

# RESEARCHREPORT

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## Blind Spots in Belgian Flood Risk Governance: The Case of the Summer 2021 Floods in Wallonia

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## Executive Summary

We present a strategic assessment of the gaps in Belgian flood risk governance following the 2021 summer floods in Western Europe. The catastrophic floods of July 2021 in Belgium's Walloon Region underscored the critical need to comprehensively evaluate the country's flood risk governance. Through qualitative discourse analysis and stakeholder engagement, our assessment identifies critical governance gaps that exacerbated the impact of the floods. Addressing these gaps is paramount to enhancing Belgium's resilience to future extreme climate events and fostering a robust disaster risk governance framework.

The analysis highlights six primary areas of concern, referred to as 'blind spots', which require immediate attention and strategic action:

**Complex Governance Arrangements:** The intricate web of governance structures in Belgium complicates effective inter-sectoral and inter-agency coordination. The ambiguity surrounding roles, responsibilities, and decision-making authority hinders swift and efficient emergency responses. Strategic recommendations include streamlining governance frameworks to clarify authority lines and enhance coordination mechanisms across all government levels and relevant agencies.

**Communication Issues:** The current state of information exchange among stakeholders needs to be improved, particularly in emergency situations. This impedes effective risk mitigation and response efforts. To overcome this, it is essential to establish and maintain open, transparent, and real-time communication channels that facilitate the seamless flow of critical information before, during, and after disaster events.

**Preparedness Challenges:** A notable lack of proactive measures and comprehensive contingency planning leaves communities vulnerable. Strengthening preparedness requires developing and implementing robust, actionable plans that are regularly updated and tested through drills and simulations, ensuring readiness for future events.

**Citizen Engagement Deficits:** The limited involvement of communities in resilience-building efforts undermines the effectiveness of governance measures. Enhancing citizen engagement through participatory approaches and empowerment initiatives is crucial for building community resilience and ensuring that governance strategies are inclusive and representative of local needs and perspectives.

**Return to Normalcy Obstacles:** The recovery phase post-flood is fraught with challenges, notably in the 'build back better' agenda's reliance on the insurance sector. Developing comprehensive recovery strategies that prioritize rapid restoration, adaptation, and resilience-building is essential. This includes revising insurance frameworks to support effective recovery and incentivize risk-reduction measures.

**Risk Culture Gaps:** The absence of a well-established risk culture amplifies vulnerabilities to climate-related disasters. Cultivating a strong 'risk culture' involves enhancing public awareness, understanding, and acceptance of risk management principles. This can be achieved through education, community engagement, and the integration of risk considerations into all levels of planning and decision-making.

In conclusion, addressing these identified gaps offers a pathway to strengthening Belgium's disaster risk governance framework at national and sub-national levels, and holds potential for scaling at the regional level. We call for a cohesive, interdisciplinary approach that enhances communication, preparedness, community engagement, recovery strategies, and risk culture. By adopting adaptive and inclusive governance strategies, Belgium can protect its communities against the increasing threat of floods and other extreme climate events, ensuring a resilient and sustainable future.

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The key points from this work also fed the Joint Publication REPORT: Climate Resilient Water Resources Management - Driving the Conversation Forward (2022) report published by Water and Climate Coalition (WCC) Geneva, Switzerland (available at <https://cris.unu.edu/sites/cris.unu.edu/files/Joint%20Publication%20-%20Climate%20Resilient%20Water%20Resources%20Management%20-%20Driving%20the%20Conversation%20Forward.pdf>)

The key points of the report were also presented by UNU-CRIS at the Seasonal School *The Climate, Migration & Health Nexus: Mechanisms Of Mitigation, Adaptation & Loss And Damage* and was followed by a panel discussion with Belgian and global experts on climate change adaptation and mitigation. The event was organized by the International Thematic Network [CliMigHealth](https://www.climighealth.org/).

And finally, the authors thank Ms Olivia Toles for her help in revising the final manuscript. And thanks to Dr Maximilian Jungmann from Heidelberg Center for the Environment (HCE), Germany for providing a foreword to our work.

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## Glossary<sup>1</sup>

**Alert:** Immediate notification of imminent danger and action to be taken (Schmitz et al., 2023: 73).

**Anticipatory action:** A set of actions taken to prevent or mitigate potential disaster impacts before a shock or before acute impacts are felt. The actions are carried out in anticipation of a hazard impact and based on a prediction of how the event will unfold. Anticipatory actions should not be a substitute for longer-term investment in risk reduction and should aim to strengthen people's capacity to manage risks (Anticipation Hub, 2020).

**Cerac (Climate Risk Assessment Centre):** An entity established to conduct analysis on sectoral risks due to climate change in Belgium, providing insights into climate-related risks in various sectors.

**Climate change adaptation:** The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate change and its effects (IPCC, 2012).

**Cordex I and II:** Generally, CORDEX (Coordinated Regional Climate Downscaling Experiment) is a project aimed at producing improved regional climate change projections for use in impact and adaptation studies.

**Disaster risk:** The potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity (UNGA, 2016).

**Disaster risk reduction:** Action focused on preventing new and reducing existing disaster risks and managing residual risk, all of which contribute to strengthening resilience and, therefore, to the achievement of sustainable development as outlined in the Sendai Framework for Disaster Risk Reduction (UNDRR, 2020).

**Early warning system:** The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities, and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss (IPCC, 2012: 559). Or: an integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities, systems and processes that enable individuals, communities, governments, businesses, and others to take timely action to reduce disaster risks in advance of hazardous events (UNDRR, 2020).

**Economic loss:** Total economic impact that consists of direct economic loss and indirect economic loss (UNGA, 2016).

**Flash flood:** A flood that rises and falls quite rapidly with little or no advance warning, usually because of intense rainfall over a relatively small area. Flash floods are a subset of fluvial floods (ECA, 2018: 4).

**Flood:** The overflowing of the normal confines of a stream or other body of water, or the accumulation of water over areas not normally submerged (IPCC, 2012: 559).

**Flood hazard:** The probability of a potentially damaging flood event occurring within a given period (ECA, 2018).

**Flood risk management:** The practices involved in identifying, analysing and mitigating flood risks in advance, focusing on:

- Prevention: preventing damage caused by floods, e.g., by prohibiting construction in flood-prone areas.
- Protection: taking measures to reduce the likelihood of floods or the impact of flooding in a specific location, such as restoring flood plains and wetlands.
- Preparedness: informing the public of what to do in the event of flooding (ECA, 2018: 4).

**Fluvial flooding:** Flooding that occurs when a natural or artificial drainage system, such as a river, stream or drainage channel, exceeds its capacity (ECA, 2018: 4).

**FRMplan (FRMP):** A document setting out appropriate objectives and flood prevention, protection and preparedness measures. Member States establish the FRMPs and coordinate the planned action at the river basin level (ECA, 2018: 4).

**Green infrastructure:** A planned network of natural or semi-natural spaces in an urban or rural setting designed to tackle climatic challenges while supporting or restoring natural and ecological processes. An example of green infrastructure, in the context of this report, is the restoration of a floodplain to prevent flooding of vulnerable areas (ECA, 2018: 5).

**Hazard:** A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation (UNGA, 2016).

**Hazardous event:** The manifestation of a hazard in a particular place during a particular period of time (UNGA, 2016).

**High-resolution climate scenarios:** Detailed climate projections that provide climate change information at a finer spatial and temporal resolution, allowing for a more accurate assessment of climate impacts at local scales.

**Indirect economic loss:** a decline in economic value added as a consequence of direct economic loss and/or human and environmental impacts (UNGA, 2016).

**Interreg:** An EU framework program that supports cooperation across borders through project funding, aiming to tackle common issues and promote regional development.

**Mitigation:** The lessening or minimizing of the adverse impacts of a hazardous event (UNGA, 2016).

**Natural hazard:** A (predominantly) natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation (UNGA, 2016).

**Pluvial flooding:** Flooding caused by heavy rainfall that overwhelms saturated natural or urban drainage systems. The excess water cannot be absorbed and flows out over streets or runs off hillsides (ECA, 2018: 5).

**Post-crisis assessment:** An assessment carried out jointly by the administrative authority and the players involved, with the aim of providing a picture of the situation, the actions taken, needs identified and, ideally, the priorities for continued action in the continuity of actions in the recovery period (Schmitz et al., 2023).

**Resilience:** The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform, and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management (UNGA, 2016).

**River basin:** The portion of land from which all surface run-off flows through a network of streams, rivers and lakes into the sea at a single river mouth, estuary or delta (ECA, 2018: 5).

**Royal Decree 2019:** Royal Decree of 22 May 2019 on emergency planning and management of emergency situations at municipal and provincial level and the role of burgomasters and provincial governors in the event of events and crisis situations requiring coordination or management at national level.

**Vulnerability:** The conditions determined by physical, social, economic, and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards (UNGA, 2016).

**Warning:** Prior notification of a potential hazard (Schmitz et al., 2023: 73).

**Water Framework Directive:** Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for community action in the field of water policy (OJ L 327, 22.12.2000, p. 1).

<sup>1</sup> Based on ECA (2018), UNDRR (2020), UNGA (2016), UNISDR (2009), Schmitz et al. (2023).

## Foreword

By Maximilian Jungmann

In the summer of 2021, Belgium was confronted with an unprecedented crisis as floodwaters inundated the Walloon Region. Homes were submerged, livelihoods disrupted, and lives tragically lost, underscoring the urgent need for a robust and resilient flood risk governance framework; against the backdrop of escalating climate change, characterized by increasingly frequent and severe weather events, the summer events laid bare the vulnerabilities inherent in our current governance systems.

The UNU CRIS Research Report on “Blind Spots in Belgian Flood Risk Governance: The Case of the Summer 2021 Floods in Wallonia” is a timely and invaluable contribution to our understanding of the challenges facing Belgium’s flood risk governance. Authored by Samuel Lietaer, Nidhi Nagabhatla, Charlotte Scheerens, Max Mycroft, and Philippe De Lombaerde, this report offers a comprehensive analysis of the governance gaps that were exposed by the 2021 floods and the lessons learned are not only highly relevant in for adaptation and resilience building in Belgium but many regions in the world.

At the heart of the report lie six critical blind spots, each serving as a poignant reminder of the challenges that must be addressed:

- **Complex Governance Arrangements:** Belgium’s governance structures, marked by their intricacy and fragmentation, present significant barriers to effective coordination and decision-making during times of crisis. The overlapping jurisdictions and unclear lines of authority hinder swift and coordinated responses to flood events.
- **Communication Issues:** Inadequate information exchange among stakeholders exacerbates the challenges of risk mitigation and response efforts. The lack of open, transparent, real-time communication channels across regional and international borders impedes coordination and cooperation among relevant agencies and communities.
- **Preparedness Challenges:** A notable lack of proactive measures and comprehensive contingency planning leaves communities ill-prepared to respond to flooding events. The absence of regularly updated and tested plans undermines the effectiveness of emergency responses and exacerbates the impacts of floods on vulnerable populations.

- **Citizen Engagement Deficits:** The limited involvement of communities in resilience-building efforts undermines the efficacy of governance measures. Meaningful participation and engagement of citizens in decision-making processes are essential for fostering resilience and ensuring that flood risk governance strategies are responsive to local needs and realities.
- **Return to Normalcy Obstacles:** The post-flood recovery phase is characterized by various challenges, including difficulties accessing financial resources, rebuilding infrastructure, and addressing psychological and social impacts. The reliance on traditional recovery approaches underscores the need for innovative strategies prioritizing resilience and long-term sustainability.
- **Risk Culture Gaps:** Belgium’s lack of a well-established risk culture amplifies vulnerabilities to climate-related disasters. Building a robust risk culture requires enhancing public awareness, understanding, and acceptance of risk management principles through education, outreach, and community engagement.

Notably, the challenges identified in this report resonate within the Belgian context and echo experiences observed in other regions dealing with extreme weather events. The devastating floods that struck Western Germany in the summer of 2021 or the ones in India and Bangladesh in 2022 serve as a stark reminder of the interconnectedness of global climate impacts and the urgent need for coordinated action at all levels.

Despite the gravity of the challenges ahead, the authors offer an insightful roadmap for action. From streamlining governance structures to fostering citizen engagement and cultivating a robust risk culture, the recommendations put forth in this report provide a blueprint for building resilience in the face of climate-related disasters.

As we navigate the uncertainties of an ever-changing climate, we must heed the lessons learned from the 2021 floods and take decisive action to strengthen our flood risk governance framework. I sincerely thank the authors for their dedication and diligence in producing this timely and insightful report. May their findings catalyze meaningful change, both here in Belgium and beyond.

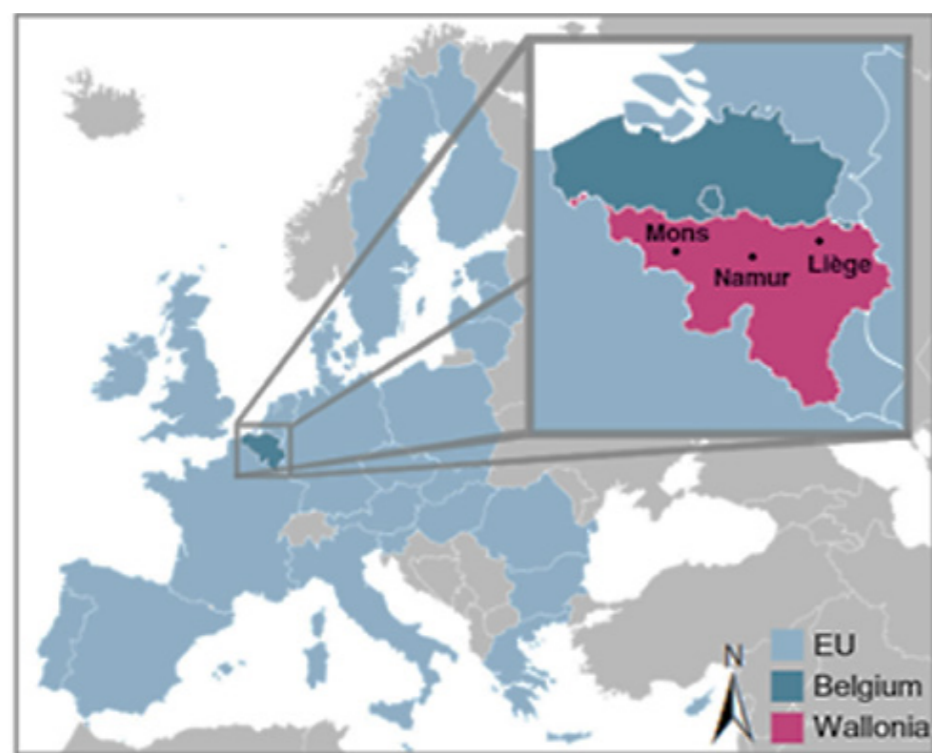
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## 1. Introduction

### 1.1 Re-occurring “natural” hazards – a new phenomenon in Western Europe?

In recent decades, the frequency and economic damage of climate extreme events/ disasters have increased considerably worldwide and in Europe (Munich Re, 2014). In recent years, more than twice as many flash floods of medium to large magnitude have been registered in Western Europe compared to the late eighties (Seneviratne et al., 2021). Many significant disasters, often due to climate disruption, have left their mark across Europe, prompting severe economic damage, casualties, and social disruption (see, for example, Munich Re, 2015). These historical trends are also reflected in Belgium (Delforge, 2021; Mees et al., 2016). Recurring natural hazard-induced disasters such as heat waves and droughts have forced changes in disaster management discourses, implementation strategies, and resilience policies. In July 2021, the weather system ‘Bernd’ caused catastrophic environmental and socio-economic damage in the Rhine-Meuse Region which comprises neighbouring parts of Germany, Belgium, and The Netherlands (UNU-EHS, UNU-CRIS, UNU-MERIT, 2023). In the Belgian Region of Wallonia (see map Figure 1) 39 lives were lost and many communities were left in ruins in the Vesdre basin. The floods that struck Wallonia on July 14, 2021, despite being categorized as a natural hazard, caught many off guard with their severity. The significant precipitation, resulting damage, and loss of life sparked surprise both locally and internationally. Almost immediately, concerns were raised regarding the breakdown of early warning systems and the efficacy of the emergency response in Belgium.

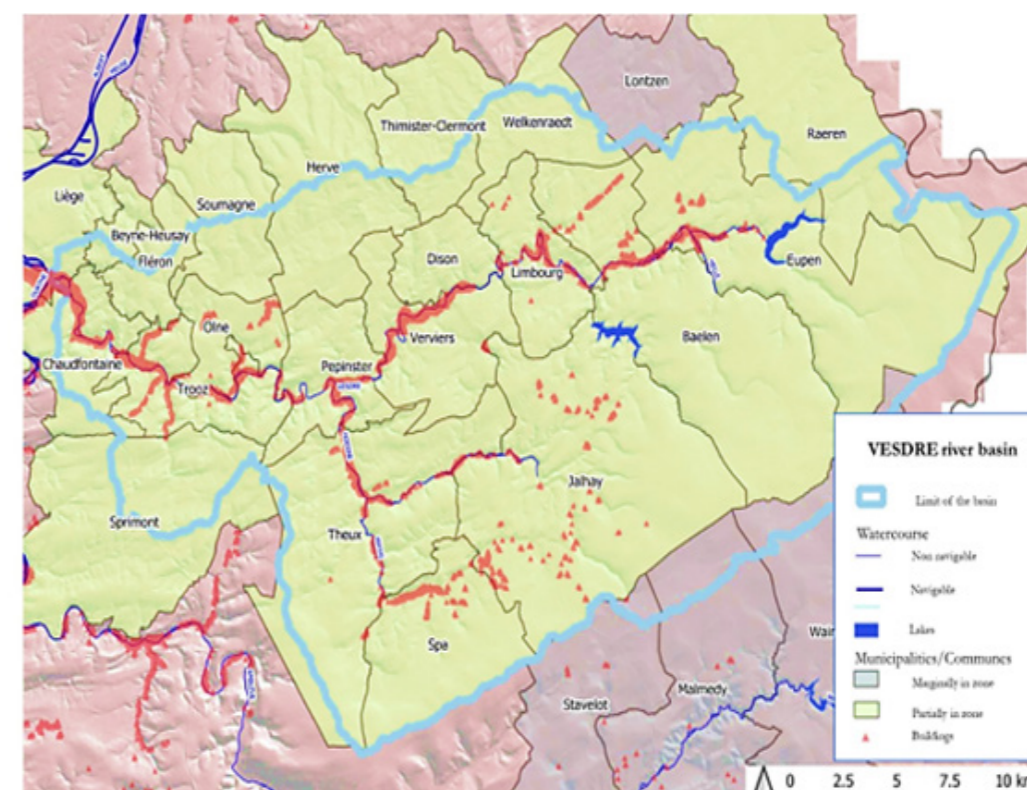


**Figure 1.** Map of the Walloon Region in Belgium representing the general area of study  
**Source:** Habran et al. 2020

### 1.2 The 2021 floods in Wallonia: an overview of what happened

The floods in the summer of 2021 were the most devastating in Belgium’s history. For the inhabitants of the Vesdre Valley (Figure 2), both the flooding, and the flood recession were perceived as happening very rapidly. In addition, inhabitants emphasised the violent nature of the current due to its speed and the noise created by debris carried within it, which was characterised as completely unusual (Zeimetz et al. 2021). This high impact led to a colossal damage. Figure 3 depicts the key events of the flooding, in chronological order, while Figure 4 and Table 1 highlight the key social, economic, and infrastructural impacts.

Preliminary estimates of the total economic losses of the impact of the floods in the affected areas across Europe range from €40 to €50 billion (bn) – and approximately €2.2 bn in Belgium. The latest estimated cost of repairs is almost €5.2 bn in Wallonia alone (SPW-website, 2023). The Vesdre valley has been especially impacted, as the ancient industrial sub-river basin in Wallonia was already fragile. For Germany, the 2021 floods (known locally as the ‘black swan’) were the costliest disaster in the country’s history and the deadliest in 60 years (Szönyi et al., 2022). Comparatively, a hailstorm that hit France, Belgium, and Western Germany in 2014, one of the worst natural disasters that occurred in the same region, caused approximately €3.5 bn in damages (Munich Re, 2015). The Walloon region faces long-term reconstruction bills as it deals with the colossal damage to public infrastructure, currently estimated at €650 million (mn): €19 mn for bridges (33 bridges were subject to partial or total traffic restrictions), €55 mn for the rehabilitation of the E40-E25/Cointe tunnel link (lighting, ventilation, remote management, emergency exits, video surveillance, etc.), €36 mn for the river network (130 sites impacted, including the repair of walls and banks at around 50 sites) and €22.5 mn for the rehabilitation of 343 stormwater basins (Szönyi et al., 2022; SPW-website, 2023).



**Figure 2.** Map of the Vesdre river basin in Wallonia (Belgium) representing the specific area of study  
**Source:** Authors

To finance recovery and reconstruction, the Walloon government distributed more than €2 bn through various recovery and reconstruction budgets. Donations were also contributed to the recovery and reconstruction budgets in Belgium; one month after the floods, the Belgian Red Cross had received €35 mn in donations, a record amount for the organisation (Szönyi et al., 2022). To finance recovery and reconstruction, the Walloon government distributed more than €2 bn through various recovery and reconstruction budgets. Donations were also contributed to the recovery and reconstruction budgets in Belgium; one month after the floods, the Belgian Red Cross had received €35 mn in donations, a record amount for the organisation (Szönyi et al., 2022).

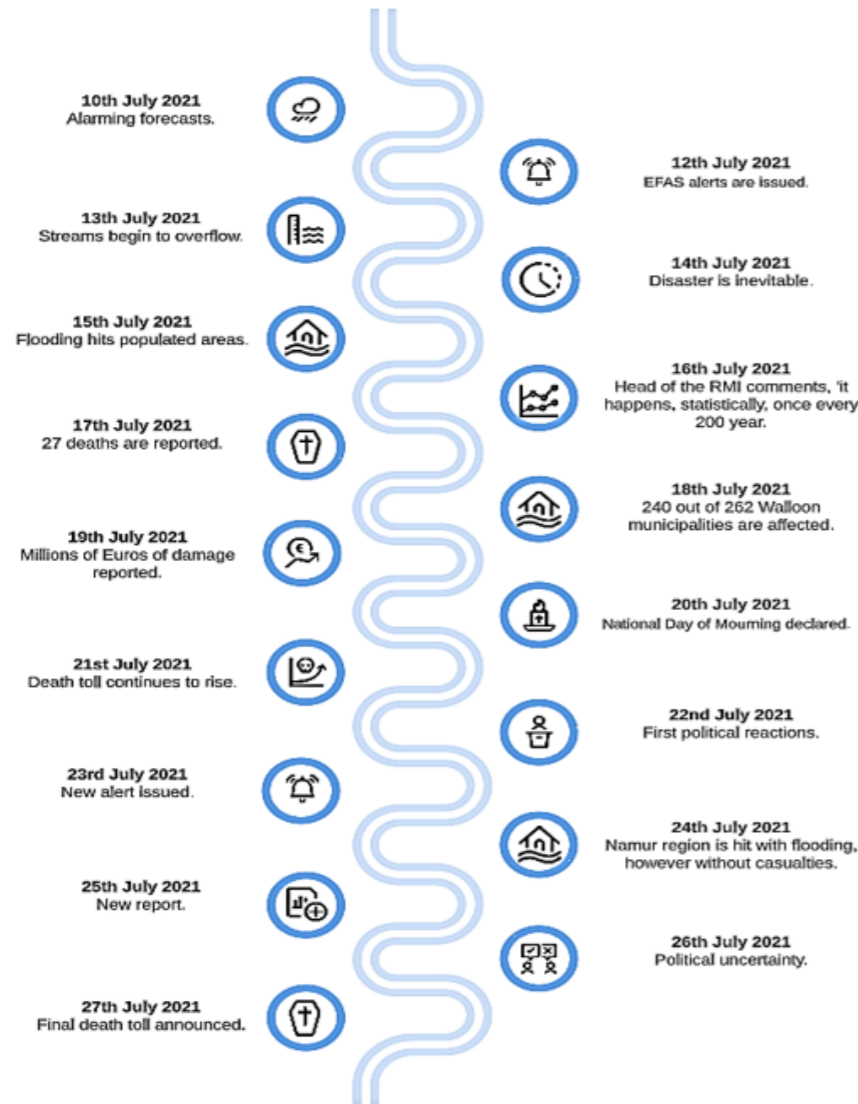


Figure 3. Timeline of July 2021 floods in Vesdre basin

Source: Authors, based on Zeimetz et al., 2021; Paelinck & Dumarey, 2022

Infrastructure type	Associated damage costs	Details
Bridges	€19 million	33 bridges were subject to partial or total traffic restrictions
E40-E25 Tunnel Link	€55 million	Rehabilitation efforts needed for lighting, ventilation, remote management, emergency exits, video surveillance.
River network	€36 million	130 sites were impacted, and repair included river walls and levies at around 50 sites.
Stormwater basins	€22.5 million	Rehabilitation of 343 stormwater basins

Table 1. The most significant costs associated with infrastructure damage in July 2021 Walloon floods (SPW, 2023).

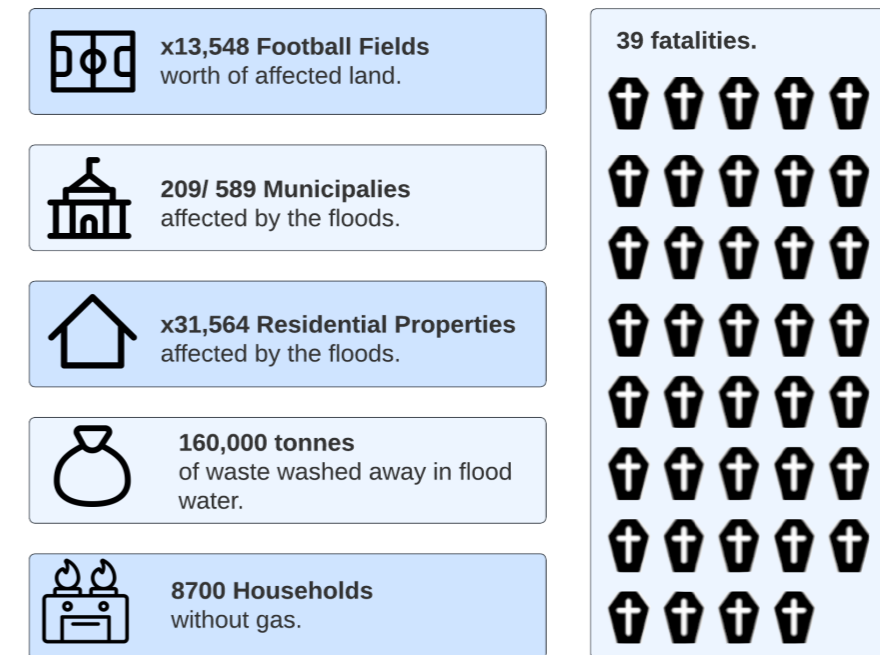


Figure 4. Key figures about the summer 2021 in Wallonia (SPW, 2023)

Source: Authors



### 1.3 Governance and flood risk management during the 2021 floods through the eyes of the media

According to media coverage, Belgium experienced great challenges governing and managing the flood’s impacts, both during the disaster and in the aftermath of it. For example, Belgian media framed the Walloon Inquiry commission report that questions the management of the floods (Annex 3), as an overall negative evaluation of the public authorities’ crisis management. Other media outlets framed the investigation reports’ conclusions as if the responsible authorities could have foreseen and anticipated the disaster better (Counasse, 2021; Scharff, 2021; Votquenne & Légère, 2021). However, no government official or separate entity seemed to be held individually responsible for casualties related to the impact of the disaster.

These social dynamics, including power relationships, can result in silo thinking, as well as in the idea that the responsibility for flood management must fall on someone other than oneself. The disaster’s impacts are often not value-free or “blind to politics”; managing flood risks and emergency response involves practices based on social relations and perceptions (Bright & Bagley, 2017). The effectiveness and efficiency of the actual emergency response practices depend significantly on cooperation and social interactions between numerous stakeholders and policy actors at various policy-levels. Moreover, the extent to which politicians take unforeseen disasters into account depends on the attention that disasters receive in the media. As a result, the complex mix of politics and social dynamics from local to federal governance levels that are at play during a disaster can – either intentionally or unintentionally - result in problematic “blind spots”, notably in flood risk management and emergency responses (Brunet et al., 2019).

Interestingly, despite its tense political character and the magnitude of the disaster’s impact, only a handful of Inquiry Commission Reports were produced in the immediate aftermath of the floods (see Annex 3). For example, a few weeks after the disaster, the Walloon Minister for Climate, Energy and Mobility commissioned an analysis of the floods with the Stucky study office (Zeimetz et al., 2021; Michaud et al., 2021). In addition, the work of the Inquiry Commission of the Walloon Government (Parlement Wallon, 2022) produced 161 recommendations, which were discussed by the Walloon parliament. One year after the floods, about a dozen policy reports were commissioned by various policy-levels while, in contrast, many more initiatives and studies from universities and Non-Governmental Organisations (NGOs) have been published (e.g., Cloquet & Braeckman, 2021; Natagora, IEW & WWF, 2021; Moran Garcia, 2022, i.e. Ten recommendations from disaster victims to the Walloon Parliament, see Annex 2). Three years after the disaster, work on the recovery phase of the floods is still ongoing. The Learning Commission, set up by the Federal Minister of the Interior and headed by the National Crisis Centre, assessed the federal aspects of the crisis (Sbaraglia & Saeys, 2022). In early 2023, a white paper led by former Governor De Witte also provided six major recommendation sheets about the organisation model (Schmitz et al., 2023). A non-exhaustive overview of commissioned reports and initiatives can be consulted in Annex 2.

When looking at earlier literature, most studies have focused on meteorological events and flood risk management (FRM) in Belgium (Brouyaux et al., 2004) or in one of its federal entities (Kellens et al., 2013 in Flanders; Michel and Van Dijck, 2010; Brunet et al., 2019 in Wallonia). Other studies are focused on impact, vulnerability, and adaptation assessments that were funded and piloted at the Regional (e.g., EcoRes-TEC Conseil et al. 2012; VMM, 2023; Lamarque et al., 2022) and federal levels (on health: Van de Vel, 2021; on socio-economic dimensions: De Ridder et al., 2020). Belgium also submitted its updated Nationally Determined Contribution (NDC) as a European Union (EU) Member State and its 8th National Communication in 2023, which includes a chapter on Vulnerability assessment, climate change impacts and adaptation, also mentioning flood risks (National Climate Commission, 2023). Few empirical studies on floods in Belgium have focused on flood risk governance (FRG), with the exception of Mees et al. (2016, 2017). In the next section we explain the difference between both concepts (FRM and FRG) and why this report considers them altogether . Flood risk governance refers to the overarching framework of institutions, policies, and processes involved in managing flood risks. It encompasses the coordination, decision-making, and implementation of strategies to reduce vulnerability and enhance resilience to flooding.

Given the limited evidence and studies available, this report hopes to contribute to this field by examining flood risk governance discourses on the impact of flooding as experienced by communities and public institutions from various policy-levels in distinct phases of disaster management. It could thus offer insights into which governance and monitoring tools should be deployed to anticipate, manage, and adapt to environmental risk. More specifically, the report aims to identify blind spots in Belgian flood risk governance and emergency response, applied to the case of the 2021 summer floods in Wallonia.

Flood risk emergency response is integral to both flood risk governance and the disaster risk management cycle. Emergency response is a vital aspect of flood risk governance as it involves the mobilization of resources, coordination of stakeholders, and implementation of measures to protect lives, property, and infrastructure during flood events (Mees, 2017). Blind spots are understood as controversial governance issues affecting flood risk management, due to policy-making and operational gaps. These can take the form of legal, informational and/or knowledge gaps and may have important practical and operational repercussions when flood disasters occur. Hence, the study’s objectives are:

- 1) What are the major flood risk governance issues pointed out by stakeholders in Belgium?
- 2) How does the varying discourses on ‘blind spots’ in flood risk emergency response from Belgian stakeholders relate to each other?

This report uses Dryzek’s work (1997) and the Disaster (Risk) Management (DRM) Cycle (Figure 5) as a theoretical foundation for analysing discourses concerning Flood Risk Management and Flood Risk Governance (FRG) (Dordi et al., 2022).

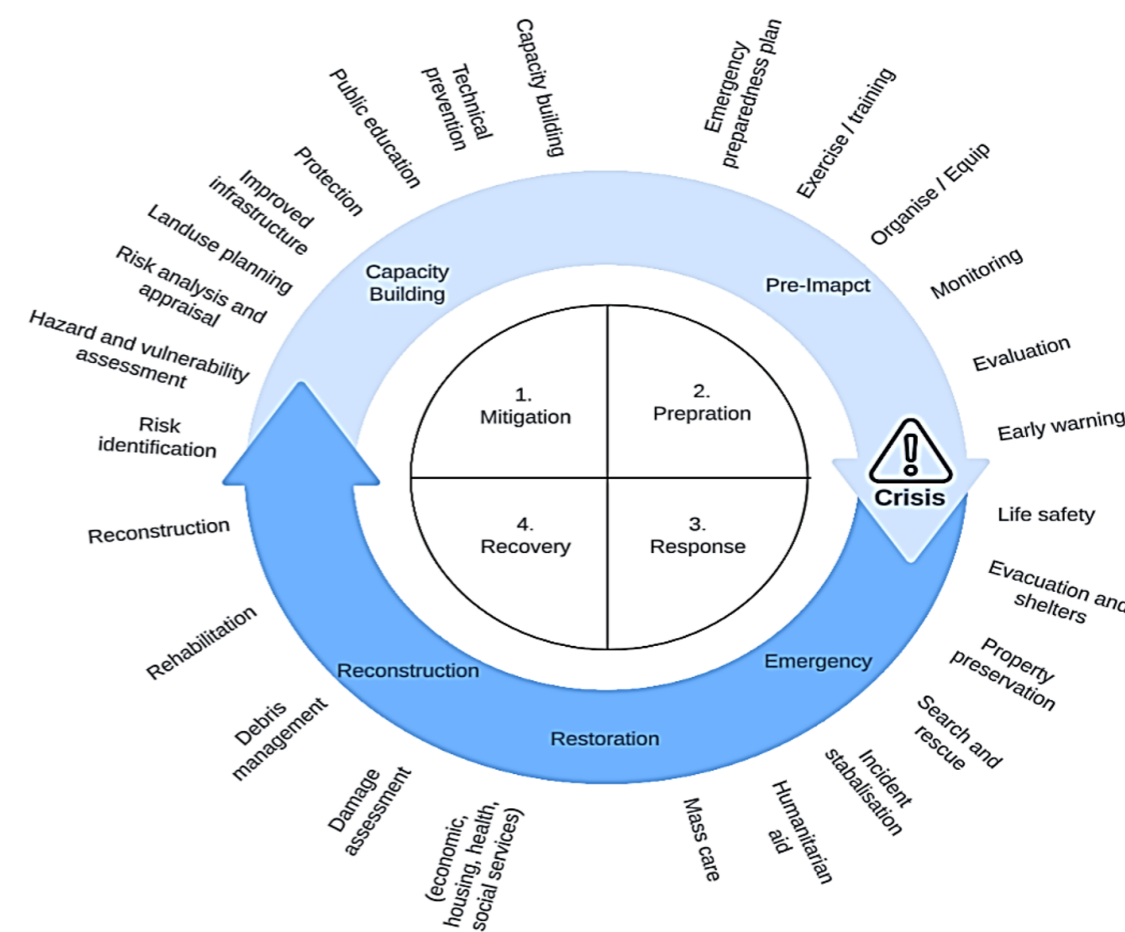


Figure 5. The phases of the disaster management cycle and examples of related activities  
 Source: Authors, inspired, a.o., by Rana et al. 2020

## 2. Conceptual and Methodological Framework

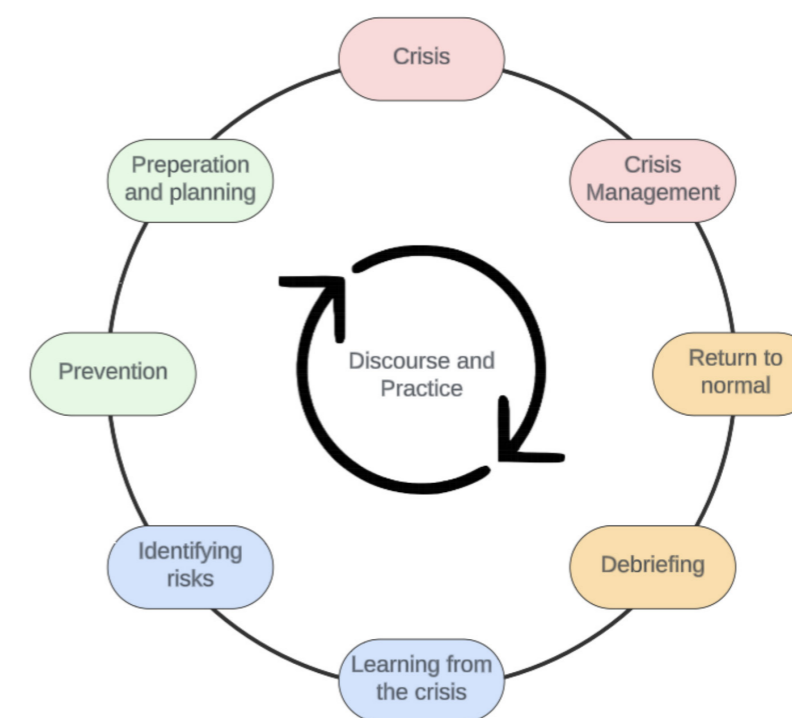
This chapter presents the conceptual and methodological framework, while Chapter Three explores the results, focusing on the gaps and blind spots in disaster risk governance during the 2021 summer floods. Chapter Four analyzes these blind spots through six major thematic gaps, offering tracks for improvements and recommendations. Lastly, Chapter Five offers concluding remarks.

### 2.1 Discourse analysis, Flood Risk Governance, and the Disaster Risk Management Cycle

Given the scope and severity of its impacts, flooding has been featured prominently in academic scholarship, as analysts around the world have sought to better understand its underlying causes and map out courses of action to reduce flood-related impacts on people and property. Analysis and evaluation of flood risk management (FRM)—a strategic approach to reduce flood impacts by sharing responsibilities and employing a diversity of instruments—is well-established and distinctive (Klijn et al., 2008; Sayers et al., 2013; Simonovic, 2013). By contrast, flood risk governance (FRG), referring to the complex institutional arrangements that shape the behaviour of state and societal actors concerning FRM, is a relatively nascent topic (Raadgever et al., 2018; Alexander et al., 2016; Mees et al., 2017). Flood risk management (FRM) and flood risk governance (FRG) should be examined in tandem (Dordi et al., 2022) as they are closely interlinked and mutually influence each other. This is especially true in the Belgian context, as the governance system is characterized by high complexity and polycentric systems. Studying them together also allows for a more comprehensive understanding of how decisions about flood risk are made, implemented, and experienced by different stakeholders. It helps to identify opportunities for improving governance arrangements and enhancing the effectiveness, equity, and sustainability of flood risk management efforts (Dordi et al., 2022; Kaufmann & Wiering, 2022).

The Disaster Risk Management (DRM) cycle is a crucial instrument for managing various disasters, including human-induced, naturally caused or a combination of both (Coppola, 2007; Sawalha, 2020). It has been devised to assist governments in reducing the impacts of disasters. For the past 30 years, the cycle has been used extensively in managing the effects of disasters (Coetzee and Van Niekerk, 2012). Despite its limitations for climate-related research, notably the absence of the direct integration of climate change, the DRM cycle is still used because it is convenient and robust (Alexander, 2019). Our analysis following the disaster management cycle integrates controversial debates concerning elements of climate change adaptation, as well as elements of time, resources, preferences, capacities or needs, and institutional transformations. These controversies emerged throughout the - mostly politically loaded - debates amongst stakeholders that touched upon the major concepts of the DRM cycle: anticipation, prevention, protection, and preparedness (planning, communication, trainings), and some dimensions concerning recovery and post-crisis (debriefing, rebuilding, human and financial resources) (Boin et al., 2021).

This study focuses on the issue of managing the response network during the crisis management and learning from the crisis by analysing the 2021 Summer floods (see Figure 6 below: first and fourth phase in the DRM cycle). The Disaster Risk Management cycle is a valuable analytical tool for both scholars and policymakers. But in practice, steps may tend to overlap and intermit (Brunet et al., 2019).



**Figure 6.** Discourse and practices throughout the Disaster (Risk) Management cycle  
**Source:** Authors, inspired by Brunet et al., 2019 and Zeimetz et al., 2021

### 2.2 Analysing the discourses of major stakeholders to identify blind spots

In times of crises, such as the period following the flood events, controversies usually destabilise the normality of certain discourses and ideas as well as call into question things that were previously considered logical. From a situation of certainty and predictability, we arrive at a situation of shared uncertainty, where different (social) actors actively defend divergent opinions (Venturini, 2010). Instead of a single path to managing flood risks in times of global warming that can be objectively defined, divergent opinions emerge as to which direction to take. Discourse analysis helps to highlight this shared uncertainty: it allows us to identify not only the concrete arguments put forward, often technical, but also the social representations (and worldviews or ideologies) that underlie them (Dryzek, 1997).

We thus use discourse analysis as a research method that allows for the systematic mapping of perspectives, the narrative lines, and used metaphors, their underlying ideas, and their mutual relationships. We adopt an approach focusing on discourses' relationship to social structures (including governmental institutions) and critical approaches, rather than purely descriptive approaches to discourse analysis looking at linguistic phenomena. It is based on an interpretation of discourse as both a textual practice and a social/material practice. More concretely, the framework of our research is based on the work of John Dryzek (1997) who identifies four constituent elements of discourse: worldview<sup>4</sup>, narrative lines, roles, and metaphors. This analysis uses particularly Dryzek's "narrative lines" and "roles" dimensions<sup>2</sup>.

The narrative lines form the concrete content of the controversy, which includes the definition of the problem (diagnosis) and the range of workable solutions. **What leads to what? What set of arguments is put forward? The roles are discourse elements that attribute roles to social actors. Who, in which discourse, is part of the problem, and who is considered part**

<sup>2</sup> Dryzek explores in "The Politics of the Earth" (1997) different environmental discourses and their implications for political decision-making and governance. His work emphasizes the role of language, communication, and power dynamics in shaping environmental policies and practices.

**of the solution? Which actors are assigned an active role, and which are seen as passive and subject to the problem in question? Which actors are marginalized or not mentioned?**

A major issue appeared to relate to the fact that the involved actors could put on various lenses, and these were not always clear, namely:

1. Who were they – and which role did they take – in the crisis organization?
2. At what stage of the crisis were they in?
3. At what level were they looking at the crisis?

We define blind spots here as gaps or controversial issues leading to inadequate or sub-optimal emergency responses in FRM. Policymakers can be biased or ‘blinded’ as to ignore or misinterpret legislation, policies related to events rightly in their policy domain. These blind spots can occur in organisational or institutional assumptions about itself or in assumptions held about other public policy sectors or third parties, including civil society stakeholders.

We have chosen the controversies based on the following criteria, borrowed from Venturini (2010):

1. Controversies must be sufficiently delimited.
2. Controversy discourses should combine technical-scientific positions with normative orientations.
3. Controversies should be framed within the climate and/or flood issues.

### 2.3 Methods: data collection, materials and analysis

Empirical observations for the critical discourse analysis were drawn from a combination of four methodological resources: media articles, reviews of grey literature (public/parliamentary reports), speeches and discourses from conferences (attended or available online), and semi-structured interviews with stakeholders ranging from federal to local policy levels, NGOs, citizen associations, and individuals (Table 2). The focus was on information obtained shortly before and up to one year after the event, gathered through various channels such as press, authorities, social networks, and community members. This included observations and behaviors during the flood (location, event chronology, wave phenomena), as well as post-flood measures (rescue efforts, evacuations, rehousing, interactions with insurance companies, and ongoing recovery work).

In a first phase, we collected data from articles of the Belgian Flemish and French-language press. For the Flemish press, we used the search engine GoPress academic; for the French press, we used the internal search function of different media. From this first pool of articles, we made a manual selection according to relevance criteria. One of the selection criteria was the importance given to controversy related to FRG during the emergency responses and FRM in the news, opinions, and/or press articles (see the selection criteria in previous section). Regarding the chronological boundaries, the selected articles date from the start of the floods on 14th of July 2021 to the summer of 2022 (the time of data collection). Concerning the speeches and discourses, we analysed 40 stakeholders’ speeches at events at conferences, congresses, and meetings. These stakeholders were decision-makers from federal to local policy level, NGOs, citizen associations, and citizens with engagements related to the summer 2021 flood events. The speeches were recorded and put online on the institutions’ respective websites.

In a second phase, the corpus was supplemented by various other sources using a “snowball” method by integrating sources to which the analysed articles referred. We also looked for additional data that would allow us to further investigate the narrative lines or verify certain discourses in the light of these sources: did they still hold up or did they need to be revised in the light of this new data? To collect this additional data, we used the search functions of Google.

Finally, thirty-eight (38) semi-structured individual interviews, specifically focused on local crisis management during the July 2021 events, were conducted with national, regional, and local stakeholders, ranging from civil society actors to authorities (mayors, municipal managers, aldermen, etc.) in charge of emergency planning or crisis management, and some impacted citizens. The participants were recruited via e-mail and phone using snowball sampling and LinkedIn. Individual interviews were used to ensure a high level of confidentiality for respondents. Collective interviews with two or three respondents were used in some cases to obtain a collective reconstruction of the crisis by capturing the interactions between participants. The interview methodology was meticulously designed to ensure structure and flexibility. Pre-established questions and topics guided the conversations (detailed in Annex 5), yet interviewees were encouraged to allow the dialogue to flow naturally. This approach facilitated open-ended discussions, allowing interviewees to express their personal beliefs and concerns. Data collection and analysis were concluded once theoretical saturation was achieved, ensuring that all relevant insights were captured without redundancy. The interviews, complemented by local fieldwork observations, were geographically focused on four municipalities within the Vesdre Valley in Wallonia: Verviers, Pepinster, Trooz, and Theux, as illustrated in the referenced map (Figure 2). This targeted scope ensured a concentrated examination of the areas most impacted by the events under study.



Sources consulted	Description
Phase 1: Media articles	FR : Le Soir (N=4), Le Vif (N=6), RTBF.be (N=16), l’Echo (N=6), La Libre (N=7).  NL: VRTNWS (N=8), Het Laatste Nieuws (N=5), Het Nieuwsblad (N=4), De Standaard (N=6), DeMorgen (N=5), De Tijd (N=4), Knack (N=4).
Phase 2: Additional data obtained by "snowballing":  YouTube channels providing interviews and speeches at events of public authorities and public stakeholders from various political levels (federal, rRegional, provincial, local/municipal)- N= 30.  Post-disaster reports from the federal and federal entities policy-levels – N= 5 (see Annex 1).  Debate programs (De Afspraak, TerZake, Pano <sup>8</sup> , Journal Télévisé de 19h; Vedia TV) - N=6;  Works of important interlocutors in the debate, such as essays of academics in Belgian newspapers – N= 5  Public initiatives related to the 2021 summer floods (see Annex 4).  Belgian environmental associations (Bond Beter Leefmilieu, Canopeia, WWF, Natagora,...) and citizens' initiatives (10 selected).	Stakeholders (NGOs and citizen associations - national associations: 2; rRegional associations: 4); and decision-makers from federal (3), rRegional (6), and local policy level (8), and impacted citizens (13), fire brigade officers (3); academics (5).
Phase 3: Semi-structured interviews: • Individual • Collective	Stakeholders (NGO and citizen associations - national associations: 1; rRegional associations: 3; euRegional organisation: 2); and policymakers from federal (6), rRegional (3), and local policy level (7), and impacted citizens (10), fire brigade officer (3); academics (1); pPolitical representatives from the federal government (5); Walloon government (5), Walloon Parliament (2); Walloon province (4)
Total data corpus for blind spot/controversies: • 80 textual media sources (39 French; 36 Dutch; 5 English) • 60 online speeches (notably on YouTube channels) • 38 semi-structured interviews	

**Table 2.** Overview of the entire corpus of data sources and a description of the sources consulted.

The media articles, online speeches, and interviews were all subjected to the same coding protocol. In a first open coding phase, each data source was analysed line by line, and all notable, relevant, and important statements were labelled. The labels used in this phase were close to the original data to avoid too many jumps in abstraction that would blur the link between the original data and the final discourse. In the second phase of selective coding, we made the first categorization of the codes. First, we grouped similar codes - according to our interpretation. This highlighted the codes that occurred most frequently in the articles and interviews analysed. The codes were further categorized analytically according to whether they related to a narrative line or an assigned role for an actor. In the third phase of theoretical coding, we tried to match the codes to different discourses. Based on the NVIVO 12 coding schemes, we made a delineation of the different discourses for each controversy/blind spot.

### 3. Results

#### 3.1 Blind spots in the complexity of the Belgian federal and regional governance structures

##### Governance arrangements and institutional knowledge?

We found that many stakeholders believed they needed to understand how the Belgian DRM system works for flood events, leading to some actions and decisions being postponed or delayed, if taken at all. A potential reason might be that officials needed to clearly know their competencies compared to other agencies and organisations. Moreover, they often struggled with misunderstandings about attributed responsibilities and priorities of tasks and needed more hierarchical order and unity of command. A review of the basic principles of FRM governance in Belgium (based on diverse legislation – see Table 3 and below) may explain some of these misunderstandings in more detail.

FRM - Emergency Management in Belgium		
What?	Who?	Framework
Personal assistance/aid	Rescue zones, Operational units of the Civil Protection	Law of May 15, 2007, on civil security.  Royal Decree of June 10, 2014, on the missions of civil protection
Evacuation/sheltering order	Authorities (Minister of the Interior, Governor, Mayor)	Law of May 15, 2007, on civil security.
Crisis coordination	Authorities (Minister of the Interior, Governor, Mayor) depending on the strategic level of crisis (=municipal, provincial, federal).	Royal Decree of May 22, 2019, on emergency planning.
Logistical support/National aid	Defense/Army	"Help the Nation" mission
FRM - Recovery in Belgium (Rétablissement)		
What?	Who?	Framework
Coordination recovery period	The competent authority that has taken responsibility for the strategic coordination of the emergency	Royal Decree of May 22, 2019, on emergency planning. (Article 40)
Floods - Compensation (disasters/calamities)		
What?	Who?	Framework
Processing claims for recognition/compensation	SPW-IAS - Regional Disaster Service Regional Crisis Centre (reports)	Decree of 26 May 2016  Order of the Walloon Government 21 July 2016 (AGW 21/07/2016)  Insurance Law of 4 April 2014, (M.B. 22/11/2021)  Order of the Walloon Government 21 July 2016 (AGW 21/06/2016)  Decree of 23 September 2021 establishing a special compensation scheme for certain damage caused by the flooding and heavy rainfall that occurred from 14 to 16 July 2021 and on 24 July 2021 and was recognised as a natural public disaster, M.B. 20.10.2021

**Table 3.** Emergency management structures in the case of the summer 2021 floods in Wallonia

**Box 1: Key findings on identified Blind Spots**

1. **Complex governance structures:** The intricate framework of Belgium's federal and regional governance systems prompt inquiries into their practicality for managing flood risks. These structures seem excessively convoluted and fragmented for effective flood risk management.
2. **Communication blind spots:** The crisis terminology created confusion. This was caused by the interchangeable use of terminology such as “unprecedented events,” “emergency response”, “crisis”, “natural disaster” and “exceptional situations”, which sparked debates about their precise implications and the formulations of response strategies. Disinformation, particularly through social media, eroded trust between the government and the public. The study also identified several infrastructural issues related to communication centres and early warning systems. It points out that communication centres faced challenges in ensuring timely information sharing and collaboration during the crisis. Information and forecasting transmission issues resulted in sub-optimal regional early warning systems. The warnings and/or alerts provided by different agencies were often too technical or lacked clarity, making it difficult for decision-makers and the public to understand the potential impacts of the flood.
3. **Responsibility for preparedness:** The responsibility for risk preparedness revealed significant pre-impact blind spots despite existing protocols for risk mitigation. Local authorities, particularly at the municipal and provincial levels, are tasked with identifying risks and developing emergency plans, yet coordination and preparation were lacking. While special plans for flooding existed, they often didn't integrate climate scenarios or account for failures of upstream dams, highlighting a gap in comprehensive risk management. Additionally, insufficient resources and training hindered emergency response efforts, with a notable shortage of personnel and equipment compounded by budgetary constraints. Furthermore, the inability to predict extreme events accurately and the absence of models for localized impacts underscored the need for enhanced forecasting capabilities and coordination between agencies responsible for flood risk management.
4. **Engagement of citizens:** An area of contention centres on citizen involvement and participation. The extent to which citizens were integrated into flood risk management efforts and their perspectives effectively assimilated became a focal point. Citizen engagement was needed and researched by public authorities, but the public frameworks and services to cooperate with citizens was not always optimally functioning. This resulted in frustrations from various sides, including from citizens complaining about the Red-Cross and/or about the insurance companies, but equally from the insurance sector demanding increased ownership on individual resilience responsibilities.
5. **Transition to normalcy:** An observable gap emerges in discourse pertaining to the ‘return to normalcy’ phase following floods, particularly as it pertains to decision-makers. These regional and local decision-makers were not so well-equipped beforehand to manage post-flood recovery and restoration processes. Some regulatory gaps and fuzziness in the phase transitioning (moving between policy-levels) rendered this transition from emergency response phase to recovery cumbersome and difficult.
6. **Deficiency in risk culture:** There was consensus about the lack of risk culture within Belgium, which refers to a situation where there is insufficient emphasis or awareness placed on understanding, assessing, and mitigating risks associated with flooding. In a robust risk culture, stakeholders including government agencies, communities, businesses, and individuals, would actively engage in efforts to identify, evaluate, and manage flood risks effectively. However, the specific implications and political ramifications of addressing this deficiency remain subjects of debate, characterised by varying viewpoints.

*Administrative capacity – complex distribution of competencies on environmental matters*

The Belgian state has been gradually transformed from a unitary state to a federal state through a series of state reforms between 1970 (first reform) and 2012-2014 (sixth reform). Since 1993 (fourth reform), Belgium is constitutionally a Federal State composed of three Regions and three Communities. With the fifth reform (2001), for example, agricultural policy became a regional competence; with the sixth reform (2014), the disaster fund, the agricultural disaster fund, and inland waterways became regional competencies, among others.

In Belgium, no national law related to climate adaptation or specifically related to floods exists. However, Belgium has flood-related policies and strategies across national, regional, and local levels. In its federal government system, the responsibility for FRM sits mainly with the three distinct regions of Brussels, Flanders, and Wallonia and not with the federal government. FRG is organised through a set of regional policies, regulations, strategies and plans for flood and coastal risk management (Castanheira et al., 2017). The various reforms of the State have entrusted more and more powers to the federated entities. These powers regularly find themselves at the centre of an emergency. However, civil security is a sovereign competence exercised by administrative authorities that do not exist at regional level. Yet, the actual legal framework should make it possible for the respective regions to prepare their own organisation for emergency situations (for example by carrying out an in-depth analysis of the risks and threats that they face or by training all their managers in emergency planning and crisis management).

This federal mechanism has repercussions on environmental and climate (adaptation-related) competencies, as these are shared between the national authority and the three regions. The three regions are federated, separate entities not subordinated to the federal rule or the other regions. Hence, there is no hierarchy of norms between the national level and the federal entities. They exercise their authority through their territorial base, which defines their jurisdiction. The distribution of competencies, notably in environmental matters, is governed by the Law of 08/08/1980 on institutional reforms and subsequent modifications.

Thus, the competencies on climate change are also shared (see Table 4 below), resulting in many laws and plans at various policy levels (national level involving inter-federal arrangements, federal government, the regions of Brussels, Wallonia and Flanders, and the municipalities). Coordination structures have thus been set up in Belgium, for both national and international matters. The main one on international environmental policy is the CCPIE or Coordination Committee for International Environmental Policy, set up in 1995 on the basis of a cooperation agreement between the Federal State, the Flemish Region, the Walloon Region and the Brussels-Capital Region. Concerning water policy, the Water Steering Group is dedicated to the coordinated implementation of water policy. Its main task is to coordinate the implementation of the Water Framework Directive (WFD) in Belgium. Table 4 highlights the competencies for climate change, particularly for adaptation-related policies, at different levels.

Sector/thematic area	Federal	Regions (+ Communities)	Provinces	Municipality	(Potential) National/inter-federal (adaptation actions)
Environment	*	**	*	*	**
Biodiversity	*	**	*	*	*
Forests	*	**	*	*	*
Health	**	**	/	*	**
Crisis management	**	**	**	*	**
Water management	*	**	**	*	*
Energy	**	**	*	*	**
Transport/Mobility	*	**	*	*	*
Land use planning	*	**	*	*	*
Constructed areas	*	**	*	*	*
Infrastructures	*	**	*	*	*
Industry and services	*	**	*	*	*
Tourism	*	**	*	*	*
Agriculture	*	**	*	*	*
Education	*	**	*	*	*
Taxation	**	*	*	*	*
Research	**	**	/	**	**
Foreign affairs	**	**	*	*	**
Marine areas <sup>3</sup>	**	*	*	*	*
Coastal protection <sup>4</sup>	*	**	*	*	*
Fisheries <sup>5</sup>	*	**	*	/	*
Finance	**	**	/	*	**

Here, the distribution of powers and roles between different policy levels in Belgium concerning matters relevant to climate change adaptation is illustrated. The sign (/) means 'no relevant powers or role'. It indicates that at this particular policy level, there are no relevant powers or roles assigned for the specific theme of climate change adaptation under consideration. This symbol signifies the absence of direct authority or responsibility in this domain at the indicated policy level.

The sign (\*) means 'relevant role present, but relatively indirect, weak or shared competence'. It signifies that there exists a role at this policy level regarding the specified aspect of climate change adaptation. However, this authority may be comparatively weaker, incomplete, or shared among multiple governing bodies. It suggests that while the policy level has some involvement, its capacity or authority in this domain may be limited or subject to collaboration with other entities. For the policy domains 'Forests', 'Water management', 'Land-use planning' and 'Education', the role of the federal level concerning adaptation to climate change consists mostly of awareness-raising and ensuring coordination, for both national and international levels.

The sign (\*\*) means 'relatively strong role, shared competence and/or exclusive competence': this symbol indicates a significant role, degree of authority and capacity, suggesting that the policy level possesses strong regulatory powers or exclusive jurisdiction over the relevant matters. It implies that this level of governance plays a pivotal and perhaps leading role in shaping policies and initiatives related to climate change adaptation in the indicated domain, potentially influencing outcomes at lower levels of governance.

**Table 4.** Distribution of powers between the different policy-levels in Belgium relevant for climate change adaptation

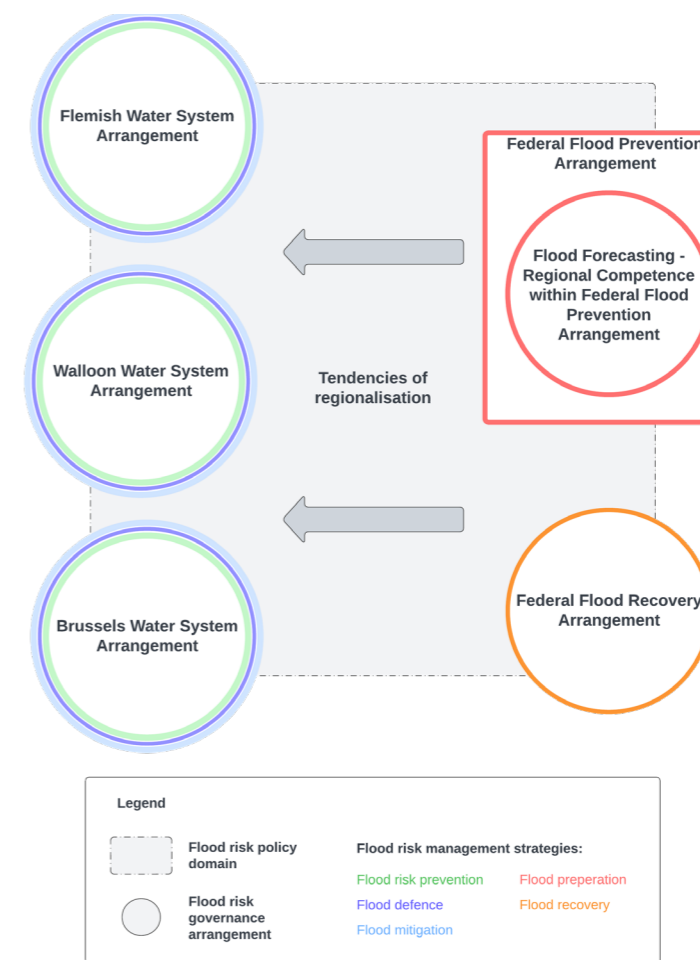
Source: Authors; adapted from: Wittoeck, 2017

3 Concerning the provincial level, these powers are only applicable to the Province of West-Flanders.  
 4 Concerning the provincial level, these powers are only applicable to the Province of West-Flanders.  
 5 Concerning the provincial level, these powers are only applicable to the Province of West-Flanders.

While both federal and regional levels have their own adaptation plans based on their specific responsibilities, there is also a National Adaptation Plan (NAP). The NAP is a collaborative effort across federal entities aimed at complementing the individual plans and addressing gaps, particularly where there are shared responsibilities, through inter-federal cooperation across various policy areas. Importantly, many measures taken by regional authorities are incorporated into plans other than their designated adaptation plans. For instance, Walloon adaptation measures are part of the Walloon Recovery Plan, whilst Flemish measures are integrated into the “Blue Deal,” and Brussels’ measures are dispersed across plans such as the Water management plan, Nature plan, and Sonian forest management plan.

**Complex levels of competence for risk and emergency management**

Mees (2017: 72-75) explains the main characteristics of the flood risk governance arrangement (FRGA) in Belgium, i.e., the ensemble of actors, rules, resources and discourses addressing flood risks within a particular geographic area (Liefferink, 2006). She shows that five separate FRGAs can be identified (see Figure 7 below). The Water System Arrangements encompass strategies for flood risk prevention and protection, with competences for these strategies falling under the jurisdiction of regional governments. This necessitates the establishment of separate arrangements for the Flemish, Walloon, and Brussels-Capital Regions. In addition to these three regional Water System Arrangements, there is a distinct Flood Preparation Arrangement that focuses on emergency planning and crisis management. Unlike the Water System Arrangements, the Flood Preparation Arrangement is predominantly governed at the federal level. Similarly, the Flood Recovery Arrangement, which primarily addresses insurance-related matters, is also primarily governed at the federal level (Mees, 2017).



**Figure 7.** Flood risk governance in Belgium (Adapted from Mees et al. 2016; Mees, 2017: 73).

Source: Authors

### A. Water management and spatial planning at the regional level

In Belgium, FRM is guided by the European Union (EU) Directive 2007/60/EC (“EU Flood Directive”), which Belgium has fully implemented since 2013 (SPW website, 2022)<sup>6</sup>. Implementation of the Water Framework Directive (EC, 2000) in Belgium is divided between the Federal State, which manages coastal waters, and the three Regions (Flanders, Wallonia, and the Brussels Capital Region), which manage rivers, lakes, transitional waters, and groundwater. For both the Regions of Flanders and Wallonia, water management is thus organised depending on the water category. Accordingly, there are five levels: 1. authorities responsible for navigable waters (Regional bodies); 2. Regional authorities; 3. provinces; 4. towns; and 5. unclassified watercourses managed by residents. In all three Regions, regional bodies are responsible for several measures (see EC, 2019: p. 31).

### B. Emergency planning and insurance – policy coordination competence at the federal level and unclear role for the regional level

In contrast to water management and spatial planning, emergency planning and insurance policymaking is primarily at the federal level. However, some emergency planning activities are also developed at the provincial and municipal levels. At the Regional level, there is de facto increased coordination of regional competencies in case of emergency by the Direction Centre régional de Crise (in Wallonia) and the Crisis Centre of the Flemish Government (CCVO) (in Flanders)<sup>7</sup>.

To coordinate the high number of actors at the regional level, the Walloon Government decided in 2007 to establish a single point of contact for crisis managers. This Walloon Crisis Centre (CRC-W) is not a crisis manager, but it bundles the expertise and competencies within the Walloon government administration in case of emergencies. It thus serves as a single point of contact for crisis managers to coordinate the Walloon actors involved. The CRC-W is active during crises and has responsibilities in emergency planning (SPW, 2014): e.g., it blends the development of flood damage maps and offers assistance for crisis evaluation, debriefing of population, etc. (personal interviews, SPW-1; SPW- 2, May 2022).

As emergency planning is still a federal responsibility, the federal authority, through the Minister of the Interior, remains the authority of last resort and ensures a line of administrative responsibility from the national level to the municipal service. This is to ensure consistency in crisis management and to guarantee the necessary continuity of operational management by relying on various emergency services. In terms of crisis management linked to flooding, a distinction must be made between the infrastructures that come under a specific organisation (e.g., reservoir dam) which must ensure the management of their internal risk and define a Flood Management Plan (PUI-Plan d’Urgence Inondations) and transmit it to the governors’ services, on the one hand, and crisis management which comes under the administrative authority (communal and provincial) on its territory, on the other (Zeimetz et al. 2021). In both cases, the services of the SPW can intervene either as managers (DVH<sup>8</sup> and DBR<sup>9</sup> and DCENN<sup>10</sup>) or as experts (DGH<sup>11</sup>, DCENN, CRC-W). As managers, they must respect the federal prescription and as experts, they can be invited to participate in the discussions of the crisis cells (communal, provincial, or federal).

<sup>6</sup> See: Service public de Wallonie (SPW) website (2022): <https://inondations.wallonie.be/home/directive-inondation/plans-de-gestion-des-risquesdinondation/pgri-2016-2021.html>

<sup>7</sup> A Flemish Crisis Centre (CCVO) was founded in 2011. Following the Walloon example, it was decided in 2014 that, in future, the CCVO should become the central contact point for crisis entities on the Flemish Regional level. Yet, the exact scope of the CCVO remains unclear.

<sup>8</sup> Major waterways (voies hydrauliques) are managed by the SPW Mobility and Infrastructure (MI) (three Waterways Departments: Département des Voies Hydrauliques (DVH) of Tournai and Mons; DVH of Charleroi and Namur; DVH of Liège and the Reservoir Dams). For detailed information, see p. 10 of the Teller-report: Organisation of the management of watercourses and hydraulic works in Wallonia.

<sup>9</sup> Direction des Barrages-réservoirs (DBR)- Directorate of Reservoir Dams (DBR).

<sup>10</sup> Direction des cours d’eau non navigables (DCENN)- Directorate for Non-Navigable Waterways (DCENN).

<sup>11</sup> Direction de la Gestion Hydrologique (DGH) - Directorate of Hydrological Management (DGH). The DGH is the centralised service for announcing, monitoring and forecasting floods as provided for by article D54 of Book II of the Environment Code, containing the Water Code.

This sharing of competencies can work on the condition that all partners are aware of each other’s responsibilities, both in crisis management and risk management mode. We found that this knowledge and awareness is not yet widespread (also Zeimetz et al., 2021; Schmitz et al., 2023).

The July 2021 floods showed that the **role of the regional level in emergency planning still needs to be clarified**. For example, the Walloon crisis centre (CRC-W) should be mentioned in the 2019 Royal Decree on emergency planning. Therefore, during the parliamentary Inquiry commission and response to critiques, the Walloon Minister-President proposed appointing a single commander of the Walloon public service administrations in case of emergency<sup>12</sup>. This would follow the ongoing trend and logic of decentralising competencies at the regional level in the broader realm of FRM beyond emergency response (e.g., prevention etc...). Some policymakers, especially at the federal level, argued that this suggestion risks adding confusion instead of clarity. It was argued that it is not in line with the “command in control” and “subsidiarity” principles, which naturally puts the local or provincial level at the core of the operations, while the federal level would be keeping these levels together with a coordinating overview. For them, it could be a political move for direct visibility rather than a solution for structural change and planning (Personal interviews, SPW-1, SPW-2, SPW-3, FPS-1, June 2022).

### C. Emergency planning and insurance – policy coordination competence at the federal level and unclear role for the regional level

Emergency response coordination occurs at the municipal, provincial, or federal level. A mayor, governor, or the Minister of the Interior can declare a phase at each level. Cooperation between the various emergency services is coordinated at the crisis site and the administrative level<sup>13</sup>. While the Royal Decree of May 2019 provides for both operational and strategic management, the regional levels’ role is not clarified in the federal law text (see Figure 8 below).

Operational management is carried out by the emergency services, which are grouped into five disciplines (sets of tasks). The operational coordination occurs at the disaster site in the Operational Command Post or CP-OPS, which is set up for the event. All disciplines send a delegate to an Operational Command Post (CP-Ops): Director of the assistance area (Dir-BW – Discipline 1), Director of medical assistance (Dir-Med – Discipline 2), Director of Police (Dir-Pol – Discipline 3), Director of logistics (Dir-Log – Discipline 4) and Director of information (Dir-Info – Discipline 5). Operational decisions are taken under the direction of the Dir-Cp-Ops (see section below). Operational coordination requires coordination in the field. The Dir-CP-Ops is the highest-ranked officer at the scene. This is always an officer of the assistance area whose territory the emergency occurs, with a Dir-CP-Ops certificate of compliance (NCCN-website, 2023; Personal interviews, SPW-1, SPW-2, FPS-1, June 2022).

Strategic or policy coordination comes into play when policy-level decisions must be taken. Strategic management concerns decision-making and the strategic aspects of crisis management. This coordination takes place in a coordination committee (CC). Policy coordination can occur at three levels, also called emergency phases. An emergency phase indicates the severity and extent of the disaster and who is responsible for general coordination. Note that the regional level (e.g., CRC-W) is not officially included in the ‘alarm phases’ (Royal Decree 22/05/2019, see Figure 8 below).

When a “higher” phase is triggered, there are no mechanisms for determining exactly which territory is affected by this phase. For example, as happened during this large-scale flood, it is quite possible for a provincial phase to be triggered without the entire province being affected. In this case, there should be a clear mechanism for the Governor to determine which “territory” is affected by this phase, by identifying the municipalities concerned. At the same time, it should be possible to offer communes the option of joining a provincial phase that is already underway. The same applies to the federal phase, with the provinces concerned or considering themselves concerned. This mechanism would also enable the development of “lateral support”, which is necessary in very large-scale emergency situations (floods, nuclear incidents, etc.), by activating municipalities (or provinces) within a provincial (or federal) phase to, for example, simply set up a reception center, even if the municipal (or provincial) territory is not affected by the situation (Schmitz et al., 2023). Such mechanisms were thus insufficient or lacking during the 2021 summer floods.

<sup>12</sup> Sylvie Marique, Head of SPW DG and commissioner of the Special Commission for recovery, was appointed by the Walloon Minister-president. The Minister-president would give her hierarchical power upon the other SPW administrations during Emergency crises.

<sup>13</sup> See: <https://crisiscenter.be/en/what-do-authorities-do/crisis-management/coordination-emergency>

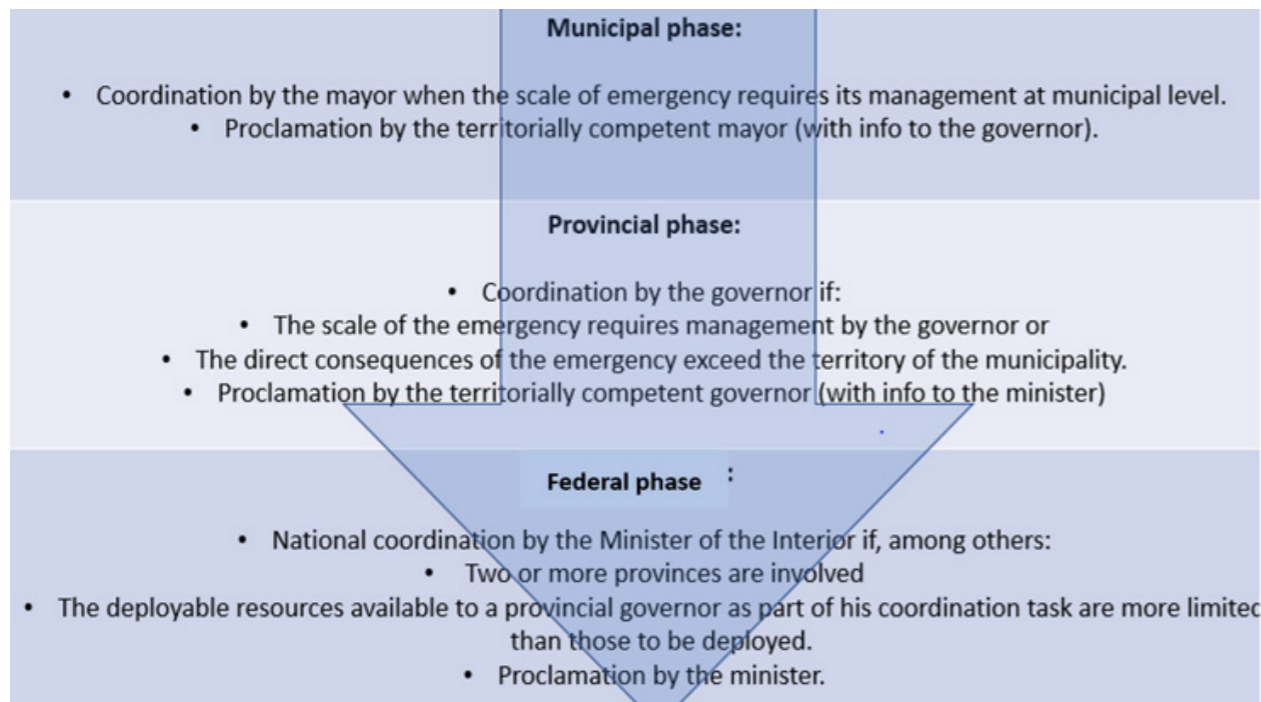


Figure 8. Summary of the upscaling system of strategic coordination in Belgium  
Source: Authors

The fact that the **regions or regional levels are not included in the strategic coordination** (figure 8), illustrates probably that the emergency planning structure in Belgium has not evolved sufficiently with the successive State reforms. However, good cooperation and coordination with the federated entities is more important when regional competences are affected (depending on the type of emergency/crisis, of course) (see also Schmitz et al., 2023).

In the policy implementation phase, a distinction can be made between the immediate response to a disaster and the measures aimed at repairing the damage. In the DRM cycle, the quick response to the disaster belongs within the crisis phase, while the recovery measures fall within the post-crisis phase. In Belgium, a disaster falls under the general heading of ‘Emergency Planning and Crisis Management’ and within the competence of Home Affairs<sup>14</sup>.

Three levels of government are thus primarily involved: local/municipal, provincial and federal level. At the same time, these levels constitute different stages. When a disaster occurs, the municipal level is activated first. Thus, the municipal level, i.e., the mayor as policy coordinator, can launch a municipal crisis management phase. The mayor will then gather the people from the different disciplines, his PLANU coordinator and their communication manager. They will then take the strategic decisions for their municipality.

The provincial level intervenes if the disaster exceeds municipal boundaries or a local government’s capacity. In the provincial stage, the governor functions as policy coordinator and chairman of the provincial coordination committee<sup>15</sup>. When several communes are affected by the crisis and the means of a commune are exceeded, the provincial phase is activated (under the governor’s authority, who can activate his provincial plan). The governor will gather his provincial crisis management committee around him, with a person in charge of each discipline to decide to activate the provincial phase. Then there is the federal level, with a federal phase that can be triggered under the authority of the Minister of the Interior (who also assembles his federal crisis management committee).

14 See : [https://crisiscentrum.be/sites/default/files/noodplanning\\_en\\_crisisbeheer\\_nl.pdf](https://crisiscentrum.be/sites/default/files/noodplanning_en_crisisbeheer_nl.pdf)

15 Article 21, §1 of the Royal Decree of 16 February 2006.

When a federal or provincial phase is triggered, with the Minister of the Interior as policy coordinator and chairman of the federal coordination committee<sup>16</sup>, this does not mean that the other levels do nothing anymore. The Royal Decree of 2019 provides that, in the provincial phase, the mayor continues to take all necessary measures for his population while awaiting the governor’s measures. They must inform the governor of their measures and remain active on their territory. The same applies to the governor and their provincial crisis unit in the federal phase (see Figure 9 below).

Moreover, a significant confusion concerns the concepts of strategic management and operational management. These two concepts were the basis of the principles of the Royal Decree of 2006 and remain so in the Royal Decree of 22 May 2019. This is particularly true in the case of the COVID-19 crisis. These concepts, and this difference between strategic and operational management, did not correspond to the concrete way decision-makers operated in the field.

As a Walloon governor explained:

“So, we have seen strategic decisions taken by strategic decision-makers who have plunged their hands into the boiling pot of the operational, sometimes forgetting for a while the very essence of their [strategic] function. So, this is not a reproach at all. I think that the need was unprecedented. It explains in the short term, but I think that operation’s legal and regulatory principles cannot be satisfied with this confusion in the long term.” (Prov. 2, May 2022).

To summarize, the key issue here is the blurring of lines between strategic and operational management, which does not align with the actual situation in the field. This challenge also holds significance in addressing the long-term management of flood risk impacts, as evident in the blind spot related to the ‘Return to normal’ phase.

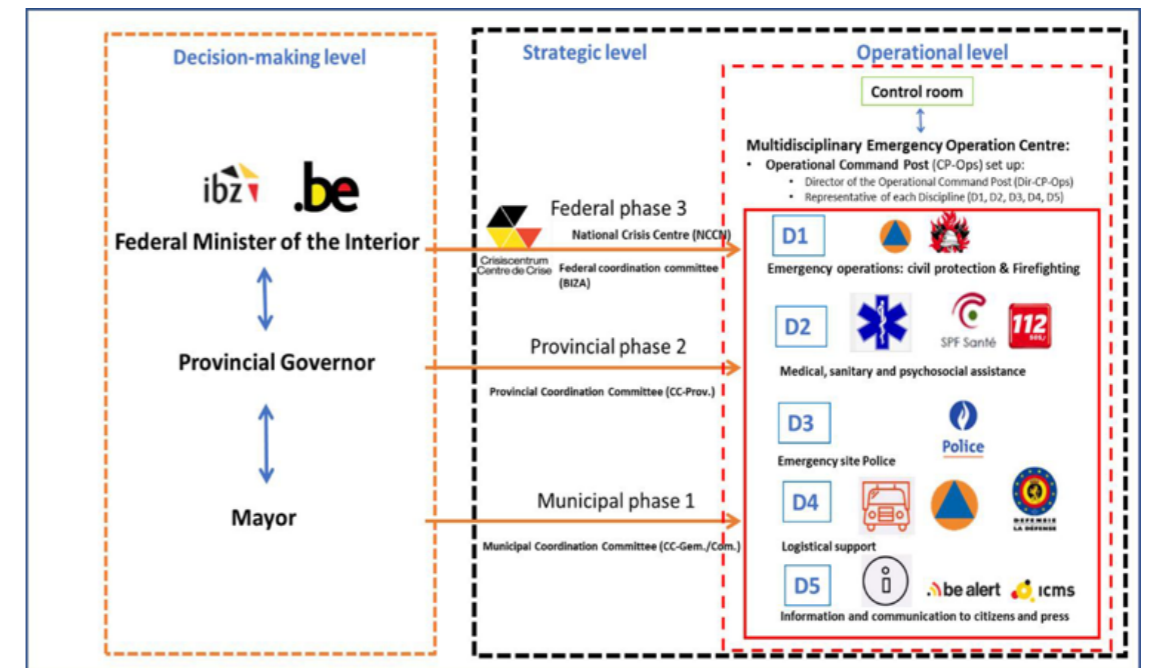


Figure 9. Distribution of competencies for emergency responses based on the Royal Decree of 20 May 2019  
Source: Authors

16 Article 15 and 16 of the Royal Decree of 16 February 2006.



#### D. Crisis management and emergency planning in the field: operational tasks in five disciplines

At the place of the disaster, emergency planning is organised among five disciplines. In an emergency, the National Crisis Centre (NCCN) does not refer to the fire brigade, the ambulance, or the police but to discipline 1, 2, 3, 4 or 5 (see Figure 9)<sup>17</sup>. A discipline is a collection of tasks that various services can carry out. Each discipline must develop a mono-disciplinary intervention plan (MIP), which can contain specific flood provisions. Since 1 January 2015, the fire brigade is no longer organised by municipal boundaries but by the supra-local assistance zones. As each discipline includes a range of tasks, different services can carry out other tasks (see Figure 9). For example, a firefighter (usually D1) can take care of victims (mission D2), Civil Protection (D4) can help extinguish fires (D1), and a police officer (D3) sometimes addresses the media press or the population (D5). For more details, see the tables in Annex 5 (the five disciplines and their tasks) and 6 (actors involved in operational coordination).

#### Emergency planning – many plans with unclear rules

Civil protection, covered by the Law of 31 December 1963, aims to assist people, and protect goods in case of ‘calamities, catastrophes, and damages’ (for definitions, see: Article 1 of the 2007 Law on civil protection)<sup>18</sup>. However, the most crucial legislation concerning emergency planning is the Royal Decree of 16 February 2006 (and related ministerial circulars). It distinguishes three different types of plans:

- Multi-disciplinary (General and Special) emergency and intervention plans (EIPs)
- Mono-disciplinary intervention plans
- Internal emergency plans

These plans are implemented whenever an (imminent) emergency emerges (see Figure 10).

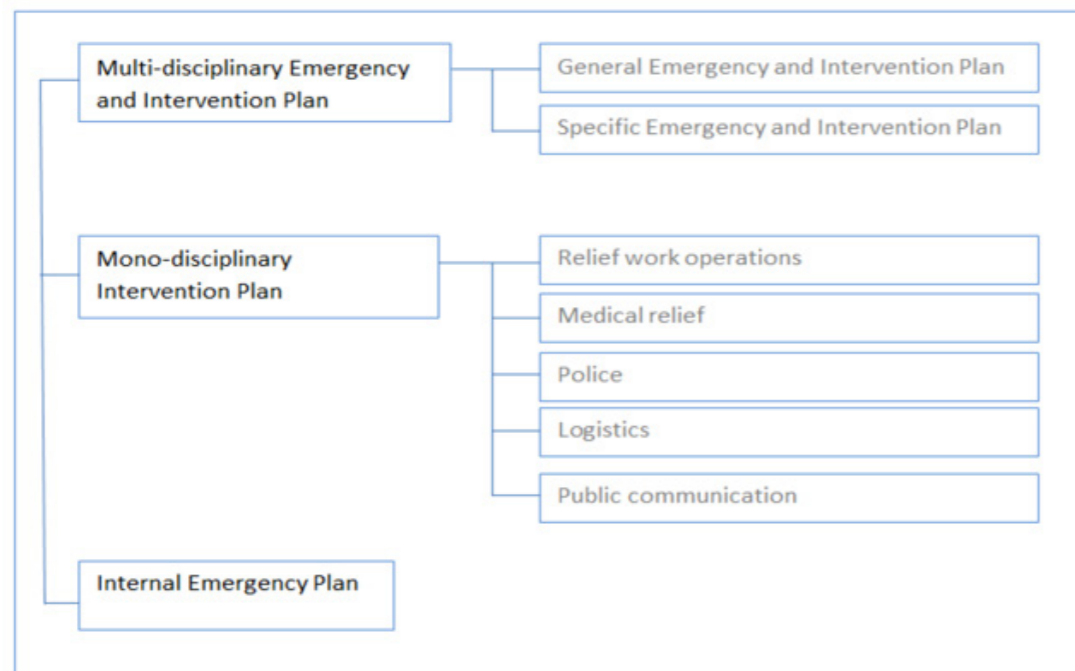


Figure 10. Overview of emergency and intervention plans (Mees et al. 2016)

<sup>17</sup> See also: [Organisation in an emergency - Crisiscenter](#)

<sup>18</sup> This law is referring to Article 1 of the Royal Decree of 23 June 1971 on the organisation of the tasks of civil protection and the coordination of operations during calamitous events, catastrophes and damages.

The most relevant plans to flood preparation are the Emergency and Intervention Plans (EIPs), which are drawn up at the federal, provincial, and municipal levels. They consist of a General Emergency and Intervention Plan (GEIP) and a Special Emergency and Intervention Plan (SEIP). The GEIP contains the necessary information and general guidelines to manage an emergency: different alarm phases, procedures concerning alarming the population, accommodation of the victims in case of an evacuation, etc.<sup>19</sup>

The SEIP supplements the GEIP with specific guidelines for risks; for example, an SEIP on floods can contain geographical information.<sup>20</sup> Some risks require additional preparatory measures. Think, for example, of Seveso emergency and intervention plans or the nuclear emergency and intervention plan. A federal SEIP, ‘Natural disaster – High water and floods’, exists but was never officially approved.<sup>21</sup> While some specific ‘national emergency planning sheets’ exist for a number of risks linked to natural phenomena (including heatwaves, storms and floods) and can be activated by the National Crisis Centre for climate-related incidents in Belgium, there is still no proper, specific national emergency planning in this regard, including for floods (Personal interviews, FPS-2; FPS-3, 2022). The emergency planning sheets provide additional information on specific risks to complement the national emergency plan, and give an overview of, for example, the risk, the expected impact, the thresholds leading to activation of the national emergency plan and possible triggering of the federal phase, the exact services that will compose the national crisis cells mobilized, possible measures, etc.

However, there was a general emergency plan at the national level, namely the [Royal Decree of 31 January 2003](#) (besides the regional basin management plans adopted by the Floods Directive)<sup>22</sup>. This Royal Decree establishes general principles for coordinating and managing an emergency at the national level. It follows the emergency planning structure of the Ministerial Circular of 11 July 1990<sup>23</sup>. It is only put into practice in particular crises. For instance, when there is a threat or presence of numerous casualties or when two or more provinces or the entire national territory is involved, or the means to be deployed exceed the means of a provincial governor.<sup>24</sup> In the period investigated, it was never activated in case of flooding – until the summer of 2021.

This does not mean that no response structure exists, but simply that national crises arising from these natural/climatic risks will be managed according to the principles contained in the newly established national emergency plan of April 26, 2024. This general emergency plan is a framework plan, the guideline for procedures to be followed, decisions to be made and actions to be taken when the need arises. It describes the tasks to be carried out by the authorities, departments, services and sectors concerned, each within their legal remit. However, this plan is only the beginning of an overall process and must be operationalized and supplemented by the plans and procedures of these authorities, departments, services and sectors, notably in the emergency and intervention plans of the mayors and governors, or in the emergency planning procedures and tools drawn up by the National Crisis Center (NCCN) for a particular risk. For this last point, the NCCN has drawn up what are known as “emergency planning sheets”, which describe and detail the main principles included in the general emergency plan for a particular risk.<sup>25</sup>

The mono-disciplinary intervention plan regulates the intervention options of one discipline (e.g., start-up, division of tasks, commands, etc.). In addition to a general emergency and intervention plan describing the cooperation between the different

<sup>19</sup> Article 26 of the Royal Decree of 16 February 2006.; Ministerial Circular of 26 October 2006 concerning the emergency and intervention plans. See also: [Contingency plans - Crisiscenter](#)

<sup>20</sup> Article 3 of the Royal Decree of 16 February 2006.

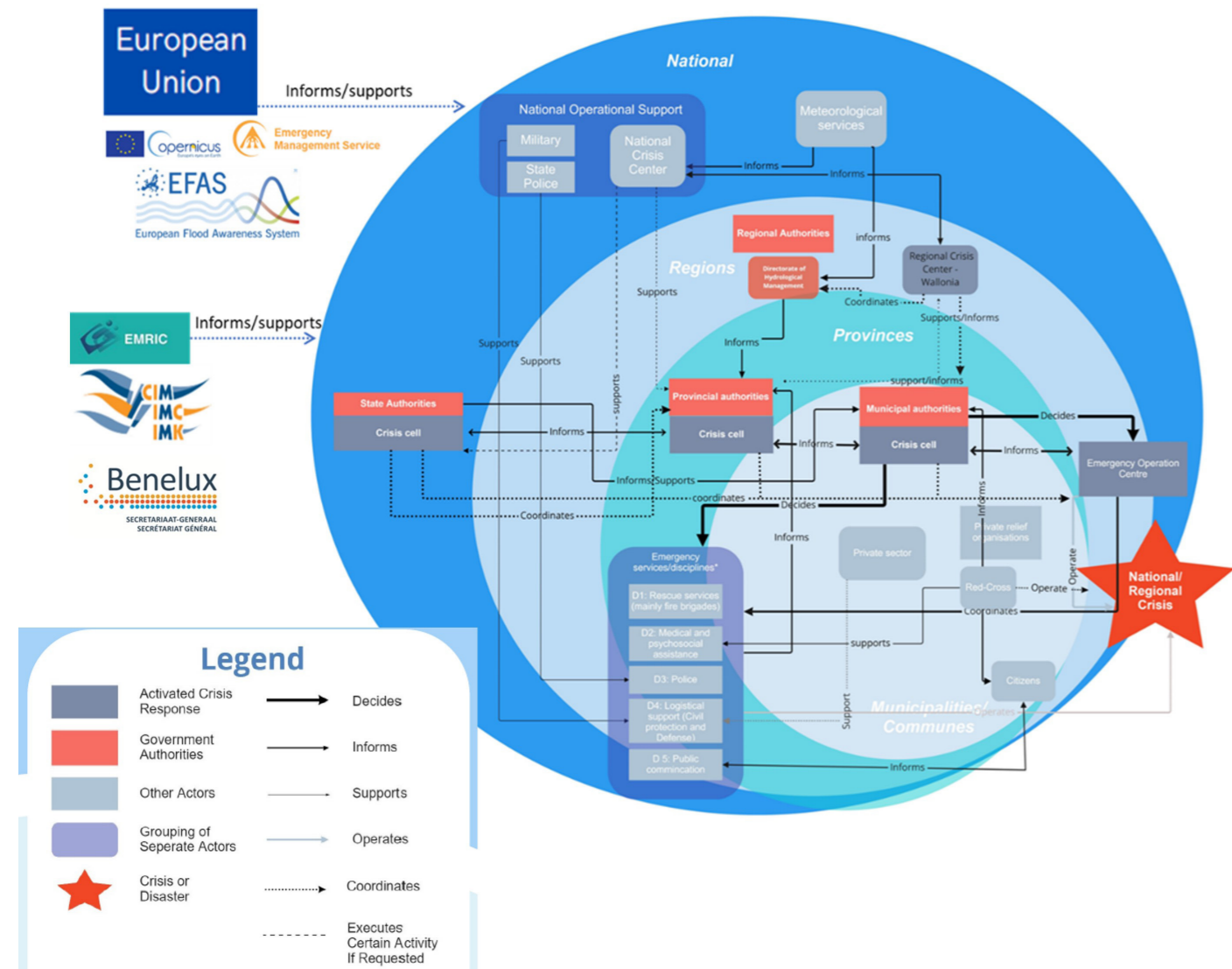
<sup>21</sup> Coördinatiecommissie Integraal Waterbeleid, Rapport Globale evaluatie overstromingen 2010 – bijlage 5.

<sup>22</sup> Royal Decree of 31 January 2003 establishing the emergency plan for crisis events and –situations that require a coordination or management at national level, BS 21 February 2003.

<sup>23</sup> Circular of 11 July concerning the emergency plans – Implementation of the law of 21 January 1987 on the major-accident hazards of certain industrial activities. This Ministerial Circular has been replaced by the Ministerial Circular of 26 October 2006 concerning the emergency and intervention plans. The plan however is still applicable.

<sup>24</sup> Point 4.1 of the Annex of the Royal Decree of 31 January 2003.

<sup>25</sup> The general emergency plan is available here at [KB nationaal noodplan, AR plan d’urgence national.pdf \(centredecrise.be\)](#). The various emergency planning sheets, on the other hand, are for restricted distribution and are only shared between the crisis management actors who would have to intervene if one of these risks were to occur.



**Figure 11.** The theoretical structures applied to the case of the summer 2021 floods.  
 Source: UNU Climate Resilience Initiative

actors, each discipline also prepares its intervention plan. These plans include agreements on who will take on which task, who will be in charge, how communication will occur, and which resources can be used. There are five different mono-disciplinary intervention plans:

- Mono-disciplinary intervention plan discipline 1 or BIP (Fire Brigade Intervention Plan)
- Mono-disciplinary intervention plan discipline 2 or MIP (Medical Intervention Plan), PSIP (Psychosocial Intervention Plan) or SIP (Sanitary Intervention Plan)
- Mono-disciplinary intervention plan discipline 3 or PIP (Police Intervention Plan)
- Mono-disciplinary intervention plan discipline 4 or LIP (Logistics Intervention Plan)
- Mono-disciplinary intervention plan discipline 5 (Communications Intervention Plan)

The internal emergency plan draws up adapted material and organisational emergency measures at the level of a company or institution (for example, a Seveso establishment, a hospital, or a school). Such an emergency plan contains all standards and procedures for emergencies inside and outside the organisation. Finally, anyone can make a personal emergency plan.

**E. European support: when country capacity is depleted.**

When a disaster beyond its response capacity hits a Member State, European countries can aid through the Union Civil Protection Mechanism (UCPM). This mechanism provides a legal and operational framework for European Civil Protection assistance. Belgium has a ‘Single Point of Contact for the Union Civil Protection Mechanism’ (SPOC UCPM) at the General Directorate for Civil Security. The European Union Civil Protection Team (EUCPT) coordinated all interventions by the foreign teams. The operational commandos of the Regions remained responsible for the operations (personal interview, EMRIC director, 2022). Concerning its membership to the UN Sendai Framework for Disaster Risk Reduction (UNISDR, 2015), it has officers working on this at Foreign Affairs and Belgian National Crisis Centre (NCCN)<sup>26</sup> (Figure 11).

**Additional resources during the emergency response**

Several municipalities were affected starting from the night of the 13th of July and had to move operations into crisis mode. After the alerts from the European Flood Alert System (EFAS) and the Royal Meteorological Institute (RMI), it became clear that a provincial coordination committee needed to manage the situation and the events on the source (see Timeline, Annex 1). During the morning of the 14th of July, several evacuations were carried out, either as an order from a local mayor or spontaneously by response teams. One of the key moments was when the people in charge of the Eupen dam were obliged to release a large amount of water. Before this operation, many inhabitants were evacuated towards rescue centres. This operation was difficult and time intensive as many inhabitants were reluctant to leave their houses. “Based on our previous experience with floods, we expected the situation to improve, which is usually what happens after a few hours. But instead of getting better, the situation got worse”, argued the deputy governor of Liège (Prov. 4 - Deputy Governor of Liège, speech in April 2022). As she explained further:

*“In the middle of the afternoon, there was a spectacular and unanticipated rise in the water level, which, at this point, reached the upper floor of some houses. The situation deteriorated throughout the day and the following night. Several homes were destroyed, with debris being swept away by the waters. At this point, there had already been several deaths, and many people were reported missing. Rescue teams were also placed in immediate danger. The situation was perilous: streets and neighbourhoods were trapped”* (Prov. 4 - Deputy Governor of Liège, speech in April 2022).

The rescue and emergency operations spanned a vast area with 30 municipalities in the province of Liege. The means and resources at the disposal of the Province of Liège became very quickly insufficient and could not adapt as soon as they arrived.

<sup>26</sup> The National Crisis Centre (NCCN) is responsible for national emergency planning and crisis management during federal phases in Belgium. Since 2015, the NCCN has been coordinating periodic national risk assessments in accordance with Article 6 of Decision 1313/2013 /EU of the European Parliament and of the Council of 17 December 2013 on the Union’s Civil Protection Mechanism (UCPM). With the Belgian National Risk Assessment (BNRA), the NCCN aims to identify and evaluate the relevant risks to which Belgium may be exposed. Belgium’s first NRA covers the period 2018-2022 and it is currently working on a new, second, iteration of this risk assessment that will cover the period 2023-2026. This risk assessment is an important foundation for national emergency planning (NCCN, 2023): .

The additional rescue teams were overwhelmed. They could not act because access to the flooded areas was so tricky, and the boats could not be put in the water due to the strength of the currents. The National Logistics Hub was activated on the 14th of July to allocate available public and private resources. The National Crisis Centre (NCCN) considered this hub “a necessity” and believed that it worked well. It aims to “further develop this specific structure” (NCCN, 2022: 8).

Given the scale of the event, it was immediately recognised that external assistance was needed. The first line of escalation in Wallonia would be to the Wallonia Regional Crisis Centre (CRC-W), which acts as a Regional ‘one-stop shop’ for the authorities in charge of crisis planning and management (National Crisis Centre, Governors, police zones, disciplines, municipalities) and informs the Walloon Government. However, throughout our interviews with Walloon policymakers, we noted that - like other crisis management actors - the CRC-W had difficulty coping with the “unprecedented scale” of the floods<sup>27</sup>. This situation was further complicated as several key decision-makers took holidays without arranging for adequately qualified replacements. Yet, the CRC-W has been operational since 2008, on the decision of the Walloon Government (Personal interviews, SPW-2, Reg. Min. 1, Mun. 3).

### Ministry of Defense

Suppose the civilian capacity (firefighters, civil protection, police, emergency medical services) is insufficient in a crisis or disaster on national territory. In that case, assistance may be requested from Defense via the provincial and federal authorities responsible for crisis management. However, Defense is not a structural partner for crisis management during natural disasters, as it is almost exclusively deployed on an ad hoc basis with available capabilities. Nevertheless, permanent consultations should be organised between the provincial commanders and the provincial governors to deploy the available capacities, if necessary, effectively (Personal interviews, 2022: FPS-7., EuReg. 1; Reg. FL. 1).

On the 14th of July, the Province of Liège called in additional means within the province and significant reinforcements at the national level: the Ministry of Defence came to support the operations, as well as private resources: jet skis, tractors, and construction equipment (Defense, 2021). As part of its “Help the Nation” mission, the Ministry of Defence has deployed numerous resources since the evening of the 14th of July to help victims. At the beginning of August, the Federal Support Cell, under the auspices of the Special Commissioner for Reconstruction (“Commissariat Spécial à la Reconstruction”), appointed the Ministry of Defence as the food distribution coordinator for the worst affected municipalities. Therefore, several teams were sent to the scene on Sunday, 8th August 2021, to identify the exact needs and available resources. Meanwhile, contact points and field kitchens were installed. A central coordination centre provided food distribution. The Red Cross took over all food distribution points (Defense, 2021; Personal interviews, 2022).

From October 2021, the soldiers of various Battalions continued their clearance work in various localities, such as Verviers, Limbourg, Liège and Colonster (Defense, 2021). Firefighters, civil protection, and police could often not easily access flooded sites where citizens needed to be rescued. Hence, many civilians helped each other during the floods. Response in this way is faster than the traditional top-down response from government agencies - local people do not need to wait for orders or permission. They have the equipment, and they are quickly on the scene. However, in several municipalities, local authorities prohibited the population from clearing rubble (“because of security issues”), leading to incomprehension and frustrations from the citizens’ side. (Based on personal interviews with citizens; see also Albris et al. 2019). For some firefighters, including professional divers, it was a different matter. They found themselves on the spot without adequate equipment in an unprecedented situation. Many firefighters still experience post-traumatic stress syndrome (PTSD) due to witnessing the death of local people without being able to intervene due to a lack of equipment.

Their equipment was not adequate in many stages of the flooding. In the beginning, the water was too shallow to use diving equipment or boats and then quickly became too strong. As a professional diver from Civil protection explained his experience during the flood events:

*“When we got into the water, we had water up to here (40 cm) - not deep enough. We had to move forward, and there started moving forward. Again, there was no current. There was nothing. (...) Never, never, never, did we think we would be faced with such a strong current and so much water...”* (F.B. 2, professional diver, Brabant-wallon firebrigade, interview conducted by RTBF Investigation, 2022).

The means of the fire departments were insufficient, and equipment that would have been useful in this situation, such as helicopters, were absent. Even the army, which has far superior means in terms of logistics compared to the fire department, had problems with the use of equipment: the helicopters could not take off because the ceilings were low, the boat vehicles could not circulate because there was too much debris which broke the propellers. “To be able to circulate in these conditions, we really should have had boats with turbines, such as jet skis, and people who know how to navigate well through white water”, explained another professional firefighter (RTBF Investigation, 2022; F.B.2). The hierarchy knew that the firefighters were passed a terrible and traumatising time. To be better prepared for future floods, firefighters were sent to France for training in white water while flood emergency and rescue training in Belgium will be reinforced. In sum, the means at the disposal of civil protection and firefighters were argued not to be adapted to this disaster (Interviews conducted by RTBF Investigation, 2022 and with officials from fire brigades and civil protection: F.B.2; F.B.3; F.B.4; FPS-4; FPS-7).

### European assistance

Following a request on the 14th of July by the Minister of the Interior upon demand by the Governor of Liège for assistance through the European Civil Protection Mechanism (UCPM), the Emergency Response Coordination Centre (ERCC) quickly mobilised assistance and expertise. The ERCC monitors events around the globe 24/7 and ensures rapid deployment of emergency support through a direct link with national civil protection authorities. Specialised teams and equipment, such as search and rescue and medical teams, were mobilised for deployments in Wallonia at short notice. Thus, as the deputy governor of Liège expressed, “through the UCPM, the province of Liège could count on high-quality international assistance” (Prov. 4, April 2022). According to various local stakeholders interviewed, this was “of enormous help” (Assoc. Nat.1 + 2; Mun. 2 + 3; Vol.cit. 3).

Helicopters were provided from international sources; however, as was the case for the Belgian Army, internationally provided helicopter rescue was impossible. The helicopter rescue attempts could only be launched on the 16th of July, and the authorities had to wait till the 17th of July to save the last people in danger. The following day on the 18th of July, “after a horrific night of evacuations”, as many responsible authorities said, the strategic management of the crisis was handed over to the federal level (as three provinces were severely affected).

The army was sent to the affected areas to assist in the rescue and evacuation operation, led by local paramedics, police and fire brigades. There were also calls for support from other parts of the country. On Wednesday night, firefighters from Antwerp went to aid the province of Liège, bringing essential divers with boats and rescue equipment. The Brussels-Capital Region sent personnel and equipment to the provinces of Liège, Luxembourg and Flemish Brabant from the firefighting and emergency medical aid service. Brussels Prevention and Security provided drones to survey the extent of the damage, and the Brussels Public Transport Company (STIB) provided heavy equipment, including trucks, cranes, and buses, to help transport people from the affected areas (personal interviews, May-June 2022). Other assistance, such as personnel and equipment (drivers, sweeper team, generators, trucks, etc.), reached the Region from the municipalities in the area. As Belgian capacities continued to be exceeded, Belgium activated the European Union’s civil protection mechanism to request international support. Consequentially, The Netherlands, France, Italy, and Austria sent aid through rescue teams, boats, and helicopters. France also sent 40 rescue workers, and Austria sent a convoy of 103 firefighters to reinforce the province of Liège (personal interviews, 2022: FPS-2; FPS-3).

<sup>27</sup> Note that all municipalities in the Walloon Region (262) have experienced at least one flooding event since 1993. 524,000 inhabitants in Wallonia in flood-prone areas (overflow flooding and extreme return period). Source: SIGEnSa - ISSeP; IGEAT.

### 3.2 Communication blind spots: the crucial role of crisis communication in emergency response and beyond

#### Sub-optimal communication during the emergency

Semantic confusion: using the right or wrong word?

#### A. Mixing up notions of unprecedented event, exceptional situations, natural disaster, emergencies, and crises.

First, the notions of the unprecedentedness of the weather events and the exceptionality of the situation were often used interchangeably by politicians and media. This has political reasons. The use of the notion of ‘natural disaster’ has legal consequences, especially concerning insurance coverage (Art. 124. § 1 of the Insurance Law of 14 April 2014). When the scale of the disaster became clear, the first political reactions showed great surprise. In the plenary session of the Federal parliament on Monday, the 19th of July 2021, Interior Minister Annelies Verlinden (CD&V) said, “Madam President, dear colleagues, no one could have predicted this natural disaster, and no one could have prevented it.” With a different analysis, most civil society organisations, generally argued that “IPCC reports have warned us, but the violence and destruction caused by the July 2021 floods still surprised us...” (Associations 21 director, Mons 17/06/2021). Several institutions had warned of severe floods, even if the total extent was unclear (see section 2.3.2.). In addition, disinformation, mainly through (social) media, undermined the necessary bond of trust between the government and the population. Belgium has a platform for “hybrid threats” (including such misinformation) and should further consider how best to deal with them in the future (Personal interviews with policymakers, 2022).

From a historical point of view, the July floods are relatively **exceptional in terms of their duration** (normally, the level drops after 9 or 10 hours, this time, it lasted at least 48 hours) **and the number of victims and losses** (39 dead and about 3 billion Euros of damage). Since the middle of the 19th century in Belgium, the disaster historian, Paul Delforge, identified the Meuse flooding of 1880 with 12 victims. In 1906, the floods in Verviers were also significant (see picture – Figure 12). Some local respondents, including citizens, referred to previous floods (1966, 1993, and 2018). However, the earlier experiences were considered much less impacting than the floods in 2021 (Delforge, 2021; All respondents, 2022). The recorded rainfall intensities (and accumulations) are, strictly speaking, ‘extraordinary’, for which climate change may be responsible (Blöschl et al., 2021; Halbardier & Becker, 2021 for data from before the 2021 floods in Wallonia). Nonetheless, many scientific studies have documented an increasing trend in extreme damages from natural disasters, which is consistent with a climate-change signal (Coronese et al. 2019). The potential effects of global warming have been known for at least three decades. Land-use planning in Wallonia has neglected this global warming factor too much. This is something that most interviewed citizens and CSO respondents blamed the politicians for. In sum, while the 2021 Summer weather events were relatively exceptional, the impacts were unprecedented. And not the other way round.



Figure 12. Flooding in Verviers in February 1906

Source: Institut Destrée. Sofam

#### B. What’s in a name? “Crisis” and “national security” are not defined in Belgian Law.

A second confusion comes from the fact that the notions of emergency, crisis, and exceptional situations have been mixed up in their use. Although these concepts have collided as never before in everyday language, in the authorities’ discourse and the media, these notions seem to have lost their precise substance. As the governor of Namur explained:

*“We have seen different realities with different legal implications, and this is not insignificant. Of course, these different notions have been too quickly elevated to the rank of synonyms, thus biasing, in my opinion, part of the reflection and the analysis. But also, sometimes, biasing part of the action. In any case, appropriate action...”* (Prov. 2, May 2022).

Indeed, the **federal legislation**, through the Royal Decree of May 2019, **does not define a “crisis”; it defines an “emergency situation”** as: “any event that leads or is likely to lead to harmful consequences for social life, such as a serious disturbance of public security, a serious threat against the life or health of persons and against important material interests, and which requires the coordination of the competent actors, including the disciplines, to remove the threat or limit the harmful consequences of the events<sup>28</sup>.”

Recent crises show that the “emergency situation” legislation, provided for “disasters” (civil security), is not sufficient to manage off-framework crises, of long duration, with more numerous institutional partners and which have a major impact on the areas affected. The floods of July 2021 go beyond the “emergency situation” concept because they exceed the available means for rescue and intervention.

<sup>28</sup> Royal Decree of May 2019.

Finally, the definition of “national security” in Belgium, in times of “crisis” and/or “emergency situations” seems a bigger priority recently. The absence of its legal definition for Belgium has cascading effects on legislation like the General Data Protection Regulation (GDPR), resulting in stringent privacy laws. However, this definition has already been established in other countries and EU directives. Consequently, the exchange of personal data or enforcement of evacuation orders posed challenges for public authorities. Numerous stipulations governing governmental actions create challenges in making necessary decisions in a timely manner, with waiting periods of up to six months even for urgent procurements (personal interviews, FPS-2, FPS-3, 2022).

### *Problems with preparedness*

Infrastructural issues with communication centers

During the emergency, various structures arose to manage the situation: an Operational Command Post in the field and a coordination committee in the municipality, the province, or the National Crisis Center (NCCN). Ensuring all partners have the most up-to-date information is always a challenge in a complex emergency. While a common operational picture and flow of information are crucial aspects in crisis management (Brunet et al., 2019), this appeared to be missing or not working optimally.

While these actors must be in contact with each other – and know each other – this sometimes did not appear to be sufficiently the case. Yet, special channels have been developed for this purpose, including:

- The National Security Portal ICMS (Incident & Crisis Management System), an online platform to which all partners have access during an emergency to exchange information<sup>29</sup>;
- Emergency services and partners are also in contact via radio communication, namely using ASTRID radio communication<sup>30</sup>.
- The REGETEL network is an alternative communication system of the federal government. This way, governments can always communicate with each other, even if the telephone network fails<sup>31</sup>.
- The Crisis Support Team (CST) was set up to assist emergency services and authorities with crisis management. The Crisis Support Team is a team of trained volunteers who can support crisis management in a crisis cell and the CP-Ops.

The flash floods had a terrible impact on the communication centres. Due to the rising waters, some communication centres from the province of Liège had to move to two other provinces. That made answering emergency calls even more difficult. The Deputy Governor said this was “absolutely necessary to prevent the ASTRID communication system from collapsing.” The emergency numbers were improperly set up to deal with such an important event. As a result, people seeking help contacted other numbers, and some had to be treated by the provincial crisis centre (Personal interviews, Mun.4; Assoc. Reg. 2.; FPS-5; and speeches: Prov. 2; Prov. 3; 2022).

<sup>29</sup> The platform includes: a database with all the contact information that is useful in an emergency. This information is checked at least twice a year; a library with emergency plans; a calendar to plan exercises; a library with all legal texts, guides and other useful documentation. In an emergency situation, the platform one can be used to; a logbook, both for all partners involved (multidisciplinary logbook) and one logbook per discipline; situational reports that reflect the situation at a single point in time; map sharing options- all important areas or locations can be shown on the map (e.g., the [intervention areas](#) or the location of the [Operational Command Post](#)).

<sup>30</sup> See: [ASTRID radio communication](#)

<sup>31</sup> Regetel stands for government ('REGErings-') TELecommunications network. There are two networks: (1) a federal network: Via this network, all federal ministers and the heads of the ministers' offices, the chairpersons of the management committees and the directors-general of the federal public services, the chairpersons of the Chamber of Representatives and the Senate and the royal palaces can communicate with one another; (2) a crisis network: via this network, all the provincial crisis centres, the permanent units of Civil Protection, the 112 centres, the 101 centres, the Coordination Unit for Threat Analysis (CUTA), the sites and crisis centres of Fluxys and Eandis, the dispatch centre of the Red Cross, the Maritime Rescue and Coordination Centre (MRCC) in Ostend and the Maritime Security Centre Belgium (MIK) can communicate with each other.

### *Undetailed regional forecasting and imprecise local early warning systems*

#### **A. Negative and defensive discourses on preparedness**

Two months after the floods, the Walloon Inquiry Commission report indicated that warnings were issued before the disaster occurred on the 14th, 15th, and 16th of July 2021. The report states that the European Flood Alert System (EFAS) started issuing warnings four days before the disaster, on the 10th of July 2021. The warning system, well received by the SPW, indicated a high risk of flooding within the Meuse River basin. The report also states that the forecasts were sufficiently alarmist for the authorities to foresee and manage in time the events.

The Walloon government defended itself, saying the warnings were inaccurate. However, from the European Flood Alert System (EFAS) maps, various public actors estimated that these forecasts were accurate 48 hours before the floods. Hence, a major controversial question was: why did the Walloon public authorities not take adequate measures for what would happen? In that regard, media and critical stakeholders argued that it is necessary to understand why and where the EFAS information was lost (e.g., RTL INFO, 17/09/2021). EFAS noted the need for “preparatory measures in advance of major floods” to be taken along the Rhine, particularly along the border with Germany and the Meuse in eastern Belgium and the Netherlands, on the weekend before the events.

On the 9th and 10th of July 2021, flood forecasts by EFAS of the Copernicus Emergency Management Service<sup>32</sup> indicated a high probability of flooding for the Rhine River basin, affecting Switzerland and Germany. Subsequent forecasts also indicated a high risk of flooding for the Meuse River basin, affecting Belgium. The magnitude of the floods forecasted for the Rhine River basin increased significantly in this period. The first EFAS notifications were sent to the relevant national authorities starting on the 10th of July and, with the continuously updated forecasts, more than 25 notifications were sent for specific regions of the Rhine and Meuse River basins in the following days until the 14th of July 2021 (EC Copernicus-website, 16 July 2021)<sup>33</sup>.

In Belgium, as early as Monday, 12 July, the RMI had observed that the weather models were predicting extreme rainfall, with 100-150 mm expected in some areas, and the forecasts crossing the pre-alert to alert thresholds on Tuesday night. The Flemish Environment Agency (VMM) noted on Sunday, 11 July, that its forecasting system was detecting severe flooding for the coming week. On Monday, 12 July, VMM started to pre-alert and alert the civil services, provincial governors, and the services responsible for the various rivers. On the 12th of July at 2:38 pm, the Direction de la Gestion Hydraulique (DGH), responsible for flood forecasts, sent a first alert to the Walloon Crisis Centre, the emergency zones and the five provincial governors. This alert specifies possible water damage, noting that “the rainfall could also have significant consequences on many watercourses.” They recommended that people be vigilant when operating along waterways.

On Tuesday, 13 July, VMM issued a flood warning for the eastern part of Flanders. Although these observations were passed on to the relevant regional counterpart, the Walloon River authorities (SPW MI), no pre-alert or alert was issued until a red alert was issued on Wednesday, 14 July, almost two days later. The RMI’s warning times made it difficult to issue ad hoc warnings: a yellow warning can be issued 48 hours before the event, an orange warning 24 hours before, and a red warning 12 hours before. As the red alert was issued, several communities were already flooded, while others were struggling to cope with the extreme intensity of the predicted floods: the actual precipitation exceeded the forecast precipitation by 50% and the previous highest measurements by 100%. Even when warnings were finally issued, not all communities translated them into evacuation orders; only the municipality of Limbourg issued evacuation orders late on 14 July 2021 as the Vesdre River was rising, while others followed suit the next day (15 July 2021) as flooding had already devastated several municipalities.

<sup>32</sup> “The Copernicus Emergency Management Service (CEMS), one of the six Copernicus services, provides information for emergency response in relation to different types of disasters, including meteorological hazards, geophysical hazards, deliberate and accidental man-made disasters and other humanitarian disasters, as well as prevention, preparedness, response and recovery activities. Beneficiary end users of EMS include entities and organisations at Regional, national, European and international level actors in the field of civil protection and humanitarian aid.” EMS Information Bulletin Nr 144, Available from: [https://emergency.copernicus.eu/mapping/sites/default/files/files/IB\\_144\\_EMSR517-EMSR518-EMSR519-EMSR520\\_Flood%20in%20Germany%2C%20Belgium%2CSwitzerland%20and%20The%20Netherlands\\_0.pdf](https://emergency.copernicus.eu/mapping/sites/default/files/files/IB_144_EMSR517-EMSR518-EMSR519-EMSR520_Flood%20in%20Germany%2C%20Belgium%2CSwitzerland%20and%20The%20Netherlands_0.pdf)

<sup>33</sup> Available from: <https://emergency.copernicus.eu/mapping/ems/copernicus-emergency-management-service-forecasts-notifies-and-monitors-devastating-floods>

In the subsequent EFAS forecasts, on the 15th and 16th of July 2021, the flooding probability gradually decreased for the Vesdre and Amblève rivers, then for the Ourthe River, and finally for the Meuse River, where the predicted risk became zero on the 18th of July.

Despite the flooding being signalled as early as the 12th of July, there was still uncertainty about the actions to take. As confirmed by the climatologist Xavier Fettweis, who appeared before the Flood Commission on the 16th of September, the meteorological models (precipitation) predicted a major rainfall event as early as midnight on the 12th of July. This is supported by hydrological models found in the EFAS data. However, relatively high uncertainty made it difficult to interpret the models on that day accurately. In the following two days, forecasts evolved, and the EFAS data showed a high-to-very-high probability of an extreme flooding event. Although EFAS provides a European view of the flood risk, national and, in the Belgian case, regional models are used to interpret the flood risk. The Inquiry Commission therefore shed light on the way in which these forecast data were integrated and analysed in the FRM by the Hydrological Management Directorate of the SPW (using its own Hydromax system) (Parlement wallon, 2022; speeches: FPS-8; Prov. 2; Prov. 3).

#### B. Early warnings arrived late, with low ‘actionability’ for decisionmakers.

The delays in issuing warnings and the difficulties in translating them into evacuation orders during the first days of the flood were linked to several constraints. In Wallonia, the announcement, monitoring, and forecasting of floods is the responsibility of the waterways manager of the Walloon Public Service Mobility and Infrastructure (SPW MI) and, more specifically, of the Hydrological Management Department (Direction de la Gestion Hydrologique - DGH)<sup>34</sup>. The competent regional authority must issue warnings that the RMI cannot issue<sup>35</sup>.

To anticipate, determine the risks and trigger the warning phases, the on-call operator has a series of hydrological models to predict the evolution of flows in the main Walloon basins. Over 35 models are deployed in Wallonia, all based on stochastic modelling. To reproduce equivalent responses, these models compare real-time hydrological measurements and meteorological forecasts with previous floods. However, these models focus on the large first-order river basins. Second and third-order rivers and streams such as the Vesdre and other (sub)tributaries of the Meuse are not monitored with the same level of detail as the larger basins. As most ‘Bernd’ floods occurred along these less well-monitored basins, the available regional models do not illustrate the same level of urgency as those available at the federal and European levels. The Walloon forecasting services traditionally focus on maintaining hydrological models for assessment and planning purposes, including those related to energy production, checking the navigability of waterways, as well as planning and controlling dredging. As a result, and due to the complex topography of the Ardennes, precipitation forecasts for Wallonia cannot (yet) be fully translated into likely flooding footprints and potential impacts in real time to inform early warnings.

Moreover, several regional officers (SPW-Mobilité Infrastructures; DGH) argued that the risk information data provided, notably by EFAS and the RMI, should indicate usable elements, such as the water-level of the Vesdre River instead of unusable probability data about precipitation. The forecasts of the RMI were not translated into the predicted water level. The Walloon hydrological service converted those predictions into flows, the number of cubic metres per second of water flowing past a certain point. But to inform early warning, they should also be able to tell decision-makers how much water will rise in their region.

The actionability of RMI messages is generally considered too low. As most argued, there are (too) many crisis centres in Belgium, and it would thus be useful to ration them. Few interviewees said it might be useful to suppress the provincial level, of which the Governor is not elected but nominated politically in Belgium<sup>36</sup>.

<sup>34</sup> On 12 July at 2.38pm, the Direction de la Gestion Hydraulique (DGH), which is responsible for flood forecasts, sent a first alert to the Walloon Crisis Centre, the emergency zones and the five provincial governors. This alert specifies, in the conditional, possible water damage, specifying that “the rainfall could also have significant consequences on many watercourses.” They recommend that people be vigilant when operating along waterways.

<sup>35</sup> See: The Pano documentary, three months after the floods in Belgium, David Dehenauw (head of RMI) gave an insight into the role of the RMI. (See online: <https://www.vrt.be/vrtnws/nl/2022/07/07/hoer-voorspellingen-we-dat-dit-nog-eens-gebeurt-dit-is-er-veranderde>)

<sup>36</sup> In The Netherlands, it is the mayor who is not elected by its citizens. The advantages this may provide in terms of FRM are beyond the scope of this paper.

However, the provincial deputies are elected by the Provincial Council, which is - in turn - elected by the citizens. Others said this level was crucial in the Belgian flood risk governance arrangement (e.g., Governor of Namur, Prov. 2, 13/05/2022).

Progress would be made by improving the ICMS (with Paragon underway) and Be-alert system<sup>37</sup>.

The message should, at the same time, communicate the level of uncertainty and expected cost of acting. The message should also be simple to be understood by those who receive it. Most often, there is a communication gap between early warning system specialists who use technical and engineering language and the early warning system users, who are generally outside of the scientific community. To avoid this, these early warnings must be reported concisely, in layman’s terms and without scientific jargon. We found, however, that this communication aspect during the flood events has been criticized by various stakeholders (also Zeimetz et al., 2021; Schmitz et al., 2023). In this regard, a regional officer argued: “We are working (as we have always worked) internally and with outsiders, notably with the RMI, to move towards an ever more complete forecast with better and better-adapted communication. But this is a long process, to be thought out over several years, especially in a context of limited human resources” (Personal interview; SPW-MI-DGH, 13 February 2023).

A general discourse emerged that it is crucial to have communication and coordination structures between the central and local levels to circulate information in both directions. Intermediaries such as the provinces are considered important (despite some general recurrent debates about the utility of keeping the provincial level). The Union of Towns and Municipalities (UVCW) also asked for reliable communication tools to be made available to the mayors; in the July 2021 floods, this was lacking. “There are still too many mayors who get up in the middle of the night during heavy rain to check the state of the watercourse. This is neither viable nor tenable”, said the president of the UVCW, himself being mayor of Braine-le-Comte (Assoc. Reg. 5, May 2022). As the Head of weather forecasting at the RMI stressed illustratively: “One region did not always know what the other was doing. Take the Monsin dam near Liège: it was considered (in the period from 13 to 15 July) to dynamite it. And the governor of Limburg did not even know about it!” (PFS 8, September 2022). Only during the information round held after the floods, where he spoke with each of the 10 governors, did the governor of Limburg become aware of this specific situation. It is just one example of how the different competent services did not communicate well enough. Specifically, this point is relevant to the RMI, SPH DGH, the governors of Belgium and the municipal councils. These actors from diverse types of services should consult each other more – even informally, as the head of RMI forecasts pointed out: “Thanks to those video calls [after the floods], we now know more people. We know who we are and what we can expect from each other. And I can speak directly to a governor, for example. (...). Last year, people only called the weather room (the service of the RMI that makes weather forecasts, among other things) when it was already flooding. That kind of condition will not occur now” (FPS- 8, VRT, 12/07/2022).

The ICT team of the NCCN is currently developing a new platform, Paragon, which will go live in 2024 and have the same functionalities as ICMS but will be used as an in-house tool. The new ‘early warning systems’ are designed to provide timely warnings to both the public and relevant authorities, enabling a rapid response to impending climate-related crises such as floods and heat waves. Within this framework, a Paragon CLEWS module is being set up that will build on the already developed Paragon application, the new collaboration tool around emergency planning and crisis management. This new module will be responsible for combining three information streams related to climate risks, external warning sources and geospatial information respectively in the existing application to generate alerts targeting local decision-makers with suggested actions, measures, and communication. This action increases both the timeliness and appropriateness of actions to be taken and improves the targeting of communication (Personal interview, FPS-4, 2022). Before Paragon’s release, the NCCN’s priority is (revealing for the suboptimal situation during the flood events) to “appropriately train the local users of what ICMS is currently doing, to be able to transfer smoothly to the use of the new tool” (NCCN, 2022: 17; see also: Paragon application).

<sup>37</sup> In 2014, the Belgian National Crisis Centre launched the BE-Alert pilot project. BE-Alert is a text-message based warning system that allows the government to inform its citizens in an emergency situation.

### C. Is the current flood alarm model suitable for sudden-onset hazards in Wallonia?

The weather models used at federal, Walloon and Flemish levels differ. While the federal level draws weather forecast information from up to five different models and cross-checks it with models from neighbouring countries, the regional services rely on fewer models and are, therefore, more likely to miss early indications of extreme weather events. The lack of coordination across the language divide between Flanders and Wallonia further hampers this capacity, according to some respondents (FPS- 2; FPS- 3; SPW 1, 2022).

On the 17th of September 2021, the head of forecasting at the RMI and the director of hydrological management (DGH) at the SPW, were questioned by the committee of Inquiry into the floods that hit Wallonia from the 14th to the 16th of July. Among the MEPs' questions, several concerned the EFAS notifications: the European Flood Awareness System, which provides forecasting models to help manage floods. These notifications were linked to an online map system with various indicators to access the forecasts. The director of the Walloon hydrological management (DGH<sup>38</sup>) confirmed to the flood commission that the SPW DGH was not yet connected to this system. They were not consulted on this data because their engineers were not trained to use this information and because the DGH had yet to test this system before integrating it into its routines. The Director of DGH explained why:

“EFAS is a tool that is not yet being used in an operational way in our circuit, especially because we have not been able to validate it. We do not necessarily always have positive feedback. It is extremely complicated to interpret.” (Interview by the RTBF, by Louvigny & Carton, 2021).

Conversely, the head of RMI forecasting explained at the audition in the Walloon parliament (17/09/2021):

*“On Monday [July 12, 2021], several models were already predicting large amounts [of rain] for July 14, with between 100 and 150 mm expected locally south of the Sambre-et-Meuse corridor,” (...) “What [rain] normally drops in two months was going to drop in two days. This was very clear data for the specialists. I was convinced that something serious was going to happen.”*

Yet, the RMI was not able or allowed to trigger a red alert, which could only be launched 12 hours before the event. Nor could the RMI talk about possible ‘flooding’, as the body does not have the attributed competence in this domain. “We forecast the weather but not its impact because we have neither the skills - it depends on the Region - nor the knowledge to do so. Assessing this impact is another job,” said the head of the RMI, adding that “a closer collaboration could be maintained with the hydrological service of the SPW.” (Audition in Walloon Parliament, 17/09/2021).

The Hydromax hydrological forecasting model only used data from the WacondaH metrological system (waterways). The AQUALIM data (non-navigable rivers) are not used to provide flow and water level forecasts. On the other hand, the data measured continuously on the AQUALIM network are made available to the engineer on duty to help him decide whether to issue an alert. Nevertheless, it is precisely on these small rivers of the Directorate for non-navigable waterways (DCENN<sup>39</sup>) network that rapid flooding can occur (Zeimetz et al. 2021).

<sup>38</sup> Direction-Général Hydraulique (DGH).

<sup>39</sup> SPW Agriculture, Ressources naturelles Environnement (ARNE) – Direction des cours d'eau non navigables (DCENN).

### D. The organisation of the services of the SPW: incomplete transversal cooperation and crisis management regulation

At least two major Walloon services did not seem to dispose of the necessary tools and/or powers to be effective in their role as crisis managers, namely the Transversal Flood Group (Groupe Transversal Inondations - GTI) and the Walloon Regional Crisis Centre (CRC-W).

First, the Groupe Transversal Inondations (GTI) is an area of cooperation between CRC-W<sup>40</sup> - DCENN- DGHydro<sup>41</sup> - SPT, leading to two progress points. First, institutionalising the “InfoCrue” service is a remarkable step forward in making hydrological data available to the public. Second, it resulted in the definition of the PGRI (Plans de Gestion des Risques d’Inondation). However, the participation of the Waterways Directorate (Direction Voies Hydrauliques - DVH) and Reservoir Dams (Barrages-Réservoirs - BR) departments in the GTI seems to be less important, as the BRs have their own older meteorological system. The competencies of the GTI are concentrated on risk management and forget the specific issues of crisis management: the GTI has few links with local authorities and their emergency services in preparation for crises (including but not limited to PPUI Floods, multidisciplinary exercises) and episodic contacts with the governors' departments.

Second, the Walloon Regional Crisis Centre (CRC-W) could not transmit specific messages, even though it is at the heart of the crisis communication system: not only for alarm management but also for the technical support of the Crisis Units. It has access to all the information in the Incident and Crisis Management System (ICMS) and the national security portal for the Belgian services involved in emergency planning and crisis management under the Federal Public Service Interior (IBZ) management. The CRC-W organises a certain amount of debriefing on managing events, but this is done in a vacuum, without any link with the operational players (local authorities and emergency services). The learning dynamic is overall considered very impoverished (Zeimetz et al., 2021).

#### *Disparity in weather information dissemination skills*

Alerts were received two days before the flood's struck<sup>42</sup>. But these were not different from the hundreds of floods alerts the Province of Liège usually receives. The first warnings were treated as usual flood warnings “because Liège is a water province. Floods already hit the province in the past, and we already have experience with this type of crisis management”, according to the Deputy Governor of Liège (Prov. 4, Deputy Governor of Liège, April 2022).

Many local decision-makers, first responders and crisis managers reported difficulties in understanding the messages and alerts they received - they were not explicit enough or were too technical. For example, meteorological services would report rainfall levels in windows of one hour, three hours, one day or even three days. For example, the Deputy governor of Liège received a red alert for the period between the 14th of July at 9:01 and 02:00 AM on the 15th of July. This was the message received: “(...) because there is more than 65% chance that rainfall amounts will exceed 100 mm in 24 hours over at least a quarter of the province of Liège” (Prov. 4, April 2022). Nobody knew what this meant for the impact on the ground.

Consequently, the governor (coordination committee) of Liège, for example, decided not to use Be-alert. Indeed, giving a global evacuation alert or sheltering instruction was impossible and even dangerous: the reality of one street was not the same as the street next to it. The emergency services could not reach certain houses on the same street, while other households could be easily evacuated. This was the subject of a strategic decision which the governor of Liège had to justify later.

A negative element to remedy is that the official weather alerts are sent with a maximum delay of 24 hours, and the messages can hardly be exploited. The type of alerts the governor received did not provide the information to know what consequences to expect on the ground and, as a result, to organise the work to be done (Prov. 2 and Prov. 4., 2022)

<sup>40</sup> Direction du Centre régional de crise (CRC) du Secrétariat général du Service public de Wallonie (SPW).

<sup>41</sup> Département Expertises Hydraulique et Environnement du Service public de Wallonie Mobilité et Infrastructures (SPW MI). The SPW MI - DGH manages the WacondaH measurement network: measurements of precipitation, water levels and flows throughout Wallonia: 100 measurement stations with a measurement time step of 5 minutes.

<sup>42</sup> See the Glossary for the definition of ‘alerts’, and ‘warnings’, which have a different meaning.

Similarly, when the decision was taken to open the Monsin dam to avoid flooding Liège with its nearly 200,000 inhabitants, the actors we interviewed said they had difficulty interpreting the information they received. Rather than receiving information on how high the floodwaters might rise or where flooding might occur after the dam was opened, they were told that the water flowing through the dam would increase from 43 m<sup>3</sup>/s to 90 m<sup>3</sup>/s - as some said they were faced with a mathematical problem rather than usable information.

*“Information is not a sprinkled alert. The mailboxes of hundreds of interlocutors in the middle of the night with successive messages that are technical and sometimes even contradictory or very different from one another cannot be considered as an alert worthy of the name.” (Prov. 2, May 2022).*

In the absence of timely official warnings, for many residents and first responders, the flooding came as a sudden and devastating surprise. In many places, local police took matters into their own hands and warned residents of the affected areas of the impending dangers. For example, in the hardest-hit area of Pepinster, officers waded through floodwaters to put up signs asking people to stay away from several houses threatened by collapse. Other officers used the loudspeaker in their police van to broadcast public service announcements on the streets. Hence, the recommendations from the Walloon parliamentary enquiry commission rightly advocate for “better and more comprehensible weather forecasts.”

To remedy these perceptions, the Head of Scientific Studies of Weather Forecasts of the Royal Meteorological Institute organised a “Tour de Belgique”, starting from the second half of 2021 until the first half of 2022, as a consultation round with governors and administrations. He aimed to increase alert readability and response needs and reinforce training and impact forecasts in collaboration with the hydrologists of the Regional public services. In addition, a specific working group has been set up at Home Affairs level to review crisis management and formulate proposals (Personal interviews of FPS- 1, FPS- 2 and FPS- 3, 2022).

Concerning cooperation and exchanges of information, it is less known that at the level of the Meuse and Scheldt Commissions, various partners and countries gather at least annually to focus on cross-border basins (Flanders, Wallonia, Brussels, The Netherlands, France, and Germany). Also, concerning droughts, warnings are exchanged. A larger working group at the European level in the Water Framework Directive, which covers different themes, including droughts and floods, provided exchanges of good information. As a Walloon policy officer explained: “But this is already done by our administrations through the review of the literature (peer review) where we can see what everyone is doing. When I thought about what we could do in Wallonia, I looked at what was being done in Flanders, France, etc. As for realising what is on the ground, it is difficult to be ‘cross-border’. When you install a wetland or a stormwater basin - unless it is really on the border -in general, these infrastructures will concern a part of the territory, even within the Region” (SPW-ARNE, Mons, 17/06/2022),

Exchanges can also be made within the framework of the EU’s Interreg projects programme, particularly in the context of flooding (also IFV, 2020). This is done within a joint framework between Wallonia, Flanders, and Germany, which supports universities (such as ULiège) to develop projects evaluating flood statistics, etc. It is an initiative that already exists and could be strengthened, provided the means are available. Nevertheless, as a policy maker argued: “It is necessary to work well at home first, before wanting to put important funds - sometimes exaggerated and which could waste resources - for international cooperation and to see what is done elsewhere” (Director advisor -SPW ARNE Department of European Policies and International Agreements Environment, Mons, 17/06/2022).

In sum, we found that communication during the emergency could have been improved. We identified communication blind spots related to human interactions, lack of proper semantic use of concepts (due to undefined crisis issues and unprecedented events), and infrastructural and technological systems such as communication centres and early-warning failures. The flood crisis is generally framed as a communication crisis, however narrative lines show that underlying and fundamental risk management issues must be considered to reduce the impact of future flood events. There is a discursive consensus that new territorial development strategies should be implemented.

### 3.3 Pre-impact blind spots - were authorities well prepared?

#### *Risk mitigation (protection and prevention): Identifying risks*

In terms of flood risk management, it is the local authorities that are responsible for identifying risks and drawing up general emergency and intervention plans (GEIP) containing the general guidelines and information necessary to ensure the management of emergencies (Royal Decree of 22 May 2019), or even Special Emergency and Intervention Plans (SEIP)<sup>43</sup>, for additional provisions specific to risks. The GEIP is drawn up under the responsibility of the administrative authorities: at the municipal level, under the mayor’s responsibility, or at the provincial level, under the governor’s authority, and sent to the Minister of the Interior for validation. Each intervention discipline defines its monodisciplinary intervention plans, which regulate the practical modalities of intervention of a service to ensure its intervention in the framework of a SEIP in an emergency. Those in charge of the site must also draw up internal emergency plans at the site level to establish the material and organisational measures necessary to enable staff to manage an emergency and make it possible for external authorities and services to intervene. Each municipality must appoint an emergency planning coordinator and set up a “security cell.” This consists of the mayor, the emergency planning coordinator, a member of the municipal staff responsible for informing the population (representing the D5) and a representative of each discipline (the relief operators of the emergency zones, medical and psychosocial health, police, etc.).

Regarding the specific risks linked to flooding, a special flooding plan exists at the level of the province of Liège, which has been fed, among other things, by feedback from the floods that affected the province’s territory in 2018. Depending on the identification of risks in their territory, the municipalities can also draw up a specific plan for flood risks (identify buildings in flood-prone areas, communities at risk, etc.).

Yet, civil society members were mostly skeptical in this regard, as the coordinator of a Walloon relief organization expressed:

*“As volunteers, we quickly understood that crisis management in an extreme situation had not been foreseen and that the road to reconstruction would be long (...) The Walloon government released important means, but we were not allowed to follow the state of the place (...). No one had been trained to work together” (Volunteer coordinator of the Petits Robins des Toits, presentation at the Walloon Spring Resilient Congress, Mons, 17/06/2022).*

The risk identification phase is crucial: based on this phase, special emergency plans will be drawn up, and preparations will be made to manage risk in a specific area. But how is this phase coordinated in the Walloon Region? With what method? How do the municipalities integrate the risk of flooding, and how is that linked to the possible “leaching”/failures of upstream dams?

In terms of risk identification for reservoir dams, there is no real legal framework that imposes certain management and safety methods, and that imposes this risk identification. Only since 2019 has the first internal emergency plan been put in place and transmitted to the governor’s services, who oversee emergency planning (Zeimetz et al. 2021). On the other hand, the Belgian Committee on Large Dams, which brings together scientists and dam managers (affiliated with the International Committee on Large Dams), drew up flood maps in 2016 for structures in the event of failure of large dams (particularly in the event of breaches). These disaster cases are not included in the analysis of the Flood Risk Management Plans (FRMplans)<sup>44</sup> nor in the flood plans of the flood services (this is the ultimate case of disaster scenarios).

The reservoir dam’s department has been engaged in a reflection regarding emergency planning for a year. As Climate Minister Philippe Henry argued: “It is not normal that we do not have a legal framework for infrastructures like this one [i.e., reservoir dams]. Fortunately, we have elements of modernisation of the management, in particular, what we call the handling curves: where there is a tension between the water reserve and the potting to accumulate in case of rainy weather. So, we have taken precautionary measures of administration to increase the available reserve in the immediate future.” However, the climate

<sup>43</sup> SEIP is translated from the French Plans Particuliers d’Urgence et d’Interventions (PPUI).

<sup>44</sup> Flood Risk Management Plans (FRMplans), which in French are the PGRI-Plans de Gestions des Risques d’Inondations, les PARIS- Programmes d’actions pour les Rivières dans une approche Intégrée et Sectorisée.



minister explains that “this is a provisional situation on which we are working precisely because the episodes of drought are rather more probable finally and that we must also resist episodes of drought, which may cause fires. So, all this work is ongoing. And, of course, part of the answer is the infrastructure [...]” (UVCW, Mons, 13/05/2022) Following the European Commission<sup>45</sup> and the Floods Directive<sup>46</sup>, the Walloon public authorities could conduct an established cost-benefit analysis, which can be effective in such situations. Further, it is recalled that in the Annex of the Floods Directive, a cost-benefit analysis to assess measures with transnational effects is a component of the FRM plan when available (ECA, 2018).

The transversal flood group, GTI (which inherited the PLUIES plan), is the most active in estimating flood risks on the Walloon territory. It brings together watercourse managers, so both the SPW Mi, non-navigable watercourses and the provincial technical services, and even the municipalities, but the latter have been involved at more distance than the provincial technical services. “They are very involved in the analysis of flood risks; they contribute to the whole Infocruet system<sup>47</sup> (which is now stabilised), they produce plans (the PGRI - FRMPlans, the PARIS - Action Programmes for Rivers in an Integrated and Sectorised Approach) ...” The question remains: what is done with those plans? They are indicative rather than prescriptive, so this is an open question (see part 2 of the independent experts’ report, ‘recommendations’; Michaud et al., 2021).

The other question is the organisation of this GTI: is it complete, and how complete are its members (such as the Walloon Regional Crisis Centre participating in the GTI)? We found that there were few relations with the reservoir-dam managers and very few contacts with the crisis managers, local authorities, and emergency services, who will be the first to refer to these plans (also Zeimetz et al. 2021).

#### *Adaptive capacity assets – using available flood risk maps*

Wallonia has various adaptive capacity assets, including the FRM plans, which covers 100% of its territory, stock of surface outside of hazard zones that can be urbanised, the 60% of economic losses insured in Belgium (1990-2019), information tools (including the Flooding portal and Portal Inundation), technical support tools (including river contracts), legal tools (hazard zones/zones d’aléas, water code/code de l’eau); monitoring tools (Aqualim), and crisis management tools (Regional Crisis Centre, Infocruet) (OECD, 2021). To prepare for floods, Belgium relies on publicly available flood risk maps that illustrate the areas likely to be subject to river flooding. These illustrate both the areas likely to be subject to fluvial flooding, the risks of flooding and landslides, and information on rainwater runoff and landslides.

In Wallonia, the flood risk maps are updated every six years, the latest updates dating back to 2020 when they were submitted to public enquiry (14 September to 31 October 2020) and approved by the Walloon Government on the 18th of March, 2021. According to interviewed regional policy officers, one of the major difficulties concerns modelling so-called “extreme” events and those with a long return period (e.g., 100 years). Indeed, it is necessary to use observed historical series much longer than the targeted return period so that the results are relatively reliable. This implies that for return periods of 100 years or more, one would need observation times that do not exist in the history of hydrology (and probably not in meteorology). Notwithstanding this issue, analysts must continue trying to evaluate the impacts of these extreme events<sup>48</sup>. Walloon mayors are required to take account of flood risk maps in their planning decisions (around 10% of permit applications are affected by flood risk issues), and flood preparedness measures are taken considering the available flood risk maps (based on various interviews, 2022).

As a result, many residents expressed surprise that their houses were flooded up to the upper floors, seeing how they had understood that they were not in flood zones. Similarly, several stakeholders interviewed during our visit to the region said they would not expect another deluge of this level, given that the floods were a once-in-a-century event, illustrating the need to better translate technical information on return periods and flood zones into usable information for local decision-makers and residents.

<sup>45</sup> The EC proposed for 2021-2027 that managing authorities for cohesion policy programmes have to “ensure that selected operations present the best relationship between the amount of support, the activities undertaken and the achievement of objectives” (ECA, 2018: 59).

<sup>46</sup> “FRMplans shall take into account relevant aspects such as costs and benefits...” [Article 7(3), Floods Directive],

<sup>47</sup> The Infocruet system in Wallonia is a platform designed to provide information about floods and water levels in rivers across the Region. It offers real-time data on river levels, helping authorities and residents to monitor and respond to flood risks effectively.

<sup>48</sup> To know more about these maps, see the Walloon flood portal: <https://inondations.wallonie.be/home/urbanisme/cartes-inondations/carte-alea-inondation.html>

Climate change is officially considered an increasingly important factor to flood risks in Wallonia, just as elsewhere in Europe (EEA, 2017). But in many cases, flood risk is also the result of where and how people choose to live. In the case of the floods in Wallonia, increasing costs from flooding in recent decades can be partly attributed to more people living in flood-prone areas, as generally acknowledged by policymakers in the media and confirmed by our interviews.

Hence, regarding land-use management and planning, responsible authorities (SPW Director for the Walloon Recovery Plan and various responsible ministers) acknowledged that it would become increasingly constringent – or even forbidden - to build in certain flood-prone areas.

#### *Responsibility to prepare for better planning risk*

In the third conference on disaster risk reduction of the United Nations, the Sendai Framework for Disaster Risk Reduction (2015–30) was adopted. This framework called for a paradigm shift “from managing disaster to managing risk.” Belgium, like other EU Member States, faces unprecedented risks, including those from climate change. However, the country also has unprecedented foresight capabilities. Together these create a ‘Responsibility to Prepare’<sup>49</sup>. Yet, according to most interviewees, this paradigm shift is not yet fully integrated or applied in Belgium. Indeed, it appeared that managing the crisis during the disaster period is the policymakers’ major issue, as they are not always capable of managing the various risks.

Media generally relayed the discourse from most policymakers, authorities, and experts that the inhabitants will never have any choice but to deal with unpredictability. At the mercy of the clouds and the amount of rainfall, the same area can react in a different way from one episode to the next. But territorial resilience, one of the cornerstones of adaptation to climate change, will be crucial to avoid the worst-case scenario. It implies reviewing the use of certain green spaces, limiting the increasing artificialisation of land or widening riverbeds in places. In short, it means dealing with the vagaries of nature rather than vainly - and expensively - trying to shape it.

Being able to predict (even several days in advance) exceptional floods is not enough: given the uncertainty that will always accompany hydrological and meteorological forecasts, the main challenge is to put in place a real risk culture to ensure a rapid response to phenomena that the population has never been confronted with.

Keeping a population mobilised and ready to react is possible if the risk is frequent (this is the case for earthquakes in Japan, for example). It seems more difficult to organise truly exceptional flood events. It, therefore, seems essential to continue efforts in several directions: improving forecasting systems, improving the use of these forecasts, and improving crisis communication. This comprehensive approach was widely adopted in discourse by both policy experts and civil society stakeholders (based on interviews and media sources).

After the acute emergency crisis, there was a more general debate in the media and policy circles on building flood risk resilience in the context of increased global warming. The three main mechanisms of resilience were engineering, ecological, and socio-ecological (Vitale et al., 2020). The engineering lens has long been the dominant one discussed in Belgium (Mees et al., 2017). This discourse was present and still dominant in most debates around the summer floods but has been complemented by ecological and socio-ecological resilience discourses. Mainly fed by inputs from academia and (climate) risk policy experts, these three approaches are simultaneously being translated into institutions (rules-in-use) and outcomes, thus combining engineered hard flood protection infrastructures, or building regulations, on the one hand with ecological and environmental restoration (ecological) and spatial strategies (socio-ecological) to reduce flood risk, on the other. This diversification of FRM strategies has been advocated by academia as a reasonable way forward (Hegger et al. 2016).

The prevention policy controversies in Belgium were especially focused on land planning; it was considered a huge failure and a major cause of the heavy impact of the floods. Though, many policymakers argued that a zero-risk society is impossible to achieve. What should be done if it is impossible to defend against all floods (Johnson & Priest, 2008) and if societies must learn to live with floods in a world where flood disasters are also rising sharply (EASAC, 2018)? How safe is safe enough (Doorn, 2015)? Fair and democratic FRM practices cannot avoid making difficult ethical choices.

<sup>49</sup> The ‘Responsibility to Prepare’ framework was first [debuted](#) at the UN Security Council in December 2017 by the Center for Climate and Security.

How should efficiency be balanced with equity (van der Most, 2010)? What should be a just distribution of benefits and risks (Ciullo et al., 2020; Doorn, 2015; Doorn, 2018; Johnson et al., 2007)? And in a flood emergency where uncontrolled flooding can be unpredictable or catastrophic, but where “controlled flooding” (i.e., deliberate flooding of one area to prevent another area from flooding) can nevertheless inflict harm on many lives (Shilcutt & Asgarian, 2017). Several interviewed citizens believed in a kind of conspiracy by the political elite, willing to privilege the “more important city of Liège” above rural towns and settlements. Evidence also suggests that risk harm and outcome harm tend to be disproportionately experienced by marginalised and vulnerable residents living in deprived communities who show low participation in FRM policy and, therefore, receive less support (Thaler, 2021) or that FRM policies are oriented to maximise utility tend to overlook already deprived communities with low economic, social, and environmental performance (Johnson et al., 2007).

### 3.4 Insufficient prevention and planning, including adapted infrastructure and building less (where it does not belong)

According to the hazard map, river managers issue a favourable or unfavourable opinion with conditions for planning permission in flood zones. The municipality issuing the building permit is not legally obliged to follow the opinion of the watercourse manager. There is, therefore, to our knowledge, no legal framework prohibiting construction in high or medium-hazard areas. It should be noted, however, that the law governing Land insurance contracts defines “risk zones” which correspond to the high hazard areas. This law allows insurance companies to refuse to cover constructions erected in these areas. Revising the criteria for determining the risk zone and the consequences could be possible. Specifically, this would need amending the Royal Decree of 12 October 2005, establishing the criteria for the Regions to formulate their proposals on the delimitation of risk zones (see also Box 2).

#### Box 2. The revision of Sector Plans in Wallonia

Considered a major issue by public policy officers as acknowledged by the Walloon Minister for Infrastructure, the revision of Sector Plans in Wallonia is complicated and politically sensitive. Sector Plans in Wallonia organise the territorial space and regulate its different uses to ensure harmonious development and prevent excessive consumption of space. The region is covered by 23 sector plans adopted between 1977 and 1987.

Revising the sector plans would require addressing various challenges, including the complexity of the subject, the need to consider property rights and assets, potential capital losses if building in certain risk areas becomes prohibited, attachment to places, individual and collective histories, cultural history, and participation procedures imposed by the European Union. Due to these challenges, the political approach to reforming or revising the sector plans seems to have been abandoned.

As many mayors are tempted to allow construction permits to increase their municipality/town population, citizens took risks to build their houses in flood-prone areas – even without being insured. For example, businesses, such as a bakery, who did not have fire insurance were not covered by insurance for this recognised natural disaster. This resulted in controversial public debates about whether the government should intervene to cover the loss and damage during the floods.

Notwithstanding the uninsured citizens’ lack of due diligence, many stakeholders argued that the governmental authorities should never have let these risky constructions happen in the first place. So, according to most civil society actors, instead of a lack of citizens’ self-reliance, the irresponsible and undiligent authorities should be blamed and hence account for the losses. The programme of actions on rivers through an integrated and sectoral approach for each Walloon sub-catchment area, hereafter referred to as “PARIS” (Plan d’Aménagement de Rivières par une approche Intégrée et Sectorielle), is defined by sub-catchment area. The basin authority adopts the PARIS, reviews them every six years, and updates them if necessary. The prescriptive provisions of the PARIS are indicative, and the other provisions of the PARIS are descriptive.

There is no “Flood PPUI” Plans particuliers d’urgence et d’intervention) in most municipalities, no connection to “Be Alert” and little investment in “emergency planning” (identification of local risks, organisation of plans and updates) beyond the minimum legal obligation to appoint a “plan” official (i.e., a coordinator for emergency planning in the municipality). This observation is striking even in the Vesdre catchment area, known for its high vulnerability. There is also a lack of multi-disciplinary exercises, updating and a great difference in the level of preparation from one municipality to another.

Moreover, these local plans have little or mostly no inclusion of climate scenarios. This will most likely make the flood risks worse in the future<sup>50</sup>.

#### *Discursive convergence: more financial, material, and human resources is needed*

If the crisis remains in the municipal phase, the municipality pays the response costs. In the provincial and federal phases, the federal government finances the means. The Regional governments, in turn, fund the flood-forecasting systems. Municipalities are legally obliged to provide the infrastructure, equipment and staff required for their fire brigade service<sup>51</sup>. This puts a serious burden on the municipal budget. The federal government can grant complementary subsidies for the purchasing of equipment and the provision of training. However, this financial support is not prescribed by law and varies yearly. Under the currently implemented fire brigade reform, costs are divided 50-50 between the federal state and the municipalities<sup>52</sup>. A study on civil protection reform has been commissioned by the Federal Minister of the Interior (Université de Liège & UHasselt, 2022). That reform took place under the previous government but has been the subject of fierce criticism.

The Flood Preparation Arrangement suffers from a lack of resources, particularly in terms of personnel, more than other arrangements. For many small municipalities with limited financial resources, appointing an emergency planning official is not evident. Therefore, these officials are sometimes hired part-time or shared among several smaller municipalities. At other governmental levels, emergency planning units have also faced a decline in personnel since the economic crisis in 2008. The funding of daily operations has also been cut back, and the funds for new projects have been reduced drastically in 2014 and in 2019<sup>53</sup> (Université de Liège & UHasselt, 2022). In terms of units prepared to respond to floods, Belgium relies on its federal civil protection and local emergency services, such as the fire brigade, first responders and the police, with the army intervening in the event of an extreme disaster.

As a result of the reduction in civil protection capacity, several rescue services interviewed for the PERC noted that, given the scale of the disaster, neither the army nor civil protection had the necessary equipment in the vicinity to respond to floods, even though these are the units that should be called upon when a disaster exceeds local capacity or requires specialised resources. Given the location of the two remaining units in Brasschaat and Crisnée, some parts of the country are also cut off from rapidly deployable units, relying instead on the cooperation of local emergency services (e.g., the Ghent fire brigade has taken the initiative to provide rescue boats in support of rescue operations in disaster areas).

Moreover, Wallonia (and Belgium, in general) has been facing an underfunded and under-resourced emergency response sector despite risk assessment reports pointing out this issue. This is a result of the cuts/restructuring of civil protection (D4), budgetary restrictions in health (D2), and budgetary restrictions in defense (esp. in 2014).

<sup>50</sup> Based on the results of the Amice-project and using extrapolations, ICEDD (2014) estimated the extra cost of inundations in the Walloon Region due to climate change at about 400 M€ in the year 2100.

<sup>51</sup> Royal Decree of 8 November 1967 concerning the organisation of municipal and Regional fire brigade services.

<sup>52</sup> Civiele Veiligheid, <http://www.civieleveiligheid.be/CivieleVeiligheid/HervormingvandeCivieleVeiligheid/>,

<sup>53</sup> Following the substantial cuts, the Belgian civil protection system has been left with only two of the six existing central civil protection units maintained - Brasschaat (Antwerp province) and Crisnée (Liege province) - and one operational centre in the capital, Brussels. Before the reform, the civil protection unit in Crisnée had 266 professionals and 379 volunteers. In January 2020, there were only 139 professionals (a reduction of 127 people) and 129 volunteers (a reduction of 250).

Illustratively, as a federal emergency respondent from the International Relations Department of the General Directorate of Civil Security, argued:

*“The Austrians and the Dutch who came to help us during the crisis were able to send twice as much emergency aid capacity to Belgium as Belgium was able to deploy at home.”* (FPS- 2, June 2022)

In general, respondents reported a lack of training and exercises and the absence of a reference framework supporting the latter’s organisation. Feedback intended to promote learning and coordination is rarely organised and analysed in a multidisciplinary manner. Yet, civil protection respondents and interviewed crisis managers argued that the annual multidisciplinary exercises within the UCPM helped them greatly during the 2021 summer flood events. It is argued to have increased the awareness of officers in the affected Province of Liège, as another federal Civil protection policy Officer explains:

*“Two years before, we had done the exercise in the province of Liège, which ensured that he [the officer] was already well-aware, well-informed and trained when the floods happened. He was able to think beforehand about how to use it and update his emergency planning. That clearly proved its added value.”* (FPS- 3, June 2022)

The timing of the ‘Bernd’ floods could have been worse, besides the fact that it happened during the COVID-pandemic. Fortunately, the police officers of Liège decided not to work remotely. The floods occurred during the school holidays, just one week before the Belgian national day. Most of the authorities and senior officials of the intervention services were present. This was said by various higher-level public authorities to be a huge asset in managing the crisis. However, because flooding is typically a winter phenomenon, the Perex centre, which was set up to centralise monitoring services 24 hours a day, seven days a week, was understaffed. It was noted that the lack of staff was due to holiday-related absences combined with a general problem of understaffing in childcare services.

The understaffed hydrological service in Wallonia is another pain point and a work in progress. As the Head of RMI forecasts (FPS- 8, 2022) argued:

*“That service is very competent but understaffed, and it can only look ahead 24 hours. (...) When new data came in on the evening of Tuesday, 13 July 2021 (about the amount of precipitation that would fall during the night of Tuesday to Wednesday, ed.), they were not sufficiently picked up. And when those forecasts also came true, and it started raining properly, the one engineer on duty was in his bed.”*

At 5 am, they still switched to code red, but by then, it was too late<sup>54</sup>. That is why the hydrological services have requested additional funds from the Walloon government, says an officer of the public infrastructure department (Interview, SPW-3). That money should serve to staff a first-line emergency service 24 hours a day. Then the Walloon government would present its action plan and the budgets and people allocated to it.

Walloon hydrological services had no idea of the impact such heavy rainfall would have on reservoirs and dams. After the disaster, many looked in the direction of the Eupen reservoir. There, they would have started releasing water too late to reduce the pressure on the dam at too high a flow rate. This would have increased the damage downstream between Eupen and Verviers. Most interviewees saw the decision not to pre-emptively empty the dam as an incomprehensible mistake. Two other dams operated by the energy company Engie in the region were reportedly emptied earlier in the week.

#### **Insufficient additional water storage**

The collection/storage capacity in Wallonia has significantly increased over the last decade (more than doubled), but “that is still not enough to capture the volume of precipitation that fell in 30 hours in July 2021 if there is no preventive water discharge, or during the disaster itself,” a Walloon officer said from the hydrological services. The reservoir would have had to be almost empty to absorb that volume. And that, in turn, goes against the main function of the reservoir, to provide drinking water (Based

<sup>54</sup> Note that three months after the floods, “Pano” (VRT programme, on official Regional Flemish radio and TV) reconstructed exactly what went wrong in the run-up to the floods. In it, David Dehenauw gave an insight into the role of the RMI. (See online: <https://www.vrt.be/vrtnews/nl/2022/07/07/hoer-voorziening-veiligheid-dat-dit-nog-eens-gebeurt-dit-is-er-veranderd-e>)

on various interviews: Reg. Min. 1; Assoc. Reg. 5; Assoc. Reg. 7).

But even if authorities made a judgment call on the dam, it is unclear why only a handful of communities on the Vesdre were evacuated before the release. However, computer models do exist that calculate the impact of precipitation on dams. In fact, before the floods, the RMI was already providing this information to the energy company Engie. The latter uses that info to manage Robertville Dam. The head of the RMI weather forecasts explains:

*“They stated that they used that information to lower the water level already on Monday (two days before the floods started, ed.). We have offered to provide the Walloon hydrological service several times a day with graphs for each reservoir: that of Eupen, Gileppe, Nisramont... They can then, in turn, share that with the people who manage those reservoirs.”* (FPS- 8, 2022).

Yet it remains difficult to predict down to the municipal level exactly how much a specific watercourse will swell due to a rainstorm or thunderstorm. Various members of the municipal executive complained that there is still no model for that. In reaction, the RMI has since sent information several times a day about the impact of precipitation on Walloon dams, like the one at Gileppe. The Walloon hydrological service aims to predict the condition of sewers and watercourses down to the municipal level. But that starts with the RMI: municipalities cannot do much if the RMI cannot predict storms some time in advance.

The head of the RMI forecasts explained further:

*“We should be able to predict heavy showers two or three hours in advance and locate them in even more detail. Last year, we could tell that heavy precipitation would fall, but not exactly where. This is an ongoing process: we are constantly improving our atmospheric models. Thanks to the disaster, we have received the necessary funds to accelerate that even more. We hope to be stronger at that by the end of this decade.”* (FPS- 8, VRT NWS, 2022).

### **3.4. Citizen engagement**

#### **An emerging general policy discourse of citizen engagement and individual responsibilities**

There is a dominating discourse amongst policymakers about the necessity to enhance and enable citizen projects to strengthen risk management at the communal level. Most crisis managers interviewed in our analysis believe flood preparedness should be a shared responsibility between the government and its citizens. However, at the same time, crisis managers assume that the Belgian population lacks the risk culture to do so. Floods do not occur frequently enough, and citizens are used to falling back on the well-functioning crisis management structure. Consequently, little effort has been made to enhance self-reliance. Accordingly, crisis managers rarely make use of spontaneous volunteering (Mees et al., 2016) despite the existence of, for example Citizens Can, a national network of volunteers in Belgium<sup>55</sup>.

Opinions on the desirability of volunteers vary largely among actors. While most actors are in principle in favour, concerns are raised about coordinating and ensuring them. Most actors claim that citizen volunteers are appealing in theory but are sometimes too complicated to implement (also Mees et al., 2016). Most actors believed that increased citizen engagement is the way forward for observation and risk identification purposes. To strengthen the links with citizens who may sometimes suffer from a feeling of powerlessness in the face of environmental risks, they have the capacity to collect so-called “situated” knowledge (experiences of certain people in relation to the past). Citizen participation then gives a role to the people concerned by the problems linked to environmental risks by granting them the power of action through the expertise they bring. This citizen expertise could be just as essential as that of the experts for FRM. The involvement of citizens can take place at different levels in observatory practices (definition of research themes and questions, establishment of protocols, data collection and analysis of results). However, managing this participation requires the observatories (public departments and universities) to have the means and skills to facilitate, train and animate the group (SPW Développement Durable, 2021b - recommendations of the working group of the Walloon Resilience Congress of December 2021)<sup>56</sup>.

<sup>55</sup> See: <https://citizenscan.org/fr/>

<sup>56</sup> See: [Congrès Résilience Module 2 Synthèse et recommandations.pdf \(wallonie.be\)](https://www.wallonie.be/fr/ressources/le-congrès-de-la-résilience-2021)

Besides the argument to increase individual resilience of ‘knowledgeable citizens’, this policymakers’ narrative is likely to be used to close the expectation gap from citizens towards the governments in Belgium. As discussed in this paper, communication issues are subject to the increased attention of policymakers (‘Discipline 5’). On the one hand, governments in Belgium were blamed for the lack of early warning information (or for providing unusual information). Impacted citizens and local authorities blamed a lack of quality and preciseness of (meteorological and hydrological) information. Yet, the Sendai framework states that the availability of and access to multi-hazard early warning systems must be increased (UNISDR, 2015). On the other hand, governments often used a discourse on citizens’ individual responsibilities and their involvement in FRM (“floodable citizens”, using volunteering alert launchers...). This then shifted the collective responsibility of politicians and policymakers, or at least shared with the concerned citizens. The same logic arguably applies when policymakers aim to involve private insurance companies (Davids, 2021).

*Blind spot: public services insufficiently matching with self-reliance of citizens*

Soon after the rain, right after the acute emergency phase, thousands of people were left without food or clean drinking water. The army and the Red Cross were framed as almost invisible by most citizens and in the media. By contrast, we were told that volunteers’ ‘historic wave of solidarity’ was framed as fast, organised, and creative. This is also reflected in the so-called “Teller/Stucky report” after citizen consultation: while the municipality remains the first-level interlocutor, the citizens reported the limits of public action. Many shared a feeling of abandonment during the crisis because of the lack of resources in their commune (Zeimetz et al., 2021).

The mandated Red Cross received heavy criticism for its poor relief management in the affected areas by local public and private stakeholders both on the streets and on social media. For example, there was a long delay - in some municipalities it took about two weeks - before the Red Cross teams helped citizens with short-term relief, such as food and shelter. As the Red-Cross communications director argued: “Indeed, there are places and streets where the Red Cross was never present, so impacted citizens there might not have seen us” (RTBF Investigation, Assoc. Nat. 3, October 2022). Moreover, food provision of low quality was provided by the Red Cross - despite a €40 mn budget collected from donations. However, the Red Cross had novel ideas: it decided to collaborate with the Belgian Federation of Food Trucks. But some food trucks did not respect the conditions by, for example, receiving donations and serving them to citizens and then charging the Red Cross for the food (Assoc. reg. 2; Assoc. nat. 3; Vol. cit. 3, Mun. 5, 2022).

Fortunately, there was a great wave of solidarity, with citizens rushing to each other’s aid, which compensated positively for the citizens’ general feeling of being abandoned by the government. All stakeholders, especially citizens and civil society, discussed it as “a crisis with a very strong solidarity.” There was relatively little criticism and tension with the local authorities (compared with higher level authorities), especially regarding evacuation, because they realised that these authorities were overwhelmed and had low human and material capacities. And there was a lot of solidarity to evacuate the inhabitants, support them and provide meals. The citizens emphasised two shocks: the negative shock of the flooding (of living through this flooding crisis) and the realisation of the extent of the damage (to their own homes, as well as to their commune), but also a positive shock, with the great solidarity (the solidarity mechanisms, which were reported by the media), and the role of social networks in structuring this support (Zeimetz et al., 2021).

Two weeks after the floods, victims of the Walloon flood disaster received food parcels from the Red Cross, but the dishes had to be heated in an oven. Thousands of people did not have access to a kitchen at this time. After a month of hard work, authorities proposed handing over the work of some spontaneously volunteering citizens’ associations to the army and the Red Cross. One initiative involving a restaurant-based food provision service, which attracted 1400 volunteers, highlighted this challenge. As the initiating lead-volunteer restaurant owner explained:

*“The handover was very complicated with the army and the Red Cross because we gave them all our files, everything we did, but they did not necessarily use it for the right purpose. I did not have proper contact with the Red Cross - a little more with the Army. They are not super well organised.... The problem is that they change battalions weekly. So basically, each time I had a different referral person...And they did not pass information to each other” (RTBF Investigation, 2022, Vol. Cit. 6, October 2021)<sup>57</sup>.*

<sup>57</sup> Interview of Mrs Depierreux by RTBF Investigation (2022), see Annex 3.



### *A general feeling of despair and, for many, a feeling of abandonment*

More people died during the 2021 floods in Belgium (39 people) than during the 2016 terror attacks in Brussels. The victims of the latter are rightly commemorated every year, while there is raw grief from people who have lost family members and acquaintances during the former's crisis, and the misery of other people directly related to the floods. More than 50,000 houses were affected; many belonged to or were rented by people from lower socio-economic status. The Vesdre Valley is narrow and steep, with an old 19th-century industrial heritage. The people who live in working-class houses close to the water were most affected, with some villages having entire stretches bulldozed away.

One year after the floods, many people still lived in unrepaired houses, some even in their garages if they have not been rehoused elsewhere. Many people were discouraged and marked or were experiencing grief. There was also no victim list, which is different from the 2016 terror attacks. Many people who were victims living a few kilometres from each other did not know each other. Some citizens feel resentment toward the governing bodies in Belgium - one respondent said: "Maybe this was done deliberately by the government so that we wouldn't start organising ourselves" (Personal interview, Cit. 2, 2022).

The feeling of many affected citizens' despairs started when they realised this would not be a flood like past ones. As an Aldermen in Trooz explains: "They realised that what they had put in place (a few sacks of sand, a fridge, etc.) will be insufficient" (Mun. 1, May 2022). This occurred before there were any messages from local authorities (even if some have activated 'reflex actions', such as moving their cars, etc.). Most affected citizens believed that the disaster was mainly caused due to poor politics, including the upstream dams' management and bad spatial management.

Sometimes it seemed that the anger and despair are so great that people seek a concrete source to graft their anger. In this case, impacted people were looking for scapegoats. (Personal interviews: Assoc. Reg. 1 & 2; Mun. 1, Mun. 2, Mun. 3, Cit. 2, Cit. 3 + 4; Cit. 12, 2022; also Zeimetz et al., 2021)

In its conclusion, the Stucky/Teller report identified two types of citizens: "expert citizens", who would actively inform themselves, via the Infocru website, radar weather data, and follow the situation continuously; and "lay citizens", who did not. Some citizens, especially the non-experts, were the least active (not registered with Be-alert nor informed via the commune). The traditional media mainly informed them. They experienced tension and dissonance because there were alarming weather forecasts and delays in precipitation levels, especially downstream of the basin (Zeimetz et al., 2021).

In most cases, it was only when the rising waters became visible in the immediate vicinity that people living in the affected areas decided to leave. Many of them remained trapped in their homes and had to wait long hours to be rescued. Of the people surveyed, only 24.7% left their homes. Two-thirds of those questioned said they had not been warned. Of those who had, the vast majority had been told not to evacuate, but to move their vehicles or move to the first floor (Schmitz et al. 2023). Very quickly, many inhabitants believed that the information from the local authorities was insufficient for different reasons. They saw that the public authorities had lost their monopoly on the dissemination of information. Consequently, these people continued to log on to social networks, which are rumour amplifiers. In many municipalities, there was no longer any information from the official local authorities (personal interviews: Mun. 1, Mun. 2, Mun. 3, Cit. 2, Cit. 3 + 4; Cit. 12; also Zeimetz et al., 2021).

Moreover, the emergency services were perceived as saturated, and residents could not contact them. And when citizens were in contact with 112 operators, the agents had sometimes less information than citizens did. This created a lot of tension and frustration amongst citizens. The lack of official information encouraged risk-taking behaviour by citizens, which was tricky given the multiple-waves flood (Zeimetz et al., 2021). Remarkably, there was also a widespread feeling of abandonment amongst the municipality stakeholders. This was notably perceived by attributable to a too-fast removal from federal support. In reaction to this observation, an interviewed National crisis officer responded: "People are mixing up of federal minister of home affairs' competencies during the emergency response in the federal phase and proposals with the mandate of the National Crisis Centre for better coordination" (personal interview, FPS-. 3, June 2022).

### **3.5 Post-disaster, but still in 'crisis': a complicated 'return to normal'**

After the flood episode, the crisis period continued, with the stress of reconstruction. The Teller/Stucky report speaks of an "administrative burn-out" for the residents. Many residents talked about the difficulty finding information about financial support and insurance coverage. Residents could not find the information they need from insurers, public authorities, or technicians (Zeimetz et al., 2021; various media sources and personal interviews with citizens).

Two months after the floods, the Walloon Minister-President reacted to this criticism and explained the government's approach: "First, the insurance, then the Calamity Fund<sup>58</sup>. We want to help all the impacted citizens. We already spent billions with the COVID crisis and will have to continue spending hundreds of millions. But people need to understand that we cannot solve everything directly regarding the magnitude of the damages" (Vedia TV, 25/09/2021).

Another battle with the insurance companies also unfolded. Many people were exhausted and unhappy with how the insurance companies handled their cases, which were dragging on too long. Some argued that insurance experts were reluctant to reimburse the losses properly by refusing to reimburse parts of the losses (doors, windows, etc.). Their insurance companies would, for example, only reimburse for three months of housing - called "emergency housing." As an impacted woman in Trooz expressed: "We did not ask to be flooded in the first place, and now we have to fight with the insurance and the insurers!" (RTBF Investigation, 2022).

Insurance companies were overbooked because of impacted citizens' important demands. Hence, a significant part of the victims had been waiting more than a year for the visit of an expert and waited a "very long time" to be reimbursed by their insurance, as citizens and local authorities complained (RTBF Investigation, 2022 and personal interviews, 2022). However, some victims did not reply to calls and/or letters from the government and/or insurance companies for the needed next steps for their reimbursement (Commissariat Spécial à la Reconstruction - CSR, 2022).

Another issue is that in Belgium, a home insurance policy (colloquially: fire insurance) is not required by law, although the government imposes minimum risks to be insured under a home policy. These so-called insured risks include natural disasters: earthquakes, floods, tidal waves, etc. Storms are not included in the Belgian legislation. Yet even such a policy never covers all damages, for instance, because the insurer applies compensation limits or financial ceilings (e.g., 20% of the assets value). The Belgian state, therefore, set up a disaster fund in 1976 after the floods in Ruisbroek. The National Disaster Damage Fund known as the Calamity Fund, is a lasting consequence of this disaster<sup>59</sup>. Citizens or businesses affected by a natural disaster recognised by the government can apply to this fund for financial compensation, albeit for disasters recognised before July 2014. Indeed, since the sixth state reform in 2014, the regions have been competent for the Calamity Fund after it being previously federal<sup>60</sup>.

However, the regulation of the insurance sector falls within the competence of the Federal Government, namely of the Federal Minister for the Economy (cf. law of 2014<sup>61</sup>). Note that some insurance legislation is also enacted at the European level. The Commission has launched a reflection in 2022 to strengthen the capacity of the insurance sector to respond to losses caused by climatic events<sup>62</sup>. As 'closing the climate protection gap'<sup>63</sup> is on the European Commission's agenda and part of its strategy (EC, 2021), new legislation integrating climate risks in insurance schemes emerged timidly in Belgian political debates. In this regard, the Walloon Minister-president pleaded for "an insurance mechanism that integrates climate-related factors (Lefèvre, 2022).

He also requested a revision of the 2014 Law (see below) to raise the ceiling or cap for insurers' intervention during natural disasters. This mechanism was built on the realities of the past. But as from January 2024, a reform of this 2014 Law entered into

58 See further details on the Calamity Fund here: <http://www.ibz.be/code/fr/loc/calamites.shtml>

59 Wet van 12 juli 1976 betreffende het herstel van zekere schade veroorzaakt aan private goederen door natuurrampen; <https://financien.belgium.be/nl/financi%C3%A5le-verrichtingen-van-deschatkist-fvs/nationale-kas-voor-rampenschade-nkr>

60 Links to the different Regional funds here: [Fonds de Calamités | Belgium.be](https://www.fonds-de-calamites.be/)

61 Federal Law of 4 April 2014 on insurance, see Subsection 2 on natural disasters. [LOI - WET \(fgov.be\)](https://www.fgov.be/loi-wet).

62 More information on this subject here: [Insurance of climate-related disasters \(europa.eu\)](https://ec.europa.eu/insurance/insurance-climate-related-disasters)

63 The Climate Insurance Protection Gap refers to "the difference between economic losses and insured losses resulting from the materialisation of climate-related risks." See: <https://www.ecb.europa.eu/pub/financial-stability/climate/html/index.en.html>

force, namely a strong increase in the insurance sector contribution in case of severe floods<sup>64</sup>.

At the time of the floods, the ceiling or the cap of the insurers' intervention amount was still based on previous years. Without the negotiation between the insurers and the Walloon government, the insured would have received only 20% of the amount. The insurers have almost doubled their intervention ceiling but still cover less than half of the losses, whilst the government insures the remaining losses. The Federal government agreed to a 10-year loan (2025-2035) of €1.2 bn to the Walloon Region to achieve this commitment. This loan, which covers about one-third of all losses and damages (estimated at more than €3 bn), will be used in all affected and recognised municipalities (209). A donation in relation to powers that are not federal was not permitted by the Special law on financing. The latter does not allow the federal government to absorb the expenses without compensation, in place of a Region, in the context of a "natural disaster" (Lefèvre, 2022; SPW-website, 2023).

The reconstruction process of housing and businesses was framed as 'slow' to 'very slow', by most stakeholders (both in the analysed media documents and throughout the interviews). One year after the floods, many houses and businesses were still closed in the towns and villages of the Vesdre Valley. The SPW website summarised the aid schemes the Region put in place to compensate insured and uninsured disaster victims<sup>65</sup>. Given the scale of the floods in July of 2021 and to reduce the administrative burden of applying for insurance support, the Walloon Government decided to intervene in an exceptional manner, through an agreement with the insurance sector and a special scheme of the Calamity Fund, to support insured disaster victims financially and, to a lesser extent, uninsured people.

In Wallonia, adaptation measures are integrated into the Air Climate Energy Plan (December 2022), and the Walloon Recovery Plan (Plan de Relance de la Wallonie), which has been reinforced after the 2021 flood events. The year thereafter, the Walloon Recovery Plan (March 2023) had been revisited, with a budget of more than €7 bn. It includes more than 300 projects that should enable the Region to respond to current social, economic, and environmental issues and the impacts of the various crises suffered, such as the historic floods of July 2021. In addition, the Walloon government launched calls for projects earmarked "adaptation" to fight floods, but policymakers seemed to have forgotten that there was an adaptation plan. They supported adaptation-related projects at the time because there were opportunities to release resources. This was therefore done outside the regional planning framework. But it was set up for another minister than the climate minister. When talking about adaptation, it is the Minister for Climate who is responsible; when addressing resilience, it is the Minister for the Environment who is in charge. Potentially, there could be this problem in other EU Member States and the European level when discussing adaptation policies in the Environmental Council of Ministers.

It took much longer to 'return to normal' than in smaller-sized floods. Several problems continued to be challenging, such as those related to mobility, waste management, electricity, and cellular networks, drinking water, managing donations, and psycho-social and first-line medical support (Reygaert, 2022). Various measures were taken in the following months to help the victims of the floods so that they could gradually resume and rebuild their lives in these difficult circumstances (e.g. the reduction in VAT from 21% to 6% for the demolition and reconstruction of homes damaged by the floods, the raising of the ceiling for corporate donations from €500 thousand to €2.5 mn and the tax deductibility of donations made in cash to Regional disaster funds (CSR, 2022).

Numerous private initiatives have been launched to collect relief materials and/or help with on-site reconstruction. Many private individuals and companies from all over Belgium have contributed directly, for example, by making their company buildings and vehicle fleets available for the collection and transport of materials, by making staff available free of charge, by lending industrial machinery and tools and even by providing all kinds of goods in stock to be used on-site for the reconstruction. Many employers have also decided to help their affected workers in the Region directly and/or to support them financially (CSR, 2022). However, these actions represent a significant cost for companies. Parliamentary debates were held nationally concerning further fiscal deductions and tax exemptions for all companies<sup>66</sup>.

Nevertheless, the "return to normal" stage appeared to be a blind spot in planning. It is rarely included in emergency and

64 See the new reformed articles in the 2014 Insurance Law [here](#).

65 <https://www.wallonie.be/fr/quelles-sont-les-demarches-liees-au-fonds-des-calamites>

66 See, for example: [MyMinfin \(fgov.be\)](#).

response plans. Once the crisis is over, response and recovery agents and actors tend to leave the field of operations and, at the same time, end their role in the strategic management of the crisis. The Royal Decree of May 22nd, 2019 has partially corrected this shortcoming by stipulating that the general emergency and intervention plans must include 'information on the procedures for returning to normal and/or restoring the situation within the meaning of Article 40 of this decree', and that the D5 must, among its tasks relating to alerting and informing the population, ensure, after the emergency, the task of "informing the population of the recommendations to be followed with a view to returning to a situation as normal as possible" (R.D. 22/05/2019, Article 13).

This 2019 Royal Decree has sought to draw attention to this planning stage by devoting a specific chapter to it, entitled 'Recovery period'. Article 40 of the Royal Decree states that: "The competent authority which has taken charge of the strategic coordination of the emergency, or the mayor in the case of emergencies which have been the subject of operational coordination only, must ensure the coherence of the overall recovery strategy/planning process on its territory with the aim of pursuing in particular aspects" (see Figure 13 below).

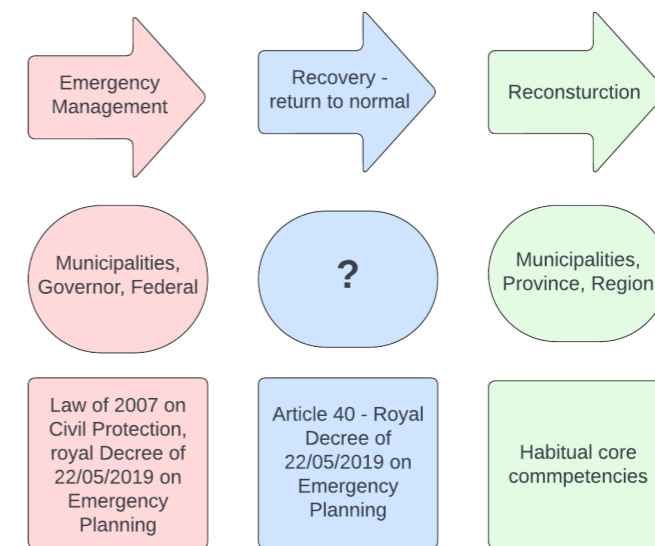


Figure 13. Key aspects in return to normal gap assessment

Source: Authors

This update of the legal framework was the result of the experience of the management of the terrorist attacks of March 22nd, 2016 in Brussels and Zaventem, following which the recovery period was particularly long, given the uncertainties regarding the residual risk.

In the context of the floods of July 2021, the recovery and even reconstruction phase already lasts years. This is an 'unthinkable part of our emergency planning system', as several respondents argued from various policy-levels (also Zeimetz et al. 2021). The Walloon government appointed two reconstruction commissioners to coordinate this recovery phase. There were some difficulties in distributing competencies in the aftercare/return to a normal period. As a crisis manager at National Crisis Centre explained:

*"I think that there should be better coordination between the various authorities (federal and Regional) in aftercare. That has been difficult. In between, there is a transition phase where you must be active in both phases and make sure everyone has the right information."* (Personal interview, FPS-1, 22/06/2022).

Once the National Crisis Centre has all the conclusions from the various studies and expert group reports about the 2021 Summer Floods, the NCCN wanted to set up a new project to review the legal basis of everything that is emergency planning

and crisis management. It also aimed to anchor several principles that are now commonplace in legislative texts. Moreover, the legislation concerning national emergency planning is argued to be outdated, so it needs updating. In the context of the political discourse on the matter, it was pointed out that the Walloon Region was still in crisis even a year after the floods. It appeared obvious that Article 40 of the Royal Decree (2019) on the procedure for the recovery period must be reworked without delay. This fact raises the question of the means of action of the local authority that must take charge of this recovery.

Furthermore, the crisis highlighted a significant permeability or interpenetration in the management phases (similar as in the COVID-19 crisis). The governor of Namur argued:

*“We have seen the concomitance of several federal phases for different phenomena. We have seen communal phases triggered while we were in the provincial or even federal phase. We saw phases that followed each other from provincial to federal and then back to provincial. We saw phases that were triggered as a preventive measure, particularly by the municipalities. Sometimes using BE-ALERT, but not only”* (Prov. 2, speech in May 2022).

Certain officials, such as the Governor of Namur, expressed reservations about the practicality of reconciling the sequential and interconnected nature of various phases with the stipulations outlined in Article 40. It is conceivable that the overseeing authority assumes responsibility for strategic emergency coordination, whereas the mayor’s role primarily encompasses operational coordination and safeguarding the holistic recovery strategy’s coherence. This aspect further contributes to the overarching discourse concerning effective courses of action. The scrutiny directed towards the progression of phases necessitates initiating a deliberation on the pragmatic viability of this recovery timeframe.

#### **Special Compensation schemes for (un)insured persons.**

In many cases, victims had no fire insurance because they could not afford it, leaving them without insurance to compensate for their house-related losses. To avoid complete despair for these uninsured citizens, the Walloon Government has granted them partial compensation through the Calamity Fund. The amount granted by the Government – after application by the victim and a significant waiting time – was reported to be less than what they would have received if they had been insured with a fire insurance. The argument went on that it is not a question of encouraging people not to insure themselves but rather that exceptional circumstances call for exceptional measures. This special scheme applies to the affected citizens of the 209 municipalities that have been recognised as a public natural disaster following the floods<sup>67</sup>.

While all the municipalities of the provinces of Liège (84), Namur (38) and Luxembourg (44) were subject to a “natural disaster” recognition for the floods, this was not the case for other Walloon provinces<sup>68</sup>. Among these municipalities, a categorisation has been established to determine the amount of regional aid. As of 23 September 2021, the categorisation is as follows.

- Category 1 corresponds to the ten municipalities most affected by the floods: Chaudfontaine, Esneux, Eupen, Liège, Limbourg, Pepinster, Rochefort, Theux, Trooz and Verviers. Three out of the ten most affected communes receive 100% of what is needed to rebuild the destroyed infrastructure from the Walloon Region, while for the other seven only 90% is covered by funds of the Walloon region. Amongst the latter is the commune of Verviers, which has €40 mn of damage. Thus, 10% of the damages had to be covered by the commune. The reasons are unclear and considered unfair by the mayors of these municipalities. Especially, “while the finances of the communes are already under strain” argued the mayor of Verviers (RTBF Info, Jan. 2022).
- Category 2 is made up of municipalities with a small disaster area or a large area with significant damage, dozens of families to be rehoused, as well as between 100 and 500 homes affected to varying degrees, which will have to carry out major one-off renovation work on certain roads or in public buildings and which have had to evacuate a large amount of waste<sup>69</sup>.
- Category 3 includes all the other communes affected by natural disasters that are not in the first two categories.

<sup>67</sup> Walloon government decree of 14/10/2021, “Arrêté du Gouvernement wallon portant exécution du décret du 23 septembre 2021 instituant un régime particulier d’indemnisation de certains dommages causés par les inondations et pluies abondantes survenues du 14 au 16 juillet 2021 ainsi que le 24 juillet 2021 et reconnues en tant que calamité naturelle publique », available online : <https://wallex.wallonie.be/eli/arrete/2021/10/14/2021022261/2021/10/20>

<sup>68</sup> <https://www.wallonie.be/fr/actualites/inondations-202-communes-wallonnes-reconnues-comme-calamites-naturelles>

<sup>69</sup> Aiseau-Presles, Amay, Aywaille, Baelen, Châtelet, Comblain-au-Pont, Dalhem, Durbuy, Ferrières, Hamoir, Ham-sur-Heure-Nalinnes, Hotton, Houyet, Jalhay, La Roche-en-Ardenne, Marche-en-Famenne, Nassogne, Olne, Ottignies-Louvain-la-Neuve, Rendeux, Soumagne, Spa, Stavelot, Tubize, Walcourt, Wanze and Wavre.

The amount of compensation for damage caused to public property (excluding schools) located on the territory of municipalities falling under category 2 and category 3, is respectively limited to 80% and 70% of the amount of the damage (Article 17 of the Walloon Order of 14 October 2021<sup>70</sup>).

### **3.6 Identified blind spots in risk culture and impediments to learning from the crisis**

#### *Learning from the crisis - are blind spots resulting from a lack of risk culture?*

It is often said not to “let a good crisis go unused”, meaning to make changes based on the mistakes made and continue to carry the lessons learned. The various stakeholders, from policymakers to emergency rescue services, did not take enough time to meet, get to know each other’s specificities and learn about the crises they have gone through. Several interviews and reports pointed out that there should be more space given to lessons learned (Brunet et al. 2019).

Amidst and after the flood crisis, all evaluated policymakers concurred that the 2021 flood crises (in conjunction with COVID-19) led to numerous and escalating interactions among the distinct tiers of authority. Most policymakers emphasised the pivotal role of governors in crisis management and emergencies, notwithstanding a prevailing trend of diminishing competencies<sup>71</sup> at the provincial level in recent decades. It is noted that the frequency and intensity of interactions among authorities has grown following the floods:

*“From February 2020 to July 2021, we had more than 600 meetings exclusively or mainly, including about 60 meetings with the burgomasters to establish and maintain this interactive link with the provincial level. (...) Videoconferencing has helped us a great deal in organising these contacts and meetings, but I think that this, too, was essential for me and for the local authorities.”* (Prov. 2, governor of Namur, 13/05/2022)

Emergency planning also aims to generate a learning process between all the actors involved in managing a crisis at both strategic and operational levels. Thus, interdisciplinary exercises are organised to test emergency plans and familiarize actors so they can coordinate outside of a crisis. Feedback from crises and exercises is generally presented as the main driver for improving the risk management cycle. Their purpose is to generate a group learning process. Analysing crises and exercises through debriefings and feedback allows for a learning process by drawing lessons from the past to improve future crisis management. The Royal Decree of May 22nd, 2019 requires the organisation of multidisciplinary exercises regularly (at least annually) to test and adapt existing emergency planning. Yet, actors in the field agreed that there is generally a lack of a multidisciplinary learning culture and sufficient resources: actors faced a lack of teaching, remembering, and sharing previous emergencies (also Zeimetz et al., 2022, citing Fallon & Thiry, 2019).

Besides the lack of debriefing culture in Belgium, it’s not always possible to learn from all crises and exercises due to various reasons. After a crisis, the dynamics of debriefing and reporting can be slowed down by the traumatic nature of the events for the actors and by the question of civil liability, ongoing legal proceedings, or even a parliamentary commission. This issue of accountability through feedback is also highlighted in the literature (Gaillard, 2008; Gauthey, 2008, Mbaye, 2009, 2010; Marsden, 2014):

*“The objective of accountability is detrimental to the understanding of the accident since it tends to exacerbate the defensive reactions of those involved”* (Mbaye, 2009, own translation).

But beyond these aspects, specific to the most serious crises, practical elements also limit the possibility of actors engaging in a crisis and exercising the feedback process. Four issues are raised by the actors in the field (Thiry et al. 2019) as shown in Figure 14 below.

<sup>70</sup> 14 October 2021 - Order of the Walloon Government implementing the Decree of 23 September 2021 establishing a special compensation scheme for certain damage caused by the flooding and heavy rainfall that occurred from 14 to 16 July 2021 and on 24 July 2021 and was recognised as a natural public disaster (M.B. 20.10.2021). See: [Législation/indemnisation inondations pluies calamité \(wallonie.be\)](https://www.wallonie.be/fr/legislation/indemnisation-inondations-pluies-calamite-wallonie-be)

<sup>71</sup> By risk culture, we follow Schmitz et al (2023: 39), who define this notion as “awareness of the dangers faced by a network of actors in a given territory, as well as the vulnerabilities of this network (crisis awareness) and the desire to prevent these risks and reduce the vulnerabilities of the network of actors concerned. This awareness is based on a collective and individual memory dimension (crisis memory).”



**Figure 14.** Difficulties faced by crisis actors in engaging in feedback processes (drawn from: Gaillard (2008), Gauthey (2008) Marsden, (2014).

*Risk and crisis management culture at the local authority level: important variation between municipalities*

A notable disparity exists among municipalities in terms of their flood-specific plans, connection to the “Be Alert” alarm network, and investments in “emergency planning.” The level of preparedness among authorities and the professional capabilities of “Planu” coordinators vary significantly across different municipalities (a.o. Mun. 1, Mun. 3, Mun. 4, Assoc. Reg. 5; 2022). Multidisciplinary exercises and plan updates are often lacking, contributing to these disparities.

In addition, administrative bodies overseeing dams have developed internal emergency plans shared with local officials and the Governor’s office. However, there is a deficiency in establishing communication networks and collaborative practices to facilitate coordination with local authorities and rescue areas during crises. An illustrative case is that of Eupen’s mayor attempting, unsuccessfully, to contact dam managers during the peak load shedding between July 14th and 15th. The “handling note” outlines the dam operator’s crisis response plan. Additionally, SPW directorates can offer expert support (DGH, DCENN, CRC) to municipal, provincial, or federal crisis units. Yet, the effectiveness of such shared responsibilities relies on a comprehensive understanding of each partner’s crisis management and risk management roles, a state not uniformly achieved across all domains. Zeimetz et al. (2021) argue that such a sharing of competencies can only work if all stakeholders have comprehensive familiarity with each sector (health, recovery, response, insurance, etc...) crises and risk management responsibilities.





## 4. Discussion

### 4.1 Interpretation of findings

#### *Untangling complexity: national and international operational solutions for navigating Belgium's Flood Risk Governance and Crisis Management Web*

Our first controversy relates to the question: are governance arrangements too complex in Belgium to be operational? Belgium has a very complex (flood) risk management and governance system (Zeimetz et al., 2021), as it also has for climate policy, in general (Dupont, 2020; Reybrouck, 2023). There is a general lack of understanding and clarity within the Belgian disaster risk management system, particularly for flood events, regarding responsibility and governance. During the floods, interviewed government stakeholders said they often faced delays in actions and decisions due to a lack of clarity concerning competencies in comparison to other agencies and organizations. The complexity of the governance structure and issues related to responsibilities and task priorities further contributed to these challenges, emphasizing the need to review and address these misunderstandings and blind spots in the system, particularly in the context of environmental (risk) matters.

We found that strategic and operational management concepts are often muddled in the field. This led to debates and confusion during and after the emergency response. The legislation concerning the composition of coordination committees lacks clarity. To understand how these committees are structured, one must compare different texts. For example, according to Belgian law (Royal Decree 22/05/2019), it is required that the mayor be present at the crisis coordination committee that pertains to his/her jurisdiction. Therefore, the mayor should be located within his/her municipal administration, where strategic decisions for the area are typically made. This debate about the appropriate role of the mayor and even the governor in direct ground-level actions versus strategic decision-making is not new. Historically, they were tempted to involve themselves in on-the-ground activities, despite their primary role being at the strategic level. It is crucial for them to have advisors around them to assist in making practical decisions. Effective communication between the mayor/governor and their D5 (Communication Discipline) officer is also vital to relay instructions to the public. Overinvolvement on the ground may hinder this communication, as per interviews with policy officers in 2022.

Furthermore, our results show that if a crisis management support team is called, it will join the coordination cell at the level where the support was requested. Extending support to other coordination cells at other levels may make sense. Beyond the coordination cells described in the legislation, intermediate forms are still possible in practice. These often arise out of necessity or to ensure better coordination. When scaling up, the coordination cells should be de-duplicated. This means there must also be twice as many people to fill all roles. A merger of two coordination cells can provide a solution here. Even with a limited number of experts, a merger can make sense. When establishing a crisis management support team, Belgium should also consider its four neighbouring countries and their way of crisis management. If a coordination cell is established abroad, it is desirable to station a liaison there to ensure a smooth flow of information. The so-called 'learning Commission' set up by the Ministry of Home Affairs proposes to strengthen and formalize the possibility for a higher authority to support the coordination action undertaken by a local authority - without changing the level of management. This would make it possible to deploy new resources, expertise, and professionalism without sacrificing the level of local knowledge or the importance of local authority investment at the strategic level (Schmitz et al., 2023).

The 'Learning report' commissioned by Home Affairs, also highlights the absence of a General Emergency and Response Plan in several municipalities, or the failure of those that have one to update it (Schmitz et al. 2023). According to the data collected, this can be explained, firstly, by a lack of awareness of emergency planning on the part of local authorities; by the limited resources available to small municipalities to provide dedicated human resources trained in emergency planning (besides the Planu); and by the absence of legal constraints if these preventive measures are not put in place. Respondents would prefer "shorter, more pragmatic sheets", focusing more on the human, material, and logistical resources available (Sbaraglia & Saeys, 2022). The provinces have substantial and varied resources which could effectively support the work of the crisis management response services and add value to it. There is a legal basis for developing this cooperation, but it is insufficient and not entirely

suited to the objective pursued<sup>72</sup>. This cooperation needs to be enshrined in regulations to enable structured and effective dialogue and implementation (Schmitz et al., 2023).

Finally, it thus became evident that regional (water) agencies lacked awareness of existing coordination mechanisms and/or did not sufficiently enter transregional and interfederal dialogue. Hence, the utilization of disparate methodologies by these agencies in generating flood risk data currently results in incongruent flood risk mappings across Belgian regions. This inconsistency poses a significant challenge to effective flood risk management and underscores the need for enhanced coordination and standardization within the governance framework. The newly formed Climate Risk Assessment Centre (Cerac), in collaboration with the National Crisis Centre (NCCN), ought to specify protocols for standardizing risk assessment methodologies across both regional and federal entities.

#### *Breaking the silence: unraveling communication blind spots in Belgian Flood Crisis Management*

Regarding communication, politicians and policymakers faced significant criticisms, by other stakeholders - including in the media - due to various major issues that were observed.

- First, concerning the unprecedentedness of the 2021 Summer floods in Wallonia, there have been several 'unprecedented situations' that both citizens and policymakers have encountered, which bear some resemblance to these flash flood events (Halbardier & Becker, 2021). Nevertheless, during interviews, citizens and civil society organizations (CSOs) emphasized that policymakers should not use this as an excuse to avoid accountability for shortcomings in flood risk management. They stated the importance of assuming political responsibility, acting with due diligence, and proactively preventing the catastrophic impacts of weather events that, under good governance structures, should be manageable. Given that every Walloon municipality has faced at least one flood since 1993, the entire region of Wallonia is vulnerable to flooding. The 15 sub-basins in Wallonia have been identified as areas with a substantial potential flood risk (Halbardier & Becker, 2021). Flooding has been a recurring issue in Wallonia for several decades, often exacerbated by factors like soil artificialization and agricultural land management. In this regard, the occurrence of this 'natural' disaster should not have caught anyone by surprise and should not have been framed as such.
- Second, we could discuss the notion of 'crisis' management - what's in a name? The notion of crisis, incidentally, shares its etymological basis with the notion of critique, as both derive from the Greek word *krinein* - 'judge', 'decide'. A crisis, especially if it endures and worsens despite decades of efforts to tackle it, asks for an assessment of its origins and possible solutions (Pellizzoni et al., 2022). The crisis surprised political leaders while breaking the routine of state bureaucracies. Most decisionmakers in Belgium insisted in their discourses that it was not "a crisis" but an "unprecedented, terrible disaster." This could perhaps justify the impossibility for politicians and policymakers of reacting with the necessary means to avoid human and material losses. Unlike an 'ordinary' crime or accident, a disaster is characterised by its large-scale nature with far-reaching consequences<sup>73</sup>. In addition to its scale, a disaster is usually characterised by the absence of a direct link between the perpetrator (e.g., the terrorist) or the act (e.g., a flood) and the victim or injured party (citizens in the Vesdre Valley in Wallonia, Belgium). Two months after the events, the floods were recognised by Belgian public authorities as a "Public natural calamity" ("calamité naturelle publique"). This is important for accountability and legal consequences (liabilities), including insurance issues. These floods, mainly caused by the so-called 'Bernd' weather system, went beyond the existing framework: they were an unthinkable part of the Belgian emergency planning model (also Zeimetz et al., 2021). Using precise terminology helps ensure that everyone involved in flood risk management understands the severity and urgency of the situation. Defining a situation as a "crisis", affecting "national security" - two notions which are not defined in Belgian law -

<sup>72</sup> Law of 15 May 2007 relating to Civil Security, Art. 10: "The provinces, communes and zones may be required to make available to the civil security services the land, premises, furniture and supplies necessary either for the training of the personnel of the said services or for the execution of civil security measures on their territory. The King determines in which cases and under which conditions compensation may be granted"(Own translation).

<sup>73</sup> According to the United Nations Office for Disaster Risk Reduction (UNISDR), disaster management means "the organisation, planning and application of measures preparing for, responding to and recovering from disasters." (<https://www.undrr.org/#letter-d>). The first part of the definition focuses on management (organisation, planning and application of measures) while the second part clearly addresses three phases: preparation, response and recovery.

may prompt the activation of specific protocols or the implementation of emergency measures. Ministerial decrees are used in times of crisis (cf. COVID-19) and urgency instead of letting the parliaments/national assemblies do their legislative work.

- Third, while the public authorities are willing to involve citizens, there are practical issues to its implementation. Emergency planning and crisis communication are essential steps in the risk cycle. However, they currently rely, especially at local level, on two people: the Emergency Planning Coordinator and the Information Officer (D5). These are important and difficult tasks for which they are responsible. Yet, their profile, level of training and involvement vary widely. A proper status should thus be defined for these officials, with proper trainings, and mutualization schemes for smaller municipalities (Schmitz et al., 2023: p. 39). This standardization could allow for the better utilization of citizen involvement in emergency planning and crisis communication.

Wallonia still lacks a large-scale active communication program regarding flood risks. This approach involves the organisation of, for example, workshops in which different aspects of the FRM planning are explained to the participants. The authorities sometimes disseminate flood risk-related information via reports and leaflets; however, these are mostly limited in edition and spatial spread. Passive communication is realised through the availability of web maps with flood information. The use of flood maps is encouraged by the EU Floods Directive as a basis for FRM (Meyer et al. 2012). Therefore, it would be useful to expand the Team D5's territorial coverage and consolidate the D5's status as a discipline (Schmitz et al. 2023).

In addition to the requirement of improved proactive risk communication before floods, there is an equally pressing necessity for such communication during and after flooding incidents. For instance, significant challenges arose when attempting to organize and coordinate the substantial influx of donations and volunteer personnel in the field. Stakeholders conveyed surprise and deep gratitude for the multitude of volunteers and the overwhelming volume of donations pouring into the affected areas, which even crossed Regional and language boundaries. However, effectively managing this display of national unity and support seemed nearly unattainable for local authorities. Authorities at different levels of governance encountered difficulties in overseeing and orchestrating the numerous voluntary assistants, which resulted in heightened stress related to donation management. Strikingly, these intricacies have not been comprehensively addressed in the recommendations presented across various reports (Zeimetz et al. 2021; Michaud et al. 2021; Szönyi et al. 2022; Céder et al. 2021).

A partial dissatisfaction of affected people with state-led support, particularly from the higher policy levels, was recurrent in the discourses of citizens and associations. As one citizen expressed in the Vesdre Valley: “The rain also flushed away the trust in politics” (personal interview, Cit. 5, Trooz, May 2022). Moreover, along the same line as a study conducted in the US (American Red Cross, 2010) and a study commissioned by the Dutch police in 2012 (Johanninck et al. 2012), our respondents believed that social media could be used better in emergency situations.

Information gathering is important strategically: as a process in crisis management and operationally by gathering relevant information (Bruelemans et al. 2015). However, it is tactically crucial to consider the downside of information, for example, when it becomes too involved for actors who do not consider this their main role. Management officials should not be viewed as data collectors or prevention actors. Often, there is a misconception that these officials are responsible for data collection and even the prevention of events like floods. The analysis of data, particularly in the context of floods, can be highly technical and complex. Instead, the emphasis should be on facilitating communication between analysts and managers who are responsible for implementing prepared procedures.

Administrative authorities may also need to take precautionary measures, such as putting their coordination committees on standby. It is not practical for these authorities to constantly search for information in various sources, as this could delay the activation of predefined flood response procedures. Establishing a structured input system, like the (new) CELEX (Cellule d'Experts), is vital and can benefit from further clarification to enhance its role in the process. This CELEX assembles experts from the RMI, including weather forecasters and hydrologists. When the RMI issues an alarm code orange, they are automatically convened in an online video meeting (and, in some cases, already at code yellow). This allows governors, local administrations, and emergency services to be briefed quickly on the situation and know where difficulties might arise.

In this vein, setting up partnerships with a plurality of scientific, political and citizen actors would be wise, as pointed out at the

second Walloon Resilience Congress (SPW Développement Durable, 2021b). They can also generate and enhance data through training in methodologies, centralisation, homogenisation, dissemination, and making existing data more visible, and play an advisory and decision-making role in facilitating the implementation of actions. It is necessary to consider the link between the observations made and the implementation of concrete actions. The production of observations and knowledge by the various observatories (administration departments, academic labs, etc.) is meant to improve the resilience of Wallonia to environmental risks. However, communication and exchange of information could be improved when these observatories know they exist. Therefore, having an overview of existing observatories in Wallonia would allow us to know the themes they deal with, their operating methods, the needs and expectations, and the existing data at the scale of the territory.

#### *Preparedness for forecasting clarity: navigating communication challenges and climate scenario gaps in Belgian Flood Management*

In addition to these communication challenges, the lack of usable climate scenarios in Belgium was identified as a key concern. Although alerts were issued two days before the flood, they were often indistinguishable from the routine alerts that the Province of Liège regularly received. The authorities found it difficult to predict the scale of the disaster. The first preparatory measures were those taken as in the event of a normal flood. One of the problems highlighted was the fact that the warnings issued by the Royal Meteorological Institute (RMI) were not associated with explicit risks - it was impossible to predict how high the water would rise and for how long, which made it difficult to take appropriate measures. In addition, the fragmentation of responsibilities between the federal government, which is responsible for the RMI, and the Regions, who are responsible for waterways, made it difficult to provide comprehensive information. As there were no automatic measures associated with alerts, time-consuming consultation was required.

Effective communication between various departments and sectors is crucial in disaster management. However, it is often observed that this communication is not as clear as it should be. Concerns were raised about the technical nature of messages from institutions like the RMI. Officers at the Walloon Crisis Center have pointed out that these messages might be too complex, too technical and lacked clarity to understand fully. For example, rainfall forecasts were presented in terms of millimetres rainfall in time intervals like one hour, three hours, one day, or three days, making it challenging for local decision-makers and first responders to understand the expected impacts. Consequently, the governor of Liège decided not to use the Be-alert system, as issuing global evacuation, or sheltering instructions was impractical due to varying conditions on different streets. This highlighted the need for more timely and actionable information.

Initially, the July floods were addressed as routine occurrences, but the transition to local emergency protocols occurred chaotically, prompted less by official alerts from RMI than by an immediate recognition of the looming danger. This phenomenon was compounded by the disaster within the disaster, as several municipal buildings, works departments, barracks, etc. were also flooded. At provincial level, there was a lack of overall vision, mainly due to the absence of tools for visualising the situation (Schmitz et al. 2023; Sbaraglia & Saeys, 2022). Additionally, when crucial decisions, such as opening the Monsin dam, were made to prevent flooding in Liège, the information provided was often not readily interpretable by the recipients. Rather than receiving information about potential flood heights and impacted areas, they were given technical data, creating confusion. This lack of usable information meant that many residents and first responders were caught off guard by the flooding. Local authorities had to take their own initiative to warn and protect residents, reinforcing the need for more comprehensible weather forecasts and timely warnings. In this regard, efforts were made to enhance the readability of alerts and improve response coordination through consultations with governors and administrations. Attempts are ongoing to improve the clarity of communication through platforms like Celex and the Paragon programme, which continuously refine their processes based on real-time data. A working group was also established at the Home Affairs level to review crisis management and propose solutions, aiming to rectify these communication challenges and ensure better preparedness for future weather-related events.

The expertise of crisis managers also varies greatly. While crisis managers in provinces and big cities are trained intensively and are regularly confronted with crisis events, their colleagues in smaller municipalities and more rural provinces experience crisis situations less regularly and do not have a similar capacity to build up a professional crisis response structure. However, in general, an evolution can be observed towards higher professionalisation (Meeusen, 2017; Brunet et al. 2019). The federal government is, for example, currently assembling a mobile expert pool of communication officials that can assist local

governments during emergencies. The Higher Institute of Emergency Planning is assigned to spread new insights and best practices to a wider public and to follow up research projects on crisis management.<sup>74</sup>

High-resolution climate scenarios are essential for developing effective climate adaptation policies. They need to be adapted to the diverse needs of various sectors, considering uncertainties and international standards like those used in the IPCC 6th Assessment Report. The development and refinement of consistent climate scenarios in Belgium should prioritize meeting the requirements of potential users, making them a valuable resource for assessing impacts and vulnerabilities across different sectors (see CORDEX II – project<sup>75</sup>).

Belgium has also seen private technology companies like Google contribute to improved preparedness. Google's Floodhub now provides flood forecasts for several rivers in the country (including the Vesdre, Amblève and Ourthe) offering predictions up to seven days in advance using machine learning. While such technology has its uses, it primarily serves as a broad pre-warning system. The government's models, on the other hand, are more precise on a local scale and consider in-depth knowledge and experiences related to water systems (FPS-8; Belga, 2023).

Moreover, lessons have been learned from past flood events, especially those of July 2021. The RMI realized that the implications of its forecasts were not always clear to the relevant services, leading to misunderstandings about flood risks. The RMI's role is to predict weather conditions, not the resulting impacts. Governors had relied on the RMI's warnings to assess the gravity of situations, if other services would raise alarms based on these forecasts. To address this, the RMI now provides additional context to its forecasts during emergency situations. Additionally, the Walloon hydrological service launched a new website to provide better and more accurate information on precipitation, water levels, and flows to both the public and local authorities, enhancing clarity in communication. The National Crisis Centre recognizes the importance of expanding communication channels through initiatives like digital information boards in public spaces (for example, in train stations and hospitals) to ensure that citizens receive relevant information effectively (NCCN, 2023: 16).

Finally, the info-risques.be website (currently hosted on the web platform of the National Crisis Centre) could also be further developed into a single information portal on public safety in the citizens' safety in the broadest sense (fire safety, emergency situations, physical safety digital security, anti-burglary security, road safety, etc.) and provide tools that would contribute to strengthening global resilience, taking into account a unified graphic charter (Schmitz et al., 2023).

#### *Citizen engagement, whilst maintaining strong policies and governmental accountability?*

There is a growing discourse about the need to involve citizens in strengthening risk management at the community level, particularly in the context of flood preparedness. Most crisis managers believed that flood preparation should be a shared responsibility between the government and citizens. However, it is also commonly assumed that citizens may lack the inclination for such responsibilities due to the infrequent nature of floods and the existing reliance on well-functioning crisis management structures. As a result, there's been little effort to enhance self-reliance, and spontaneous volunteering is rarely utilized, despite the presence of national volunteer networks like "Citizens Can." Opinions regarding the desirability of volunteers vary widely, with concerns often raised about the coordination and management complexities.

The involvement of citizens in flood risk management is generally seen by most respondents as essential for improving observation and risk identification (also Davids, 2021). Citizens, who may sometimes feel powerless in the face of environmental risks, can contribute valuable "situated" knowledge based on their experiences. This citizen expertise is arguably equally significant as that of experts in flood risk management. Citizen engagement can occur at different levels in observatory practices, such as defining research themes, establishing protocols, collecting data, and analysing results.

However, effective management of this participation necessitates the means and skills to facilitate, train, and animate citizen groups, as outlined in the recommendations of the Walloon Resilience Congress (SPW Développement Durable, 2021b, 2022). Additionally, the policymakers are exploring avenues to involve private insurance companies in flood risk management.

<sup>74</sup> Article 1 of the Royal Decree of 29 July 1991 on Higher Institute for Emergency Planning. See also: the 5/12/2011 - Royal Decree amending the Royal Decree of July 29, 1991 establishing a Higher Institute for Emergency Planning.

<sup>75</sup> See: [KMI \(meteo.be\)](https://www.kmi.meteo.be)



While home insurance policies in Belgium are not mandatory, the government imposes requirements for insuring against certain risks, including natural disasters. However, these policies often have limitations, such as compensation caps and financial ceilings. As a result, a disaster fund known as the Calamity Fund was established in 1976 to provide financial compensation for citizens and businesses affected by government-recognized natural disasters. After the floods, discussions have emerged about enhancing the insurance sector's ability to respond to losses caused by climatic events and integrating climate risks into insurance schemes. The Walloon regional authorities decided to provide financial support for the reconstruction of uninsured citizens who had built homes in flood-prone areas (red zones). This decision illustrates the significance of citizen considerations in policymaking, emphasizing the need to address the challenges and vulnerabilities of those living in flood-prone Regions. The Walloon Minister-president has advocated for an insurance mechanism that considers climate change and requested a revision of the 2014 law to raise the cap for insurers' intervention during natural disasters. This adjustment is crucial given the evolving realities and substantial costs associated with such events, and it involves negotiation between insurers and the government to ensure compensation for affected parties. Nevertheless, these processes are hampered by the slow administrative procedures, impacting the assessment and reconstruction efforts following the floods.

Increased integration of citizens and citizen associations in flood risk management is essential, as highlighted by the findings of the study. The Walloon Parliamentary Inquiry Commission's 161 recommendations for flood risk management are criticized for insufficiently involving citizens in the process, with explicit mention of citizen involvement occurring only once (recommendation 34). This limited engagement is seen as inadequate by most stakeholders who believe that citizens should play a more significant role in co-constructing adaptation strategies and policies, especially at the local level. They stress the importance of bottom-up approaches that consider the real-life situations on the ground and the responsibilities of various stakeholders. government increasingly emphasises the necessity to share responsibilities concerning FRG with the population at large. While this approach should strengthen society's resilience to flooding, "it is at odds with the traditional management pursued in the country, which considers flood risk management as a governmental responsibility" (Mees, 2017: 80).

Stakeholders recommend promoting and strengthening citizen participation in environmental risk adaptation policies, particularly at the local level, by considering their specific concerns and constraints in participatory processes. Inclusivity was argued to be a key principle, allowing diverse participants, including marginalized groups, to have a voice in the decision-making process. The goal is to empower all stakeholders involved in adaptation efforts and increase the acceptance of the measures. To achieve this, various methods can be employed, such as citizen panels, consultative commissions with parliaments, and citizen dialogues. The emphasis is on creating a sense of belonging and strong involvement for citizens throughout the participatory process. This can be done by tailoring the mechanisms based on civil society's demands and citizens' experiences, ensuring effective communication about these processes, preparing citizens adequately before meetings, and accommodating the constraints of their professional lives (SPW Développement Durable, 2021b, 2022).

### *Recovery tracks to step out of the crisis*

The post-disaster situation in Wallonia highlights a complex and multifaceted challenge in the return to normalcy following a significant crisis like the historic floods of July 2021. In Belgium, recovery is currently a nebulous stage in the monitoring of collective emergency situations. Little attention is devoted to this period in Belgian legislation apart from Article 40 of the Royal Decree of 22 May 2019; Several key points deserve critical consideration.

First, Wallonia's adaptation measures integrated into the Air Climate Energy Plan and the subsequent Walloon Recovery Plan demonstrate a certain willingness to address climate-related risks. However, there appears to be a disconnect between the adaptation plan and recovery efforts, suggesting a need for better coordination and alignment between climate and recovery strategies. The major "Walloon Recovery Plan", reoriented after the 2021 summer floods, seem to a significant way forward in this regard (see the reports of 2022 on the SPW-website: Plan de relance de la Wallonie). The federated entities should – maybe with some additional 'light' legislation - be able to coordinate the recovery period<sup>76</sup>.

<sup>76</sup> According to the Learning Commission (Schmitz et al., 2023) the actual legal framework should allow this, as well as following the Opinion of 7 April 2021 of the Conseil d'Etat on the draft law on administrative police measures during an epidemic emergency (pandemic law).

Second, the "return to normal" stage is often overlooked in emergency and response plans. This oversight can result in prolonged recovery periods and a lack of clear guidance for citizens and authorities on how to transition 'back to normalcy', or ideally, towards a resilient society (CSR, 2022). The recognition of this gap and the introduction of a new Royal Decree chapter focused on the recovery period are steps in the right direction. The transition at the end of the emergency and, ultimately, the return to a state of post-disaster community functioning are crucial stages that require understanding and effective planning and preparation from the outset, even beforehand. National and international recommendations are unanimous on the need for careful ex ante preparation for recovery, whether in terms of pre-designated people, identification of the players involved, and the conclusion of protocols and framework agreements, support tools, etc. This preparation is also closely linked to assessment, of potential new vulnerabilities and integrating the lessons learned into future planning aimed at reducing risks and vulnerabilities, as well as response activities (Schmitz et al., 2023).

Third, the observation of concomitant phases at various administrative levels, from communal to provincial and federal, during crisis management in the emergency phase up till the recovery phase highlights the complexity of coordinating responses. Clarifying the roles and responsibilities of different authorities in the phases of disaster management is crucial to ensuring effective and efficient responses. The results indicate that Article 40 of the Royal Decree of 2019 should be ambitiously adapted, updated and rewritten, including the idea of the designation of a Recovery Coordinator, i.e. a permanent coordinator seconded at least to the Governors' federal departments (Services fédéraux auprès des Gouverneurs). They will be responsible, as head of this evolutive body, for preparing and planning the strategy. In the event of a collective emergency and during the acute phase, it could advise the authority on anticipation and supports the implementation of reflex actions linked to recovery. It would be able to set up a "recovery" unit to avoid any discontinuity in decisions during the transition period. After the acute phase and if necessary, this unit would be responsible for implementing the Recovery Management Committee, a supralocal coordination structure adapted to recovery (Schmitz et al., 2023).

Finally, the special compensation scheme for uninsured citizens through the Calamity Fund is a commendable step to provide some relief to those without insurance (CSR, 2022). However, it raises questions about the balance between encouraging insurance coverage and providing support in exceptional circumstances. The categorization of municipalities for aid distribution also needs transparency and fairness.

In summary, the challenges faced in the post-disaster phase in Wallonia reveal the need for improved coordination, clarity in roles and responsibilities, as well as a more comprehensive approach to disaster management that encompasses the "return to normal" stage. Recovery should thus not be seen as a "return to normal", but, more ambitiously, as a window of opportunity to "build back better" according to the Build Back Better concept of the 2015 Sendai framework (UNISDR, 2015, Priority 4). Moreover, the success of this recovery will depend directly on its preparation. These issues are not unique to Wallonia and may be relevant to other Regions and nations facing similar climate-related crises. Lessons learned from such experiences can inform better disaster preparedness and response strategies.

As a future research direction, exploring the implementation of "build back better" requirements within climate change adaptation policies rather than solely in response to disasters could enhance solidarity and emergency aid reserves. The integration of the 'Build Back Better' principle into broader eligibility criteria, particularly expanding its application beyond infrastructure restoration (cf. article 3 EUSF), warrants further investigation to align with evolving risk prevention principles.

### *Identified gaps in 'risk culture' or 'shared adaptation culture' and impediments to learning from the crisis*

There is a "crying need for a risk culture" among the population. This is one of the conclusions from most of the conferences and reports, inclusive of the learning commission set up by the federal Minister of the Interior (Schmitz et al. 2023). Depending on the authority's function, the notion of adaptation culture is preferred compared to risk culture.<sup>77</sup> The report commissioned by the Federal Home Affairs Minister also stressed the "very poor preparation of the population for crisis management and, more broadly, for a culture of risk" (Schmitz et al. 2023). Among the recurring themes, is the difficulty of deciding on evacuation orders and convincing the population to evacuate.

<sup>77</sup> For example, the Walloon Minister for Sustainable Development said: "We need to adapt to prevent future risks as far as possible, by building a shared culture of adaptation to our environmental vulnerabilities", (Belga, 28/01/2022, <https://www.7sur7.be/belgique/la-wallonie-a-montre-des-faiblesses-dans-la-gestion-de-la-crise-a0af2e29/>).

A risk culture appeared to be insufficiently installed in most of the affected communities, despite some interesting projects destined to increase a flood risk culture. The Flood Risk Culture project conducted from September 2019 to September 2021, the Escaut-Lys River Contract aimed to establish a model that encourages the active involvement of residents in reducing their susceptibility to flooding while educating them on sustainable coexistence with this natural occurrence. The primary objective of this initiative was no longer just flood prevention but focused on mitigating the consequences through effective information dissemination, increased awareness, and community engagement. The project aligns with various goals set by the P.L.U.I.E.S plan and the Walloon flood risk management plans<sup>78</sup>. The project exemplifies a proactive and community-driven approach to flood risk management, which could serve as a valuable model to bolster flood risk culture in Belgium. By engaging and educating residents, increasing data collection, and fostering a sense of preparedness and awareness, similar strategies can be employed to better manage and mitigate flood risks across the country.

In sum, doubt is inherent in decision-making. Because expert analyses are probably never completely unambiguous, risks still need to be assessed, and consequences only become clear after the event. Yet, public opinion and the media expect policymakers to be decisive when disasters occur. Not responding adequately or credibly (or at least the perception of it) can have disastrous consequences for the disaster and cause collateral damage from a political viewpoint.

This report therefore recommends the full application of the Sendai Framework for Action (2015-2030) (UNISDR, 2015), which advocates the development of a collective and shared culture of risk, i.e. the integration, both in the preparedness phase and in the management or recovery phase, of stakeholders from civil society, volunteers, institutions, university networks, businesses, associations and the media, associations and the media (also Schmitz et al., 2023).

Concerning disaster risk reduction, to enhance the capability of local authorities to exercise their competences, they need extra support from the national level at certain times. This can come in many forms and needs to be low tier and readily available. This could be extra skilled manpower, legal advice, or a direct link to the entire network of the national level with other authority levels. In addition, actively engaging local authorities in national-level exercises effectively underscores the significance and pertinence of their role, facilitating a genuine grassroots transmission of local issues and hurdles to the national level. Finally, regulatory frameworks should permit the organic or spontaneous formation or dissolution of local partnerships, enabling local authorities to consolidate resources as they see fit for maximum efficiency or advantage (also NCCN, 2023).

#### 4.2 Limitations – strengths and weaknesses of the study

##### *Strengths of the study*

This qualitative study on flood risk governance issues, using the case study of the floods in Belgium in July 2021, has several strengths. First the study utilizes a diverse range of data sources, including in-person interviews, media articles, grey literature review, speeches, and semi-directed interviews. This comprehensive approach ensures a rich dataset that captures multiple perspectives and experiences related to the flood events. The aim of the interviews with policymakers and broader public (citizens in impacted areas) was to supplement the media and grey literature (reports) data with an analysis of the policymakers' and local population's perception of the events.

These interviews had two main purposes. They allowed to structure the diagnoses made by public investigation reports and media stories. They added field data that were available through conventional measurement tools: presence of logjams, backflow from the drainage system (including in buildings), chronology of the rise in water level and of the peak of the flood, nature of the water (pollution, presence of mud etc.). Interviews with local population and stakeholders (including policymakers) provided a concrete representation of the flood experience of the policymakers and stakeholders (including some impacted citizens) by considering the preparation, adaptation, and repair measures that they may have adopted.

By combining various methodological devices for analysis (reports, published interviews, and in-person individual and collective interviews), the study enhances the robustness of its findings. It combines both qualitative and quantitative data sources, allowing for a more holistic understanding of the flood risk governance issues. The authors engaged a wide range of stakeholders, from decision-makers to citizens, NGOs, and local authorities. This broad spectrum of participants provides a well-rounded view of the flood events and governance responses. Data was collected both during and after the flood events, ensuring that the information is fresh and reflective of the immediate aftermath of the crisis. This timeliness can lead to more accurate recollection of events and experiences.

Finally, the use of individual and collective interviews, as well as the guarantee of high confidentiality, helps protect the privacy and rights of respondents, especially when discussing sensitive topics related to the crisis. The qualitative nature of the study allows for in-depth exploration of the perceptions, experiences, and behaviours of the participants. It provides a nuanced understanding of the flood events and governance responses.

##### *Weaknesses of the study*

In addressing the qualitative research conducted on the 2021 Summer floods, it is crucial to consider several inherent limitations that could impact the study's applicability and interpretation. This research primarily delves into the qualitative aspects, focusing on depth and detailed insights rather than breadth. Consequently, the findings might not be universally applicable across different populations or contexts due to the absence of a representative sample. This limitation restricts the ability to generalize the results broadly, which is a significant consideration for strategic discussions and decision-making processes. The subjective nature of qualitative research also introduces potential biases, both conscious and unconscious, which can influence the outcomes. The researchers and participants' perspectives and interpretations play a central role, which might affect the objectivity of the data collected. This subjectivity must be carefully managed to maintain the integrity and reliability of the research conclusions.

Furthermore, the politically sensitive nature of the 2021 Summer floods adds another layer of complexity. The researchers clarify that the objective was not to assign blame or engage in political debates. However, this sensitivity could influence the data collection and analysis phases, potentially leading to skewed or cautious participant responses. It is key for strategic discussions to acknowledge these dynamics to avoid misinterpretations that could lead to ineffective or misguided policy decisions. While the study benefits from integrating various data sources, there needs to be more quantitative data, which could provide additional statistical insights and patterns. The reliance on qualitative data necessitates rigorous interpretation, which inherently involves a degree of subjectivity. Ensuring the accuracy and reliability of these interpretations is paramount to deriving valid and actionable insights from the research. Lastly, the use of discourse analysis in this study simplifies the complex reality of public debates into a structured format by categorizing them into a limited number of discourses. While this approach aids in clarity and understanding, it also reduces the richness of the original data, potentially overlooking nuanced arguments and perspectives. This reductionist approach is practical for analysis but should be approached cautiously in strategic settings to ensure that critical details are preserved in the simplification process. In summary, while the qualitative study of the 2021 Summer floods provides valuable insights, it is essential for strategic discussions to critically evaluate the limitations related to generalizability, subjectivity, political sensitivities, lack of quantitative data, and the potential reductionism of discourse analysis. Acknowledging and addressing these factors will enhance the strategic use of the research findings in policy-making and organizational decision-making processes.

<sup>78</sup> Including, amongst others; Advising local residents on measures to decrease their vulnerability to floods, encompassing adjustments to their homes, businesses, and gardens; Promoting the participatory flood mapping system established by the SPW, which encourages local residents to contribute data on meteorological events, floods, and mudslides (This system could be integrated with a network of local weather stations for precise measurement of rainfall quantities and locations); etc. See: <https://www.crescautlys.be/projet/culture-risque-inondation/>

## 5. Concluding Notes

Flood risk management presents a formidable challenge, especially given the intricate and varied implications of flooding that Belgian society confronted during the summer of 2021. To address the set of challenges related to effective flood risk governance in Belgium, this report undertakes an evaluation of discourses and actions taken after the 2021 floods in Western Europe, that severely impacted Belgium, along with other neighbouring regions and countries. Our examination employs Dryzek's conceptual framework and discourse analysis methodology to illuminate the discursive landscape and its implications for policy and emergency response strategies. The discourse analysis pertaining to flood crisis management revealed six major blind spots (Complex Governance Structures, Communication issues, Responsibility for Preparedness, Engagement of Citizens, Transition to Normalcy, and Deficiency in Risk Culture).

To conclude, we have five primary considerations.

**First, the persistence of various 'blind spots' during the emergency and crisis response unveils communication and governance deficiencies within this domain.** Hence, while there was a general tendency to attribute blame, there were no significant actors who could be held clearly responsible for this historic disaster situation that impacted people and state assets in Wallonia. This lack of clarity among major policymakers and stakeholders largely stems from the intricate so-called "institutional lasagna" that characterises the Belgian federal system, comprising multiple complex layers. For a significant number of respondents, the roles of various pivotal actors remained ambiguous: who assumes what responsibilities during the emergency response? The absence of clear oversight and an often-unclear understanding of command hierarchy hindered effective communication. We reiterate that addressing these issues is imperative to bolster proactive risk communication both before and after disaster (flooding) incidents remain pertinent to ensure 'risk proofing' in settings of climate crises.

**Second, the feasibility of translating environmental knowledge, including climate impacts and their trajectory, into actionable measures is pivotal for bolstering resilience.** While ample reliable data exists to depict the state of the Walloon environment, substantial room for enhancement remains, particularly in terms of capacity factors. However, resources remain insufficient for enhancing short-term weather forecasts aimed at responding to extreme weather events. Precision in localized measurements is crucial for advancing effective impact forecasting. Collaborative efforts between pertinent federal and regional institutions could notably augment early-warning systems in the region that was affected by Summer Floods 2021, especially by refining the 'Be-alert' system. This aspect emerged as a prominent concern on the stakeholders' agenda. Belgium needs to prepare to face new types of crises in the future. Systemic and polymorphic crises, with domino effects, will shake the foundations of our society. They require us to change our current structure. The strongest response is most likely a network approach (Schmitz et al., 2023). However, this requires a certain level of preparation, an awareness that each sector must play an active role, and a collective confidence in the success of the network. It thus calls, in general, to shift the policymakers' approach of the Belgian federal system from 'dual federalism to cooperative federalism approach' (Reybrouck, 2023).

**Third, both affected citizens and civil society organizations have articulated disillusionment with the State's ability to promptly address their diverse urgent requirements.** Walloon public authorities have simultaneously navigated the transition from addressing human (psychological distress, post-traumatic burnout) to non-human (physical) recovery processes. However, these dual challenges remain unresolved. Several disillusioned respondents voiced that the floods of 2021 eroded their trust in political institutions. If policymakers across various government levels aim to amplify citizen participation and civil society engagement in flood risk management, they must demonstrate robust State support. Consequently, a disconnect looms between citizens' expectations from the government and the actual governmental capacity to mitigate risks swiftly and substantially.

**Fourth, regarding long-term trends, recurrent factors exacerbating risks across various environmental aspects include climate change, land reclassification, and intensive agriculture practices.** Prioritising the cessation of these exacerbating factors is essential for resilience strategies to be effective. While collaboration exists between preparedness and crisis management entities, there are avenues for enhancing the coordination of strategy and information exchange and 'blind spots' that need to be carefully cemented.

Finally, this Belgian region appears to have learned some lessons from the Summer Floods 2021. This is evident in relatively swift political reactions, such as establishing a fresh crisis cell, endeavors to produce clear and more actionable weather forecasts for decision-makers, and constructing reservoir dams with better water-holding capacity. Given the prevailing resource constraints in the discourse, there was increased funding for personnel to fortify crisis management. Furthermore, discrete progress has occurred behind the scenes through various initiatives (risk management policy expert groups, academic studies, Task Forces, and the Master Plan Vesdre). Some challenges are rooted in timing and temporality, with swift solutions required, while recovery policies unfold slowly. These challenges are closely aligned with the priority areas outlined in the UN Sendai Framework, which holds considerable utility in the recovery process. The lingering question remains: can Belgian governments exhibit robust recovery policies after inadequate prevention and preparedness measures? The urgency of this and related questions was recently again illustrated by the flooding events in the Yser (November 2023) and Dendre (January 2024) water basins. In both cases, the lack of coordination between Flanders, Wallonia, and France was again pointed at (Eelbode et al., 2023; Schoofs & Pauwels, 2024; VRT, 2024).

Overall, this discourse analysis of flood crisis management in Belgium highlights critical areas requiring immediate attention and systemic reform. Addressing communication gaps, enhancing predictive capabilities, and fostering cooperative federalism at the regional scale remain central steps toward building a resilient framework capable of managing future crises. Engaging citizens and strengthening governmental capacities will help bridge the gap between expectations and reality, ensuring more robust community involvement and trust in political and policy institutions. As Belgium learns from past events and moves towards a more integrated and proactive risk management approach, these lessons must translate into tangible improvements in disaster preparedness and response, more so as the state is in the process of setting and deploying agendas and actions to manage climate change impacts.



Charlotte Scheerens and Nidhi Nagabhatla presenting parts of this report at the UNCCD Pavilion at COP28 in Dubai.

## References

Albris, K. et al. (2019), “Causing wrong while doing good: on the question of liability for volunteers in emergencies”, *Environmental Hazards*, 20(2):1-14.

Alexander, M., Priest, S. & Mees, H. (2016), “A framework for evaluating flood risk governance.” *Environ Sci Pol*, 64:38–47. doi:10.1016/j.envsci.2016.06.004

Alexander, D.E. (2019), “L’Aquila, Central Italy, and the “disaster cycle”, 2009-2017”, *Disaster Prev. Manag. An Int. J.*, 28: 419-433. 10.1108/DPM-01-2018-0022.

American Red-Cross (2010), “Social media in disasters and emergencies”, presentation available at: <https://i.dell.com/sites/content/shared-content/campaigns/en/Documents/red-cross-survey-social-media-in-disasters-aug-2010.pdf>

Belga (2023), “Google voorspelt met AI-model nu ook overstromingen van Belgische rivieren | VRT NWS: nieuws”, 22/05/2023, <https://www.vrt.be/vrtnws/nl/2023/05/22/google-voorspelt-met-ai-model-overstromingen-van-belgische-rivie/>.

Blöschl, G., Kiss, A., Viglione, A. et al. (2020), “Current European flood-rich period exceptional compared with past 500 years”, *Nature*, 583: 560–566. <https://doi.org/10.1038/s41586-020-2478-3> <https://www.nature.com/articles/s41586-020-2478-3>.

Boin, A., Ekengren, M. & Rhinard, M., (2021), *Understanding the Creeping Crisis*, Palgrave Macmillan.

Bright, C.F. & Bagley, B. (2017), “Elections, news cycles, and attention to disasters”, *Disaster Prev Manag.*, 26(4): 471–478. doi: 10.1108/DPM-02-2017-0018

Brouyaux, F., Mormal, P., Tricot, Ch. & Vandiepenbeeck, M. (2004), *La Belgique au fil du temps – Les événements météorologiques marquants du vingtième siècle en Belgique*, Institut Royal Météorologique de Belgique, Ed. Le Roseau Vert.

Brunet, S., Fallon, C., Ozer, P., Schiffino, N., & Thiry, A. (Eds.) (2019), *Risques, planification d’urgence et gestion de crise*. Bruxelles: La Charte. <https://hdl.handle.net/2268/232524>

Castanheira, M., Rihoux, B. & Bandelow, C.B. (2017), *Sustainable Governance Indicators 2017: Belgium Report Sustainable Governance Indicators*, Brussels: ULB-Université Libre de Bruxelles.

Ceder, T., Delaite, G. & Ransy, A. (2022), “Un an après les inondations, l’UVCW attire l’attention du Gouvernement wallon sur ses revendications pour l’avenir”, *Mouvements communales*, 972(Oct.) : 60–62. [https://www.uvcw.be/no\\_index/articles-pdf/download/7600.pdf](https://www.uvcw.be/no_index/articles-pdf/download/7600.pdf).

Cloquet, I. & Braekman, I. (2021), *Analyse van de spontane hulpverlening door vrijwilligers na de overstromingen van 14 juli 2021*, Burgerinitiatief “Hulp voor slachtoffers overstromingen Wallonië vanuit Vlaanderen.” <https://associations21.org/wp-content/uploads/2021/09/nederlandse-analyse-pdf>.

Coetzee, C. & Van Niekerk, D. (2012), “Tracking the evolution of the disaster management cycle: a general system theory approach”, *Jambá J. Disaster Risk Stud.*, 4: 1-9. 10.4102/jamba.v4i1.54.

Commissariat spécial à la Reconstruction (CSR)(2022), “1 an après les inondations: Bilan de la gestion post-inondations et continuité de la reconstruction”, SPW, 01/07/2022, <https://www.wallonie.be/sites/default/files/2022-07/Bilan%20complet%20CSR%2026%20juillet%202022.pdf>

Coördinatiecommissie Integraal Waterbeleid (CIW) (2022), “Evaluatierapport overstromingen zomer 2021”, 15 December 2021, 21 p., <https://www.integraalwaterbeleid.be/nl/nieuws/downloads-van-nieuwsberichten/ciw-evaluatierapport-overstromingen-2021.pdf>

Coppola, D.P. (2007), *Introduction to international disaster management*, Elsevier. 10.1016/C2014-0-00128-1.

Coronese, M., Lamperti, F., Keller, K., Chiaromonte, F. & Roventini, A. (2019), “Evidence for sharp increase in the economic damages of extreme natural disasters”, *Proc. Natl. Acad. Sci. USA*, 116: 21450–21455. <https://doi.org/10.1073/pnas.1907826116>

Counasse, X. (2021), “Grand format - A qui la faute? Notre enquête sur les inondations historiques”, *Le Soir*, 04/08. <https://www.lesoir.be/387689/article/2021-08-04/grand-format-qui-la-faute-notre-enquete-sur-les-inondations-historiques>

Davids, P. (2021), *Rethinking floodlabel: a situational approach to homeowner involvement in flood risk management*, Ghent: Faculty of Engineering and Architecture, Ghent University. <https://biblio.ugent.be/publication/8718390/file/8718394.pdf>

Defensie (2021), “Update 19/10 – Defensie zet tal van middelen in om slachtoffers van overstromingen te helpen”, <https://beldefnews.mil.be/defensie-zet-tal-van-middelen-in-om-slachtoffers-van-overstromingen-te-helpen/>

Delforge, P. (2021), “Comment faire barrage à une montée des eaux violente et soudaine? Approche historique”, Institut Destrée, [https://www.institut-destree.eu/wa\\_files/2021-08-16\\_paul-delforge\\_barrage-vesdre\\_bis.pdf](https://www.institut-destree.eu/wa_files/2021-08-16_paul-delforge_barrage-vesdre_bis.pdf)

De Ridder, K., Couderé, K., Depoorter, M., Liekens, I., Pourria, X. Steinmetz, D., Vanuytrecht, E., Verhaegen, E. & Wouters, H. (2020), “Evaluation of the socio-economic impact of climate change in Belgium”, VITO, KENTER, ECORES, Study Commissioned by the National Climate Commission, Final report, July 2020, Available at: [https://www.adapt-2climate.be/wp-content/uploads/2020/09/SECLIM-BE-2020\\_FinalReport.pdf](https://www.adapt-2climate.be/wp-content/uploads/2020/09/SECLIM-BE-2020_FinalReport.pdf).

Dordi,T., Henstra, D. & Thistlethwaite, J. (2022), “FRM and governance: A bibliometric review of the literature”, *Journal of Flood Risk Management*, 15(2): e12797. <https://doi.org/10.1111/jfr3.12797>

Dupont, C. (2020), “Is België te complex voor een effectief klimaatbeleid?”, *Samenleving & Politiek*, (4): 45–51. <https://www.sampol.be/2020/04/is-belgie-te-complex-voor-een-effectief-klimaatbeleid#footnote12>

Eelbode, F., Dekock, L. & Verhaeghe, O. (2023), “West-Vlaamse wateroverlast niet op te lossen zonder Frankrijk”, *De Tijd*, 10/11. <https://www.tijd.be/politiek-economie/belgie/algemeen/west-vlaamse-wateroverlast-niet-op-te-lossen-zonder-frankrijk/10505549.html>

European Commission (2000), “Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for community action in the field of water policy”, *Official J. Eur. Communities*, L 327: 1–73.

European Commission (2017), *EU Environmental Implementation Review Country Report – Belgium*, Brussels: European Commission. [http://ec.europa.eu/environment/eir/pdf/report\\_be\\_en.pdf](http://ec.europa.eu/environment/eir/pdf/report_be_en.pdf)

European Commission (2021), *Forging a climate-resilient Europe – the new EU Strategy of Adaptation to Climate Change*, COM(2021) 82 final. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2021:82:FIN>

European Commission (EC) (2022), “Environmental Implementation Review 2022, Country Report – BELGIUM”, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Environmental, Brussels, 8.9.2022, SWD (2022) 261 final. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=SWD:2022:261:FIN&from=EN>

European Commission (EC) (2019), “First FRMPlans – Member State: Belgium”, Commission Staff Working Document, SWD (2019) 62 final, Brussels, 26.2.2019 [LexUriServ.do](http://eur-lex.europa.eu/LexUriServ.do) (europa.eu)

European Court of Auditors (ECA) (2018), “Floods Directive: progress in assessing risks, while planning and implementation need to improve”, *Special Report*, (25), 63 pp. [https://www.eca.europa.eu/Lists/ECADocuments/SR18\\_25/SR\\_FLOODS\\_EN.pdf](https://www.eca.europa.eu/Lists/ECADocuments/SR18_25/SR_FLOODS_EN.pdf)

European Environment Agency (EEA) (2017), *Climate Change Impacts and Vulnerability in Europe 2016, An Indicator-Based Report*, EEA.

EcoRes-TEC Conseil, Amelung, B., Biernaux, M., Cauchy, A., Céron, J.-P., Cornélis, P., Dubois, G., Frisson, G., Henrard, S., Joveneau, A., Mahy, G., Monty, A., Mouazan, E., Pouria, X., Speybroeck, N., & van Ypersele, J.-P. (2011). *L’adaptation au changement climatique en région wallonne*. Agence Wallonne de l’air et du climat. <https://hdl.handle.net/2268/113405>

Fallon, C. & Thiry, A. (2019), “Planification d’urgence externe en matière de risque Seveso: quelles sont les difficultés rencontrées par les acteurs belges?”, In: S. Brunet, C. Fallon, P. Ozer, N. Schiffino & A. Thiry (eds.), *Risques, planification d’urgence et gestion de crise*, Bruxelles: La Charte, pp. 137-150.

Gaillard, I. (2008), “Le retour d’expérience : analyse bibliographique des facteurs socio-culturels de réussite”, *Les cahiers de la sécurité industrielle*, (1).

Gauthey, O. (2008), “Le retour d’expérience: état des pratiques industrielles”, *Les cahiers de la sécurité industrielle*, (2).

Habran, S., Crespin, P., Veschkens, M. & Rémy, S. (2020), “Development of a spatial web tool to identify hotspots of environmental burdens in Wallonia (Belgium)”, *Environmental Science and Pollution Research*, 27(6). 10.1007/s11356-019-04418-5

Halbardier, F. & Becker, C. (2021), *Milieu-effectenrapport van de Overstromingsrisicobeheerplannen in Wallonië (ORBP), Cyclus 2: 2022-2027*, SPW Direction des Cours d’eau non navigables. [https://inondations.wallonie.be/files/documents\\_a\\_telecharger/DI/PGRI%20/RIE%20PGRI%20-%20version%20finale%20-NL.pdf](https://inondations.wallonie.be/files/documents_a_telecharger/DI/PGRI%20/RIE%20PGRI%20-%20version%20finale%20-NL.pdf)

Hegger, D. L., Driessen, P. P., Wiering, M., Van Rijswijk, H. F., Kundzewicz, Z. W., Matczak, P. & Priest, S. J. (2016). “Toward more flood resilience: Is a diversification of FRMstrategies the way forward?”, *Ecology and Society*, 21(4) .

ICEDD (2014), « L’identification et l’évaluation des coûts de l’inaction face au changement climatique en Wallonie », Etude pour le compte de la DG04 Département de l’Energie et du Bâtiment Durable et Agence Wallonne de l’Air et du Climat. Institut de Conseil et d’Etudes en Développement Durable (ICEDD) asbl, 372 pp. IFV (2021), “Grensoverschrijdende samenwerking bij rampen en crises. Een inventarisatie van mogelijkheden om de samenwerking te versterken”, Arnhem: IFV. <https://nipv.nl/wp-content/uploads/2022/04/20210521-IFV-Grensoverschrijdende-samenwerking.pdf>

IPCC (2012), “Glossary of terms.” In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 555-564. [https://www.ipcc.ch/pdf/special-reports/srex/SREX-Annex\\_Glossary.pdf](https://www.ipcc.ch/pdf/special-reports/srex/SREX-Annex_Glossary.pdf)

Johannink, R., van As, N. & van Duin, M. (2012), “Gebruik sociale media in noodsituaties: feiten, beelden en verwachtingen”, Recht, Bestuur en Organisatie van Hulpdiensten, 9(3): 115–120.

Kaufmann, M. & Wiering, M. (2022), “The role of discourses in understanding institutional stability and change – an analysis of Dutch flood risk governance”, Journal of Environmental Policy & Planning, 24:1, 1-20, DOI: 10.1080/1523908X.2021.1935222

Kellens, W., Vanneuville, W., Verfaillie, E., Meire, E., Deckers, P. & De Maeyer, P. (2013), “FRM in Flanders: past developments and future challenges”, Water Resources Management, 27(10): 3585–3606. <https://core.ac.uk/download/pdf/55849625.pdf>

Lamarque, P, Tondeur, A., Marbaix, P., Gaino, B. & van Ypersele, J.-P. (2022), “L’adaptation aux changements climatiques en Wallonie : synthèse et points d’attention pour l’actualisation des connaissances”, Plateforme wallonne pour le GIEC, Avril. [https://plateforme-wallonne-giec.be/assets/documents/Adaptation/PwG-SyntheseAdaptation\\_2022\\_rapport\\_rev1.pdf](https://plateforme-wallonne-giec.be/assets/documents/Adaptation/PwG-SyntheseAdaptation_2022_rapport_rev1.pdf)

Lefèvre, F.-X. (2022), « Elio Di Rupo plaide pour “un mécanisme d’assurance qui intègre le dérèglement climatique” », L’Echo, 4 July 2022. <https://www.lecho.be/economie-politique/belgique/wallonie/elio-di-rupo-plaide-pour-un-mecanisme-d-assurance-qui-integre-le-dereglement-climatique/10399985.html>

Liefferink, D. (2006), “The Dynamics of Policy Arrangements: Turning Round the Tetrahedron.” In B. Arts & P. Leroy (Eds.), Institutional Dynamics in Environmental Governance (pp. 45–68). Springer Netherlands.

Louvigny, A. & Carton, A. (2021), “Les autorités auraient-elles pu mieux anticiper les inondations de juillet? Ce que disaient les prévisions de l’EFAS”, RTBF online, 18/09. <https://www.rtbf.be/article/les-autorites-auraient-elles-pu-mieux-anticiper-les-inondations-de-juillet-ce-que-disaient-les-previsions-de-l-efas-10842799>

Mbaye, S. (2010), “Le retour d’expérience. Analyse comparée des pratiques de REX dans les industries chimiques et nucléaires”, Les cahiers de la sécurité industrielle, (5).

Mbaye, S., Kouabenan, R. & Sarnin, P. (2009), “Le retour d’expérience: processus sociocognitifs dans l’explication des dysfonctionnements”, Les cahiers de la sécurité industrielle, (8).

Mees, H. (2017), “Co-producing flood risk governance between authorities and citizens in Flanders and abroad. How ‘co’ can we go?”, PhD-thesis, Sociology, UAntwerpen.

Mees, H., Suykens, C., Beyers, J.-C., Crabbé, A., Delvaux, B., & Deketelaere, K. (2016), “Analysing and evaluating flood risk governance in Belgium. Dealing with flood risks in an urbanised and institutionally complex country”, Report STAR-FLOOD Consortium, March. 10.13140/RG.2.1.4745.0007.

Meeusen, A. (2017), “Verdere professionalisering van de functie van ambtenaar noodplanning: naar een uniforme en specifieke opleiding”, Eindverhandeling Postgraduaat rampenmanagement, Campus Vesta. <https://rampenmanagement.be/eindwerken/>

Merckx, V. (2022), “Hoe vermijden we dat dit nog eens gebeurt? Dit is er veranderd één jaar na de overstromingen in Wallonië”, VRT nws, 12/07. <https://www.vrt.be/vrtnws/nl/2022/07/07/hoe-vermijden-we-dat-dit-nog-eens-gebeurt-dit-is-er-veranderd-e/>

Meyer, V., Kuhlicke, C., Luther, J., Fuchs, S., Priest, S., Dorner, W., Serrhini, K., Pardoe, J., McCarthy, S., Seidel, J., Scheuer, S., Palka, G., Unnerstall, H., Viavatenne, C. (2012), “Recommendations for the user-specific enhancement of flood maps”, Natural Hazards and Earth System Sciences, 12: 1701-1716.

Michaud, T., Fallon, C. & Teller, J. (2021), “Analyse indépendante sur la gestion des voies hydrauliques lors des intempéries de la semaine du 12 juillet 2021. Lot 2 – Recommandations”, Rapport de synthèse, Cabinet du Ministre Philippe HENRY, Ministre Wallon du Climat, de l’Energie et de la Mobilité, 6 décembre 2021, 33 pp. [https://bibliotheques.wallonie.be/doc\\_num.php?explnum\\_id=14376](https://bibliotheques.wallonie.be/doc_num.php?explnum_id=14376)

Michel, R. & Van Dijk, F. (2010), “Les risques naturels en région wallonne”, BSGLG, 54 : 157-176.

Moran Garcia, S. (2022), “On refuse de nous donner la parole”: Dix recommandations des sinistrés au Parlement Wallon, 7sur7, 01/04. <https://www.7sur7.be/belgique/on-refuse-de-nous-donner-la-parole-dix-recommandations-des-sinistres-au-parlement-wallon-a500c143/?referrer=https%3A%2F%2Fwww.google.com%2F>

Munich Re (2015), “Loss events worldwide 2014: 10 costliest events ordered by insured losses.” Munich Re Geo Risks Research, NatCatSERVICE.

Natagora, IEW & WWF (2022), “No nature, no future. Manifeste pour la nature comme solution climatique.” <https://www.canopea.be/no-nature-no-future-la-nature-pour-defier-les-changements-climatiques/> National Climate Commission (2023), “Belgium’s eight National Communication on Climate Change, Summary”, Published by the Federal Public Service Health, Food Chain Safety and Environment, January 2023, <https://www.cnc-nkc.be/en/reports>.

National Crisis Centrum/Centre de Crise National (NCCN) (2023), “Sendai Framework for Disaster Risk Reduction. Belgian Midterm Report in contribution to the Midterm Review 2023. Based on the Midterm Report Questionnaire provided by the UNDRR”, 34 pp. Belgium: Voluntary National Report of the MTR SF | Midterm Review of the Sendai Framework (undrr.org)

National Crisis Centrum/Centre de Crise National (NCCN) (2023), “Coordination in an emergency - Crisiscenter”, website, consulted on 05/01/2023. <https://crisiscenter.be/en/what-do-authorities-do/crisis-management/coordination-emergency>

OECD (2021), Enhancing financial protection against catastrophe risks: the role of catastrophe risk insurance programmes, Paris: OECD, [www.oecd.org/daf/fin/insurance/Enhancing-financial-protection-againstcatastrophe-risks.htm](http://www.oecd.org/daf/fin/insurance/Enhancing-financial-protection-againstcatastrophe-risks.htm)

Paelinck, G. & Dumarey, A. (2022), “Tijdslijn: de zondvloed in de Vesder-vallei, van toen tot nu”, VRT nws. <https://www.vrt.be/vrtnws/nl/2022/07/08/tijdslijn/>

Parlement wallon (2022), “Rapport de la Commission d’enquête parlementaire chargée d’examiner les causes et d’évaluer la gestion des inondations de juillet 2021 en Wallonie”, Rapport présenté au nom de la Commision d’enquête parlementaire par M. Bierin et Mme Schyns, 894 (2021-2022) — N° 1, 24 mars. [http://nautilus.parlement-wallon.be/Archives/2021\\_2022/RAPPORT/894\\_1.pdf](http://nautilus.parlement-wallon.be/Archives/2021_2022/RAPPORT/894_1.pdf), 94 p.

Pellizzoni, L., Leonardi, E. & Asara, V. (2022), « Introduction: what is critical environmental politics? », Prevention and Management: An International Journal, 26(4): 471.

Rana, I.A., Asim, M., Aslam, A.B. & Jamshed, A. (2021), “Disaster management cycle and its application for flood risk reduction in urban areas of Pakistan”, Urban Climate, 38: 100893. <https://doi.org/10.1016/j.uclim.2021.100893>

Reygaert, J. (2022), “Eén jaar na de regenbom: staan Duitse slachtoffers er beter voor dan Waalse?”, VRT nws, 04/07. <https://www.vrt.be/vrtnws/nl/2022/07/04/duitsland-jaar-later/>

Reybrouck, K. (2023), “Van dual naar coöperatief federalisme. Een alternatief voor de staatsvorming?” In: Inspiratie voor de staatsvorming (pp. 181–216). Intersentia; Antwerpen. <https://lirias.kuleuven.be/4069157&lang=en>

RTL INFO (2021), “Un rapport remet en cause la gestion des inondations et conclut que les autorités auraient pu prévoir et anticiper la catastrophe”, RTL Info, 17/09. <https://www.rtl.be/info/belgique/societe/un-rapport-remet-en-cause-la-gestion-des-inondations-et-conclut-que-les-autorites-auraient-pu-prevoir-et-anticiper-la-catastrophe-1325478.aspx>

SPW Développement Durable (2021a), Congrès “Résilience de la Wallonie face aux risques environnementaux », launch event on 23/09/2021, <https://developpementdurable.wallonie.be/congres-resilience/retour-soiree-lancement-23-septembre>

SPW Développement Durable (2021b), « Anticiper et s’adapter pour notre futur », Notes de synthèse et de recommandations, Congrès Résilience Wallonie 02/12/2021, Bruxelles: SPW Développement Durable. Congrès Résilience (wallonie.be)

SPW Développement Durable (2022), Congrès Printemps Résilient, 16/06/2022 ; Printemps résilient | Le développement durable en Wallonie | Le développement durable en Wallonie

Sawalha, I.H. (2020), “A contemporary perspective on the disaster management cycle”, Foresight, 22: 469-482. 10.1108/FS-11-2019-0097.

Sbaraglia, F. & Saeys, M. (2022), Étude d’apprentissage de la catastrophe qui a affecté plusieurs provinces de la Belgique les 14, 15 et 16 juillet 2021, Bruxelles: SPF Intérieur.

Scharff, C. (2021), “Les inondations de cet été ont révélé une gestion de crise inadéquate”, L’Echo, 11/11. <https://www.lecho.be/economie-politique/belgique/wallonie/les-inondations-de-cet-ete-ont-revele-une-gestion-de-crise-inadequate/10337927.html>

Schmitz, O. et al. (2023), Livre blanc. Recommandations permettant d’améliorer la gestion de crise en Belgique. Commission d’experts en matière de gestion de crise, 53 p. [https://www.ibz.be/sites/default/files/media/docs/livre\\_blanc\\_vdef.pdf](https://www.ibz.be/sites/default/files/media/docs/livre_blanc_vdef.pdf)

Schoofs, S. & Pauwels, L. (2024), “Hoe de aanslepende vernieuwing van stokoude stuwen het overstromingsgevaar rond de Dender verhoogt”, VRT News, 03/01. <https://www.vrt.be/vrtnws/nl/2024/01/02/dender-overstromingsgevaar-stuwen-sluizen/>

Szönyi M., Roezer V., Deubelli T., Ulrich J., MacClune K., Laurien F. & Norton, R. (2022), PERC floods following “Bernd”, Zurich: Zurich Insurance Company. <https://www.newsroom.zurich.de/documents/zurich-perc-analysis-bernd-english-version-423750>

Thiry, A., Glesner, C. & Fallon, C. (2019), Projet RETEX/RETAC. Apprentissage de la situation d’urgence : construction d’un cadre de retour d’expérience pour la Province de Liège. Analyse de l’enquête Mesydel. Rapport de recherche, Université de Liège.

Thiry, A., Verhaegen, C., Fallon, Bergmans, A. & Desmet, K. (2017), Benchmark et analyse des écarts pour la planification d’urgence externe relative au risque Seveso, Université de Liège / Universiteit Antwerpen.

UNDRR (UN Office for Disaster Risk Reduction) (2020), Integrating Disaster Risk Reduction and Climate Change Adaptation in the UN Sustainable Development Cooperation Framework. Guidance Note on Using Climate and Disaster Risk Management to Help Build Resilient Societies. July 2020. 1st Edition. 70 p.

UNGA (2016), Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction. United Nations General Assembly, A/71/644.

UNISDR (United Nations International Strategy for Disaster Reduction) (2009). Terminology on disaster risk reduction. Geneva: United Nations International Strategy for Disaster Reduction. [https://www.unisdr.org/files/7817\\_UNISDRTerminologyEnglish.pdf](https://www.unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf).



UNISDR (United Nations International Strategy for Disaster Reduction) (2015), Sendai framework for disaster risk reduction 2015–2030, Geneva: United Nations International Strategy for Disaster. [https://www.preventionweb.net/files/43291\\_sendaiframeworkfordrren.pdf](https://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf)

Université de Liège & UHasselt (2022). Étude sur la (réforme) de la Protection civile, Bruxelles: SPF Intérieur.

UNU-EHS, UNU-CRIS, UNU-MERIT (2023), Building climate resilience: Lessons from the 2021 floods in Western Europe, Bonn, Brugge, Maastricht: UNU.

Van de Vel, K., Vandenberghe, D., Bruffaerts, N., De Clercq, E., De Ridder, K., Devleeschauwer, B., Koppen, G., Vanuytrecht, E. & Willen, P. (2021), “Impact of climate change on the healthcare system in Belgium”, Study commissioned by the Federal Public Service Health, Food chain safety and Environment, VITO, Möbius, Sciensano, Final Report, July 2021. Available at : [https://www.adapt2climate.be/wp-content/uploads/2022/04/FHS\\_climate-healthcare-final-report-final-220408.pdf](https://www.adapt2climate.be/wp-content/uploads/2022/04/FHS_climate-healthcare-final-report-final-220408.pdf)

Vitale, C., Meijerink, S., Moccia, F.D. & Ache, P. (2020), “Urban flood resilience, a discursive-institutional analysis of planning practices in the Metropolitan City of Milan”, Land Use Policy, 95: 104575. <https://doi.org/10.1016/j.landusepol.2020.104575>.

VMM (2023,) “Impact van klimaatverandering tot op wijkniveau — Vlaamse Milieumaatschappij (vmm.be)”, 09/02/2023,<https://www.vmm.be/nieuwsbrief/februari-2023/impact-van-klimaatverandering-nagaan-tot-op-wijkniveau>,

Votquenne, D. and Légère, E. (2021), “Overstromingen onderschat”, Pano documentary, VRT nws. <https://www.vrt.be/vrtnws/nl/2022/07/07/hoer-voermijden-we-dat-dit-nog-eens-gebeurt-dit-is-er-veranderd-e/>

VRT (2024). “Slag in het water”, Pano documentary. 2024, March 12, available at: <https://www.vrt.be/vrtmax/a-z/pano/2024/pano-s2024a4/>

Wittoeck, P. (2017), “Recent Development and Approaches in Belgium”, Malta Legal Forum on adaptation to climate change, 22/05. [https://www.researchgate.net/publication/318110364\\_Recent\\_Developments\\_and\\_Approaches\\_in\\_Belgium](https://www.researchgate.net/publication/318110364_Recent_Developments_and_Approaches_in_Belgium)

Zeimetz, F., Launay, M., Bourqui, P., Calixte, E., Fallon, C. & Teller, J., (2021), “Analyse indépendante sur la gestion des voies hydrauliques lors des intempéries de la semaine du 12 juillet 2021. Lot 1 – factualisation”, Cabinet du Ministre Philippe HENRY, Ministre Wallon du Climat, de l’Energie et de la Mobilité, 8 octobre, 128 pp. [https://bibliotheques.wallonie.be/doc\\_num.php?explnum\\_id=13814](https://bibliotheques.wallonie.be/doc_num.php?explnum_id=13814)

**Major legal sources**

Law of May 15, 2007 on civil security. Available at: <https://www.civieleveiligheid.be/nl/wet-van-15-mei-2007-betreffende-de-civiele-veiligheid>

Royal Decree of May 22, 2019, on emergency planning and management of emergencies at the municipal and provincial levels and on the role of mayors and provincial governors in case of crisis events and situations that require coordination or management at the national level. Available at: [http://crisiscentrum.be/sites/default/files/documents/files/2021-03/arkb22052019\\_0.pdf](http://crisiscentrum.be/sites/default/files/documents/files/2021-03/arkb22052019_0.pdf)

Ministerial circular NPU-3 on approval of provincial emergency and intervention plans, 30/03/2009. Available at: [http://crisiscentrum.be/sites/default/files/documents/files/2021-03/cm-mo-npu-3\\_30\\_03\\_2009\\_approbation-goedkeuring.pdf](http://crisiscentrum.be/sites/default/files/documents/files/2021-03/cm-mo-npu-3_30_03_2009_approbation-goedkeuring.pdf)

Royal Decree of February 16, 2006, on emergency and intervention plans (Moniteur belge of March 15, 2006)

Ministerial circular NPU-4 regarding disciplines, 30/03/2009. Available at: [http://crisiscentrum.be/sites/default/files/documents/files/2021-03/cm-mo-npu-4\\_disciplines.pdf](http://crisiscentrum.be/sites/default/files/documents/files/2021-03/cm-mo-npu-4_disciplines.pdf)

Ministerial circular NPU-1 on emergency and intervention plans, 26/10/2006. Available at: [http://crisiscentrum.be/sites/default/files/documents/files/2021-03/cm-mo-npu-1\\_26\\_10\\_2006\\_plans\\_durgence-noodplannen.pdf](http://crisiscentrum.be/sites/default/files/documents/files/2021-03/cm-mo-npu-1_26_10_2006_plans_durgence-noodplannen.pdf)

Royal Decree Higher Institute for Emergency Planning 29/07/1991. Available at: [http://crisiscentrum.be/sites/default/files/documents/files/2021-03/ar\\_5\\_dec\\_2011\\_modifiant\\_lar\\_ispu\\_fr-nl\\_0.pdf](http://crisiscentrum.be/sites/default/files/documents/files/2021-03/ar_5_dec_2011_modifiant_lar_ispu_fr-nl_0.pdf)

Royal Decree amending the Royal Decree of July 29, 1991, establishing a Higher Institute for Emergency Planning. 5/12/2011. Available at: [http://crisiscentrum.be/sites/default/files/documents/files/2021-03/ar-kb-ispu\\_29\\_juillet\\_1991\\_fr-nl.pdf](http://crisiscentrum.be/sites/default/files/documents/files/2021-03/ar-kb-ispu_29_juillet_1991_fr-nl.pdf)

**Annexures**

**Annex 1 – Timeline of the summer 2021 flood events in Wallonia<sup>79</sup>**

Date and Major Event/ Indicator	Policy Actions and Measures
<p><b>10 July 2021</b> Alarming Forecast</p>	<p>RMI (Royal Meteorological Institute) warned of heavy showers for the afternoon. In the wake of this, the number 1722 is activated until 11/07. Mudflows, as well as cellar and road flooding, mobilised the fire brigade in Walloon Brabant.</p>
<p><b>12 July 2021</b> EFAS alerts</p>	<p>11.30 am EFAS (European flood prevention system), sends a first 'informal' notification to the Walloon administration in charge of monitoring rivers (DGH).</p> <p>12.15 pm: RMI issues a yellow alert for “the next few days”, i.e., 48 hours; it expects significant rainfall accumulations. “A very active front will remain almost stationary over part of the country between Tuesday and Friday and will cause heavy rainfall over the (south) eastern half of the country,” the Institute warns. According to several forecasting models, rainfall totals of 30 to 60 mm can be expected in the center, 50 to 100 mm in the east, and 80 to 130 mm south of the Sambre-et-Meuse corridor, and even 150 mm very locally, while risk of thunderstorms is not excluded. The number 1722 is reactivated. The information is passed on to the Hydraulic Management Directorate (DGH) -Walloon Public Service.</p> <p>14.40 pm: The DGH transmits the EFAS information to the regional crisis center, transferring the warning to the emergency zones and the governors.</p>
<p><b>13 July 2021</b> The streams start to overflow</p>	<p>7.50 am: EFAS sends a second notification, like the first. DGH forwards it to the crisis centre.</p> <p>11.30 am: EFAS sends a third notification, expanded compared to the previous two. EFAS also provides more information on a dedicated platform. However, as the parliamentary inquiry committee later learned, “the engineer on duty did not log on.”</p> <p>Shortly before 2 pm, the RMI placed Limburg and the provinces of Liège, Namur and Luxembourg under code orange. Cumulative amounts of 60 to 130 mm are expected in Limburg, 80 to 150 mm in Liege, 40 to 100 mm in Namur and 70 to 120 mm in Luxembourg. The other provinces, including Walloon Brabant, will not be affected, as rainfall totals are not expected to exceed 60 mm.</p> <p>First calls to the fire brigade in rescue zone 4 (Vesdre Hoëgne and Plateau) were made at around 7:15 pm on 13 July. They intervened 165 times until 3 am The streams began to overflow, the roads and cellars flooded.</p>

<sup>79</sup> Source: Authors, based on various reports, notably Paelinck and Dumarey, 2022; Walloon Parliamentary Inquiry Commission, 2021.

<p><b>14 July 2021</b> The disaster becomes inevitable</p>	<p>6:20 am: The Regional crisis center alerts, via Be-Alerte, the mayors or officials in charge of emergency planning, the governor of the province of Liège, the national crisis center, the emergency zones concerned and the Walloon water company that the entire Vesdre basin is on red alert for flooding.</p> <p>The general damage is starting to show up as dawn sets. The railway tracks between Liège and Welkenraedt were flooded and blocked, as were other places in the provinces of Luxembourg and Namur.</p> <p>At around 8 am, the fire brigade of zone 4 carried out another 100 interventions, bringing their number to 260. Scout camps had to be evacuated during the night in Jalhay and Theux.</p> <p>The Regions of Wavre and Dinant were also affected, with rivers bursting their banks, scout camps being evacuated, and cellars flooded.</p> <p>At around 9 am, the RMI issued a red alert (which can be given for a period of 12 hours) for the province of Liège, which was already under water, announcing further heavy showers over at least a quarter of the province. More than 100mm (100 litres per square metre) are expected in 24 hours. The provinces of Namur and Luxembourg have been placed under code orange.</p> <p>As a precaution, while the Lesse is expected to overflow, the mayor of Rochefort Corine Mullens announced that she wanted to evacuate the five youth movement camps on her territory.</p> <p>At 9:30 am, the flood alert thresholds are reached for several rivers in Wallonia. The risks of flooding concern the Eau d’Heure, Eau blanche and Eau noire rivers, the Lhomme, the Vesdre and their tributaries. The Haute-Lesse and the Viroin as well as the tributaries of the Haute and Basse Meuse are placed in the pre-flood phase.</p> <p>At the end of the morning, the provincial crisis phase is triggered by the interim governor of Liège, Catherine Delcourt, who replaces Hervé Jamar, who is on holiday. It is advised to close the gas, water and electricity taps, to put the furniture in a high place, to limit the movements and to follow the recommendations of the firemen.</p> <p>1 pm: The SNCB advises against train travel in the provinces of Liège, Namur and Luxembourg, where many lines are already inaccessible.</p> <p>Risk of flooding and overflows on the rivers Eau d’heure, Eau blanche and Eau noire, Basse and Haute Lesse, Lhomme, Ourthe, Amblève, Vesdre and their tributaries. Overflows have already been observed. 1:30 pm: the provincial crisis phase is triggered in Namur.</p> <p>3 pm: the provincial crisis phase is triggered in the province of Luxembourg; decision is taken to preventively evacuate all the scout camps on the territory of the province. Around 3 pm, the first preventive evacuations are ordered in some streets of Baelen, Eupen and Limbourg as well as in Chaudfontaine. For people who do not wish to be evacuated, they are asked to turn off the water, gas and electricity taps and to take food, a torch and batteries to the upper floors.</p> <p>“Due to the exceptional flooding of the Vesdre, the Eupen dam will not be able to reduce the impact of the flooding in the coming hours”, the province warns. The dam will start to be unloaded from 7 pm, after the evacuation of the Lower Town.</p> <p>At the end of the afternoon, the army announced that it would make military trucks available for the evacuation of the population in the communes of Theux and Liège, as well as in Namur and Rochefort. Sandbags were brought to the province of Luxembourg and camp beds were provided in Nassogne.</p> <p>At around 6 pm, the province of Liège asks to evacuate Verviers, Pepinster, Trooz and Chênée.</p>
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<p><b>15 July 2021</b> A black day for Belgium</p>	<p>12:30 am: the risks of flooding and overflowing still concern mainly the rivers Eau d’Heure, Eau blanche and Eau noire, Basse and Haute Lesse, Lhomme, Ourthe, Amblève, Vesdre. The thresholds are now also reached for the tributaries of the Lower Meuse. The Eupen dam has reached its maximum capacity.</p> <p>7 am: Infrabel announces the shutdown of the entire rail network in Wallonia. Early morning: a dozen houses collapse in Pepinster. At the same time, there is information about the discovery of a person drowned in his cellar in Aywaille.</p> <p>Evacuations also began in Flanders, in the Fourons Region. Inter-Regional solidarity is also set in motion with the arrival of divers from Antwerp in the province of Liège.</p> <p>10:00 am: Minister of the Interior Annelies Verlinden announces that she has activated the EU’s civil protection mechanism [ Wednesday 14 July]. This mechanism allows other countries to be called upon for specific support needs. France immediately responded to the request and sent 40 rescue workers and a helicopter with two water rescuers to Liege. The European Commission announced that Austria and Italy had also offered their help.</p> <p>Some municipalities in Flemish Brabant were under water. At the end of the morning, almost all Walloon rivers - with the exception of those in the province of Hainaut - were in flood stage.</p> <p>At midday, four new victims were announced in the district of Verviers, bringing the temporary death toll to six.</p> <p>On Thursday afternoon, King Philippe went to Chaudfontaine. At around 3 pm, the Walloon water company announced that the floods were beginning to affect the water supply in the south of the country. Several municipalities in the provinces of Liège and Namur could no longer drink the water, which had become undrinkable. Others are facing temporary water shortages.</p> <p>In the afternoon, the Walloon government acknowledged the calamitous nature of the floods. The Regional executive also released emergency financial resources to help the affected populations. In the Chamber, Annelies Verlinden triggered the federal emergency phase.</p> <p>In the middle of the afternoon, the water began to recede in Eupen, revealing the extensive damage caused by the flooding.</p> <p>The city of Verviers announced a curfew between 9 pm on Thursday and 6am on Friday to avoid looting. Around 6 pm, the RMI announced a yellow code for the country, the rainfall was calming down and should not exceed 30mm. By Thursday evening, the death toll had risen to 11 and four people were missing.</p>
<p><b>16 July 2021</b> “It happens statistically once every 200 years” (RMI head)</p>	<p>Three lifeless bodies are found in Trooz, bringing the death toll to 14. The Palace announced that the King and Queen would go to Pepinster in the afternoon</p> <p>As the flood waters began to recede, the governor of the province of Liège, Hervé Jamar, announced a new death toll at around 1.30 pm: at least 20 people had lost their lives in the province, and three others elsewhere in Wallonia.</p> <p>Alexander De Croo declared 20 July a day of national mourning and reduced festivities for the following day, the bank holidays.</p> <p>The RMI announced that a rainfall record had been broken. In 48 hours in the province of Liege, more than 271mm fell in Jalhay and 217mm in Spa. “This happens statistically once every 200 years. Normally we see 100 mm in July in these Regions”, says David Dehenauw.</p> <p>At the end of the afternoon, the Red Cross, which has been at the ready since the beginning of the crisis, launched an appeal for donations for the victims. Resa (the main operator of the electricity and gas distribution networks in the Province of Liege) announced that entire sections of the gas network had been swept away in the Province of Liege.</p> <p>Assuralia indicates that the insurers have activated their crisis procedure to help the victims in the short term.</p>

<b>17 July 2021</b> 27 deaths reported	Most cities announce the cancellation of the 21 July festivities. Prime Minister Alexander De Croo went to Rochefort, then, accompanied by the President of the European Commission Ursula von der Leyen, he visited several devastated towns in the east of the country, notably Eupen and Pepinster.  Shortly before 6 pm, the Ministry of the Interior reported a death toll, still provisional, of 27 confirmed and 103 presumed missing.
<b>18 July 2021</b> 240 out of 262 Walloon municipalities affected	7,000 households are still without electricity in the provinces of Liège and Walloon Brabant. The Walloon Minister-President, Elio Di Rupo, and the Vice-President of the Regional government, Christie Morreale, visit Ensival (Verviers). The former reported that 240 of the 262 Walloon communes had been affected to varying degrees by the flooding. At the end of the afternoon, the crisis centre published a new report, still provisional, of 31 people dead and 163 presumed missing.
<b>19 July 2021</b> Millions of euros of damage	The first estimate of damage to the railway network is between 40 and 50 million euros. Twenty-five lines were affected. Daniel Bacquelaire, mayor of Chaudfontaine, announced a new death toll of 36. The crisis centre still mentions 31 deaths and 127 missing, as well as 54 people hospitalised.
<b>20 July 2021</b> National Day of Mourning	11 am: official ceremony at the fire station of the Vesdre-Hoëgne and Plateau rescue zone in Verviers. In the presence of the King and Queen, Prime Minister De Croo, Walloon Minister-President Di Rupo, Ministers Verlinden, Jeholet, Jamar and several mayors of the affected localities.  12.01 pm: Belgium observes a minute's silence in tribute to the victims.
<b>21 July 2021</b> The death toll rises	New provisional toll from the federal police: 32 dead and 18 missing
<b>22 July 2021</b> Political reactions	Philippe Henry, Walloon Minister for Infrastructure, commissions an independent study on the management of waterways.
<b>23 July 2021</b> New alert	A new report from the crisis centre states that 36 people have died and 11 are missing. The number 1722 is reactivated because of a risk of flooding. The RMI issues an orange alert for thunderstorms over most Regions.
<b>24 July 2021</b> The Namur Region is next, this time without casualties	The showers mainly affect the province of Namur. The communes of Anhé, Dinant, Eghezée, Florennes, Hastière, Houyet, La Bruyère, Mettet, Namur, Onhaye, Perwez, Philippeville, Rochefort, Walcourt and Yvoir are concerned. This time there were no victims, but the material damage was significant.
<b>25 July 2021</b> New report	New report from the crisis centre: 37 dead and five missing
<b>26 July 2021</b> The political weather is cloudy	The CdH (which has since become Les Engagés) calls for a parliamentary commission of enquiry into the floods. The federal crisis management phase ends.
<b>27 July 2021</b> Final toll	Federal police announced a new official toll of 38 deaths and one missing person. The final death toll was 39.
<b>30 September 2021</b> Objective of reconstruction	The federal government announces a loan of 1.2 billion euros at market rates to Wallonia.

**Annex 2 – Public initiatives related to the Summer 2021 floods (Source: Authors)**

Level	Actor/Body	Initiative
National/Federal	Ministry of the Interior/Home Affairs:	A new expert 'Learning commission' on crisis management mapping at all political levels (announced end of March 2022). This commission will be responsible for defining the main lines of cooperation between the various services concerned in the event of a crisis. These situations have presented the services with new challenges and shown the importance of optimal cooperation. This commission will map out crisis management at all political levels in Belgium and draw up an opinion with coherent and practical recommendations. To achieve this, a proactive and sustainable organisational model will be developed to deal with emergencies. The chairman (the former governor of the province of Flemish Brabant, Lodewijk De Witte) will be assisted by two programme managers from the administration and experts from the academic world, the federal and Regional levels of government, the five disciplines of the emergency services and the 112 emergency centres. (Sbaraglia & Saeys, 2022; Schmitz et al. 2023).
		The National Crisis Centre launched a Codification project of existing principles and good practices, including role of Regions in emergency management; New legislation bringing together all emergency plans, both at the national and local levels, is being drafted (codification project).
	The Royal Meteorological Institute	Information campaign and networking round. This "Tour de Belgique" is led by RMI policy officer and weather forecaster professor David Dehenauw;
	Ministry of Climate - The Federal Public Service Environment's Climate service	A future 'Coordinating Body for Risk Analysis and Climate Crisis Assessment' (CCRA-CC). This would be an independent body that has yet to be established. This federal multidisciplinary centre of knowledge and expertise along the lines of OCAM (for the terrorist and extremist threat). Initially, this Climate OCAM - whose exact tasks are still being worked out - will be integrated into the Climate Change department. The Climate OCAM should enable Belgium - for climate change (and by extension all global borders) - to have an adequate and up-to-date risk analysis based on a challenge and vulnerability assessment at all times.
		Do No Significant Harm expertise center;
	Universities (Flemish and French-speaking)	Task Force Vesdre (TFV) interuniversity cooperation between KUL, ULB, ULiège and UMons (mainly funded by Walloon Region). The TFV is a transdisciplinary scientific team created in September 2021 within the University of Liege in response to the recent hydrological crisis that has severely affected the territory of the province of Liège. To question the concrete and operational actions likely to have impact on the territory and its resilience to flood risks, the TFV is developing a "research-project" based on a "territorial prospective" approach articulated in a series of scenarios, and fed by the integration and systematization of the complementary skills present in the TFV. In doing so, the TFV contributes to the themes and ambitions of the public debate and proposes itself as a decision-making tool.

Regional	The Regional Crisis Centre of Wallonia (CRC-W)	The CRC-W launched a new strategic plan of how they want to develop and/or be reformed.
	The Union of Towns and Communes of Wallonia (UVCW)	The UVCW launched an internal working group on FRM after the Floods Conference of the UVCW on 13/05/2022.
	Walloon government and parliament	Post-disaster commissions, conferences and reports (see table below).
	Coördinatiecommissie Integraal Waterbeleid (2021) commission (CCIW) in Flanders;	The 'Zomer 2021' evaluation report (CCIW, 2021)
Provincial	Provincial bodies in Wallonia	Trainings in white waters in France for the firefighters and divers.
		Initiatives about citizen involvement and engagement in FRM (e.g., Province of Hainaut and Province of Liège);
Local (Towns and Municipalities)	Various towns and municipalities	Cultural events related to the 2021 flood events, such as the Rain Requiem theatre play and expositions, such as organised by the Task Force Vesdre
		Expositions, conferences, and workshops (e.g., in Tubize, Hotton, Tournai...)
		Associations and citizens' initiatives, such as new working groups on the themes of the floods.

**Annex 3 – Post-disaster commissions, conferences and reports**

Post-disaster commissions, conferences and reports				
Title	What	Commissioned by	Authors/Contributors	Date and link
1. "Rapport de la Commission d'enquête parlementaire chargée d'examiner les causes et d'évaluer la gestion des inondations de juillet 2021 en Wallonie"	Parliamentary Inquiry commission report on the floods – 161 recommendations in response to the various aspects that raised questions after the disaster. Voted on 31/03/2022, Walloon Parliament.	Walloon Parliament	Parliamentary Inquiry Commission (M. Bierin et Mme Schyns)	24/03/2022 ; <a href="http://nautilus.parlement-wallon.be/Archives/2021_2022/RAPPORT/894_1.pdf">http://nautilus.parlement-wallon.be/Archives/2021_2022/RAPPORT/894_1.pdf</a>
2.a. Congrès "Résilience de la Wallonie face aux risques environnementaux"	Soirée de lancement - Event 23/09/2021	Walloon Minister for the Environment, Nature, Forestry, Rural Affairs and Animal Welfare (Céline Tellier) and organized by SPW Sustainable Development	Various academics, a.o. François Bousquet; Déborah Goffner; Slavica Zec	23/09/2021; <a href="https://developpementdurable.wallonie.be/congres-resilience/retour-soiree-lancement-23-septembre">https://developpementdurable.wallonie.be/congres-resilience/retour-soiree-lancement-23-septembre</a>
2b. Congrès Résilience Wallonie	Event – Soirée de Congrès 2/12/2021 : Notes de synthèse et de recommandations	Idem	-	21/12/2021; <a href="https://developpementdurable.wallonie.be/congres-resilience/programme">https://developpementdurable.wallonie.be/congres-resilience/programme</a>
2c. Congrès Résilience Wallonie	Event in June 2022	Idem	-	16/06/2022 Printemps résilient   Le développement durable en Wallonie   Le développement durable en Wallonie
3.a. Analyse indépendante sur la gestion des voies hydrauliques lors des intempéries de la semaine du 12 juillet 2021. Lot 1 – factuelisation	Independent synthesis expert report – part 1	Office of Minister Philippe HENRY, Walloon Minister for Climate, Energy and Mobility	Zeimetz F., Launay M., Bourqui P., Calixte E., Fallon C., Teller J.,	8/10/2021 <a href="https://henry.wallonie.be/files/Documents/211011-Rapport%20synth%C3%A8se%20analyse%20inondations%20Wallonie%20juillet%202021-%20Stucky.pdf">https://henry.wallonie.be/files/Documents/211011 - Rapport synth%C3%A8se analyse inondations Wallonie juillet 2021 - Stucky.pdf</a>
3.b. Analyse indépendante sur la gestion des voies hydrauliques lors des intempéries de la semaine du 12 juillet 2021. Lot 2 – Recommandations	Independent synthesis expert report – part 2	Idem	Michaud, T., Fallon, C. & Teller, J.	06/12/2021 <a href="https://bibliotheques.wallonie.be/doc_num.php?explnum_id=14376">https://bibliotheques.wallonie.be/doc_num.php?explnum_id=14376</a>

4.« Un an après les inondations, l'UVVCW attire l'attention du Gouvernement wallon sur ses revendications pour l'avenir »	Seven Recommendations from the Municipalities and Towns in Wallonia	Union of Walloon Cities and Communes (UVWC)	Céder, T., Delaite, G. & Ransy, A.	28/07/2022 <a href="https://www.uvcw.be/no_index/articles-pdf/download/7600.pdf">https://www.uvcw.be/no_index/articles-pdf/download/7600.pdf</a>
5.“PERC floods following “Bernd”.”	Post-Event Review Capability (PERC) - 4 major recommendations	Zurich Insurance Company	Szőnyi M., Roezer V., Deubelli T., Ulrich J., MacClune K., Laurien F. and R. Norton	27/06/2022 <a href="https://www.newsroom.zurich.de/documents/zurich-perc-analysis-bernd-english-version-423750">https://www.newsroom.zurich.de/documents/zurich-perc-analysis-bernd-english-version-423750</a>
6. Learning Commission report	Learning study of the disaster that affected several Belgian provinces on 14, 15 and 16 July 2021.	Federal Minister of the Interior	Sbaraglia & Saeys, 2022	December 2022; link unavailable.
7. White paper (Livre blanc/ Groenboek)	Recommendations for improving crisis management in Belgium. Commission of experts on crisis management.	Minister of the Interior	Schmitz, O. Et al.	Schmitz, O. et al. (2023). Available at: <a href="https://www.ibz.be/sites/default/files/media/docs/livre_blanc_vdef.pdf">https://www.ibz.be/sites/default/files/media/docs/livre_blanc_vdef.pdf</a>
8. Evaluatierapport overstromingen zomer 2021	Evaluation report of the 2021 summer floods	Flemish government	Coördinatiecommissie Integraal Waterbeleid (CCIW)	15/12/2021, <a href="https://www.integraalwaterbeleid.be/nl/nieuws/downloads-van-nieuwsberichten/ciw-evaluatierapport-overstromingen-2021.pdf">https://www.integraalwaterbeleid.be/nl/nieuws/downloads-van-nieuwsberichten/ciw-evaluatierapport-overstromingen-2021.pdf</a>
9. « 1 an après les inondations: Bilan de la gestion post-inondations et continuité de la reconstruction », SPW,	Assessment Report of the 2021 summer floods one year after	Commissariat spécial à la Reconstruction (CSR) (2022), SPW	SPW	01/07/2022, <a href="https://www.wallonie.be/sites/default/files/2022-07/Bilan%20complet%20CSR%2026%20juillet%202022.pdf">https://www.wallonie.be/sites/default/files/2022-07/Bilan%20complet%20CSR%2026%20juillet%202022.pdf</a>

**Annex 4 – List of respondents and stakeholders in FRM in Belgium**

Organisation	Role	Date	Code
1. Pluralist Scouts and Guides Federation (SGP)	Support to Scouts Movement	30/05/2022	Y-1 Youth-Scouts
2. Pluralist Scouts and Guides Federation (SGP)	Communications and External relations	30/05/2022	Y-2 Youth-Scouts

3. Service public de Wallonie (SPW) SPW General secretariat   CRC-W	Crisis manager officer	30/05/2022	SPW-1
4. Service public de Wallonie SPW Secrétariat général   CRC-W	Director Public Service of Wallonia, SPW General Secretariat; Regional Crisis Center; (CRC-W) – crisis management	30/05/2022	SPW- 2
5. Collège Communal de Trooz	3rd alderman – “Together with the mayor” Responsibilities: Town planning, Territorial development, Mobility, Communal Plan for Rural Development, Agriculture.	01/06/2022	Mun. 1
6. Collège Communal de Trooz	President CPAS - "ECOVA" Responsibilities: Public health	01/06/2022	Mun. 2
7. Croix-rouge de Belgique	President Maison de la Croix-Rouge Olne-Spirmont-Trooz (Entités :	03/06/2022	Assoc. Nat.1 Vol. Cit.
8. Red CrossRed	Regional Coordinator	07/06/2022	Assoc. Nat.2
9. Office of the Minister of Spatial Planning	Officer in charge of the flood file within the office of the Minister of Spatial Planning	13/06/2022	Reg. Min. 1
10. National Crisis centre (NCCN) – DG International Affairs	Directorate of International Affairs International Relations Department - National Crisis Center (NCCN)	14/06/2022	FPS-1
11. SPW - Commissariat Spécial à la Reconstruction	Officer - Commissariat Spécial à la Reconstruction	16/06/2022	SPW.3
12. Commune of Pepinster – Public Library	Alderman Environment/Mobility, Library, Energy, Education, Environment, Youth, Early Childhood and Mobility	15/06/2022	Mun. 3.
13. Commission Communale des Jeunes de Pepinster	Director – Youth centre of Pepinster (Espace No)	15/06/2022	Assoc. Loc. 1
14. Commune of Pepinster	Director Public Library of Pepinster	15/06/2022	Mun. 4

15. Federal IBZ (Home Affairs) - Directorate-general for Civil Protection (DGCP)	Directorate-general for Civil Protection (DGCP) - International relations	21/06/2022	FPS-2
16. National Crisis Centre - Emergency Planning Department	Attaché Emergency Planning at the Belgian National Crisis Centre	20/06/2022 (phone call)	FPS-3
17. Plan Cohésion Sociale de Pépinster	Coordinator for the local Plan for Social Cohesion of the municipality of Pepinster	22/06/2022	Mun. 5
18. National Crisis Centre Belgium - NPU	Coordinator training and exercises - Information manager at CrisisCenter Belgium - NPU	22/06/2022	FPS- 4
19. Walloon River Contracts	Scientific advisor (Contrat Rivière Vesdre)	04/07/2022	Assoc. Reg. 1
20. Walloon River Contracts	Coordinator (Contrat Rivière Vesdre)	04/07/2022	Assoc. Reg. 2.
21. Directorate-General Health Care	Psychosocial Manager Emergency Assistance Service   Field Unit Directorate-General Health Care	14/07/2022	FPS- 5.
22. Directorate-General Health Care	Psychosocial Manager Emergency Assistance Service   Field Unit Directorate-General Health Care	14/07/2022	FPS- 6.
23. Euregio Maas-Rijn Incident Control and Crisis Management (EMRIC)	Euregio Maas-Rijn Incident Control and Crisis Management (EMRIC) programme manager  MCDM  Programme-manager EMRIC  Project leader PANDEMERIC  Project leader MARHETAK	13/10/2022	EuReg. 1
24. Federal Civil Protection Officer	Federal Civil Protection Officer	13/10/2022	FPS -7.
25. Dutch Fire Brigade officer	Brandweer Zuid-Limburg	13/10/2022	Eureg. 2. - FB1
26. Provincie Oost-Vlaanderen	Provincie Oost-Vlaanderen - watermanagement expert	10/07/2022	Reg. Fl. 1
27. Commune of Pepinster	Informal collective interview with 2 municipal employees in charge of Works (Travaux)	15/06/2022	Mun. 6 + 7

28. Service public de Wallonie - mobilité infrastructures (DGH)	Attachée qualifiée, Service public de Wallonie mobilité infrastructures Département Expertises Hydraulique et Environnement, Direction de la Gestion Hydrologique	13/02/2023	SPW-3
<b>Personal interviews with citizens about the Vesdre river basin</b>			
1. Citizen- Antwerp (Flanders)	Interview with Flemish retired 65-year-old man from Antwerp, living parttime in Verviers (Verviers, 01/06/2022)	01/06/2022	Cit. 1
2. Citizen -Sint-Truiden; Trooz	Interview with worker of the housing service in Trooz- 4 children, living in Sint-Truiden (Flanders)(Trooz, 01/06/2022)	01/06/2022	Cit. 2
3. Citizens - Trooz	Double/collective interview with Mr. and Mrs Henry - retired teacher of 82 years old (Trooz, 01/06/2022)	01/06/2022	Cit. 3 + 4
4. Citizen - Pépinster	Bar/café manager - centre of Pepinster - 50-year-old, grand-mother, divorced with two adult children	15/06/2022	Cit. 5
5. Citizen- Pépinster	Pre-retired worker - depressive	15/06/2022	Cit. 6
6. Public Secondary School - Pepinster	Informal collective interview in sandwich shop with 2 pupils (15 years old)	15/06/2022	Cit. 7+ 8
7. Sandwich shop - Pépinster	Informal interview with sandwich shop manager	15/06/2022	Cit. 9
8. Scouts - Ghent (Flanders)	Scouts leader and student in Ghent (Flanders)	20/05/2022	Vol. Cit. 1
9. Natuurpunt - Ghent (Flanders)	Volunteer manager (Flanders)	21/05/2022	Vol. Cit. 2
10. Maison Médicale-Trooz	Physical family physician/Medical doctor	01/06/2022	Vol. cit. 3

## List of stakeholders in Belgian FRM whose discourses were assessed at conferences and in documentaries.

Third event - Congrès Résilience Wallonie – Printemps Résilient 17/06/2022 (Attendance by author)			
1. Associations 21	Director	17/06/2022	Assoc. Reg. 3
2. City of Mons (Wallonia)	Alderman of the Ecological transition of the city of Mons	17/06/2022	Mun. 8
3. ULiège; ULB; SciencePo Paris	Professor and Director HUGO Observatory	17/06/2022	Acad. 1
4. ULB – Psychology Department	Professor Dr. - Researcher Psychology – Climate/ Eco-anxiety – Maître de conférence ULB	17/06/2022	Acad. 2
5. SOS Inondations Tubize	Lead - Citizen Association (volunteers) -	17/06/2022	Vol. Cit. 3
6. Clean Walker and Les Petits Robins des Toits asbl	Lead - (volunteers)	17/06/2022	Vol. Cit. 4
7. ULiège- ARCHI	Researcher – architect – Member of Taskforce Vesdre ULiège-KULeuven-UMons	17/06/2022	Acad. 3
8. SPW ARNE	Ir, Directeur conseiller –SPW ARNE Département des Politiques européennes et des Accords internationaux Environnement	17/06/2022	SPW-4
9. Aqualim (Wallonia)	Aqualim	17/06/2022	SPW-5
10. Inter-Environnement Wallonie (IEW)	Resources officer	17/06/2022	Assoc. Reg. 4
11. Province du Brabant-wallon	Governor	17/06/2022	Prov. 1
12. Municipality - Amay	Mayor	17/06/2022	Mun. 9
UCVW- Colloque - Gestion de crise(s) et reconstruction : focus sur l'après-inondation.			
1. Commune of Limburg (Wallonia)	<a href="#">Mayor of Limburg</a>	13/05/2022	Mun. 10
2. UVCW	<a href="#">President of the UVCW (53)</a>	13/05/2022	Assoc. Reg. 5

3. Walloon government	<a href="#">Minister of Local Authorities, Walloon Region</a>	13/05/2022	Reg. Min. 2
4. Province of Namur	<a href="#">Governor of the Province of Namur</a>	13/05/2022	Prov. 2
5. Commune of Hannut	<a href="#">Mayor of Hannut and president of emergency rescue zone of Hesbaye (role of the UVCW)</a>	13/05/2022	Mun. 11
6. Royal Meteorological Institute	<a href="#">Head of Scientific service of Weather forecast (on role of the RMI at the service of local authorities)</a>	13/05/2022	FPS-8
6. Defence/Army	Lieutenant-Colonel, military commander of the province of Liège (on role of the army in reinforcing other disciplines)	13/05/2022	FPS-9
7. Commune of Eupen	<a href="#">Mayor of Eupen UVCW</a>	13/05/2022	Mun. 12
8. UVCW	Secretary General of the UVCW	13/05/2022	Assoc. Reg. 6
9. Province of Namur	District Commissioner of Namur (about the crisis beyond the emergency).	13/05/2022	Prov. 3
10. SPW	<a href="#">Special Commissioner for Reconstruction</a>	13/05/2022	SPW-6
11. UVCW	<a href="#">Expert advisor at the UVCW (land use planning and watercourse management)</a>	13/05/2022	Assoc. Reg. 7
12. Commune of Hotton	<a href="#">Mayor of Hotton (example of good practice with the "Amice" stormwater basin)</a>	13/05/2022	Mun. 13

13. Scheldt-Lys River Contract	<a href="#">Coordinator (on role of the Scheldt-Lys River Contract)</a>	13/05/2022	Assoc. Reg. 8
14. Commune of Tubize	<a href="#">Alderman (echevin) in Tubize (temporary immersion zones)</a>	13/05/2022	Mun. 14
15. Service Public Gestion des Eaux (SPGE)	<a href="#">Technical Director at the SPGE (focus on dewatering in Wallonia).</a>	13/05/2022	SPW-7
16. University of Liège	Professor at ULiège (focus on the Vesdre Master Plan)	13/05/2022	Acad. 4
<b>Other discourses and speeches from conferences online</b>			
17. Province of Liège	Deputy governor of Liège (actual « Commissaire d'arrondissement de la Province de Liège »), Marseille	27/04/2022	Prov. 4
<b>Launch event Congrès Résilience wallonie on 02/12/2021- <a href="#">(58) Congrès Résilience - 2 Décembre (YouTube)</a></b>			
1. Walloon Government	Minister of Environment, Nature, Forestry, Rurality and Animal Welfare, in charge of Sustainable Development	02/12/2021	Reg. Min. 3
2. Walloon government	Minister of Climate, Energy, Mobility and Infrastructure	02/12/2021	Reg. Min. 4
3. Walloon Government	Minister-president of Wallonia	02/12/2021	Reg. Min. 5
4. ULiège	Co-presiding academic (see above)	02/12/2021	See above
5. ULB	Co-presiding academic	02/12/2021	Acad. 5
6. SPW- Demna	Inspector-general, Department of Natural and Agricultural Environment Studies	02/12/2021	SPW-8

(Round-table N°1 : « La résilience de la Wallonie, quel état de préparation ? »)	Round-table 2 : « Résultats des modules préparatoires », see : <a href="#">(58) CONGRES RESILIENCE - 2 DECEMBRE - YouTube</a>	02/12/2021	/
<b>Second event/part, « Congrès Résilience, anticiper et s'adapter pour notre futur » on 23/09/2021 <a href="#">(58) Congrès Résilience, anticiper et s'adapter pour notre futur - YouTube</a></b>			
1. Walloon government	Minister of Environment, Nature, Forestry, Rurality and Animal Welfare, in charge of Sustainable Development	23/09/2021	See above
2. ULiège	Co-presiding academic (see above)	23/09/2021	See above
3. ULB-SONYA	Co-presiding academic (see above)	23/09/2021	See above
4. SPW-Direction du Développement Durable	Project Manager	23/09/2021	SPW-9
<b>RTBF Investigation (2022), « À la rencontre des victimes des inondations de juillet 2021 en Wallonie », <a href="#">(58) À la rencontre des victimes des inondations de juillet 2021 en Wallonie   #Investigation - YouTube</a></b>			
1. Civil protection volunteer	Volunteer water rescuer	Oct. 2021	Vol. Cit. 5
2. Belgian Red Cross	Communication Director	Oct. 2021	Assoc. Nat. 3
3. Trooz -Citizen	Impacted, relocated citizen from Trooz (female, 85 years old)	Oct 2021-July 2022	Cit. 10
4. Verviers -Citizen	Impacted citizen from Verviers (male, 48 years old)	July 2022	Cit. 11
5. Fire Brigade – Brabant-Wallon.	Professional Fireman diver from Brabant-Wallon.	July 2022	F.B.2
6. Fire Brigade – Brabant-Wallon.	Professional Fireman diver from Brabant-Wallon.	July 2022	F.B.3
7. Fire Brigade – Brabant-Wallon.	Professional Fireman diver from Brabant-Wallon.	July 2022	F.B.4



8. Citizen - Liège	Restaurant owner and volunteer catering	Oct. 2021	Vol. Cit. 6
9. Citizen - Trooz	Impacted citizen in Trooz (male, about 65 years old)	Oct. 2021- July 2022	Cit. 12
10. Citizen - Trooz	Impacted citizen in Trooz (female, about 45 years old)	Oct. 2021- July 2022	Cit. 13
11. Citizen - Angleur	Impacted citizen in Angleur (male, about 60 years old)	Oct. 2021	Cit. 14
12. Prof-Expert	Real estate expert and professor in real estate expertise.	Oct. 2021	Acad. 6
13. Citizen - Bakery business - Hony-Esneux	Impacted citizen - Bakery in Hony-Esneux	Oct. 2021	Cit. 15
<b>RTBF Info (2022), « Inondations : 6 mois plus tard », Jan. 2022, <a href="https://youtu.be/QvyEeLyZE1Q">https://youtu.be/QvyEeLyZE1Q</a></b>			
1. Municipality-Verviers	Mayor of Verviers	Jan. 2022	Mun. 15
2. Citizen- Ensival	Impacted citizen - Ensival (Liège)	Jan. 2022	Cit. 16
3. Citizen- Chaudfontaine	Impacted citizen - parent of kids - Chaudfontaine	Jan. 2022	Cit. 17
4. Citizen- Chaudfontaine	Impacted citizen - parent of kids - Chaudfontaine	Jan. 2022	Cit. 18
5. Citizen- Vaux-sous-Chèvremont (Chaudfontaine)	Impacted citizen - retired - Vaux-sous-Chèvremont (Chaudfontaine)	Jan. 2022	Cit. 19
6. Citizen - Angleur	Impacted Citizen - Bakery Louis - Angleur (Liège)	Jan. 2022	Cit. 20
7. Citizen - Angleur	Impacted Citizen - Bakery Louis - Angleur (Liège)	Jan. 2022	Cit. 21
8. Citizen-Angleur	Impacted Citizen - house owner - Angleur (Liège)	Jan. 2022	Cit. 22
9. Citizen - Trooz	Impacted Citizen - retired - Trooz	Jan. 2022	Cit. 23

10. SPW	Special Commissioner for Reconstruction in Wallonia	Jan. 2022	See above
11. PTB (political party)	Walloon Member of Parliament and member of parliamentary Inquiry Commission.	Jan. 2022	Reg. MEP 1
12. CDH-Les Engagés	Walloon Member of Parliament and member of parliamentary Inquiry Commission.	Jan. 2022	Reg. MEP 2

### Annex 5 - Questionnaire and topic list for semi-structured interviews

For each interview, a specific questionnaire has been drafted, but this list provides a non-exhaustive overview of the main questions posed (translated from Dutch and French).

#### Questions on the actor dimension (Actor & Flood Risk Management):

1. Who are you?
  - a. What is the role of your organisation in flood risk management?
  - b. What is your role in flood risk management?
1. What policy instruments do you have that are linked to flood risk management?
2. What is missing / what future opportunity do you see?
3. With what other actors do you cooperate in flood risk management?
4. How do you evaluate the cooperation with other actors (e.g., with DGO3, provinces, etc.)?
5. The amount of water managers is large; do you consider this problematic?
6. Is there a need for more coordination between the actors or to reduce their number?
7. Are there sufficient contacts with crisis managers?
8. Is there enough attention among spatial planners for FRM(FRM)?
9. Is your organisation sufficiently represented in the CIW/GTI? What is the added value of this forum?
10. Is there sufficient interest in FRM at the political level?
11. How are non-governmental actors involved in FRM?
12. Are there regular contacts with Flanders/Wallonia on flood issues? How do you evaluate this cooperation?
13. Do you consider engaging in long-term recovery as part of your tasks?

#### Questions on the rules dimension:

1. What are the most important legal initiatives in recent times?
2. How do you evaluate the application of the water assessment/art? 136 CWATUP?
  1. How do you evaluate the reform of the legal framework (e.g., the reform of the Decree Integrated Water Policy in July 2013)?
  2. Are legal conditions sufficiently followed up and enforced in the field?
  3. Can you talk about the challenges to the decisions of your administration before the relevant courts?
  4. Do you make use of expropriation measures?
  5. What is the impact of the WFD/FD on FRM?
  6. What do you believe will be the impact of the FRMPs on FRM?
  7. Which further legislative steps could be taken to improve FRM?
  8. Are you expecting a considerable change in the rules as a response to the experienced flooding?

9. Federal - local disconnect? Should the federal level impose mandatory matters to the local level or rather opt for a non-committal approach as it was organised in the summer of 2021?
10. Is there coordination to integrate the different cells (such as the psychosocial intervention plan) with other assistance/logistics?

#### Questions on the resources dimension:

1. Do you dispose of enough budget to take all necessary actions to reduce flood risks?
2. Has your organisation been impacted by the economic and/or corona crisis? Were cuts in budget/staff in proportion with other departments?
3. Do you make use of cost-benefit analyses?
4. Does your organisation possess sufficient expertise in FRM? If not, do you rely on external sources of expertise (other governmental organisations, consultancy firms, universities, etc.)?
5. What are the main sources of inspiration for innovation?
6. Is there enough exchange of expertise between the actors involved in FRM?
7. Do you involve citizens (and homeowners) in flood risk management? How?
8. Do you use specific instruments or policies?

#### Questions on the discourse dimension:

1. Do you know the 3Ps of FRM? Do you apply them in your organisation?
2. Have you heard already of multi-layer water safety? Do you apply it in your organisation?
3. Do you know/use the term resilience?
4. What does recovery mean to you? What are the characteristics? (Build back better – do they need to consider climate scenarios?)
5. According to some, citizens should take on responsibility in FRM as well. Do you agree with this statement?

#### Questions on change and stability/evaluation of FRM:

1. Which evolutions have taken place in FRM since you are active in the field?
2. What has caused these changes, according to you?
3. Did the 2021 flood cause any changes in FRM, in your opinion?
4. What are the main strengths of the current FRM?
5. On which points does Wallonia do better than neighbouring countries?
6. What could still be improved? Where could we learn from other countries?
7. How are future flood risks taken into account?

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