Interreg
Euregio Meuse-Rhine
Marhetak

EUROPEAN UNION
European Regional Development Fund

Institute for Transnational and Euregional
cross border cooperation and Mobility / ITEM

"Innovative forms of cooperation and crisis management at the strategic-political level"

Study as part of work package WP 4
Coordinated cross-border crisis management

Dieses Projekt wurde durch das Programm Interreg V-A Euregio Maas-Rhein unterstützt.
Dit project is ondersteund door het Interreg V-A Euregio Maas-Rijn programma.
Avec le soutien du programme Interreg V-A Euregio Meuse-Rhin.
This project is supported by the Interreg V-A Euregio Meuse-Rhine programme.

Maastricht University

Innovative forms of cooperation and crisis management at the strategic-political level.

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July 2023

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Interreg
Euregio Maas-Rijn
Europees Fonds voor Regionale Ontwikkeling
EUROPESE UNIE

The aim of the Marhetak project is to strengthen cooperation between the Euregional services, which are legally responsible for crisis management, and the weather, water and ground services in the event of a flood crisis.

Partners of the MARHETAK project: the Veiligheidsregio Zuid-Limburg in the form of EMRIC, the Public Service of Wallonia, the Federal Public Service Home Affairs Belgium and the Limburg Water authority

Contents

Summary

Although the EMRIC network was able to take on important tasks during the 2021 flood crisis in terms of the flow of information between the various partner organisations, as in the case of the COVID crisis, the network was not institutionally set up for such a crisis. There were basically two reasons for this: the previous orientation was based on scenarios in which damage events on one side of the border can be managed jointly through cross-border assistance at the operational level. Mutual assistance in the event of simultaneous crises is envisaged, but was hardly possible due to the massive damage caused by the 2021 floods on all sides of the border. On the other hand, the network is geared towards cooperation between active EMRIC partner organisations and the respective responsible specialist external partners. In view of the floods, the network initially lacked the corresponding routines with the water and flood protection services. Unlike in the areas of "fires in nature" or "radiation accidents", for example, there were no special agreements or working groups. Due to the simultaneous utilisation of rescue services, the crisis situation was less about mutual aid and more about information, coordination and consultation with regard to individual measures of the individual crisis teams. Various deficits were identified in these areas in this study, some of which lie outside the work of EMRIC. These range from inadequate information exchange with regard to weather data and forecasts to deficits in information and communication with regard to crisis team measures, the effects of which could not always be assessed promptly on the other side of the border and led to uncertainties, particularly in crisis communication. In many individual discussions with EMRIC partners, who brought experience from the work of the respective crisis teams, it was confirmed that the Marhetak project addresses key issues that correspond with the deficits experienced in cross-border crisis management. This ranges from the better exchange of weather data, the more comprehensive cross-border use of information and communication systems, the handling of different emergency planning and the question of better communication between crisis teams at the level of political leaders. With a view to improving communication at the political management level, all stakeholders discussed how the coordination and communication of crisis teams could be improved across borders. Accordingly, a key recommendation of this study is that it would not make sense to set up a cross-border crisis unit, but that there could very well be an innovative instrument that is presented with the term "crisis unit coupling". The term "coupling" was chosen because, in the case of fire hoses, it clearly facilitates cross-border cooperation without harmonising national systems. Such a crisis unit coupling should always be set up under the umbrella of EMRIC when, as in the case of the floods, it is less about mutual assistance and more about information and consultation in the event of a crisis. If possible, it should even facilitate the coordination of measures and also contribute to joint crisis communication through better coordinated risk assessments (one of Marhetak's products), which should lead to the avoidance of negative cross-border effects. A type of escalation model could be established in an EMRIC "crisis team coupling" agreement, which would also trigger a structured coupling of the politically responsible parties in the partner regions in certain hazardous situations. Although EMRIC has set up an instrument for this case with the liaison model, the appointment of liaison persons per partner institution, this was not sufficiently well known or was not always fully utilised. A crisis unit coupling can build on this model. In particular, it should enable individual EMRIC partners to request the establishment of a crisis unit coupling at very short notice if necessary, if there are uncertainties regarding the procedure and the situation in the partner regions. A crisis unit coupling could be particularly effective in the future if the various Marhetak work packages contribute concrete innovations within the framework of EMRIC. This concerns above all the improved exchange of data (such as weather forecasts), the improved information and communication possibilities at the operational level, as well as progress in joint risk assessment, crisis communication and emergency planning. The proposal for an institutionalised "crisis unit coupling" would therefore be a building block based on a fundamental recommendation of this study: To develop EMRIC even more strongly into a competence network for cross-border civil protection.

Introduction

The flood disaster in mid-July 2021 caused major material damage in Germany, Belgium and the Netherlands, including in the Euregio Meuse-Rhine (EMR), the area in which the EMRIC services are responsible for crisis management and disaster relief. There were fatalities on the Belgian territory of the EMR. Apart from the corona crisis, this is yet another exceptional disaster in recent years that involved a simultaneous disaster in areas throughout the EMR. In particular, the simultaneity on both sides of the border was a key feature of the events. Whereas previous crisis scenarios often assumed that in the event of a disaster at one of the EMRIC partners in a region, actors on the other side of the border from the neighbouring region would be able to help, this simultaneity has highlighted the need for new considerations regarding cross-border crisis management. In particular, questions of improved information, communication and coordination of measures are coming to the fore. This is all the more evident in the case of flood management, as measures taken at one point in the course of the river can have a positive or negative impact on the situation in the partner region.

This research study is part of the Interreg project Marhetak, work package "Coordinated cross-border crisis management". The aim of the study is to contribute to the debate on improving future cooperation in the Euregio Meuse-Rhine by analysing the quality of cross-border crisis management and drawing up specific proposals.

Chapter 1 describes the background to the study, explains the focus and objectives and discusses methodological issues. Chapter 2 describes the background to the 2021 flood crisis and the chronology of events in the respective regions. Chapter 3 analyses and describes the characteristics of crisis management and the specific conditions in the different EMRIC partner regions, with a focus on the situation in the partner regions in NRW, Wallonia, Dutch Limburg (Veiligheidsregio Zuid-Limburg) and Belgian Limburg. The main focus here is on the vertical integration of regional actors within the framework of national crisis management and horizontal cooperation across regions within the state. Chapter 4 analyses the respective political processing and evaluation of the crisis in the regions. Proposals and political decisions are also presented on how crisis management is currently to be improved in the individual partner regions. Chapter 5 then analyses the characteristics of cross-border crisis management in the 2021 flood crisis and discusses the respective perspectives of the EMRIC partners involved. The assessments of the actors involved in cross-border crisis management are presented in detail with regard to the flow of information, communication and consultation in the event of a crisis and the contacts between the various crisis teams.
Finally, Chapter 6 makes various proposals on how various innovations within the EMRIC structure could be used to optimise cross-border crisis management, above all with better cross-border coupling of crisis teams.

1. Background

1.1 EMRIC in the Euregio Meuse-Rhine

According to its own description, EMRIC stands for "Euregio Meuse-Rhine Incident and Crisis management. EMRIC" and is a "unique partnership of public services responsible for firefighting, technical assistance, emergency care, infectious diseases and disaster and crisis management in their area."[1]
A fundamental idea is that in a region with many borders, such as the Euregio Meuse-Rhine, foreign emergency services could often be on site faster than their own. This indicates that the "normal case" is an event that "only" occurs in a specific area of the Euregio and therefore offers the opportunity to provide free capacity for the neighbouring region. In this sense, both the COVID crisis and the flood crisis in 2021 were crisis scenarios in which the exchange of cross-border rescue services was very difficult or even impossible due to the simultaneous nature of the events. [2]

In the event of a disaster or crisis, EMRIC partners must first and foremost coordinate their actions as far as possible within the framework of their own legislation. Crisis management and civil protection have crisis teams at different levels: strategic, tactical and operational. It is of course the responsibility of the lead and legally competent authorities in the three states to coordinate corresponding crisis management measures vertically within the division of competences. EMRIC has added a cross-border framework to this vertical internal coordination in the EMR. The EMRIC partners have defined certain issues in various agreements and protocols, which primarily relate to technical cooperation in the area of exchange, for example in the operational area of control centres. A liaison model has been set up for the event of a disaster, with designated fixed contact persons for the services involved. The aim is to ensure that information, communication and measures are coordinated promptly at the political level between those responsible for the respective crisis teams. This study focusses in particular on cross-border cooperation at this strategic level, i.e. the political management level.

1.2 Priorities and objectives

At the request of the EMRIC partner organisations, this study addresses the needs of cross-border crisis management in the case of the 2021 floods. While specific areas of emergency response and disaster management are already coordinated in the EMR, the flood as a crisis goes beyond EMRIC cooperation and requires the combination of national, regional and euregional levels. The aim of the study is to analyse the current situation of crisis management at administrative and political level across the border and to discuss recommendations for the partners of this Interreg project that could improve cross-border crisis management in the future. In this regard, the study analyses the characteristics of crisis management during the 2021 flood event first at the regional/national level and describes the role of relevant actors at different levels of government (national, regional, local). As an essential part, the actual quality of cross-border coordination during the crisis is examined in terms of information, communication, consultation (via informal and formal channels) and whether active coordination of measures and bilateral or multilateral assistance could take place with regard to capacities of rescue services or other supporting organisations. The study focusses primarily on the

[1] See self-description on the EMRIC homepage https://www.emric.info/de, opened on 17 June 2023.
[2] This was the case for Covid patients.

level of those politically responsible and examines the specific coordination structures of the crisis teams. Based on the results, the aim is to formulate recommendations for EMRIC and its partners on important elements for improving cross-border crisis management in the area of flooding.

1.3 Method

As part of the study, the various sources from the sub-regions of the EMR were first analysed, for example press reports, documents on how parliaments dealt with the crisis and descriptions of internal competencies and processes in the respective state. In addition, the different evaluations of crisis management were also focussed on. The question was what deficits were identified in the respective sub-regions and were cross-border aspects also included in the evaluations. The main sources of this investigation were the intensive discussions held with political leaders and their staff in the first half of 2023. In addition to the "official" interviews as part of the study (see list in the appendix), there were also numerous informal background discussions with stakeholders. The ITEM team also had the opportunity to take part in discussions conducted as part of the other two studies on questions relating to evaluations and risk assessments. These were also included in the study. In this context, there was also a lively exchange with colleagues from Aranco and Plato on the specific aspects of crisis management that play a key role in their investigation.

2. Chronology of the 2021 flood crisis

2.1 Chronology of events in the area of the Euregio Meuse-Rhine in NRW

On the morning of 14 July, the German Weather Service warns of heavy rain and storms in NRW - highest warning level for many parts of the state. On the night of 14 to 15 July 2021, a flood of the century devastated parts of North Rhine-Westphalia. 49 people lost their lives. With 180 towns and municipalities, almost half of the municipalities in NRW were affected.[3] During the night, many rivers and streams in the Eifel, Bergisches Land, Rhineland and Sauerland burst their banks.
The German Weather Service described the events immediately after the flood event on 21 July 2021:

> *"Beginning on 14.07.21 and into the morning hours of 15.07.21, there were then heavy continuous rain, which was repeatedly reinforced locally by rain showers. The The main focus of precipitation activity was in an area stretching from Dortmund over Cologne, Euskirchen, Gerolstein, Bitburg and even Trier (Fig. 3). Here, more than 100 litres/m² of precipitation was recorded in 72 hours. Regionally, even more than 150 litres/m² fell Precipitation in 24 hours...".*[4]

The Aachen region in North Rhine-Westphalia is the German part of the Euregio Meuse-Rhine and consists of the Aachen city region, the Düren district, the Euskirchen district and the Heinsberg district

[3] See the description of the chronology in the online version of the Ruhrnachrichten, https://www.ruhrnachrichten.de/regionales/flutkatastrophe-nrw-2021-chronologie-w1771549-2000576235/, accessed on 3 July 2023.
[4] Deutscher Wetterdienst, T. Junghänel (et al), "Hydro-climatological classification of heavy and continuous precipitation in parts of Germany in connection with the low pressure area "Bernd" from 12 to 19 July 2021", as of 21 July 2023.

with a total area of around 3,500 km² and around 1.3 million inhabitants in 46 towns and municipalities. [5]
The following chronology of events is based on an analysis of the press, in particular the detailed account in the online edition of the Aachener Zeitung. [6]

City of Aachen

The flood caused considerable damage in the Aachen districts of Kornelimünster, Sief, Hahn and Friesenrath between 14 and 15 July 2021. The two rivers Iter and Inde, which come together directly in front of Kornelimünster, caused unprecedented water levels and corresponding damage in Friesenrath, Sief and Hahn. Kornelimünster was severely affected, with record water levels there too. According to the Aachener Zeitung newspaper, the situation at the primary school, which is located directly on the Inde, was particularly problematic. The newly renovated building was no longer accessible.

Stolberg and Eschweiler

Three flood peaks hit Stolberg and Eschweiler on 14 and 15 July 2021. The water levels reached unprecedented heights and caused a lot of damage as a result. The Vichtbach and Inde streams reached all-time highs. During the night, the Dreilägerbach dam overflowed into the Vicht at a rate of up to 40,000 litres per second. According to the Aachner Zeitung newspaper, it devastated the southernmost and lowest valley in the northern Eifel with two flood waves. It caused the bridge on the country road to Venwegen to collapse and swept away footbridges, it caused a leak in the gas pipeline and devastated houses in the valley. The valley and houses in the Schleebach valley were also flooded. Upstream, on the so-called "Roetgen mainland", ditches also burst their banks and caused serious damage.
In Monschau's old town, it was mainly the Laufenbach stream that burst its banks above Haus Troisdorf and caused a trail of devastation. Many cellars in the old town were flooded with water and mud. There was also serious damage in Simonskall.[7]

Herzogenrath
According to the Aachener Zeitung newspaper, the flooding in Herzogenrath was caused by heavy rainfall on 29 June 2021, which resulted in debris, sand and root wood being washed onto the tracks of the Herzogenrath-Mönchengladbach railway line. Due to the persistent rain forecasts, the Herzogenrath fire brigade brought hundreds of sandbags into position on the afternoon of 12 July to protect the town centre from flooding. During the night of 15 July, the level of the Wurm rose to over 3.40 metres. The flood defences in the city centre were no longer sufficient and countless cellars were flooded. The fire brigade and THW fought against the flood with pumps and suction lorries. With the help of many citizens, around 9000 sandbags were filled well into the night, preventing the flooding of the old town centre.

Heinsberg district
In the district of Heinsberg, many people had to leave their homes along the Rur and Wurm rivers from Übach-Palenberg to Wassenberg. While the level of the Wurm near the Heinsberg district of Randerath was still 80 centimetres on 13 July 2021, 24 hours later it was 2.73 metres. On 15 July, it

[5] See homepage of the Aachen region, https://regionaachen.de/ueber-uns/, last opened on 2 July 2023.
[6] See Aachener Zeitung online, 14 July 2022, Ein Jahr nach der Flut: Der Regen, das Hochwasser, die Zerstörung, accessed 20 June 2023, https://www.aachener-zeitung.de/nrw-region/der-regen-das-hochwasser-die-zerstoerung_aid-72745973.
[7] Ibid.

was more than three metres in the morning. The town centre of Randerath was completely flooded and was one of the worst affected town centres in the district of Heinsberg.

The centre of Geilenkirchen was also almost completely flooded. 400 households and businesses were affected by the flooding. Two people lost their lives in the heavy rainfall. According to the Aachener Zeitung newspaper, the 74 and 78-year-old residents of a house were found dead in the flooded cellar. As the clean-up work began in many areas from Übach-Palenberg to Heinsberg, the situation in the Wassenberg village of Ophoven only came to a head on 26 July. Two days after the heavy rainfall, a dyke broke here. 700 residents had to be evacuated. Ophoven was partially under water.

2.2 Chronology of events in the area of the Euregio Meuse-Rhine in Wallonia

The heaviest rainfall in Belgium fell between 13 and 16 July in eastern Belgium. In some places, more rain fell on two days than normal in two months. The measured precipitation amounts of more than 250 mm in 2 days (13/14 July) (normal monthly precipitation in July 73.5 mm) in the Ardennes were historically high.[8] The resulting flood disaster in Wallonia in the night from 14 to 15 July caused billions of euros worth of damage. 38 people lost their lives in this disaster. According to the Walloon Housing Minister Collignon in September 2021, around 3,200 buildings either collapsed during the floods or had already been demolished afterwards. [9] The worst-affected municipalities were in the province of Liège, as the Vesdre, Ourthe and Meuse were unable to cope with the large volumes of water: Pépinster, Verviers, Trooz, Chaudfontaine, Tilff and Angleur (Liège), Theux and Spa were the hardest hit. The most devastated municipality was Pépinster, where several houses collapsed due to the water pressure and other houses were severely damaged.[10]
The precipitation amounts were summarised in an evaluation study.

> *"Especially at the measuring stations Jalhay, Mont-Rigi, Spa_aerodrome and Ternell. The rain event lasted 72 hours and is characterised by three major peaks and a fourth, smaller peak. The first peak was recorded by all four stations on 13/07/2021 at 22:00-23:00. The second peak was recorded at Jalhay and Spa aerodrome on*
> *14.07.2021 measured around 4.00-5.00 am. On 14/07/2021 at 13:00, Jalhay records a third peak less intense than the previous two. Finally, on 14/07/2021 at 20:00-21:00, all four precipitation gauges record a fourth peak of the same magnitude as the first two for Ternell and MontRigi and weaker than the first two for Jalhay and Spa aerodrome."[11] (own translation)*

The special situation at the Monsin weir in Liège.

On 15 July, the Meuse in Liège burst its banks in several places. One reason for this was the situation at the Monsin weir. The weir had been under construction for a year and only two of the normal six culverts (or gates) were open. As a result, the weir was unable to release the necessary amount of water, causing water from the Meuse to overflow into the streets of Liège. According to a report in Le

[8] Coördinatie Commissie Integraal Waterbeleid (2022): Evaluatierapport Overstromingen Zomer 2021, published on 15 December 2021.
[9] See VRT News: https://www.vrt.be/vrtnws/de/2021/09/03/nach-dem-hochwasser-in-der-wallonie-bis-zu-24-000-gebaeude-betr/, accessed on 3 July 2023.
[10] See also the presentation on https://www.meteobelgie.be/klimatologie/nieuws/la-suite/2309-watersnood-juli-2021, accessed on 2 July 2023. .
[11] Fränz Zeimetz et al: "Analyse indépendante sur la gestion des voies hydrauliques lors des intempéries de la semaine du 12 juillet 2021", Lot 1 - Factualisation.

Soir, the biggest concern at the time was whether a crane on the construction site would be able to withstand the current events. The crane was submerged in water and there was a risk that it could fall onto a high-voltage power line that supplied all the pumping stations in the region. In order to prevent the city centre from being flooded, it was decided to flood the construction site where the sluice gates of the Liège dam were to be replaced (Le Soir, 4 August 201). The official external evaluation report mentioned above described in detail the various measures that could be used to divert water.
One of the biggest concerns, which was also relevant for cross-border stakeholders in Belgian and Dutch Limburg, was the danger that the water level in the Albert Canal could rise to too high a level. This would jeopardise the city of Liège along the canal. There was also a risk of dyke breaches along the canal. Flood maps had to be drawn up in a hurry so that the population at risk could be evacuated if necessary.
Catherine Delcourt, who had taken over from Governor Hervé Jamar during the floods, had been in charge of the Walloon Parliament's committee of enquiry,
presents a comprehensive chronology of events, excerpts from which provide a good overview of the events and crisis management.[12] The following is a short extract to illustrate this.

Box 1: Extracts from the chronology of events from the perspective of Mrs Catherine Delcourt, Acting Governor of the Province of Liège at the time of the 2021 floods

- On 13 July 2021, Be-Alert informs the services of the Governor of the Province of Liège of a rain warning. "Rain" for holiday camps and warns of a
calls for caution;
- On 14 July 2021, it was decided to initiate the provincial emergency phase.
...
- Also on 14 July 2021, 12.34 pm, the ministry announced that evacuation measures should be considered in the area of the municipalities of Eupen and Limburg...
...
From the afternoon of 14 July 2021, the situation deteriorated continuously and it became increasingly difficult for the provincial services to provide meaningful support to the mobilised actors;
....
- Also on 14 July 2021, the Regional Crisis Centre informed that the Eupen dam had to implement relief measures. Following this information, it contacted the local authorities affected by the evacuations to check whether the evacuation measures had been carried out properly;
...
- Also on 14 July 2021, at 11.30 p.m., she called for the activation of the European Civil Protection Mechanism[13]
of the civil security mechanism, to mobilise more helicopters and boats;
- On 15 July 2021 between 4.00 and 7.00 a.m., requested material arrived from France. On the same day, a meeting was held with the National Crisis Centre (NCCN). The Minister of the Interior decided to initiate the federal emergency phase on 15 July 2021 at 14:00 30:30.
....

[12] See Parlement Wallon, 2021: 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 Commission d'enquête parlementaire par M. Bierin et Mme Schyns 4e session de la XIe législature, www.parlement-wallonie.be, accessed on 23 January 2023.
[13] The EU Civil Protection Mechanism was first established in 2001 to coordinate the response to natural and man-made disasters at EU level. See description on the website of the Council of the European Union,https://www.consilium.europa.eu/de/policies/civil-protection/

2.3 Chronology of events in the Euregio Meuse-Rhine region in the Dutch province of Limburg

The following description of the events is taken from the crisis management evaluation "Voorbij het ergste scenario Leerevaluatie hoogwater", which was carried out by the Veiligheidsregio Zuid-Limburg in 2022.[14] According to this, Parkstad was the first to be affected by extremely heavy rainfall and flooding on 13 July. The rivers Geul and Gulp burst their banks and the campsites in the area had to be evacuated. The rapidly rising water also affected the Jeker and the Voer.

Valkenburg
The following night, from 14 to 15 July, the water in Valkenburg aan de Geul rose very quickly. Parts of the city centre and nursing homes were evacuated and several places lost power. There were major problems in Meerssen, where residents were asked to leave their homes following an NL alert. In the meantime, the Meuse also rose.

Maastricht

On 15 July 2021, the water level of the Meuse was so alarming that the districts of Heugem and Randwyck had to be evacuated as a precaution. It was expected that the Meuse would burst its banks during the night at around 03:00 and flood these neighbourhoods. Fortunately, this did not happen. On 16 July, the water of the Meuse slowly began to recede and the residents were able to return to their homes. From 16 July, the tidal wave moved to the north of the province of Limburg and the water slowly began to recede in the south.

Mouth of the Geul
In the Geul estuary, water levels rose extremely during the crisis due to a combination of high discharges from the Geul and the Meuse. As a result, areas throughout the Geul valley were flooded, including areas near Meerssen and Bunde. North of Bunde, the terrain slopes downwards, where the floodwater flowed as far as Brommelen, Westbroek, Geulle and Broekhoven. Local obstacles in the landscape, such as bridge piers, held back the rising water for a while and caused the water depth to rise to several metres. Existing spring ditches, seepage ditches and culverts allowed the water to spread further north (Brommelen, Westbroek). Due to the high water level of the Meuse, the water could only be drained during the floods using pumps, but these could not provide sufficient capacity for the corresponding volumes. As a result, flooding continued to occur in this area for a long time, even after the water levels of the Geul and Meuse had already dropped.[15]

2.4 Chronology of events in the Euregio Meuse-Rhine region in the Belgian province of Limburg

The Belgian province of Limburg was also affected by the 2021 flood crisis, albeit to a lesser extent than the neighbouring regions. The Flemish Coördinatie Commissie Integraal Waterbeleid (Integrated Water Policy Coordination Committee) presented a report on the flood situation in Flanders in

[14] See: Veiligheidsregio Zuid-Limburg, Voorbij het ergste scenario Leerevaluatie hoogwater Veiligheidsregio, chapter 3, "Gebeurtenissen op hoofdlijnen", page 8-12.
[15] There is a detailed analysis of the situation on the Geul: Deltares, Waterschap Limburg, Analyse overstromingen Geulmonding, Watersysteemevaluatie, April 2022.

December 2021. This document also initially reconstructed the facts of what happened in Flanders.[16] According to the report, several areas of precipitation passed over Flanders between 29 June and 28 July 2021, causing flooding. The most extreme precipitation fell between 13 and 16 July in East Belgium. In some places, more rain fell in two days than normally falls in two months. The measured rainfall of more than 250 mm on 13 and 14 July (normal monthly rainfall in July is 73.5 mm) in the Ardennes was rated as historically high, with a return period of more than 100 years. The subsequent precipitation, which tended to fall in the centre (especially south of Brussels), was also very high. In Flanders, there were extreme discharges and water levels in the watercourses and waterways in the Meuse and Demer catchment areas and, to a lesser extent, in the Dijle and Zenne catchment areas and in the Nete catchment area. The report emphasises that, unlike in Wallonia and NRW, there were no casualties. However, flooding also led to local crisis situations. The Limburg hamlet of Herbricht in the municipality of Lanaken was under water for a long time. Kotem in the municipality of Maasmechelen was also affected by flooding. The retaining wall in Heppeneert in the municipality of Maaseik, built in 1926, had to be reinforced with two layers of sandbags. Moelingen, a village in the municipality of Voeren, was affected by flooding of the Berwijn. Extreme discharges also occurred on the navigable watercourses.

On 15 July, the inhabitants of the Belgian-Limburg municipalities along the Meuse were ordered by the provincial governor to leave low-lying areas. This concerned residents of the municipalities of Maasmechelen, Lanaken, Maaseik, Dilsen-Stokkem and Kinrooi. Some streets in Lanaken were forcibly evacuated. During the critical phase, Governor Jos Lantmeeters expressed his concern in an interview that the water level could reach a level during the night for which the dykes were not designed. He also mentioned the risk that the Monsin weir near Liège would not hold, in which case the Albert Canal would also be at risk of flooding.[17] This scenario did not materialise. In another more specific report on the water levels, the Vlaamse Milieumaatschappij presented a specific hydrological report detailing the situation of the rivers and streams in Belgian Limburg.[18]

[16] Coördinatie Commissie Integraal Waterbeleid, 2021, Evaluatierapport overstromingen Zomer 2021, accessed on 12 May 2023 at https://www.integraalwaterbeleid.be/nl/nieuws/downloads-van-nieuwsberichten/ciw-evaluatierapport-overstromingen-2021.pdf.

[17] See Preventieve evacuaties voor bewoners Belgisch Limburg, NOS online, Donderdag 15 juli 2021, accessed 3 July 2023, https://nos.nl/collectie/13869/liveblog/2389373-dringend-advies-maastricht-aan-10-000-mensen-ga-je-huis-uit-dodental-duitsland-boven-55.

[18] See:Vlaamse Milieumaatschappij (2021), Rapport wateroverlast 29 juni - 28 juli 2021, accessed 26 May 2023 at https://www.waterinfo.be/Rapporten.

3. Characteristics of crisis management and the specific conditions in the EMRIC partner regions

3.1 Partner region in NRW

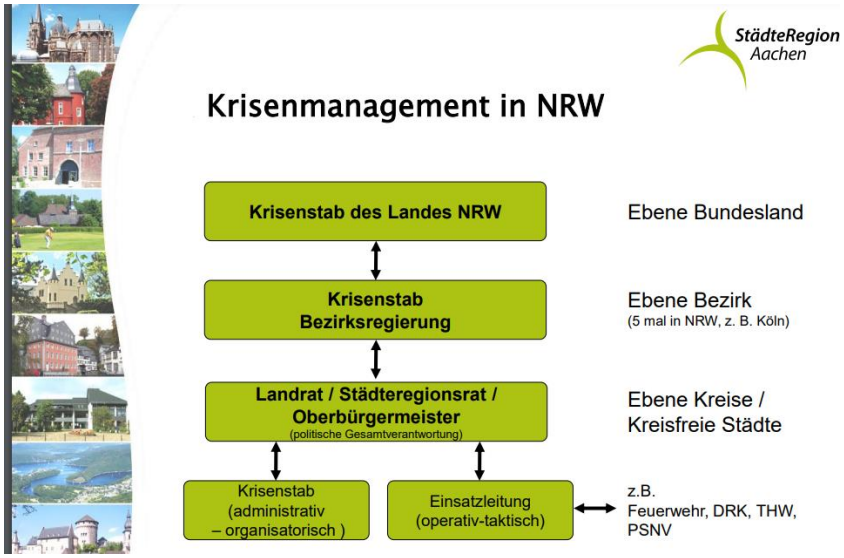
The legal requirements in North Rhine-Westphalia are regulated by a decree issued by the state government entitled "Crisis management by crisis teams in the state of North Rhine-Westphalia in the event of large-scale operations, crises and disasters Circular of the Ministry of the Interior and Municipal Affairs of 26 September 2016". [19] The decree also defines the term crisis management used. "For the purposes of this decree, the term crisis management covers all measures for the prevention, detection, management and follow-up of crisis situations (large-scale operations, impending or actual disasters)."[20] The decree describes that the overall political responsibility for major emergency situations and disasters lies with the chief administrative officer at the level of the districts and independent cities, as well as with the district president at the level of the district governments, and with the regional president at the level of the district authorities.

at the state level with the relevant departments of the state government. Interestingly, section 2.4 describes the crisis teams at the level of the districts and independent cities in detail, including their tasks and composition. The crisis teams at district and state government level are described in less detail. Point 3 merely states: "At these levels, the administrative-organisational and operational-tactical tasks are bundled in a crisis unit. Rather than an operational command, operational-tactical operational support is formed as a module of the crisis unit. This is due to the fact that emergency forces are generally managed at the municipal level. At state level, the structures are therefore based on the principle that the relevant departments are politically responsible in accordance with the departmental principle. The crisis team of the state government is organisationally affiliated to the Ministry of the Interior. The decree also states that the Ministry of the Interior creates the organisational conditions for the activities of the crisis unit and maintains a coordination group for the crisis unit. In the case of the 2021 floods, however, no separate crisis unit was set up, but the coordination group acted as a crisis unit. This is why there were mainly crisis teams at the municipal level, crisis teams of the City of Aachen, the StädteRegion Aachen and the districts as well as a crisis team of the Cologne district government.

[19] "The decree is based on Section 54(3) in conjunction with Section 2(1)(3), Section 4(2) and Section 35 of the Act on Fire Protection, Assistance and Disaster Control of 17 December 2015 (GV. NRW. p. 886)". The text of the decree was accessed on 2 July 2023 at https://recht.nrw.de/lmi/owa/br_text_anzeigen?v_id=62020161021103137880.

[20] Ibid. under point 1, General information.

Figure 1: Crisis management in NRW



Source: Aachen city region, Marlies Cremer, 2022

3.2 Partner region in Wallonia

The Belgian law of 22 May 2019[21] on emergency situations distinguishes three possible phases of strategic coordination of crisis management: the municipal phase, the provincial phase and the federal phase. The coordination of relief measures is carried out by the competent authorities, i.e. the mayors, provincial governors and the federal Minister of the Interior, in order to ensure the efficient use of all resources to protect the population and their environment. The evaluation report on the flood disaster[22] points out that some actors are not explicitly included in the Royal Decree of May 2019. This is the case for the Regional Crisis Centre, which plays a role in emergency planning and crisis management on Walloon territory. This applies to matters relating to regional competences. In the area of flooding, for example, which falls within the regional remit, the Regional Crisis Centre is responsible for planning flood protection measures and plays an expert role in supporting the provincial coordination committee.
In connection with the floods in July 2021, the 5 provinces in the Walloon Region have triggered their provincial crisis management phase at different times and convened their crisis management committee. In the province of Liège, this took place on Wednesday 14 July at 9.30 am. The very next day, crisis management was raised to the federal (national) level, which was not the case in the Netherlands and Germany. Minister of the Interior Annelies Verlinden declared the federal phase of crisis management on 15 July.[23]

[21] Arrêté royal du 22 mai 2019 relatif à la planification d'urgence et la gestion de situations d'urgence à l'échelon communal et provincial et au rôle des bourgmestres et des gouverneurs de province en cas d'événements et de situations de crise nécessitant une coordination ou une gestion à l'échelon national, accessed 16 June 2023 at https://centredecrise.be/fr/documentation/legislations/22052019-arrete-royal-relatif-la-planification-durgence-locale

[22] The institutional structure is described in detail in Fränz Zeimetz et al: "Analyse indépendante sur la gestion des voies hydrauliques lors des intempéries de la semaine du 12 juillet 2021", Lot 1 - Factualisation, page 111.

[23] See the description of the National Crisis Centre (crisiscentrum) on the website https://crisiscentrum.be/nl/newsroom/overstromingen-einde-van-het-federale-crisisbeheer, accessed on 22 June 2023.

According to the federal government, the National Crisis Centre was already playing a supporting role in crisis management for the local authorities and emergency services before the federal phase was declared. The situation was monitored around the clock by the National Crisis Centre. In a federal phase, several crisis cells come together: the assessment cell, the federal coordination committee, the strategy cell and the information cell. The National Crisis Centre chairs the Federal Coordination Committee and the Information Cell and supports crisis management by providing infrastructure or personnel to the federal government. For example, the Federal Coordination Committee (COFECO) met 16 times in connection with the flood disaster.[24] This committee is made up of representatives from specialised departments and government agencies. Coordination meetings were held several times a day with the various partners (governors, fire brigade, medical assistance, police, civil protection, defence, etc.). Communication with the population and the media was coordinated by the National Crisis Centre. The tasks of the National Crisis Centre included, among other things Monitoring the flow of information by preparing situation reports, providing legal advice, preparing ad hoc risk analyses, coordinating crisis communication and providing logistical support.
The Groupe Transversal Inondations (Transversal Flood Group) is the place of cooperation between several technical services of the Walloon Ministry (le Département Expertise Hydraulique et Environnement SPW MI) and the technical services of the provinces. However, according to the evaluation report, the Groupe Transversal Inondation had little liaison with the local authorities and their emergency services in preparing for crises

3.3 Partner region in Limburg, the Netherlands

According to the Dutch national government, it has a dual role in the event of a crisis. On the one hand, it is a crisis partner at local or regional level. In the case of the floods, this was Rijkswaterstaat. On the other hand, the national government also has a role in the national crisis structure. The Minister of Justice and Security is the coordinating minister in the area of crisis management.[25] He is responsible for the organisation, functioning, coherence and integrated approach of the crisis management policy and system, with the National Coordinator for Counter-Terrorism and Security (NCTV) performing this coordinating role of the Minister. The interministerial agreements on the structure and working methods of the national crisis organisation are laid down in the decree establishing the ministerial crisis management committee and elaborated in the national manual for decision-making in crisis situations. [26]
However, in the Netherlands, local or regional crises are usually handled by the authorities (e.g. the municipality, the water authority or the Veiligheidsregio) and the organisations working at this level. This was also the case in the 2021 floods. The national government was mainly involved through Waterstaat, but the regional and municipal level took the lead. The competences are described in the above-mentioned manual for decision-making in crisis situations. For its part, the Veiligheidsregio South Limburg has also laid down the structures and responsibilities in a regional crisis plan.[27]

[24] See the 2021 Annual Report of the National Crisis Centre, available at https://crisiscentrum.be/sites/default/files/documents/files/Jaarrapport_2021_NL.pdf
[25] See detailed description on the website of the Ministry of Justice and Security, https://www.nctv.nl/themas/crisisbeheersing.
[26] See the current version, Instellingsbesluit Ministeriële Commissie Crisisbeheersing 2022, available at https://wetten.overheid.nl/BWBR0047534/2022-11-30. Nationaal Handboek Crisisbeheersing, https://www.nctv.nl/documenten/publicaties/2022/12/06/nationaal-handboek-crisisbeheersing. Accessed on 10 July 2023.
[27] See Veiligheidsregion Zuid-Limburg: 2020 - 2023 Regionaal crisisplan, versie oktober 2020, available at https://www.vrzl.nl/application/files/1416/0570/6867/Crisisplan_2020-2023_VRZL_Definitief.pdf

In addition, the requirements of the updated Flood Protection Plan Meuse, Limburg 2020-2023 (rampbestrijdingsplan Hoogwater Maas, adopted on 4 December 2020) were also crucial for managing the crisis in order to be prepared for flood problems. The plan builds on the existing crisis structure (GRIP). The plan describes how the Veiligheidsregio South Limburg responds to various scenarios around the Meuse. However, the plan does not address the surrounding rivers and streams. The evaluation report[28] of the Veiligheidsregio had shown that it was precisely because of the flooding in the Geul and Gulp area that it was decided to upgrade to GRIP-4. At that time, the Meuse had not yet exceeded the limit value of 2600 m/3, which applies in the planning for the upgrade to GRIP-4.
Who and when was in charge during the crisis is regulated in the Dutch system of various "GRIP" stages. This stands for "Gecoördineerde Regionale Incidentbestrijdingsprocedure" (Coordinated Regional Crisis Management Process). The GRIP structure was created in order to organise the increase in emergency services in an orderly manner. GRIP refers to the organisation of disaster relief and crisis management by the emergency services of the Veiligheidsregio.

The scaling levels are:

GRIP 1: Response at the scene of the incident (Commando Plaats Incident' (CoPI) management, police or fire service personnel)
GRIP 2: Further effects on the environment (head of the fire brigade or police)
GRIP 3: Threat to the well-being of the wider population (led by the mayor)
GRIP 4: Event affecting several municipalities (led by the chairman of the Veiligheidsregio)
GRIP 5: Supra-regional event

If there is a need for impact or preparatory measures, so-called 'kernoverleggen' (core consultations) will be organised. In the late afternoon of 12 July, after the KNMI reports of extreme rainfall arrived and warnings were issued, a 'kernoverleg' met to examine possible scenarios, after which the municipalities were also informed. Grip 2 was declared in the evening of 13 July and Grip 4 at around 1 p.m. on 14 July, putting the Veiligheidsregio in charge. At 5.30 pm, KNMI announced the highest warning level (code red). The warning indicated that the weather situation could cause considerable damage.[29] On 17 July, the Grip level was returned to Grip 2 and on 19 July to Grip 1. The crisis management was therefore characterised by the respective Grip level, which determined both political and operational responsibility. In the crisis, however, the Veiligheidsregio was the most important point of contact for the neighbouring regions during the peak phase due to the rapid classification as a Grip 4 event. In this respect, the Dutch situation was not particularly complex for the partners in the Euregio Meuse-Rhine, but fitted well into the EMRIC structures because the Veiligheidsregio is well networked with the partners there. It is also worth noting that the national government played a less prominent role, although it was involved locally through Waterstaat.

3.4 Partner region in Limburg, Belgium

The structures and legal regulations between the federal level, the provinces and the municipalities already described for the province of Liège also apply to the province of Belgian Limburg.
As already described in the case of the province of Liège, the governor of the province of Limburg declared the provincial phase and led the provincial crisis management. Together with experts from the emergency and security services, he decided on the steps to be taken to manage the crisis. This

[28] See description of the adjustments to the GRIP stages in the evaluation, Veiligheidsregio Zuid-Limburg, Voorbij het ergste scenario Leerevaluatie hoogwater Veiligheidsregio, chapter 3, "Gebeurtenissen op hoofdlijnen", page 8-10.
[29] Ibid.

involved, for example, the deployment of equipment and troops, the evacuation of certain areas (see chronology section), the setting up of shelters for those affected, informing the population, etc.[30] The Governor is supported by the Noodplanning & Crisisbeheer (Emergency Planning and Crisis Management) service. This service is responsible for emergency planning and supports municipalities, writes emergency plans and organises exercises. In the case of the floods, the service went into crisis management mode as prescribed and supported the provincial coordination committee. This committee meets in the specially equipped crisis room in the provincial government building, which is always available for this purpose.

The provincial phase is declared if an incident affects several municipalities at the same time or if one municipality does not have sufficient resources to deal with the situation. This allows resources from the entire province to be mobilised to provide assistance. How long a provincial phase lasts depends on the nature and extent of the event. As already mentioned in the chapter on the Walloon situation, the federal phase was declared on 15 July.

[30] See the description of the competences on the website of the Province of Limburg, https://crisis-limburg.be/gouverneur/, accessed on 13 July 2023.

4. Political appraisal and evaluation of the crisis in the regions

4.1 Different processing methods in NRW

Due to the many fatalities and the immense financial damage, the affected German federal states had to come to terms with the question of political responsibility. In NRW, this mainly took place in the state parliament, where a "Flood Disaster Investigation Committee" was set up[31] . This committee focussed in particular on the actions of the state government in coordination with the district government, districts and independent cities. The report comes to the conclusion that central flood protection offices in North Rhine-Westphalia in the Ministry of the Environment[32] and in the subordinate authority (LANUV) were either not staffed or understaffed at the time of the flood disaster.[33] It is also listed in detail that the responsible Environment Minister Ursula Heinen-Esser (CDU) was involved in crisis management to a very limited extent due to a holiday. This led to her resignation in April 2022.[34]
The Committee of Inquiry presented an interim report in March 2022. To this day (July 2023), the Committee of Inquiry II "Flood Disaster" is still active and only held hearings in May 2023. This suggests that the investigation into the flood disaster in NRW has still not been completed.

With regard to crisis resolution and crisis management, experts and persons involved in the hearings carried out analyses and described recommendations. These related, for example, to the information and communication of the various sources of weather forecasts and the further processing of early warnings by the European EFAS system, the German Weather Service and other sources that had issued warnings. [35] Basically, the experts found that it was not the early warnings issued by the above-mentioned services, but rather the ability to analyse them on site and assess their local significance.
It also dealt with general deficits in the Federal Republic of Germany in terms of disaster prevention, which, according to expert witness Professor Christoph Gusy from the University of Bielefeld, had played a role. He said that there was an underdeveloped disaster prevention culture in Germany. This is not least due to the fact that the possibility of a disaster is not normally widely discussed in normal political business and is therefore pushed back from communication processes. The committee of enquiry also discussed the structure of the crisis teams and, above all, their legal anchoring, such as the definitions in the state government's decree "Crisis management by crisis teams in the state of North Rhine-Westphalia in the event of major emergencies, crises and disasters" of 26 September 2016. During their questioning, individual experts, such as the legal and administrative expert Prof. Markus Thiel, expressed the need for the role of the state government to be strengthened by law. In the case of the floods, the state government did not set up a crisis team at state level, but rather a coordination group.

Following their own evaluation and the available evaluations (e.g. state parliament), some stakeholders in NRW have formulated proposals for improving crisis management in the area of flooding. On 20 January 2022, the then Ministry of the Environment, Agriculture, Nature Conservation

[31] See Landtag NRW, interim report of the Parliamentary Investigation Committee V ("Flood disaster") on the mandate of the North Rhine-Westphalia Landtag of 9 September 2021, printed matter 17/14944 (reprint), 25.03.2022.
[32] At that time, the official name was "Ministry of the Environment, Agriculture, Nature and Consumer Protection" (MULNV).
[33] Ibid., page 1129.
[34] See Süddeutsche Zeitung of 7 April 2022, Resignation after the party, accessed 13 July 2023, https://www.sueddeutsche.de/politik/flutkatastrophe-heinen-esser-ruecktritt-mallorca-1.5563029.
[35] See, for example, the interviews with employees of the German Weather Service and the experts on the European EFAS system.

and Consumer Protection of the State of North Rhine-Westphalia presented a document entitled "Learning from the floods - 10-point work plan for flood protection in times of climate change". Among other things, proposals were made for the provision of information, risk management planning, local flood protection, the designation of floodplains and dam management. Cross-border issues are not included in the 10-point plan.

Of particular interest for this study were the concrete proposals of the fire services in NRW, which were actively involved in operational crisis management. The fire services had drawn up recommendations for the further development of civil protection in a separate document.[36] In this document, concrete proposals are made on various aspects of preparation and crisis management, such as the introduction of recurring disaster control requirement planning in the state, districts and independent cities as a central control element. The creation of a competence centre for disaster control at the state level is also proposed, as well as the mandatory formation of teams for extraordinary events (SAE) in all towns and municipalities belonging to the district, combined with the introduction of regular exercises for all those involved in disaster control and the expansion of technical equipment for disaster control.

Appraisal in the Aachen city region

According to Tim Grüttemeier[37] , the city-region councillor, those responsible in the city-region had decided not to take part in the survey conducted by the NRW state parliament investigation committee as they did not want it to turn into a party-political reckoning. The stakeholders in the city-region were sceptical as to whether the "evaluation" of the state parliament would actually achieve anything significant for the learning process. The city-region itself did not carry out an explicit evaluation of its own crisis management in the 2021 flood hazard situation. However, a new strategy was presented in June 2023 ("Civil Protection Strategy Paper"). As part of this, a kind of evaluation of existing processes and capacities was carried out. According to the strategy paper, it "identifies deficits and goals, but also visions." Instruments and objectives are proposed to better manage the challenges of the future.[38] In a separate chapter on the future of the crisis unit, the area of responsibility was examined in a workshop in March 2022. It emerged that the crisis unit's coordination group (KGS) was not being used appropriately in the event of a crisis and was sometimes being used as "another working muscle for the specialist offices". According to the report, this utilisation was neither meaningful nor motivating. For this reason, the spatial and technical basis for the coordination group was created in an immediate measure and the task profile was sharpened. To relieve the workload of all employees, additional staff were recruited from the authority and initial training and further education measures were carried out.

The Heinsberg district's own reappraisal was carried out internally, as was the reappraisal by the city of Aachen.

[36] Katastrophenschutz in Nordrhein-Westfale, Vorschläge für eine Weiterentwicklung (2021), strategy paper published by the Verband der Feuerwehren in NRW (VdF NRW), the Arbeitsgemeinschaft der Leiter der Berufsfeuerwehren in NRW (AGBF NRW) and the Arbeitsgemeinschaft der Leiter hauptamtlicher Feuerwachen in NRW (AGHF NRW), accessed on 14 July at https://cache.pressmailing.net/content/0dd9aa00-938a-4d09-9adc-5d4f4101de90/2021-10-08Katastrophenschutz.pdf.

[37] Video call with city-region councillor Tim Grüttemeier on 23 March 2023.

[38] See StädteRegion Aachen, 2023: Strategy paper on disaster control Basis for ensuring an efficient level of protection for the area of responsibility of StädteRegion Aachen as the lower disaster control authority in the long term.

Processing the federal level

In order to optimise the vertical and horizontal exchange of information between the federal and state and to intensify cooperation in civil protection, a report was presented by the Federal Ministry of the Interior as a consequence of the flood disaster entitled "Report on the flood disaster 2021: disaster relief, reconstruction
and evaluation processes." In this report, various proposals are made to improve crisis management. One specific proposal was the establishment of a Joint Centre of Competence for Civil Protection (GeKoB) by the federal and state governments. This centre of excellence is a structured cooperation platform designed for the long term and, according to the federal government, "is supported by the federal government and the federal states as the original task bearers for civil protection". The federal and state governments founded the Joint Civil Protection Competence Centre (GeKoB) on 2 June 2022 in Würzburg at the spring meeting of the Conference of Interior Ministers. The legal basis for this is the "Agreement of the Federal Government and the Federal States on the Establishment of the Joint Civil Protection Competence Centre", which was published in the Federal Gazette on 5 May 2023. In addition, the training programme in the area of crisis management is to be significantly expanded for the personnel of the federal states, districts and independent cities. The legal basis for the introduction of warning notifications on mobile phones via cell broadcast was also quickly created. A new Section 164a was added to the Telecommunications Act. Cell Broadcast was tested for the first time in Germany on the nationwide warning day on 8 December 2022. The system was then introduced on 23 February 2023.

4.2 Processing in the province of Liège and Wallonia

In the province of Liège and for the Walloon Region, there were two external and detailed evaluations of the events. One relates to fact-finding and the second presented conclusions and recommendations ("Analyse indépendante sur la gestion des voies hydrauliques lors des intempéries de la semaine du 12 juillet 2021").
In Part 2 (Michaux et al, 2021), the authors came to the conclusion that the event in July 2021 can be considered rare to very rare in terms of both the intensity and geographical distribution of precipitation and the hydrology of the rivers. The discharges measured on the Weser exceeded the 100-year flood. At the Eupen dam, the analysis showed that the dam fulfilled its function as a flood barrier and that the manoeuvres were carried out in accordance with the handling note. Without the presence of the dam, the situation downstream would have been even more catastrophic. The speed of the flood did not allow the operators to create an additional reserve in the reservoir through preventive releases. The handling instructions for the dam did not provide for the possibility of creating this additional reserve in advance anyway. From a hydraulic point of view, the capacity of the Eupen dam was not sufficient to compensate for the proven deficit in hydraulic capacity of the river downstream. In addition, the urbanisation of the valley has unfavourable characteristics. Buildings are located directly on the banks of the river or even in its clearance profile. As a result, a large part of the valley's population is at risk. The sub-catchment area of the Weser is the one of the floodplains with the highest settlement density in the district.
The evaluation report listed recommendations that had undergone a consultation process within the Walloon administration and the departments of the provincial governors. A total of 35 measures were proposed, covering four different areas, namely the management of dams, alert and warning systems, flood defence and crisis planning and management. Some of the recommendations in the area of crisis planning and management are presented below.
The report suggested that the staff of the "Groupe Transversal Inondations" (Transversal Flood Group) should be better involved in emergency planning at the level of the governors and municipalities in order to promote the development of common relevant tools for crisis management. The cross-sectional group is the place of cooperation between several technical services of the SPW MI (Walloon

Ministry, le Département Expertise Hydraulique et Environnement) with the technical services of the provinces. The dovetailing of the services should be improved. The report identifies a similar need to improve cooperation with local/provincial emergency services. To simplify communication between the parties involved, the NCCN (Federal Centre) has developed the Incident & Crisis Management System (ICMS), a national portal for cooperation. One recommendation was to better connect the municipal stakeholders to the management system. This IT system is used by all crisis management actors throughout the country, in particular to synchronise information and facilitate communication between the various actors involved. It also fulfils the function of a logbook. It was also recommended to strengthen the dam management teams in the areas of dam maintenance and management as well as risk management. In terms of crisis management, it was suggested that the development of planning tools for measures to protect the population (e.g. evacuations) be further developed in order to strengthen the culture of dealing with this risk. Due to the critical situation with regard to construction sites at dams, the introduction of procedures for the management of the construction site in the event of a crisis was proposed. There should also be a reform towards a more standardised management of watercourses regulated by hydraulic structures.[39]

In addition to this external, technical reappraisal of the flood disaster, a political reappraisal took place in the political arena - similar to NRW - which also focussed on political responsibility. On 24 March 2022, the committee of enquiry presented its final report to the Walloon parliament, which had questioned many witnesses from the political and operational areas of crisis management. At the hearing on 21 January, the Walloon Minister responsible for Climate, Energy, Mobility and Infrastructure, Philippe Henry, identified various shortcomings and proposed improvements, some of which were taken from the above-mentioned independent evaluation report[40] . Henry argued that the way in which weather forecasts are analysed and used by the various interest groups in Wallonia should be strengthened and improved. He also saw the need for a legal framework for the external control of dams, the need to develop emergency plans specifically tailored to dams and coordinated with provincial and local authorities. In addition, he saw the need to find a new balance for the Eupen dam between increasing the buffer reserve for future floods and maintaining the guarantee of drinking water supply.

On 15 October 2021, the Committee of Inquiry held a hearing with Catherine Delcourt, Commissaire d'arrondissement de la Province de Liège (District Commissioner of the Province of Liège). The main focus was on the institutional aspects of flood management and emergency aid, including the organisation of their services and interaction with the various levels. On 21 June 2021, Governor Hervé Jamar handed over the leadership of the province to Catherine Delcourt, who was acting provincial governor during the floods. Among other things, Mrs Delcourt made the following suggestions for improving crisis management: the provincial services should be put in a position to better assess the material impact of storms predicted by weather forecasts. She also suggested improving co-operation between the police and rescue zones. And the role of the Regional Crisis Centre (Centre régional de crise, CRC) should be strengthened with a view to mobilising human and material resources. She also called for more exercises to ensure full control over emergency plans and improved operational readiness.[41]

[39] Thomas Michaux et al: Analyse indépendante sur la gestion des voies hydrauliques lors des intempéries de la semaine du 12 juillet 2021, Lot 2 - Recommandations.
[40] Ibid.
[41] See Parlement Wallon, 2021: 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 Commission d'enquête parlementaire par M. Bierin et Mme Schyns 4e session de la XIe législature, www.parlement-wallonie.be, accessed on 23 January 2023, page 32.

4.3 Appraisal in South Limburg

The Veiligheidsregio South Limburg carried out an evaluation between 9 September and 25 November 2021 with the help of the external office COT (Instituut voor Veiligheids- en Crisismanagement)[42] . Surveys and evaluations were carried out by participating managers and employees, as well as a citizen survey.[43] Evaluations and reports are also available.[44] Unlike in Wallonia and NRW, the character of the reappraisal in South Limburg was less characterised by a search for political responsibility. As a result, the review was more of a technical, administrative nature, with the Veiligheidsregio stating that its aim was "to learn from the events that have taken place since the KNMI declared Code Yellow on 12 July 2021". The focus is on the tasks and challenges and how these were overcome." In this sense, the evaluation should describe what went well and where there is room for improvement.[45]
One of the most important findings of the evaluation with regard to crisis management was that the organisation of crisis management was not resilient enough in several respects (in Dutch "kwetsbaar"). Firstly, because of staff shortages. One factor in this context was that the crisis organisation of the Veiligheidsregio South Limburg consisted of staff who largely came from one organisation, namely the fire brigade. In addition, many members of the fire brigade had multiple roles within this crisis organisation. According to the report, it also proved to be a challenge for the teams to liaise with each other at the right time and to establish clear interfaces. This was due to the fact that the operation in this disaster did not fit into the framework for which the crisis management had been prepared. [46]
The evaluation also revealed many positive aspects, especially with regard to the cooperation of many stakeholders, despite the complexity noted. For example, the report states that all agencies worked closely with the Limburg Water authority, Rijkswaterstaat, the national rescue fleet (Nationale Reddingsvloot), the Ministry of Defence, Enexis (electricity grid operator) and the Red Cross. It was sometimes difficult to coordinate help from other regions and partners, as a lot of things were organised informally during the disaster. Despite all the challenges, the evaluation found that those involved enjoyed working together and that there was a great deal of mutual understanding.[47]
However, the own evaluation of the National Rescue Fleet (NRV) stated that its integration was a particular problem area. In Limburg, crisis partners (defence, water authoritys and the Red Cross) were deployed that were not coordinated with the National Rescue Fleet.[48]

In the evaluation of the Veiligheidsregio, various suggestions were made to improve crisis management in the future.[49] This related, for example, to a more effective updating of the planning documents. In discussions with the partner organisations, it should be discussed how cooperation can also be used in the "cold" phase (phase without a crisis). With a view to the future, it would also be desirable to reach concrete agreements with the partners. The development of a so-called "scenario map" was proposed, which takes impact assessment into account. This would make it possible to quickly and clearly provide different bodies with the correct interpretation of a situation during a crisis.

[42] See COT (Instituut voor Veiligheids- en Crisismanagement): Voorbij het ergste scenario, Leerevaluatie hoogwater Veiligheidsregio Zuid-Limburg, 2022.
[43] Ibid, page
[44] For example, the events and the exact sequence have already been described in the following report: Task Force Fact Finding hoogwater 2021 (2021). Hoogwater 2021: Feiten en Duiding. Expertise Netwerk Waterveiligheid . https://doi.org/10.4233/uuid:06b03772-ebe0-4949-9c4d-7c1593fb094e
[45] You COT 2022, page 4.
[46] Ibid. page 3.
[47] Ibid.
[48] Nederlands Instituut Publieke Veiligheid (2022): De inzet van de Nationale Reddingsvloot bij de watersnood in Limburg en België, https://nipv.nl/wp-content/uploads/2022/04/20220324-NIPV-Evaluatie-inzet-Nationale-Reddingsvloot.pdf
[49] See COT (Instituut voor Veiligheids- en Crisismanagement): Voorbij het ergste scenario, Leerevaluatie hoogwater Veiligheidsregio Zuid-Limburg, 2022, page 28/29.

As a lesson learnt from the crisis, it was also recommended to be flexible in terms of structures as complexity increases.
Various suggestions were made, particularly with regard to communication with residents. When residents are alerted, different messages should be avoided. In addition, the possibilities of expanding the incident command and the local CoPI (Commando Plaats Incident) management to include staff from all four multidisciplinary pillars (fire brigade, police, medical care, municipalities) should be examined. On the other hand, efforts should be made to better match supply and demand in the area of emergency services in the future.

4.4 Processing in the Belgian province of Limburg and in Flanders

In the Belgian province of Limburg, the evaluation and review process differed from the other regions. Whereas in the case of the Dutch Veiligheidsregio Zuid-Limburg, various documents can be referred to (see above), the province of Limburg in Belgium has not published its own evaluation. Public documents on the crisis situation come from the Coördinatie Commissie Integraal Waterbeleid (CIW) Flanders[50] and the Vlaamse Milieumaatschappij (2021)[51] The CIW has been organising the consultation on integrated water policy since 2004 and is responsible for coordination and consultation between the various stakeholders in Flanders. The CIW is chaired by the Vlaamse Milieumaatschapij (as part of the Flemish government), which is responsible for coordinating an integrated water policy. According to the responsible parties, the province of Limburg deliberately did not commission an external public evaluation, but carried out an internal evaluation in consultation with the municipalities concerned.[52] To this end, talks and discussions were held with practitioners and responsible persons in the municipalities and other institutions. Services. These were primarily the affected employees in the fire brigade, police, civil defence, those responsible for water management and the information and communication services. The intention behind this was also to forward them to the national crisis centre for processing at national level. Unlike in Wallonia, there was no need for an extended political review due to the limited damage. On Monday 10 July 2021, the Flemish Parliament held a topical debate on the flood situation.[53] However, in comparison with the partner regions, we can speak more of technical and administrative evaluations later on.

Proposals for structural reforms:

The Flemish development is also exceptional because in 2023 the government presented comprehensive proposals for a structural reform of the current organisation and responsibilities in the field of water management. Flemish Environment Minister Zuhal Demir (N-VA) announced on 19 July 2023 that she wanted to drastically reform the management of watercourses in Flanders. She wants to reduce the number of organisations of non-navigable watercourses in Flanders from 112 to a

[50] Coördinatie Commissie Integraal Waterbeleid, 2021, Evaluatierapport overstromingen Zomer 2021, accessed on 12 May 2023 at https://www.integraalwaterbeleid.be/nl/nieuws/downloads-van-nieuwsberichten/ciw-evaluatierapport-overstromingen-2021.pdfCIW 15 december 2021.
[51] Vlaamse Milieumaatschappij (2021), Rapport wateroverlast 29 juni - 28 juli 2021, accessed 26 May 2023 at https://www.waterinfo.be/Rapporten.
[52] The informal, internal documents of this evaluation could be viewed by the authors.
[53] See Coördinatie Commissie Integraal Waterbeleid, 2021, Evaluatierapport overstromingen Zomer 2021, accessed on 12 May 2023 at https://www.integraalwaterbeleid.be/nl/nieuws/downloads-van-nieuwsberichten/ciw-evaluatierapport-overstromingen-2021.pdfCIW 15 december 2021, page 8.

maximum of 12 under the name Waterschappen.[54] The aim is to improve Flanders' ability to fight floods and droughts with more uniformity in administration. The responsible authorities are currently: 50 municipalities, the management of 56 polders and waterways, five provinces and the Flemish Environment Agency (VMM).

4.5 Processing in the EU

The flood disaster, and in particular the issue of cross-border cooperation, was evaluated not only nationally and regionally, but also within the EU. A virtual meeting on "Lessons Identified from Recent Floods in Europe" was held on 28 September 2021 as part of the annual "Lessons Learned" programme of the EU Civil Protection Mechanism (UCPM), which focused in particular on the evaluation of the flood disaster.
The flood disaster in July 2021 caused devastating destruction not only in Germany, Belgium and the Netherlands, but also in Luxembourg and France.
The compiled "Lessons Learned" included the following recommendations and are taken from a document of the German Federal Government[55] :

- Improved embedding of scientific knowledge in all phases of the disaster risk management cycle,
- Continuous further development of early warning systems (e.g. the European Flood Alert System EFAS) in order to obtain usable information that enables well-founded decision-making,
- Improve cross-sector and cross-level (e.g. local/national/EU) coordination and communication,
- Deployment of the EU Civil Protection Team as quickly as possible and, if necessary, deployment of more than one EU Liaison Officer,
- Continuous training, practice and exchange opportunities as part of the Union process.

5. Characteristics of cross-border crisis management in the 2021 flood crisis

5.1 Agreements and protocols on cross-border crisis management: Flooding was not an EMRIC topic

The role of EMRIC in the case of the 2021 floods depends to a large extent on which cooperation agreements have been made in the network to date and which specialised services have been involved as network partners in EMRIC's work up to 2021. It quickly becomes clear that the topic of flooding and corresponding services have not played a role in the network up to this point. This is due to the

[54] See, for example, the report on the website of the Flemish Info Centre for Agriculture and Horticulture (Vlaams infocentrum land- en tuinbouw) of 17 July. 2023. https://vilt.be/nl/nieuws/demir-maakt-schoon-schip-in-het-waterloopbeheer-en-gooit-100-beheerders-overboord

[55] See: Federal Ministry of the Interior and Homeland: Report on the flood disaster 2021: Disaster relief, reconstruction and evaluation processes, (no year given).

history of EMRIC, which began with cooperation in the field of medical services and fire brigades. According to EMRIC's own description, the co-operating services are the fire brigade of the city of Aachen, the public order office of the district of Heinsberg and the public order office of the city region of Aachen in Germany, the provinces of Limburg and Liège in Belgium and the Veiligheidsregio Zuid-Limburg and GGD Zuid-Limburg in the Netherlands. As already mentioned, these organisations finance the EMRIC office. With regard to the issue of flooding, there are no specific agreements on cooperation as have been drawn up for the other issues, as the technical expertise lies with external authorities. Cooperation is based on joint agreements on cross-border cooperation. This partly concerns international agreements and treaties between the EU member states of the Netherlands, Belgium and Germany or with federal states. But more importantly for the very intensive cooperation, especially in the Euregio Meuse-Rhine, the EMRIC partners have concluded their own thematic cross-border cooperation agreements. It is precisely these own agreements that explain the differences to other border regions, for example on the German-Dutch border. According to the EMRIC office, the list of agreements has remained unchanged in recent years.

Box 2: Agreements and contracts in the field of cross-border crisis management in the Euregio Meuse-Rhine

European agreements and treaties:

1992 Convention on the Transboundary Effects of Industrial Accidents (Helsinki)

International agreements and treaties between the Netherlands and Germany

1988	Agreement between the Kingdom of the Netherlands and the Federal Republic of Germany on mutual assistance in combating disasters, including major accidents
1996	Agreement between the Government of the Kingdom of the Netherlands and the Government of the Federal Republic of Germany on the costs of assistance under Article 9(1) of the Convention of 7 June 1988 on Mutual Assistance in Disasters, including Major Accidents
2010	Agreement between the Technical Assistance Centre, the North Rhine-Westphalia Regional Association and the Veiligheidsregios Twente, Noord- en Oost-Gelderland, Zuid-Limburg, Limburg Noord, Gelderland Midden and Gelderland Zuid
2012	Adaptation to the 1988 Agreement between the Kingdom of the Netherlands and the Federal Republic of Germany on mutual assistance in combating disasters, including major accidents
2013	Agreement between the Veiligheidsregio Zuid-Limburg and the City of Aachen and the Städteregion Aachen on close cooperation in disaster and crisis management
2013	Agreement between the Veiligheidsregio Zuid-Limburg, the Veiligheidsregio Noord-Limburg and the district of Heinsberg on close cooperation in disaster and crisis management
2014	Agreement on the implementation of the Agreement of 7 June 1988 between the Kingdom of the Netherlands and the Federal Republic of Germany on mutual assistance in the event of disasters, including major accidents

International agreements and treaties between the Netherlands and Belgium

1984	Agreement between the Kingdom of the Netherlands and the Kingdom of Belgium on mutual assistance in the event of disasters and accidents

1990	First Supplementary Agreement implementing the Agreement between the Kingdom of the Netherlands and the Kingdom of Belgium on mutual assistance in the event of disasters and accidents
2006	Agreement between the Kingdom of Belgium, the Kingdom of the Netherlands and the Grand Duchy of Luxembourg on co-operation in the field of crisis management with possible cross-border implications
2013	Agreement between the Veiligheidsregio Zuid-Limburg in the Netherlands and the Province of Liège in Belgium on close cooperation in the field of disaster and crisis management
2013	Agreement between the Veiligheidsregio's Zuid-Limburg, Limburg-Noord and Brabant-Zuidoost in the Netherlands and the Province of Limburg in Belgium on close co-operation in the field of disaster and crisis management
2017	Amendment to the Agreement between the Kingdom of the Netherlands and the Kingdom of Belgium on mutual assistance in combating disasters and accidents
International agreements and treaties between Belgium and Germany	
1980	Agreement between the Federal Republic of Germany and the Kingdom of Belgium on mutual assistance in the event of disasters and serious accidents

Source: own presentation with sources from EMRIC

As already mentioned, the list shows a wealth of individual agreements between local stakeholders that is unusual for border regions. On the other hand, the list also makes it clear that there are no special agreements on specific flood crises in the EMRIC association, which, as already mentioned, is due to the fact that responsibility lies with external actors. There are also no special protocols in the case of other crisis phenomena such as a health crisis, as was the case with regard to COVID, for example. With the aforementioned liaison model of appointing fixed contact persons, there are agreements with regard to communication in the event of a crisis. However, the focus of EMRIC cooperation is primarily on good cross-border networking between the control centres.
In this sense, close coordination between the partners also leads to joint exercises in particular.

Box 3: Control centre cooperation exercise 2023

A typical EMRIC activity took place in Liège in June 2023. EMRIC had organised a cross-border control centre exercise in the Euregio Meuse-Rhine. The scenario took place in the province of Liège. The aim of this exercise was to realistically train cross-border assistance requirements and the exchange of information. The aim of the exercise is to be able to organise the exchange of information in crisis management quickly and efficiently if assistance is required on the other side of the national border. [56]

Source: EMRIC.info

Floods did not play a significant role as a specialist area before the 2021 crisis. For example, there were no dedicated working groups on the topic of flooding. This does not mean that EMRIC did not have a clearly defined role in the event of a flood disaster. However, as in the corona crisis, the question of mutual aid was not at the forefront, as the partners on all sides of the border primarily needed personnel and material to deal with their own crisis situation. In this sense, EMRIC's role as a

[56] See EMRIC's own description of the exercise at https://emric.info/de/berichte/aktuelle-berichte/69/euregionale-leitstellenubung-in-luttich.

network was to a certain extent more modest than in other areas in terms of expertise, organisation and approach.

5.2 Cross-border aspects as part of the regional evaluation of the flood crisis?

Surprisingly, cross-border co-operation is hardly mentioned in the national and regional evaluations, with very few exceptions. For example, the Dutch evaluation of the Veiligheidsregio makes no reference to the role of EMRIC. Other aspects of cross-border cooperation are also not addressed. However, this is mentioned in the evaluation of the National Rescue Fleet (nationale reddingsvloot), as it was deployed across borders in the province of Liège. Belgium submitted a number of requests for assistance via the Common Emergency Communication and Information System (CECIS) during the night of Wednesday to Thursday 15 July. These were initially not answered by the Netherlands, but as the flooding problems in Belgium proved to be serious, Train 2 (Northwest) of the National Rescue Fleet (NRV) sailed to Liège in the afternoon at the request of the Dutch National Coordination Centre. There, the NRV reportedly supported the local authorities with reconnaissance and evacuation. In the evaluation of the deployment of the National Rescue Fleet, various problems of this deployment are described. [57]

According to the report, the units encountered a number of bottlenecks during the deployment: Belgium had a different (local) deployment plan, which made it difficult for the National Rescue Fleet to be properly deployed. The language barrier also made it difficult to exchange information between the competent local authority and the NRV units on the ground. The objectives of the operation and the local needs were unclear and the management that was supposed to support the rescue teams did not seem to be familiar with the area. One conclusion of the report was that the National Reddingsvloot was not prepared for the extreme situation in Belgium. Equipment and devices were not prepared for these conditions (high water levels, fast flow velocity). The lack of structure, leadership and logistical support placed considerable demands on the incident command present to manage the situation safely.

The role of EMRIC or cross-border cooperation is also not reflected in the two parts of the Walloon evaluation study, which has already been cited very frequently; aspects of cross-border cooperation were apparently not the subject of the study. The only reference to cross-border cooperation is the mention of the requested French support with special equipment on 15 July as a result of a request under the European Civil Protection Mechanism. However, there is also no description of the exact nature of the assistance and the corresponding quality of the cooperation. According to press reports, the French Minister of the Interior, Gérald Darmanin, and the French Civil Defence reported on 15 July that they had sent 40 paramedics from the Civil Defence's training and intervention unit and a helicopter to the province of Liège.[58] The deployment of the Dutch "Nationale Reddingsvloot" is not mentioned or analysed in the evaluations.

The interim report of the NRW state parliament also only mentions cross-border issues in passing. Cooperation within the framework of EMRIC is not addressed. In the interviews, it was a concern of Werner Pfeil, a member of parliament from Aachen, who asked about cross-border aspects, but without receiving clear answers. The expert Prof Thiel was one of the few in the hearing who made recommendations in the area of cross-border cooperation. According to Thiel, the basic principles of

[57] Nederlands Instituut Publieke Veiligheid (2022): De inzet van de Nationale Reddingsvloot bij de watersnood in Limburg en België, https://nipv.nl/wp-content/uploads/2022/04/20220324-NIPV-Evaluatie-inzet-Nationale-Reddingsvloot.pdf

[58] See Le Soir, Inondations: la France envoie de l'aide à Liège, published online on 15 July 2023, https://www.lesoir.be/384180/article/2021-07-15/inondations-la-france-envoie-de-laide-liege.

civil protection, such as similar professional standards or the interchangeability of equipment used, will be important in the future. Communication systems should also be more closely harmonised, including communication with comparable telecommunications systems.[59] Otherwise, no cross-border aspects are discussed in the expert hearings. The chronological list of the interim report shows that there was a telephone conversation on 15 July in the evening between NRW Environment Minister Heinen-Esser and a colleague in the Dutch government, although the interim report does not discuss what this contact was about. [60]
As already mentioned, the StädteRegion did not carry out a specific evaluation of the 2021 crisis, but a fundamental evaluation of civil protection. [61] This document does not make any specific proposals for improving cross-border crisis management, but it does recommend continuing to promote and financially support cooperation under the umbrella of EMRIC. In particular, this also means that the work of committees and experts under the umbrella of EMRIC should be recognised as an essential component of a functioning civil protection system. [62]

In the internal evaluation of the Province of Limburg, which was carried out by the Noodplanning & Crisisbeheer service, cross-border issues are at least briefly mentioned. In principle, the internal report was positive with regard to the contacts with the Dutch Veiligheidsregio Zuid-Limburg. However, the assessment is mentioned that the information on measures and planned evacuations was rather modest and could be improved. Contacts with the Veiligheidsregio Limburg Noord and Brabant Zuid-Oost should also be intensified.
The Flemish government's evaluation report, which is also frequently mentioned, does not evaluate cross-border aspects in detail. However, one cross-border aspect is mentioned on the list of measures to improve crisis management, namely communication with Wallonia, France and the Netherlands with regard to the exchange of information (water levels, flow data) and information on the respective approach to the crisis. [63]
The report by the "Expert Panel on Flood Protection" to the Flemish government entitled "Weerbaar Water land. Ons voorbereiden op wat al gebeurt" (July 2022) aspects of cross-border cooperation. From the perspective of the expert panel, the dynamics of cooperation in the international river commissions for the Rhine and Meuse are perceived as limited. Significant implementation within the framework of international cooperation is still pending. An exchange does take place there, including through the Flemish-Dutch bilateral Meuse Commission, the Flemish-Dutch Scheldt Commission and the cross-border water association. The expert panel recommends an improved cross-border exchange of information, e.g. on water levels and rivers, as well as an improvement in cross-border cooperation in crisis management. Specifically, the expert report suggests integrating the two secretariats of the International Meuse Commission (IMC) and the International Scheldt Commission (ISC) in order to increase efficiency. Cooperation with the International Commission for the Protection of the Rhine (ICPR) should also be strengthened. It is further recommended that the upcoming Belgian Presidency of the European Council in spring 2024 should work to put cross-border flood protection, including long-term considerations and climate change, on the European agenda and promote greater European solidarity between upstream and downstream areas.

[59] See interim report of the NRW state parliament, page 75.
[60] Ibid. page 1132.
[61] See StädteRegion Aachen, 2023: Strategy paper on disaster control Basis for ensuring an efficient level of protection for the area of responsibility of StädteRegion Aachen as the lower disaster control authority in the long term.
[62] Ibid., page 16.
[63] See: Coördinatie Commissie Integraal Waterbeleid, 2021, Evaluatierapport overstromingen Zomer 2021, accessed on 12 May 2023 at https://www.integraalwaterbeleid.be/nl/nieuws/downloads-van-nieuwsberichten/ciw-evaluatierapport-overstromingen-2021.pdfCIW 15 december 2021, page 18.

This aspect of the evaluation is therefore very interesting, as no other evaluation in the neighbouring regions has addressed the problem of poorly functioning cross-border networks at river basin level.

5.3 Stakeholders' assessments of cross-border crisis management

5.3.1 Need for improvement: the different aspects of crisis management

The first concrete thoughts on a structural approach to the cross-border aspects of the flood crisis can be found above all in the development of the Marhetak project. The topics of the work packages already show this most clearly.[64] The interviews in this study confirmed that the improvement of forecasting models is pending in all partner regions and that an improved exchange of information in the area of weather forecasts is considered necessary by those responsible. This also involves the question of how information that is exchanged at national level could also be exchanged better and more effectively in the EMR in future in the area of water, weather and ground services and in particular between the EMRIC partners. All dialogue partners who had political responsibility in the event of a crisis or who advised political decision-makers were of the opinion that significant improvements could be made, particularly in the area of mutual information. This primarily relates to the exchange of weather data and weather warnings. Here, national and regional deficits are linked to cross-border problems. For example, the committees of enquiry in Wallonia and North Rhine-Westphalia, as already shown, clearly revealed that there were problems in the crisis management teams in interpreting the weather data in a targeted manner, i.e. with a view to the local effects. For example, the person responsible for the province, Catherine Delcourt (acting governor during the crisis), pointed out that it was precisely this ability to interpret the weather data that also needed to be strengthened at provincial and municipal level. As shown in Chapter 4, it was also noted by experts in the NRW Committee of Inquiry that it was not the early warnings from the services available in Germany, but rather the ability to analyse them locally and assess their local significance. This certainly also applies to the EMRIC partners in the cross-border sense. On the one hand, it must be possible in future to exchange the different national weather data across borders. Even more important, however, would be the joint ability to interpret this data for the common cross-border area and, if possible, to formulate a common cross-border hazard situation. This could, for example, be an innovative element of a new, enhanced crisis cooperation under the umbrella of EMRIC and would be an important prerequisite for structural cooperation during the crisis.
The selection of topics in work package 2 also shows that the actors involved see deficits in the area of linking computerised information systems and data-based analysis.
In this case, the EMRIC network is focussing on the development of a joint Paragon system as part of Marhetak in order to improve the international cross-border exchange of information in crisis situations. In various discussions, for example with managers from Germany, it was regretted that their own information system had a very limited capacity. In this sense, it was described as very important to be able to fall back on an existing crisis management system with Paragon. The Paragon programme combines map layers with data sources and communication channels. In the course of the project, it will be proven whether Paragon is indeed the ideal platform for strengthening operational regional cooperation. In discussions with EMRIC practitioners and political decision-makers, it was also pointed out that the 2021 floods had also shown that there were still differences between the partner regions in the area of risk assessment. This will be addressed in work package 3. There are also separate work packages for improving joint risk and crisis communication, as well as for the issue of joint evaluation. It was frequently mentioned in the interviews that crisis communication was not harmonised across borders, as the tools to do so were not yet available. The same applied to the quality of the respective evaluation of the flood crisis, which is dealt with in work package 6. Like the

[64] The authors were involved in the development of some of the focal points of the project.

risk assessment, this is very much linked to the possibilities of successful cross-border crisis management.
As already shown in Chapter 4, the approach to evaluations of the crisis and crisis management in the partner regions was extremely different. Even more problematic was the fact that cross-border aspects played almost no role in the regional/national evaluations. Discussions with political decision-makers and practitioners also showed that they knew little or nothing about the processing in the neighbouring region and the evaluations there. Due to the lack of a joint cross-border evaluation, it was also noticeable that reflecting on cross-border aspects of crisis management was very difficult for many interviewees, as these had not previously been the subject of intensive discussions. The same applies to the uncoordinated emergency plans, which are also the subject of a separate work package. In this case, too, the interviews clearly showed that the operational level and the political decision-makers lacked knowledge of what emergency planning looks like in the neighbouring partner regions. Finally, the selected topic "Cross-border exchange of crisis material" also shows that considerable opportunities are seen to coordinate the procurement of equipment and material across borders. As shown in this study, with very few exceptions (National Reddingsvloot), there was no extensive exchange of personnel and material during the flood crisis. However, this was mainly due to the simultaneity of the crisis situation and the very similar material requirements. Finally, and this is the focus of this study, the participants in the development of the Marhetak project recognised the need to address cross-border crisis management at the level of political decision-makers and to identify options for improving it. How did the stakeholders experience the cross-border aspects and what opportunities do they see for improvement? The following section describes how actors at the political leadership level experienced the crisis management and what options are seen.

5.3.2 The organisation of cross-border crisis teams

In the discussions with political leaders, the question of necessary innovations with regard to cooperation between the politically responsible crisis teams was discussed. To what extent are the current cross-border organisational instruments within the framework of EMRIC and beyond sufficient, and in what respect could new formats have added value, particularly at the level of political crisis teams? In the discussions, it was repeatedly emphasised by all sides that it should be logical to expand this under the umbrella of EMRIC with a view to better interlinking the responsible crisis teams. Effective structures have already been established there, for example in terms of mutual assistance between the fire brigade and health services.

Box 4: Current EMRIC committees and working groups [65]

EMRIC Steering Group
Fire and disaster prevention focus group (BuKS)
Focus group "Eumed" (emergency medical services and emergency medical care in the hospital)
Focus group "Combating infectious diseases"

Control centres" working group
Working group "Threat situations"
Working group "Radiation accidents"

[65] The German designations can be found on the website of the City of Aachen at https://www.unserac.de/rats-infos/vorlage/beratungen/17163.html.

EMREX" working group (exercise) Public Relations" working group Materials" working group CBRN" working group (chemical, biological, radiological and nuclear hazards) Drones working group Working group on fires in nature

Source: unserac.de

Based on the current tasks and the establishment of various focus and working groups, it is clear that the EMRIC structures are designed to enable neighbourly assistance in crisis situations. As stated on its own homepage, for example, in the border region "foreign rescue services can often be on site faster than our own".[66]

Even today, the structures are still less geared towards enabling joint crisis management when it comes to crisis situations that occur on all sides of the border at the same time. In this sense, the coronavirus and flood crises are similar. In such an event, it is less about the organisation of cross-border aid from one partner region for the other, but rather about effective information and communication about the situation and developments in the partner region, which can also be particularly relevant for assessing the situation in the neighbouring cross-border region, especially in the area of cross-border river basins (see discussion about the Monsin weir). In this case, the discussions showed that the EMRIC structures and, in particular, the very good personal contacts of the EMRIC actors had considerable added value, but that, as in the COVID case, there was a lack of structural interlinking of the political crisis teams when it came to coordinating and communicating a cross-border crisis. A look at the various focus and working groups described above shows that there is no specific working group that could explicitly take on the role of a cross-border crisis unit in a major crisis. A significant difference to the topics of fire or emergency medical care is of course also that the actors in the water sector were not directly involved in the EMRIC network before 2021, as already mentioned, as they are not part of the internal EMRIC structure. This is different in the case of fire services and emergency medicine in the Euregio. In the case of the flood crisis, it was not primarily a question of providing assistance by the fire brigade or health services, but of coordinating measures, the effective exchange of information and structured consultation with a view to the effects of the measures on one side of the border on the partner region. It was therefore discussed with the stakeholders involved in this study whether it might make sense to establish various new crisis formats within the framework of EMRIC. For example, the stakeholders were asked whether a cross-border crisis team could be useful, which could bring together the political leaders of the partner regions under the EMRIC umbrella. The form and composition of this was left open in the question. Those responsible in the province of Belgian Limburg do not clearly see the added value of a cross-border crisis team. The biggest problem is that the differences in terms of competences are too great. In this sense, it is difficult to bring together those who are really responsible in such a cross-border crisis team. This also has to do with the structure in Belgium, where the responsibilities in the water sector are very complex and widely ramified. Furthermore, in the case of the federal phase, which was triggered in the case of the flood crisis, it depends very much on regional and federal bodies in Belgium, namely on the interaction between regional and national ministries and the Centre de Crise/National Crisis Centre. In the internal evaluation of the province of Limburg (BE), for example, it was described as a problem that the many meetings between the different levels and the federal level went into too much operational detail, which should actually be the responsibility of the provinces and governors. Complexity is also increased on the Belgian side by the so-called "logistics hub" (Hub national de coordination pour l'appui logistique), which is also set up as part of the National Crisis Centre. However, according to the evaluation of the Province of Limburg (BE), this is not effective enough. The Belgian province of Limburg sees the need to first improve information and

[66] See self-description on https://emric.info/de.

communication between the Belgian provinces and thus also the coordination of measures as a priority. The experience with the Monsin weir also played a role in this assessment, which the province believes was not optimal in terms of the exchange of information.
A key objective is therefore firstly to reduce the complexity of the internal Belgian system. This also applies to the functioning of the Belgian crisis teams. Nevertheless, the province of Limburg (BE) is also in favour of better and more structured cross-border networking in the Euregio Meuse-Rhine and a better exchange of information in the event of a crisis. Here, too, it is repeatedly emphasised that there have also been very good contacts with the Veiligheidsregio Zuid-Limburg via EMRIC. However, it was also noted that there was too little useful and up-to-date information from the Dutch crisis team, including on the measures taken and planned evacuations. In this sense, it was pointed out that this information could also be very important for a joint communication strategy towards the public. This would be particularly necessary in order to be able to communicate and explain differences. In the respective emergency plans, the linking of threshold values and corresponding measures will always remain different, which has to do with different definitions. Therefore, even in the case of a joint cross-border crisis team, there can be no harmonised timing and coordination of the scope of the measures. However, the assessment of the Province of Limburg (BE) also makes it clear that there is a good basis for cooperation in the Euregio Meuse-Rhine with EMRIC, with good conditions for achieving significant improvements. In contrast, contacts with the Veiligheidsregio Noord-Limburg and Brabant Zuid-Oost still need to be intensified, as the internal evaluation had also shown. In this case, there are no EMRIC structures available. What could certainly be improved in the EMRIC association would be access to information from the respective crisis teams and a better and more timely exchange.

The views in the Aachen city region differ from this. Political leaders there believe that it is definitely important to investigate what a cross-border crisis team could look like. The prevailing opinion there is that EMRIC works well, but that the structural links in the event of a crisis could be improved. From the perspective of the city region, there were occasional informal contacts between political leaders during the crisis, but a structure independent of personal contacts would also be important. In the case of the EMRIC partner district government of Cologne, the impression was that the role of EMRIC as a network could have been somewhat greater in this crisis. Here, too, the experience was that the cross-border network had not played a prominent role in this crisis. In the district of Heinsberg, too, the impression was that cross-border information and communication was very modest during the crisis. This could also be seen, for example, in the irritation caused by the closure of the lock in Roermond in the Netherlands. The crisis team in the district of Heinsberg had the impression that they were surprised after all. As the Veiligheidsregio Noord-Limburg is not a partner in EMRIC, there would be fewer formal and informal contacts here. In this sense, it would also be difficult to solve these problems through a new cross-border crisis team or other instruments that are organised under the umbrella of EMRIC.

In line with this, the EMRIC partner Veiligheidsregio Zuid-Limburg raised the question in a background discussion as to whether a "cross-border structure" could be advantageous internally, namely in Limburg across the Veiligheidsregios. This concerns the current separate structure with the Veiligheidsregio Zuid-Limburg and the Veiligheidsregio Limburg-Noord. However, the Veiligheidsregio Zuid-Limburg is of the opinion that the current structure is appropriate, as the problem of the south in the water area arises much earlier due to the course of the river and only reaches the north later and in a different way. In this sense, communication and coordination would also be very important here, but the separate approach has also proven its worth in the 2021 crisis. At the Veiligheidsregio, it is not yet clear what closer cooperation could look like at the level of the respective crisis teams in the Euregio Meuse-Rhine. A need is seen for the rapid and validated transmission of information on the respective situation and the corresponding measures. These deficits would have become apparent

in some situations during the crisis, for example in the exchange of information with regard to the events surrounding the Monsin lock/dam near Liège (see chapter 5.4.4).
In the province of Liège, the other EMRIC partner, it is also felt that cross-border information sharing and consultation can be improved. It was reported that the exchange of information during the crisis relied heavily on the control centres. As with other EMRIC partners, it was pointed out in these discussions that the EMRIC programme manager was the main contact person for information exchange. This was a recurring motif in the discussions with those responsible in crisis teams and shows how important the role of the EMRIC office was and is in this sense. However, it also shows the dependence on individuals and the lack of direct contact between the actors in the partner regions.

5.3.3 Cross-border coordination of measures - problem of different emergency plans

The Noodplanning & Crisisbeheer service (Limburg/BE) identified a general problem with the possibilities of coordinating measures across borders in the event of a crisis, for example with a joint cross-border crisis team or another network structure. The assumption was made that the Dutch view, for example, was based on different threshold values that were defined in the emergency plans. In this sense, for example, evacuations were carried out more quickly on the Dutch side than on the Belgian side during the summer floods in 2021. This was due to the different coupling of certain values with corresponding measures. After the crisis summer of 2021, all partner regions began work on amending their own emergency plans. The following overview shows the state of development.

Table 1: Emergency plans in force in the partner regions

Belgian Limburg	**Dutch Limburg**	**Province de Liège**	**City region/District of Heinsberg/City of Aachen**
Update after 2021 **Bijzonder Nood- en Interventie Plan (BNIP**) for the Meuse basin Basis of the EMRIC partner Noodplanning & Crisisbeheer service	Rampenbestrijdingsplan (Disaster Management Plan) Hoogwater Maas became a disaster **Rampenbestrijdingspan Hoogwater Limburg**	Civil protection plan for floods (**Plans Particuliers d'Urgence et d'Intervention** - PPUI) for the province of Liège is currently being updated	All German EMRIC partners are currently updating **their disaster control plans for districts and independent cities** on the subject of flooding Many municipalities are currently drawing up a disaster prevention plan

Own presentation

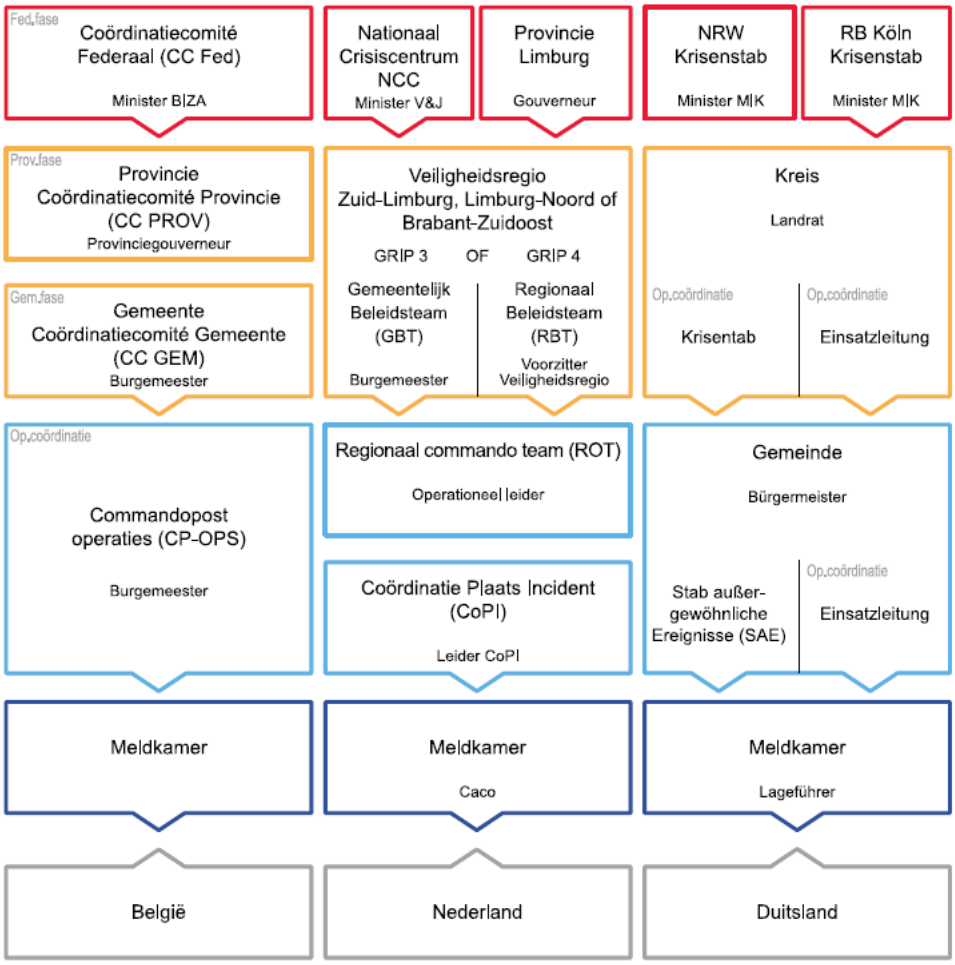
As impressively illustrated in a current Marhetak document from March 2023 on the "Requirements of public crisis management organisations in the EMR for water, weather and ground services in the event of flooding"[67] , the various responsible services in the water sector operate with different water levels, which in turn are linked to different warning levels. The warning levels are therefore described in a different way in each system. In this sense, the analysis of various interviewees that there could be no synchronised measures at all in a cross-border crisis team due to the different emergency plans

[67] See: Marhetak/EMRIC, 2023, Requirements of Public Crisis Management Organisations in the EMR for Water, Weather and Ground Services during Floods, https://marhetak.info/de/downloads-2/, accessed 25 June 2023.

is correct. An illustrative example of this is the fact that the Noodplanning & Crisisbeheer (DNC) service of the Province of Limburg (BE) works with different warning levels than the Veiligheidsregio Zuid-Limburg, although both are based on the same measuring point in Sint Pieter, where the discharge is reported by the Dutch Rijkswaterstaat to the Belgian Vlaamse Waterweg in m3 per second. [68]
Another problem is that it is also not possible to assume a common definition of cross-border phases with regard to crisis management, as there is a different definition and categorisation of phases in each sub-region. This is a problem for the organisation of a cross-border crisis unit, however it is structured, as the different classifications of phases are often linked to certain responsibilities and competences, which in the Belgian system, for example, could also make the federal government a key player. In this sense, innovations such as a cross-border crisis unit or other structured crisis networks must actually be set up in a very innovative way. This means that they cannot be based on the structures and tasks of national or regional crisis teams, but must be a completely new form of crisis cooperation in this sense. And this new form of crisis cooperation must be able to integrate these national and regional competences of the different players and the classification and significance of the different phases or be able to deal with them in an intelligent way. The different phases and responsibilities are summarised in the following diagram.

[68] Ibid., page 7.

Figure 2: Crisis management competences and levels in the partner regions



Source: Veiligheidsregion Zuid-Limburg, Crisis Plan 2020-23

5.3.4 Communication: Cross-border disagreements and potential conflicts

In the following, two circumstances will be used to describe how information and communication deficits led to uncertainties at the border and to ambiguities in cross-border relations.
In the district of Heinsberg, it had long been rumoured that the closure of a lock on the Rur in Roermond would have had a negative impact on the situation in the district of Heinsberg. This was described, for example, in the online edition of DIE ZEIT on 18 July[69] . It stated that the mayor of Wassenberg, Marcel Maurer, had cited the closing of the sluices in Roermond as the cause of the dam burst in the Ophoven district. According to ZEIT, he had asked the Dutch authorities to reopen the locks. According to a press report in the Dutch newspaper "Limburger", this was rejected by Waterschap Limburg because calculations had been made which showed that the one had nothing to do with the other. In Roermond, according to the daily newspaper "Limburger", the lock at the mouth of the Roer into the Maas is always closed at high tide to prevent the floodwater from the Maas

[69] See ZEIT online, 18 July 2021, https://www.zeit.de/news/2021-07/17/niederlande-oeffnen-schleusen-nicht-fuer-ueberflutetes-ophoven, accessed on 23 June 2023.

flowing into the Roer and flooding the entire city centre.[70] In a later interview, Mayor Maurer explained that the dyke in the Ophoven district broke because it was soaked and not because the lock in the neighbouring country had been closed. This had had no immediate effect. According to him, however, it would have been much better if Wassenberg - the last German municipality before the border - had been informed early on.[71] This statement describes an information and communication deficit that was problematic with regard to the coordination of individual measures in a river basin and subsequent crisis communication. On the basis of the first assumption, this question was also dealt with in the NRW Investigation Committee. CDU MP Thomas Schnelle, who himself comes from the Heinsberg district, had mentioned the rumour at an expert hearing and asked whether flood protection measures in the area of the Netherlands had had an impact on the Wassenberg area at the time. The expert Gerd Demny, in a leading position at the Eifel-Rur water authority, denied the assumption. He confirmed the view of Waterschap Limburg at the hearing. He explained that, according to his calculations, the water in Roermond would have had to be dammed up to a height of around 12 metres for it to be noticeable in Wassenberg-Ophoven. [72] This statement also confirms that there was a lack of prior knowledge on the German side in this case to assess the effect of certain measures on the Dutch side. The discrepancy could have been avoided if there had been better dialogue. It is important to note that Roermond is not located in the Veiligheidsregio South-Limburg, but in North-Limburg. This means that EMRIC's structures cannot take effect in this case.

The second example deals with events relating to the Monsin dam in Liège. As already mentioned in chapter 4, construction work was carried out on the Monsin weir in Liège during the extreme flooding in summer 2021. Four of the six openings were dry to build new towers and gates. Only two new sluice gates were available for flow regulation. The weir was opened, but could not prevent the water level of the Meuse from rising considerably. The high water level also caused the water in the Albert Canal, which is openly connected to the Meuse above the Monsin weir, to rise.
This situation also led to inconsistencies and uncertainty in crisis communication. As already mentioned in the review of the Province of Liège, there were several crisis meetings on the situation at the Monsin weir, which were attended by both the Walloon minister responsible and the acting governor. For example, a meeting was held on 15 July, which focused in particular on preventing the collapse of a construction crane. [73]
In Belgian Limburg, the online edition of the daily newspaper "Het belang van Limburg" reported the concerns expressed by Mayor Marino Keulen on 15 July 2021. Namely, if something went wrong at Monsin because of the construction site, this would also cause problems in the area of Lanaken an der Maas. "If this dam breaks, the word disaster will be on everyone's lips," the mayor is quoted as saying. [74] In the report by the Dutch Fact Finding Task Force,[75] , it was described that flooding was also characterised by a high discharge in the Albert Canal. Due to maintenance work on the Monsin weir,

[70] See article in the daily newspaper Limburger on 17 July 2021, accessed online on 23 June 2023, https://www.limburger.nl/cnt/dmf20210717_97443062.
[71] See ZEIT online from 18 July 2021, "No apportioning of blame from Wassenberg towards the Netherlands". https://www.zeit.de/news/2021-07/18/keine-schuldzuweisung-aus-wassenberg-richtung-niederlande. Accessed on 17 June 2023.
[72] See Interim Report Parliament, page 569.
[73] See Parlement Wallon, 2021: 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 Commission d'enquête parlementaire par M. Bierin et Mme Schyns 4e session de la XIe législature, www.parlement-wallonie.be, accessed on 23 January 2023, page 12.
[74] See Het belang van Limburg, online edition of 15 July 2021, https://www.hbvl.be/cnt/dmf20210715_96307479, accessed on 16 July 2023.
[75] See: Task Force Fact Finding hoogwater 2021 (2021). Hoogwater 2021: Feiten en Duiding. Expertise Netwerk Waterveiligheid . https://doi.org/10.4233/uuid:06b03772-ebe0-4949-9c4d-7c1593fb094e

the water levels of the Meuse near Liège and the Albert Canal actually rose during the flood. However, locks on the Albert Canal were also flooded, which led to an outflow in the waterway. The third lock chamber of the Ternaaien/Lanaye lock flowed water back into the Meuse.
In the Walloon evaluation, the outflows were presented in even more detail, according to which an outflow took place via the only 2 manoeuvrable lock gates, in addition to the acceleration of the hydropower turbines, a bypass of the lock gates of lock 4 of Ternaaien/Lanaye and the removal of the dam beams at the lock gates under construction in Monsin, which flooded them. This information apparently did not reach the Dutch and Flemish stakeholders in time. It was not until 16 July 2021 that information about the Monsin weir was published on the website of Waterschap Limburg. This debunked rumours that the weir was unstable and/or defective. According to the Waterschap, these concerns were unfounded at the time. The situation was stable and the weir was functioning properly.[76] However, the uncertainty about the situation was also evident in the discussions with the EMRIC partners' political representatives. In the discussions, it was repeatedly stated that there was a lack of information and communication in this regard and that it was not clear at all times what the situation actually was. Overall, the interviews gave the impression that the events are still somewhat in the dark. However, this did not only relate to the cross-border partners, but was also a problem within Belgium. Overall, this example also shows that there was apparently a lack of appropriate communication channels to provide information across borders in a timely manner. And there were apparently no instruments for spontaneous consultation that would have made it possible to coordinate measures. It was therefore also not possible to coordinate crisis communication with the public. This was certainly a problem in view of the uncertainty.

5.3.5 Cross-border assistance

In 2007, EMRIC had already published a first report on the various agreements at national, regional and municipal level on mutual assistance in the event of disaster and crisis situations.[77] This work was prepared in the run-up to the INTERREG project EMRIC (2006-2008). The basic considerations that characterised EMRIC's work more than 10 years ago still apply today. At that time, the focus was on joint concepts for cross-border fire service provision and emergency medical assistance. The basic aim was to create uniform cooperation concepts for the fire services in the Euregio so that assistance in the event of major incidents would be organised in the same way by all partners. Corresponding agreements had already been reached at an earlier stage for emergency medical assistance and were anchored in the earlier EUMED project. Mutual assistance in the event of operational crisis management is therefore a key component of EMRIC today. As already mentioned, only a very modest amount of cross-border assistance was provided during the 2021 flood crisis. In the case of the operational forces working together in the EMRIC network, this was difficult, as already described, due to the simultaneous nature of the events on all sides of the border. In this sense, it was also difficult to help each other out with material that was needed in the shortest possible time. This question will be dealt with in one of the work packages of the Marhetak project. It is therefore logical that one of the issues is the acquisition of a mobile flood barrier unit, which could then also be used across borders. In addition, an investigation is being carried out into the necessary tools and additional equipment that can be used across borders and enable connection to the existing infrastructure in the respective border region. A cross-border deployment that did not run optimally shows that this is

[76] See publication by Waterschap Limburg, dated 16 July 2023, https://www.waterschaplimburg.nl/@6426/liveblog-watersnood/, accessed on 15 June 2023.
[77] See EMRIC publication 2007, Cross-border assistance in the Euregio Meuse-Rhine, downloaded ma 2 July 2023 at https://www.staedteregion-aachen.de/fileadmin/user_upload/A_32/Dateien/Rettungswesen_Bevoelkerungsschutz/Rettungsdienst/Grenzueberschreitende_Zusammenarbeit/Grenz_Zus_arbeit.pdf.

necessary after the experiences of 2021. One cross-border exception at the operational level was the deployment of the Dutch "Nationale Reddingsvloot" in Wallonia. The difficulties of this deployment have already been described in Chapter 4. In its own evaluation of the national rescue fleet, deficits were identified in the coordination of the management, structure and objectives of the operation. In addition, there were language problems, insufficient exchange of information, adaptation to local needs, and the equipment and devices were not adapted to the conditions (high water levels, fast flow velocity).[78] However, these difficulties should come as no surprise. It is precisely the careful harmonisation and coordination of cross-border operations - for example by fire brigades - that is a key focus of EMRIC's work. To this end, working groups, agreements, protocols and joint exercises have been in place for many years. However, the Dutch National Rescue Fleet is not an EMRIC partner and it is not surprising that such an ad-hoc operation was difficult without preparation and personal and institutional contacts. However, as the flood crisis has shown that the deployment of supra-regional rescue forces can also play an important role across borders in the future, the question arises as to whether EMRIC should at least play an advisory role in the context of supporting cross-border rescue forces that are not integrated into the EMRIC network. This would make sense because of the wealth of experience gained from cross-border co-operation, the intensive contacts and the knowledge of mutual institutional circumstances. With a view to the EU level, it is striking in this sense that an important component of the European civil protection procedure could be the inclusion of existing cross-border networks such as EMRIC.

6. Suggestions for possible innovations

6.1 Innovation: Integration of cross-border aspects in regional evaluations

The individual evaluations of the flood crisis in the respective partner regions described in Chapter 4 had shown that cross-border aspects did not play a significant role in either the more technical evaluations or the political reappraisal. In this sense, the present investigation within the framework of Marhetak was the logical consequence of doing this more intensively within the framework of the Interreg project. With regard to North Rhine-Westphalia and Wallonia, the reticence in cross-border issues was quite understandable, as the parliaments in particular were also primarily concerned with a political reappraisal, namely the question of political responsibilities and structural deficits in their own crisis management. The partly internal, partly public evaluations of the EMRIC partners were also primarily characterised by the need to evaluate their own processes, responsibilities and coordination capacities. The question of cooperation with neighbours was only marginally addressed. One of the main reasons why EMRIC did not automatically evaluate cross-border crisis management is also obvious. Unlike the regional or national crisis teams, EMRIC had no explicit mandate or defined role with regard to the coordination of measures, operations or communication between the various partners. In addition, there were of course many players involved in the floods who were not integrated into the EMRIC network. At the time of the flood crisis, there was also no explicit working group on the topic of flooding in EMRIC's internal working group structure. Therefore, the work of the Marhetak project offers the option of transferring thematic aspects of the Marhetak work packages into the working group structure after the project duration. This would be a prerequisite for the institutional integration of crisis management in the area of flooding into EMRIC. This could also mean that EMRIC could also be given a clear mandate for the evaluation of cross-border crisis management in the event of a flood crisis, which should be part of the regular tasks even without a special Interreg project. Of course, this makes particular sense if, beyond Interreg projects, flood protection and actors from the water sector are also linked to EMRIC in the longer term, for example in new thematic working groups. Basically, this would only follow the logic of earlier EMRIC Interreg projects, which

[78] Nederlands Instituut Publieke Veiligheid (2022): De inzet van de Nationale Reddingsvloot bij de watersnood in Limburg en België, https://nipv.nl/wp-content/uploads/2022/04/20220324-NIPV-Evaluatie-inzet-Nationale-Reddingsvloot.pdf, accessed 3 July 2023.

had done the preparatory work for the further integration of a topic into the network. Anchoring these actors and the topic could mean both with regard to future evaluations: through the EMRIC connection, the actors in the water sector would have more attention for cross-border issues and would address these in more detail in their own regional evaluations. Co-operation on the topic under the umbrella of EMRIC would be the prerequisite for a technically more intensive cross-border evaluation of future flood situations. However, a plea is made here in favour of integrating the topic with a "sense of proportion". Overstretching and overstretching EMRIC as a network would not be helpful either.

6.2 Innovation: weather data, effective IT systems and prerequisites for joint crisis communication?

Many interviewees identified information and communication deficits as part of this study. On the one hand, these relate to aspects such as weather data and forecasts, which are addressed as part of Marhetak. This also concerns an effective IT system for the international cross-border exchange of information in crisis situations. With this in mind, the EMRIC partners hope that the Paragon system can be linked to the existing systems and used in the partner regions of Member States that do not have their own crisis management system. This would be an important building block to ensure that the absence or use of different tools is no longer an obstacle to cross-border information processing, particularly for operational crisis teams. However, the accessibility of mutual information would also be an important prerequisite for a better picture of the situation for the entire Euregio Meuse-Rhine. This could not only facilitate co-operation between emergency services. It would also be a prerequisite at the level of political decision-makers for coordinated decisions and subsequent crisis communication to citizens. As the two cases of a lack of cross-border information and communication mentioned above have shown, there was a lack of prompt cross-border information and communication in the event of specific hazard situations during the flood crisis. For this reason alone, it was difficult to coordinate crisis communication across borders. For this reason, too, it would certainly be helpful if there could be a sustainable integration of actors from the water sector under the umbrella of EMRIC in the future. These could make a significant contribution to exchanging information on the respective risk situation between the partner regions and communicating corresponding measures. As coordinated cross-border crisis communication has also been very difficult in other crisis situations such as the Covid crisis, it would be an option to set up an ad-hoc crisis communication group under the umbrella of EMRIC. As there is already a public relations working group, it would be possible to set up an ad hoc crisis communication group within this working group in the event of a crisis.[79] The respective regional employees would then have the task of processing and sharing information from the respective region. To do this, they would have to have information and access to the respective crisis teams of those politically responsible in the EMRIC partner organisations. If corresponding services in the water sector are also connected to EMRIC, it would be easier to incorporate their technical expertise into the information flow in the event of a flood situation. As seen in Chapter 5, the various stakeholders operate on the basis of very different emergency plans. An exchange of information on the respective bases for decisions in the respective partner region would be very helpful for both the political decision-makers in the crisis teams and the operational actors. In addition, jointly coordinated communication could prevent irritation, as in the case of the 2021 flood crisis, and certain hazardous situations from being based more on rumours than on a solid mutual exchange.

[79] Such a link has been arranged in recent weeks.

6.3 Innovation: EMRIC as a euregional competence network?

The difficulty of categorising and interpreting the nationally communicated weather and forecast data for the respective regional or local area was also discussed by many interviewees and in the respective evaluations. As an essential component of early political crisis management, it is important that political decision-makers are provided with relevant weather data by the respective specialised departments, which is also meaningful with regard to forecasts for local situations. As shown, work is underway in all partner regions to improve the ability of specialised officials at regional and local level in particular to interpret weather data with a view to their own area. With this in mind, work is also being carried out under the Marhetak umbrella to develop standardised euregional forecast models in the future. This means better coordination of the respective national and regional weather, water and ground services.

This should primarily be initiated by the national services, but in close cooperation with the EMRIC services and the partner organisations, so that the information required for the risk assessment can be shared. According to the EMRIC office, the partners in the areas of water, weather and soil are already included in the existing EMRIC focus groups dealing with disaster management, at least within the framework of the Marheta project. This is done in order to ensure good mutual co-operation, information exchange and a good linkage of planning. This is certainly also an important building block for the further development of EMRIC with a view to the time after the Interreg Marhetak project. The aim of processing and improving the exchange of weather data is also to give political decision-makers the opportunity to share the interpretation of the respective data with regard to a crisis scenario across borders and to discuss the consequences for their region and the Euregio as a whole. According to the participants, this was not possible in view of the 2021 crisis. Rather, the political decision-makers already had difficulties in the vertical national system using the transmitted weather data and forecasts to assess the impact on their own area. A cross-border exchange of data is of course particularly important in the area of flooding, as the cross-border river basins can have "borderless" effects in any case, and measures on one side of the border can have positive or negative effects on the neighbours. The interpretation of weather data becomes relevant at a very early stage, when crisis teams have probably not yet been set up. Rather, a well-founded, very early interpretation of the weather data is the prerequisite for triggering the respective phase in the partner regions, setting up a crisis team and initiating certain protective or evacuation measures. In this sense, based on the results of Work Package 1, there could be a mechanism under the umbrella of EMRIC that enables the exchange of relevant weather data at the working level. Basically, the structural integration of experts from the water sector into the EMRIC network would also provide a further building block with a view to very broad expertise in different areas of disaster prevention. In various partner regions, such as the StädteRegion Aachen and in NRW, strategies are currently being developed for the reorganisation of civil protection. As shown, all partner regions have been or are currently working on the corresponding emergency plans in the area of flooding. It would therefore make sense for EMRIC to be seen and equipped by the partners as a kind of Euregional competence network in the field of civil protection. In particular, the current innovations and changes that will be initiated in the partner regions in 2021 as a result of the experience gained should also be analysed across borders after the end of Marhetak. In this sense, the interlinking and exchange of weather, water and soil data is an important additional building block. EMRIC has had impressive cross-border expertise for years, for example in the areas of emergency response, cooperation between fire services, control centres, disasters and major accidents and in the area of hazardous goods. If the expertise in the area of flooding is now integrated in the longer term, it would be an option for the partners to actually see EMRIC as a Euregional competence network and expand it accordingly.

6.4 Innovation: a needs-based "crisis team coupling" with the involvement of political decision-makers?

In principle, previous studies have found that EMRIC has played an important and effective role in cross-border crisis management during the coronavirus pandemic (initially in the Interreg project "Pandemric"). On the other hand, deficits in cross-border crisis communication at the level of political leaders were already identified at that time. In the case of the 2021 flood crisis, many political leaders also stated that the information provided by the EMRIC office had been very important, but that there were deficits with regard to direct contact with the other crisis teams, their assessment of the situation and corresponding measures. This is actually surprising, as EMRIC is a network of players who were all involved with crisis teams during the flood crisis or were at the head of crisis teams. However, it was apparently not possible for the relevant information, communication or even consultation between the crisis teams to be structured in crucial situations. This does not mean, as already mentioned, that it was not possible to share much useful information via the EMRIC office. However, most political leaders or specialised officials with crisis unit experience acknowledged that cross-border aspects had played a subordinate role. And they also reported situations in which certain uncertainties and irritations could have been avoided through a more effective exchange. This raises the question of whether a closer integration of the political level would have been necessary in this case. To what extent would it be possible to set up a kind of cross-border ad-hoc crisis team? Who should or could sit on a cross-border crisis team and how could such work be organised as efficiently as possible so that the time required due to the workload in their own crisis teams could be kept to a minimum? In the background discussions, it became clear that in some partner regions there is still no clear picture of the added value that such a cross-border body could have in the event of a crisis. It was also pointed out that the competences and respective tasks of the respective partners within the framework of crisis teams are very much determined by the national distribution of competences, laws and emergency plans. In this sense, for example, it does not seem appropriate to use the term "cross-border crisis unit", as this sounds too much like a legally established body. What could be aimed for within EMRIC is a linking of the respective individual crisis teams in which EMRIC partners are involved. "Crisis team coupling" would therefore be a more appropriate term. This is based on the image of the coupling often used by the fire service, which makes it possible to connect different hoses across borders.

If you play the idea through for the flood event, the EMRIC network would certainly have important political players who were at the head of crisis teams. This applies to the Veiligheidsregio Zuid-Limburg as well as to the StädteRegion, the city of Aachen, the district of Heinsberg and the provinces of Liège and Limburg in Belgium. Even if the respective flood defence services were not yet integrated into the EMRIC network at the time, the respective EMRIC partners were in direct contact via their respective crisis management structures. This also applies to the national or supra-regional crisis teams. There was a core of political leaders among the EMRIC partners who had permanent access to the crisis teams. In this sense, it would also have been possible to share the information from these crisis teams directly across borders at the political management level. Fortunately, there was no situation where a specific measure (such as opening or closing floodgates) led to fatal situations in the cross-border partner region. However, this was probably due to fortunate circumstances. It was clear from the discussions that there was no direct communication, especially in uncertain situations. This also means that in the event of a difficult decision on one side of the border with consequences for the other side, there would probably have been no structured consultation.

In a worst-case scenario, this could actually have led to a crisis team being surprised by the neighbours' decision. And it could have led to inconsistent communication with the population.

One option would therefore appear to be to stipulate in an agreement within EMRIC that crisis teams can be linked in the event of a crisis if, as in the case of the floods, crisis teams are set up by the politically responsible parties in all partner regions. As mentioned frequently, this would expand the EMRIC structures as required. From focussing on providing assistance in the event of a crisis in just

one of the partner regions, to structured information, consultation and coordination in the event of a crisis situation occurring in the entire area of the Euregio Meuse-Rhine. A kind of escalation model could be established in an agreement on a crisis team coupling, which would also trigger a structured coupling of the politically responsible parties in the partner regions in the event of certain hazardous situations. In particular, it should enable individual EMRIC partners to request the establishment of a crisis unit coupling at very short notice if necessary, if there are uncertainties with regard to the procedure and the situation in the partner regions. And in order to allay concerns that such a body would be an unmanageable additional time burden in a crisis situation, an extremely efficient working method for the crisis unit coupling would have to be agreed, for example a strict focus on online communication and strict time requirements for meetings that are as short and tightly structured as possible. This includes, for example, a video system with good opportunities for simultaneous translation, if necessary, and appropriate opportunities for joint discussion of data and map material. However, this should not be a problem due to the experience gained during the coronavirus crisis. An agreement could, for example, regulate this:

- In a crisis situation in which crisis teams are set up in several partner regions, a crisis team coupling is set up under the umbrella of EMRIC,
- In this crisis team coupling, the political leaders (and official support) of the EMRIC partners who lead crisis teams or are involved in crisis teams communicate,
- The primary task of the crisis team coupling is to exchange information on the situation in the respective partner region, to exchange and compare different data (such as weather data and forecasts in the area of flooding) and to provide prompt information on appropriate measures,
- In particular, the partners should consult each other with regard to the cross-border effects of individual measures and with regard to the exchange of material and personnel capacities.

It is possible that the work of a crisis management team would have remained limited during the 2021 crisis. This has to do with the fact that certain prerequisites, such as a solid exchange of data in the area of flooding, were still lacking. In this sense, the various building blocks of the Marhetak project would be an essential prerequisite for the effective work of a crisis unit coupling. Such a coupling could benefit greatly from an improved exchange of data (such as weather forecasts), as well as from the improved information and communication possibilities of the operational level in the case of a joint application of programmes such as Paragon, and from the other work in the area of risk assessment, crisis communication and emergency planning. This goes in the direction of the approach already described, namely to develop EMRIC into a competence network for cross-border civil protection.

6.5 EMRIC Working Group Crisis Management Coupling

The respective EMRIC partners have appointed many representatives at the level of specialised officials who, for example, meet in the steering group at the level of directors or in many other focus and working groups at the technical level and also maintain direct contact with the EMRIC office. With this in mind, it would also be conceivable to establish a "Coupling crisis team" working group at working level. As a first step, this working group could work out the requirements that would be necessary for a crisis unit coupling in the hot phase. On the other hand, such a working group could also permanently bring together those specialised officials from the partner regions who would be involved in supporting the politically responsible parties if the crisis teams were set up. In the event of a crisis, this EMRIC working group would have the task of initiating the establishment of a crisis management team at management level in accordance with the formulated agreement and the defined conditions and coordinating this with the respective political leadership. There would also be the possibility of organising preparatory crisis management team couplings in view of the time

constraints within the crisis management teams. The framework and conditions under which this could take place should also be discussed when developing a specific EMRIC agreement. The EMRIC office could chair this "crisis team coupling" working group, as in the past it has already been recognised by many parties as a central "information point" in the event of a crisis. The structured establishment of a crisis unit coupling could further strengthen this role and structure and formalise access to information from the various crisis units. This could also help to make the flow of information less dependent on the good personal contacts of individuals. Many interviewees in this study pointed out how important the EMRIC programme manager, for example, was as a communication hub in the event of a crisis. In this case, the establishment of a special working group for crisis team coupling could also ensure that the flow of information and communication is institutionalised. If such a working group were to bring together specialised officials who would assist the management of the crisis teams in the event of a crisis, the crisis team coupling would also be solidly underpinned at the specialist level.

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Appendix 1 List of interviews

#	Name	Organisation
	Marlies Cremer	StädteRegion Aachen, Head of Office for Rescue Services and Civil Protection
	City Councillor Tim Grüttemeier	Aachen city region
	Ralf Johnen	Head of Staff and Office Volunteer Fire Brigade City of Aachen/Chair of the Fire Protection Focus Group in cross-border cooperation between Belgium, the Netherlands and Germany at EMRIC
	Frank Wageman	Head of operations, volunteer fire brigade, Kornelimünster
	Silvie Hardy	Province de Liège
	Michel Carlier	Service Noodplanning & Crisisbeheer - Provincie Limburg
	Hans Verheijen	Mayor of the city of Sittard-Geleen, Head of Crisis Management Veiligheidsregio Zuid-Limburg during the 2021 flood crisis
	Leron Vos	Veiligheidsregio Zuid-Limburg, Specialist Operationele Voorbereiding
	Kerstin Baars	Municipality of Sittard-Geleen, Bestuursondersteuner
	Marc Vos	Province of Limburg, Netherlands, Programmema Waterveiligheid en Ruimte
	Silke Römer	Head of the Public Order Office, District of Heinsberg
	Sarah Jürges	Head of Non-Police Hazard Prevention, Cologne District Government

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provincie limburg gesubsidieerd door de Provincie Limburg

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ITEM is an initiative of Maastricht University (UM), the Dutch Centre of Expertise and Innovation on Demographic Changes (NEIMED), Zuyd Hogeschool, the city of Maastricht, the Meuse-Rhine Euregion (EMR) and the (Dutch) Province of Limburg.

PANDEMRIC examines the benefits of euregional cooperation in the event of a pandemic or a large scale outbreak of an infectious disease. The project is financially supported via the Interreg Euregio Meus-Rhine COVID-19 call, by the European Regional Development Fund.

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