

A photograph of a flooded landscape under a bright, hazy sky. The water is calm, reflecting the light. In the distance, there is a line of trees and a small boat floating on the water. The foreground shows some wooden posts in the water.

FLOODPLAINS PILOT COEVORDEN

A DELIBERATIVE REPORT

The Interreg VB C5a project promotes a more integrated and innovative solution for the effects of climate change. The Cloud-to-Coast (C2C) approach facilitates this.



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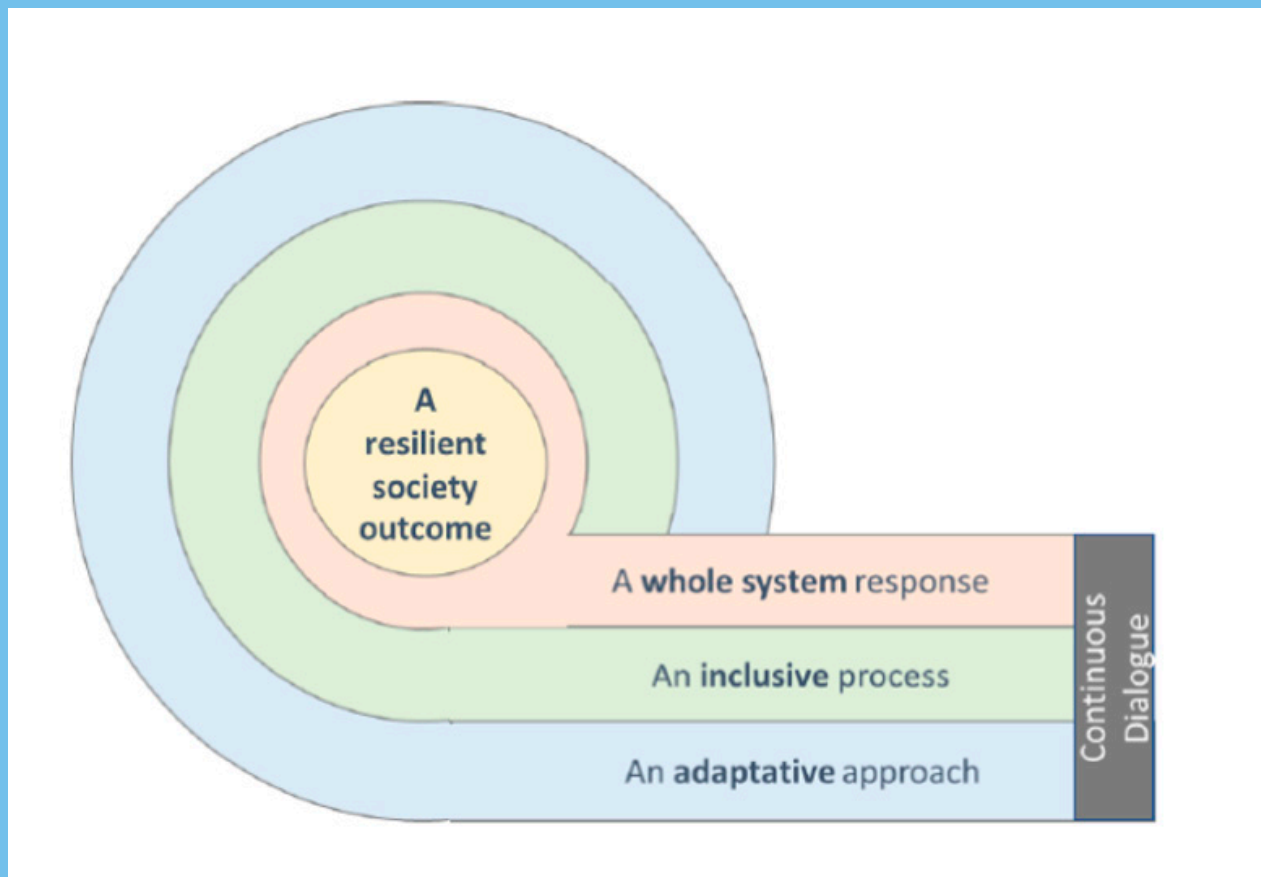
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FIGUUR 1: SCHEMATIC VISUAL OF C2C APPROACH



1 | INTRODUCTION

Climate change leads to a significantly higher risk of flooding in the catchment area of the River Vecht and the IJsselmeer (IJssel Lake) in the Province of Overijssel. Flood protection measures in this region are mainly focussed on the local situation, where high waters occur. Rising water levels have led to an increase in flood plains, higher quay barriers or dikes. At the same time our changing climate leads to drought in higher grounds. Combatting measures are also being taken here. The connection between these two issues is not always recognized sufficiently.

The goal of the C5a project is to promote a more integrated and innovative solution for the effects of climate change. The project aims for efficient and effective adaptation to the results of future climate-related risks. This will be done by not just looking at the physical impacts but also at the economic and social impacts on the whole water system. From this perspective, efforts are focussed on connecting the various stakeholders and policy fields to reach an integral assessment of project proposals. The Cloud-to-Coast (C2C) approach facilitates this process.

The C2C approach looks at the whole system. Working inclusively and adaptively on a continuous dialogue under an umbrella parameter. New insights or results should be shared continuously. The whole water system – both local and regional – is taken into account. An adaptive working method is when more future scenarios are deliberated upon and these are considered in the results. An inclusive process allows for all the different actors involved.

The C2C approach is currently being developed and tested through pilots. These pilots have been proposed by the partners in the Interreg North Sea Region project C5a. There are ten partners from six different countries with seven current pilots and the project runs from 2019-2021. In this report we deal with one of the pilots: 'Flood plains at Coevorden – Integrated River Management'.

2 | GOALS

As mentioned in the introduction, the main goal of C5a is to integrate the different economic, social and physical/tangible aspects involved in the process with regards to effective and efficient climate adaptation. With this in mind, the C5a approach has been developed.

Aim of the pilot 'Flood Plains at Coevorden' is two-fold, being oriented on both process and content. This pilot has been set up to test the C2C approach.

Important questions:

- What does this approach add to the current process in terms of retention areas?
- Is there sufficient knowledge available to make the right decisions regarding the reservation and labelling of the retention areas?

Conclusions need to be reached per theme.



3 | METHOD

In this pilot, solutions for the water challenges in the area of Coevorden are being developed using the C2C approach.

A schematic overview of the various aspects is shown in the tables below so that it is easy to verify if the C2C approach is compatible with the steps taken or if there are possible gaps. The approach as described in the Concept Note provided no concrete step-by-step plan for the workshop, so it was decided to divide into different levels.

By considering the different local, regional and national levels, the whole water system is dealt with. More tasks can be coupled by tackling both flooding and drought-related issues at the same time. These different levels and themes make adaptive solutions possible and support the full system approach.

The third part of the approach is also dealt with by adding social inclusion to the scheme. However, the subject matter of the pilot does not lend itself for a large citizen involvement seeing as the topic of flood plains at Coevorden is politically and environmentally sensitive. The adopted strategy is therefore limited in terms of inclusion, seeing as only local, regional and national government authorities are involved.

First steps were taken during the workshop to decide if there is enough information available regarding the connection between the themes and the flood plains at Coevorden. The themes can be viewed in the table below, with a differentiation made between those that are necessary (these are in green) and those that are optional. The optional themes, such as energy production, housing construction and recreation offer extra opportunities to create support or interconnect.

TABEL 3.1: SCHEMATIC OVERVIEW OF THEMES

FLOODING	DROUGHT	WATER QUALITY	SOCIAL INCLUSION	ENVIRONMENT & RECREATION	AGRI-CULTURE	BIO-DIVERSITY	ENERGY PRODUCTION	POTENTIAL HOUSING CONSTRUCTION
Local								
Regional								
National								

These themes were discussed during the workshop and an overview was created of the themes with enough available information and where there is a knowledge deficit. It is also unclear whether there is already a thematic interconnection within the retention areas or if such a connection is still necessary. From this we can distil the next steps.



4 | WORKSHOP RESULTS

On 19th November 2020 a workshop for the pilot “Flood Plains at Coevorden, Integrated River Management” was held. Below the participants list:

TABEL 4.1: WORKSHOP PARTICIPANTS

ORGANISATION	ATTENDEE
Province of Drenthe	Leo de Vree
Province of Drenthe	Rinke van Veen
Municipality of Coevorden	Mark Jurjens
Waterboard Vechtstromen	Sjon Monincx
Province of Overijssel	Bart Beukema
Waterboard Drents Overijsselse Delta	Linda Kuil
National Dept. Of Waterways and Public Works (Rijkswaterstaat)	Peter Mulder
University of Twente	Erwin Nugraha
Aveco de Bondt (Engineering Consultancy)	Eva de Rooter
Aveco de Bondt (Engineering consultancy)	Beatrijs Koet

The discussions that took place are handled per theme. First there is an introduction with previously collected background information, where available. Then the cursive text relates to the workshop discussions. The last alinea reflects the relation between theme and the retention area.

4.1 GENERAL

During the workshop there was a short discussion on climate change in general. The following paragraph is a summary:

The solutions for both climate adaptation and mitigation often take up a lot of the available space. In a small and overpopulated country like the Netherlands it is always a challenge to find the right balance. Solar parks, water retention areas and the stimulation of biodiversity are all matters that require space – and they often have incompatible effects. Planting woods for extra CO2 storage, for example, results in even more drought.

When considering measures that require a lot of space, extra thought must be given to the optimal/most efficient use of this space.

4.2 FLOODING

4.2.1 Local - Delta Plan Spatial Adaptation (DPRA)

The Delta Plan for Spatial Adaptation (Deltaplan Ruimtelijke Adaptatie (DPRA)) has been designed to make The Netherlands climate resilient and adaptive to water challenges. Within this framework, the Municipality of Coevorden has carried out a number of stress tests as part of the water alliance Samenwerking Noordelijke Vechtstromen (SNV) – a cooperation of several municipalities, a waterboard and a drinking water company in the region. These stress tests revealed the potential bottlenecks for flooding, heat stress and drought as a result of climate change. These are local results, but the study provides an insight into the impacts of climate change if frequency, intensity and duration of dry, warm and wet periods in the municipality of Coevorden increases.

Opening by Mark Jurjens, the Municipality of Coevorden:

A lot is happening in Coevorden in terms of the Delta Plan for Spatial Adaptation (DPSA) and the Municipality is actively working on this. Together with the SNV alliance, a tool (Laat je niet Verassen/ Don't be taken by Surprise) has been made to illustrate the bottlenecks. The Municipality is investing heavily in climate adaptation and investigating how the authority and its citizens can contribute. The dialogue with inhabitants on this matter has had to be rescheduled as a result of Corona virus limitations, but the results can be included in the Municipal Sewerage Plan (vGRP).

The DPSA stress test provides valuable insights into local flood risk areas. A link has not been made with new water retention areas or the need thereof from a DPSA perspective.

4.2.2 Regional (NBW/LBW)

In the national administration agreement for water - the NBW (Nationaal Bestuursakkoord Water) - government authorities have set down a strategy, time path and financial plan for cooperating on the great water challenges the Netherlands faces in the 21st Century. The agreement emphasises the joint

responsibility for adapting and maintaining the whole water system. It lists which instruments are to be used to achieve this goal, each party's tasks and responsibilities and how these parties can support each other in the implementation of these tasks. The LBW covers local flood norms.

As a result of the shared goals in terms of water challenges, the municipalities involved in this area drew up a local administrative agreement (Lokaal Bestuursakkoord Water) in 2009, together with the waterboard. The organisations involved in this local water agreement were:

- Waterboard Velt en Vecht (since merged into Waterboard Vechtstromen)
- Municipality of Emmen
- Municipality of Coevorden
- Municipality of Hardenberg
- Municipality of Ommen

The local agreement is based on a calculated water-retention capacity for 11.3 million cubic metre for the municipalities of Coevorden, Emmen, Hardenberg and Ommen.

Introduction by Sjon Monincx, Waterboard Vechtstromen:

The (former) Waterboard Velt en Vecht made agreements with the municipalities in the Vecht area regarding the retention of extra rainwater as a result of flash flooding or extreme precipitation (climate change). Following a review of the local and national water agreements (LBW and NBW) it became apparent that a great number of bottlenecks would no longer cause problems within the norms of the current climate situation. Climate change has been added into the overall calculations, but this did not result in any new problem locations. The climate scenarios were used to assess the remaining bottlenecks, resulting in possible climate-resilient measures that could be taken. Water retention upstream/ in higher areas is another option worth considering.

Tests have resulted in a good overview of the flood-sensitive areas in the region. Further studies are needed at the specific bottleneck locations. The local water alliance (LBW) see no need for new retention areas at this moment.

4.2.3 National (HWBP)

The High Water Protection Programme – in Dutch Hoogwaterbeschermingsprogramma (HWBP) – is a programme working on the security of the primary water system, ensuring that water barriers and dikes are future-proof. The HWPP bridges government and regional levels and tackles national water security and flooding issues as mentioned in Chapter 3.

In this respect the HWPP relates to water safety in the lower catchment area of the Vecht in Overijssel and the area around Zwolle.

In terms of water safety, the following processes in the region are relevant:

- Flood risk management Zwolle
- Water safety in Vecht (Veilige Vecht)
- Re-accessing barrier norms in the Vechtstromen catchment area

Within the framework of the HWPP, the dikes along the IJssel, the River Vecht and in and around the city of Zwolle need to be heightened. This is a question of national water safety. To this end, the exploratory investigation Veilige Vecht (Secure Vecht) has been initiated for Zwolle. Besides strengthening the dikes, this project also considers the possibilities within the whole catchment area and options to retain water upstream in the Vecht valley for a longer period.

Introduction by Leo de Vree, Province of Drenthe:

There is concern regarding the water safety issues around Zwolle. The barriers now in place no longer measure up to the currently applicable standard. Can the situation be resolved by raising the dikes or by taking alternative measures? To the north of Zwolle there is space - an expansive, low-lying area - which could provide a solution. However, using this area could potentially have great effects. Other options include using side channels of the River Vecht near Ommen or retaining water upstream in the area of Hardenberg, Gramsbergen and Coevorden.

The Veilige Vecht project investigates alternatives for raising, stabilizing and piping the dikes. Other alternatives would be in combination with these dike adjustments.

Suggested solutions include increasing the absorption capacity in the catchment area, slowing drainage upstream following heavy precipitation, using a 'break-through' dike in extreme situations or controlled flooding in designated areas. Stakeholder support is essential. This can be achieved by ensuring that all are engaged in the development of these plans - environmental organizations, the agricultural sector and citizens. This requires a different mindset - a move from 'standard' solutions towards a catchment approach. In Overijssel this is taking place in the form of design workshops.

It is important to remember that cross-border dilemmas also provide administrative challenges. Furthermore, agreements with Germany need to be revised in terms of how much water passes through the border region.

Waterboard Vechtstromen is currently in talks with Waterboard Drents Overijsselse Delta regarding the security of Zwolle by high water. This shows that cross-border cooperation is important (for waterboards too) although this does make it more complex to come to agreement and the division of costs.

The question of flood security around Zwolle offers an opportunity to investigate the potential for water retention areas/flood plains in the Vecht municipalities.

With regards to the Veilige Vecht project, the influence of upstream flood zones on the required barrier heights is also being considered. Depending on the results, informed decisions can be made about the need for new retention areas.

4.3 DROUGHT

4.3.1 Local

Introduction by Mark Jurjens, Municipality of Coevorden:

The DPRA is a priority of the Municipality of Coevorden and drought is an important factor. This theme runs parallel across the board as well as in various working groups at the Council, such as the municipal sewage plan and the regional project Zoetwater Oost-Nederland (ZON) (Freshwater in the East Netherlands). Connecting opportunities are explicitly sought and noted in the related future perspectives.

The link between retention zones and local drought issues could not be made. Participants of the workshop could not name the added value.

4.3.2 Regional

In the past three years we have experienced severe drought. The summers of 2018 and 2019 were particularly arid. Before this we talked of drought more in the context of nature areas that were surrounded by (arable) land and an extremely low groundwater table – often as a result of drainage.

With the visible effects of Climate Change (these extreme summers are possibly a sign of what's to come) drought is not just a problem for nature areas but also for agriculture. Retaining more groundwater in spring could be a solution but the question is how to do this while observing the current measures and norms.

No introductory presentation:

Taking alternative measures requires a clear insight into the consequences and the need to investigate the whole area in order to gauge where the best effects can be found. Studies have shown that (increased) water supply during periods of drought may only effect the groundwater levels in the direct vicinity of the ditch. Using the regional water balance could clarify this.

There are still some questions about the effects of flooding on water retention areas used for drought. The Vechtstromen is researching this on a mainly local and regional level.

Flooding could also offer opportunities. We hear more often that farmers would prefer a little flooding to a period of drought. This provides chances to introduce drought-combatting measures on a field scale rather than just in the capillaries. The bigger the challenges (and the inclusion of stakeholders in the area) the bigger the room to manoeuvre towards solutions.

It would be a positive motivation to deal with drought issues on a regional level if the national government made it compulsory to retain water in the winter months to compensate shortages in summer.

An improved insight is required into the effects of drought measures on flood situations. As yet, there is no direct connection between water-retention areas and regional drought issues. Combining solutions and cooperating to resolve these themes can potentially lead to a more effective result – the blade cuts both ways.

4.3.3 National

Introduction by Leo de Vree, Province of Drenthe:

With regards to drought, a lot is happening on the national level. Political advice has been given in terms of water retention, raising groundwater levels, securing drinking-water reservoirs and making an inventory of who does what with water. However, it needs to be clarified which 'drought' measures have effect and if these apply for general dry periods or for periods of extreme drought. One should note that with current drought measures the effects can be expected to last a week or two, no more. What is the real return on such a measure?

At the moment there is no direct connection between the national approach to drought issues and that in retention areas. Both require some of the available space. An integral approach is needed, within a particular area, to implement effective and efficient measures. This underlines the importance of the C2C approach.

4.4 WATER QUALITY

4.4.1 Local

No specific introduction:

There is a strong link between water quality and flooding. Extreme precipitation results in more runoff of nutrients. The timing of such a downpour is important. The effect is much greater if this occurs directly after spreading fertilizer or pesticides.' Morpho-management' could be a possible answer for this whereby 'contaminated water' can be caught using small interventions. Conflicts with water quality can be avoided by catching water on the spot as it rains. This is not the case with regional water. Further investigation is needed into how to deal with water coming from upstream.

A direct link was not made between the retention areas and local water quality issues. This is mainly a point for discussion on the regional level.

4.4.2 Regional

The Water Framework Directive dictates that water quality – both groundwater and surface water – be up to standard. Climate change brings a number of potential dangers with it. On the one hand, intensive rainfall can cause increased runoff, resulting in reduced quality of surface water. Overflow mechanisms will kick in more often in that case. On the other hand, longer periods of drought result in streams gradually drying up, with all the inherent negative ecological side effects.

Presentation by Rinke van Veen, Province of Drenthe:

The location of effluent discharge points plays a big role on a regional level. In dry periods the discharge from some streams is predominantly effluent. But catching water from other areas can have a great effect on the biodiversity in an area. That should be considered when discussing retention areas. There is a general discussion about using water 'imported' from other areas and the inherent potential risks for water quality.

The regional water quality issue does not directly give an extra reason for water retention areas, but it is a point to be kept in mind. It should be clear what the consequences are before measures are undertaken.

4.4.3 National

There is a strong connection between the water quality issue in the Vecht and drought. Drinking water extraction along the riverbanks by Vechterweerd is not possible as the Vecht has a very small estuary. As indicated in 4.4.2, there is a general discussion around the risk of 'imported' water on the water quality. That also impacts the water that enters the Vecht via Adorp and the Twente canals.

The issue of water quality at a national level does not directly give an extra reason for water retention areas, but this is a point to consider.

4.5 SOCIAL INCLUSION

At the moment Weijerswold, in particular, is a complex issue because of its history. Floodplains and flooding are always sensitive subjects for the agricultural sector. As a result, and because this discussion relates to a pilot, only the authorities are involved for now.

Introduction by Leo de Vree, Province of Drenthe:

Weijerswold is a sensitive subject, mainly due to issues in the past. There is a lot of resistance to the development of floodplains in the area. This resistance will also apply to any other designated area being farmed. Support for such measures has gradually dwindled since the last widespread floods in 1998.

During the process of nominating floodplains in South Drenthe, the site managers, landowners and the farming sector were involved as this was made possible through the MER-procedure. In the Netherlands a 'Milieu Effecten Rapport' (MER) is a mandatory decision-supporting tool whereby a report is made of potential environmental effects. Context is very important for the stakeholders' perception.

Areas that are naturally suitable for water retention should not be used so that water retention is no longer possible. This doesn't just apply for water retention but also for other adaptive solutions in the future. This requires good communication and a good cost-benefit analysis in combination with social acceptance. It is important to keep in mind that potential water retention areas that have been rejected cannot be re-considered as option for the coming 30 years.

The Veilige Vecht project can contribute as a methodology to hold integral discussions on flooding with inhabitants and other municipalities. This dialogue should be completed before conclusions can be reached with regards to Weijerswold.

The sensibilities relating to Weijerswold mean that it is not possible to have a totally inclusive workshop. The Veilige Vecht methodology makes it possible to broaden the discussion at a later stage in the process.

4.6 ENVIRONMENT AND RECREATION

The Municipality Coevorden has started a workgroup to deal with the theme of 'environment and recreation'. Their advice is to discourage any large capital investments in the Weijerswold area. Limited recreative use is possible.

4.7 AGRICULTURE

Climate change has both a direct and indirect effect on agriculture. To retain water longer, less water is drained away in the winter which could possibly result in flooding in early spring, leading to problems with land access and fertilizing. Moreover, downpours in summer can result in 'drowned' seed and seedlings and reduced or lost crop yield. Irrigation restrictions during drought and an increase in plagues/diseases can also lead to this.

Introduction by Leo de Vree, Province of Drenthe:

Various costs must be considered when deciding whether to invest in adaptations to combat drought or flood-containing measures. An adequate calculation method facilitates the process.

Furthermore, it is advisable to make the landowner responsible for the groundwater level under his field. This can be done by clarifying the advantages for the farmers themselves. First of all, the idea that flood damage can be prevented and drought damage 'happens to you' needs to be changed.

Efforts are currently being undertaken to come to an agreement about balanced fertilization. This means crops receive no more than the required nutrients. This demands accurate administration from the farmer and possibly some form of legal condition from government.

In order to factor in agriculture correctly in the decision-making process for new floodplains, it is necessary to have a sharp insight into the impacts of drought and flooding and the cost-benefits for each measure.

4.8 BIODIVERSITY, ENERGY AND CONSTRUCTION

No specific introduction:

Biodiversity is prominent on the administrative agenda of the Municipality of Coevorden. This was not elaborated on further during this workshop but the conclusions in terms of water quality and water from other areas can be repeated here. Storing 'imported' water can effect local biodiversity, while the implementation of a floodplain could also increase the biodiversity of an area.

Energy production also claims space. Investigations are ongoing as to the best ways to combine the different spatial demands in the area and how interconnecting opportunities can become a compulsory part of regional policy.

5 | CONCLUSIONS

The goal of the C2C pilot Floodplains at Coevorden is two-fold, namely process-based and content-based. The Floodplains at Coevorden pilot has been developed to test the C2C approach and to explore if this approach can add to the current process in terms of retention areas.

The first paragraph of this chapter deals mainly with the latter and the conclusions are presented per theme.

In the second paragraph, a connection is made between the conclusions and C2C methodology, as presented in chapter 3. Finally, in the last paragraph, conclusions are drawn per section as to what degree the C2C approach has been able to contribute.

5.1 CONCLUSIONS OF THE WORKSHOP

The DPRA has provided a good insight into the flood risks at local level. No connection was made with the need for new water retention areas. The LBW and NBW have also provided a clear overall view of the regional challenges faced in terms of flood-threats. While further research is needed for specific bottlenecks, the LBW sees no need for new retention areas.

There are more opportunities for water retention areas from a national water security perspective. The Veilige Vecht project will consider the effect of upstream water-retention areas when deciding whether or not to raise the dikes/flood barriers in and around Zwolle. Decisions can then be made regarding the need for new floodplains depending on the outcomes of that investigation.

The connection between floodplains and local drought problems could not be made. The workshop participants could not name the added value.

Furthermore, a direct connection could not be made with regional and national drought issues either. An integral approach to flood and drought-related themes does offer more possibilities. Both themes require spatial planning whereby efficient and effective measures are needed, from a catchment viewpoint.

The potential effect of floodplains in relation to drought issues needs to be researched further. A better insight is required into the effects of drought-

combatting measures on flood situations, such as the aim to raise the groundwater levels. As yet this is a knowledge gap.

A direct connection could not be made between floodplains and the local and national water quality challenges. This mainly regional issue of water quality does not offer a direct opportunity to create floodplains but deserves consideration. The consequences of temporary water retention (possibly from other areas) need to be clarified further before measures are taken.

The sensibilities surrounding Weijerswold have limited the inclusiveness of this workshop – not all parties were present. However, the methodology of the Veilige Vecht project makes it possible to ‘repair’/adapt this further on in the process. The conclusion, for the time being, is to prolong/maintain the Province of Drenthe’s spatial ‘labelling’ of the area as the long-term effects of climate change cannot be accurately forecast right now.

In terms of agriculture, more insights are needed into the impacts of drought and flooding, as well as the cost-benefits of proposed measures, in order to make a balanced decision for new floodplains.

TABEL 5.1: SCHEMATIC OVERVIEW

	FLOODING	DROUGHT	WATER QUALITY	SOCIAL INCLUSION
Local	No need	Effect water retention on local drought unknown, spatial planning, n connection with other themes.	No need	Not all stakeholders involved so not total C2C approach.
Regionaal	No need	Effect water retention on drought unknown. Effect drought-combatting measures on flooding unknown. Interconnection of themes, spatial issues.	No need but possible through consequences water quality water retention.	
Nationaal	Possible need following conclusions of Veilige Vecht	No effect water retention national drought issues, spatial issue, connection between themes.	No need	

5.2 OVERVIEW

In the schematic overview below, it has been indicated if the theme gives reason for the realization of water-retention area or causes a bottleneck. If there is no direct connection then this has also been indicated, or where there is a knowledge gap. The overview also shows if all aspects of the C2C approach have been handled. This leads to the conclusion whether or not the C2C approach has been followed by each question/issue and if this approach has provided new insights.

ENVIRONMENT AND RECREATION	AGRICULTURE	BIODIVERSITY	ENERGY PRODUCTION	POTENTIAL HOUSING/ CONSTRUCTION
No need. Possible spatial issue.	Clear cost-benefit analysis for floodplains, effects of flooding and drought. Possible spatial bottleneck.	Insufficient expertise in this workshop. Possibly more within organizations.	Insufficient expertise in this workshop. Possibly more within organizations. Does take up same space as floodplains so possible bottleneck.	Insufficient expertise in this workshop. Possibly more within organizations.

5.3 CONCLUSIONS C2C APPROACH

The catchment perspective and adaptive approach has been divided into manageable sections by looking at the most important themes – some at different levels. It has been indicated, per theme, if there is/is not a reason to realize a floodplain/water-retention area. By not just looking at the local and regional flood issues, but also taking the national flood security into account, the realization of a floodplain can be substantiated.

The other themes offered no direct basis for realization, though the spatial matter is one that could be problematic - or actually provide opportunities if combined with other topics. Some knowledge gaps remain regarding drought, agriculture, energy production and potential construction and their connection with floodplains. In order to fully follow the C2C approach more research is needed. However, it is clear that this approach offers opportunities for cooperation between authorities and organizations. And there is an added value to combining and tackling different themes at the same time.

This workshop is the start of an inclusive process, but as not all stakeholders were present one cannot reach absolute conclusions regarding inclusion.

Finally, the workshop is part of a continuous dialogue. Through more of such meetings this can progress further. The participation of a range of stakeholders and experts made for good, in-depth discussions although it must be mentioned that it was not easy to get the right people involved. This could be a result of an initial unfamiliarity with the methodology and content of the workshop.

5.4 C2C APPROACH, OUTCOMES AND INDICATORS

The impact of the new C2C method has been described by answering questions on the relevance and applicability of the C2C concept. The questions and answers have been filled in by the Province of Drenthe using the input from the workshop. Also, the project indicators have been described as much as possible. See Appendix 1 for full informatio

5.5 NEXT STEPS

As indicated in the previous paragraphs, some next steps have been formulated:

- Use the conclusions regarding the need for floodplains Veilige Vecht for Weijerswold;
- The spatial label for Weijerswold will be maintained/prolonged for the moment;
- Administrative involvement of the Province of Drenthe in the Veilige Vecht discussions is essential;

- Include potential bottlenecks caused by water-retention areas when considering the option of floodplains;
- A catchment approach should play a bigger role in problem solving;
- Further research is needed into the connection between water-retention areas and drought, agriculture, energy production and construction;
- Keep the dialogue on the various themes going to keep the different stakeholders on board and ensure an integral approach. This needs a suitable framework.





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APPENDIX 1

C5A EVALUATION SHEET

Evaluation sheet regarding the relevance and applicability of the C2C approach in the Floodplains at Coevorden case study.

What will you do differently using the C2C approach?

The implementation of adaptation measures around Coevorden took place on local and regional level. By using the C2C approach we had to take the national level into account too. (In the Dutch situation safety aspects concerning dikes are the responsibility of the national government and are of national interest.) In the case of floodplains Coevorden it meant that problems downstream in the Vecht region, near the city of Zwolle, had to be considered. The fact that reservations made in the Flood Plan Weijerswold by the Province of Drenthe, not only needed to solve local and regional flood problems, is probably something to consider when solving issues in the Vecht downstream from the German-Dutch border towards the city of Zwolle.

How will your emphasis in the case study, such as engagement with stakeholders, metric/ indicators, change by implementing the C2C approach.

There is a need for more administrative commitment across borders because the Vecht problem is mostly an issue within the province of Overijssel. But solutions can probably be found in Drenthe too. On the other hand, problems also occur as a result of the discharge from Germany and the legal agreements in place only cover the dimensions of the Vecht and not the amount of water.

Local and regional flood solutions are mainly based on the current climate. A new strategy is needed to be able to adapt different climate scenarios.

What knowledge do you gain from examining the C2C approach, such as can it be understood clearly, does it mean anything in your context, do you find any connection in your case study.

The approach was pretty clear to the participants in the workshop. It's similar to the way we are already dealing with climate change adaptation in the region. Most relevant point was that the whole water system is important to finding solutions. That's the main gain taken from the C2C approach, although this was already a work in progress. However, finding combinations with other issues, such as drought and water quality, was much more difficult.

What future opportunities and barriers do you foresee with the C2C approach, such as opportunities for strategic, tactical and/or operational dialogues.

Opportunities:

- Solutions for climate change adaptation need space and that will probably lead to combinations for different goals that also demand space (solar panels, wind turbines, drought solutions, sustainable farming)
- Spatial planning should include climate change adaptation
- By using the long-term impact of climate change and combining that with possible solutions, stakeholders have the opportunity to participate and have an impact in the discussion
- The Province of Drenthe should participate on a political level in the discussions regarding climate adaptation in the whole Vecht region

Barriers:

- Solving problems upstream for areas downstream will lead to "Who pays?" discussions.
- Uncertainty of climate change
- There is no pressure from economic development in our area to look further ahead than 10-20 years. So, implementing a long-term perspective with different possible routes is still a bridge to far. However, the connection with the problems in Zwolle will probably accelerate this process.

What are the alternatives for adaptation pathways and socio-ecological resilience using C2C approach?

Considering only the short-term climate change (10-20 years) in areas with low economic development.

INDICATORS OF PROJECT RESULTS

1. No. of additional functions of the targeted infrastructure / system

Case Study report: Farmland, city, water quality, drought, recreation

2. Benefit-Cost-Ratio (BCR) of the investment in flood protection, in percentages of increase

The costs for flood areas amounts to approximately 10 euro/m³

The capacity of Weijerswold is 500,000 m³. The total costs are about 5,000,000 euros.

There are no costs indicators available for the reinforcement of dikes nearby Zwolle.

3. No. of additional adaptation pathways available to the decision maker to choose from

Pathways are:

- Not using Weijerswold and removing the spatial reservation
- Keeping Weijerswold as a spatial reservation for future use when, as a result of climate change, further action is needed around Coevorden.
- Link the possible future flood problems around Coevorden to the problems around Zwolle where dikes need to be raised.







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