of the broader climate crisis, emphasizing the increasing severity and frequency of extreme weather events that resulted in the flood event. The overwhelming emphasis on climate change as the primary cause of the flood suggests a strong media narrative that aligns with global discourses on environmental crises.

However, this heavy focus may have overshadowed other critical factors, such as infrastructure limitations. For instance, less attention was given to systemic causes, such as insufficient infrastructure maintenance (n=11) or any other causes not mentioning climate change (n=7). This framing has shown that the Dutch media really focussed on connecting climate change as one of the most prominent factors that instigated the extreme weather and therefore the flood event. Thereafter, the failure of specific flood infrastructure due to being oversaturated with water was framed as causing floods in certain areas in Limburg.

Problem identifications: Similarly, the media used the flood event to discuss climate change as an urgent problem as this was mostly framed (n=52) as the cause of the flood event. The second most salient problem definition with 24 quotes, identifies significant challenges in both insurance and government

compensation areas. The theme "Insurance Challenges and Disputes" (n=16) highlights the difficulties victims face with inadequate coverage and disputes with insurance companies, while "Government Compensation Issues" (n=8) focuses on bureaucratic delays and insufficient support. These issues are consistently framed in the media as significant barriers to effective recovery efforts, emphasizing the need for improved processes and better support for flood-affected individuals.

Furthermore, interestingly the challenges of flood prevention in Limburg are highlighted, with 23 media quotes focusing on two primary issues: the complexity of flood prevention due to the region's unique geographical characteristics, and the inadequacy of current flood protection standards. The theme "Only Flood Prevention is Complicated in Limburg" (n=12) underscores how Limburg's hilly terrain complicates traditional flood prevention measures, leading to rapid water accumulation in lower areas and increasing flood risks. This theme is echoed in the media with quotes that emphasize the limitations of existing water storage facilities and the spatial constraints in expanding infrastructure.

The second theme, "Current Flood Protection Standards Are Too Low" (n=11), however, reflects widespread concerns that existing infrastructure and policies are insufficient to handle the increasing frequency and severity of extreme weather events. Media quotes illustrate significant issues with infrastructure, such as the siphon at Bunde, which became a critical bottleneck during the flood. This theme calls for a reassessment and enhancement of flood protection standards to prevent future disasters. These frames suggest that while current flood defence infrastructure is outdated, solely relying on flood prevention measures is seen as problematic, if not impossible, due to Limburg's spatial constraints. Lastly, issues underscoring communication towards residents (n=7) and communication between water authorities (n=6) were framed less frequent.

Moral Evaluations: Negative judgments were relatively sparse, with only a few quotes expressing clear dissatisfaction with flood management efforts. Criticisms focused on inadequate measures and the perceived failure of authorities to implement effective flood prevention strategies. Positive evaluations, however, were more frequent, highlighting the success of flood protection measures such as dike reinforcements. This disparity suggests a general acknowledgment of progress and effectiveness in flood management, despite criticisms of specific shortcomings.

The moral evaluation of disaster management revealed a more pronounced negative sentiment. The majority of the criticism centered on failures in communication, coordination, and timely action by authorities. Negative judgments reflected deep dissatisfaction with the perceived inadequacies in managing the crisis and addressing the needs of affected residents. However, positive evaluations were relatively rare, acknowledging the effective response by some regional bodies and volunteers. This imbalance points to a predominantly

critical view of disaster management, with limited recognition of the successful aspects of the response efforts.

Moral evaluations of insurers and government compensation were predominantly negative. Flood victims expressed feelings of betrayal and injustice, particularly regarding the perceived failures of insurers to provide promised support and the bureaucratic challenges in accessing government compensation. Quotes reflecting these sentiments highlighted a profound sense of unfairness and inadequacy in the responses of both insurers and government authorities. The dominant negative evaluations suggest a significant disconnect between the expectations of flood victims and the support provided, emphasizing ethical concerns and dissatisfaction with the response mechanisms

Treatment recommendations: Media discussions on solutions varied between immediate, reactive measures and more long-term strategies. Immediate solutions, such as repairing flood defences and improving emergency protocols, were frequently covered, reflecting the urgency of addressing immediate threats. The most salient frame related to flood prevention was "Upstream/International Cooperation," highlighting the need for cross-border collaboration. Media coverage frequently emphasized the importance of working with neighbouring countries to manage shared water systems and implement upstream interventions. This frame aligns with addressing the spatial problems for flood prevention in Limburg. Moreover, the media prominently featured existing infrastructure improvements, such as dykes and barriers, as solutions (n=8) and urban climate adaptation solutions, such as creating a highwater underground tunnel under Valkenburg (n=7).

However, the overall coverage related to mitigating measures was notably less than sum of flood prevention measures. Yet, the quotes recommending mitigating measures all had a similar message: Changing land use and avoiding flood-prone areas when building cities (n=13).

5.1.2 Salience of MLS Principles in the Media Frames

The salience of Multi-Layered Safety (MLS) principles in media frames concerning the 2021 Limburg flood is critical to understanding how different aspects of flood risk management are prioritized in public discourse. This section examines the prominence of each MLS layer—flood prevention, infrastructure vulnerability and strategic planning, disaster management, and climate-resilient recovery—based on media coverage and the implications for flood resilience in Limburg.

Layer 1: Flood Prevention

Flood prevention, the first layer of the MLS approach, was significantly highlighted in media coverage. The most salient frame related to flood prevention was "Upstream/International Cooperation," which emphasized the necessity of cross-border collaboration with neighbouring countries such as

Belgium and Germany. This frame was most frequently cited (n=9) and reflected a widespread recognition of the importance of managing shared water systems and implementing upstream interventions to mitigate flood risks. This focus on international cooperation aligns with addressing spatial challenges and integrating broader, regional strategies into flood risk management.

Another prominent frame within flood prevention was "Infrastructure Improvements & Water Management" (n=8), which underscored the need to enhance existing flood defences and improve water management infrastructure. Media coverage in this category highlighted specific actions, such as reinforcing dikes and optimizing water retention capabilities. This frame reflects an ongoing concern with strengthening current flood protection measures to better handle future events.

In contrast, the frames addressing "Urban Climate Adaptation to Water" (n=7) and changes in agricultural practices (n=1) were less prominent. The focus on urban adaptation, such as high-water tunnels and advanced water flow systems, reflects a growing awareness of innovative solutions but was less emphasized compared to traditional flood prevention measures.

Layer 2: Flood mitigating measures

The second layer of MLS—focusing on infrastructure vulnerability and strategic planning—was represented by the frame "Mindset Change: No More Building in Flood Risk Areas" (n=13). This frame was relatively salient and underscored the need for a significant shift in urban planning to avoid high-risk flood zones. Media coverage highlighted the need to reconsider land use practices in light of climate change and flood risks, advocating for a more sustainable approach to development. This frame aligns with the MLS approach by emphasizing the integration of climate resilience into strategic planning and land use decisions.

However, there was limited media attention on specific strategies for improving infrastructure resilience beyond general calls for mindset changes. The coverage of urban climate adaptation and infrastructure improvements was less frequent in this layer, suggesting that while there is recognition of the need for strategic planning, detailed discussions on implementing resilient infrastructure were not as prominently featured.

Layer 3: Disaster Management

Disaster management, or the third layer of MLS, was discussed in terms of both crisis response and long-term recovery. The media coverage revealed a critical perspective on disaster management, focusing on failures in communication, coordination, and timely action by authorities. Negative judgments were prominent, reflecting dissatisfaction with how the crisis was managed and the effectiveness of response efforts. Positive evaluations were less frequent,

acknowledging some successful aspects of the response but highlighting a general perception of inadequate management during the flood event.

This critical view of disaster management underscores the need for improved crisis response mechanisms and better coordination among authorities. The media's focus on negative evaluations in this layer suggests a gap between the expectations of the public and the actual performance of disaster management efforts.

Layer 4: Climate-Resilient Recovery

In the context of climate-resilient recovery, the media predominantly emphasized issues related to "Insurance Challenges and Disputes" and "Government Compensation Issues" (n=24 combined). This focus on insurance and government compensation reflects significant concerns about the adequacy of financial support and bureaucratic processes following the flood. Media coverage highlighted difficulties faced by victims in securing insurance payouts and navigating compensation claims, pointing to a broader dissatisfaction with the recovery mechanisms in place.

The emphasis on insurance and compensation issues reveals a critical aspect of the recovery process, underscoring the need for more effective and equitable support systems for flood-affected individuals. Despite the prominent coverage of these issues, there was less media focus on broader climate-resilient recovery strategies that integrate long-term planning and adaptation measures beyond immediate financial compensation.

5.1.3 Theoretical Implications & Discussing Prior Research

The 2021 flood was defined as a shock event, as derived from Kingdon's (1984, 1995) interpretation and further elaborated by Kaufmann et al. (2016b). This concept suggests that such events can catalyse a shift toward different forms of resilience (Kaufmann et al., 2016b). As a result, the 2021 flood served as a critical starting point for evaluating its impacts and exploring potential solutions to prevent or mitigate similar effects in the future. This established a clear conceptual link between the event's occurrence and its subsequent influence on flood resilience discourse in Dutch news media.

The findings from this research complement prior studies on how floods are framed in the media. For example, Devitt & O'Neill's (2017) analysis of Irish floods identified climate change as an emerging dominant frame, particularly in the context of trade-offs and government limitations. In Ireland, the politicization of flood risk and the dual role of citizens as both victims and risk managers were more pronounced. This contrast underscores how national contexts shape the prioritization of specific frames over others. In the Dutch context, similar to the media focus during the 1993 and 1995 floods in Limburg (Kaufmann et al., 2016b),

the emphasis was on the adequacy of flood defences versus environmental and spatial planning concerns. In both cases related to the Netherlands, there was a tension between competing narratives: in 2021, between climate change and flood defence infrastructure, and in the earlier floods, between the need for structural defences and the preservation of environmental values. These findings align with previous assertions that the dominant defence approach in Dutch water management remains the prevailing discourse (Kaufmann et al., 2017; Liefferink et al., 2018).

The moral evaluations in the 2021 flood framing were notably more critical, with widespread dissatisfaction directed at disaster management efforts, particularly regarding communication, coordination, and support mechanisms for flood victims. This contrasts with the framing in the 1990s, which focused more on blaming interest groups that delayed dike strengthening (Kaufmann et al., 2016b). Additionally, the media's emphasis on insurance challenges and government compensation issues during the Limburg floods highlights a critical aspect of post-disaster recovery. This frame resonates with Devitt & O'Neill's (2017) findings in Ireland, where the portrayal of citizens as victims and the limitations of government action were prominent. While the Irish media discussed the individualization of flood risk and the role of private insurance—emphasizing the increasing responsibility of citizens in flood risk management—Dutch coverage took a different approach. In Ireland, the focus evolved from the 1980s and 1990s, where citizens were primarily expected to acquire insurance, to include stories on how they could take flood preparedness and protective actions at home. In contrast, Dutch media centred more on systemic failures in the insurance and compensation processes, with less emphasis on mitigating measures oriented towards citizens.

Furthermore, while emergency management and private insurance were mentioned in Kaufmann et al. (2016b), these aspects were less frequently discussed compared to frames related to "pro-dike strengthening," "additional study," and "spatial planning." This shift suggests a potential increase in the salience of Climate-Resilient Recovery (Layer 4) following the 2021 flood event.

In summary, the 2021 Limburg flood media framing highlighted a more critical stance on disaster management and recovery, particularly regarding communication failures and inadequate support for flood victims. This contrasts with the 1990s focus on blaming interest groups for delaying dike strengthening. The Dutch media's emphasis on systemic failures in insurance and compensation processes, rather than individual responsibility, also marks a departure from past narratives. Additionally, the increased attention to Climate-Resilient Recovery suggests a growing recognition of the need for more comprehensive strategies to address the impacts of extreme weather events. Lastly, the dominant framing of climate change are present in all three studies, with the Dutch media discourse

similarly focussing on flood prevention prior to the 2021 flood.

5.1.4 Implications for MLS Resilience Approach

The salience of different MLS layers in media framing indicates varied priorities and concerns in flood risk management. The dominant emphasis on traditional flood prevention measures reflects a continued reliance on established strategies. However, the media's attention to mindset changes in land use planning and critical evaluations of disaster management and recovery processes highlights the evolving discourse around flood resilience.

The media's focus on climate-resilient recovery, particularly insurance and government compensation issues, underscores the need for improved financial and bureaucratic support systems. This emphasis reveals a significant gap between public expectations and the current recovery mechanisms, suggesting a need for more comprehensive and integrated approaches to flood resilience that address both immediate and long-term challenges.

Overall, the media framing of the 2021 Limburg flood reveals a complex landscape of priorities and concerns, with varying levels of emphasis on different MLS layers. The dominant frames reflect ongoing debates and challenges in flood risk management, highlighting the need for a more integrated and adaptive approach to enhancing flood resilience in Limburg and beyond.

6. Conclusion

The following chapter will present the conclusions. This research has conducted one literary review and a framing analysis. The conclusions of each of these analyses answers the sub-questions. These sub-questions are used as guidelines for answering the main research question: **How was the 2021 Limburg flood event framed within Dutch news media in relation to the Multi-Layered Safety (MLS) approach?**

These sub-questions are answered below.

6.1 Media reaction and perspectives

1. What dominant frames emerged in Dutch newspapers regarding the causes, problems, moral evaluation and solutions of the 2021 Limburg flood event?

The analysis of Dutch newspaper coverage of the 2021 Limburg flood over a 3 year time-span identified several dominant frames concerning the causes, problems, moral evaluations, and solutions. The most prominent frame regarding the causes of the flood was climate change, which was frequently highlighted as the main factor behind the event. This framing underscores concerns about environmental crises that results in the increasing severity of extreme weather events. However, there was less emphasis on other human related factors. Some news articles included the infrastructure limitations as causes of the flood's impact in specific areas in Limburg.

When addressing problems, media coverage focused extensively on climate change and its role in exacerbating flood risks. Additionally, the challenges related to insurance and government compensation were frequently discussed, reflecting concerns about inadequate financial support and bureaucratic inefficiencies. The complexity of flood prevention in Limburg, due to its unique geographical features, and the inadequacy of current protection standards were also highlighted.

In terms of moral evaluations, the media exhibited a mix of positive and negative judgments. While there was acknowledgment of successful flood management measures, criticisms were directed towards communication failures and inadequate disaster management efforts. The coverage also revealed negative sentiments towards insurers and government compensation, reflecting dissatisfaction and perceived injustice among flood victims.

Regarding solutions, media discussions encompassed both immediate measures, such as repairing flood defences, and longer-term strategies, including improved infrastructure and urban planning. The emphasis on "Upstream/International Cooperation" and "Infrastructure Improvements & Water Management" indicates a focus on collaborative and enhanced flood prevention measures, although the coverage of mitigating measures was relatively limited.

2. How salient are the principles of the Multi-Layered Safety (MLS) approach in the media frames related to the 2021 Limburg flood, particularly regarding traditional flood defences versus alternative strategies?

The salience of MLS principles in media framing varied across different layers of the approach. Flood prevention, as the first layer, was prominently featured, particularly through discussions on international cooperation and infrastructure improvements. This reflects a continued reliance on traditional flood defence strategies, while also acknowledging the need for enhanced measures.

The second layer, focusing on infrastructure vulnerability and strategic planning, was represented by calls for changes in land use and urban planning. This frame underscores the need for integrating climate resilience into development practices, although detailed discussions on implementing resilient infrastructure were less prevalent.

Disaster management, the third layer, was critically evaluated in media coverage. The focus on communication failures, coordination issues, and overall dissatisfaction with response efforts highlights the need for improved crisis management mechanisms. Positive evaluations were less frequent, indicating a predominantly critical view of disaster management.

The fourth layer, climate-resilient recovery, was primarily associated with insurance challenges and government compensation issues. The media's emphasis on these aspects reflects concerns about the adequacy of financial and bureaucratic support, suggesting a gap between public expectations and recovery mechanisms.

3. What are the implications of the media framing of the 2021 Limburg flood for public discourse in the context of flood risk resilience debate in Limburg?

The dominant emphasis on climate change and immediate flood prevention measures indicates a recognition of the urgent need to address environmental crises. However, the critical focus on disaster management and recovery highlights ongoing debates about the effectiveness of current approaches and the need for more integrated solutions.

The coverage suggests that the public discourse surrounding flood resilience in Limburg cannot solely focus on flood prevention to prevent extreme weather, such as in 2021 from creating another flood event. Thus, hinting at incorporating broader aspects of resilience, including strategic planning, but also reassessing communication during disaster management and climate-resilient recovery surrounding private insurance and government compensation matters.

6.3 Answering the research question

How was the 2021 Limburg flood event framed within Dutch news media in relation to the Multi-Layered Safety (MLS) approach?

The media coverage surrounding the 2021 flood event primarily emphasized climate change as the leading cause of the flood, aligning with broader environmental discourses and highlighting the increasing severity of extreme weather events. This strong focus on climate change may have overshadowed other critical factors, such as infrastructure limitations.

In terms of flood prevention, media coverage maintained a significant focus on traditional measures, particularly highlighting the need for international cooperation and improvements in infrastructure, while spatial constraints were framed as significant issues for Limburg when building conventional flood prevention measures, such as water buffers. This reflects a continued reliance on conventional flood defence strategies up stream while acknowledging the necessity for more unconventional measures within the region of Limburg. Limburg's unique geographical context illustrates the limitations in existing strategies.

Regarding the second layer of MLS, which involves infrastructure vulnerability and strategic planning, the media discussed the need for changes in land use and urban planning. This emphasis underscores the principle of integrating climate resilience into development practices, although detailed discussions on implementing resilient infrastructure were less prominent than flood prevention.

Disaster management, was critically evaluated by the media. Coverage focused on failures in communication, coordination, and overall dissatisfaction with the response efforts. This indicates a perceived need for improvements in crisis management mechanisms.

For the fourth layer, climate-resilient recovery, media coverage predominantly highlighted issues related to insurance challenges and government compensation. This focus points to concerns about the adequacy of financial and bureaucratic support during the recovery process.

Overall, the media framing of the 2021 Limburg flood event suggests a slight shift towards a more integrated approach to flood resilience. While traditional flood prevention salience remains the biggest, there is a growing recognition of the need for enhanced strategic planning, better disaster management, and effective climate-resilient recovery mechanisms. However, most noticeable, the evolving discourse highlights both the urgency of addressing environmental crises and the need for more comprehensive and adaptive solutions in flood risk management.

7. Limitations and Suggestions for Future Research

Every research study inherently faces its own set of limitations. This section will outline the constraints of this thesis and provide recommendations for future research.

The main challenges encountered during the research included defining salient frames with limited number of articles and identifying the relevance of statements within each article. Furthermore, one notable limitation is that the entire coding process was carried out by a single researcher. Ideally, qualitative content analysis should involve multiple coders, with software tools used to measure inter-coder reliability. This approach would improve the consistency and reliability of the findings. The use of only one coder also constrained the scope of the research due to time limitations, which restricted the number of articles that could be analysed. While the sample size was adequate for identifying patterns in the media coverage, expanding the sample could have enhanced the robustness and depth of the results. Moreover, different kinds of media sources could have been added, such as visual media instead of only textual news to further identify frames.

In addition, this research used Entman's (1993) framing theory as an approach to analyse media frames with additional focus on quotes referring to any MLS layers. Some information might be lost, as media frames can also be made in a more subtle ways. Therefore, it is recommended for future research to use a different analysis approach, to see if similar results are made. Expanding the research to include comparative analyses with other flood events in the region would help identify common patterns and differences in media framing. This could reveal broader trends in flood risk management and resilience strategies and how they are communicated across different contexts. Lastly, interviews with the waterboards and Department of Waterways and Public Works "Rijkswaterstaat (RWS)" could give much more in-depth information on the resilience debate that the Dutch FRM is having in Limburg.

The research methodology, which combined framing analysis of newspaper articles, was appropriate for answering the research question and underlying sub-questions. The conceptual model created for this research did in fact help with answering the research question as it dissected the 2021 flood event into concise frames and MLS layers. This approach allowed for a comprehensive examination of public discourse in Dutch textual news media. However, I could have made the process more systematic while I did make some unnecessary steps when collecting the data. It took me a few tries to present all the quotes in a comprehensive table. Furthermore, determining what quotes were relevant and which ones weren't was also a process where I could have made better guidelines earlier in the research process.

An alternative method that could be considered is a mixed-methods approach, incorporating qualitative interviews with key stakeholders such as policymakers, local residents, and experts in flood management. This would have provided deeper insights into the motivations and challenges behind the frames identified in the media. Moreover, this study recommends that future research would include the aspect of “who” is framing. This can be interesting while a difference in moral evaluation was found between the victims and the managing governmental bodies during the flood. For instance, Prime Minister Rutte and the Dutch regional disaster management body “Veiligheidsregio Limburg Noord” praised the efforts of local and regional bodies in preventing a more severe disaster, which contrasted with the overall discontent expressed by overall citizens and flood victims.

Overall, the research findings provided insights into media framing of the Limburg 2021 flood event. The results highlighted the persistent dominance of technical flood prevention solutions, and the challenges in implementing integrated approaches.

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9. APPENDICES

9.1 Codebook

Codes	Comment
○ (Only) MLS Layers (SECOND CODING PHASE)	
● L_1	L= MLS Layer
● L_2	
● L_3	
● L_4	
● Other	
○ First demo Media coding	First coding run, not filtered, mistakes are made and filtered out and changed in the 2th coding phase documents ^{1,2}
○ Causal Frames	
○ Climate change effect	
○ Critising Governmental Functions	4-10-2023 23:21:07, merged with Causal Frames: Lack of government actions ^{1,2}
○ Flood infrastructure	Level 1 ^{1,2}
○ To much rainwater	done 24-10-2023 14:51:35, merged with Causal Frames: Measuring water river stream difficult ^{1,2}
○ Problem Frames	
○ Climate change will cause extreme weather	3-12-2023 15:55:56, merged with Problem Frames: Environmental extremes less rare ^{1,2}
○ Critics on Governmental institution	26-11-2023 15:34:12, merged with Problem Frames: Government failing to inform Flood ^{1,2} 11-2023 15:34:12, merged with Problem Frames: Government viewed negatively ^{1,2} 11-2023 15:34:12, merged with Problem Frames: Miscommunication management ^{1,2}
○ Discussion compensation floods	26-11-2023 15:42:12, merged with Problem Frames: Farmers water damage compensation ^{1,2} 11-2023 13:45:26, merged with Problem Frames: Discussion Flood insurance ^{1,2} 11-2023 16:31:17, merged with Other statements: Rampenfonds ^{1,2}
○ Dutch population unprepared against floods	
○ Environmental impact on housing	26-11-2023 15:38:44, merged with Problem Frames: Climate change influencing house prices ^{1,2} 11-2023 15:38:44, merged with Problem Frames: Housing in flood prone areas ^{1,2} 11-2023 15:28:04, merged with Problem Frames: Houses less worth ^{1,2}
○ Financial Damage	29-11-2023 16:32:56, merged with Problem Frames: Flood cost ^{1,2}
○ Flooding damages nature	
○ FRM international measurement dependency	
○ Safety LVL is too low	
○ The problem with just flood prevention measures	
○ Treatment recommendation Frame	
○ Better crises response	16-12-2023 13:52:40, merged with Treatment recommendation Frame: Informing population ^{1,2}
○ building water robust infrastructure	
○ Climate adaptation	5-12-2023 15:16:45, merged with Treatment recommendation Frame: call to adaptation ^{1,2}
○ Dike reinforcement	De Telegraaf.nl 28 oktober 2021 donderdag ^{1,2}
○ Improving water infiltration into soil	16-12-2023 14:01:59, merged with Treatment recommendation Frame: Local residents contribution asked ^{1,2} 12-2023 15:19:22, merged with Treatment recommendation Frame: Removing tiles (more green in gardens/streets) ^{1,2} 12-2023 14:01:59, merged with Treatment recommendation Frame: working with agriculture ^{1,2} 12-2023 12:19:11, merged with Treatment recommendation Frame: work with nature ^{1,2}
○ Increase Watersafety LVL	
○ Institutional improvement of water management	
○ International measures cooperation	
○ New creative solutions	
○ Ongoing or finished projects	
○ Redirecting or storing water temporarily	11-12-2023 16:19:54, merged with Treatment recommendation Frame: Giving rivers more space ^{1,2} 12-2023 14:05:23, merged with Treatment recommendation Frame: Risk zoning ^{1,2}
○ Relocating critical infrastructure	
○ Residents Self-sustainability	
○ Tackle Climate Change	11-12-2023 16:14:55, merged with Treatment recommendation Frame: Co2 reduction ^{1,2} 12-2023 16:14:55, merged with Treatment recommendation Frame: Shared Climate goals ^{1,2}
○ Levels in Media (FIRST CODING TRIAL)	First coding run for identifying MLS layers, these are evaluated and corrected where needed in the 2th coding phase ^{1,2}
○ Layer 1	
○ Layer 2	
○ Layer 3	
○ No Layer	
○ Media Frames + Layer (SECOND CODING PHASE)	
● Causal Interpretation MLS layer	
● C_L_1	C= Causal Interpretation L= MLS Layer
● C_L_2	
● C_L_3	
● C_L_0	
● Moral Evaluation MLS Layer	M= Moral Evaluation
● M_L_1	
● M_L_2	
● M_L_3	
● M_L_4	
● Problem Identification MLS Layer	P= Problem Identification
● P_L_1	
● P_L_2	
● P_L_3	
● P_L_4	
● P_L_0	
● Treatment_R MLS Layer Identification	T= Treatment Recommendation
● T_L_1	
● T_L_2	
● T_L_3	
● T_L_4	
○ News Source & Year	
○ 2021	
○ 2022	
○ 2023	
● Algemeen Dagblad	
● De Limburger	
● De Telegraaf	
● De Volkskrant	
● NRC	
● NRC Handelsblad	
● NRC or NRC handelsblad	
● Trouw	
○ Overig	
○ Meuse	
○ Speaker	
○ Daan Prevo	
○ Deltans	
○ Phase 3 (Frame Themes within categories)	These include all recurring frame themes
○ Cause	
○ Climate change	
○ High water lvl due to rain	
○ Infrastructure limitations and failures	
○ Moral_E	
○ Negative Judgement	
○ Positive judgement	
○ Problem	
○ Climate Change Urgency	
○ Coordination and Leadership Issues in Crisis Management	
○ Criticism of Emergency Response and Management Failures	
○ Current flood protection standards are too low	
○ Entrepreneurial and Economic Impact	
○ Government Compensation Issues	
○ Increasing Frequency and Severity of Extreme Weather Events	
○ Infrastructure Vulnerability and Strategic Planning	
○ Insurance Challenges and Disputes	
○ Only Flood prevention is complicated in Limburg	
○ Outdated prediction models Maas	
○ Treatment_R	
○ Change agricultural land use near rivers	
○ Delta Commissioner Maas River basin	
○ Improving communication	
○ Infrastructure Improvements & Water Management	
○ Mindset change (no more building in flood risk areas)	
○ More clarity flood damage compensation	
○ More space for River and its tributaries	
○ Post flood tourism recovery	
○ Raise regional water safety norm in Limburg	
○ Response to climate change	
○ Upstream/International Cooperation	
○ Urban climate adaptation to water	