



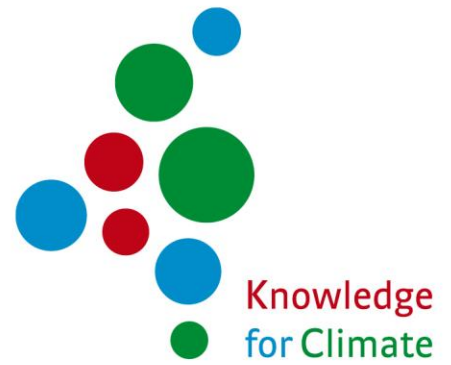
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Transboundary Aspects of Water Safety

Assessment of the state of the art of cross-border cooperation on water safety in the Rhine and Meuse catchments







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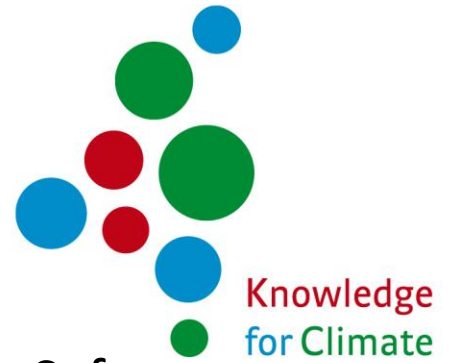
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Transboundary Aspects of Water Safety

Assessment of the state of the art of cross-border cooperation on water safety in the Rhine and Meuse catchments

Inventarisation for the Delta Programme Rivers

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1 Samenvatting

Nederland is gelegen in een delta-gebied waar vier middelgrote rivieren uitmonden in de Noordzee. Dit levert veel voordelen op, maar maakt het tevens een kwetsbaar gebied. Verschillende wetenschappelijke studies onderschrijven namelijk dat de effecten van klimaatverandering een groot effect zullen hebben op de stroomgebieden van deze rivieren. Zo zullen de regenpatronen in het gebied van de Maas en Rijn, evenals de waterafvoer veranderen. Daarnaast zullen beide rivieren te maken krijgen met temperatuurveranderingen en afvoerproblemen als gevolg van de stijgende zeespiegel.

De maatgevende afvoer van de Rijn en Maas in Nederland wordt beïnvloed door de afvoer en de genomen waterbeheersmaatregelen in de buurlanden. Bovenstroomse maatregelen hebben een invloed op benedenstroomse waterstanden en andersom. Daarnaast kan het falen of aftoppen van dijken in grensregio's leiden tot overstromingen in Nederland, mogelijk zelfs door een waterstroom achter de dijken. Deze wederzijdse afhankelijkheden maken het nut en de noodzaak tot grensoverschrijdende samenwerking in riviergebieden duidelijk. Ook de Europese Unie pleit voor het hanteren van een stroomgebiedbenadering in verschillende Europese richtlijnen, zoals de Kader Richtlijn Water en de Richtlijn Overstromingsrisico's.

Dit onderzoek is uitgevoerd in opdracht van het Deltaprogramma Rivieren, één van de negen deelprogramma's van het Deltaprogramma. Dit is een nationaal programma waarin verschillende overheden en organisaties samenwerken om toekomstige overstromingen te voorkomen, om Nederland aan te passen aan klimaatverandering en om de zoetwatervoorziening ook op de lange termijn te garanderen. Doel van deze studie is om het Deltaprogramma Rivieren een overzicht van lopende samenwerkingsverbanden in het Rijn- en Maasstroomgebied te verschaffen vanuit het hoogwater en veiligheidsperspectief, zodat het internationale aspect meegenomen kan worden in de afronding van de voorkeursstrategieën van het Deltaprogramma Rivieren.

Dit rapport beschrijft historische, institutionele en inhoudelijke aspecten van de belangrijkste samenwerkingsorganisaties op multilateraal en bilateraal niveau, evenals de recente ontwikkelingen en verwachtingen voor de toekomst. Elk samenwerkingsverband is beschreven in een overzichtelijke factsheet gepresenteerd in hoofdstuk twee.

Het overzicht van lopende samenwerking dat geschetst wordt in dit rapport maakt duidelijk dat er verschillende gremia voor samenwerking bestaan, die samen een breed scala aan actoren, overheidsniveaus en beleidsthema's omvatten. Wij concluderen dat er geen witte vlek is qua samenwerkingsstructuren en geen noodzaak om een nieuw verband op te zetten voor de internationale afstemming van de uitkomsten van het Deltaprogramma. De verscheidenheid aan samenwerkingsverbanden geeft tevens de mogelijkheid tot subsidiariteit, waardoor een aspect of maatregel van waterbeheer geïmplementeerd kan worden op het meest geschikte, efficiënte en effectieve niveau. De keerzijde van de veelheid aan samenwerkingsverbanden en actoren is dat dit gemakkelijk kan leiden tot onduidelijkheden over de verdeling van bevoegdheden met betrekking tot internationale afstemming. Dit kan worden voorkomen door een goede afstemming tussen met name het landelijke en regionale niveau. Hiervoor kan worden geleerd van de succesvolle organisatiestructuur en de regionale processen van het Deltaprogramma. Constante afstemming tussen overheden en de unieke combinatie van top-down en bottom-up management was voor het Deltaprogramma een succesvolle strategie om tot een

oplossing te komen van complexe water problemen. Bovendien moeten we concluderen dat voor een aantal samenwerkingsorganisaties, regionale grensoverschrijdende samenwerking de laatste jaren wat in het slop heeft gezeten, terwijl de urgentie van bijvoorbeeld het samenwerken aan de grensoverschrijdende dijkringen steeds duidelijker wordt. Sturing van het regionale grensoverschrijdende systeem dreigt daarom enigszins tussen het wal en het schip te geraken: het Deltaprogramma heeft er weinig oog voor gehad, omdat dit programma voornamelijk een nationale focus had, en de regio was niet erg actief, deels ook omdat klimaatadaptatie en overstromingsrisico's nationale verantwoordelijkheden zijn.

Voor wat betreft de inhoudelijke thema's van grensoverschrijdende samenwerking is er een beperkt aantal witte vlekken. Daarbij gaat het om klimaatadaptatie, de problematiek van lage afvoer en waterschaarste en de drinkwatervoorziening. Dit zijn relatief nieuwe thema's op de internationale agenda naast de traditionele thema's van hoogwater en water kwaliteit, een tendens naar een bredere aanpak van waterbeheer is dus zichtbaar. Een integrale benadering en het afwegen van deze thema's zal een uitdaging zijn voor grensoverschrijdende samenwerking in de toekomst. Daarnaast namen wij enkele verschillen waar tussen samenwerking in het Rijn- en Maasstroomgebied, vooral veroorzaakt door historische en geografische factoren. Een voorbeeld is dat in het stroomgebied van de Rijn vooral op multilateraal niveau intensief wordt samengewerkt, terwijl in het stroomgebied van de Maas vooral de bilaterale samenwerking tussen Vlaanderen en Nederland goed is ontwikkeld.

De belangrijkste belemmerende factoren voor grensoverschrijdende samenwerking zijn de lastige timing van samenwerkingsinitiatieven en -processen, verschillen in belangen en doelen, in de organisatorische structuur, cultuur en beschikbare middelen en capaciteiten. Wanneer deze verschillen worden erkend, er rekening wordt gehouden met de doelen en belangen van de buitenlandse partners en met de planningen waarmee zij te maken hebben, bieden de bestaande samenwerkingsgremia echter goede mogelijkheden om het Deltaprogramma en de ontwikkelde voorkeursstrategieën te bespreken met internationale partijen.

2 Introduction

2.1 Climate change and shifting challenges at the border

The Netherlands is located in a delta area of four European rivers (Rhine, Meuse, Scheldt and Ems). This location provides advantages for the Dutch economy and living conditions, although it also leads to vulnerabilities, such as flooding or droughts. Over the years, the vulnerability of the Netherlands has decreased due to major infrastructure projects, such as the 'Afsluitdijk' and the Delta Works, flood safety policy programmes ('*Hoogwaterbeschermingsprogramma*') and the implementation of Room for the River projects. However, economic and demographical developments and climate change effects will lead to new challenges for the Dutch delta region. For example, climate change will have various effects on river basins that do not stop at man-made borders: precipitation levels and water temperature may change, floods and also droughts may occur more frequently.^{2, 3, 4} This study focuses on the Rhine and Meuse catchment, presented in Figures 1 and 2. The Meuse basin has a length of 905 km from its source in France, flowing through parts of Belgium, Germany, Luxembourg and has its outlet in the Netherlands. The total basin covers an area of approximately 35,000 km², and is used for drinking water supply, navigation and agricultural purposes. The Meuse is a rain-fed river, drainage of this river is on average 320 m³ per second in Liege and it is relatively sensitive to floods.^{5, 6, 7, 8} The Rhine catchment, shown in Figure 2, is one of the longest rivers in western Europe with a length of approximately 1,300 km, and its basin spreads over an area of 185,000 km². The Rhine is one of the most densely populated, industrialized and economically im-

² IPCC (2007), *Climate change 2007: synthesis report*, fourth assessment report: intergovernmental panel on climate change.

³ P. Kabat and H. van Schaik (2003), *Climate changes the water rules: how water managers can cope with today's climate variability and tomorrow's climate change*.

⁴ A.H. te Linde, *Rhine at risk? Impact of climate change on low-probability floods in the Rhine basin and the effectiveness of flood management measures*, 2011, dissertation, VU Amsterdam.

⁵ Ministerie V&W, VROM and LNV (2009). Stroomgebiedbeheerplan Maas: 2009-2015, December 2009, Thieme Deventer.

⁶ Regionaal Bestuurlijk Overleg Maas (RBOM) (2012). Stroomgebied Maas: tips bij uitvoering KRW in de landbouw, [online] website, retrieved November 26 2012, <http://www.google.nl/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&sqi=2&ved=CCKQFjAA&url=http%3A%2F%2Fwww.helpdeskwater.nl%2Fpublish%2Fpages%2F16644%2Fnb0359_if_factsheet_06.pdf&ei=6XGzUKiaAcGi0QWikiCoDg&usg=AFQjCNGTAO86v47dKwaV8E5BU05SNa55w>

⁷ de Wit M.J.M., Van den Hurk B., Warmerdam P.M.M. (2007). *Impact of climate change on low-flows in the River Meuse*, Climate Change 82, pages 351-372.

⁸ Ward P.J., Aerts J.C.J.H., de Keizer O. and Poussin J.K. (2013). Adaptation to Meuse flood risk, Knowledge for Climate HSGR06, 93/2013.

portant regions in Europe and is shared by nine countries. Drainage of this river is on average 2,200 m³ per second, which consists of a mixture of rain and



Figure 1: The Rhine River basin

Source: note 9



Figure 2: The Meuse catchment

Source: note 5

melt water. The river is used for navigation, agricultural water supply, fresh water supply, industry, recreation and various other purposes.^{9, 10, 11, 12}

Research shows that precipitation patterns in the Rhine basin could change in winter with up to a 15% increase in the near future and up to a 25% increase in the distant future, while in the summer a decrease of between 10% and 30% is expected.¹³ The hydrology of the basin will

⁹ Ministerie V&W, VROM and LNV (2009). *Stroomgebiedbeheerplan Rijn-delta: 2009-2015*, December 2009, Thieme Deventer.

¹⁰ Becker G., Aerts J. and Huitema D. (2013). Influence of flood risk perception and other factors on risk reducing behavior: a survey of municipalities along the Rhine, *Journal of Flood Risk Management*.

¹¹ Bubeck P., te Linde A., Dekkers J. and Ward P. (2010). Flood risk developments and adaptation strategies in the Rhine-Meuse delta, in: Kabat P and Vellinga P., *Abstracts Scientific Programme Deltas in Depth*, International conference Rotterdam, the Netherlands 29 September-1 October 2010.

¹² Dieperink C. (1998). From the open sewer to salmon run: lessons from the Rhine water quality regime, *Water policy* (1), pages 471-485.

¹³ K. Görgen et al. (2010), *Assessment of Climate Change Impacts on discharge in the Rhine river basin: results of the RheinBlick2050 Project*, 2010, International Commission for the Hydrology of the Rhine Basin (CHR).

change from a combined rainfall-snowmelt regime – having an average discharge throughout the year – to a rainfall dominated regime.^{14, 15, 16, 17} Average annual discharge is expected to increase between 0% to 15% in the near future. Clear trends for summer and winter have been predicted for the distant future: in winter discharge will tend to increase between 0% to 25% and in summer there will be an opposite tendency, namely a decrease between 30% to 5% in the water flow. For the Meuse river basin, a rainfall dominated regime, wetter winters and dryer summers are also expected.¹⁸ Rainfall is expected to increase by 20 % in 2100 during winters, leading to a 17% increase in peak flows. This means that the normative Meuse discharge level at Borgharen could increase to 4,600 m³ per second in a worst case scenario. For Dutch Limburg, a combined impact of climate change and land use change will result in a two- to three-fold increase in flood risks; for the whole basin this will be an increase in flood risks of roughly 16-39% between 2000 and 2030.^{19, 20} Water quality issues play a bigger role in the Meuse river, since that river deals with more pollutants and has a lower water discharge in summer. Even so, water quality issues will become more relevant for the Rhine catchment as well, because this basin will increasingly depend on rain water.²¹ Both Rhine and Meuse will deal with increasing water temperatures due to discharges of warm water from industry, increasing overall temperatures and the more frequent occurrence of heat waves as a result of climate change. In the future, the temperature of the Rhine water will exceed 28 degrees Celsius on a structural basis, which is too warm for the Rhine's fish popula-

¹⁴ G. Becker et al., supra note 10

¹⁵ H. Middelkoop et al (2001)., 'Impact of climate change on hydrological regimes and water resources management in the Rhine basin', *Climate change* 49, no. 1-2, pp. 105-128.

¹⁶ L. Pfister et al. (2004), 'Climate change, land use change and run off prediction in the Rhine-Meuse basins', *River Research and Applications* 20, no. 3, pp. 229-241.

¹⁷ Te Linde, supra note 4.

¹⁸ De Wit et al., supra note 7.

¹⁹ Ward et al., supra note 8.

²⁰ de Wit M. (2004). Hoeveel (hoog)water kan ons land binnenkomen via de Maas, nu en in de toekomst?, RIZA afdeling Rivieren, werkdocument nr. 2004.151x

²¹ Van Vliet M., Zwolsman G. and Joziasse J. (2008). Effecten van klimaatverandering op de waterkwaliteit in de Rijn en Maas, Deltares-rapport, June 2008-U-R0629/A.

tion.^{22, 23} For both rivers, the drainage of water towards the sea will become more difficult due to rising sea levels in the North Sea.

Those changes, leading to high and low water problems, as well as changes in the temperature of the Rhine and the Meuse and the ecology of flood plains, will have an impact on different societal sectors like housing, agriculture, nature conservation and navigation.^{24, 25, 26} The potential impacts of floods will also increase, as a result of a growing number of people living in flood prone areas and increasing economic activity behind the dikes.²⁷

Still, sustainable water management is accustomed to deal with uncertainties, which manifest themselves in several ways, for example, due to natural variability, socio-economic uncertainties and model uncertainties. Furthermore, various factors could be influential in a dike failure and differences in occurrence and type of flood also lead to uncertainty in water management.²⁸

2.2 The need for transboundary governance on high water issues

Changing precipitation patterns and other climate change effects in river basins cannot simply be converted into increasing discharges and possible flood events, as water management approaches in neighbouring countries and other factors – such as saturation of the subsoil – are also influential. The normative discharge level for the Rhine that should flow safely through Dutch levees is a discharge at Lobith with the possibility of 1/1250 each year. Until 1995 this was related to a design discharge level of 15,000 m³ per second, the Dutch Room for the River project applies a 16,000 m³ per second discharge level and, for the long term, a maximum discharge level of 18,000 m³ per second at Lobith is applied. Today, this discharge level is being

²² Deltares (2014). Rhine too warm for fish, [online] website consulted on 15-04-2014, <<http://www.deltares.nl/en/news/news-item/item/16521/rhine-too-warm-for-fish>>

²³ Van Vliet et al, supra note 21.

²⁴ M. Haasnoot et al. (2004), 'Impact of climate change and anticipating flood management strategy on floodplain ecosystems of the River Rhine, the Netherlands', in D.G. Jalón Lastra & M.P. Vizcaíno (eds.), *Aquatic habitats: analysis and restoration*.

²⁵ F. Ludwig and M. Moench (2009), 'The impacts of climate change on water', in F. Ludwig et al., (eds.), *Climate change adaptation in the water sector*.

²⁶ N. Pinter et al. (2006), 'Flood magnification on the Rhine river', *Hydrological Process* 20, no. 1, pp. 147-164.

²⁷ P. Bubeck et al. (2013), *Assessment of upstream flood risk in the Rhine Basin (HSGR02)*, Synthesis Report Knowledge for Climate.

²⁸ Deltares (2010). Sustainable water management under climate change: how to develop strategies for an uncertain future.

challenged, since discharges between 11,000 and 16,000 m³ per second will lead to large-scale flooding along the Lower Rhine in Germany. In that case, the extreme peak discharges at Lobith will be reduced. The first floods during extreme scenarios will occur around Köln and Bonn towards Düsseldorf and Dormagen. In this region, North Rhine-Westphalia is now improving its dikes. The problem could be, in such extreme scenarios, that the water will discharge into the Netherlands not at Lobith, but at other places near the border and perhaps not within the confines of dikes, but behind them.^{29, 30, 31} As mentioned before, the designed Meuse discharge level at Borgharen is set at a maximum of 4,600 m³ per second, even though large-scale floods could occur upstream at lower discharge levels.³² In any case, discharge levels in the Dutch part of the Meuse and Rhine catchment will depend on discharge levels and related measures taken in the upstream, neighbouring countries.

Thus, water management in both catchments is clearly an upstream-downstream issue, for example problems of flooding and water quality could flow from upstream to downstream regions, often leading to a complex cooperation process because of conflicting interests, goals and the like. The study by Lammersen (2004) underlines the fact that measures taken in Germany affect the Netherlands and vice versa, for example planned measures along the Lower Rhine in Germany also reduce maximum water levels in the Netherlands by between 0 and 0.06 metres. Likewise, Dutch measures could have a noticeable upstream cross-border effect, for example planned measures would decrease maximum water levels by 0.30 metres at the German-Dutch border. For instance, the Room for the River measures ensure a discharge level of 16,000 m³ per second at Lobith, instead of 15,000 m³ per second, leading to a reduction of water levels at the border of 30 centimetres and a maximum of 25 centimetres at Bislich/Lohrwardt. If all Dutch Room for the River measures are implemented, reductions of water levels upstream will have an impact as far as the German city of Wesel, which is about 40 kilometres from the Dutch border. Dike relocation projects are a good example of measures that have particularly local and upstream effects. Yet, upstream-downstream effects are not inevitably noticeable; for example German measures taken upstream from Köln will not affect Dutch flood risks, while flood management measures applied in the region between Köln and Lobith definitely do.^{33, 34, 35, 36}

²⁹ Lammersen, R. (2004). *Grensoverschrijdende effecten van extreem hoogwater op de Nederrijn*, Eindrapport. Provincie Gelderland/Rijkswaterstaat Directie OostNederland, Arnhem.

³⁰ Kroekenstoel D.F. and Lammersen R. (2005). *Transboundary effects of extreme floods on the Lower Rhine*, in: Makaske B. and van Os A.G (Eds), NCR-days 2004: Research for managing rivers: present and future issues, October 2005.

³¹ Deltares (2008). *Rek in het Rivierengebied*, brochure.

³² Van Vliet et al., *supra* note 21.

³³ Lammersen, *supra* note 29.

The upstream-downstream dependencies manifest themselves not only as a result of the application of measures: dike failures and floods in Germany could also impact the Netherlands. For instance, the transboundary dike rings 42 and 48 could be flooded as a result of failures on the German side also causing flooding in the Netherlands, and vice versa.^{37, 38}

On the other hand, countries in a river basin could also have reciprocal interests and be mutually dependent, which is the case for the shared border river, the Meuse, thus enabling cross-border cooperation.^{39, 40} In the Meuse basin between the Netherlands and Flanders both actors deal with largely the same problems and have similar interests, since the river is a shared border region.⁴¹ Furthermore, measures undertaken in this region will directly and to a similar extent affect flood risks and water quality in the border region.

This section has shown the need for cooperation between upstream and downstream areas in the future, since rivers do not stop at institutional or territorial man-made boundaries. Catchments can be seen as one water system, in which sovereign water management approaches have both upstream and downstream effects and could complement each other. Various studies underlined the hydrological interdependencies of riparians in one catchment, since measures taken in a river basin will have a (regional) effect on flood risks upstream and downstream, for example German flood risk management determines the discharge level of the Rhine in the Dutch border region. In addition, dike failures in neighbouring countries could also lead to floods in the Netherlands, possibly even behind the confines of dike rings. For effective and efficient water management, transboundary governance, at least for the nearby border regions, is of significant relevance, particularly in uncertain times of climate change. The need to cooperate and coordinate across borders and to manage water issues from a river basin perspective is underlined in the newest European Water Directives, particularly the Water

³⁴ Deltares, supra note 31.

³⁵ R. Durth (1996), *Grenzüberschreitende Umweltprobleme und regionale integration: zur politischen oekonomie von oberlauf-unterlauf-problemen an internationalen flüssen*, Nomos Verlag, Baden-Baden.

³⁶ Kroekenstoel D.F. and Lammersen R., supra note 30.

³⁷ Mehlig B. and Brinkmann M. (2004). *Grensoverschrijdende effecten van extreem hoogwater op de Niederrhein: deelrapport effect van waterstands-verlagende maatregelen*.

³⁸ Kroekenstoel D.F. and Lammersen R., supra note 30.

³⁹ Durth, supra note 35.

⁴⁰ T. Bernauer (2002), 'Explaining success and failure in international river management, *Aquatic Science* 64 (1), pp.1-19.

⁴¹ Van Roode M. (2014). *Interview with Mirjam van Roode: Rijkswaterstaat Zuid-Nederland*, 01-04-2014, Maastricht.

Framework Directive (focusing on water quality) (WFD) and Floods Directive (particularly addressing water quantity issues) (FD).

2.3 The Delta Programme (Rivers)

This study was conducted on behalf of the Delta Programme Rivers, one of the nine sub-programmes of the Dutch Delta Programme. This is a national programme that originated from the Second Delta Committee's recommendations for avoiding a disaster in the future and to adapt in good time to climate change. In this programme the national government, provinces, municipalities and regional water authorities cooperate to protect the country against floods and to ensure an adequate supply of fresh water in the long term. Societal actors and businesses also join in the programme. The programme proclaims a 'down-to-earth' realistic approach called 'adaptive delta management'. The use of regional processes and the leading role of provinces in those processes are unique. A Delta commissioner coordinates the programme, which is supported by a Delta Act and Delta funding. In 2014, five Delta decisions will have to be taken on the topics of: flood risks in general, freshwater strategies, spatial adaptation, the Rhine-Meuse river delta, and water levels in Lake IJssel.^{42, 43}

The sub-programme Rivers focuses on protection against river floods in the long term and aims to create an attractive catchment area. In the preferred strategies of this programme, improvements of dikes and river expansion are suggested in particular, and water safety is linked to spatial development. This strategy does not focus on major interventions in the main water system, rather focusing on a regional, customized approach.^{44, 45}

Even though the Delta Programme has a strong national focus, the international challenge is recognized. The Delta Programme's progress has already been presented in some international fora, such as the International Commission on the Protection of the Rhine, the International Commission on the Protection of the Meuse, the Flemish-Dutch Bilateral Meuse Commission and the Dutch-German Working Group on High Water.^{46, 47, 48} The sub-programme Rivers also

⁴² Van Eerd M.C.J., Dieperink C. and Wiering M. (2014). *Exploring the prospects for cross-border climate change adaptation between North Rhine-Westphalia and the Netherlands*, Utrecht Law Review 10 (2), pp. 91-106.

⁴³ Deltaprogramma (2013). *Werk aan de Delta: Deltaprogramma 2013; de weg naar de deltabeslissingen*, Uitgave van het Ministerie van Infrastructuur en Milieu en het Ministerie van Economische Zaken, Landbouw en Innovatie.

⁴⁴ DP Rivieren (2010). *Deltaprogramma Rivieren: voor een veilig en aantrekkelijk rivierengebied, noodzaak Deltaprogramma Rivieren, Fasering Deltaprogramma Rivieren, Betekenis Deltabeslissingen voor Rivierengebied, Beoogde producten, Vandaag Beginnen!*, November 2010.

⁴⁵ DP Rivieren (2013b). *Deltaprogramma Rivieren: rivieren verbinden regio's*, programmabureau van Deltaprogramma Rivieren, september 2013.

⁴⁶ Van Roode, supra note 40.

briefly describes the international perspective in its preferred strategies, in particular considering the outcomes of Rheinblick 2050 of the International Commission for Hydrology of the Rhine (CHR).⁴⁹ A broader focus could be applied for a follow-up of this Delta Programme, in which the current programme could be used for setting the agenda for the necessity to address the international aspect of water management from an integrated perspective.⁵⁰

2.4 The research objective, scope and methods

This report is the final outcome of phase one of the research project HSGR 3.3, a research project concerning transboundary aspects of high water in the Rhine and Meuse river basin, which is being undertaken by the Radboud University Nijmegen on behalf of the Knowledge for Climate research project and the Delta Programme Rivers. This report aims to provide a state of the art overview of today's most important cross-border organizations in the Rhine and Meuse catchment that could be used by the Delta Programme Rivers for considering the international aspect of river basin management during the finalization of their preferred strategies (June 2014). Based on the preferences of the Delta Programme Rivers, the researchers applied the clients' perspective while analysing present transboundary governance structures in the Rhine and Meuse border region. Therefore, the research scope concerns in particular the main water systems for the issue of high water and water safety. It should be noted that other themes, as well as other cooperation levels, are also covered in the studied border region, although they are not considered or analysed at this stage of the study. The main research question answered in this report is: *What is the state of the art of cross-border cooperation on high water issues in the Rhine and Meuse river basin?*

To answer the Delta Programme Rivers' question appropriately, a combination of research methods was applied, such as a desk analysis of earlier conducted studies, scientific literature, reports, websites et cetera. Exclusively for this study, 11 semi-structured interviews were conducted and we have made use of 15 earlier conducted interviews (Appendix 1 provides an overview of interviewees). In addition, a workshop on transboundary governance for high water in the Rhine and Meuse was organized on 7 May 2014 in Utrecht, in order to discuss with experts and stakeholders current issues and the draft report of this research. Input was used to complement our research outcomes.

⁴⁷ Mol S. and Onnink S. (2014). *Interview with Sandra Mol and Saskia Onnink, Ministry of Infrastructure and Environment*, 04-04-2014, The Hague.

⁴⁸ Broseliske G. and Buiteveld H. (2014). *Interview with Gerard Broseliske and Hendrik Buiteveld, Rijkswaterstaat*, 11-04-2014, Lelystad.

⁴⁹ DP Rivieren (2013a). *Deltaprogramma Rivieren: contouren voor de voorkeursstrategie Rivieren*, Discussiestuk voor de consultatie, 9 December 2013.

⁵⁰ Workshop grensoverschrijdende aspecten van hoogwater in het Rijn- en Maasstroomgebied (2014), Utrecht, 7 May 2014.

2.5 Report's outline

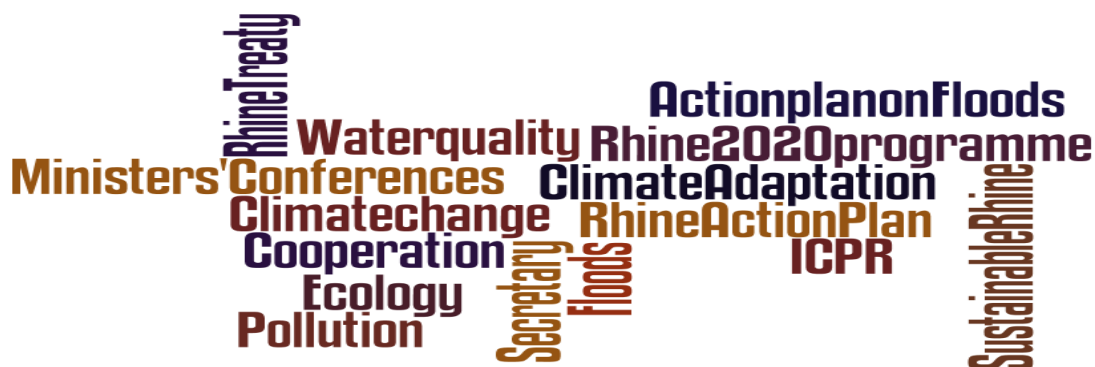
The following seven factsheets present the most relevant cooperation organizations according to the Delta Programme Rivers' perspective. In each factsheet, first, general information is briefly presented in a table, after that more detailed information on specific discussion points and today's issues, addressed themes et cetera are described in sub-paragraphs. It should be mentioned that those organizations are not the only ones active in the Rhine and Meuse river basin; some organisations which are less relevant from the perspective of high water issues in the main water system are presented in the final factsheet. Section 3 reflects on the state of the art of cross-border cooperation and ends with some concluding remarks.

3 Factsheets of transboundary cooperation structures

In this section, seven factsheets on significant cooperation structures in the Rhine and Meuse river basin are presented. Each factsheet presents a historical overview, and describes the current organization. For each cooperation structure, a concise overview is presented in a table. More in-depth information on interesting discussions and contemporary topics can be found in sub paragraphs below. A structure of factsheets was chosen to provide readers with the possibility of filtering relevant information for their own purposes. It should be noted that this overview is not comprehensive, as the research scope was narrowed down to the main water system and the issues of high water and safety. In particular, formal cross-border cooperation bodies are analysed, although parallel tracks and informal cooperation could also be important triggers for collaboration.

3.1 The International Commission for Protection of the Rhine

The International Commission for Protection of the Rhine (ICPR), a multi-lateral cooperation organization for all riparians in the Rhine river basin, is one of the oldest and most renowned transboundary institutions on catchment issues in Europe. The following word cloud gives an impression of the commission's work and a timeline enables readers to visualize some important moments in the ICPR's history. A table presents information on the institutional characteristics of the ICPR, the substantive issues that are being addressed within the commission, and information on the state of the art of the main ongoing discussions. At the end of this section, more detailed information is given on specific subjects in sub paragraphs.



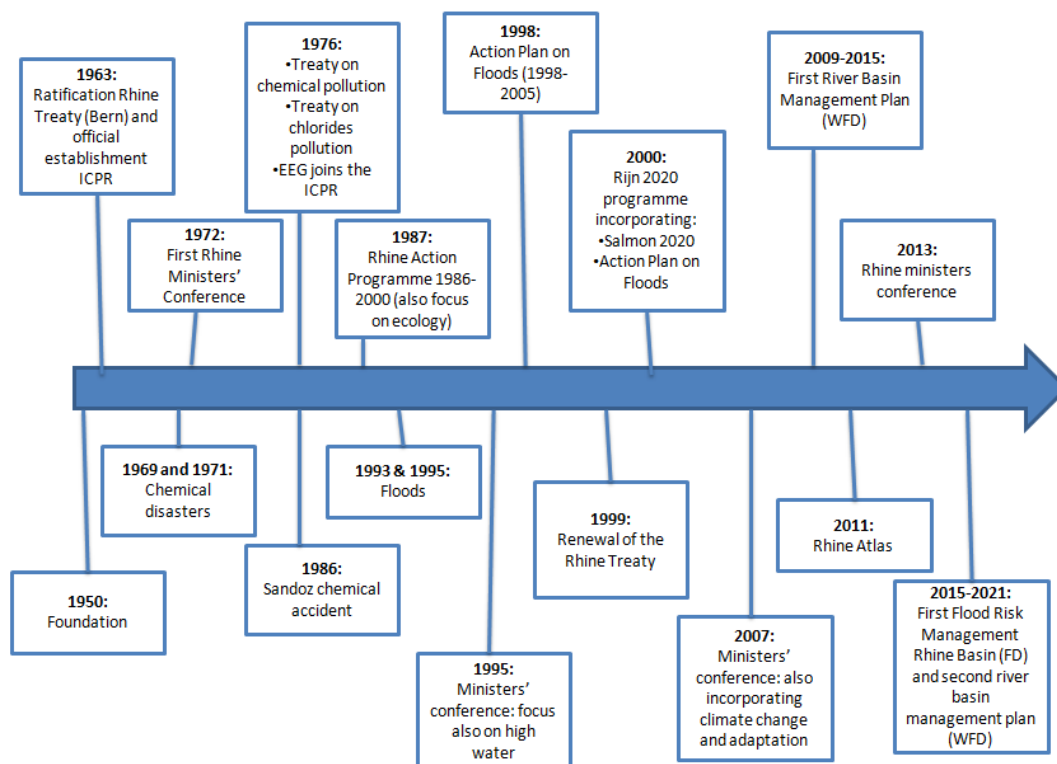


Figure 3: Historical overview development ICPR

Institutional characteristics of the ICPR	
Genesis	After WW II, awareness concerning the necessity of cooperation was raised due to, amongst other things, increased attention to the Rhine pollution and the lack of a platform to jointly address this issue. The first meeting was in 1950. (paragraph 1)
Formal foundation	Cooperation in the International Commission for Protection of the Rhine (ICPR) is based on the Rhine Treaty , signed in 1999 , replacing the Rhine treaty of 1963 . (paragraph 1)
Commission's participants	At the top of the ICPR's organization is the plenary assembly , consisting of delegates (the highest officials) from the Treaty Member States.
Chair	ICPR's chair is currently Gustaaf Borchardt (the Netherlands). Every two years, a new chair is appointed (rotating representatives of Member States).
Ministers' conferences	Every six to seven years, the ministers of the ICPR Member States meet . (The last two meetings were in 2007 and 2013.) These meetings are an important engine for the work within the ICPR. During those meetings, the ICPR's political goals for future years are formulated in a mandate, and activities are evaluated (paragraph 2).
Plenary Assembly	The plenary assembly meets every year and considers the most important decisions with regard to working programmes, financing and formal procedures.
The strategy group	The strategy group prepares the plenary assembly meetings, discusses various topics and coordinates all activities of the working and expert groups.
The secretariat	The secretariat of the ICPR is currently Ben van de Wetering (the Netherlands). The secretariat of the ICPR supports the chair, plenary assembly, the coordinating

Working Groups	committee of the Rhine and all working and expert groups. The secretariat is located in Koblenz (Germany), they are objective, prepare meetings, documents et cetera and are responsible for translations. It is a central contact point and performs an educational role (paragraph 3).
	The commission is divided into three working groups , which are supported by various expert groups that focus more on practical and technical issues (Figure 4). These groups address the following themes: water quality and emissions, ecology and high water
Participating actors	The German delegation consists of representatives of: <ul style="list-style-type: none"> - The Ministry of environment, nature conservation and nuclear safety - The Ministry of transport, building and housing - The Ministry of foreign affairs - German states in the Rhine basin
	Representatives from France are working for: <ul style="list-style-type: none"> - The Ministry of foreign affairs - The Ministry for spatial planning and environment - The Water service Rhine Meuse
	The Luxembourg delegation consists of representatives from: <ul style="list-style-type: none"> - The Agence de l'eau Rhine-Meuse - The Office for water and forestry
	The Dutch delegation is represented by: <ul style="list-style-type: none"> - The Ministry of infrastructure and environment - The Ministry of foreign affairs
	The Swiss delegation consists of representatives of: <ul style="list-style-type: none"> - The Ministry of environment, transport, energy and communication - The Ministry of foreign affairs
	The European community also has a delegation within this organization. This delegation consists of representatives of: <ul style="list-style-type: none"> - The Directorate-General Environment - The European Commission
	NGOs also attend meetings at the different collaboration levels. Examples of attending NGOs are WWF, Hochwassernotgemeinschaft Rhein Gemeinde- und Städtebund and European Union of National Associations of Water Suppliers and Waste Water Services.
Purpose establishment	The purpose of the ICPR is to gather information, produce information and coordinate exchanges between actors to develop the Rhine ecosystem in a sustainable manner , to ensure that Rhine water is usable for drinking water production , that the quality of Rhine sediments is improved, that floods are holistically protected and prevented and that pollution is decreased .
Content characteristics of the ICPR	
Main task	Work of the ICPR focuses on the following objectives: <ul style="list-style-type: none"> - Improvement of the chemical and ecological state of the Rhine - Comprehensive flood prevention and protection, taking into account ecological requirements - Support of the implementation of EU regulations
Main activities	Main activities of the ICPR at present are: <ul style="list-style-type: none"> - Implementation of the Rhine 2020 programme (paragraph 7) - Realization of the Action plan on Floods - Development of a climate adaptation strategy - Implementation of EU Directives (FD and WFD)
Themes addressed (paragraph 1&7)	<ul style="list-style-type: none"> - Water quantity, focus on high water issues - Water quality

Significant outcomes	<ul style="list-style-type: none"> - Ecology - Climate adaptation (also low water, paragraph 7)
	<ul style="list-style-type: none"> - This commission has developed various agreements and action plans that form the basis for formal, international agreements in the Rhine river basin, such as Chemical and Salt Pollution Accords (1976), the Rhine Action Plan (1987), the Rhine Convention (1998), the Action Plan on Floods (2001) and the Rhine Atlas (2011). For example, a clear result of the successful Rhine Action Programme is that water quality and the biological state of the Rhine and many of its tributaries have distinctly improved, as well as the number of animal and plant species. For instance, the salmon was able to reach Strasburg again. - Studies, such as the research in 2008, which was a first analysis of climate change in the Rhine river basin. And this point in time also marked the start of the development of an adaptation strategy, completed in 2014
Applied principles	<ul style="list-style-type: none"> - Solidarity principle - Subsidiarity - Proportionality
State of the art beginning 2014 (paragraph 7)	
Aspiration	The ICPR strives for cooperation to develop a sustainable Rhine . In the latest programme (Rhine 2020) objectives are united that were conflicting in the past (e.g. nature protection, flood management, user functions).
Current issues	<ul style="list-style-type: none"> - Flood risk management Implementation of FD, forecasting, protection of inhabitants, evacuation plans, planning and structural measures, flood risk awareness, (decentralised) water retention, financial precautionary and recovery measures - Improvement of ecosystems and ecological situation, protection and recovery of habitats, connection of habitats, ecological protection against floods - Climate change and adaptation <ul style="list-style-type: none"> o Now discussing whether and how to address low water issues, educate society, improve low water forecasting o High water - Chemical and Ecological quality Implementation of WFD, reducing hazardous substance pollution, micro-pollutants from diffuse sources, measures to prevent thermal discharges - Measures related to user functions
Approach	For example, concerning fresh water supply, water abstractions, shipping, recreation. Paragraph 1 and 7
Future expectations	From the most recent Ministers' Conference (28 October 2013) the importance of the following tasks became clear (paragraph 2): <ul style="list-style-type: none"> - Joint determination of innovative techniques - Implementation of EU regulations - Drafting a preliminary climate adaptation strategy <p>It is expected that the integration and balancing of issues, working fields and interests will become increasingly important in the future. To a certain degree this is already visible in the drafting process of the preliminary climate adaptation strategy of the ICPR.</p>

Table 1: institutional, substantial and state-of-the-art characteristics of the ICPR

1. A Treaty as a basis for collaboration and changes over time

After WW II, awareness was raised concerning the pollution problems of the Rhine, yet no platform for cooperation to address this issue existed. Cooperation in the Rhine basin on water quality issues dates back to 1950, to the establishment of the ICPR in Basel on the proposal of Switzerland, following several Dutch initiatives. This could be seen as a political focus and a major boost for an active interplay between countries in the Rhine river basin. Thirteen years later, the ICPR was ratified, based on the Rhine treaty signed in 1963 in Bern by the Netherlands, Germany, France, Luxembourg, Switzerland and a delegate of the European Community. At the start, the ICPR concentrated merely on the gathering and publishing of information to reduce pollution problems in the Rhine, since water quality was the main concern. At this time, collaboration was difficult, often leading to long and laborious discussions at times and to blaming each other for the Rhine pollution. A significant outcome was the institutionalization of information exchange, resulting in common problem and solution perceptions. Currently, activities are more comprehensive and cooperation has been stabilized. Today's activities include operational measures, joint implementation of EU Directives, the joint execution of projects, studies et cetera, as well as information gathering and exchange. A Rhine chemistry treaty and a Rhine salt treaty (both were signed in 1976 and entered into force in 1979) are important outcomes for the ICPR. Later on, the ICPR's focus was also expanded to ecology and habitat restoration in the Rhine Action Programme, particularly after the Sandoz accident in the 1980s. On a Dutch initiative, the return of the salmon became the symbol of this programme, because the salmon vanished in the mid-1950s. The first Rhine treaty has been replaced by a new Treaty regarding the protection of the Rhine after the flood events in the 1990s; this treaty was signed in 1998 and ratified in 1999 by the same parties. A new treaty was necessary as some issues, such as water quantity, had not been addressed previously. In this Treaty, countries formally confirm that they will continue to protect the valuable character of the Rhine, its banks and flood plains in the future. The main aim is to preserve, improve and develop the Rhine ecosystem in a sustainable manner. Since 2000, Austria, Liechtenstein, Italy and Wallonia have also participated in this commission. It is unique that this treaty is signed by both EU Member States and countries that have not joined the EU. The ICPR extended its focus again in 2007, to incorporate climate change and adaptation. Today, the ICPR addresses a broad range of topics and works on three thematic pillars: water quality, ecology and floods. This historical overview shows that catastrophes were an important trigger for (changes in) the activities of the ICPR, whereby cooperation could be described as 'management by accident'. For instance, chemical disasters in 1969 and 1971 led to the first Rhine ministers' conference in 1972, the Sandoz disaster in 1986 led to the start of the Rhine Action Programme's establishment (1 October 1987) for improving water quality in a sustainable manner, focusing on five goals (return of the salmon, decrease in pollution, suitability of Rhine water as drinking water, decreasing pollutants in sediment and improving the prevention of calamities). Furthermore, the high waters in the Rhine (1993 and 1995) led to a focus shift towards water quantity issues and the development of the Action plans of Floods (requiring a more holistic approach to river basin management, with the main goals being to decrease the possible damage by floods, decrease extreme flood levels, increase awareness concerning flood risks and improve flood announcement systems. These goals should be achieved in 2020).

2. Ministers' conferences and the latest mandate

One of the stimulating factors of the ICPR's cooperation are the regular conferences of ministers; the first took place in 1972. Those conferences could be seen as an engine for cooperation, as they define precise tasks for the ICPR to deal with in future years. The ICPR is required to follow the mandate established in the conference of ministers. The latest Conference of Rhine Ministers was on 28 October 2013 in Basel. This ministerial declaration focused on prevention and adaptation for future challenges for sustainable water management in the Rhine catchment. The main themes that should be addressed based on this mandate are the field of substance pollutions (including micro-pollutants) with regard to chemical and ecological quality, flood risk management and the effects of climate change and adaptation.

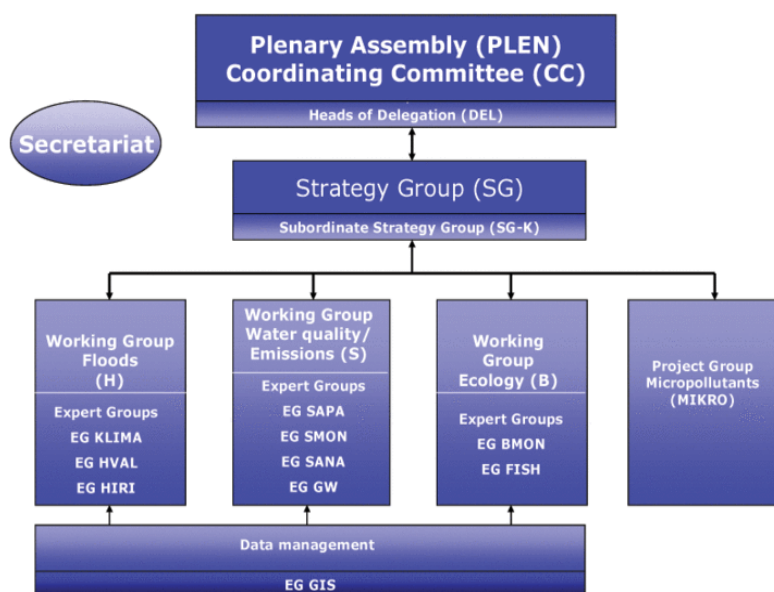


Figure 4 ICPR's organizational structure

3. ICPR's organisation

The ICPR has a relatively well-staffed secretariat, at least in comparison with other river basin commissions, which is located in Koblenz. This secretariat has an international staff and performs a supporting role by carrying out a variety of tasks, such as the preparation and facilitation of policy documents, agreements, (contents of) meetings and conferences, translations into the ICPR's working languages (Dutch, German and French), educational, public relations and information tasks for the public and experts. Targets in most of the ICPR's programmes are theoretical and abstract, although practical and concrete measures are also set by the ICPR. As the ICPR does not have the financial and capacity resources to implement those measures and only acts as a negotiation platform and advisor to Rhine governments, measures are to be implemented by the individual Members. Each State reports on the implementation process every five years, while the ICPR ensures coordination between them.

4. Lessons from a 'successful cooperation leader'

Looking at history, the Rhine Commission played a leading role and could be seen as an exemplary case for establishing transboundary governance. There are explanations for this success, such as the decentralized organization, the role of national delegations, the reaching of decisions by consensus, recommendations to countries, the obligation to report on the implementation of measures, the role of political trust and the absence of sanctions, the important role of the small, yet objective secretariat for the daily work and its advisory role. In particular, the knowing well and the trusting of other Members is also stimulating cooperation, which is based on the long history of collaboration. Normally, the Rhine Commission's inability to impose sanctions does not lead to problems, as all Members are working on compromised targets, measures and decisions. However, sometimes decision-making discussions take a long time and another problem is that decisions based on consensus will tend to produce agreements at the lowest common denominator level.

5. Coordinating Committee of the Rhine

The Rhine water directors meeting, also called the coordinating Rhine committee, operates parallel to the ICPR. This committee was established during the 13th Rhine ministers' conference in 2001; nevertheless it does not have a constitutional basis and meetings are informal. Still, this committee can be seen as a successful ICPR outcome. Its primary task is the coordination of the WFD's implementation, for which the Rhine basin is divided into nine 'working areas', such as the Rhine Delta and Lower Rhine area. This committee was established because the WFD's obligations caused difficulties as the Rhine treaty did not have a similar geographical scope to the WFD. The Rhine treaty is geographically restric-

ted to the outflow of Lake Constance, while the WFD focuses on the whole hydrological system. Thus, collaboration for the WFD also involves countries such as Austria. The committee and the ICPR are segregated for several reasons, for example Switzerland, as a non-EU Member, would not be obliged to follow the WFD requirements and the WFD implementation that leads to extra financial costs.

6. International Commission for Hydrology of the Rhine (CHR)

The CHR also acts parallel to the ICPR, as it is not a component part of this commission, and was founded in 1970 following advice from UNESCO to promote closer cooperation in international river basins. The CHR is a scientific cooperation structure drawn from knowledge and water management institutes of all the Rhine riparian states (Switzerland, Austria, Germany, France, Luxembourg and the Netherlands), such as Rijkswaterstaat. This organization acts within the framework of the International Hydrological Programme of UNESCO and the Operational Hydrological Programme of the WMO. The main aim of this organization is to formulate joint hydrological measures for a sustainable development of the Rhine, through joint research, exchange of data, methods and information, the development of standardized procedures and publications. Its tasks are to expand the knowledge base on the hydrology of the Rhine and to contribute to the solution of cross-border problems. The secretariat of this commission is located in Lelystad, the Netherlands and the CHR meets at least twice a year. An important outcome is the Rheinblick project that studied the impacts of future climate change on discharges of the Rhine and its major tributaries and is now used for the ICPR's climate adaptation strategy. The CHR also organizes seminars, the latest was in March 2014 and focused on the socio-economic influences on the discharge of the Rhine. Other ongoing projects are a study on the run-off amounts from snow and glacial melts against the background of climate change, RheinBlick2050, HYMOG, floods and flood management, changes in the discharge regime in the light of climate change, sediment projects, GIS and a Rhine Alarm model for harmful substances.

7. Today's collaboration, Rhine 2020 and future expectations

The latest programme of the ICPR was established in 2001, when the ministers in charge adopted the Rhine 2020 Programme on Sustainable Development of the Rhine. This new programme follows up the successful Rhine Action Programme (1987-2000). This programme integrates all issues of the Rhine catchment, both water quantity and quality of surface and ground water in combination with all ecological aspects. Core aspects are the implementation of a habitat patch connectivity, Salmon 2020, the improvement of flood mitigation (via the implementation and further development of the Action Plan on Floods, also enhancing the FD), the further improvement of water quality to achieve a good chemical and ecological state of the catchment (by supporting the WFD's implementation) and groundwater protection. A difficulty is to fit this, and other, long-term programmes into the shorter implementation cycles of the EU Water Directives. First, interim evaluations clarify that Rhine 2020 has led to successes, even though further efforts are required. The Rhine Ministers' conference of 2013 gave the ICPR the mandate to concentrate also on the aspect of low water, especially in the light of a changing climate. At this moment, the issue of low water is being addressed in the drafting process of the preliminary climate adaptation strategy, which will be finished by the end of 2014. It is not yet decided how this aspect will be addressed, possibilities are a warning and alarm system or a low water action programme. Low water is a difficult topic to address in the Rhine river basin, as impacts will vary significantly across the catchment. The drafting of a climate adaptation strategy and the combination of interests and themes will be central to ICPR's cooperation for future years. In conclusion, collaboration in the ICPR is shifting even more to a holistic and integrated approach of international river basin management.

3.2 The international Meuse Commission

This section describes the characteristics of the International Meuse Commission (IMC) (formerly called International Commission for Protection of the Meuse/ICPM), a multi-lateral cooperation organization for all riparians in the Meuse river basin. The following word cloud gives a first impression of the commission's work, the timeline presents some important moments in the IMC's history and a table describes the IMC's institutional, substance and state-

of-the art characteristics. At the end of this section, more detailed information is given in sub-paragraphs.

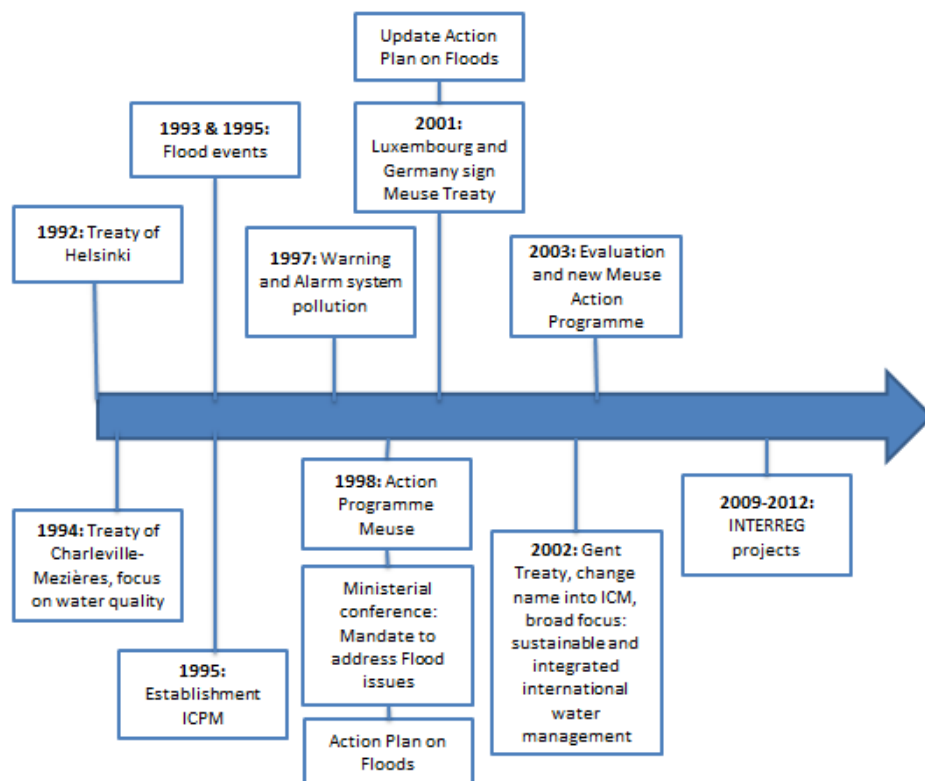


Figure 5 historical overview development IMC

Institutional characteristics of the IMC	
Genesis	The ICPM was established after the Treaty of Helsinki (1992, UNECE Water Convention) that required cross-border cooperation for water management (paragraph 2 & 5).
Formal foundation	The ICPM was based on the Treaty of Charleville-Mezières of 1994 for protection of the Meuse and Scheldt against pollution. The current IMC is based on the Treaty of Gent (2002) , focusing on integrated and sustainable river basin management . (paragraph 5)
Commission's participants	<p>Officially, the eight IMC partners are represented by their responsible ministers, however in practice this is often their Directorate General. The IMC partners are:</p> <ul style="list-style-type: none"> - France: Monsieur le Préfet Coordonnateur de Bassin, Monsieur le Président du Comité de bassin Rhin-Meuse. - Belgium: FOD Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu, Directoraat-Generaal Leefmilieu, Dienst Internationale zaken, Marien Milieu. - Wallonia: Gouvernement wallon, Cabinet du Ministre Président - Flanders: Coördinatiecommissie Integraal Waterbeleid - Region of Brussels - The Netherlands: Ministry of Infrastructure and Environment, Ministry of Foreign Affairs, Rijkswaterstaat Zuid, Provincie Limburg, Water board Roer en Overmaas. - Luxembourg : Administration de la Gestion de l'Eau - Germany <ul style="list-style-type: none"> o Bund: Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit o Länder North Rhine-Westphalia: Ministerium für Umwelt, Naturschutz, Landwirtschaft und Verbraucherschutz des Landes NRW
Chair	Presidency rotates every two years. From 1 January 2015 the Netherlands will be the chair of the IMC. Currently, the chair is a representative from Flanders (Jurgen Tack).
Ministers' conferences	The IMC also organizes ministerial conferences, the most recent were in 1999 and 2001.
Plenary Assembly	The plenary assembly meets every year and is the decision-making level. The ICM partners' delegates meet twice a year. (paragraph 4)
The secretariat	The secretariat supports and facilitates cooperation within the IMC, consists of three staff members and is located in Liège. (paragraph 5, Figure 6)
Secretary	Since 2010, Willem Schreurs has been the secretary of the IMC, acting as guardian of the Meuse treaty's ambitions, by organizing, facilitating and stimulating the cooperation process within the IMC.
Working Groups	<p>The IMC has five working groups, one focusing on the general management, meeting three times a year to prepare, for example, delegation leaders' meetings (workgroup regie). The other four working groups focus on specific themes:</p> <p>-Accidental Pollution -Hydrology and Floods, currently mainly focusing on coordination of the FD -Water Framework Directive -Monitoring</p> <p>The different working groups implement tasks and decisions of the IMC on the basis of their approved working programmes. The working groups have set up some ad hoc project groups, such as on ecology, chemistry, ground water and geographical information systems.</p>
Other participants	Nine NGOs were granted access to the plenary meetings and working group meet-

Purpose of establishment	<p>ings (namely, WWF Belgium, Bond Beter Leefmilieu Vlaanderen, RIWA-Maas, Union Wallone des Entreprises, Inter-Environnement Wallonie, Union régionale du grand Est des Fédérations pour la Pêche et la protection du Milieu aquatique, Milieu- en Natuurraad Vlaanderen, ALUSEAU, Benelux Unie).</p> <p>The IMC is established to organize cooperation between states and regions for a safe and clean Meuse river basin, for instance by maintaining the monitoring and warning and alarm system.</p>
Content characteristics of the IMC	
Main task	<p>At this moment, the IMC's main tasks are:</p> <ul style="list-style-type: none"> - To coordinate problems that should be solve transnationally. - To make sure that Member States' activities do not negatively influence each other - To coordinate the alignment of the WFD and FD - To manage flood risks (text box 1) - To prevent incidental water pollution
Main activities	<ul style="list-style-type: none"> - Coordination of EU Directives (WFD & FD) - Maintaining and improving the warning and alarm system (e.g. digitalisation of the system and the inclusion of pollution disasters) - Activities on other themes, for instance Floods alarm, Masterplan fish migration, International Meuse symposia
Instruments	<p>No formal instruments, even though the IMC could give recommendations to contracting parties.</p> <ul style="list-style-type: none"> - Providing a platform for information exchange - Flood risk management plan facilitated by the IMC - River Basin Management plan - Working plans of the working groups
Themes addressed	<p>Since the Treaty of Gent, the IMC has addressed a broad range of themes, as it focuses on sustainable and integrated water management. Most significant themes addressed are:</p> <ul style="list-style-type: none"> - Coordination WFD (drinking water, water temperature and sediments) and coordination of FD - Sustainable management of the water system - Water quality - Water quantity (high and low water via the FD and Action plan Low Water 2010) - Surface water and ground water - Chemistry and Ecology
Significant outcomes	<p>Most important outcome of the IMC is regular information exchange on water management issues that cross borders.</p> <p>Results of the 1994 treaty are:</p> <ul style="list-style-type: none"> - Homogeneous monitoring networks - Water quality reports in 1994 and 2004 - A warning and alarm system on pollution accidents (WASM) in 1997 - Meuse action programme 1998-2003, which was evaluated in 2003 at which time a second one was also drafted (2003-2010) - A list of relevant physical chemical substances (1998) <p>In general water quality has improved, the Meuse is now a reliable source for drinking water and nature in this basin is recovering.</p> <p>Based on the ministerial mandate for flood management: (text box 1)</p> <ul style="list-style-type: none"> - Action plan on floods Meuse, updated in 2001 - Actors now can find each other during high water incidents, open dialogue - Information systems

Applied principles	<p>There also have been valuable projects, linked to the IMC, such as:</p> <ul style="list-style-type: none"> - AMICE (consequences of climate change, factsheet 6) - FLOOD-Wise (implementation of the FD, factsheet 6). - Aquadra (operational water management in four regional cross-border rivers including modelling, monitoring and pilot projects) - Solidarity principle - Subsidiarity is an important philosophy (paragraph 4). - Precautionary principle, principle of preventive action - Pollution pays principle
State of the art beginning 2014	
Aspiration	The IMC strives for sustainable and integrated water management of the international Meuse river basin district , particularly considering the Meuse's multi-functionality. (paragraph 6)
Current issues	<p>At this moment, the IMC's main focus is the final year's cycles of the EU directives (WFD and FD) which get most attention in 2014. (paragraph 2)</p> <p>The IMC is broadening its focus even more. Currently the most significant themes addressed by the ICPM are:</p> <ul style="list-style-type: none"> • Climate change (e.g. via AMICE, factsheet 6 and studies on the consequences of climate change) • Water quality (e.g. implementation of WFD, monitoring quality, warning and alarm system Meuse for incidental pollution) • Water quantity (e.g. implementation of FD, exchange of hydrological information, flood forecasting system, joint crisis management) (paragraph 1)
Future expectations	The expectation of the IMC for cross-border cooperation in the future is that high water and flood issues will continue to be worked on, although less focus will be placed on the Meuse basin in comparison with the current approach (for this issue much work has already been done in the past), while the effects of climate change will become a central discussion and cooperation topic. The impacts of climate change in this catchment will mainly lead to low water issues with effects on drinking water supply, navigation and water quality .

Table 2 institutional, substantial and state-of-the-art characteristics of the IMC

1. The IMC addressing flood issues

Based on the ministerial mandate of 1998, IMC partners also work together on flood issues based on an Action plan of Floods in the Meuse, which should be implemented by the riparian states. At this time a working group on high water issues was also established. This first phase of water quantity management was based on the principles of sustainable action from an integral, multi-disciplinary and solidary perspective, the creation of awareness on flood risks, upstream water retention and more space for the river system. The IMC's instruments were the action plan, the development of forecasting models, the improvement of alarm systems and information exchange.

2. Comparison of the IMC and ICPR and the stimulating role of EU legislation

The ICPR has a longer history of cooperation than the IMC, because after WW II cooperation with Germany accelerated, interests were largely similar and the visions for cooperation were not that far apart. Cooperation in the Meuse was more difficult, due to a historically tense relationship between the Netherlands and Belgium and tensions on interests, such as in the Scheldt between the ports of Antwerp and Rotterdam. A further hindrance was that water management was less well developed in Belgium and the distribution of responsibilities between the Belgian federal level and the regions was not always clear. In the Meuse basin, there were no shock events to stimulate cooperation, comparable with those for the Rhine commission. Since the beginning in 1994 with the Meuse treaty, cooperation intensified

rapidly, as lessons could be learned from other river basin commissions, although there is resistance to applying an 'ICPR cooperation method'. In comparison, regional input is more relevant in the IMC, while the ICPR deals more with national interests and input. EU legislation also stimulated cooperation in the IMC, as the FD and WFD were pushing for cooperation at river basin level and were experienced as a 'stick' for cooperation.

3. Discussion on the discharge level

Based on scenarios, a maximum design discharge level for the Meuse river basin is set at 4,600 m³ per second at Borgharen over the next century, considering a changing climate and upstream flooding in the area of Liege. In 2001, the 1/1250 discharge level was set at 3,800 m³ per second. Even though opinions differ on the likeliness of this level, the discussion seems less pressing than the discussion on the Rhine design discharge level (factsheet 4). This discharge level is also surrounded with scenario and modelling uncertainties, ambiguities concerning socio-economic developments et cetera. Moreover, those extreme situations will lead firstly to major problems in upstream regions (specifically in France and Wallonia).

4. Organisation of the IMC

The plenary assembly meets every year and decides upon the IMC working programmes (Figure 6). Decisions are made based upon unanimity. The IMC has formally three working languages (Dutch, French and German). Hampering cooperation in the IMC are the different interests and risk perceptions of the partners, as well as having varying cultural backgrounds and financial and capacity situations. Non-governmental organizations also attend the meetings. The commission's costs are (not equally) shared among the riparian states. The IMC is supported by a permanent secretariat. This secretariat has a relatively low capacity, which could hamper cooperation, since the secretariat cannot address substantial tasks, but focuses on facilitating and supporting the cooperation process. The IMC's working groups and the lower governmental levels, particularly the bilateral cooperation structures and national governments, realize the agreements and work programmes, based on the subsidiarity principle. This is an important philosophy underlying cooperation in the IMC, meaning that this multi-lateral cooperation level should only address what cannot be handled at the trilateral, bilateral, national or regional level. In comparison with cooperation at the bilateral level, collaboration in the IMC and ICPR is a relatively slow and formal process. Cooperation at the lower governmental levels is also discussed in the IMC. The IMC and ICPR have no formal responsibilities, as there is no 'Meuse or Rhine authority', countries are sovereign and the national governmental level is responsible for issues such as climate adaptation.

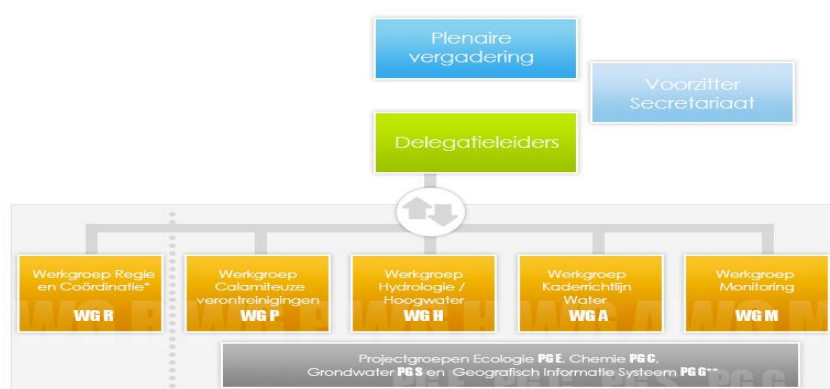


Figure 6 IMC's organizational structure

5. A Treaty as foundation and the historical development of the IMC

For years, there was no cooperation on water issues in the Meuse basin. Between 1988 and 1990, constitutional reforms occurred in Belgium, whereby water management responsibilities were decentralized to the regions of Flanders and Wallonia, leading to cooperation possibilities. Another turning point

towards cooperation was the Treaty of Helsinki in 1992 (UNECE water convention) that forced cooperation, since all Meuse partners signed the Treaty. This Treaty concerns the protection and maintenance of transboundary water systems and could be seen as a basis for the river basin management approach and the related WFD. Eventually, the signing of the Charleville-Mezières Treaty in 1994 could be considered as an important turning point in multilateral relations in the Meuse river basin, which had had a long history of political conflict and distrust. This Treaty was signed by France, the Netherlands and three regional authorities of Belgium (Brussels, Wallonia and Flanders). The Treaty focuses mainly on multilateral coordination of surface water quality of the main river course and sediment management of the main water system of the Meuse river basin and Scheldt river basin. In 1995 both the International Commission for Protection of the Scheldt (ICPS) and for Protection of the Meuse (ICPM) were established based on the 1994 treaty. The ICPM started its activities on an informal basis, which changed after the ratification of the Treaty by all parties in 1998. At the beginning, collaboration focused on water quality issues and the establishment of a joint measurement system on changes in water quality and a system for warnings during disasters. During this time, an action programme was also formulated to maintain and improve the quality of the Meuse via measures such as the reduction of urban and industrial discharges, the prevention of incidental pollution, evaluations of the water quality, information exchange and research. Even so, this action programme addressed mainly European obligations. The ICPM also organizes ministerial conferences, the first took place in 1998. After the flood events in 1993 and 1995, the ministers gave their mandate for cooperation on flood protection in the Meuse in 1998 in Namur. Partners for this mandate were France, Wallonia, Flanders and the Netherlands. This mandate resulted in an action plan on floods to prevent damage (actualized in 2001) and the establishment of a new working group on high water. However, until 2002, the water quantity and water quality cooperation structures were on parallel tracks, because the first did not fall under the 1994 treaty, although the IMC secretariat was used to facilitate both and the same staff were involved. In 2001, Luxembourg and Germany also became contracting parties and in 2002, after the enforcement of the WFD, all parties signed the Gent Meuse Treaty, replacing the 1994 Treaty. The Treaty implements the Helsinki Convention, just as the Rhine treaty does, although additionally it has been concluded to create a multilateral structure for the implementation of the WFD's obligations. This new Treaty entered into force in 2006 and focuses on sustainable and integrated water management within the Meuse River Basin District. The Commission was renamed the International Meuse Commission (IMC). Clear focus shifts are from pollution control towards sustainable water management, including the ecological status as well, such as water quantity issues (water scarcity and floods) and therefore already taking into account the upcoming Floods Directive, from the main water system towards the whole river basin, from only surface water to also including ground water, et cetera. In recent years, cooperation in the IMC has also intensified through the execution of various INTERREG projects, such as AQUADRA, FLOOD-Wise and AMICE.

6. Future expectations on cross-border cooperation

The original tasks of the Meuse Treaty are repeated in the 2002 Gent Treaty, and the monitoring of water quality and incidental pollution are still significant and main cooperation themes. Even so, those original tasks have been expanded, e.g. the water quality monitoring network now also concerns the river's tributaries and biology and ecology aspects, and the measurement system of incidental pollution has been updated and digitalized. Alongside that, the WFD and FD European Directives are currently two important, dominant collaboration topics for the IMC, as this EU legislation requires cooperation in river basins and the deadlines for the river basin and flood risk management plans are in 2015. Therefore, cooperation on other topics has currently been put on hold. At this moment, the INTERREG projects in the Meuse basin have also been finished and discussions concern a possible follow-up to AMICE, since new EU projects within the IMC are at an undefined interim stage. The main discussions at this time are related to effects of climate change on the level of the Meuse water system. Because of the Meuse's character, a rain-fed river, which is more vulnerable to climate change effects such as changing precipitation patterns, an approach for dealing with climate change will become a central discussion in the coming years. Secondly, this river is an important shipping lane, which could collapse during periods of low water and it is also an important source for drinking water supply for inhabitants in this catchment and its

hinterland. It is expected that issues such as climate change, droughts, scarcity of water, drinking water supply and water quality during times of low water will be the IMC's main concerns in the future. Flooding will also remain a topic for collaboration. For those relatively 'new' issues in the cooperation field, Flanders and the Netherlands could be important partners, as both have comparable interests with regard to low water problems. At this moment, the discussion on climate change focuses on two pillars, firstly, information exchange on climate scenarios and modelling and, secondly, the consequences of climate change on the most important user functions of the Meuse and on how to deal with those impacts. Thus, the IMC is also shifting to a more all-encompassing approach to cross-border cooperation, even though EU legislation on the issue of water quality and quantity grabs most of today's attention.

3.3 The Permanent Border Waters Commission

This section describes the Permanent Dutch-German Border Waters Commission (PBWC); focusing on bilateral cross-border cooperation between the Netherlands and Germany along its border, incorporating parts of the Meuse, Rhine and Ems river basins. The following word cloud gives a first impression of the commission's work, after that a timeline is presented with some important moments in the PBWC's history. A table presents characteristics of the PBWC and, at the end of this section, some detailed information is given on specific subjects in subparagraphs.



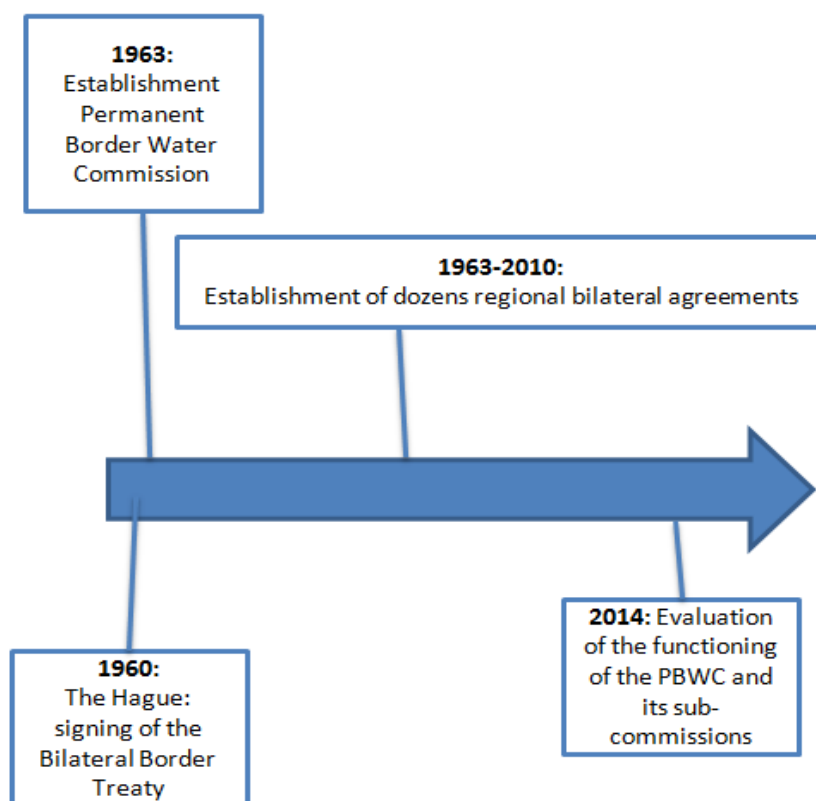


Figure 7 Historical time-line PBWC

Institutional characteristics PBWC	
Genesis	The Permanent Border Waters Commission (PBWC) was established in 1963 based on Article 64 of a Dutch-German bilateral border Treaty and is responsible for all cross-border rivers and streams, except for the Rhine, Ems and Dollart (paragraph 3).
Formal foundation	The PBWC has an international status , as it is based on a Treaty. This commission has an advisory role with regard to national and regional governmental organisations and public bodies on both sides of the border (paragraph 3).
Commission's participants	State government representatives from both sides of the border participate. <ul style="list-style-type: none"> - For the Netherlands representatives are linked to the Ministry of Infrastructure and Environment, Ministry of Foreign Affairs and Ministry of Economic Affairs and Rijkswaterstaat. - German commission members represent the Federal Environment Ministry of the <i>Bund</i> and the two <i>Länder</i> sharing borders with the Netherlands: North Rhine-Westphalia and Lower Saxony - Chairs of the sub-commissions
Chair	Rotating chair. The Netherlands is represented by the Ministry of Infrastructure and Environment (Elaine Awayn, formerly Bob Dekker) and a representative of the German ministry of Umwelt (Heide Jekel).
Meetings' frequency	The PBWC meets at least annually, alternately in the Netherlands or Germany.
Sub-commissions	Seven sub-commissions (A to G) assist the PBWC, namely: <ul style="list-style-type: none"> - Maas-Roer (A) - Maas-Niers (B) - Duffelt-Oude Rijn (C) - Berkel- Oude IJssel (D) - Vecht en Dinkel (E) - Bourtanger Veen (F) - Eems-Dollard (G) <p>The Dutch chairs for the sub-commissions are representatives of the provinces and for the Ems-Dollard region this is a representative of Rijkswaterstaat Noord-Nederland. (paragraph 1 and 4)</p>
Participating actors In the sub-commissions	Regional actors are represented in those groups, examples of German representatives of regional participants are: <ul style="list-style-type: none"> - Bezirksregierungen - Kreise - Stadte - Wasserverbanden - Landesamt für Umwelt, Natur und Verbraucherschutz NRW <p>Dutch representatives are, for example:</p> <ul style="list-style-type: none"> - Water boards - Provinces - Regional representatives of Rijkswaterstaat
Purpose of establishment	The commission is established to coordinate cross-border water issues from an integration perspective . Examples of those issues are discharge levels, prevention of floods and damage, discharge of pollution, et cetera.
Content Characteristics PBWC	
Main task	The main task of the PBWC is to encourage the management of transboundary water issues by ensuring and promoting cross-border contacts between responsible actors. Thus, the PBWC is developed for the benefit of cooperation in good neighbourliness, shaping an interstate consultation and cooperation framework for water- and border-related issues mainly to improve information exchange .
Main activities	<ul style="list-style-type: none"> - The PBWC is an operational platform for the exchange of information and experiences

Themes addressed	<ul style="list-style-type: none"> - Has a control function with regard to agreements made between participants. - The PBWC could advise actors on the implementation of joint agreements
Significant outcomes	<p>All water implementation issues on the border from an integrated perspective.</p> <ul style="list-style-type: none"> - Water quantity; flood issues, management and protection (only taking the FD's implementation into account where it concerns bilateral aspects) - Water quality; including water pollution, water abstraction, implementation of the WFD, sediment management - Other topics, such as fish migration, water power, control of beavers and muskrats, meandering of rivers and streams forming the border, ground water issues (particularly related to lignite mining in Germany).
Applied principles	<ul style="list-style-type: none"> • 20 agreements on the larger streams E.g. management plan for the Vecht • Various reports on water quality and other themes and pilot projects at the regional level in the sub-commissions. • Recommendations of the PBWC to water managers, e.g. on granting of permits
State of the art beginning 2014	<ul style="list-style-type: none"> - Solidarity principle based on upstream-downstream relation - Good neighbourliness
Aspiration	Platform to coordinate on a national and regional level on all water border issues.
Current issues	<ul style="list-style-type: none"> - Since the WFD activities started, cross-border activities of the PBWC decreased. Even so, this transboundary platform is still necessary for collaboration with regard to regional, cross-border water issues. - Coordination of and information exchange on the implementation of the WFD and FD - Water quality (monitoring, exchange of information) - Water quantity (exchange of information, monitoring)
Future expectations	In recent years, the PBWC's role has decreased . Currently, Germany and the Netherlands both evaluate the efficiency and effectiveness of the PBWC and its sub-commissions' functioning . Outcomes will be discussed in the next meeting (25 and 26 September 2014 in North Rhine-Westphalia). Future developments within this forum will depend on this evaluation and are yet uncertain. (paragraph 3)

Table 3 institutional, substantial and state-of-the-art characteristics of the PBWC

1. The seven sub-commissions

In 1963 17 sub-commissions were established to focus on specific, regional water related questions. Today, seven sub-commissions assist the PBWC, being responsible for the practical implementation of this border Treaty, having the same goals as the PBWC, whereby each transboundary sub-river basin is represented by one sub-commission, in which delegates of the competent regional water management authorities on both sides of the borders are represented. The sub-commissions operate quite separately and offer a platform for regional water authorities to discuss concrete solutions for local issues. Those sub-commissions focus on the operational level and also meet annually, alternately chaired by Dutch or German representatives (e.g. the province of Limburg and Bezirksregierung Köln in sub-commission A (Meuse-Ruhr) and with Bezirksregierung Düsseldorf in sub-commission B (Meuse-Niers).

2. Success factors for cooperation

Even though the PBWC currently could be seen as a less active collaboration platform, lessons can be learned from the past. The less formal status, in comparison with other cooperation structures and platforms (e.g. the ICPR), and the fact that only two countries (regions) are involved, means that agreements and commitments are more easily, more quickly and more directly established in the PBWC. Also,

the PBWC acts mostly in an operational sphere, since the commission mainly focuses on the implementation of measures. Thus overall, the Borders Commission markedly improved cooperation and is even described by some actors as the basis for Dutch-German cooperation.

3. Historical development and the border Treaty

On 8 April 1960 in 's-Gravenhage, Germany and the Netherlands signed a general, bilateral Treaty (the Dutch-German Border Convention) to regulate all border issues. This Treaty entered into force in 1963 and does not contain specific instruments for cross-border cooperation between water managers, yet based on Article 64 of this Treaty, the Permanent Dutch-German Border Waters Commission (PBWC) was developed for the benefit of cooperation in good neighbourliness, shaping an interstate consultation and cooperation framework for water- and border-related issues. The PBWC has an operational and tactical nature and its field of operations concerns all water systems in the border region between the Netherlands and Germany (approximately 100 regional cross-border or border rivers, streams and canals). The PBWC is not concerned with the main water system, such as the Rhine, Ems and Dollart rivers. Recently, this commission celebrated its 50th anniversary and, since the first meeting, approximately 20 agreements have been made with regard to the maintenance of the larger cross-border streams. For transboundary water governance, Chapter four (Articles 56-73) of this Treaty is important. The PBWC is an institution for consultation in the Dutch-German border region as a result of the recognition of upstream-downstream dependencies between the border regions, with the aim of overcoming any interference between parties on water management issues. The PBWC's main commission is a regular collaboration where national governmental representatives are involved, thus decentralized organizations are not directly involved at this level. The foundation in a treaty is very important, since everything agreed upon in this commission automatically has an international status, which cannot be changed or ignored easily. Originally, this commission focused mainly on water management issues, however the commission's field of operations is now more comprehensive, covering all aspects of integrated water management. This involves themes covering both water quantity and quality issues. Since its first meeting in 1963, water quality has improved considerably and dozens of bilateral agreements have been realized, the most recent one (2010) is an agreement between water board Rivierenland and Deichverband Kleve-Landesgrenze with regard to the Dutch-German pumping system near Nijmegen. Further development of the PBWC is yet unclear; in 2014 the functioning and relevance of the PBWC is to be evaluated and a vision for the future will be discussed.

4. Dormant sub-commissions

At the bilateral regional level, sub-commissions of the PBWC are important cooperation structures, yet those sub-commissions vary in their level of activity. For instance, the Ems-Dollart region is quite active (sub-commission G), while sub-commissions E and F and, to a lesser degree, also sub-commission D in Rhine Delta East are at this moment dormant commissions. This year, sub-commission D will meet one more time, while sub-commissions E and F have already reached a standstill. The role of those sub-commissions in this border region changed due to the WFD, as Rhine East decided to establish new cooperation structures for the Directive's implementation, in particular the *Arbeitsgruppe and Steuerungsgruppe Deltarhein* (AGDR/SGDR) in 2005 and the *Grensoverschrijdend Platform voor Regionaal Waterbeheer* (GPRW) in 2010 (factsheet 7). Some scholars argue that both are replacing the PBWC to a certain extent. Other reasons for the poor functioning of some sub-commissions are the low frequency of meetings, cultural and organizational differences between actors involved, the focus on operational and relatively local aspects and the good functioning of the ICPR at the multilateral Rhine level. Furthermore, the PBWC was established for the exchange of information, not for coordination of policies or even the development of joint policies. In conclusion, cooperation in the PBWC after 2002 was outshone and to some extent even frustrated by the introduction of the WFD. An explanation for the different situation in the Ems-Dollart region is that this sub-commission is also concerned with the implementation of the environmental protocol of the Ems-Dollart Treaty. This year, the functioning of the PBWC and its sub-commissions will be evaluated in both border regions.

3.4 The Dutch-German Working Group on High Water

This section describes cross-border cooperation at a bilateral level between the Netherlands and Germany in the Rhine river basin via the Dutch-German Working Group on High Water (also called the *Arbeitsgruppe*). The following word cloud gives a first impression of the Working Group on High Water, and then a timeline is presented with some important moments in its history. Following the timeline, a table presents characteristics of the Working Group divided into institutional, substance and state-of-the-art information. At the end of this section, some detailed information is given on specific subjects in paragraphs.



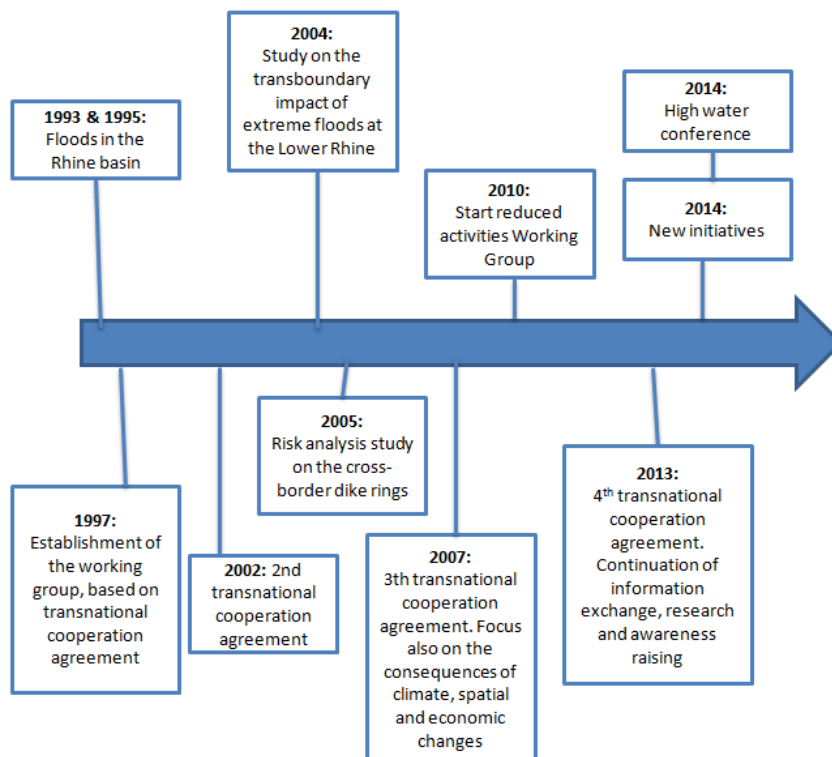


Figure8 Historical overview of collaboration in the Arbeitsgruppe

Institutional characteristics Arbeitsgruppe	
Genesis	Established in 1997 , initiated by the Dutch province of Gelderland, after the 1993 and 1995 floods in the Rhine basin. (paragraph 2).
Formal foundation	In 1997 the ' transnational cooperation agreement on sustainable protection against floods ' was signed by ministers from the Netherlands and North Rhine-Westphalia, as well as the Dutch province of Gelderland, constituting the establishment of the Working Group. Cooperation is based on a common declaration (a political agreement), consisting of formal rules of the game and a working programme. The declaration states the Group's aim, the expected results and planned activities, and is updated every five years (2002, 2007, 2013). The group has an informal character, stimulating the testing of innovations, concepts, information exchange, research and awareness-raising. (paragraph 2)
Lead participants	Dutch actors: <ul style="list-style-type: none"> - Province of Gelderland - Dutch regional office Rijkswaterstaat Oost (on behalf of the Ministry of Infrastructure and Environment, DGRW) German actors: <ul style="list-style-type: none"> - The State of North Rhine-Westphalia, (Ministry of Climate Protection, Environment, Agriculture, Conservation and Consumer Protection and Ministry of Economic Affairs and Energy)
Chair	Presidency is shared between the Netherlands and Germany. Before 2014, the Dutch chair was a representative of the province of Gel-

Participating actors (text box 1)	<p>derland, currently this is the regional office of Rijkswaterstaat (East) (Henry Bossenbroek). The German chair is a representative of the Ministry of Climate Protection, Environment, Agriculture, Conservation and Consumer Protection and Ministry of Economic Affairs and Energy (Erik Busschüter).</p> <p>Dutch actors:</p> <ul style="list-style-type: none"> - Water board Rivierenland - Water board Rijn en IJssel - Rijkswaterstaat - Union of Dutch River Municipalities (VNR) <p>German actors:</p> <ul style="list-style-type: none"> - District Government Düsseldorf - State Institute of Environment North Rhine-Westphalia (Landesumweltamt) - Municipality (Kreis) of Cleves - Association for flood protection and waters in North Rhine-Westphalia - Flood Centre Köln
Meetings' frequency	The Arbeitsgruppe normally meets two to four times a year , depending on the issues (projects/conferences). The next high water conference is planned for 30 October 2014.
Purpose of establishment	Improving communication and research in the border region, via the coordination of activities, studies and methodologies to improve flood protection in the Lower Rhine region.
Content characteristics of the Working Group	
Main activities	<ul style="list-style-type: none"> - Information exchange - Research stimulation - Plan development - Alignment between participating actors on strategies - Improvement of crisis management
Themes addressed (paragraph 4)	<ul style="list-style-type: none"> - High water and safety, all aspects of high water risk management are addressed. - Also addressing spatial issues
Significant outcomes	<ul style="list-style-type: none"> - Establishment of knowledge and information exchange, particularly regarding practical issues concerning all aspects of risk management. - Creation of mutual understanding and communication possibilities. - Joint research projects. (paragraph 4)
Applied principles	<ul style="list-style-type: none"> - One of the group's main goals is to give substance to the solidarity principle - Most activities are based on the principle of 'creating more room for allowing floods' instead of focusing only on defence systems.
State of the art beginning 2014	
Current Issues	<p>Information exchange is still the main task of this working group, particularly with regard to Room for the River measures, Delta Programme, FD, dike rehabilitation NRW et cetera.</p> <p>Also, the organization of a high water conference is now a main discussion point. Last year, coordination on the implementation of the flood risk and hazard maps of the FD was the main task of this platform. (paragraph 1&2)</p>
Expectations	In the near future, coordination on high water management will still be

	<p>the main task of the working group. Main issues for the near future might also include: discussion on the new Dutch standards (and the effects on the border dike rings), consequences of the preferred strategies of the Dutch Delta Programme on water discharge levels in Germany.</p> <p>At this moment, the working group is discussing new topics and projects within the high water theme that will be addressed in the future, as a result of the operational delays. Other themes could also be addressed in the future, probably depending on the development of EU legislation. Furthermore, joint research projects have clarified the need for more co-operation in the transboundary dike rings. (paragraph 1 &2)</p>
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Table 4 institutional, substantial and state-of-the-art characteristics of the Arbeitsgruppe

1. Organisation of the Arbeitsgruppe

Most international forums consist of a three-layered structure (decision-making, daily management and substantive groups). The Working Group has two layers: a high water conference (every two years) and the working group for the daily work consisting of substantive projects. At this moment, new projects are being defined, decisions are to be made on topics that are in the Working Group's interest and a high water conference has been organized (30 October 2014). Interestingly, most participants in this co-operation structure have a regional background, as national organizations are not directly involved in this Working Group. The aim of this group is to develop closer cooperation at the regional level. The involvement of particularly regional actors is often seen as a stimulating factor for cooperation in this Working Group, together with the low level of involvement by politicians.

2. The development of cooperation in the Arbeitsgruppe over the years

As stated in the table, the Working Group was established after the Rhine high water episodes in 1993 and 1995, when in particular the province of Gelderland realized that current bilateral contacts were not satisfactory and the regional level felt the urge for closer cooperation. Earlier cooperation was too bureaucratic and too focused on water quality issues. Also, the high waters during that time raised attention to the necessity for cross-border cooperation. During the early years, differences in language, knowledge, experience and practical matters, such as norms, methods and standards, led to irritation between Dutch and German actors. Latterly, sufficient trust has been built up, creating possibilities for an exchange of views, experience and knowledge in open discussions. This was enhanced by the technical background of all participants and the focus on technical and scientific problems and objectives. Common declarations are the formal basis for cooperation on this platform. The first declaration addressed issues like crisis management and the exchange of information and knowledge on practical matters, such as existing measures and projects in the border region. The main focal point of the 2007 declaration is the study on the consequences of climate, spatial and economic changes. The latest declaration's goals (2013) are the continuation of information exchange, research and awareness-raising. After a few years of reduced activity of cooperation since 2010, caused by a variety of reasons, the work has again intensified since 2013, due to questions on climate change and transboundary flood risk issues. According to the actors involved, this group is still effective, because of the trustful atmosphere, common objectives of all actors, their regional background, the technical focus and expertise of the Working Group and the common understanding, as well as the fact that politicians are not closely involved. Currently, this platform is used to coordinate daily practices in water management (e.g. with regard to Room for the River, the Delta Programme, dike rehabilitation in North Rhine-Westphalia, activities of water authorities on both sides of the border). Last year, collaboration and coordination on the maps of the FD was the focal point. Today (spring 2014), the focus is more on organizing a high water conference. In March and May 2014 the Delta Programme presented some result in this group and the new standardization will be presented in the meeting at the end of October

3. Focus on high water issues

As the Working Group's name suggests, high water is the main theme addressed. Issues such as low water were often raised in this group, but most actors were not enthusiastic. Specifically, German actors state that it is not necessary to include low water as a topic for cooperation, as this is not an issue in the German borders region (e.g. North Rhine-Westphalia already has large water storage areas). Furthermore, the established cooperation structure and time, resources and capacity constraints on both sides of the border do not allow the addressing of more themes than high water issues.

4. Impacts and outcomes of the Arbeitsgruppe

The Working Group has influenced national and cross-border policies in a variety of ways, cooperation is often limited to coordination and information exchange with regard to regional and national measures and programmes. Flagships of the working group are joint research projects, being actively executed by the group, such as the study on 'transboundary impacts of extreme floods at the Lower Rhine' and the 'risk analysis of the transboundary dike rings 42 and 48'. The study on the 'transboundary impacts of extreme floods at the Lower Rhine' (often called Nieder Rhein study) resulted in joint models to calculate the mutual effects of measures that reduce water levels on both sides of the border and to calculate flooding behind the dikes, including transboundary flooding. The results of this study (and follow-up studies in the Netherlands) were used for the reasoning in Dutch policies to include the effects of flooding in Germany in design discharge level calculations (further described in text box 5). The dike rings risk analysis was the latest joint research project of the Arbeitsgruppe. For instance, flood risks within this region were measured and methods of measurement were exchanged. This study clarified that both countries' flood management methods do not fit well together and that measures will directly affect the other country within the same dike ring, for instance a dike failure at the Dutch side could lead to flood flows behind German dike systems and vice versa. In a joint dike region, such themes should be addressed in common. Also, projects were supported by the group, such as the Project VIKING (Verbesserung der Informationseinrichtung Katastrophenschutz bei Hochwasser in Nordrhein-Westfalen und Gelderland). VIKING was a cooperation project between 17 water managers in the border region of the province of Gelderland and North Rhine-Westphalia and was supported by the Working Group. This project mainly focused on crisis and safety management (e.g. evacuations were jointly practised in 2005), including computer software calculating the consequences of dike breaks and flooding risks, evacuation calculations and the development of various instruments, such as FLIWAS (flood information system). The VIKING project ended with a symposium in 2012 and as a result information exchange during high water situations improved significantly. In line with VIKING is the new project 'X-Regio veilig blijven werken'; this project stimulates businesses in the border region to prepare for flood events. Currently, new initiatives have come up in line with VIKING, in which Kreis Wesel and the safety region Noord en Oost Gelderland are important leading partners. The Arbeitsgruppe is only informally informed about this progress. Finally, collaboration in the Working Group is used for informal, bilateral coordination on issues that are required via EU Directives, such as the FD and WFD.

5. Discussion on the 18,000 m³ per second discharge level

For current Dutch flood management and for the decisions of the Delta Programme, calculations of the river discharges in extreme scenarios are of outmost importance. The general assumption of the Second Delta Committee is that Dutch society has to make preparations for a design discharge level of 18,000 m³ per second of the Rhine at the German border (Spijk/Lobith), to be reached in the year 2100, taking into account a changing climate. The main problem is that this is both a technical and political discussion. The study on 'transboundary impact of extreme floods at the Lower Rhine' (Lammersen, 2004) concluded that, in this current climate, extreme conditions could occur where river discharges of 18,700 m³ per second could develop in the Rhine catchment, not even considering dike overflows. Yet, it concluded, this was not likely to happen, because severe flooding will already have occurred in the Upper and Lower Rhine region, reducing these numbers to 15,500 m³ per second at Lobith. A study of the Delta Committee in 2008 on the effects of climate change on river discharges and the KNMI came to the conclusion that discharge levels of 17,000 to 22,000 m³ per second could be expected for the Rhine at Lobith in 2100, not taking into account upstream flooding. Based on both studies, it was concluded that,

while taking into account upstream flooding in Germany, no more than 18,000 m³ per second could reach the Dutch border at Lobith in 2100. This extreme Dutch design scenario is discussed with neighbouring countries in the ICPR and the Working Group. Overall, German actors involved in the *Arbeitsgruppe* think that this design discharge level is too high, since in their opinion a level of 18,000 could never reach the Netherlands, as dikes in the Upper and Middle Rhine region are not high enough to deal with this amount of water. In their view, this will not change in the near future, since no radical change in the German flood management approach is to be expected and, in addition, simply from a perspective of technical possibilities of raising the dikes (in some of the German regions), such a level is not possible. There are different studies investigating this issue. The Delta Programme Rivers seems to acknowledge this problem and proposes to formalize an expected maximum discharge level for the Rhine of 17,000 m³ per second in 2050 and a level of 18,000 m³ per second in 2100. After the predicted flood policy measures in Germany in the Rhine river basin (mainly the *Hochwasserschutzkonzept Nordrhein Westfalen*) in 2020 there is an expectation of 16,000– 17,500 m³ per second, but with additional emergency measures (sand bags) this could add up to 500 m³ per second extra, reaching 18,000 m³ per second. In short, there are differences in view points and expectations between Dutch and German experts regarding climate change effects and the proper discharge levels of the Rhine. In any case, it is of great concern for Dutch flood management which measures are taken – and when – in North Rhine-Westphalia, specifically near the Dutch border. At this moment it can be said that Germany is not planning to raise the levees, due to their risk perception and the physical impossibility of raising dikes in some regions. There is a risk that the dikes are ‘safe’ on the Dutch side of the border, while at the same time German dikes overflow and water runs behind the dikes into the lower parts of Dutch and German polders. According to a recent report of regional water authority Rijn and IJssel, inundation levels could be 2-4 metres of river water within the cross-border dike ring 48.

3.5 The Dutch-Flemish Bilateral Meuse Commission

This section describes cross-border cooperation at a bilateral level between the Netherlands and Flanders for the common shared part of the river Meuse (*grensmaas*), via the Dutch-Flemish Bilateral Meuse Commission (VNBM). The following word cloud gives a first impression of the commission’s work, after that a timeline is presented with some important moments in the VNBM’s history. A table presents the VNBM’s institutional, substance and state-of-the-art characteristics, and in sub-paragraphs at the end of this section some detailed information is given on specific subjects.



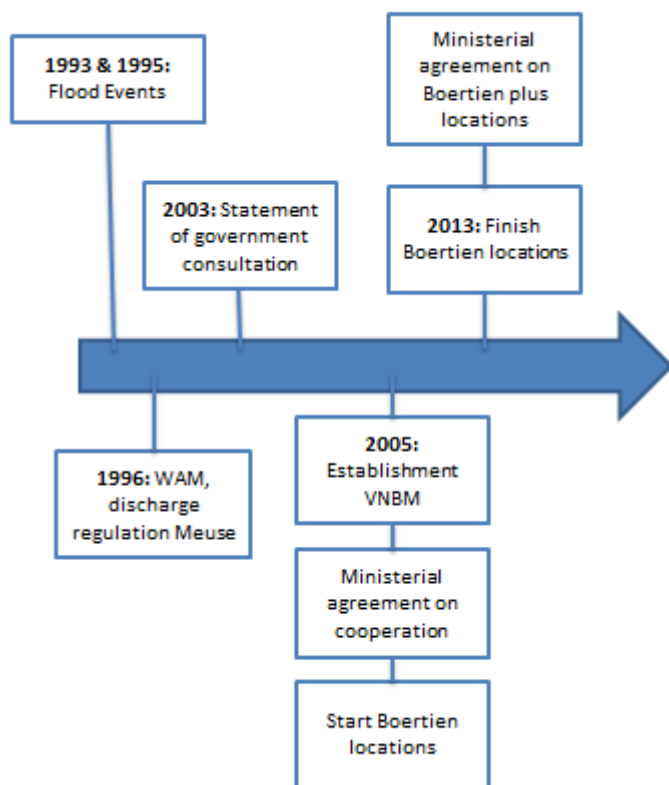


Figure 9 Historical overview collaboration VNBM

Institutional characteristics VNBM	
Genesis	Based on Article 4 of the Meuse discharge convention and a statement of government consultation in 2003 , Flemish and Dutch officials started the establishment of a bilateral and integrative cooperation platform . This resulted in the establishment of the Dutch-Flemish Bilateral Meuse Commission (VNBM) in 2005 after an official consultation concerning the issues in the Meuse border region. Initially, ministers from both parties signed an agreement for the joint execution of works for the shared Meuse river basin , characterizing the starting point for further co-operation. (paragraph 1)
Formal foundation	The VNBM started based on a ministerial agreement . However, most agreements are made at the regional level in the working groups and do not have a formal status at national level. (text box 1)
Commission's participants	For the Netherlands, representatives of the following organizations participate: <ul style="list-style-type: none"> - Ministry of Infrastructure and Environment - Rijkswaterstaat Zuid-Nederland - Province of Limburg - Water board Roer en Overmaas For Flanders, the following organizations are represented in the commission: <ul style="list-style-type: none"> - Department of Mobility and Public Works (e.g. shipping) - Department for Land and Soil protection, Subsoil and Natural Resources - Agency for Nature and Forestry - Internationaal Vlaanderen - Vlaamse Milieumaatschappij
Chair	Alternating chair for each of the commission's meetings: for the Netherlands this is a representative official from Rijkswaterstaat Zuid-Nederland and for Flanders an official from nv De Scheepvaart.
Meetings' frequency	This bilateral commission meets twice a year , alternately in Flanders and the Netherlands, similar to most working groups.
Working Groups	The VNBM consists of 14 working groups , addressing the following aspects: Contacts consultation, Regular official technical consultation, General management and policy dialogues, Water quality monitoring biology and chemistry , Wa-

<p>Participating actors in the working groups</p> <p>Purpose establishment</p>	<p>ter quality Water Framework Directive, Water quality chain management, Water quantity monitoring, Water quantity modelling, Water quantity flood forecasting, Sediment management, Recreation, Common operational management, Long-term management, Floods Directive.</p> <p>Regarding high water issues, the water quantity working groups with regard to monitoring, modelling and flood forecasting and the group concerned with the Flood Directive's implementation are the most important (paragraph 4).</p> <p>Dutch representatives in the working groups are:</p> <ul style="list-style-type: none"> - Regional office of Rijkswaterstaat (Zuid-Nederland) - Province of Limburg - Water board Roer en Overmaas - Water board Peel en Maasvallei - Watermaatschappij Limburg <p>Representatives in the working groups for Flanders are:</p> <ul style="list-style-type: none"> - Nv De Scheepvaart - Vlaamse Milieumaatschappij - Department Leefomgeving en Milieu - Flemish province of Limburg - Waterbouwkundig Laboratorium/Hydrologisch centrum - Agentschap voor Natuur en Bos <p>The VNBM is a bilateral and integral consultation forum for the higher, regional official level with the aim to improve the structure of Flemish-Dutch cooperation in the Meuse river basin. The VNBM's aim is to cooperate on and integrate all cross-border matters which concern the border Meuse region.</p>
Content characteristics VNBM	
<p>Main task</p>	<p>Concerned with all cross-border policy, maintenance and governance aspects in the Meuse river basin.</p>
<p>Main activities at this moment</p>	<ul style="list-style-type: none"> - Implementation of Boertien plus projects (paragraph 3) - Joint monitoring - Joint management of the Meuse river basin
<p>Themes addressed</p>	<p>By performing its main task, several aspects are covered since an integrative approach is applied, such as:</p> <ul style="list-style-type: none"> - Spatial planning - High water management (priority is often given to water quantity issues) - Water quality issues - Development and conservation of nature - Monitoring and research - Shipping - Legal affairs
<p>Significant outcomes</p>	<p>(paragraph 2)</p> <ul style="list-style-type: none"> - One of the flagships of this cooperation structure is the successful implementation of the common Meuse works for river widening and nature development in Flanders (Hochter Bamd, Herbricht and Kotem (<i>Vlaamse Boertienlocaties</i>)) that are financed by the Dutch government. For future years, more comparable projects at other locations are planned (<i>Boertien plus locaties</i>). (paragraph 3) - An integrated cross-border monitoring network (instead of individual water quality, quantity and ecology monitoring stations) - Mutual understanding - Information exchange - Application of similar data and research modeling and methods. - Operational cooperation: e.g. joint inspections, disaster and emergency

Applied principles	management <ul style="list-style-type: none"> - Cooperation as the main concept - Moving from Border Meuse towards Common Meuse (paragraph 1).
State of the art beginning 2014	
Aspiration	At this moment, the VNBM strives to reach common cross-border policies for the management of the shared Meuse region , with contributions from both the Flemish and Dutch regions. Currently, they are developing a shared vision for future management of the shared Meuse basin.
Current issues	At this moment, a shift is visible from operational measures towards management issues. The following issues are currently addressed in the VNBM: <ul style="list-style-type: none"> - River widening - Monitoring (quantity, quality, fish, ground water) - Maintenance - The development of a long-term, shared vision for the shared Meuse river basin concerning maintenance of nature, water safety, et cetera.
Future expectations	<ul style="list-style-type: none"> - Even though already addressed in the WAM (paragraph 2), low water issues could also play a bigger role in the future for the VNBM. - Managing the 45 km shared stretch of the Meuse will be a future ambition

Table 5 institutional, substantial and state-of-the-art characteristics of the VNBM

1. Rapidly increasing cooperation

Ten years ago, no structural collaboration existed on flood risks and changes in the Meuse river basin. After the federalization of Belgium by constitutional reform in 1993, responsibilities for water management and policies rest almost completely on the regions of Flanders, Brussels and Wallonia. Therefore, the Dutch cooperate separately and jointly together with Wallonia and Flanders (e.g. VNBM, Dutch-Walloon consultation, trilateral cooperation with Wallonia and Flanders and via the IMC). In 2005 the VNBM was established for collaboration in the shared Meuse river, particularly for the implementation and coordination of three common Meuse work projects in the Flemish region, financed by the Dutch government. This was a successful project and raised the awareness of parties involved that both could cooperate on other issues as well, such as monitoring and measurements networks and modelling. Before, both applied individual systems and methods in the same river area. For the establishment of works in the border Meuse region, the 'consortium Grensmaas' was established. Several reasons for this increase in cooperation could be distinguished, for instance that Rijkswaterstaat Zuid-Nederland is now more externally focused, there is more administrative attention and priority due to enthusiastic individuals, there is willingness for cooperation on both sides of the border, the lack of language barriers and the clearness of the necessity for cross-border cooperation. Also, the regional focus is stimulating cross-border cooperation. The significant increase in cross-border cooperation in this border region could be clearly described by the shift in conceiving of the Meuse as a 'border region' towards thinking of it as a 'common region' (*van Grensmaas naar Gemeenschappelijke Maas*). In both border regions the Meuse was seen as a clear border, which changed towards the discourse of a shared river. This discourse shift underlines the changing views of actors involved in the cooperation process. The aim of the shared Meuse is a regional joint approach without borders. This shift could happen in this region as the Meuse is indeed a shared border and thus cross-border cooperation in this area does not deal with upstream-downstream issues, dependencies et cetera, but leads to similar interests based on a shared geographical position.

2. An integrated approach and the missing aspect of low water

The VNBM presents itself as a bilateral and integrative consultation platform, because of the great variation in themes addressed. Yet, a missing topic is the issue of low water; nevertheless the Flemish and Dutch actors already cooperate on this issue. Before the VNBM's establishment, the *Werkgroep Afvoer Regulering Maas* (discharge regulation Meuse) (WAM) was established, based on a ministerial

agreement (Meuse discharge Treaty) signed in 1996. This working group was established during the time of the construction of channels in Flanders and the Netherlands to equally share water and to overcome droughts in the Meuse river basin and related problems for ecology, addressing all bilateral aspects of cooperation during times of low water. Issues addressed in recent years in this group are, for example, costs of pumping, the pump installation Albertkanaal, the execution of Environmental Assessments for low- and high-water situations, joint information systems and more. In comparison with other commissions and working groups, the WAM is an isolated group focusing on one aspect of water quantity issues in the Meuse basin.

3. VNBM's flagships

One of the flagships of the VNBM are the Boertien locations, which were recent river widening locations in Flanders and the Netherlands, where the works in Flanders were partly financed by the Netherlands (amounting to 5 million euros). An outcome is a reduction in water levels in the Netherlands and Flanders of a maximum of 30 centimetres in Eijsden, Maastricht, Borgharen, Itteren, Smeermaas, Herbricht and Kotem. In 2013 the Dutch and Flemish ministers signed a new agreement for a joint realization of additional Boertien-plus measures, reaffirming the joint management of a common Meuse. Again, the VNBM will coordinate those measures.

4. The VNBM's working groups

In the working groups of the VNBM, experts from the regional offices are represented. In this way there is more direct contact on topics between specialists, overcoming political and official barriers to cooperation. Conversely, members of the Commission are higher officials of the regional parties, such as officers and directors. Working groups discuss cooperation possibilities, work out shared ideas and present those to the Commission; the latter can then give permission to implement the ideas. Each half year, working groups must also present their progress to the commission. Alternatively, the commission can give assignments to the working groups. In this way, agreements are less formal in comparison with a river basin commission and regional experts are enthusiastic to start on projects, stimulating cooperation. With regard to water quantity issues, there are four relevant working groups within the VNBM cooperation structure, covering the aspects of monitoring, modelling, flood forecasting and the EU FD. All meet regularly, twice a year and consist mainly of regional experts. The main outcomes of the monitoring working group are the establishment of an efficient, common water quantity measurement network (e.g. the merging of two stations at Maaseik), and the establishment of a monitoring plan. This working group deals currently with issues like the forwarding and analysing of common data. As a result of the modelling working group, four parties work now together on modelling issues (Rijkswaterstaat WVL, Rijkswaterstaat Zuid-Nederland, Waterbouwkundig Laboratorium, nv De Scheepvaart). Common models like WAQUA and Simona 2D are applied for the common Meuse region, resulting in the fact that similar data is used for both countries' Flood Directive's maps. Cooperation in this group is seen as a successful example, for instance, the best practice of the Flood-Wise INTERREG project, and the group has been awarded the Gouden Globe-prijs by Rijkswaterstaat. The flood forecasting working group resulted in the outcome that both countries now apply similar flood forecasting approaches. Additionally, the working group established for the EU Floods Directive's implementation also deals with flood management issues. However,, this working group mainly coordinates the implementation of this Directive. An important outcome of this group is that the flood risk and hazard maps for the Meuse border region are jointly produced and thus identical

3.6 INTERREG projects: AMICE and Flood-Wise

One of the most influential European programmes to stimulate cross-border cooperation is European Territorial Cooperation, formerly known as and often still called INTERREG. INTERREG, deriving its name from Interregional Cooperation or International Regions, is a financial instrument of the European Regional Development Fund, which was introduced in the 1990s to support sustainable spatial and regional development projects. Until 2006, this instrument was made up of three strands: namely, interregional cooperation, cross-border cooperation, or

transnational cooperation. The 5th INTERREG Programme will start in the autumn of 2014, will end in 2020 and will focus on innovative and sustainable projects that create a stronger Europe. In general, INTERREG projects are a platform to establish partnerships across borders, they stimulate joint agreements across borders and are often the start of (operational) pilot projects, in which INTERREG provides a framework for cooperation. Of course, the co-financing of projects by Europe is also of significant importance. Those kinds of projects will only last for a few years, yet stimulate cooperation for a longer time because parties get to know each other, networks are established and mutual understanding between actors is created. After the completion of an INTERREG project, the network contacts often carry on in the form of information and knowledge exchange.

In this section, the INTERREG projects AMICE and Flood-Wise are described, which are chosen because of our research perspective. There are other examples of interesting INTERREG projects from this research perspective. The Dinkel Plan (1997-2001) set up floodplain restoration and conservation between Dutch and German actors to improve ecosystem quality and floodplain dynamics. IRMA (Rhine-Meuse Activities, 1997-2003) was an investment programme for flood protection. INTERREG Sustainable Development of Floodplains is another example; it started in 2003, aiming to reduce floods and encourage the development of sustainable floodplains for multifunctional use in times of climate change.



3.6.1 Flood-Wise

Institutional characteristics of Flood-Wise	
Genesis	Water managers spotted the implementation of the EU Floods Directive (FD) as an opportunity to establish and improve cross-border flood risk management . Flood-Wise started as a test project for the FD's implementation process.
Formal foundation	INTERREG IVC project, funded with 302 million euros from the EU.
Participants	Mostly regional actors from the following countries participated: <ul style="list-style-type: none"> - Germany (North Rhine Westphalia, Sachsen) - Netherlands - Poland - Hungary - Romania - Slovenia Also three non-EU countries participated: <ul style="list-style-type: none"> - Belarus - Ukraine - Croatia
Duration	2010-2012
River basins	<ul style="list-style-type: none"> - Meuse - Ruhr - Elbe - Bug - Somes - Sotla
Purpose of establishment	The project's objective was to improve cross-border flood risk management in Europe , based on lessons learned in six European river basins
Content characteristics of Flood-Wise	
Main task	Improve cross-border flood risk management in European river basins that cross na-

Main activities	<p>tional boundaries.</p> <ul style="list-style-type: none"> - Staff exchanges - Pilot projects - Intervision meetings - Transfer of experience and good practice - Joint approaches development
Themes addressed	<ul style="list-style-type: none"> - Flood risk management
Significant outcomes	<p>During Flood-Wise a vast body of information and products was created on:</p> <ul style="list-style-type: none"> - Joint flood risk assessments - Joint flood hazard maps and flood risks maps - Good practice - Recommendations to water managers at different levels
Applied principles	<ul style="list-style-type: none"> - solidarity
State of the art beginning 2014	
Conclusions	<p>The EU could help countries if the FD were to be supported by a catalogue of potential objectives and related measures, including experience and good practice.</p> <p>River basin commissions will lead to beneficial outcomes for the transboundary river basins. They could overcome one-sided measures, and provide opportunities to harmonize cost recovery, and for spatial planning, public participation and communication.</p> <p>Measures including spatial planning restrictions should be enforced.</p>
Today	<p>The official Flood-Wise project ended in 2012, but the network of actors remains. This project resulted in actors getting to know each other, mutual trust, et cetera. The FD's implementation is also strongly influenced by Flood-Wise, leading to more intensive and structured cooperation between the Netherlands and Germany.</p>
Next steps	<p>A Task Force Water Governance, the initiative of Euregio Meuse-Rhine, follows up the FLAPP and Flood-Wise programmes. This task force can be considered as a vehicle to bridge the present period and future new programmes for cross-border water management activities, which will be available in 2014. Objectives of this task force are to continue with existing partnerships, enhance the network, organize meetings on a regular basis, act as a catalyst for new cross-border project ideas and initiate new proposals and prepare applications for EU funding. This Task Force met for the third time in May 2014 in Brussels.</p>

Table 6 institutional, substantial and state-of-the-art characteristics of Flood-Wise

3.6.2 AMICE



Institutional characteristics of AMICE	
Genesis	A transnational project on the adaptation of the Meuse and its basin to the impact of floods and low water from climate change .
Formal foundation	European INTERREG IVB programme
Participants	Participants from more than 17 universities, institutes, local and national governments from France, Belgium, Germany and the Netherlands are involved. The IMC hosts the meetings and acts as an observer.
Duration	2009-2013
River basins	Meuse catchment
Purpose establishment	The main objectives of AMICE are: to define a common adaptation strategy for the impact of climate change on floods and drought; to realize a set of beneficial

	measures which are transferable to the whole Meuse basin; to strengthen and widen the partnership of stakeholders ; to involve society and public bodies through improved knowledge and a feeling of belonging to the Meuse basin; as well as to raise awareness with regard to the knowledge of flood and drought risks.
Content characteristics of AMICE	
Main task	The task of AMICE was to make sure that the Meuse would become a good example of a climate-proof river , but one that keeps its natural beauty.
Main activities	<ul style="list-style-type: none"> - Increasing knowledge base - Exchange of data, information, models, knowledge
Themes addressed	<ul style="list-style-type: none"> - Climate change - Water quantity issues (high and low water) - Awareness-raising
Significant outcomes	<p>AMICE clarified the possible consequences of climate change in the Meuse basin, for example that some regions will suffer from droughts, leading to impacts on drinking water supply and navigation, while other regions will also deal with flood risks. For instance, modelling systems are now linked to one model for the total river basin.</p> <p>Results of AMICE are not used in the Delta Programme.</p> <p>Another result is that actors now know each other and that mutual understanding has been created, stimulating future cooperation.</p>
State of the art beginning 2014	
Conclusions	As methodologies and approaches to study the effect of climate change on river basins were found to be rather different between the four countries, the main outcome has been the sharing and integration of those methods.
Today and the next steps	Due to AMICE, climate adaptation now plays an important role in the Meuse basin. This INTERREG project was linked to the IMC, via similar staff and because IMC members hosted AMICE meetings. AMICE's outcomes are building blocks for the IMC to develop an approach for dealing with climate change. After 18 months of discussions in the IMC, members decided to continue working in line with the AMICE results. It is still not clear just how this will be continued.

Table 7 institutional, substantial and state-of-the-art characteristics of AMICE

3.7 Other cooperation organizations

The previous factsheets described cooperation platforms that could be relevant for addressing high water issues across borders in the Rhine and Meuse river basin in the light of the Delta Programme Rivers. In addition, other (types of) organizations could affect cross-border cooperation in this region as well, even though they are less relevant from our research perspective and thus not described in detail. Those cross-border cooperation bodies are shortly illustrated in the following paragraphs.

1. EU legislation and cross-border water management

Cross-border cooperation in the Meuse and Rhine river basin is influenced by EU legislation. EU governance on water issues is mainly embodied in a few Directives, the Water Framework Directive (WFD) (focusing mainly on water quality issues and integrating former water Directives) and the Floods Directive (FD) (mainly addressing high water issues) being the most important. Before the establishment of those Directives, EU water legislation was somewhat of a patchwork. Those Directives, particularly the WFD, introduced the river basin management approach, stimulating cross-border cooperation and harmonisation in river basins. Also, the FD and its formalized solidarity principle stimulate cross-border cooperation between Member States for upstream and downstream water issues. The EU climate adaptation strategy of 2013 also influences transboundary water management.

2. European Water and Marine Directors Consultations (CIS)

The EU Water and Marine Directors of all 27 Member States meet informally every half year, being the highest level of informal cooperation within the EU, called the CIS (Common Implementation Strategy). Non-EU Water and Marine Directors (e.g. from Norway, Iceland, Liechtenstein, EFTA countries and candidate EU Member States), as well as representatives of the European Environment Agency, are also invited to those meetings. The chair and host of those meetings is the Member State holding the EU presidency, jointly with a representative of the European Commission. The CIS platform discusses the main water and marine environmental issues during those meetings, which are currently topics such as the implementation of the WFD, the FD, climate change, priority substances, the Marine Framework Directive, the Urban Wastewater Directive, the Nitrates Directive and the reports of the IPCC. For instance, the Water Directors jointly decide how European workgroups will deal with themes of the EU Directives. The EU Water and Marine Directors Consultations are supported by a strategic coordination group with a technical background, preparing documents for the meetings. Rijkswaterstaat and the Ministry of Infrastructure and Environment represent the Netherlands in this group. Several working groups below this strategic level discuss issues on a more detailed level, and these working groups again are supported by expert groups.

3. European Workgroup F

Another platform for discussing and coordinating high water issues that transcend national boundaries is Workgroup F of the European Commission, falling under the EU water directors meeting (Figure 10). This working group on floods was established as part of the Common Implementation Strategy to support the implementation of the FD, but also addresses the relationship between the FD and WFD and flood risk management information exchange in general. Thus, this group ensures international coordination with regard to the FD's implementation. Outcomes of this group are the reporting sheets for the FD's implementation, a handbook on good practice for flood mapping in Europe, and a CIS guidance document on river basin management in a changing climate. This working group and its members also organized several workshops, addressing themes such as flash floods and pluvial flood management, flood risk management plans, and stakeholder involvement in flood risk management. However, the main contribution of this working group is facilitation of the dialogue between Member States, enhancing knowledge exchange, increasing network contacts and the sharing of best practice.

4. Dutch-Flemish Integrated Water Consultations

The '*Nederlands-Vlaams Integraal Wateroverleg*' (NVIWO) was founded on 16 January 1997. In contrast to the VNBM, this cooperation structure covers the whole border region of Flanders and the Netherlands, including the Scheldt basin, although focuses particularly on regional rivers. The aim of the NVIWO is to jointly implement European legislation, specifically the WFD and to develop and realize joint action programmes, policy aims and cooperation projects. Delegations of all stakeholders for water management from both border regions join the NVIWO and meet twice a year. Both the presidency and secretariat rotate between the Netherlands and Flanders. The NVIWO also coordinates and gives advice to four transboundary river basin committees, the sub-committees of the IMC and the International Commission for Protection of the Scheldt. Other cooperation structures in this bilateral border region are the *Vlaams-Nederlandse Stroomgebiedscomités*, *Internationaal Minder Hinder Overleg* and *Samenwerking Meetdiensten*.

5. Bilateral consultation with Wallonia

A bilateral consultation on policies between the Netherlands and Wallonia was the only structural and formal collaboration between both border regions. In mid-2013 the Dutch national government (DGRW) laid down the leadership role, leading to a standstill in this consultation. Nonetheless, there is still an agreement between both regions with regard to mutual support during times of high water (*Samenwerking meetdiensten*), meeting twice a year.

6. Trilateral consultation in the Meuse catchment

Three trilateral collaboration organizations exist between the Netherlands, Flanders and Wallonia. For example, the *Tripartiete Overleg* is concerned with operational coordination and information exchange regarding shipping issues and water quantity problems related to navigation. Rijkswaterstaat, nv De Scheepvaart and Service Public de Wallonia started this regular and permanent collaboration structure in 2006 and it meets twice a year. Previous meetings have mainly concerned major works in the Meuse basin, obstacles for navigation, the fourth sluice at Ternaaien, and water partition issues. In 2013 there were no meetings due to Rijkswaterstaat's reorganization.

Trilateral meetings focusing on the issue of hydrology also exist. For this issue, Rijkswaterstaat, nv De Scheepvaart, Waterbouwkundig Laboratorium/Hydrologisch Centrum and Service Public de Wallonia meet four times a year. Collaboration in this group concentrates on flood forecasting, hydrologic measurements and bathymetry. In addition, trilateral cooperation has taken place on the issue of operational drainage since 2011.

7. Bilateral consultation with France

The Netherlands and France exchange high water data, as well as knowledge on dealing with flood issues. This cooperation mainly takes place between Rijkswaterstaat (Zuid-Nederland) and DREAL (Directions Régionales de l'Environnement, de l'Aménagement et du Logement), the latter is the regional authority for the Environment, Planning and Housing. An important outcome of this bilateral cooperation was a workshop on flood forecasting, organized by the Netherlands. At this workshop the French were interested in Dutch modelling systems, while the Dutch were more interested in French actual flood data.

8. Grensoverschrijdend Platform voor Regionaal Waterbeheer (GPRW)

As mentioned in factsheet 2.3, the GPRW is one of the actors for cross-border cooperation in the Rhine Delta East region based on an agreement of intent signed by regional actors' officials on 23 September 2011. However, cooperation in this organization could be seen more as an informal network. This platform was established to stimulate the implementation and realization of plans formulated in the AGDR/SGDR (*Arbeitsgruppe and Steuerungsgruppe Deltarhein*), in particular the WFD's and FD's implementation, and could be seen as a third step of cooperation progress in this region. First, the sub-commissions of the PGC stimulated information exchange between parties in this border region, later on the AGDR/SGDR stimulated the coordination of plans and strategies and currently, the GPRW focuses on the realization of measures and plans as well as cooperation in joint projects. The last two organizations cooperate intensively, via information exchange, and because the GPRW's coordination office (*Duits-Nederlands Coördinatiebureau Rijndelta-Oost* established for the period 2012-2015) also performs tasks for the AGDR/SGDR. In addition, the same individuals participate in both organizations and they share three common working groups. Thus, the GPRW focuses on similar themes. It also addresses the preparation for a possible INTERREG V project. The purpose of the GPRW is to ensure clean water in cross-border water systems, to guarantee water safety for the Dutch and German regional fluvial systems, to address climate adaptation and to work on transboundary spatial development in the surroundings of the water systems. The GPRW is a platform for regional actors, specifically the German municipalities *Grafschaft Bentheim* and *Borken* and the Dutch water boards *Rijn en IJssel* and *Vechtstromen*. Some important results from this platform are the substantive discussions between experts on mostly operational topics and measures on both sides of the border, particularly concerning measures for fish migration, monitoring and high water situations. Specific project examples of transboundary cooperation in the Rhine Delta East are the transboundary Vechtvision (*grensoverschrijdende Vechtvisie*), the development strategy Dinkel, a German-Dutch rain radar for water managers, the Schlingeproject for water managers and farmers concerning nutrients and the transboundary flood forecasting system FEWS Vecht. Besides the tasks described above, the GPRW also organizes annual conferences for a wider audience with a specific joint theme, such as high water in 2013 and fish migration in 2014. The main topics for discussion in this platform are currently the themes of droughts, low water, climate change and adaptation.

9. ENCORE (Environmental Conference of the Regions of Europe)

All European Environment Ministers also cooperate across borders with regard to environmental and sustainable development issues, in a political platform called ENCORE. The founding document of ENCORE is the Valencia Charter, signed by the participating ENCORE Members. This platform aims to contribute to effective implementation of EU environmental policy, improve environmental governance and foster sustainable development in the regions of Europe. ENCORE organizes conferences every two years at a high political level.

4. Reflections and concluding remarks

Hydrological interdependencies

The first stage of this research project clarified the interdependencies between the Netherlands and its neighbouring countries, focusing on issues of water management and flood safety. It has become clear that the discharge levels of the Rhine and Meuse will in part depend on measures taken upstream, such as retention measures or the raising of dikes. In general, upstream measures could positively as well as negatively influence downstream areas, and could affect both high and low water levels. In addition, upstream dike failures may potentially cause downstream flood problems; in the case of the overflowing of dikes upstream, this might lead to reduced water levels between dikes, but might also lead to unexpected flood problems elsewhere (behind the dikes). Conversely, Dutch flood risk management could affect upstream regions up to 40 km from the Dutch border. This underlines the need for cross-border coordination and cooperation when dealing with flood risks and water safety in the Netherlands.

Multilateral forums

This study described the existing cross-border organizations dealing with water management issues at various governmental levels. We mainly looked at multilateral and bilateral institutions. At the multilateral governmental level the International Commission on the Protection of the Rhine (ICPR) and International Meuse Commission (IMC) are the most important. The ICPR currently focuses on a broad range of themes, such as flood risk management, the improvement of the ecological and chemical quality, climate change and adaptation in the Rhine basin. The IMC deals mainly with water quantity and quality issues, but has recently started discussing climate change and adaptation in the Meuse basin as well. For both international river commissions, as well as for most bilateral collaboration platforms, the implementation of EU Directives on water quantity and quality aspects are currently a focal point, since the first planning cycle of the Floods Directive and the second of the Water Framework Directive are required to be completed in 2015.

Bilateral forums

At a bilateral level in the Rhine basin, the Permanent Border Waters Commission (PBWC) and the Dutch-German Working Group on High Water are most relevant, the former focusing on both water quantity and quality related topics, the latter on high water issues in particular. Both deal with regional collaboration regarding the implementation of EU Water Directives. As new collaboration structures have been established for discussing the implementation of the WFD and FD, the PBWC and its sub-commissions have been less active in recent years, and some are even dormant. The Working Group was also less active in recent years for various reasons. The Flemish-Dutch Bilateral Meuse Commission (VNBM) is the most significant and relatively active bilateral body in the Meuse basin, mainly discussing operational measures with regard to water quantity and quality issues, monitoring and maintenance. Other bodies, INTERREG and ad hoc projects were also involved in transboundary governance on flood issues in the Meuse and Rhine basins. A difference between these catchments is that a longer tradition of cooperation exists in the Rhine basin and also that the substantive scope of cooperation in the Rhine basin is broader, including a variety of river basin management issues (floods, ecology, water quality) and adaptation to climate change. In the Meuse basin, bilateral cooperation with the Flemish region is particularly well developed and the scope of cooperation too has broadened considerably.

Redundancy and timing

Our inventory of forums for transboundary cooperation shows that many forums exist, covering a broad range of actors, governmental levels, issues and themes. The authors focused on transboundary governance for flood and water safety, even though the outcomes made it clear that cross-border cooperation is not restricted to high water issues. There is no lack of structures and no need to establish new structures for international communication and coordination on the Delta Programme's strategies. Looking at the various themes that are currently being addressed in the different forums, there is even some overlap (redundancy). Although this may be perceived as inefficient, such redundancy may also serve a purpose. If there are emerging conflicts within one forum, interactions in other (for example more regional) forums may continue. This might well increase the adaptive capacity of river basin management. Furthermore, this gives the Delta Programme Rivers several opportunities to connect with transboundary governance. Even though there are quite a number of international forums and ample opportunities for discussing international issues, cooperation may be hampered by ambiguities with regard to the responsibilities for transboundary governance. Dutch regional water managers tend to see cross-border cooperation as a national responsibility. Hence, regional vulnerabilities may be addressed insufficiently and could fall between two stools.

Before entering the international field, the national objectives for seeking cooperation should be quite obvious to the actors involved, as well as the aims of international partners. This relates to the complex dilemma of the timing of collaboration. Timely coordination is necessary, since water management policies, objectives and strategies should not be fixed before these are discussed with foreign partners, but cooperation too early in a process, when parties do not yet know what they want to achieve, may hamper cooperation as well. An example of a problem with timing is that Flanders is a few steps ahead with the Water Framework Directive's implementation process in comparison with the Netherlands, leading to policy coordination problems.

Managing diversity

Besides the possible differences in interests for cooperation, variations in organizational structure, (policy) culture, available resources and capacities between states and regions should be taken into consideration. For instance, some partners in the Meuse basin with relatively low capacities and resources are not looking forward to a plethora of Dutch requests. Good leadership could overcome those difficulties and boost cooperation. Possible leaders can be both national and regional actors that have a considerable interest in cross-border cooperation, or independent actors from the existing transboundary organizations. Their main task is to build networks and trust, to respect differences and to search for win-win situations and joint possibilities for action.

Problem scale and subsidiarity

The plurality of forums at different governmental levels offers the opportunity to deal with specific themes of water management at the most appropriate, effective and efficient level. Substantial aspects of water management could best be addressed by applying the subsidiarity principle, meaning that the level of action and intervention should be determined based on the most relevant area of competence. An example is that water management approaches and measures could affect high water and water safety both on a regional and river basin scale and therefore should be dealt with at the bilateral, trilateral, as well as a multi-lateral government-

tal level. This study showed that the high water aspect of water management has been very well covered in various cross-border cooperation bodies since the high water incidents in the mid-1990s. Other examples are that shipping, (most) water quality and temperature issues could best be dealt with on a river basin scale (multilateral governmental level), while issues such as nature development and conservation, regional and lateral inflows and agriculture could benefit more from a regional and local approach, thus via (regional) bilateral transboundary governance. For the realization of the Delta Programme Rivers' strategies, it is important to determine, for each aspect or type of measure, whether cross-border cooperation could be beneficial, and if so, what is the relevant scale (including the European) and which already existing transboundary forum would be most suitable and adequate. The variety of existing cross-border forums at different levels seem to be sufficient to sort out problems raised by the Delta Programme on the international agenda.

Multi-level governance

One of the success factors of the Delta Programme is the smart organization of cooperation between the national and regional government agencies concerned with water management issues. Continual tuning between public organizations and a unique combination of top-down and bottom-up planning processes seem successful in addressing complex water issues. As international forums exist at both the national and the regional level, cooperation between the national level and the regions which has developed within the context of the Delta Programme could also be extended to the international level. The national and regional international strategies for issues such as high water and flood management need to be arranged to provide opportunities for shifting between levels. As often the same staff members are involved in the different forums, informal coordination between the various international projects and activities already takes place to some extent.

A good example of multi-level governance was the Dutch-German Working Group on High Water, as both national and regional organizations were collaborating in this platform. After a few years of diminished activity, the working group has become active again and will organize a symposium on 30 October 2014. When it comes to regionally relevant cross-border flood management, such as the coordination of national standards and different water management approaches within the joint dike ring 48, the Delta Programme could benefit from the experience and expertise of the Dutch-German Working Group on High Water; it seems obvious to use this forum to discuss these issues with North Rhine-Westphalia.

Exchange of expertise

Transboundary governance on water management enables a learning process between countries via the exchange of expertise, data and other types of knowledge. For example, countries could learn lessons from aspects of the Dutch Delta Programme, as the Netherlands are the first country applying such an approach. Unique for this kind of management is the long-term perspective taken on climate change and adaptation, the application of adaptive delta management for dealing with uncertainties, effective internal cooperation between public organizations and the combination of challenges. Then again, the follow-up process of the Delta Programme and Dutch water management in general could be improved by lessons learned from other states' approaches. For instance, the Meuse valley is a unique area in the Netherlands, while other countries have more experience with the application of water management in valley regions.

A broadening substantive scope of cooperation

Based on history, problem visibility, awareness and urgency, cooperation across borders mainly focuses on high water issues, flood risk management and water quality problems. Themes such as the consequences of climate change, climate adaptation, fresh water supply, drought and the distribution of water are relatively new topics on the international agenda. For most analysed cross-border cooperation structures, the newer topics have become more relevant and are currently discussed at the international level. Most organizations are broadening their focus and vision for the future. It is expected that the importance of these new themes, in the light of a changing climate, will increase in the future. Integration of these themes will become a challenge in the future for transboundary governance, for instance a connection between measures to address low and high water is missing, even though both are associated water quantity issues.

The role of EU legislation

This broadening substantive scope is stimulated by the European climate adaptation strategy of 2013, addressing integrated climate adaptation for the whole European community. This strategy focuses also on the importance of border regions and cross-border cooperation in the light of a changing climate. Other EU legislation also tends to stimulate transboundary governance, such as the EU Floods Directive and Water Framework Directive. Those Directives formally institutionalize collaboration, ensure a performance obligation and thus stimulate cooperation across borders. At this moment, most of the international forums studied are very concerned with the implementation of those Directives.

Regional vulnerabilities

A topic which has received little attention as yet is the potential cross-border impact of floods near the border and other regional vulnerabilities, stressing the need for collaboration in the cross-border joint dike rings (e.g. numbers 42 and 48 on the Dutch-German border), the continuation of bilateral crisis management and awareness of the need for long-term measures. Recently, the urgency of flood risk management within dike ring 48 for the national interest was stressed again by regional water authority Rijn en IJssel, as well as the need for more cross-border cooperation within this region. Their report on this topic gained the attention of the Dutch media. Furthermore, the new safety standards for the Netherlands, which are mentioned in the Delta Programme, and will enter into force in 2017, need to be in tune with the policies of water managers on the other side of the border.

Concluding remarks

In conclusion, there are many forums for international cooperation. Although the scope of issues being addressed within these forums is mostly broader than the Delta Programme's sharp focus on flood issues, these existing collaboration forums offer ample opportunities for discussing the preferred Delta strategies with international parties. The appropriateness of a cross-border forum depends on the scale of the specific water (safety) issue at stake. The development of a strategy for discussing the preferred strategy with international partners could best be developed in the spirit of the approach taken in the Delta Programme, which is to say in close cooperation between both national government and the regions. This should be helpful in coordinating efforts and discussions within the various international forums. This multi-scaling, across borders, contributes to both the most appropriate and efficient flood risk management approach and towards integrated and comprehensive adaptation strategies

References

- Adamczak K. and Nijland H. (2007). European approaches towards integrated flood alleviation measures: the Interreg water network, International Symposium on New Directions in Urban Water Management, 12-14 September 2007, UNESCO Paris
- AMICE (2014). AMICE: Climate changing? Meuse Adapting!, [online] website consulted on 30-04-2014, <http://www.amice-project.eu/nl/context.php?page=interreg_program>
- Arbeitsgruppe Hochwasser (2007). Gemeenschappelijke verklaring: Gemeinsame Erklärung, February 8th 2007
- Arbeitsgruppe Hochwasser (2013). Gemeenschappelijke verklaring over de samenwerking op het gebied van duurzame bescherming tegen hoogwater tussen de provincie Gelderland, het Ministerie van Infrastructuur en Milieu van Nederland en het Ministerie van Klimaatbescherming, Milieu, Natuurbescherming, Landbouw en Consumentenbescherming van Nordrhein-Westfalen voor de periode 2012, 2017, 2013
- Becker G. (2009). Germany: transitions in flood management in the Rhine basin, in: Huitema D. and Meijerink S. (2009), Water Policy Entrepreneurs: a research comparison to water transitions around the globe, Edward Elgar Publishing Limited, IWA Publishing London
- Becker G. and Raadgever T. (2006). Interview report: Dutch-German 'Arbeitsgruppe Hochwasser': long term flood management in the Lower Rhine regions, BSIK ACER Project, July 2006
- Becker G., Aerts J. and Huitema D. (2013). Influence of flood risk perception and other factors on risk reducing behavior: a survey of municipalities along the Rhine, Journal of Flood Risk Management.
- Benelux (2014). Samenwerking langs de buitengrenzen van de Benelux, [online] website bezocht op 17-3-2014, <http://www.benelux.int/nl/almanak/07-03-04_almanak.asp>
- Benthelem M. (2013). Interview with Mathias Benthelem, Emschergenossenschaft and Lippeverband, 10-10-2013, Essen.
- Van Berkel W. (2013). Interview with William van Berkel; ministry I&M, Den Haag, 29-01-2013
- Bernauer T. (2002). Explaining success and failure in international river management, Aquatic Science 64 (1), pp.1-19.
- Bernauer T. and Moser P. (1996). Reducing Pollution of the River Rhine: the influence of international cooperation, The Journal of Environment Development 5, p. 389.
- Boessenkool E. (2009). Internationale milieureggeving met betrekking tot zoet water; Lexplicatie, de complete wetgeving toegelicht, Kluwer, Deventer
- Brättemark M. (2013). Interview with Maria Brättemark; EU implementation Floods Directive, 07-01-2013
- Broseliske G. and Buiteveld H. (2014). Interview with Gerard Broseliske and Hendrik Buiteveld, Rijkswaterstaat, 11-04-2014, Lelystad.
- Bubeck P., te Linde A., Dekkers J. and Ward P. (2010). Flood risk developments and adaptation strategies in the Rhine-Meuse delta, in: Kabat P and Vellinga P., Abstracts Scientific Programme Deltas in Depth, International conference Rotterdam, the Netherlands 29 September-1 October 2010.
- Buiteveld H. (2013). Interview with Hendrik Buiteveld: Rijkswaterstaat, Telephone interview 4-10-2013
- Buiteveld H. (2014). E-mailcontact with Hendrik Buiteveld, Rijkswaterstaat, 15-04-2014.
- Busschüter E. (2013). Interview with Erik Busschüter, Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur und Verbraucherschutz des Landes Nordrhein-Westfalen, 17-10-2013, Düsseldorf.
- Busschüter E. (2014). Telephone interview with Erik Busschüter, Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur und Verbraucherschutz des Landes Nordrhein-Westfalen, 02-04-2014

Castenmiller E. (2013). Telephone interview with Eric Castenmiller, Province of Limburg, 21-10-2013.

CHR (2014). General information, [online] website consulted on 17-04-2014, < <http://www.chr-khr.org/en/general>>

Cyprus presidency of the Council of the European Union (2014). Informal meeting of EU Water and Marine Directors, [online] website consulted on 20-03-2014, <http://www.cy2012.eu/en/events/informal-meeting-of-eu-water--marine-directors>

Dekker B. (2011). Interview transcript from Ismael Moralis.

Dekker B. (2013a). Interview with Bob Dekker; ministry I&M, 21-02-2013, Den Haag

Dekker B. (2013b). Interview with Bob Dekker, Former EU Water Director Ministry I&M, 07-10-2013, The Hague.

Dekker B. (2013bc). E-mailcontact: aanvullende vragen onderzoek, 29-11-2013

Deltaprogramma (2013). Werk aan de Delta: Deltaprogramma 2013; de weg naar de deltabeslissingen, Uitgave van het Ministerie van Infrastructuur en Milieu en het Ministerie van Economische Zaken, Landbouw en Innovatie.

Deltares (2008). Rek in het Rivierengebied, brochure.

Deltares (2010). Sustainable water management under climate change: how to develop strategies for an uncertain future, [online] website consulted on 29-04-2014, <www.deltares.nl/xmlpages/tan/files?p_file_id=14140>

Deltares (2014). Rhine too warm for fish, [online] website consulted on 15-04-2014, <<http://www.deltares.nl/en/news/news-item/item/16521/rhine-too-warm-for-fish>>

Dieperink C. (1998). From the open sewer to salmon run: lessons from the Rhine water quality regime, Water policy (1), page 471-485

Directive 2000/60/EC (2000). Water Framework Directive: establishing a framework for community action in the field of water policy, European parliament and council, 23-10-2000

Directive 2007/60/EC (2007). Flood Directive: on the assessment and management of flood risks, European parliament and council, October 23 2007

DP Rivieren, 2010. Deltaprogramma Rivieren: voor een veilig en aantrekkelijk rivierengebied, noodzaak Deltaprogramma Rivieren, Fasering Deltaprogramma Rivieren, Betekenis Deltabeslissingen voor Rivierengebied, Beoogde producten, Vandaag Beginnen!, November 2010

DP Rivieren (2013a). Deltaprogramma Rivieren: contouren voor de voorkeursstrategie Rivieren, Discussiestuk voor de consultatie, 9 December 2013

DP Rivieren (2013b). Deltaprogramma Rivieren: rivieren verbinden regio's, programmabureau van Deltaprogramma Rivieren, september 2013

R. Durth (1996), Grenzüberschreitende Umweltprobleme und regionale integration: zur politischen oekonomie von oberlauf-unterlauf-problemen an internationalen flüssen, Nomos Verlag, Baden-Baden.

Les Dreal (2014). Directions régionales de l'environnement, de l'aménagement et du logement, [online] website consulted on 30-04-2014, <<http://www.developpement-durable.gouv.fr/Liste-des-21-DREAL>>

de Eems (2013). Organisatie, [online] website bezocht op 5-11-2013, <<http://www.emseems.nl/organisation/>>

Van Eerd M.C.J., C. Dieperink, M. Wiering (2013a). Understanding transboundary governance of climate adaptation: enabling and constraining characteristics of the policy arrangements of the Netherlands and North Rhine-Westphalia for cross border cooperation on climate adaptation, Deliverable 5.2.2 Knowledge for Climate, August 2013.

Van Eerd M.C.J., C. Dieperink, M. Wiering (2013b). The solidarity principle in transboundary flood risk governance? The implications of the Floods Directive for cooperation between the Netherlands and North Rhine-Westphalia, Deliverable 5.2.3 Knowledge for Climate, November 2013

Van Eerd M.C.J., C. Dieperink and M. Wiering (2014). Exploring the prospects for cross-border climate change adaptation between North Rhine-Westphalia and the Netherlands, *Utrecht Law Review* 10(2), pp. 91-106.

Egli T. (2002). Non structural flood plain management: measures and their effectiveness, ICPR

ENCORE (2014). Flyer ENCORE, [online] website consulted on 30-04-2014, <http://www.encore.bayern.de/about_encore/doc/flyerencore_final.pdf>

Europa Nu (2014). Informal meeting of EU water and marine directors, [online] website consulted on 20-03-2014, http://www.europa-nu.nl/id/vjbtao343mns/agenda/informal_meeting_of_eu_water_and_marine?ctx=vg9pir5eze8o&s0e=vifdl6zl7txx

European Commission (2014a). Implementing of the Floods Directive, [online] website consulted 20-03-2014, http://ec.europa.eu/environment/water/flood_risk/implem.htm

European Commission (2014b). An European Action Programme on Flood Risk Management, [online] website consulted on 20-03-2014, http://ec.europa.eu/environment/water/flood_risk/3_compo.htm

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (2014). 50 years of cooperation on water protection: Permanent German-Dutch Boundary Water Commission celebrates anniversary, [online] website consulted on 18-3-2014, <http://www.bmub.bund.de/en/bmub/press-and-speeches/press-releases/detailansicht-en/artikel/50-jahre-zusammenarbeit-fuer-den-gewaesserschutz/>

Feld C. and Locker-Grütjen O. (2007). River restoration in the IJssel catchment, in: Verwijmeren J. and Wiering M. (Eds). Many rivers to cross: cross border co-operation in river management, Eburon Delft

Flood-Wise (2012a). Towards cross border flood risk management: results of Flood-Wise: cooperation in six European border rivers

Flood-Wise (2012b). Onderzoek basisinformatie voor het opstellen van een ORBP beneden-Roer (tot aan de monding in de Maas), in het kader van het project FLOOD-WISE, Wasserverband Eifel-Rur and Waterschap Roer en Overmaas, June 2012

Flood-Wise (2013a). Website home, [online] consulted on 30-10-2013, <www.floodwise.eu>

Flood-Wise (2013b). Flood-Wise: sharing, learning and cooperating: three year interaction and pilot actions in six cross-border-river basins, working on sustainable flood risk assessment, mapping and management, Brochure, [online] website consulted on 14-11-2013, < http://floodwise.nl/wp-content/uploads/FloodWise_folder_A5_3luik.pdf>

Frijters I.D. and Leentvaar J. (2013). Rhine case study, Water Management Inspectorate, Ministry of Transport, Public Works and Water Management, the Netherlands, [online] consulted on 24-22-2013, < http://webworld.unesco.org/water/wwap/pccp/cd/pdf/case_studies/rhine2.pdf>

Gelders Archief (2014). Provinciale Waterstaat, [online] website bezocht op 17-3-2014, <http://www.geldersarchief.nl/zoeken/?mivast=37&mizig=210&miadt=37&miaet=1&micode=3059&minr=13315489&miview=inv2>

Van der Giessen M. D. (2014). Coping with complexity. Cross-border cooperation between the Netherlands and Germany, dissertation 14 maart 2014, Radboud University Nijmegen.

Gilissen H.K. (2009). Internationale en regionale grensoverschrijdende samenwerking in het waterbeheer, Sdu Uitgevers Den Haag.

Gilissen H.K. (2010). Naar (in)formele samenwerkingsstructuren: uitdagingen in het regionale grensoverschrijdende waterbeheer, Essay.

K. Görgen, J. Beersma, G. Brahmer, H. Buiteveld, M. Carambia, O. De Keizer, P. Krahe, E. Nilson, R. Lammersen, C. Perrin and D. Volking (2010). Assessment of Climate Change Impacts on discharge in the Rhine river basin: results of the RheinBlick2050 Project, International Commission for the Hydrology of the Rhine Basin (CHR), 2010.

Goudriaan J. (2013). Telephone interview with Jaap Goudriaan, province of Limburg, 17-10-2013

GPRW (2014). Grensoverschrijdend Platform voor Regionale Wateren, [online] website consulted on 30-04-2014, <<http://www.gprw.eu/nl/>>

M. Haasnoot, H. Duel, G.E.M. van der Lee, M.J. Bapist, D.T. van der Molen & M. Platteeuw (2004). Impact of climate change and anticipating flood management strategy on floodplain ecosystems of the River Rhine the Netherlands, D.G. Jalón Lastra & M.P. Vizcaino (Eds), Aquatic habitats: analysis and restoration.

De Hartog H. (2014). Telephone interview with Henk de Hartog, province of Gelderland, 02-04-2014

Hazenoot E. (2014). Telephone interview with Evert Hazenoot, water board Rivierenland, 08-04-2014

Heijens F. (2013). Telephone interview with Frank Heijens, Waterboard Roer en Overmaas, 17-10-2013

Hoppenbrouwers N. (2011). Interview with Nathalie Hoppenbrouwers: province of Gelderland, by Ismael Moralis, Radboud University Nijmegen

Houghton J. (2009). Global warming: the complete briefing, Fourth edition, Cambridge University Press

Huisman P., de Jong J. and Wieriks J.P. (2000). Transboundary cooperation in shared river basins: experiences from the Rhine, Meuse and North Sea, Water Policy 2 (1-2), page 83-97

ICPR (2001). Atlas 2001, CD-rom

ICPR (2007a). International Commission for Protection of the Rhine, Brochure, October 2007

ICPR (2007b). Rijnministerconferentie: de Rijn leeft en verbindt: een stroomgebied als gemeenschappelijke uitdaging, Bonn, 18 Oktober 2007

ICPR (2010). Leve de Rijn! 60 jaar ICPR, Brochure

ICPR (2012). Actieplan hoogwater 1995-2010: overzicht actiedoelen, uitvoering en samenvatting van de resultaten: beknopte balans, Report 200

ICPR (2013a). Website International Commission for Protection of the Rhine, [online] consulted on 29-10-2013, <<http://www.iksr.org/index.php?id=58&L=3&cHash=455fdab52ce6eafb6f72632159564bf>>

ICPR (2013b). Report on the determination of potential significant flood risk areas in the international river basin district Rhine, ICPR FD-1st report, [online] website consulted on 14-11-2013, <http://www.iksr.org/fileadmin/user_upload/Dokumente_en/Reports/FD-1st_report_01.pdf>

ICPR (2014). NGO Non-Governmental organisations with an observer status to the ICPR, [online] website consulted on 28-04-2014 <<http://www.iksr.org/index.php?id=121&L=3&cHash=455fdab52ce6eafb6f72632159564bf>>

Integraal Waterbeleid Maasbekken (2012). Nieuws uit het Maasbekken, Nr. 4, september 2012

Internationale Maascommissie (1998). Actieplan Hoogwater Maas, Namur, 8 april 1998.

Internationale Maascommissie (2005). 2^e Fase Actieprogramma Maas: hoogwater, 18 March 2005.

Internationale Maascommissie (2007). Internationaal stroomgebieddistrict Maas: rapport over de coördinatie van de toestand- en trendmonitoringprogramma's in het internationaal stroomgebieddistrict Maas, Luik, 16 maart 2007.

Internationale Maascommissie (2009). Jaarverslag 2009: Internationale Maascommissie, rapport.

Internationale Maascommissie (2012). Jaarverslag 2012: Internationale Maascommissie, brochure, November 2013.

Internationale Maascommissie (IMC) (2013). Rapport over de uitwisseling van informatie voorafgaand aan de opstelling van overstromingsgevaarkaarten en overstromingsrisicokaarten in het internationaal stroomgebiedsdistrict Maas, 22 December 2013, [online] website consulted on 21-03-2014, http://www.cipm-icbm.be/files/files/DRI/rapport_art_6_n.pdf

Internationale Maascommissie (2014a). De Internationale Maascommissie, [online] last visited on 12-3-2014, <http://www.cipm-icbm.be/page.asp?id=35&langue=NL>

Internationale Maascommissie (2014b). [online] website consulted on 29-04-2013, <http://www.cipm-icbm.be/tempFiles/687604072_0.5606195/1333_CIM_COMPO_PDF.pdf>

INTERREG Deutschland Nederland (2014). Grensregio's bouwen aan Europa, [online] website consulted on 30-04-2014, <<https://www.deutschland-nederland.eu/home/>>

IPCC (2007). Climate change 2007: synthesis report, fourth assessment report: intergovernmental panel on climate change.

Jansen M. (2011). Interview from Ismael Moralis with Marjon Jansen: DPR riviertak manager IJssel, Nederrhein en Lek/RWS-Oost, 11-10-2011

Jekel H. (2013). Telephone interview with Heide Jekel, Federal Ministry for Environment, Nature Conservation and Nuclear Safety, 18-10-2013

Kabat P. and Van Schaik H. (2003). Climate changes the water rules: How water managers can cope with today's climate variability and tomorrow's climate change, The Netherlands

Kämper M., Näslund-Landenmark B. and Adamson M. (2013). Draft report of the WG F Climate Change Adaptation workshop, WG F Climate Change adaptation workshop 16-10-2012

KARMA (2014). Projectschets KARMA (Klimaat Adaptatie Regio Rijn en Maas).

Van Kempen J.J.H. (2012). Europees Waterbeheer: Eerlijk zullen we alles delen? Een juridische analyse van de Europese stroomgebiedbenadering in het licht van de grensoverschrijdende verontreiniging van water tussen lidstaten, Proefschrift, Utrecht University, Boom Juridische Uitgevers

van der Keur P., Henriksen H.J., Refsgaard J.C., Brugnach M., Pahl-Wostl C., Dewulf A. and Buiteveld H. (2008). Identification of major sources of uncertainty in current IWRM practice illustrated for the Rhine river basin, Water Resources Management 10, pp. 1-32

Klinkers L. (2014). Grensoverschrijdende samenwerking, [online] website consulted on 21-03-2014, http://www.klinkershovens.nl/index.php?option=com_content&view=article&id=114:grensoverschrijdende-samenwerking-1&catid=28:vlaanderen&Itemid=27

Koninklijk Nederlands Waternetwerk (KNW) (2014). Grensoverschrijdend waterbeheer, [online] website bezocht op 17-3-2014

Kroekenstoel D.F. and Lammersen R. (2005). Transboundary effects of extreme floods on the Lower Rhine, in: Makaske B. and van Os A.G (Eds), NCR-days 2004: Research for managing rivers: present and future issues, October 2005.

Lammersen, R. (2004). Grensoverschrijdende effecten van extreem hoogwater op de Niederrhein, Eindrapport. Provincie Gelderland / Rijkswaterstaat Directie OostNederland, Arnhem, under supervision of the Arbeitsgruppe.

Lammersen R. (2013). Telephone interview with Rita Lammersen, Rijkswaterstaat Oost, 04-11-2013.

Lammersen R. (2014). E-mailcontact concerning the Arbeitsgruppe, 15-04-2014

Lehner B., Döll P., Alcamo J., Henrichs T. and Kaspar F. (2006). Estimating the impact of global change on flood and drought risks in Europe: a continental integrated analysis, climate change 75, pp. 273-299

Liefveld W. (2013). Van Grensmaas naar Gemeenschappelijke Maas, Presentation, Beek- en Rivierherstel over de grens, Zutphen, 15-11-2013

Ligtvoet W., van Bree L., van Dorland R. (2013). Aanpassen met beleid: bouwstenen voor een integrale visie op klimaat-adaptatie, Planbureau voor de Leefomgeving, publicatienummer 1125, Den Haag

te Linde A.H. (2011). Rhine at risk? Impact of climate change on low-probability floods in the Rhine basin and the effectiveness of flood management measures, dissertation, VU Amsterdam

Te Linde A.H., Moors E.J., Droogers P., Bisselink B., Becker G., ter Maat H. and Aerts J.C.J.H. (2012). ACER: Developing adaptive capacity to extreme events in the Rhine basin, Climate Changes Spatial Planning 046/12

Lindemann S. (2008). Understanding water regime formation- a research framework with lessons from Europe, Global Environmental Politics 8 (4), pp. 117-140

Linsen M. (2013). Telephone interview with Max Linsen, Rijkswaterstaat, 18-10-2013

Van Loenen R. (2013). Interview Vincent van Os with R. van Loenen: Gelderse Natuur en Milieufederatie, May 1 2013

Lulofs K. and Coenen F. (2007). Chapter 4: cross border co-operation on water quality in the Vecht river basin, in: Verwijmeren J. and Wiering M. (2007). Many rivers to cross: cross border co-operation in River Management, Delft, Eburon Academic Publishers

Makaske B. and Van Os A. G. (2005). Research for managing rivers: present and future issues, NCR Days, October 2005.

Mehlig B. and Brinkmann M. (2004). Grensoverschrijdende effecten van extreem hoogwater op de Niederrhein: deelrapport effect van waterstands-verlagende maatregelen, rapport in opdracht van Arbeitsgruppe.

Meijerink S.V. (1999). Conflict and cooperation on the Scheldt River Basin: a case study of decision making on international Scheldt issues between 1967 and 1997, Rotterdam, Kluwer Academic Publishers, dissertation.

Menn K. (2013). Interview with Kerstin Menn: Bezirksregierung Düsseldorf, telephone interview, 18-10-2013

H. Middelkoop, K. Daamen, D. Gellens, W. Grabs, J.C.J. Kwadijk, H. Lang, B.W.A.H. Parmet, B. Schädler, J. Schulla & K. Wilke (2001). Impact of climate change on hydrological regimes and water resources management in the Rhine basin, Climate change 49 (1-2), pp. 105-128

Ministerie van Verkeer en Waterstaat: DG Water (2008). Implementatieplan EU-richtlijn overstromingsrisico's (Richtlijn 2007/60/EG), Juli 2008

Ministerie V&W, VROM and LNV (2009a). Stroomgebiedbeheerplan Maas: 2009-2015, December 2009, Thieme Deventer

Ministerie V&W, VROM and LNV (2009b). Stroomgebiedbeheerplan Rijn-delta: 2009-2015, December 2009, Thieme Deventer

Ministerial Declaration (1998). 12th Conference of Rhine Ministers, January 22 1998, Rotterdam

Ministeriële verklaring (1998). Verklaring van Namur van de Ministers belast met de bescherming tegen hoogwater in Frankrijk, in het Waals en Vlaams gewest van België en in Nederland, Namur, 8 april 1998.

Mol. S. (2014). Emailcontact met Sandra Mol about the PBWC, 25-04-2014

Mol S. and Onnink S. (2014). Interview with Sandra Mol and Saskia Onnink, Ministry of Infrastructure and Environment, 04-04-2014, The Hague.

Monstadt J. and Moss T. (2008). Policy innovations in the aftermath of a disaster: contexts of floodplain restoration in Germany, in: Moss T. And Monstadt J., Restoring Floodplains in Europe: Policy Contexts and Project Experiences, IWA Publishing

Nijland H. (2013). E-Mail corresponding with Henk Nijland, former coordinator of SDF INTERREG project, 12-8-2013

Overheid (2014). Verdrag tussen het Koninkrijk der Nederlanden en de Bondsrepubliek Duitsland nopens het [...] vraagstukken, met bijlagen en slotprotocol, (grensverdrag), 's-Gravenhage, 08-04-1960, [online] website bezocht op 17-3-2014, http://wetten.overheid.nl/BWBV0005042/geldigheidsdatum_01-03-2014

Overijssels Nieuws (2014). Grensoverschrijdend waterbeheer opgericht, [online] website consulted on 30-04-2014, http://www.almelonieuws.nl/nieuws/overijsselsnieuws/c9913_Grensoverschrijdend_waterbeheer_opgericht/index.html

Overmars B. (2013). Interview transcript from Vincent van Os, Arnhem, 25-04-2013.

Overmars B. (2014). Telephone interview with Bas Overmars, province of Gelderland, 25-0-2014.

Peerboom J. (2014). Interview with Jacques Peerboom: water board Peel en Maasvallei, Telefonisch, 21-03-2014
PGC(2012). De Permanente Nederlands Duitse Grenswateren Commissie, Bijlage bij IENM/BSK-2012/25677, 20-11-2012.

PGC(2013). CONCEPT Verslag van de 81^{ste} vergadering van de Permanente Nederlands-Duitse Grenswaterencommissie, IENM/BSK-2012/234274, 20-09-2013 Tegelen.

L. Pfister, J. Kwadijk, A. Musy, A. Bronsterts & L. Hoffmann (2004). Climate change, land use change and run off prediction in the Rhine-Meuse basins, River Research and Applications 20 (3), pp. 229-241.

Philip R., Anton B. and Schraffl F. (2008). Local governments and integrated water resources management in the Rhine River basin in Germany, project LoGo Water, March 2008

Provincie Gelderland (2014). Veiligheidsregio's grensoverschrijdend, [online] website consulted on 30-04-2014, <http://www.gelderland.nl/4/Home/Hier-werkt-de-provincie-Gelderland-aan/Veiligheid/Hoogwaterbescherming/Veiligheidsregios-grensoverschrijdend.html>

Provincie Limburg (2014). Twee Limburgen werken aan één gemeenschappelijke Maas, [online] website consulted on 21-03-2014, http://www.limburg.nl/demaasdebaas/De_Maas_de_Baas/Verhalen_van_toen_en_nu/Twee_Limburgen_werken_aan_%C3%A9%C3%A9n_gemeenschappelijke_Maas

Raadgever G. T. and Mostert E. (2005). Transboundary river basin management: state-of-the-art review on transboundary regimes and information management in the context of adaptive management, NeWater Report Series No. 10, TU Delft

Raadgever G.T., Mostert E. and Van de Giesen N.C. (2008). Identification of stakeholder perspectives on future flood management in the Rhine basin using Q methodology, Hydrological Earth System Sciences 12, page 1097-1109

Regionaal Bestuurlijk Overleg Maas (RBOM) (2012). Stroomgebied Maas: tips bij uitvoering KRW in de landbouw, [online] website retrieved November 26 2012, http://www.google.nl/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&sqi=2&ved=CCKQFjAA&url=http%3A%2F%2Fwww.helpdeskwater.nl%2Fpublish%2Fpages%2F16644%2Fnb0359_lf_factsheet_06.pdf&ei=6XGzUKiaAcGi0QWikiCoDg&usq=AFQjCNGTAO86v47dKwa V8E5BU05SNa55w>

Renner T. (2013). Interview with Tobias Renner, Grensoverschrijdend Platform Regionaal Waterbeheer, 07-04-2014 Nijmegen.

Renner T. (forthcoming). Progress beyond policy-making-transboundary water cooperation in Rhine Delta East.

Rijksdienst voor Ondernemend Nederland (2014). INTERREG 2014-2020, [online] website consulted on 30-04-2014, <<http://www.rvo.nl/subsidies-regelingen/interreg-2014-2020?wssl=1>>

Rijksoverheid (2013). Internationale programma's: Interreg, [online] consulted on 7-8, <<http://www.rijksoverheid.nl/onderwerpen/europese-subsidies/structuurfondsen-versterken-regio-s/internationale-programma-s-interreg>>

Rijksoverheid (2014a). Deltaprogramma: deelprogramma Rivieren, [online] website bezocht op 19 februari 2014, <http://www.rijksoverheid.nl/onderwerpen/deltaprogramma/deelprogramma-s/deelprogramma-rivieren>

Rijksoverheid (2014b). Helpdesk Water: Maas, [online] last visited on 12-3-2014, <http://www.helpdeskwater.nl/onderwerpen/wetgeving-beleid/internationaal/maas/>

Rijksoverheid (2014c). Nederland en Vlaanderen: handen ineen voor hoogwaterveiligheid, hoogwaterbescherming bij gemeenschappelijke Maas verbeterd, [online] website consulted on 21-03-2014, <http://www.rijksoverheid.nl/nieuws/2013/09/04/nederland-en-vlaanderen-handen-ineen-voor-hoogwaterveiligheid.html>

Rijksoverheid (2014d). Helpdesk water: Internationaal, [online] website consulted on 20-3-2014 <http://www.helpdeskwater.nl/onderwerpen/wetgeving-beleid/internationaal>

Rijksoverheid (2014^e). Subsidieprogramma INTERREG, [online] website consulted on 30-04-2014, <<http://www.antwoordvoorbijden.nl/subsidie/interreg>>

Rijkswaterstaat (2011). Waterhuishouding en waterverdeling in Nederland, in samenwerking met het Ministerie van Infrastructuur en Milieu: DG Water, ANDO Den Haag, Schelfaut K., Pannemans B., van der Craats I., Krywkow J., Mysiak J. and Cools J. (2011). Bringing flood resilience into practice: the FREEMAN project, Environmental Science and Policy 14, page 825-833

Rijkswaterstaat Limburg (2006). Archiefstuk: Permanente Grenswatercommissie, 07.H08, [online] consulted on 5-11-2013, <<http://www.archieven.nl/nl/zoeken?mivast=0&mizig=210&miadt=38&miaet=1&micode=07.H08&minr=1517384&miview=inv2&milang=nl#inv3t1>>

Rijkswaterstaat Zuid-Nederland (2014). Overzicht Internationale Samenwerking-natte werkveld: stand van zaken eind 2013, intern document.

Van Rijswijk M., Gilissen H.K. and van Kempen J. (2010). The need for international and regional transboundary cooperation in European river basin management as a result of new approaches in EC water law, ERA Forum 11, page 129-157

Van Rijswijk H.F.M.W., Wiering M., Keessen A., Robbe J., Tappeiner I., Thorp T., Morales I., Lindhout P., Heinsbroek P. and Gilissen H.K. (2011). Normative principles of adaptation; shifts in defining the public interest and the role of principles with regard to adaptation to climate change, position paper WP 5, Kennis voor klimaat.

Roer en Overmaas (2012). Bestuursprogramma 2009-2012: stand van zaken per 1 november 2012.

Van Roode M. (2014). Interview with Mirjam van Roode: Rijkswaterstaat Zuid-Nederland, 01-04-2014, Maastricht.

Rose T. (2013). Telephone interview with Torsten Rose, Wasserverband Eifel-Ruhr, 22-10-2013

Santbergen L.L.P.A. (2013). Ambiguous ambitions in the Meuse theatre: the impact of the Water Framework Directive on collective-choice rules for integrated river basin management, Eburon, dissertation.

Schauser I. (2013). Telephone interview with Inke Schauser, Federal Environment Agency, 05-07-2013

Schmid-Breton A. (2013). Interview of Vincent van Os with Adrian Smid-Breton ICPR, April 12th 2013.

Schmidt-Breton A. (2013), Interview with Adrian Schmidt-Breton, ICPR, 14-10-2013 Koblenz.

Schmid-Breton A. and B. van de Wetering (2014). Interview with Adrian Schmid-Breton and Ben van de Wetering ICPR, March 19th 2014.

Schreurs W.L.M. (2011). Water Verbindt: samenwerking van de Maasoeverstaten en gewesten in de Internationale Maas-commissie, presentatie Vlaams Parlement: Verenigde Commissies voor Leefmilieu en Openbare Werken: Hoorzitting Waterbeleid in Vlaanderen: 1 March 2011

Schreurs W.L.M. (2012). Interview of Bouke Ottow with Willem Schreurs, June 2012.

Schreurs W. (2014). Interview with Willem Schreurs, secretary-general IMC, 17-04-2014 Maastricht.

Seerden R. (1993). Hoofdstuk zes in: Publiek rechtelijke grensoverschrijdende samenwerking tussen decentrale overheden, MAKLU Uitgevers Antwerpen-Apeldoorn

Seys J. and Beyst B. (2014). Hoe diep is het water tussen Vlaanderen en Nederland? Dossier grensoverschrijdende Schelde-initiatieven, [online] website consulted on 21-03-2014, http://www.vliz.be/docs/Nieuwsbrief/NB09_focus.pdf

Steenhuisen B., Dicke W. and Tijink D. (2007). 'Trade-offs' versus 'Safety First': How national differences in flood policy can be bridged, *Water International* 32 (3), page 380-394

Task Force Water Governance (2013). Task Force Water Governance: with a special focus on border regions, Euregio Rhine-Meuse, February 2013

Treaty of Gent (2002). Maasverdrag, Gent December 2002.

Verhagen M. (2011). Omgevingsanalyse International rivierengebied, internal document

Verhoeven T. (2013). Interview with Ton Verhoeven: municipality Nijmegen, Telephone interview 11-10- 2013

Verwijmeren J. (2007). Chapter 5: Cross border co-operation and the Dutch-German Working Group on High Water, in: Verwijmeren J. and Wiering M. (2007). Many rivers to cross: cross border co-operation in River Management, Delft, Eburon Academic Publishers

Van Vliet M., Zwolsman G. and Joziassse J. (2008). Effecten van klimaatverandering op de waterkwaliteit in de Rijn en Maas, Deltares-rapport, June 2008-U-R0629/A.

VNBM (2013a). CONCEPT verslag achttiende vergadering Vlaams-Nederlandse Bilaterale Maascommissie, 3 juni 2013 Roosteren.

VNBM(2013b). CONCEPT verslag negentiende vergadering Vlaams-Nederlandse Bilaterale Maascommissie, 27 november 2013 Dilsen-Stokkem.

VNBM (2014). Doelstellingen van de Vlaams Nederlandse Bilaterale Maascommissie, [online] website consulted on 21-03-2014, <http://www.vnbn.eu/>

Vreugdenhil B. (2014). Interview with Bram Vreugdenhil, province of Gelderland, 07-04-2014 Arnhem.

Vreugdenhil B. (2013). Telephone interview with Bram Vreugdenhil, province of Gelderland, 22-10-2013

Ward P.J., Aerts J.C.J.H., de Keizer O. and Poussin J.K. (2013). Adaptation to Meuse flood risk, Knowledge for Climate HSGR06, 93/2013.

Waterschap Rijn en IJssel (2014). Grensoverschrijdend platform voor waterbeheer, [online] website consulted on 30-04-2014, <http://www.wrij.nl/thema/actueel/nieuws/@1544/grensoverschrijdend/>

Werkgroep Hoogwater , Internationale Maascommissie (2002). Actieplan Hoogwater Maas: voortgangsrapportage 1995-2001, Namur, 6 mei 2002

Van de Wetering B. (2013). Activities of the International Commission for the Protection of the Rhine, Executive Secretary, [online] website consulted on 14-11-2013, <<https://www2.unece.org/ehlm platform/download/attachments/25690609/21.%20Ben%20vd%20Wetering%20Rhine%20Commission.pdf?api=v2>>

Wiering M. (2010). Grenzen aan de samenwerking in het Rijnstroomgebied: Duits-Nederlandse werkgroep hoogwater, Geografie, June 2010.

Wiering M.A., Verwijmeren J., Lulofs K. and Feld C. (2010). Experiences in Regional Cross Border Co-operation in River Management. Comparing three cases at the Dutch-German border, Water Resource Management 2010

de Wit M. (2004). Hoeveel (hoog)water kan ons land binnenkomen via de Maas, nu en in de toekomst?, RIZA afdeling Rivieren, werkdocument nr. 2004.151x.

de Wit M.J.M., Van den Hurk B. and Warmerdam P.M.M. (2007). Impact of climate change on low-flows in the River Meuse, Climate Change 82, page 351-372.

Wild S. (2013). Telephone interview with Sara Wild, Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur und Verbraucherschutz des Landes Nordrhein-Westfale, 03-07-2013

Xregio (2014). X-regio: veilig blijven werken, [online] website consulted on 30-04-2014, <<http://www.x-border-gdi.org/nl/projecten/projectdetails/project/x-regio-weiterhin-sicher-arbeiten/index.html>>

Appendix one: overview interviewees

Interviews specifically for HSGR 3.3		
Bas Overmars	Province of Gelderland	25-03-2014 telephone
Bram Vreugdenhil	Province of Gelderland	07-04-2014 Arnhem
Erik Busschüter	Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur und Verbraucherschutz des Landes Nordrhein-Westfalen North Rhine-Westphalia	02-04-2014 telephone
Evert Hazenoot	Water board Rivierenland	08-04-2014 telephone
Gerard Broseliske en Hendrik Buiteveld	Rijkswaterstaat	11-04-2014 Lelystad
Henk de Hartog	Province of Gelderland	02-04-2014 telephone
Mirjam van Roode	Rijkswaterstaat Zuid-Nederland	01-04-2014 Maastricht
Rita Lammersen	Rijkswaterstaat-Oost	e-mailcontact
Saskia Onnink en Sandra Mol	Ministry of Infrastructure and Environment	04-04-2014 Den Haag emailcontact
Tobias Renner	Grensoverschrijdend Platform Regionaal Waterbeheer, Royal Haskoning	07-04-2014 Nijmegen
Willem Schreurs	International Meuse Commission	17-04-2014 Maastricht
Interviews from earlier projects, used for HSGR 3.3		
Adrian Schmid-Breton	International Commission for Protection of the Rhine	14-10-2013 Koblenz
Bas Overmars	Province of Gelderland	<i>Interview transcript from Vincent van Os</i>
Bram Vreugdenhil	Province of Gelderland	22-10-2013 telephone
Bob Dekker	Former EU water director Ministry Infrastructure and Milieu	07-10-2013 <i>Also a transcript of Ismael Moralis (2011) is used.</i>
Eric Castenmiller	Province of Limburg	21-10-2013 telephone
Erik Busschüter	Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur und Verbraucherschutz des Landes Nordrhein-Westfalen	17-10-2013 Düsseldorf
Frank Heijens	Water board Roer en Overmaas	17-10-2013 telephone
Heide Jekel	Federal ministry for Environment, nature conservation and nuclear safety	18-10-2013 telephone
Inke Schausser	Federal Environment Agency (Umweltbundesamt)	05-07-2013
Jaap Goudriaan	Province of Gelderland	17-10-2013 telephone
Matthias Bentelem	Emschergenossenschaft and Lippeverband	10-10-2013 Essen
Max Linsen	Rijkswaterstaat	18-10-2013 telephone
Rita Lammersen	Rijkswaterstaat-Oost	04-11-2013 telephone
Sara Wild	Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur und Verbraucherschutz des Landes Nordrhein-Westfalen	03-07-2013
Torsten Rose	Wasserverband Eifel-Ruhr	22-10-2013 telephone



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