Elaborated business case Twin Dike

Deliverable of Work Package 5 - Upscaling

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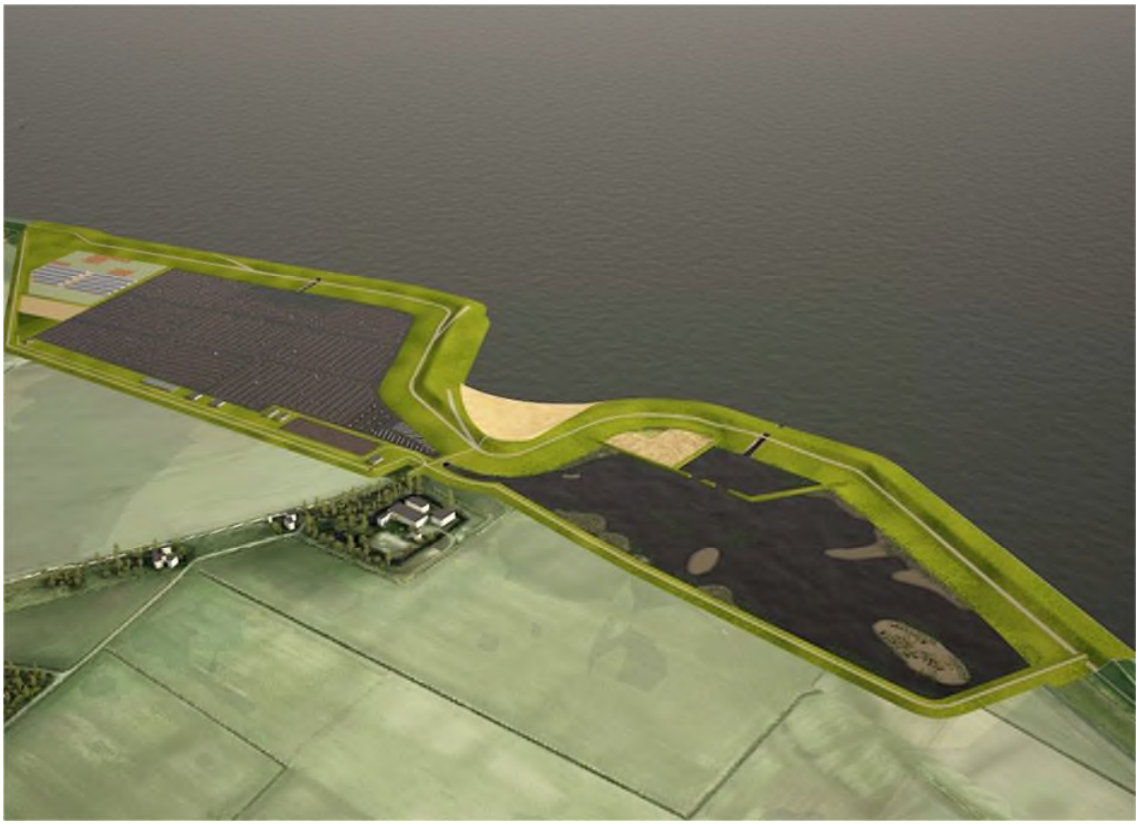

Colophon

Building with Nature – Elaborated business case Twin Dike

Deliverable of Work Package 5 – Upscaling

Part of the INTERREG Building with Nature project

https://northsearegion.eu/building-with-nature/

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Contents

Summary Elaborated Business Case Twin Dike

In order to learn as much as possible from all projects within the INTERREG North Sea Region Building with Nature (BwN)-program, three projects are subject of study in a so called 'Elaborated Business Case'. With this we mean a thorough analyses of all key aspects of the project, so: the physical system, the socio-economic part, and the governance aspects.

The Twin Dike is by far the most complicated project in the INTERREG Building with Nature program, because it combines three interests (safety against flooding, innovative land use by enabling salt-water agriculture and aquaculture, and improving water quality of the Eems-Dollard Estuary). Besides this, there are three levels of governments involved (The Ministry of Infrastructure and Water Management, Province of Groningen and Regional Water Authority Noorderzijlvest). And finally, there are several financial resources (Hoogwaterbeschermingsprogramma, Waddenfonds, Province of Groningen and The Ministry of Economic Affairs).

The Twin Dike project is in the realization stage. That makes the Twin Dike valuable for learning the do's and don'ts for BwN projects. Key aspects we pinpointed are; the process (aims, motives and urgency), political climate, financial possibilities, decision moments and legal aspects. Most important lesson is that a bold leadership is a need to even start the process. The ability to express the benefits for society makes that the project can run, and the financial resources are conditional.

Introduction

Objective

The goal of the INTERREG North Sea Region project is to scale up the Building with Nature philosophy and make it more worldwide applicable.

With this overarching goal in mind, the aim of this report is to analyze what we can learn from the Twin dike project. The Twin Dike is a visionary project, where water construction and ambitious opportunities are linked together. The governance, the visions and the interests of stakeholders determined the course of the project. Therefore, information about how the business case was made concrete for decision-making and how it changed during the project is of great importance to share.

During the project period, insights as well as budget changed due to progression in information. Before the start of the project the budgets (on which decisions were made) were based on merely estimates and progression in information changed these estimates. The same holds for the estimated benefits for society. Before the project started, the benefits were based on assumptions. Now, real-time experience gives another point of view on the benefits. These insights and lessons learned can be reused in coming Building with Nature projects and help in upscaling the Building with Nature concept.

Approach

During the project period we started by getting an overview of the involved stakeholders, their interest, and the complicated process from design to execution of the project. Reconstruction of the process: the initial business case, the first political decision based on the first budget and the social effects, which were used during the start-up phase of the Twin Dike project. One of the focus points was to investigate if or what has changed in the initial business case based on new insights and determine the key aspects within the process towards realizing the Twin Dike project.

A reflection on the initial business case was made with the two most involved parties: The Regional Water Authority Noorderzijlvest and the province of Groningen. During both interviews the focus was on the key aspects of the process to realize the Twin Dike project and their lessons learned during such a Building with Nature based solution.

The key aspects and the lessons learned gathered from the interviews are described and analyzed in this report.

Outline of the report

This report starts with an overall description of the project in terms of the geography, scope, physical aspects, socio-economic aspects and the governance aspects. After this an overall description will focus on the key-aspects which made that this project became reality. The whole scheme of the process for the Twin Dike project is shown in Appendix 1. Key aspects we pinpointed are:

- the process (aims, motives and urgency),
- political climate,
- financial possibilities,
- decision moments and
- legal aspects.

We end up with the lessons learned combined with a discussion. In the end we conclude with a consideration of the term Business Case. What do we mean by this and when is a business case closed or not?

This elaborated business case will be part of the Building with nature Guidance Report (Ecoshape, in press (a)) and is a deliverable out of Work Package 5 - Business Case, within the INTERREG North Sea Region Building with Nature project.

Case description

Location

The Twin Dike has a length of 2.5 kilometers and is located between Eemshaven and Delfzijl, at the North-Eastern part of the Province of Groningen adjacent to the Eems-Dollard Estuary (Figure 1). This area is subject to subsidence due to the mining of natural gas from the Slochteren gas field. Therefore, the area is located within an earthquake zone (Figure 2). Land use in the region is dominated by agriculture.

FIGURE 1: THE TWIN DIKE PROJECT LOCATION, LOCATED IN THE PROVINCE OF GRONINGEN AND THE WESTERN SIDE OF THE EEMS-DOLLARD ESTUARY.

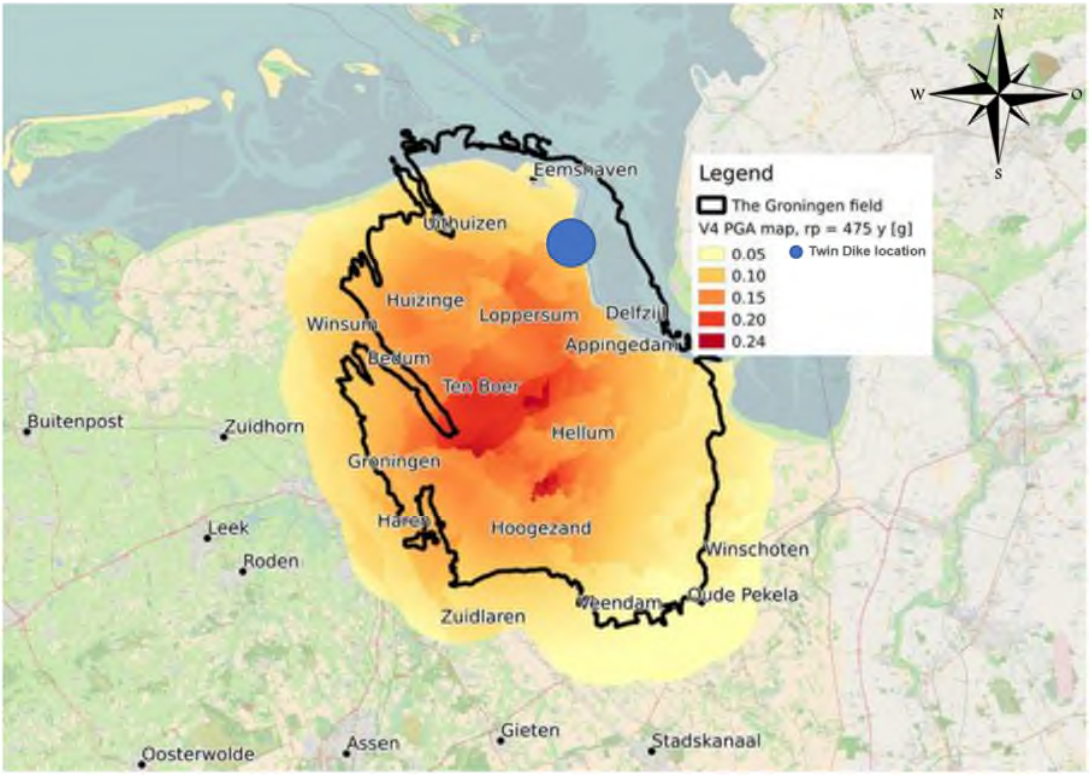

FIGURE 2: SEISMIC HAZARD MAP GRONINGEN (KNMI).

Boundary conditions

In the Netherlands, water safety is a high priority, because it is a low-lying, flood-prone country. To ensure the safety against flooding, an assigned governance organization is responsible for the policy of the water safety strategy: The Delta Program. The Delta Program consists out of (local) governments and additional parties that together develop a strategy on how the Netherlands can become climate-proof and water-robust. In 2014, a new strategy has been developed on how the Netherlands should be protected against flooding: The 'Delta Decision for Water Safety'.

Based on this decision, the Hoogwaterbeschermingsprogramma, an alignment between Regional Water Authorities and Rijkswaterstaat (executive agency of the Ministry), decided that the dikes in the Eems-Dollard region had to be reinforced, between Delfzijl and Eemshaven. Subsequently, within the program 'Ecology and Economy in Balance', launched by (local) governments, businesses partners and nature-organizations, the ambition was stated to improve the Ecology and stimulate the Economy of the Eems Delta. These ambitions stimulated the start of the Program Eems-Dollard 2050, which has an overall vision for the Eems-Dollard estuary. The pilot project Twin Dike is one of the projects that is stimulated by the Hoogwaterbeschermingsprogramma, the Regional Water Authority Noorderzijlvest, the Province of Groningen and the Program Eems-Dollard 2050. To ensure water safety, improve the ecology, and improve the economy of Groningen (see also Appendix 1).

Scope and project objectives; A three-folded project

After it was stated that reinforcements of the dike were needed along the Eems-Dollard estuary, numerous reinforcement options where explored. For the scope area, a regular dike reinforcement was an option by

strengthening the old dike. An alternative option was to construct a second dike behind the old dike, presented as the Twin Dike reinforcement (Interview W. Karten, NZV).

The concept of the Twin Dike project comes from the Delta program and focuses on the future-proof design of the coastal zone. Within the 'Delta Decision for Water Safety' an ambition was stated that the coastal zone should grow naturally through sedimentation, so the coastal zone becomes more future proof for the predicted sea level rise and the foreseen subsidence of the land. The strength of the concept of the Twin Dike project is that not one, but two dikes guarantee water safety (Project Dubbele Dijk – plan van aanpak).

The project serves three goals:

1. Sustainable and climate-proof coastal defense aimed at growing with the sea level;
2. Nature development and fine sediment extraction from the Eems-Dollard Estuary;
3. Innovation in agriculture by stimulating saline agriculture.

The combination of the old dike and the second dike realizes the water safety goal. The land in between the two dikes is designed for the two other goals and is divided into two sub-area's: the southern and the northern area (Figure 3).

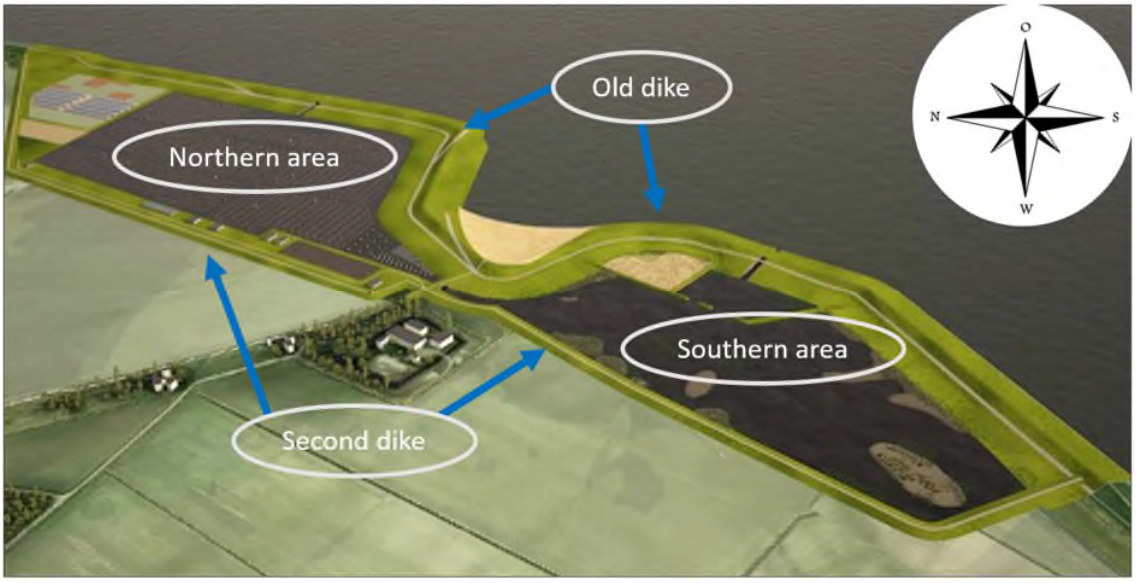

FIGURE 3: TWIN DIKE PROJECT AREA, WITH A NORTHERN AND SOUTHERN AREA (EEMSDOLLARD2015).

The southern part is designed to be used as a natural area, with an active inflow of fresh seawater through a tidal culvert in the old dike, which results in sedimentation. The northern part was foreseen to develop saline agriculture and is also supplied by fresh seawater through the tidal culvert in the old dike (Project Dubbele Dijk – plan van aanpak).

Doing this, the Twin Dike project combines three ambitions: water safety, saline agriculture and extraction of sedimentary deposits. Although it sounds so easy and simple, the reality is that it is a great challenge to get these kinds of complicated projects into realization (see also Appendix 1).

Physical Aspects

By constructing a second dike behind the old dike, the existing dike needed only limited reinforcement on the landside of the dike. The water that may flood over the old dike can still be held by the lower second dike (Figure 4). The Twin Dike concept was a serious option for water safety because the old dike has a clay-core. A

clay-core dike has a wave-repellent effect (no chance of a dike breach) and can resist the force of skipping waves. This was a necessary geotechnical condition for the Twin Dike concept to work (Interview N.J. Vermaak and M. Buurman, PoG). In order to test the water safety guarantee, a special test framework will be developed for the Twin Dike to test the failure mechanisms of both dikes (Project Dubbele Dijk – plan van aanpak).

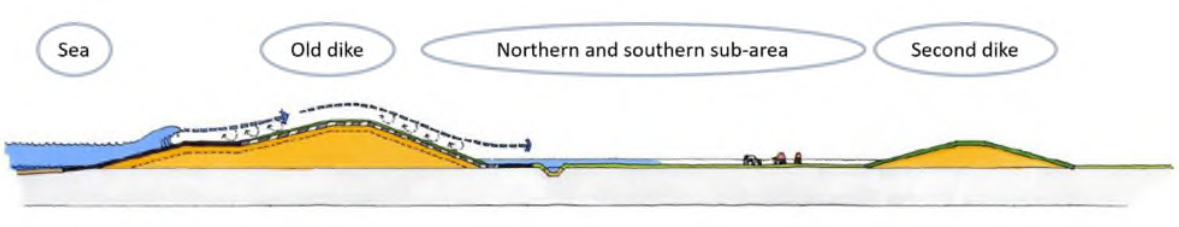

FIGURE 4: TWIN DIKE CONCEPT FOR WATER SAFETY (PROJECT DUBBELE DIJK – PLAN VAN AANPAK).

When the old dike does not flood, the northern and southern sub-area receive fresh saltwater by using a tidal culvert which is constructed in the old dike. The tidal culvert ensures that the area between the two dikes get a salt marsh physical system and ensures for the BwN principles within the Twin Dike project (Project Dubbele Dijk – plan van aanpak).

The southern sub-area between the Twin Dikes serves as a nature area and as an area for extraction of sedimentary deposits, where the natural growing of the coastal zone is put into practice. Sediment rich water from the estuary flows into the sub-area during high tide. Fine sediment particles (probably clay particles) settle down, when low flow velocities occur. During low tide water retreats, resulting in an active in an outflow of sediment during a tidal cycle. This process extracts sediment from the Eems-Dollard Estuary and reduces the (fine) sediment concentration within the estuary. This tidal process also creates a nature area and can function as a foraging area for various species (Interview N.J. Vermaak and M. Buurman, PoG; Project Dubbele Dijk – plan van aanpak).

The northern sub-area uses the same inflow of saltwater from the southern area for saline agriculture. Depending on the desired agricultural use and their efficient need of fresh water, the water inflow towards the northern sub-area can be regulated (Project Dubbele Dijk – plan van aanpak).

Socio Economic aspects

During the initiation phase (see Appendix 1), a request was made whether tenants would let their agricultural land for 25 years to realize the Twin dike concept. Parallel to this, conversations were held with entrepreneurs to identify whether there was interest to lease the sub-area for saline agriculture. Also, consultations were detained with research institutes (Deltares, Waddenacademie and Programma naar een Rijke Waddenzee) to find out if the ambitions were feasible for the sub-areas and to find out if the desired interaction with the Wadden Sea area remained (Project Dubbele Dijk – plan van aanpak).

For the southern sub-area, reduction of sediment in the estuary ensures for improvement of ecological quality within the estuary. When enough fine sediment settles and the sedimentary deposit layer is thick enough, the settled sediment can be extracted and be reused as building material for dikes in the area (Project Dubbele Dijk – plan van aanpak).

For the northern sub-area, a saline agriculture business case has been created. With the motivation that the land between the dikes holds or increases its economic value (Project Dubbele Dijk – plan van aanpak).

Governance Aspects

The governance within the Twin Dike project is rather complicated. There are three levels of governmental organizations. On national level The Ministry of Infrastructure and Water Management is involved. The Province of Groningen is involved to research if the land between the dikes could retain its value, even when the area is no longer suitable for traditional land-use. Also, the Regional Water Authority Noorderzijlvest, responsible for the safety against flooding within the area of interest, is involved in this project. It may be clear that a good cooperation was of the utmost priority.

To realize the multiple aspects foreseen within the Twin Dike project, the financial aspect was a challenge to organize. How this is solved is explained in the chapter 'key aspect Finances'.

Current phase in business case cycle

The Twin Dike project is ongoing, and the construction of the second inland dike is finished at the end of 2019. Which means that the business case for the Twin Dike reinforcement is implemented. From 2020 onwards, the design and the preparation start for the implementation of the saline agriculture and the sediment extraction on the land between the two dikes. For a total overview of the Twin Dike process, see Appendix 1.

Key aspect 1: The process (aims, motives and urgency)

The process to construct the Twin Dike was under great pressure, due to the urgency of water safety. The area is characterized by subsidence and earthquakes due to gas extraction. It was clear that the dike did not meet the water safety requirement through recent insights of frequent high-water levels (through the set-up of wavefields in combination with high tide). All these issues raised questions whether the hydraulic loads were calculated correctly for the Eems-Dollard area and whether the dikes in this area were still safe enough (Interview W. Karten, NZV).

After questions were posed by the Parliament about the water safety issue, caused by the earthquake hazard, the Minister of Infrastructure and Environment (nowadays Ministry of Infrastructure and Water Management) issued a period of three years to realize the dike reinforcement (normally this process takes up to 10 years). Those three years stated by the Minister were not achievable. However, the ambition of the Regional Water Authority Noorderzijlvest was to realize the project, from start of the initiation to completion of the dike reinforcement, within 4.5 years. During this project the urgency of the project remained undisputed (Interview W. Karten, NZV).

Collaboration on aims and motives

The Regional Water Authority Noorderzijlvest was open for combining opportunities and innovation to the dike reinforcement. This is where the province of Groningen saw the opportunity to work together with the Regional Water Authority on a new type of dike: the Twin Dike (see Appendix 1). At the location of the Twin Dike, the existing dike will not be reinforced but a second dike is constructed behind it. Between the dikes, the land will get multiple uses: water safety and other uses.

The province wanted to research if the land between both dikes can remain its value, to research if the ecology of the Eems-Dollard could be improved. To create more nature, by adding saline agriculture, and to increase recreation in the area of interest. These latter two options in order to improve the economic value of the area. The ambition of both parties is complementary to one another, which results in a positive collaboration.

The province of Groningen and the Regional Water Authority Noorderzijlvest combined their effort in a proposal for an innovative dike reinforcement, where a business case was made to combine; water safety, nature and economic development within one project (see Appendix 1). This resulted in a project proposal for the Twin Dike Pilot Project (Interview W. Karten, NZV; Interview N.J. Vermaak and M. Buurman, PoG).

Key aspect 2: Political Climate

During the process of creating the Twin Dike business case and to arrange budget, the political climate was of great importance. There were certain moments in time that a board member supported the project by accepting eventual consequences. This visionary insight is needed to support the project to assemble willingness and to arrange budget. Key in this process is a visionary story, a good perspective, and enough support from local stakeholders (Interview W. Karten, NZV).

This is seen as the most important enabler for the Twin Dike project: the leadership of the Province and the Regional Water Authority to link the aims for society (improving water quality of the Eems-Dollard Estuary and creating opportunities for saline agriculture) to the urgent goal of improving safety against flooding. The key persons did not focus on only the financial aspects of the business case but considered the benefits for society. With these benefits for society in mind the project management was persistent in finding financial solutions to realize this project.

Key aspect 3: Finances

To set up a complete business case, a complex process of arranging budgets was initiated. Multiple financing options were in place, due to a broad range of goals and opportunities that existed for the Twin Dike business case. Five organizations decided to finance the Twin Dike and each deciding party and their own requirements for their financing (Table 1).

TABLE 1: OVERVIEW OFF THE AVAILABLE BUDGET FOR THE TWIN DIKE PROJECT (WADDENFONDS, 2016).

Project part	Total investment	Available budget				
		Waddenfonds	Hoogwater-beschermings-programma	Province of Groningen	Regional Water Authority Noorderzijlvest	Ministry of Economic Affairs
Reinforcement dike	€ 20.000.000,-		€ 20.000.000,-			
Nature area	€ 836.000,-	€ 668.800,-		€ 167.200,-		
Tidal culvert	€ 9.840.000,-	€ 7.872.000,-		€ 1.968.000,-		
Saline agriculture	€ 1.500.000,-	€ 450.000,-		€ 850.000,-		€ 200.000,-
Total Twin Dike	**€ 32.176.000,-**	**€ 8.990.800,-**	**€ 20.000.000,-**	**€ 2.985.200,-**	**€ 0,-[1]**	**€ 200.000,-**

Innovation budget to build the Twin Dike

The Twin Dike Pilot is an innovation project. The Hoogwaterbeschermingsprogramma decided for the innovative option and agreed that after 25 years the Twin Dike area will be restored in its old state. Thereupon, the Hoogwaterbeschermingsprogramma guarantees any unforeseen risk. So, the Regional Water Authority Noorderzijlvest gets a 100% compensation from the Hoogwaterbeschermingsprogramma to experiment with the new design of the project area. If the Twin Dike pilot cannot guarantee the expected water safety, cost for new adjustments to the existing dike will be covered by the Hoogwaterbeschermingsprogramma. This decision gives the Regional Water Authority Noorderzijlvest low risks to start-up this innovative project (Interview W. Karten, NZV).

The Hoogwaterbeschermingsprogramma only provides budget for the dike reinforcement (see Appendix 1), and after 25 years, for the reconstruction of the dike area to its old state. Their key goal is to protect the land from flooding. Therefore, the nature- and economic-based business cases between the dikes, including the lease of the land for 25 years, where taken out of the water safety part of the business case (Interview W. Karten, NZV; Interview N.J. Vermaak and M. Buurman, PoG).

Designing the sub-areas

To find budget for the sediment extraction and saline agriculture business cases, the province of Groningen and the Program Eems-Dollard 2050 applied for budget (see Appendix 1). Budget was requested from the Waddenfonds specific for: the design details of the southern nature sub-area, the design of the saline agriculture sub-area and the construction of the tidal culvert (Interview N.J. Vermaak and M. Buurman, PoG; Project Dubbele Dijk – plan van aanpak). Due to the innovative character and the added value that the Twin

[1] The regional Water Authority Noorderzijlvest pays 10 % of their dyke reinforcement. Thereupon, they contribute to the national dyke fonds from where all Hoogwaterbeschermingsprogramma projects are organized.

Dike project has for innovation within the agricultural sector, the Ministry of Economic Affairs also made budget available for the saline agriculture sub-area development between the two dikes (Interview N.J. Vermaak and M. Buurman, PoG; Project Dubbele Dijk – plan van aanpak). The province of Groningen took responsibility for the remaining budget needed to complete the two sub-area business cases (Project Dubbele Dijk – plan van aanpak).

It is difficult to predict the actual revenue from saline agriculture, the profit from aquaculture products and the profit from the re-use of the trapped sediment. In the Twin Dike business case, it is therefore also difficult to estimate the amount of fees that will be received from the agricultural plot lease from entrepreneurs and the value of extracted sediment, which depends on the quality of the sediment. In this way, the Province bears the risk of loss of income from rent to stimulate innovation in agriculture (Antea Group, 2015).

Key aspect 4: Decision moments

Within the Twin Dike project several crucial moments are seen through time:

1. Combining the Twin Dike project and the 'Ecology and Economy in Balance' ambition.

The Regional Water Authority used the already planned political coordination meeting, which focused on a reinforcement project of the coastal zone near Delfzijl (the Marconi project), to consult the same politicians for the initiation of the Twin Dike pilot project within the Eems-Dollard dike reinforcement program. The ambitions of 'Ecology and Economy in Balance' movement ensured for a common urgency shared by the politicians to discuss the importance of the interaction between land and sea for the region. Due to this urgency, the pilot Twin Dike was implemented easier and within a shorter time period within the planned reinforcement program.

2. Collaboration between the Regional Water Authority Noorderzijlvest, the Province of Groningen and the Program Eems-Dollard 2050.

A second important moment in time, is the decision that the Regional Water Authority Noorderzijlvest, the province of Groningen and the Program Eems-Dollard 2050 started working together to combine their initiatives and use the opportunity of the dike reinforcement for an innovative pilot project (see Appendix 1). Key persons where open for new solutions and the opportunity to not 'waste' the land between both dikes, but to combine it and remain/increase the economic value of the land (Interview N.J. Vermaak and M. Buurman, PoG).

3. Presenting the starting document for the initiation and the planning phase of the Twin Dike project.

A third crucial moment in time, was when the starting document was made by the Regional Water Authority and the Province for the initiation and the planning phase of the Twin Dike project (see Appendix 1). This plan was presented for the Hoogwaterbeschermingsprogramma. Also, due to the already positive impulse of the Delta Program, the management of the Hoogwaterbeschermingsprogramma was open to this pilot initiative. Which resulted in the acceptation of the innovative water safety business case for the Twin Dike project (Interview W. Karten, NZV).

4. Continue to work on the saline agriculture and sediment extraction business case for the sub-areas.

A last key moment in time is the decision of the province of Groningen and the Program Eems-Dollard 2050 to continue with the saline agriculture and the sediment extraction business case for the area between the two dikes (see Appendix 1). Whereby, the province of Groningen is bearing the pilot risk that can be encountered (Interview N.J. Vermaak and M. Buurman, PoG).

Key aspect 5: Legal aspects

Process

Due to the relative short period in time to realize the Twin Dike project, there was little time to prepare the use, the design of, and the tender process for the area between the dikes (Interview N.J. Vermaak and M. Buurman, PoG).

Due to smart procedure preparation (see Appendix 1), the environmental impact report was already prepared for the whole area and was designed in such a way that the innovative dike reinforcements could be accommodated within the same exemption (Regional Water Authority Noorderzijlvest & province of Groningen, 2017). A crucial requirement from the environmental impact assessment was that the ground between the two dikes could be re-used to construct the second dike (Project Dubbele Dijk – plan van aanpak).

Thereupon, saline agriculture is a new combination of agriculture and aquaculture. To collect the right information about saline agriculture, the province of Groningen consulted entrepreneurs specialized in saline agriculture (see Appendix 1). They were asked to contribute to the business case and the first design of the area. During this process it was noticed that the sub-area between the dikes is located within the water safety area. Traditionally, no business activities can take place on a dike construction in order to prevent any damage that could affect its stability. Therefore, additional requirements were added for leasing a cultivation plot within the sub-area (Interview N.J. Vermaak and M. Buurman, PoG).

The province of Groningen was also obliged to start a tender process based on legal processes for the saline agriculture sub-area. This was a challenge, due to the short preparation period and the pilot character of the tender. The consulted entrepreneurs had prior knowledge about the tender, which resulted in a complex awarding process for the province of Groningen. In the end, the saline agriculture area was not granted under the pre-described conditions in the tender phase. However, multiple entrepreneurs are interested. The province of Groningen now takes the opportunity to talk more freely with multiple entrepreneurs, about their ideas and needs and if there are opportunities to combine them, without the time pressure of the authorized tender process (see Appendix 1).

The sub-area

Only a few parts of the Eems-Dollard dike were suitable for the Twin Dike reinforcement option. During the process to find the best area for the Twin Dike construction and to reach willingness for the Twin Dike business case, multiple local farmers were informed and consulted (Interview N.J. Vermaak and M. Buurman, PoG). In the end, one farmer was willing to let its land for a time period of 25 years, to implement the pilot project (Antea Group, 2015; Interview N.J. Vermaak and M. Buurman, PoG).

The province is currently the tenant of the area between the Twin Dikes, due to the lease construction with the local farmer. Legally the province self cannot make profit from the agricultural land. After the construction of the Twin Dike area is finished, the sub-areas will need multiple contracts through time. At first, a management and maintenance contract is needed to maintain the area. Second, agricultural plots can be leased for traditional agricultural land until the sub-area is ready for the lease of saline agricultural and aquaculture plots. Thereupon, it remains a challenge to construct a lease contract, because the activities take place within a water safety area (Interview N.J. Vermaak and M. Buurman, PoG).

Lessons learned and discussion

Process

There are specific interests and requirements related to the acquired funding. A lesson learned is that it is important that the requirements for funding are considered as early as possible in the process. Thereupon, the duration of a request must be taken into consideration, because raising funds takes time (Interview W. Karten, NZV).

Another lesson learned is that by consulting the entrepreneur's requirements were set high for the saline agriculture business case, which resulted in a highly detailed business case. However, the question can be asked: is that much detail required in such an early stage? Looking back, this approach had advantages and disadvantages. The saline agriculture business case was tangible through the amount of details, so board members were easier persuaded. Nonetheless, it also obstructed the process to keep a broad scope for the area of interest and it restricted the space of the scope. Therefore, it was harder to incorporate new opportunities or insights (Interview K. de Jong, NZV).

It was also seen that throughout the process to construct the Twin Dike area, the sub-areas developed into large nature area's mainly because there was little human influence. Hereby, an increase in bat population and wild plants was noticed. In future business cases, it is worth to consider these multiple development stages of an area and how these stages can be utilized. These stages increase the overall value of the area, which can add a positive influence on the business case especially for the construction phase (Interview N.J. Vermaak and M. Buurman, PoG).

Political climate and key decision moments

The political climate was of great importance for this BwN project. However, the political climate is difficult to influence. During a pilot BwN project it is of great importance to have board members or key role players on high levels who believe in the business case and who see the potential outcome of the project. This quality is essential in the political process for starting up such projects. Thus, there are certain moments in time a board member needs to support the project and dares to bear the consequences (Interview W. Karten, NZV).

These pilot BwN projects involve a great deal of money, exposure and unforeseen risks. The major result will probably be shown after several years, while board members would like to see result within the period they are appointed. So, visionary insight, believe, faith, confidence and courage are needed from a political board member to start up a pilot BwN project. Key is a visionary story, a good perspective, and enough support from local stakeholders (Interview W. Karten, NZV; Interview N.J. Vermaak and M. Buurman, PoG).

At last, the recent adoption of policy for long term strategies to ensure water safety up to 2100 (Delta Decision for Water Safety, 2014) and the policy adoption for new safety norms and integrated water protection solutions (to which nature based solutions also belong) provided a momentum at national level. Examples where needed, and due to the multiple ambitions within the Twin Dike pilot project it ensured that the interest of the Delta Commissioner and the Ministry where positive, which favored an important positive incentive for decisions.

Financing and responsibilities

Thinking ahead where budget can be arranged is a priority, and it is complex because of the different aspects of interests. To create willingness for the building with nature or the nature-based solutions, it is important that the financial risk of the business case is low or that socio-economic part is of great importance to balance the financial risk. This would indicate that the risk distribution should be designed in such a way that every financier can adequately manage the risks and justify these aspects socially within their role (Interview W. Karten, NZV; Interview N.J. Vermaak and M. Buurman, PoG).

For example, the Regional Water Authority Noorderzijlvest is primarily responsible for water safety and was responsible for the dike reinforcement. Therefore, the Regional Water Authority Noorderzijlvest applied for innovation funding at the Hoogwaterbeschermingsprogramma to construct the Twin Dike Pilot project and to ensure this water safety for the region. The total funding requested for this water safety aspect was accepted by the Hoogwaterbeschermingsprogramma. Which resulted that the Regional Water Authority Noorderzijlvest has low financial risk due to the innovative financial compensation (Interview K. de Jong, NZV; Interview W. Karten, NZV).

The province of Groningen is responsible for the exploitation from (socio-)economic perspective. Therefore, the province of Groningen applied for funding at the Waddenfonds to reshape the two sub-areas for ecological improvement along the Wadden Sea coast and is in search for investments by business exploitation to give an impulse for the economic growth of the sub-areas. At this moment, the foreseen costs are partly covered. Therefore, the province of Groningen bears a financial risk by constructing the sub-areas between the Twin Dikes (Interview N.J. Vermaak and M. Buurman, PoG).

Another lesson learned is that the landowner of the foreseen Twin Dike area, could make optimal profit from the lease contract due to its prior knowledge about the Twin Dike Pilot project. These costs make that the closure of the business case rather difficult. These costs can be prevented if agreements with a landowner(s) are finalized before a go- or no-go decision is made. Otherwise, the negotiating position of a landowner becomes too strong. Due to these current insights cost of a similar business case can be lower (Interview K. de Jong, NZV; Interview W. Karten, NZV).

Legal process

The process to make a water safety area legally available for agricultural use is complex. During the construction of the Twin Dike pilot project this was noticed during the preparations for the lease contacts and during the preparation process with the entrepreneurs. The requirements for constructing in the sub-areas are strict and within the tender process these requirements were also a complication for interested entrepreneurs.

A lesson learned is that the tender process should take place more from agricultural and aquaculture perspective, where more focus is on the financial part of the business case. The tender was to ‘traditional’ for the pilot project. Because the normal tendering process is generally designed for companies that are used to this complex process. A lesson learned is that farmers must be tempted for innovative agriculture. At this moment, farmers think that there are still too much uncertainties to guarantee success. The saline agriculture will become more interesting to implement for new entrepreneurs, when more proof of concepts will be available (Interview N.J. Vermaak and M. Buurman, PoG).

At this moment the Province of Groningen is still determining the best process of leasing the sub-area for saline agriculture. After completion, these successes and the lessons learned can also be shared with future BwN projects who can take these socio-economic aspects upfront along within the business case.

Reflection on the business cases

In the 'Building with Nature Business Guidance Report' (Ecoshape, in press (a)) the following definition of a business case is stated: *'A business case is a decision support framework that gives insight in the answers to these two questions: 1. Does the project provide increased welfare for society? 2. Can we identify sources and mechanisms for financing?'*

For Building with Nature and Nature Based solutions, a division can be made between a social business case (social cost and benefits, since some benefits cannot clearly be expressed in profit) and a financial business case (cost coverage and profit). Within these business cases it must be clear who contributes to what, in what extent, with which purpose and who bears which risk, before a conclusion can be made regarding the outcome of the business case. Both business cases should be aligned with one another (Interview W. Karten, NZV).

Earlier, we stated that there are three goals (safety against flooding, innovative land use by enabling salt-water agriculture and improving water quality of the Eems-Dollard Estuary) within the Twin Dike pilot project. These three goals are defined in three business cases (water safety, nature development and economic development) which are combined in the Twin Dike pilot project (see also Appendix 1).

Reflecting the business case for water safety, it shows that the Regional Water Board Noorderzijlvest and the Hoogwaterbeschermingsprogramma had to reinforce the dike along the Eems-Dollard Estuary. An option was to do this the traditional way, by reinforcement of the old dike, or to do this through an innovative way, by building a second dike behind the old dike. Both options ensure water safety. The combination of building a second lower dike and minimal reinforcement of the old dike was slightly cheaper than reinforcing the old dike (Interview K. de Jong, NZV; Interview W. Karten, NZV). The positive attitude for long-term innovative solutions of the political climate and the ambition to not 'waste' the area between the two dikes helped strengthening the business case.

A reflection on the second business case for sediment extraction shows that sediment that settles close to dikes can be used to build or to reinforce dikes. Therefore, it is foreseen that profit can be made from the sediment that settles in the sub-area between both dikes. The area extracts sediment and contributes to reducing the fine sediment concentration in the Eems-Dollard Estuary. The amount of profit depends on the quality of the clay. The tidal process will create a natural area which can function as a foraging area for various bird species and is a coastal area which naturally grows with sea level rise. These are large social benefits and therefore finance is found to support the construction of the area. A still unknown factor are the costs of the tidal culvert, that must be built within the old dike, and the amount of profit that will be obtained from clay extraction. Therefore, it remains unclear if there is a closed business case for sediment extraction.

Looking at the third business case it also remains unclear if there is a closed business case for saline agriculture. The amount of investments remains unsure to prepare the land for saline agriculture and the profit from the sub-area can only be determined after saline agriculture started. Subsequently, it is positive that the land persists its economic value. Also, the area will contribute to increase and improve knowledge about saline agriculture for a climate-proof agricultural land.

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Appendix 1

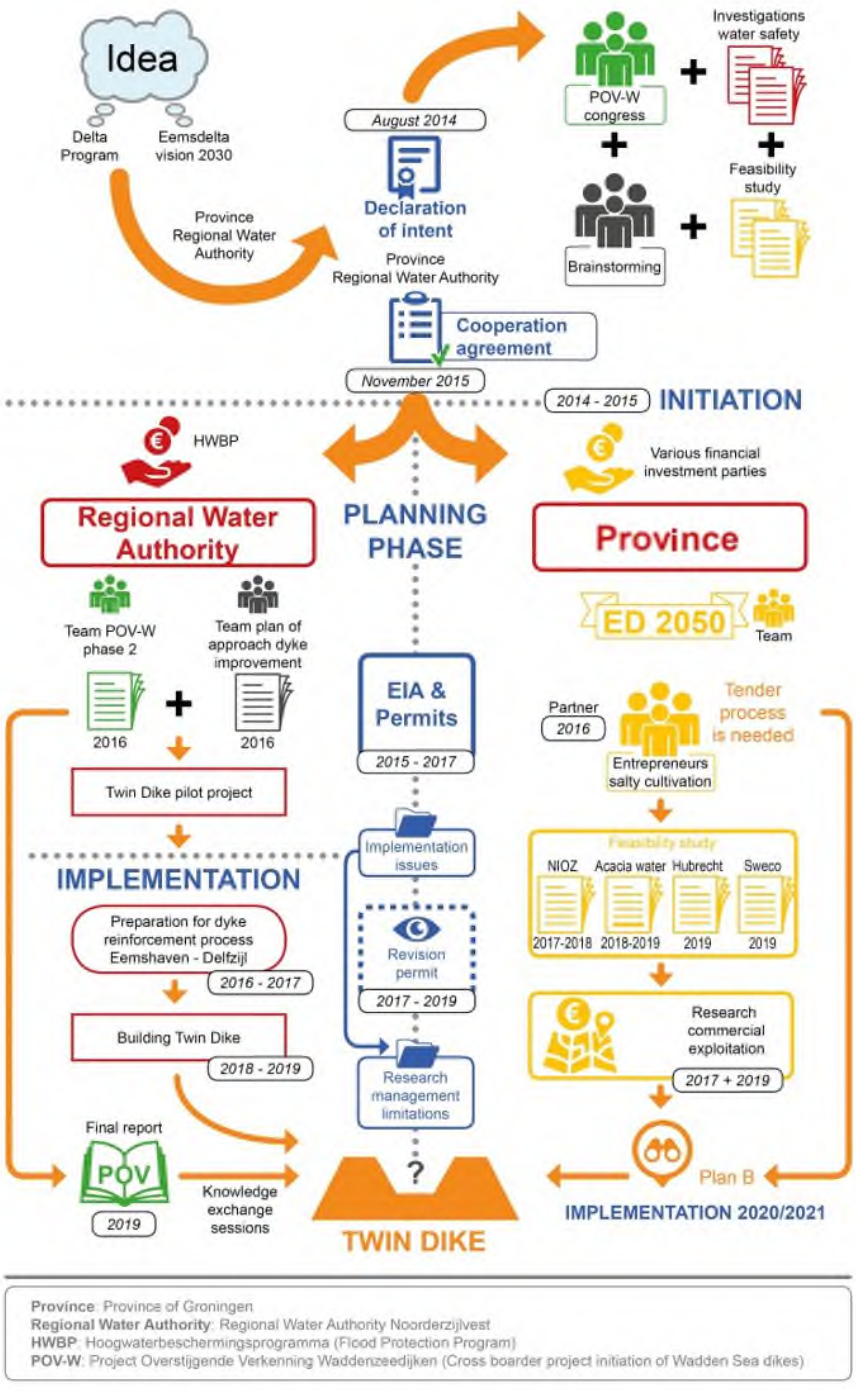

FIGURE 5: PROCESS DESCRIPTION OF THE TWIN DIKE REINFORCEMENT PROJECT (EEMS-DELTA 2050, 2019).