

Peer Reviews Results | BUFFER+ Partner Groningen

1. Introduction

Within the peer reviews used during the BUFFER+ partner meetings several different questions are asked. These peer reviews are meant to make sure the learning is easy and the same for everyone. The Province of Groningen, Municipality of Midden-Groningen and Municipality of Westerkwartier have agreed to make three summaries of these peer reviews. The three areas are Duurswold (Midden-Groningen), Southern Westerkwartier (Westerkwartier) and Gorecht (Province of Groningen).

2. Provincial context

The Dutch rural areas are confronted with a lot of challenges and developments from the national government. In 2022 the Dutch government introduced a policy-line to give water and soil a decisive role in spatial planning. The government states that the physical and technical limits are increasingly reached because of intensive land use and climate change. This new national policy describes how we should adapt our spatial developments to water and soil, instead of the other way around, to better equip the environment for climate change and to prevent further pressure on biodiversity. Currently, the area sees the impact of climate change as weather events get more extreme. Drought and more extreme rains become more common, and the rural area is reaching its limits. Furthermore, even though many measures have been taken, biodiversity goals have not all been met. Connections between nature areas thus become more and more important.

Furthermore, the Dutch government has set up a programme, ordering a transition of the rural areas in the country. Here the province of Groningen has divided the province into 7 areas, where area-based transition of the rural areas is discussed with stakeholders from the area. This should lead to an area-based program for a future-proof rural area, to work towards an integrated solution to overcome the nitrogen impasse and to offer the agricultural sector a perspective. Here agriculture, nature, water and soil are considered and discussed in area-processes. By creating such a plan for the rural areas, the liveability of the rural region also will be increased.

3. Peer review result municipality of Midden-Groningen



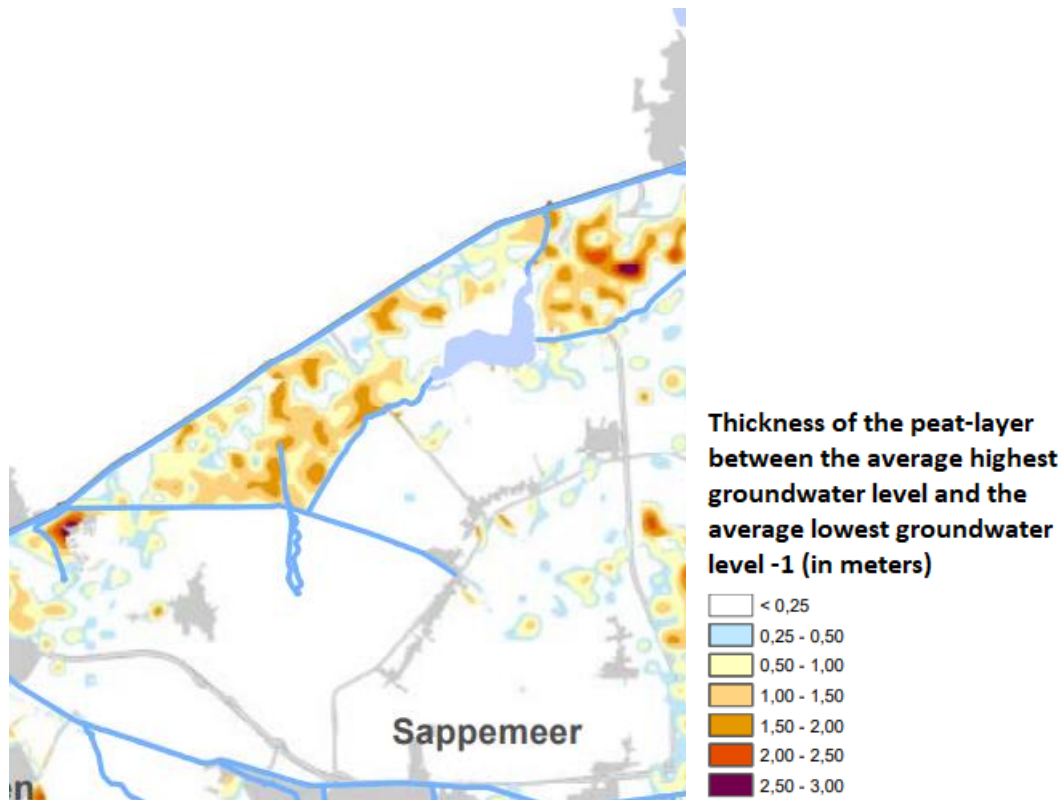
3.1 Analysis of the peatlands in Midden-Groningen

The peatland area of the municipality of Midden-Groningen is better known under the name *The Duurswold* region. The area is characterized by its complex soil structure. Former peatlands have partly been extracted, parts are covered by sandy soils and the northern part of the peatlands are covered by clay. The area thus knows classic peat meadows, peatlands, buried peatlands, and grounds where the first 80 cm of soil consists of 25-50% organic matter. The subsoil is also characterized by the presence of natural pools, filled with peat, and some pingo ruins.

Peat formation:

In short, in the Saalien period, land ice pushed up boulder clay forming hills on which villages have formed. The valley in the west has been filled with marine sediments in the Eemian period. Then, in the Weichselian, a sand layer was deposited, and glacial meltwater formed stream valleys of the Fivel. Slight relief differences slope towards the northwest, where this cover sand was covered by clay and peat deposits that formed in the Pleistocene. Both high and low bogs emerged, where the centre of the area consisted of peat moss. The edges of these areas were covered with wet forests, hence the name 'Wold' (Forest) in *Duurswold*. Large-scale peat formation occurred during the Holocene, where groundwater levels rose due to the melting of ice. When sea levels stagnated, peat expanded towards the coast, after which it became covered with clay when the sea rose. In addition, a funnel-shaped estuary formed in the north where peat flows from the hinterland deposited clay. Nowadays, the course of these rivers can often still be seen because these clay areas drop less steeply than the peat areas, which drop up to -2 meters NAP.

Historically, villages have formed on low boulder clay and cover sand ridges from where peat has been extracted since the 9th century. This created a peat meadow landscape, where diked peat basins and canals were present and where space was created for agricultural land by burning off the peat. Because of dewatering, soil subsidence occurred. In the 17th century, windmills were introduced which accelerated further subsidence. Nowadays, the *Duurswold* region is the lowest part of the province of Groningen. Large parts of the area are 1,5 to 2 meters below sea level. These grounds are still subsiding, where peatlands subside by 1 to 2 centimetres a year, and peatlands with a clay cover by 0,5 cm a year. The waterboard has mapped the peat-layers and depth and found that the thickness of the peat-layer between the average highest groundwater level and the average lowest groundwater level, differed between 0,25 and 3 meters (as can be seen on the map).



Land use:

Over time, agricultural use of the peatlands has gained significance, where it is the most common land-use now (66%). Currently, 36,8% of land is used as grassland, 22,6% for grains, 15,4% for potatoes, 6,9% for beets, 8,4 % for corn, 6,3% for hemp and then you have some other crops. Over time, agricultural plots have grown in size as have agricultural businesses. Low water tables and drainage (the Dutch polder model) have enabled this agricultural use, causing peat-oxidation and land subsidence. Currently the water system has reached its limits and the water board has set in a stand-still in raising or lowering water levels until a long-term plan has been formed for the area.

The second largest land-use cover is nature, with 12,3%. In recent years the share of nature in the area has increased. In 1966 the area, that is now the Roegwold nature area, that we drove through during the kick-off, was first mapped as an area with potential for nature development. In 1998 the re-development of the area started by buying up land. Between 2010 and 2014 the Roegwold area has been developed. In 2016 the area consisted of 6300 ha, where water levels have been raised creating a swampy nature.

The image on the next page (made with [topotijdreis](#)) shows the development of part of the *Duurswold* region over time, where plots have become larger and the new nature can be seen.

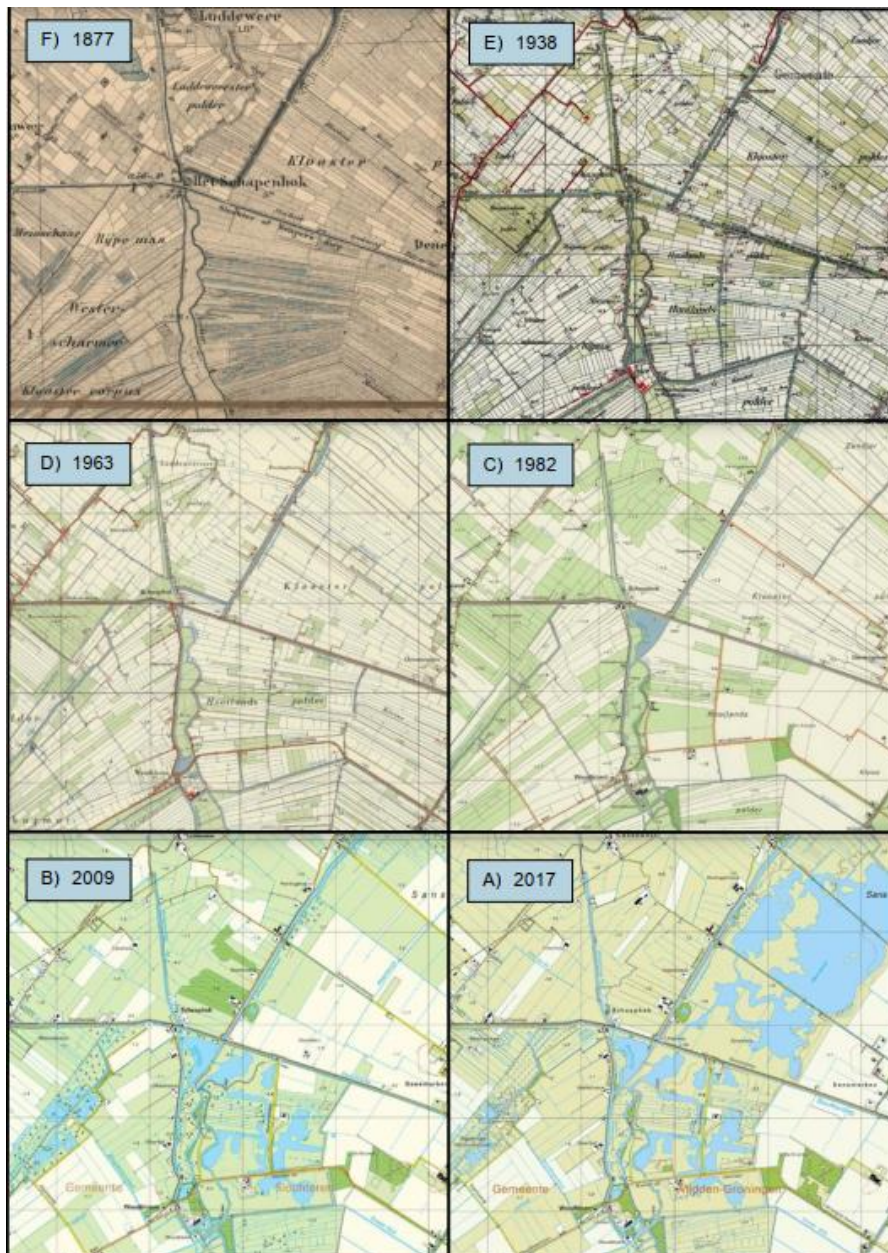
Gas extraction:

The area in our municipality is also characterized by subsidence from gas-extraction. In 1959 the gas-bell under the area was first tapped into and on the first of October 2023 the gas extraction stopped. Over the years earthquakes became more frequent and a lot of properties and infrastructure has been damaged. This has led to a lot of mistrust in the government in the area, which should be considered

while discussing peat-related land-use transitions. Furthermore, the gas-extraction has also led to subsidence of 20 to 25 centimetres. It is expected that, until 2050, a further 10 to 15 centimetres of subsidence will take place even though gas extraction has stopped.

Transition:

The *Duurswold* region, is one of the area-based regions for which the province of Groningen must develop a transition plan for the future. As the province of Groningen is an agricultural province, and Midden-Groningen is an agricultural municipality, the transition of the rural area cannot take place without providing a future perspective and business model case for farmers. The peat-strategy asks for higher water tables. This means that farming methods that can adopt higher water tables should be researched in combination with investigating ecosystem service compensation or similar developments.



3.2 Results and recommendations of WP1 for Midden-Groningen

For WP1, reviews indicated that the payment of ecosystem services is crucial in ensuring that the use of wet and restored areas will be successful. Considering the transition that the rural area of Midden-Groningen faces, such a payment might help the transition take place. The development of ecosystem services payment can help compensate the financial implications that are associated with the transition of agriculture on peatlands. On top of this, instruments on blue credits and water replenishments are also mentioned. Which could be investigated and deployed over time. Furthermore, another agriculturally related comment made in the peer reviews is the current use of livestock that is not adapted to wet conditions. This is something to consider in the transition of the area.

The peer reviews on WP1 also indicate the importance of considering wildfires as summers get dryer. This highlights the importance of raising water tables. When considering peat-restoration it is, however, also mentioned that rewetting might not be sufficient to completely stop peat-degradation, let alone peat growth. So, raising the water levels is seen as necessary to reduce peat-oxidation and wildfires, but the extent to which the peat in the area is prevented from degradation is not clear. Here another peer review states that some parts need to be completely focussed on being peat, to introduce the most peat growth as possible. Since our municipality has recently created a natural area in the peat-area, it can be interesting to see the results on peat-growth here.

In terms of the local inhabitants, the peer reviews in WP1 react positively on the innovation workplace that we visited in Midden-Groningen. Here it is indicated that these IWP might be a place to transfer best practices. Another aspect that is mentioned in the peer reviews is the lack of knowledge from inhabitants. The peat-areas are crucial for the safety and prosperity of the region. It is mentioned that the region has potential to grow its soft recreation.

3.3 Results and recommendations of WP2 for Midden-Groningen

Even though Midden-Groningen is not officially part of WP2, the creation of new business models is also a challenge in our municipality. Therefore, we have also looked into the peer reviews on this work package and will summarise the results and recommendations for our municipality as well.

Firstly, questions have been raised about the viability of wet agriculture as a sustainable alternative and its potential to provide a future perspective for businesses affected by water table changes due to gas extraction. Here the gas-extraction component that is specific to the peatlands in our region come up. It is thus important to keep considering and investigating the impact of gas-extraction on our peatlands and water system.

In the peer reviews it is advised to implement multifunctional land and water use, 'a strategy committed to finding smart combinations of water and land use, focusing on economic drivers for the region to increase support for climate adaptation. This includes the development of paludiculture for a circular economy and converting low-lying polders into floodplains for multifunctional use, which necessitates compensation for farmers.' Here, finding a strategy to compensate farmers is required. Furthermore, it is important to investigate how and where paludiculture can be applied in the area. A suggestion that is done is involvement in the restoration of water management to create moist hay meadows and herb-rich grasslands. Here citizen input and participation are required, especially where changes can affect recreational areas and local ecosystems.

Some knowledge gaps have also been identified. The complex soil structure makes it challenging to implement uniform rewetting measures, therefore it is suggested that more detailed knowledge is required. Furthermore, the impact of gas extraction on the feasibility of wet agriculture is unknown and provides a strategic knowledge gap.

3.4 Results and recommendations of WP3 for Midden-Groningen

For WP3, peer reviews indicated that stakeholders such as sustainable industries and businesses in, for example, food industries and tourism are missing. A suggestion that is made is the inclusion of players in the food industry who could share insights on the creation of new business models. It is described that there currently is a lock-in, where current business models prevent installing higher water tables. This is something that the area-based processes are discussing. Here it is advised that having conversations WITH agricultural stakeholders is important to prevent only talking ABOUT such stakeholders.

A platform for the exchange of ideas and knowledge could be created. Here presence on social media is also important, where topics that are not too complex can be brought to the attention of residents and companies. It is also stated that inspirational leaders are important, who genuinely participate instead of it being forced.

The IWP are seen as a best practice that can be transferred to other contexts. Furthermore, a good practice that has been suggested is a pilot where seaweed is used as fertilizer. Additionally, it is advised to also look into the Frisian Veenweideprogramma (peat meadow programme), when further developing the Groningse Veenweideprogramma (Peat meadow programme).

A suggestion is to investigate 'green finance' in the Groningen region to fund projects. Here we can review The Wyre NFM Investment Readiness Project' that investigates funding opportunities for implementing NFM measures along the River Wyre and its Tributaries as an examples.

3.5 Conclusions

In conclusion, for the municipality of Midden-Groningen the following recommendations can be distilled per work package:

WP1:

- Investigation of ecosystem service payments, blue credits, and credits for water replenishment
- Consideration of the introduction of livestock that is adapted to wet conditions
- Consideration of wildfires
- The use of IWP for best practice transfers
- The potential to inform inhabitants about the importance of these peatlands for their safety and prosperity
- Consideration of the extent that rewetting has on halting peat-degradation and/or peat growth

WP2:

- Consideration of the impact of gas extraction on peatlands and water tables

- Advise to implement multifunctional land and water use
- Creation of moist hay meadows and herb-rich grasslands
- Involve citizens where changes can affect recreational areas and local ecosystems
- Gain more detailed knowledge on the complex soil distribution
- Gain more knowledge on the feasibility of wet agriculture and the impact of gas extraction

WP3:

- Including stakeholders from sustainable industries (e.g. food industries and tourism)
- Have players in the food industry share insights into the creation of new business models
- Creation of a platform where ideas and knowledge can be shared
- Use of social media for information sharing
- Have an inspirational leader
- Use the IWP as a best practice
- Test the use of seaweed as a fertilizer
- Look into the Frisian Peat meadow Programme
- Review the Wyre NFM Investment Readiness Project



4. Peer review result **municipality of Westerkwartier**

4.1 Landscape analysis of Southern Westerkwartier

Westerkwartier (in Dutch Westerkwartier and in our dialect *Westerketaaier*) is a municipality within the province of Groningen which was formed on the first of January 2019 from the municipalities of Grootegast, Leek, Marum, Zuidhorn and a part of Winsum.

The Southern Westerkwartier landscape has a long history. Centuries ago it was an ice landscape when the land ice that came from Scandinavia moved over the area and made a few large plateaus with depressions in between. When the sea level started to rise, peat was growing everywhere entirely covering Southern Westerkwartier. When people started to come and settle here they started to turn the peatlands into farmland by digging elongated ditches, often several kilometres long. Each farming family got their own lot and built a small farm at the end. This is how the characteristic strip subdivision that can still be seen today was created.

After a few centuries the misfortunes started because of the peat subsidence. Though one of the convenient things that happened was the sudden appearance of alder trees in the sides of the dug ditches. Alders cannot grow on peat, but when the sand underneath comes into view, they take root causing the spontaneous storage of alders. The people started to use the wood of the alders and kept up the maintenance which gradually turned into the beautiful hedgerow landscape we still know today.

Peat information (Information from: Pilot site WP3 WK)

<i>Size of pilot site (hectares):</i>	<u>Westerkwartier does not have a physical pilot site.</u> Our pilot investigates the <i>concept</i> of the Waterfarm that <i>could</i> be realised somewhere within the peatlands of Westerkwartier. Which area(s) are most suitable, is one or the research questions we would like to have answered during BUFFER+.
<i>Size of peatland area (hectares):</i>	Currently unknown to me, I would have to look if there are numbers known.
<i>Land use types (activities, crop types, cattle species):</i>	The grounds in Westerkwartier are used for agricultural grasslands, agriculture, dairy cattle farming, goat farming, pig farming, sheep farming, Crop types used are (sugar) beets, corn, potatoes, grains, resting crops, rapeseed, hemp,

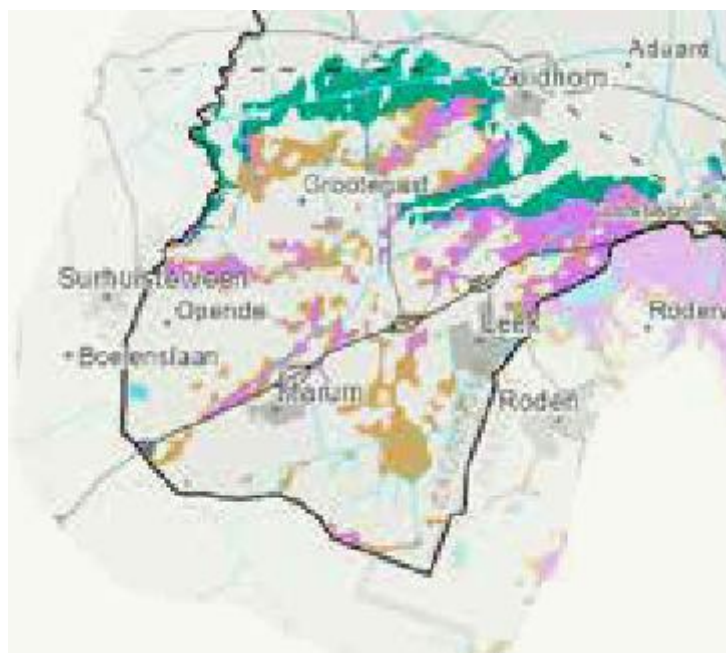


Figure 1: Pink = peatlands. Brown = ... Green = buried peatlands (covered with e.g. clay)

4.2 Results and recommendations of WP1 for Westerkwartier

Within WP1 Westerkwartier will provide information, knowledge, examples and their experience with the Area Developments of Southern Westerkwartier (= ADSW).

In the Area Developments of Southern Westerkwartier, Prolander and several other stakeholders are working on the development of new nature reserves in which water can be retained and stored. At the same time they are improving water quality and water conservation.

Within the Peer Reviews the Area Developments of Southern Westerkwartier have been mentioned as a good example/practice of successful cooperation between the various stakeholders. And due to their involvement, the NIMBY-syndrome (Not In My Backyard) has been addressed and possibly decreased. The ADSW have proven that a balanced cooperation and interests between the various stakeholders is possible and how their approach could be transferable as **a best practice solution**.

Even though the ADSW have been mentioned as a best practice, there have been and still are **several challenges** in Dwarsdiep for example where the process with the landusers is just starting:

- the **rewetting** of the peat due to cooperation with local farmers for the water management.
- A correct (high) water level needs to be maintained in order to prevent **oxidation**.
- Within the Area developments of Southern Westerkwartier the water buffers – where peat is located – could be **flooded** for a longer period of time which in turn is not good for peat restoration.
- The **unfamiliarity** of the challenges with the residents opposes another challenge. This could be tackled/solved by raising awareness by providing information on the tourist and recreational points within the areas such as the lookout towers/hills.

Within the ADSW several different **activities on peatland restoration** are implemented such as the general increase in water levels, (indirect) rewetting measures such as the installation of weirs, damming or undeepening of canals, ditches and streams and reducing water extraction. Besides that the restoration of the original relief are used to enhance the wetland character and increase biodiversity. This can be seen in the Marumerlage where completely new nature and wetlands are being developed. Good to note that these activities do not have the main goal to restore peatland, but develop new nature reserves with water storage. The peatland restoration would be a (positive) coincidence.

The development around the Dwarsdiep would be **interesting to follow** for the duration of BUFFER+ since this is being carried out and due to the fact that here they are working of a hybrid form where optimally combining nature and water goals whilst maintaining agriculture in some parts.

4.3 Results and recommendations of WP2 for Westerkwartier

With the Pilot of the Waterfarm, the creation of new business models is interesting and needed within Westerkwartier. Within the Peer reviews several points were made that are interesting for this concept.

The **rewetting of peatlands**. A process that involves raising the water levels and could lead to the development of business models around water storage, nature development, restoring biodiversity and the overall rewetting of the peat belt.

Paludiculture, where wet crops and livestock are cultivated on (wet) peat soils to combat subsidence, the reduction of CO₂ and storage of water whilst stimulating biodiversity.

Whilst this could lead to innovation, there are also **challenges** that we will face with the introduction of the Waterfarm concept:

- Overall the **agricultural sector** faces a lot of challenges, changes and has to 'follow' a lot of rules given to them by the government (Brussels). They have to reduce nitrogen, create nature, etc. all whilst running a successful business. The need for a **trustworthy government** is needed, since nowadays within the Netherlands there is a strong distrust. This is essential for creating space for investment and innovation in the sector. In addition to that, the concept of the Waterfarm will come with **technical and environmental complexities and challenges** due to the raised waterlevel. Soil structures will change and modern machines might not work. Overall, a **compensation for farmers** might be needed for those that are willing to practice Paludiculture/wet crops.

Examples on how the concept of a new business model could be adopted by the land owners, engage and support them are:

- An **integral approach with European Partners** where knowledge is shared through projects like BUFFER+.
- **Regional Area Development and Community Collaboration** where an emphasis is put on the collaboration between the developments and its local communities.
- **A multi-stakeholder process:** Where an integrated approach is used which includes land and water use, biodiversity and economic and cultural functions as drivers of the regional economy.
- **The Innovation Workplace (IWP) concept:** Within this concept the stakeholders come together to address social challenges and investigate them.
- **Engagement with residents:** Involve them in the designing process and seek examples from other countries. Acknowledge their concerns, particularly those in the agrarian sector, regarding the future for their businesses and the potential for 'wet agriculture'. This way they are heard and their concerns are being considered within the planning and implementation of new strategies.

For the concept of the Waterfarm, several knowledge gaps were identified:

- **Complex soil structures:** The soil structures change every few meters within for e.g. the ADSW, making it challenging to implement uniform measures such as 'rewetting the area' and implementing a successful Paludiculture crop. More detailed knowledge on the local soil conditions might be needed for a successful business / Waterfarm.
- **Concerns within the Agrarian sector:** as mentioned above, there is a distrust in the government which is also due to the challenges and unanswered questions.
- **Adaptation for Climate Change:** The concept of the Waterfarm also contributes to the climate change goals. There is a call for a paradigm shift in water resource management and land use and therefore knowledge and approaches to adapt to this changing climate – whilst running a successful (agrarian) business on peatland – is needed. The Waterfarm could provide some answers.

Future of Peatlands: Overall, there are many questions about how peatland areas will look in the future. There is a foundation of knowledge and initiatives but there are also still significant gaps,

particularly in understanding the local environmental conditions, the long-term viability of agricultural practices, and strategies for climate adaptation.

4.4 Results and recommendations of WP3 for Westerkwartier

The concept of the Waterfarm is researched within WP2, but *how* we are going to research the concept will provide input for WP3. We will, together with Hanze University, set up a IWP-like structure for the research of the Waterfarm concept. These experiences will provide input for WP3.

Stakeholders involved:

Farmers, local communities, residents/citizens, students, teachers, government (e.g. municipalities), public organisations, research facilities, landowners, tourists/guests,

These stakeholders have **different roles and responsibilities** such as sharing their interests and expertise, beneficiaries from the project, contribution to success, providing land(s), open for new ideas, engaging in local challenges/problems, helping to solve these challenges and problems of the local communities (students).

Within the IWP each stakeholder is encouraged to actively participate in the project, each with their own role and input. For example, teachers and students are networking and problem solving, whilst landowners provide land and challenges.

Several **good practices** were mentioned that we could use within the development of the Waterfarm, such as the test with seaweed as fertiliser; Can it also be used in areas that are actively rewetted?

Areas for improvement & tips:

- Involve sustainable industries and businesses, drinking water companies (stakeholders)
- Decrease polarisation between farming and nature
- “We are not used to have ‘the good conversation’ with each other.”
- Not every landowner is willing to commit to the project and maybe invest money and time in new technologies and other changes – be aware of this within the process.
- More presence on social media with topic and language that are understandable for the majority of the people (no jargon) to get their attention and educate them.
- Look to your neighbours: Friesland. They have been working with their peat strategy for years.
- Know the region and its people, know what is happening.

4.5 Conclusions

“People want to change, but don’t want to be changed.” ~Johan Zijlstra, Provincial Adviser Staatsbosbeheer (State Forrest Organisation)

5. Peer review results for **Province of Groningen**

5.1 Analyses Onner- and Oostpolder

The Onnerpolder is a nature reserve and a former water board in the province of Groningen. It is part of the Hunze river catchment area. The Oostpolder and the Onnerpolder have traditionally been real meadow bird areas. Nationally, meadow birds are declining drastically and Het Groninger Landschap is taking a number of measures to prevent this in the Oost- and Onnerpolder. Het Groninger Landschap lease most of the parcels to farmers who use it for cattle grazing. Most of the farmers in and around the Onner- and Oostpolder are nature inclusive farmers. In this area the Province of Groningen is going to experiment with small ditches for water supply to keep the peat more wet in summer.

The area has an Natural Flood Management NFM function and protects the city Groningen from flooding from the Hunze the Onner- and Oostpolder. A co-benefit of the NFM is the protection of vital habitats helping to achieve the conservation goals for the area. The BUFFER+ partner Bee-O-Diversity will monitor this area contributing important information on the changes in flowering plant biodiversity.

The is also site for drinking (ground) water abstraction and the wetlands help to naturally purify the raw water.



5.2 Results and recommendations WP1

The significant challenge here is to find a balance between climate change adaptation, water management in contrast to the priorities of the waterworks for Groningen, which has priority.

Strength is the involvement of every stakeholder. The constant cooperation between all those involved and continuous communication in all directions must be maintained and expanded.

Achieving an equitable balance between the various concerns of all parties involved may not always be entirely feasible. In certain situations, prioritizing a key aspect may be necessary. For instance, aligning nature conservation and land restoration efforts does not always fit equal to the agricultural interest. The integration of all interest can be time-consuming and sometimes demanding, but it is possible.

In the Onnerpolder (managed by Groninger Landschap), the proximity of an extensive water extraction operation was cited as a major problem for achieving optimal water levels for peat restoration.

A general challenge cited by all site managers was the unfamiliarity of Groningen residents with the area. However, the area is not only crucial for their own safety and prosperity as a water and climate buffer, it could in the future offer great potential for soft recreation of all kinds (welfare). A high profile will also benefit the concept of natural climate buffer.

Sufficient rewetting as a function of halting peat degradation and, in time, new peat development and growth. The areas is already significantly rewetted, nevertheless, it was indicated that it may be insufficient to completely stop peat degradation, let alone peat growth.

Major challenge here is the cooperation with local farmers for the management of these areas who often still use livestock that is not adapted to really very wet conditions. This requires keeping water levels lower than desirable for real peat restoration and peat growth.

In addition, the areas also act as a water buffer in the event of a chance of major flooding. As a function of this, the water level should be kept lower than desirable to maximise its function as a flood plain and water buffer as well.

After the development of the project sites as natural climate buffers, there will be a bedside focus by the managers on expanding the nature-oriented recreation of the sites. With the aim of tackling the unfamiliarity of the sites and the concept and offering more nature and green space (wellbeing!) to local residents, especially the residents of the city of Groningen.

What are the main goals for re-wetting the peat areas?

- Preventing further degradation of peat soils and the resulting consequences: carbon emissions, land subsidence, flooding due to accelerated water runoff, loss of biodiversity.
- Directly halt biodiversity loss through desiccation and intensification.
- Create natural water buffer areas to prevent major flooding, including of the city of Groningen (climate adaptation). "Wetlands for dry feet"
- Promotion of the 'natural climate buffer' concept as a language for climate adaptation and mitigation in the Netherlands and elsewhere in Europe.

When we visited the Onnerpolder we saw that the area is developed for climate adaptation in the sense that it can be used as a water storage area when a lot of precipitation falls in a short amount of time. After this the water can slowly be led to the Waddensea. Climate models, however, show that climate change sets in faster and more extreme than expected. We already see that areas experience a shortage of water in spring and summer. We would thus argue that water retention is required, especially as the area is also used to develop wet nature, which is negatively affected when water is short. The challenge here is how to limit the water-drainage, as this would lead to more water

retention, while simultaneously using the area when large amounts of rain fall in a short amount of time. How much water can you buffer while, at the same time, offering a space for water in the case of extreme precipitation. Our question thus is if it is possible to develop an area where both climate adaptive uses can be practiced on the same area of land.

Areas of improvement I would separate some parts of the Groeningen and go for full nature peatlands. Not every piece of land needs to be in hands of a farmer when you have this much peatlands. Some parts need to be 100% nature peat lands so you have peat growth.

Strongly increase the region's liveability by improving and promoting nature-oriented recreation and tourism (welfare) and increase prosperity by strengthening the local economy.

5.3 Results and recommendations for WP2

What are the existing and potential funding mechanisms?

Site restoration and development is currently financed through budgets made available by the Dutch government and/or the provinces as part of an active policy to establish natural climate buffers. It therefore involves public funds.

Funding through private instruments was not discussed and does not seem to be an issue at the moment. No contributions to residents and recreationists are requested.

In time, the instrument of blue credits / water replenishment could be looked at and deployed. Here, companies pay managing organisations a substantial financial contribution because they ensure that water can infiltrate their areas and thus contribute to replenishing the groundwater table (which is under severe pressure). For the companies, this is part of their sustainability goals and strategy (cf. carbon credits).

Wet Agriculture as a Sustainable Alternative: Questions are raised about the viability of 'wet agriculture' as a sustainable alternative and its potential to provide a future perspective for businesses affected by water table changes due to gas extraction.

Rewetting Peatlands: Concepts of 'rewetting' peat areas to halt oxidation, which is part of EU and national goals to reduce CO₂ emissions. This process involves raising the water table and can lead to the development of business models around water storage, nature development, biodiversity, and rewetting the peat belt.

Paludiculture: Wet peat soils can be used for paludiculture, which is the cultivation of wet crops and peat forestry. This approach not only combats subsidence and reduces CO₂ emissions but also stimulates biodiversity.

Multifunctional Use of Peatlands: There is a focus on converting low lying polders into floodplains and combining water storage with wet crops, including reed marshes, and sustainable fisheries. This approach also includes dynamic wetland nature as climate buffers and multifunctional use with recreation and tourism.

Economic and Cultural Functions: There is a need for an integrated approach that includes land and water use, biodiversity, and economic and cultural functions as drivers of the regional economy. This requires accommodating all these challenges coherently in the landscape, which necessitates a multi-stakeholder process. Lock-in in current business model prevents installing higher water levels.

Compensation for Farmers: In the development of paludicultures for a circular economy, there is a need for compensation for farmers who are affected by the changes in land use, such as converting low-lying polders into floodplains and combining water storage with wet crops.

The region of Groningen and other BUFFER+ regions and organisations could explore a 'green finance' method to fund projects. Please review 'The Wyre NFM Investment Readiness Project' that investigates funding opportunities for implementing NFM measures along the River Wyre and its Tributaries as an examples.

It is hard for young people to find a job and buy a house in a rural community.

5.4 Results and recommendations WP3

Which stakeholders are missing that should have a role according to you?

- Sustainable industries
- Businesses like food industries
- Tourism

Is there a specific reason why some stakeholder groups have not been involved yet and how could this circumstance be changed?

First and foremost, it is difficult to transform landowners' agricultural land in such a way that it contributes to climate protection, so everyone benefits from it. Then you need to get ideas what kind of tourism and industry could connect with the project to get best outcome in long term

Not every landowner is willing to commit to the project and maybe invest some money in new technologies and other changes. You need to make an attractive offer and stay in touch throughout the entire time and actively help with resources and knowledge. You need a platform for the exchange of ideas and knowledge

More presence on social media with topics that are not too complex to get the attention of every single company/resident etc. You can network with every single part of the society and share interests and knowledge in different ways.

Identified Stakeholders:

- Het Groninger Landschap: land owner of the nature reserve, leases the land to local farmers
- Farmers: land owner of farming lands or land user in the nature reserve
- Local community: engaged in solving local challenges
- Students: help to solve the challenges of the local community
- Teachers: facilitate the interaction between stakeholders to improve problem solving and capacity building

- Local government:
- Some players in the food industry could share their insights on the creation of new businessmodels for example “nature meat”
- It wasn't clear in which level the drinking water company participates in the project regarding the growth of new Sphagnum in the Onnerpolder

Innovation Workplace (IWP) Concept: The IWP is a physical and learning community where entrepreneurs, citizens, civil servants, lecturers, students, and researchers co create novel solutions to urgent concerns. This model focuses on developing new types of knowledge and partnerships to address local and regional issues.

Landscape Rearrangement: The strategy involves rearranging upstream and downstream landscapes to increase natural sponginess and buffer capacity, which requires a paradigm shift in environmental adaptation and land use. This approach aims to adapt the function and associated land use to the environment and the changing climate.

Regional Area Development and Collaboration: Working together with the local community and focusing on regional area development is crucial. This includes forming regional partnerships to strengthen biodiversity, improve spatial quality, and develop robust nature based opportunities for farmers.

Decrease polarisation between farming and nature.

5.5 Identified Knowledge Gaps

Complex Soil Structure: There is an acknowledgment of the complex soil structure in the area, which changes every few meters, making it challenging to implement uniform measures such as 'rewetting' the area. This indicates a need for more detailed knowledge on the local soil conditions.

Concerns of the Agrarian Sector: There are several unanswered questions within the agrarian sector related to the impact of gas extraction, the feasibility of 'wet agriculture', and future investment in businesses, suggesting a gap in strategic knowledge and future planning.

Adaptation to Climate Change: Calls for a paradigm shift in water resource management and land use, which implies a need for new knowledge and approaches to adapt to the changing climate.

Future of Peat Areas: Questions about how peat areas will look in the future if peat soil and water buffering capacity are taken into consideration indicate a gap in long term environmental planning and knowledge.

A Payment Ecosystem Service is a crucial part of ensuring that the use of wet and restored areas will be successful.

Test with seaweed as fertilizer.