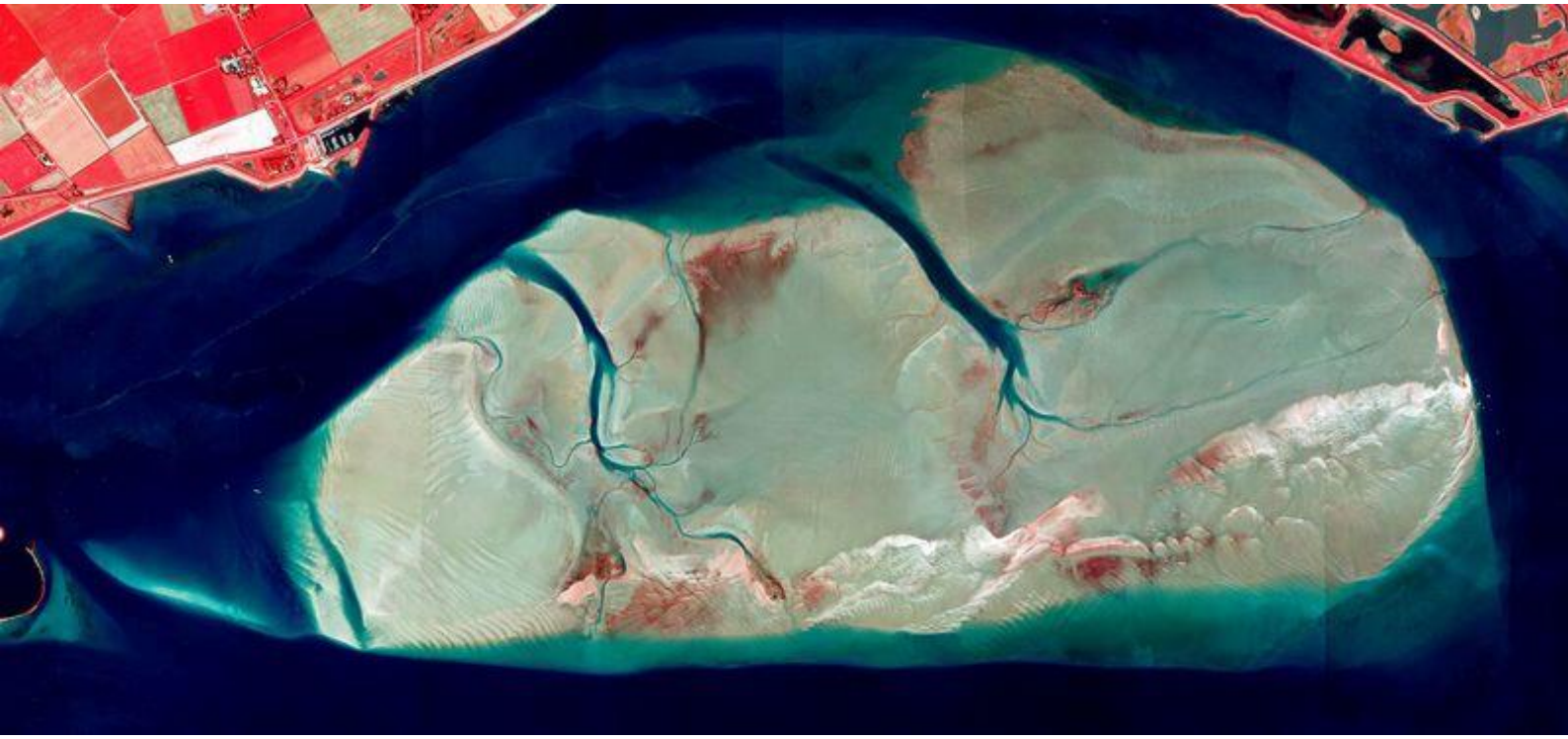

Building with Nature on the Roggenplaat

A policy arrangement for the sand nourishment project on the Roggenplaat

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Bachelor thesis

Geography, Planning and Environment (GPE)

Nijmegen School of Management,

Radboud University

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Number of words: 22.793

Date: 9-7-2020

Summary

With the growing problems of climate change, sea-level rise, rapid urbanization and many others, the use of nature-based solutions is becoming more present in research and practice. Where nature-based solutions is described as: ''living solutions inspired by, continuously supported by and using nature, which is designed to address various societal challenges in a resource-efficient and adaptable manner and to provide simultaneously economic, social, and environmental benefits'' (Maes & Jacobs, 2015, p. 121). These NBS are seen as effective methods to deal with these challenges. However, there are some issues regarding the vagueness and uncertainties of the NBS concept to successfully implement. There are not yet specific guidelines for NBS implementation in rural or coastal areas and because it can be difficult for the governance to deal with dynamic and complex natural systems and successfully implement NBS here. Building with Nature is a closely related concept of NBS that takes the natural system as a starting point and has to deal with the same difficulties.

The Oosterschelde, as a natural park, is dealing with so-called *zandhonger*. This leads to the slow loss of important parts of nature, sandbanks, in that area. The Roggenplaat sand nourishment is the first sand nourishment in an intertidal zone (on a big scale) as a Building with Nature project. Together with various actors from different backgrounds, the project was being executed after several smaller experiments, monitoring and research in the Oosterschelde. This sand nourishment is an important project for saving crucial nature (birds and seals) in that area and to guarantee water safety (less impact on nearby dikes).

This project is interesting to analyze trough different aspects (e.g. financing, natural area, actors, contradictory interests) and the scientific research suggests to apply share learning across projects. Shared learning leads to better implementation of NBS in different fields and creates knowledge for good practice. This study applies the PAA on the Roggenplaat nourishment project in order to understand, map and describe the policy arrangement of the Roggenplaat. In describing the policy arrangement of this project, conditions for success and failure are derived and lessons are created for further NBS projects. This study will contribute to the existing literature because it is the first time the PAA is applied to this unique case with the mentioned complex and dynamic character. It will also add to the literature on coastal/rural NBS since the main focus is often on NBS in cities. Following these thoughts, this is the main question of this study: *'What are the institutional conditions that influence success for the policy arrangement of the nature-based solution project on the Roggenplaat?'*

This study uses the Policy arrangement approach from Arts, Leroy and van Tatenhove (2006) created in the domain of understanding environmental Policy changes and renewal (e.g. content, instrumentation and organization) (Arts, Leroy, & van Tatenhove, 2006). This approach uses four dimensions to elaborate the policy arrangement, i.e. actors and their coalitions, rules, resources and power and discourses. This study uses these four dimensions so that the conditions for evaluation and lessons can be retrieved. The structure of the results follows the operationalization of the dimensions as can be seen in the figure below.

Policy arrangement approach	Content/ Substance	Discourses	Problem Definition
			solution approach
			General ideas about society
	Organisation	Actors & Coalitions	Type of actor
			Tasks
			Responsibilities
			Coalition and Opposition
		Resources & Power	Financial resources
			Knowledge
			Power
		Rules	Laws
			Procedures
			Policy

Operationalization of the Policy arrangement approach

To answer the main question, I will now formulate how the study is structured. The first chapter is the introduction including the research goal, the relevance of this study and the formulation of the research questions. The second chapter presents the theory, the conceptual model and the operationalization. The third chapter describes the research strategy, the research materials and the planning. After that, the results will be presented according to the different dimensions. Finally, the conclusion is formulated including a discussion and a reflection.

Based on the results and the institutional conditions for success, I have formulated the following lessons for the further use of the NBS and BwN concepts:

The first lesson is: *The Roggenplaat has a key focus on nature restoration but due to the multifunctional nature, other crucial factors (such as the vital economy) requires a careful approach and the adjustment of the design and practice according to these factors.*

The second lesson this study shows is: *A solid preparation, a good monitoring program and system-based knowledge are crucial factors for a successful result due to the uncertain character of this building with nature project and the complexity of natural areas*.

The third lesson is: *There needs to be considered that, in some cases, it can be challenging to implement innovative Building with Nature projects in everyday routines and policy practices. This might require new policies or rules to fit these kinds of projects in everyday practices*.

The last lesson I want to mention is: *A deeper collaboration (e.g. getting to know each other at the start) between the actors and the involvement of the relevant actors from the beginning has positive effects for the outcome of the project and the experiences of the actors.*

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1. Introduction

1.1 Background

Nature inclusive solutions seem to be getting a firmer presence in the Netherlands. This is implemented in various fields and in different ways and concepts like climate buffers (klimaatbuffer) or building with nature (bouwen met de natuur) (Natuurlijke Klimaatbuffers, 2019; ecoshape, 2018). The broader concept named more often the last couple of years (dealing with core elements of both climate buffers and BwN) in the Environmental domain in the EU is nature-based solutions. This concept is introduced through the innovation and policy domain by the European Commission in the final report of the expert group (2015) and is a new part of the discourse around earlier concepts like natural capital and ecosystem services (Nesshöver, et al., 2017; Faivre, Fritz, Freitas, Boissezon, & Van de woestijne, 2017). The European Commission. This concept is mainly introduced to promote the use of nature in providing solutions for climate challenges, mitigation and adaptations (Nesshöver, et al., 2017). The Expert Group has listed over 300 interventions that could possibly be applied in NBS and classified them in various themes (e.g. climate regulation, water flow regulation, erosion regulation or disease regulation) and areas (e.g. forests, coastal areas, urban setting and agricultural land).

Despite the broad framing of the term nature-based solutions (which will be discussed later), according to the European Commission, nature-based solutions have the possibility to address four different goals. These goals are: enhancing sustainable urbanization, restoring degraded ecosystems, developing climate change adaptation and mitigation and improving risk management and resilience (European Commission, 2015). The Commission also named 7 different priority actions (for dealing with societal challenges) that can be developed simultaneously with nature-based solutions such as increasing human well-being, ecosystem restoration or urban regeneration (Faivre et al., 2017). One of these priorities is 'Establishing nature-based solutions for coastal resilience'. In here, the cost-effectiveness of hard-engineering and alternatives such as soft-engineering (nature-based) with their possible multiple benefits is brought forward (European Commission, 2015).

In the Netherlands, as a country close to water, different ways of using nature for solutions are being implemented. In the context of the coast, soft-engineering (or sand nourishment) is used for a longer time in the Netherlands. With the concept building with nature (related to NBS), there are various ways in which nature is used for the coast. The biggest project of building with nature on the coast is the sand engine (near The Hague). This is a peninsula consisting of 17 million m^3 in the shape of a hook that distributes the sand along the coast with the power of natural forces (wind, waves, and tides) (Schipper, et al., 2016). This is a unique project and seems to have effective and positive outcomes for recreation, nature and the strengthening of the coast (De Zandmotor Delflandse kust, 2020). For this project and for the concept brought forward by the European Commission, nature-based solutions seem to have win-win outcomes and multiple benefits (Eurpean Commission, 2015; thinknature, 2019). However, there are also some constraints and the question that rises is how nature-based solutions are successfully planned and implemented (Nalau, Becken, & Mackey, 2018).

In this study, there will be focused on a recently executed project of sand nourishment on the Roggenplaat. The Roggenplaat is an big sandbank in the Oosterschelde and is flooded few times a

day. The island contains a nutrient-rich soil and is therefore an important stopping-off point for migratory birds. Also, the sandbank forms an resting place for seals. Furthermore, the island contributes to the safety of the coast because the sand breaks the waves and reduces the impact on nearby dikes (Rijkswaterstaat, 2019). Sand nourishments (a total of 1.3 million m^3) were applied on seven different parts on the 1460 hectares big island. And will, possibly, have multiple benefits in the near future (Rijkswaterstaat, 2020). Because the organization Natuurmonumenten started crowdfunding for the project and raised 13.500 euro (from 300 donors), the public support was shown. Without this, the sand nourishment might never have happened (Wesseling, 2019). Including the donors, natural organizations, the province, municipalities, and the state, this project had a broad collaboration (Interreg Vlaanderen-Nederland, 2019). This project brings together multiple interests and, as the first sand nourishment in an intertidal area, creates knowledge that can be used for nature-based solutions in the future. As the minister of Infrastructure and Water Management (Infrastructuur en Waterstaat) stated: 'With the embankment of the Roggenplaat, we not only guarantee a nutrient-rich sandbank. With this project, we bring different interests together. We guarantee a smart coastal defense, build a rich and diverse nature and create opportunities for economic development. We have again acquired much new knowledge here in Zeeland with this beautiful project' (Rijkswaterstaat, 2020).

As NBS is a relatively new term, there have been multiple studies on the concept but also knowledge gaps in practice, partly because of the uncertainties and vagueness regarding the concept and the main focus on NBS in cities. Considering these difficulties, it is important to produce knowledge together with policymakers, scientists, practitioners and citizens to add value to the concept. Formulating best practices, creating a knowledge base and an NBS community of innovators are crucial actions for further development. The lessons of the Roggenplaat project can add to this development as the first sand nourishment project in an intertidal zone. The broad collaboration of various stakeholders and the combination of different interests and conflicts make this project important for the NBS concept in practice. The more NBS projects are implemented in different contexts and areas, the better the NBS concept will be in the end. The Policy arrangement of this project gives an insight into the choices for implementing a nature-based solution in this area and the content and organization of the project.

NBS requires and change in culture, the easiest way is to rely on hard infrastructural types of solutions. NBS also asks for more time, effort and money because the natural system can be complex and because different stakeholders are included, all interests needs to be taken into account. Therefore, this study will mainly focus on the analysis of the Roggenplaat nourishment as an NBS project in order to improve the further implementation.

1.2 Research goal

In the context of the earlier mentioned growing implementation of nature-based solutions and Its multi-beneficial character, the implementation and the outcomes of NBS in specific domains and fields are important for future projects. Future NBS require knowledge on different domains (multi-actor, resources, power relations etc.) and an interdisciplinary approach since it serves multiple interests. Furthermore, share learning across different NBS projects can help in creating good practice and the further development of the concept (Nesshöver, et al., 2017).

Next to the advice for share learning, there are some difficulties related to the vagueness and uncertainties of the concept. These difficulties of NBS include the following:

- All the relevant stakeholders needs to be democratically involved while considering the equity between stakeholders and social cohesion. How can fairness be judged and how can different outcomes be evaluated (Nesshöver, et al., 2017)?
- Finding positive and all-benefiting NBS is quite difficult seen the complexity of problems and multiple trade-offs between stakeholders.
- Difficulty regarding the elaboration of NBS: the framing of nature is important but also difficult, what is meant with 'nature' or 'natural' (Nesshöver, et al., 2017)?
- 'Choices and decisions have to consider larger temporal and spatial scales and integrate diverse values' (Maes & Jacobs, 2015, p. 123). Therefore, the conflicting goals and interests needs to be integrated.
- 'There is a lack of sufficient guidance and technical support in terms of instructions for implementation and maintenance' (thinknature, 2019, p. 93).

The Roggenplaat building with nature exists in broader policy practice and the policy arrangement approach can help in analyzing the on-going institutionalization of NBS. With the need for share learning in the development of the concept of NBS, the best practices and lessons from this project can contribute to a better implementation. Especially because this project is executed in a complex and dynamic natural system and there is a lack of guidelines for this type of NBS. These relative new kinds of solutions are still being explored and it's often the easiest to use practices that are embedded in everyday routines (e.g. hard solutions). In this case, the building with nature approach on the Roggenplaat differs from the traditional approaches, which are mostly based on hard materials and infrastructure. NBS serves multiple interests, includes multiple actors and can be a part of the change of the traditional view.

Concluding, this study is important because there are no specific guidelines for NBS implementation in rural/ coastal areas and because it can be difficult for the governance to deal with dynamic and complex natural systems and successfully implement NBS here. The research goal is therefore formulated as follows:

''*Gathering insights on the Policy arrangement of building with nature by the Roggenplaat and identify the institutional conditions for success in order to formulate lessons for future nature-based solution projects.*''

1.3 Research Questions

According to the formulated research goal and interest in the policy arrangement of building with nature on the Roggenplaat, the following research question is formulated:

'What are the institutional conditions that influence success for the policy arrangement of the nature-based solution project on the Roggenplaat?'

The sub-questions will be formulated according to the four dimensions of the Policy arrangement approach. Also, the evaluation and further lessons from the project is formulated in a sub-question. These questions will help to answer the main questions and elaborate on the policy arrangement of building with nature on the Roggenplaat.

Sub question 1

'Who are the actors (and their coalitions) regarding building with nature on the Roggenplaat?'

Sub question 2

'What are the rules of the game (policy) for building with nature on the Roggenplaat?'

Sub question 3

'What are the resources and power relations for building with nature on the Roggenplaat and how are they distributed?'

Sub question 4

'What are the present discourses (and programs) for building with nature on the Roggenplaat?'

1.4 Societal relevance

This research is most relevant for policymakers on the regional level (municipalities or province), planners and businesses (e.g. Boskalis) that could implement NBS. Nature-based solutions is a concept that, in practice, can bring together multiple interests. Furthermore, the concept is a part of the broader environmental domain, dealing with the effects of climate change in a path to a sustainable future. It also has the potential to deal with problems like climate change and rapid urbanization within the sustainable development goals (Davies & Lafortezza, 2019). It is relevant for policymakers to know the practical implications of this analysis in order to successfully implement this method and deal with these growing issues. In evaluating the policy arrangement of the Roggenplaat, the lessons for the further use of NBS can help in implementing it in a successful way. Shared learning is important in the development of the concept (Nesshöver, et al., 2017). In the Netherlands, the Building with Nature technical knowledge is at a further stage, with many research organizations that have knowledge on natural areas (e.g. Sand Engine The Hague). However, it can be hard to include all the different disciplines and actors and apply these projects within everyday imbedded routines and institutions (Janssen, van Tatenhove, Otter, & Mol, 2015). Since there are not yet specific guide lines for these NBS practices in different fields, it can be a governance problem to successfully implement this. Traditional approaches are embedded in everyday practices and implementing these newer NBS practices can cause some issues to arise.

1.5 Scientific relevance

The dominant literature around nature-based solutions is mostly centered around urban areas (Kabisch et al., 2016; Frantzeskaki, 2019; Frantzeskaki et al., 2019; Raymond, et al., 2017). This makes NBS on rural areas less present in literature, while NBS can be a successful strategy for restoring and rehabilitating ecosystems and directly help in realizing the sustainable development goals (Keesstra et al., 2018). In studies about the coast, the success of NBS can be seen in the concept building with nature in for example the *Zandmotor* at the Dutch coast (Keesstra et al., 2018). The project of building with nature on the Roggenplaat is partly part of this coastal success. The combination of various aspects like recreation, biodiversity, economic aspects and coastal protection makes this project valuable for the research on rural and coastal NBS. While the *Zandmotor* is directly aimed at coastal protection, the focus of the Roggenplaat is mainly aimed at nature (in combination with the other aspects). Furthermore, this project is, as mentioned, the first building with nature implementation in an intertidal zone. Which makes it interesting because these areas have very complex and dynamic systems with accompanying uncertainties. This project can therefore strengthen other intertidal zones or areas with these characters (Balkenende, 2019). An important knowledge gap put forward in the literature is the overlap and the description associated with concepts that are linked to NBS (Nesshöver et al., 2017). Stakeholder participation, for example, is very difficult regarding the fuzziness of the concept. This study can give insights in how actors can work together from different disciplines in these types of projects. In the development of the project on the Roggenplaat, the crowdfunding for financial support seemed important in addressing the problem to the higher authorities (Wesseling, 2019).

This study will contribute to the existing literature because it is the first time the PAA is applied to this unique case with the mentioned complex and dynamic character. This will also add to the literature on rural (coastal) NBS. By making an evaluation and formulating lessons for further solutions, the concept can likely be implemented more successfully, keeping in mind the context of the project.

2. Theory

2.1 Theoretical Framework

2.1.1 Nature-based solutions

In the final report of the expert group on nature-based solutions and re-naturing cities (2015), nature-based solutions are introduced as an alternative way of dealing with social, environmental and economic challenges in a sustainable way. Nature-based solutions are actions that are copied from, supported by or inspired by nature and is in the framework for research and innovation of the Commission (European Commission, 2015). This approach of NBS is not a term that suddenly got introduced, there are other older concepts that fit in the discourse that produced the concept of NBS. The concept of ecosystem services is widely accepted and together with biodiversity, the platform IPBES (Intergovernmental Platform on Biodiversity and Ecosystem Services) gives advice on these domains. Also in other concepts and perspectives, there have been reflections on the role of mankind on natural resources, the environment and biodiversity (Nesshöver, et al., 2017). With the earlier concept of biodiversity conservation in mind, the concept of NBS goes beyond the traditional view by integrating societal factors such as human well-being, economic development or governing principles (Eggermont, et al., 2015).

The look on the systematic crossing of our planet boundaries with the use of non-renewable resources threatens the economy as a whole (Meas & Jacobs, 2015). Human activities could result in irreversible changes in the environment, think about climate change, natural resources or clean water provision (Eggermont, et al., 2015). Therefore, with keeping in mind economic growth and sustainable growth, NBS can serve both goals. In policy, the European Commission, this concept is expressed as an innovating concept that creates jobs and growth towards a green economy (Eggermont, et al., 2015). The definition of nature-based solutions according to the handbook developed by Think Nature is: 'actions inspired by, supported by, or copied from nature that: deploy various natural features and processes in a resource-efficient and sustainable manner; are adapted to local systems into diverse spatial scales, redefining the role of nature in urban, rural, and natural environments; and face social, environmental, and economic challenges, leading to multiple benefits and supporting sustainable development and resilience.' (thinknature, 2019, p. 25). Because the concept has a broad framing, NBS can appear vague (Nesshöver, et al., 2017). As NBS is an umbrella concept, the difficulty here is where to draw the line to what is 'nature' (or natural) and what is not (Nesshöver, et al., 2017; thinknature, 2019). In practice, the NBS could range from green roofs in cities to small scale land management or larger ecosystem management. Following the handbook of nature-based solutions (Thinknature), there are three main types of NBS based on the level of intervention. The first type is no or minimal in ecosystems and promotes the better use of natural and protected ecosystems. The second type is NBS for sustainability and multifunctionality of managed ecosystems and aims at effective management to support selected ecosystem services. Finally, the third type is the design and management of new ecosystems, a more transformational approach (thinknature, 2019). This is based on the typology proposed by Eggermont et al. and is based on the trade-offs that seem to exist, and is (Eggermont, et al., 2015). The framing of the

European Commission puts social and economic assets in the center while trying to sustain environmental conditions. On the other hand, the IUCN sees the local human communities and biodiversity as the core of NBS (Eggermont, et al., 2015). Overall, NBS is a way to integrate natural capital in planning and policies and to increase biodiversity and human well-being.

With societal challenges having an effect on multiple stakeholders, NBS needs to involve these stakeholders in the process to achieve the multiple benefits NBS can have (Nesshöver, et al., 2017). According to Nesshöver et al., and important to this study, the designing of NBS projects need to contain these five steps as key elements:

- Ensure the use of sound multi-disciplinary and trans-disciplinary knowledge, concepts and methods
- Deal with uncertainty, complexity, ambiguity and conflicts to achieve equitable trade-offs
- Ensure the involvement of multiple stakeholders and a wider public
- Develop a common understanding of multifunctional solutions
- Evaluate and monitor for mutual learning

These principles can be used as a foundation for the development of NBS as a concept and can help in putting the concept in practice. In order to formulate lessons for the further use of NBS (according to the project on the Roggenplaat), the subjective evaluation is used. Involved stakeholders, the media and relevant documents give an subjective view on the project. According to these evaluations, the aspects of success and failure are used in creating lessons for other NBS. This follows the judgement of the relevant sources.

2.1.2 Building with Nature

Building with nature is a philosophy that comes forward out of the discourse around nature-based solutions. The key foundation of the concept is the need for designs that are sustainable, cost-effective and adaptable in changing situations. Therefore, the natural system is the main subject of building with nature in hydraulic environments (ecoshape, 2018). By using natural processes like wind and waves and using natural materials like trees or sand, these solutions have multiple benefits for nature and societal functions. A strong identity of the building with nature concepts is that in making nature a part of the solution, the solutions become adaptable and flexible to a changing environment.

The building with nature concept is strongly present in the framing of flood management in the Netherlands. However, the implementation can be difficult for experts outside of the field (Wesselink & De Vriend, 2009). There are three lines (that are also interwoven) along which the BnW activities are organized (Wesselink & De Vriend, 2009):

1. Analyzing past projects to fill knowledge gaps (basic research)
2. Active involvement in ongoing BnW projects
3. Development of practice-oriented products for the user (e.g. user manual)

Building with nature can't be accomplished without the interdisciplinary collaboration and actively involved stakeholders, what already came forward in the concepts of NBS. The active involvement of stakeholders is important since it increases the chance of a successful result (ecoshape, 2018). Not only does building with nature have multiple stakeholders, it is also multi-

sectoral and multi-level (Wesselink & De Vriend, 2009). This multi-sectoral character comes forth out of the triangular approach of building with nature with the dimensions building, nature and society. Along with this multi-sectoral character, the scale of building with nature projects concerns mostly regional problems. This level is the main focus for the implementation of BwN projects since this is the level in which BnW solutions should be adopted (Wesselink & De Vriend, 2009).

As a part of the discourse of a larger domain of concepts, building with nature uses the idea of ecosystem services, which has advantages for nature and society. An example of a BnW project at the Dutch coast is the sand engine, that both contributes to coast defense and gives opportunities for recreation. Boskalis, a company that was one of the founders and investors of the BwN program, shows that BnW requires a totally different approach. The natural system is the starting point of design and with an interdisciplinary team, they start to add value for the different parties. Building with nature has the mission to realize win-win solutions and includes various advantages like cost reduction, the avoidance of environmental damage and improvements for maintenance.
The vision and goal of BwN is nicely put forward by an employee of Boskalis: ''*BnW is about creating shared values with smarter designs.''* (Boskalis, 2014).

2.1.3 Policy arrangement approach

The choice for the Policy arrangement approach for building with nature on the Roggenplaat has various reasons and is inspired by a paper about water management and spatial planning from a policy-arrangement perspective by Wiering and Immink (2006). In that study, the stability and the change of different dimensions are being studied to see that some methods, views and habits can become institutionalized but that policy domains are also in constant flux (Wiering & Immink, 2006). This inspired me to apply the PAA on the Roggenplaat since the NBS approach is a relative new method and the PAA can be used to see if and how the NBS can become institutionalized and what aspects provides a successful or failing implementation. I Therefore choose the PAA to analyze how the NBS project on the Roggenplaat is implemented and how this developed. The PAA offers a comprehensive framework based on various institutional theories to map several dimensions influencing the projects' development.

Because the approach consists of four dimensions, i.e. resources, actors, discourse and rules of the game, it deals with the different aspects of policy that are strongly interwoven (Arts & Leroy, 2006). Building with nature gives another perspective than the original 'fight against water' or the use of hard infrastructure (e.g. dikes) (Wiering & Immink, 2006). The concept of nature-based solutions is a concept that could have an impact on the different domains and might create new policy arrangements.

This approach is created in the domain of understanding environmental Policy changes and renewal (e.g. content, instrumentation and organization) (Arts, Leroy, & van Tatenhove, 2006). Thinking about Environmental Policy is an interesting subject in literature and has brought different theories. By studying environmental policy in the Netherlands, the view of institutionalism can be a good perspective. The term Policy arrangement is defined as: ''*The temporary stabilization of the content and organization of a policy domain at a certain level of policy implementation''* (Leroy & Van Tatenhoven, 2006). Although the policy arrangements are a stabilization, the institutionalization of policy arrangements is in constant change. This is based on the fact that policy arrangements are not related to one specific level of policy, but have a multi-level character (Arts, Leroy, & van Tatenhove,

2006). This can, for example be, water management or climate adaptation strategies. Since NBS is a relative new approach in relation to the embedded hard infrastructural practices (e.g. dikes), the policy arrangement can be a tool to determine how NBS relate to everyday institutional routines and practices.

In order to map and describe the policy arrangement, there are four dimensions that are heavily interrelated, meaning that change in one of the dimensions leads to change in other dimensions (Arts, Leroy, & Tatenhove, 2006; Wiering & Immink, 2006). Consequently, a change of the policy arrangement can be induced from one of the dimensions. The four different dimensions are actors and their coalitions, the division of power and influence between the actors, the rules of the game and the current discourses and programs of policy. To show the connection between the four dimensions, there is referred to a tetrahedron (a triangular pyramid), as shown in figure 1. Because the arrangement exists of four different dimensions, the four themes each highlights something else. Therefore, it is possible to approach a policy arrangement from one of the dimensions, for example from the change in actors and their coalitions (Liefferink, The Dynamics of Policy Arrangements: Turning Round the Tetrahedron, 2006). These four dimensions will be further elaborated in the following.

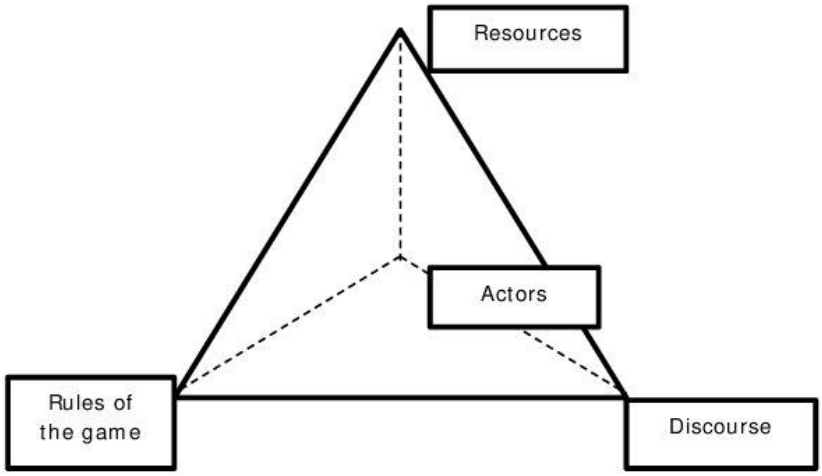

Figure 1. Tetrahedron showing the relation between the different dimensions of policy arrangement

A. Actors and their coalitions

From viewing the Policy arrangement of the actor perspective, it's the first step to identify the actors that are involved and have influence in the policy domain. Coalitions are groups of clustered actors based on a certain point of view, interest or perspective (Wiering & Immink, 2006). Actors can be analyzed in various ways. In the management of natural resources and environmental problems, Grimble & Wellard present a typology of stakeholders according to the institutional level (e.g. global, national, regional etc.) or place the stakeholders in a matrix according to their influence and importance (Figure 2) (Grimble & Wellard, 1997).

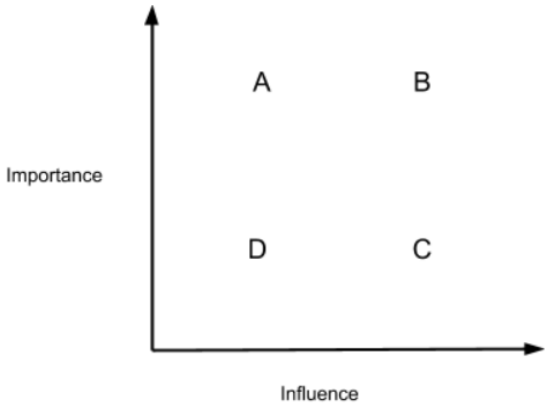

Figure 2. A system for classifying stakeholders according to their importance and influence (Grimble & Wellard)

To address the actors in the Policy arrangement, the actors are distinguished using their role in policy, from central to peripherical (Liefferink, The Dynamics of Policy Arrangements: Turning Round the Tetrahedron, 2006). This is placed in a matrix with four clusters according to the roles of the involved actors, respectively these are market, interests, expert system and state (figure 3). In an experiment with organic farmers, with some minor adjustments, all the practitioners of the field generally positioned the actors in the matrix in the same place (Liefferink, 2006). Analyzing the actors in this study is of great importance because both in the literature of NBS and building with nature, the involvement of actors in the earliest stage can be crucial for the (multi-beneficial) result of a project (ecoshape, 2018; Nesshöver et al., 2017; thinknature, 2019). Since the basic concept of NBS has a broad framing, *''stakeholder participation and the adoption of a truly systemic perspective is extremely difficult considering the fuzziness and uncertainties regarding the basic concept''* (Nesshöver, et al., 2017, p. 1224). Analyzing the actor involvement in the policy arrangement can help to identify the practice of stakeholder participation for the NBS and their roles within the project (e.g. center or periphery).

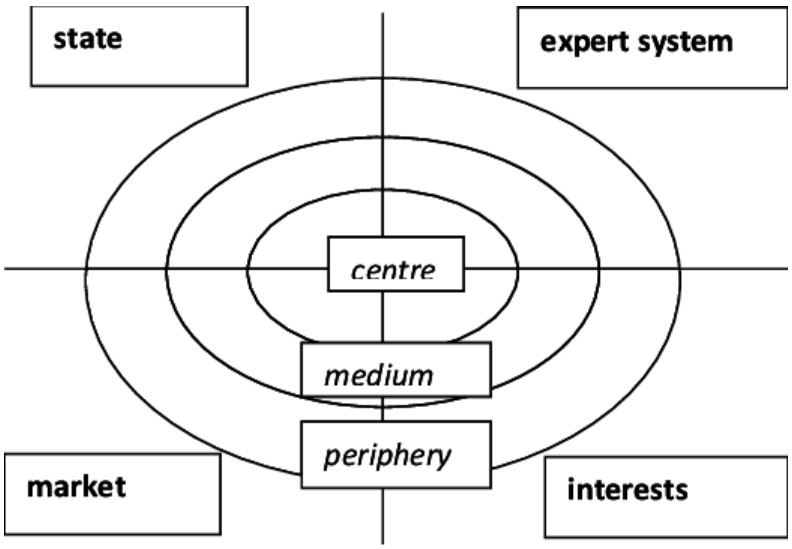

Figure 3. example of the map of actors and their positions in the policy arrangements according to arts et al. (2000)

B. Resources and power

The dimension of resources refers to the *division of power and influence between the actors*, and power being the division and deployment of resources. Influence, on the other hand, relates to the actors and their capabilities to determine policy outcomes and how (Arts, Leroy, & Tatenhove, 2006). The power and resources can also be explained by *the tools with and which an actor can exercise influence* (Wiering & Immink, 2006). This can, for example, be by the use of financial resources, the strategic use of certain knowledge and networks of stakeholders. This analysis of power and resources of actors leads to a view of the power relations between those actors. With power relations, one can see what a policy arrangement is about (e.g. knowledge or money) and which actors are driven towards or away from each other (Liefferink, 2006). The resources of the actors can be used to achieve certain outcomes and can be used to steer policy in a way. These resources could also have the form rules or discourses, which can have an important role in the interaction and decision making as a part of the knowledge of the actors (Liefferink, 2006). Because actors together produce decisions, the resources and power are of importance for the way in which the outcome will turn.

C. Rules of the game

The rules of the game in policy arrangements are: *''the mutually agreed formal procedures and informal routines of interaction within institutions''* (Liefferink, 2006, p. 56). The actors play an important role in creating the rules of the game. Hence, this dimension shows a strong relationship with the earlier mentioned dimensions like actors, as the dimensions are interwoven. It is therefore also interesting to see what will happen with the other dimensions when new rules are applied. The fourth dimension, discourses, can also be seen as the underlying rationale for the rules of interactions (Liefferink, 2006). These informal rules of the game can sometimes have an important role in decision making, like the Dutch 'polder model' (Wiering & Immink, 2006). Rules can have different forms and outcomes according to effectiveness and feasibility. Rules to structure the behavior of actors can be regulation, national and local laws or policy instruments (e.g. subsidies and

excise duties). Applying the rules on the project of the Roggenplaat makes visible the structure in which these projects are practiced.

D. Discourses

The final dimension of the policy arrangement is one about discourses and programs. The discourses are relevant at two different levels, the general ideas about the organization of society and the concrete ideas around the policy of the project at stake (Liefferink, 2006). Also for this, different actors can have different views on society or the project at stake. These underlying ideas and structures can shape the direction in which actors act, and explain their strategic positioning. To first come back to the basic concept of discourses, discourse is considered as *''an ensemble of ideas, concepts and categories through which meaning is given to social and physical phenomena, and which is produced and reproduced through an identifiable set of practices''* (Hajer & Versteeg, 2005, p. 175).

The way in which the policy arrangement describes the discourse is: the narratives and views of the actors (Arts, Leroy, & van Tatenhove, 2006). These discourses then give meaning to social and physical reality and can shape drives for actors. In analyzing the discourses, one can see the changing perceptions of problems, that are based on discourses and programs. Actors within the arrangement may have conflicting ideas that drive them. A classification that structures policy discourses can be helpful for studying the discourses relevant for the main project (Roggenplaat). The classifications according to Wiering & Immink is:

a. discourses that define reality and reflect actors' belief in the truth of certain propositions or the applicability of certain ideas (ontological discourses)
b. discourses that express desirable situations (normative discourses)
c. and discourses that give options for getting to the desirable situation (strategic, or `route', discourses) (Wiering & Immink, When water management meets spatial planning: a policy-arrangements perspective, 2006, p. 425).

The discourses around NBS also have an important role in the processes of designing and practicing projects. There can be different conceptions of the NBS viewing the benefits (win-win), advantages or the constraints of the concept. Different relatively new discourses have emerged in the planning and policy domain like biodiversity and sustainable development. Another relevant discourse around the project of the Roggenplaat is governance. The traditional ways of steering (e.g. top-down and market liberalization) are no longer sufficient and new forms including multi-level and multi-actor governance, also with new policy instruments (Arts & Buizer, 2009). These aspects of governance can be seen at the sand nourishment on the Roggenplaat.

2.2 Conceptual model and operationalization

2.2.1 Conceptual model

The theoretical conceptual model according to the literature is illustrated below (figure 4). In this model, the Policy arrangement approach concept is used as a starting point with the four interrelated dimensions. If one dimension changes, the other dimensions can be changed as well (Arts, Leroy, & van Tatenhove, 2006). These dimensions together form the policy arrangement of the project on the Roggenplaat (in this study). To evaluate the NBS at this project, the analysis of the policy arrangement is taken as a starting point. The policy arrangement of this project produce the conditions for success and lessons for the further use of the concept as formulated in the research question. For the evaluation of the nature-based solution, subjective success or failure is used. This means that the media, interviewees and other sources are used for the outcome and process of this project in formulating lessons.

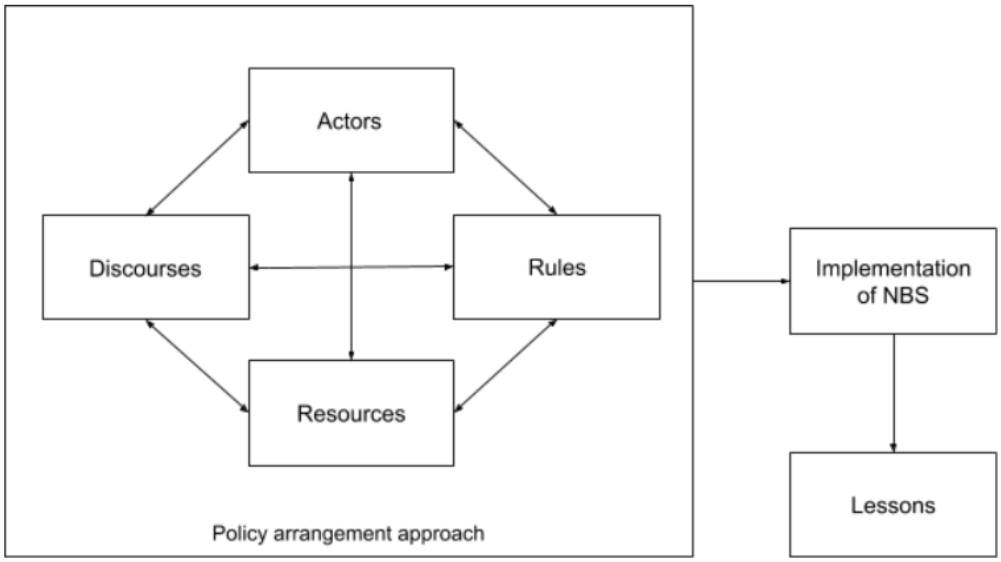

Figure 4. Theoretical conceptual model of the Policy arrangement approach and the lessons for NB

2.2.2 Operationalization

In this chapter, the Policy arrangement approach discussed will be worked out in an operationalization scheme. Because the concept may remain unspecific and vague, the operationalization helps to use this concept in the data gathering and analysis. The policy arrangement approach has operationalization through the four dimensions and makes the distinction between organization (i.e. actors, resources and rules) and substance or content (i.e. discourses). These four dimensions can be further operationalized. With discourses, the three classifications can be used, the problem definition, the finding of a solution and the general ideas about society (Wiering & Immink, 2006). The actors then can be divided into four different categories, the market,

state, interest and expert system, and their tasks and responsibilities are described. After that, the resources and power consists of concepts such as knowledge, financial resources, and power relations. Finally, the rules of the game can be divided into formal rules, procedures and policy (by formulated rules or habits/routines).

Policy arrangement approach	Content/ Substance	Discourses	Problem Definition
			solution approach
			General ideas about society
	Organisation	Actors & Coalitions	Type of actor
			Tasks
			Responsibilities
			Coalition and Opposition
		Resources & Power	Financial resources
			Knowledge
			Power
		Rules	Laws
			Procedures
			Policy

Figure 5. Operationalisation of the Policy arrangement approach

3. Methodology

3.1 Research strategy

This study has the main focus of the project by the Roggenplaat. The latter mentioned is an island an one of the biggest foreshores of the Delta area, with a surface of 1460 hectares (Delta Expertise, 2017). It is located in the west-side of the Oosterschelde and is mostly consisting out of sand (sandbank). Because of its great nutrient-rich soil, the island is designated as a part of the Natura 2000. The sandbank is a highway restaurant mostly for birds and a place of resting and nursery for seals. Besides the benefit the island gives to the animals, it also provides a good environment for recreation (Delta Expertise, 2017). Also, the island functions as a barrier for the waves and lower the impact on the coast (dykes) (Balkenende, 2019). For this case study, there has been a project on this sandbank to expand the 'lifetime' of the island. On 7 different places on the island, there have been sand nourishments to raise the level with 30 centimeter and 16.4 tons of cockles where spread out over the island. This brings various benefits to the island and different types of stakeholders (recreation, nature, economy etc.). However, the project is the first sand nourishment developed on such a big scale in the foreshore. Different stakeholders (of different levels) were involved in this project. There was also a crowd-funding that Natuurmonumenten started to financially support the project and raise awareness and gain political attention (Balkenende, 2019). The project is part of a bigger strategy regarding Zandhonger. Small experiments (e.g. nourishment Galgenplaat), research and monitoring were parts of the preparation of the Roggenplaat nourishment. Multiple actors from state, interests, market and expert system worked together to execute, design, finance and manage the project. One difficulty of the project was the chance of damage to nearby mussel growers plots. The mussel growers wanted an custom damage regulated and made an objection against the project. The procedure ended at the Council of State and caused a delay for the execution. Eventually, the project is executed by Boskalis and is being monitored for at least 10 years after the execution to follow the developments.

The case study will focus on the content and organization of this project to frame this in the broader NBS and policy in the Netherlands. There is chosen to perform a single case study. A single case produces context-dependent knowledge and is a method of learning (Flyvbjerg, 2006). Because this is a unique project with specific characteristics, the dynamic and complex context of the natural system and the first sand nourishment project in a foreshore, I hope to add to scientific development as I strategically chose the case (Vennix, 2016; Flyvberg, 2006). Also, the crowdfunding action, interests and other aspects make that the case has learning opportunities for future development. The advice of shared learning across different NBS cases also adds to the choice for a single-case study. The study of one case can help in improving implementation elsewhere (keeping in mind the constraints of a single-case study).

Figure 6. The Roggenplaat and the seven highlighted locations chosen for the sand nourishment

This research is done in a qualitative way since the research is descriptive and focusses more on the meaning and context of the project. There are different interpretations and meanings through interaction of actors with the world (Merriam, 2002). Furthermore, in the way of implementing the policy arrangements approach, the interesting and important concepts such as discourses, power relations, and formal and informal rules are hard to analyze using a quantitative approach. Qualitative data gathers in-depth knowledge about the subject and gets a better understanding of the whole project dealing with multiple (conflicting) interests, different stakeholders, rules and the wider context (Vennix, 2016). Qualitative research is also richly descriptive and inductive in order to understand the meanings of concepts but also: *''(…) understand situations in their uniqueness as a part of a particular context and the interactions there''* (Merriam, 2002, p. 5). To gather a sufficient amount of qualitative data and to assure the validity of the research, triangulation is used. Triangulation means that you gather more than one method of data collection on the same topic (Vennix, 2016). Therefore, by using different methods, you can capture different dimensions of the same topic. Furthermore, this can strengthen the position of the outcome due to various aspects. For this research, the methods for data collection are: interviews, documents and news articles which will be further explained in the next chapter (research material).

3.2 Research material

3.2.1 Documents

Document analysis is the first used qualitative method in this study. Different documents are being analyzed and interpreted to get an understanding. According to Bowen, the analytical procedure of document analysis includes: *'' finding, selecting, appraising (making sense of), and synthesising data contained in documents''* (Bowen, 2009, p. 28). The types of documents are for example background papers, journals, program proposals, policy documents and public reports. All these types of documents can help to discover the meaning, develop understanding and getting insights that are relevant to the research (Bowen, 2009). Some advantages of the document analysis are the following: document analysis relatively less time-consuming, many documents are easily available, documents are stable (repeated review), documents covers widely (long span of time, events and setting) and documents are exact in including names, details of events etc.

For this research, the use of documents is relevant because the content and organization of the project are often part of larger structures that are documented. For example, laws and policies can support or discourage certain activities and exist on a local, regional or national level. It can, therefore, have essential added value for the research. The main types of documents that is used for this study are policy documents, law documents, media articles and research/advice reports. The factors for evaluation (success or failure) for this project is specifically being looked upon by an media analysis of news article about the sand nourishment. Multiple articles have been analyzed in order to see how the project is evaluated. With this method, these media articles together with the interviews can give an subjective evaluation as a basis for the creation of lessons.

3.2.2 Interviews

Another important method that will be used to gather qualitative information are (semi-structured) interviews. The goal of interviews, is in an abstract way, to produce information together with the respondent (Wagenaar, 2011). An advantage of the use of interviews is that internal validity is high. However, the external generalization is low due to the open character of interviews and this being a single case study (Vennix, 2016). Interviews of different respondents can differ from each other and can't be well compared. On the other hand, Interviewing the stakeholders with different views, interests and expertise can together produce a complete picture of the project. In conducting an interview and get the information you need, the role of the interviewer is of great importance. The interviewer can further explain the question and make things more clear to avoid the wrong interpretation of the question to produce correct information. The answers need to be honest, relevant, complete and clear for them to be useful (Boezeman & Donkers, 2017; Vennix 2016). In this research, semi-structured interviews will be used. This type of interviews gives a structure to the interview with pre-made questions (sometimes related to themes) but also leaves room for other interesting topics and themes to come forward that are relevant for the research. An important aspect of these interviews is that the questions are not compulsory. The stakeholders that are

relevant for the research are from different professional and educational levels and therefore make it hard to use a standardized interview schedule (Barriball & While, 1994).

Interviews will also be the main source of this research since the topic is specifically focused on the Project on the Roggenplaat (case study) and literature about the content and organization is barely existing. However, the project is part of a wider context related to the project that also needs to be included. For the structure of the interviews, the different dimensions of the policy arrangement are used as themes. This gives an indication of what information is need to answer the research questions. Also, evaluation questions are included to see what are lessons for the further development of the concept of NBS.

Table 1.

Overview of the interviewees

Name	Date	Location	Function
Joost Stronkhorst (Interviewee 1)	April 24, 2020	Interview via phone (skype call failed)	Lecturer Building with nature at HZ & Researcher integral coastal management
Corné Appello (Interviewee 2)	April 30, 2020	Interview via Zoom	Project manager of the execution (tender) of the sand nourishment from Boskalis (contractor)
Eric van Zanten (Interviewee 3)	May 15, 2020	Interview via Skype	Project manager from Rijkswaterstaat and the wider *Zandhonger* strategy Oosterschelde
Addy Risseeuw (Interviewee 4)	May 20, 2020	Interview via Phone call	Secretary at PO mosselcultuur. Representative of the mussel growers during this project
Frans van Zijderveld (Interviewee 5)	May 26, 2020	Interview via Phone call	External policy Zeeland and Zuid-Hollandse Eilanden (zuidwestelijke delta) and steward Zeeland at Natuurmonumenten, involved through Natuurmonumenten

The actors that are interviewed can be seen in the table above (table 1). These actors represent the most important actors from the different clusters (i.e. market, state, expert-system and interests). This study tried to include all the relevant actors in order to get an balanced and representative view of the project, including not only supporters of the project but also the view from the opposition (mussel sector). J. Stronkhorst was my first interviewee as I wanted to get a good background on Building with Nature, the design of the project and the project itself. Secondly, the interview with Corné Appello was from the perspective of the contractor Boskalis. Thirdly, Eric

van Zanten is an important actor from Rijkswaterstaat as the initiator who has been involved in the project from the start (including the earlier Zandhonger strategy). Addy Risseeuw is the representative of the mussel growers in the Oosterschelde, and addressed their problems and worries. Finally, Frans van Zijderveld is an important actor from Natuurmonumenten as a part of the initiator and as an involved actor in the project.

3.2.3 Coding Documents and Interviews

For an structured analysis of the documents and interviews, the program, atlas.ti is used. The text is analysed trough assigning codes (labels) following the operationalization of the Policy arrangement approach and other relevant theme's such as the success factors for the project. The texts are structurally analyzed by assigning codes with names according to the four dimensions. These are then further specified to understand what is meant with the code. For example, the code *Rules- Importance Natura 2000 policy* is assigned. In some cases, *comments* help to elaborate the code even further or specify the assigned codes. In this scenario, the code can be further elaborated by writing a comment for that code: *interviewee X finds that Natura 2000 policy is strictly being followed in this area and therefore is important.* This contributes to the correct understanding and interpretation of codes in order to present reliable results based on the raw data. All the codes with *rules* are then put together in a code group. This creates an overview of all the relevant knowledge from the interviews and documents about the rules regarding the project. All the relevant information is therefore put together and can be used for the further analysis of the study. This approach is used for the coding of the documents and interviews.

4. Results

4.1 Actors and actor coalitions

To establish the policy arrangement of the Roggenplaat nourishment, one dimension following the PAA of Leroy & Arts (2006) describes the actors involved and their coalitions (Arts, Leroy, & van Tatenhove, Political Modernisation and Policy Arrangements: A Framework for Understanding Environmental Policy Change, 2006). In this chapter, the involved actors will be mapped by describing the tasks, responsibility and type of the actor. Next to the individual description of actors, it's also important to show the relation between the different actors. As Liefferink suggests, to get an overview of a certain policy arrangement, the actor perspective is the most tangible way (Liefferink, The Dynamics of Policy Arrangements: Turning Round the Tetrahedron, 2006). And through the actors involved, the rules of the game, discourses and resources arise. The Roggenplaat project had a wide range of involved actors and is assigned according to the four different types of actors, i.e. state, expert system, market & interests. Also, analyzing the actors based on shared believes and the views they have on the policy domain can be used to better understand the policy arrangement (Liefferink, The Dynamics of Policy Arrangements: Turning Round the Tetrahedron, 2006). A specific aspect of this project was the relatively intense collaboration between the initiatory actors which will be explained further later on (e.g. Boskalis, Rijswaterstaat & Natuurmonumenten)

4.1.1 State

Ministry of Infrastructure and Water Management

This is a crucial actor for the wider zandhonger challenge. The ministry established that there was attention for this problem and financed the research of the zandhonger in the Oosterschelde and the accompanying negative effects (Interviewee 3, personal communication, May 15, 2020). In the first place, the Natura 2000 goals could have been changed in a way that there is no need to deal with it. But they focused on finding solutions for the problems. This actor is therefore important for putting the strategy regarding zandhonger in motion. Thereafter, the executing body, Rijkswaterstaat, conducted the research and worked out a strategy. Also, the state financed close to half of the Roggenplaat project (i.e. 6 million euros) (Wesseling, 2019).

Rijkswaterstaat

Rijkswaterstaat is the executive part of the ministry of Infrastructure and Water Management. This governmental body is considered to be the most important actor for this project (Interviewee 4, personal communication, May 20, 2020; Interviewee 1, personal communication, April 1, 2020). Rijkswaterstaat is the main initiator of the Zandhonger strategy, of which the Roggenplaat nourishment is a part. In the context of the Roggenplaat project (the zandhonger challenge), Rijkswaterstaat executed a MIRT (Meerjarenprogramma Infrastructuur, ruimte en transport) to see what possible solutions there are for reducing these problems (van der Werf, et al., 2016). Prior to the Roggenplaat project, there were experiments with sand nourishments on a smaller scale in the Oosterschelde that lead to lessons for the Roggenplaat, as the core focus of the strategy. One of these lessons was that the mussel sector is an important actor. Therefore, ''from the start, we had the goal to keep the mussel sector satisfied. It's an important part of Zeeland, the Zeelandse mussels, and that's why it's very important'' (Interviewee 3, personal communication, May

15, 2020). Thus, Rijkswaterstaat treated the sector very carefully, listened to their problems and paid attention to the situation. This actor is seen as the best man for the job, they have the best knowledge and resources to do this and also take responsibility for their actions (Interviewee 1, personal correspondence, April 24, 2020).

Rijkswaterstaat has two main interests in the project. First, they need to act based on the Natura 2000 guidelines for this specific habitat of the Oosterschelde. Secondly, they also have an interest due to water safety. Because the nourishments cause less impact of the water on the dike and therefore reduces maintenance costs.

To be more specific on the tasks of Rijkswaterstaat, in the pre-project phase, this mainly consisted of the conducting of research for the project, the involvement of actors, the request of permits and the formulation of a plan. The actual design of the project is made by the HZ (Hogeschool Zeeland) in a consortium, a collaboration between scientific education and research institutions (Interviewee 5, personal communication, May 26, 2020). One of the key aspects in the pre-project phase and during the project was the finding of the relevant actors and involving them in the project. Rijkswaterstaat does this trough what they call omgevingsmanagement. This involves the active attention for the visions and problems of the actors and the collective searching of a proper solution. This is different than how it normally happened in the past. 20 Years back, a plan or project would be presented, after which the involved actors could give feedback after which the initiator would or would not adjust the design. Now, actors are involved from the start and the initiator got to pay attention to the problems and interests of the actors and look for a solution that benefits both the initiator and the other actors. The attention that Rijkswaterstaat gave to the other actors was being appreciated. They are considered to do a good job of informing and on the other side hearing from the actors (Interviewee 4, personal communication, May 20, 2020). Omgevingsmanagement was an important part of the rest of the project. Another role of Rijkswaterstaat is the position in the steering committee of the Roggenplaat project was the management of the project took place. Eventually, Rijkswaterstaat assigned the project to the contractor Boskalis and focused on the further guidance of the project.

Normally, Rijkswaterstaat has its own project organization and doesn't work very close together with an external actor. However, it was new that they so closely worked together with Natuurmonumenten as an external actor (Interviewee 5, personal communication, May 26, 2020). Only in one previous project in the Oosterschelde, Rijkswaterstaat had a close collaboration with Natuurmonumenten. This was for both actors a comfortable way of working, and they want to continue the work in the Oosterschelde in the future. For the remaining work in the Oosterschelde, Rijkswaterstaat keeps working on the zandhonger strategy.

Province of Zeeland

The Province of Zeeland is also involved in this project and is an actor on the board. The interest from the actor for this project is related to the zandhonger problem of the Oosterschelde. This problem is mentioned in the *Oosterscheldevisie*, which is a document that is used as input for the new *Zeeuwse omgevingsvisie*. In this document, the urgency of dealing with zandhonger is brought forward as a threat for the Natura 2000 goals. It's therefore important for the Province of Zeeland to deal with these treats and find solutions for zandhonger and accompanying problems. The Province has three main aspects in which they were involved in the project. First, they were a part of the Roggenplaat nourishment board, where the Roggenplaat nourishment was being managed. Secondly, they partly financed the project and on top of that obtained a Interreg smartsediment

subsidy for the project with the help of other actors. Thirdly, they issued a permit for project according to the Wet natuurbescherming. They needed to assess whether the project would or wouldn't negatively affect the environment and based on that outcome, issue a permit (or not). The mentioned interest of this actor mostly has to do with the nature values in this area (Natura 2000). On the other hand, they also have an economical interest. The mussel sector is an important sector for Zeeland. In the process, the Province therefore politically supported the mussel sector in their wish to obtain a damage regulation (Interviewee 4, personal communication, May 20, 2020). For the Province, the economic sector as well as the nature areas (Oosterschelde) are both points of concern.

Oosterschelde Municipalities

There were in total of 7 municipalities in the area of the Oosterschelde that financially contributed to the Roggenplaat nourishment (Interviewee 5, personal communication, May 26, 2020). Other than the financing of the project, the municipalities had no specific tasks. They were involved in this project because they acknowledged the importance of the project, these natural areas and the accompanying economic sector (e.g. recreation) are a part of these municipalities.

Ministry of Economic Affairs and Climate Policy

The ministry has a direct role in this project because the Ministry of Economic Affairs and Climate Policy is the lessor of the mussel growers plots. This actor is only marginally involved in the case. Their role was to help in finding a solution to the problems of the mussel growers. They were present at some of the consultations. In collaboration with the initiators, they came up with the so-called *wisselpercelen*. This is a solution in case that the current plots are being damaged by the sand of the Roggenplaat nourishment. If there is damage, other plots are made available in case plots are being damaged. So they were involved in thinking about ways to deal with the risk of damage to the plots. Other than that, they did not have a specific role in the project.

4.1.2 Market

Boskalis

The execution of the project was a public enrollment (opened by Rijkswaterstaat), where different companies could apply for the project using a form of 6 pages. This included the writing of three files to show the competence of the contractor and for evaluating which contractor will do best. The first file describes the risks, for the contractor, where the risks and problems that the initiator can encounter are named. Secondly, there is a file of performance, where the contractor shows the ability to do this kind of work, why they are good at it. Finally, there is also a file about the chances, where the contractor describes the possible extra chances for the project (Interviewee 2, personal communication, April 20, 2020). After the assessment of these files, there will be interviews with the contractors after which Boskalis was chosen as the contractor for this project. For this project price was inferior to quality, and this contractor could deliver that. Boskalis is a company that does a lot in the field of dredging, offshore energy and maritime services. They were interested in this project because it fits the kind of work they like to do. Lately, the focus has been more around building with nature projects.

One reason for this is that these kinds of projects are becoming more and more part of the market. Also, as my interviewee from Boskalis mentioned: ''we think that these ecological projects are nice in getting publicity for the company. (…) it's nice to be mentioned in the news like that and

that's why these are important projects for us'' (Interviewee 2, personal communication, April 20, 2020). Boskalis, as the contractor, was an important actor for the eventual result of the project. As mentioned earlier, there was a deeper collaboration than normally most actors of projects have. The view of the different actors at the beginning of this project was: '' let's together make this a very nice project'' (Interviewee 5, personal communication, May 26, 2020). Another important task that Boskalis took was the contact and involvement of the mussel growers sector in the execution of the nourishment (Appelo, 2020). Before the project was assigned to Boskalis, they already contacted the mussel growers and listened to the problems and worries of them. The interviewee from Boskalis mentioned this: ''We very well presented our plan to the mussel sector before we were the contractor. Because of that, the mussel sector was very charmed because of how we were planning to do it, we had approval before we actually started. (…) that very much helped to create a positive atmosphere with the mussel growers'' (Interviewee 2, personal communication, April 20, 2020). In doing so, they tried to remove these worries with extra monitoring and involving the mussel growers in the execution. During the nourishment, a few mussel growers were invited to the hopper dredger to see for themselves what happens and to gain trust. Also, they adjusted the sand nourishment to times where the tides could not be negative for the plots surrounding the bank. Because of all these measures, the evaluation of the contractor by the mussel sector was very positive, they would score a 9 out of 10 (Interviewee 4, personal communication, May 20, 2020).

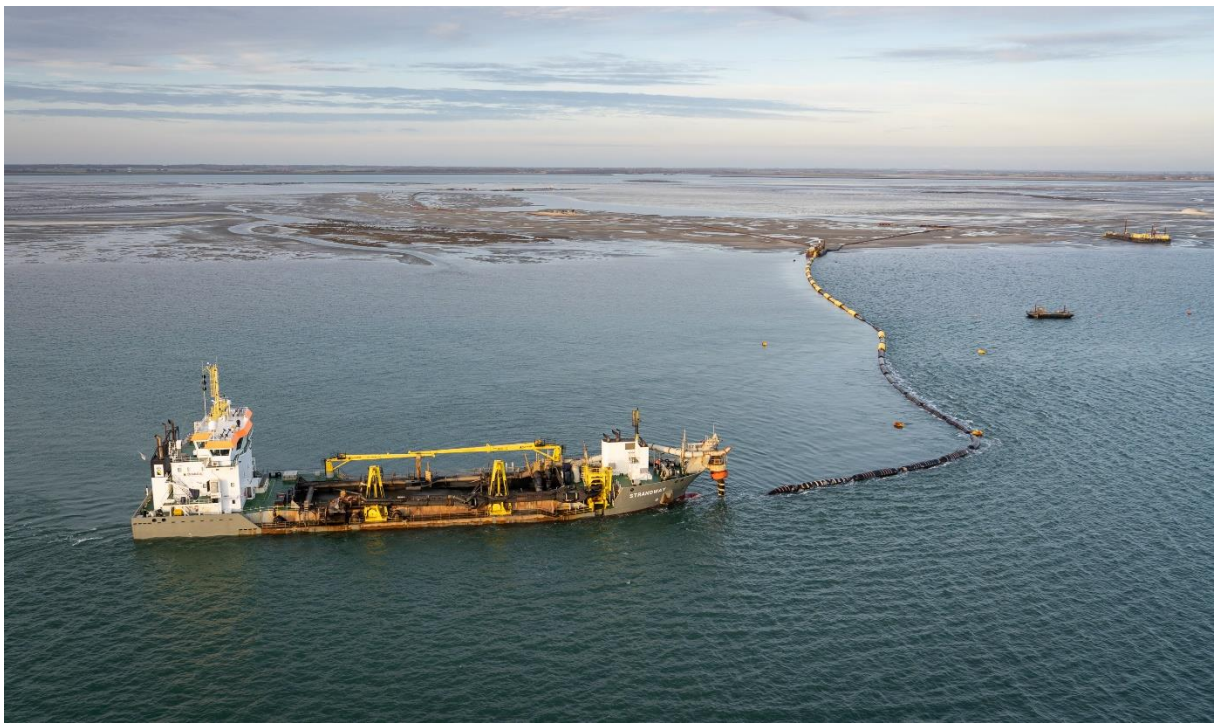

Figure 7. Execution of the sand nourishment by Boskalis (Copyright RWS/Edwin Paree)

Boskalis had the responsibility for correctly executing the project. If the execution went wrong, Boskalis was responsible. Another task that Boskalis had was the omgevingsmanagement together with Natuurmonumenten and Rijkswaterstaat. In the file with the extra chances that Boskalis handed in, there were several chances that Boskalis saw to possibly improve the result. One of the presented chances was to dredge up and spread cockles on the Roggenplaat to create a kind of kick-start for the present soil-life (priming). But not only technical chances were presented but also practical ones. Boskalis helped Natuurmonumenten with the informing of the area. Also in the form of the placement of binoculars on an old tower to give attention to the Roggenplaat

(Interviewee 2, personal communication, April 20, 2020). The execution of the project was challenging because the bank is underwater for a certain amount of time. The machines that spread the sand to the correct spots needed to be off when the water was flowing on the bank. This was a challenge for the contractor but did work out very well in the end.

Mussel growers (PO mosselcultuur)

One of the most important actors is the mussel growers in this project. This is the only stakeholder that was the direct opposite of the initiators. The mussel growers are represented by the PO Mosselcultuur (Producentenorganisatie van de Nederlandse Mosselcultuur) and have a direct interest regarding the project. To give more context on the mussel sector in the Oosterschelde, there are approximately 89 mussel growers companies in Zeeland. These companies are renting plots from the government and use those to grow mussels for consumption. Together with import and processing facilities, the average annual turnover is 200-250 million euros. That makes it an important sector for Zeeland. Moreover, next to the financial importance of the sector, it's also a characteristic sector for Zeeland, as part of the trading mark (Interviewee 4, personal communication, May 20, 2020). Their main task during the project was to address their problems, find a solution that benefits both the coalition and the opposition and together work that out.

Now to explain why this sector was the opposition. The main interests of the mussel growers in this project is economical. The plots in the area of the Roggenplaat are used to grow mussels and some are of high quality (Interviewee 4, personal communication, May 20, 2020; interviewee 5, personal communication, May 20, 2020). It's important to state that the mussel sector was not against the goal of the Roggenplaat nourishment, the fact that the nourishment would save birds and seals was not the reason to be against it. The main problem was that the nourishment could negatively affect the plots in the area during or after the execution in two ways. First, the nourishment could lead to the relocation of the sand on the plots. If a great amount of sand would end up on the plots, the mussels would suffocate and die. This could mean a disaster for the owner of the plots because these plots take a large part in the annual turn-over (Interviewee 4, personal communication, May 20, 2020). Second, the current coming from the Roggenplaat brings important nutrients for the mussels on the plots. This is the main reason for the quality of the plots. The nourishment of the Roggenplaat could lead to a change in currents and therefore negatively affect the growth of the mussels. This would end up at a reduced price and volume of the mussels.

Normally, the projects implemented by the state comes with a 'nadeelcompensatie regeling'. This is a regulation that in case a project has negative effects on an actor, this can be compensated by the government. This regulation was active during this project. However, the mussel growers were afraid that if the plots where being damaged of some sort, and the mussel grower believed it was because of the nourishment, Rijkswaterstaat would take a step back and say: there could be damage, but that can also be caused by 10 other things (not necessarily because of the nourishment). My interviewee from PO mosselcultuur mentioned the following about Rijkswaterstaat: ''(..) they want to keep their hands as free as possible to be able to say afterward that it wasn't because of the project, they were afraid that eventually there would be damage'' (Interviewee 4, personal communication, May 20, 2020) That was the main issue, the mussel growers wanted a custom settlement in case any of the plots where damaged. They wanted a good settlement so that the mussel growers would be compensated and not be the victim of this project. Although the mussel growers know that there is a small chance that the plots are being damaged, if there however is damage, they don't think it's acceptable that they are the victims of the project.

The mussel growers objected to the issuing of the permits. Their goal was not to stop the project but to acquire a good claim settlement. Eventually, they did not win at the council of state. In the end, the mussel growers think that Rijkswaterstaat did an inadequate job and didn't do enough to help the sector with these problems. The representative of the mussel growers mentioned: '' if there is damage, you cannot sneak away as the initiator and you should be fair. Just compensate the damage and not let it rest on one or two family businesses that might be the dupe of this'' (Interviewee 4, personal communication, May 20, 2020). My interviewee called Rijkswaterstaats' dealing with their issue 'morally reprehensible' several times during the fighting of the permits as an indication of their problem.

Recreation sector

The recreation sector are the actors involved from the entrepreneurs' perspective. This consists of entrepreneurs on water and on land, for example, organizers of cruises or overnight accommodations. These actors (mostly actors on water) were involved and especially helped thinking about the project, also in designing the nourishment (Interviewee 5, personal communication, May 26, 2020). They know the area and could address their point of view on the project, for example, the suggestion to fish for cockles or the releasing of 'kokkelbroed' (cockle-spawn) (Verslag bijeenkomst stakeholders Zandsuppletie Roggenplaat, 2016) Together with the initiators, certain conditions were formulated that lead to the final nourishment design (7 locations for sand nourishment). Their main interest is the function of the Roggenplaat for recreation and a chance to help thinking what's best for the Oosterschelde.

4.1.3 Expert system

Deltares

This knowledge partner worked together with NIOZ, Wageningen Marine Research and HZ University of Applied Sciences to look at the Roggenplaat nourishment, the design and the effects on morphology, nature and environment. The work that they conducted was assigned by Rijkswaterstaat.

Bodac

This is a research organization that conducted research on behalf of Rijkswaterstaat. They are the producer of some of the soil research regarding explosives and archaeological background of the sand-excavation site. This type of knowledge is needed to back up the request of an earth-removal permit. The advice that was coming from these reports is used by the steering committee of the project. All this regarding the rules for earth removal as a standard procedure.

HZ University of applied sciences

This is one of the main producers of the design of the Roggenplaat nourishment, working out the different possible designs as advice for the board. This was in a consortium, a collaboration between scientific education and research organizations. The HZ could add their own input for the design and were mainly important in the design phase. There is a research group on Building with nature on the HZ, where the HZ worked together with the important knowledge partners Deltares, NIOZ and Wageningen Marine research. These other actors were more specialized in a certain kind of knowledge (e.g. morphology).

NIOZ

This knowledge partner worked together with Deltares, Wageningen Marine Research and HZ University of Applied Sciences to look at the Roggenplaat nourishment, the design and the effects on morphology, nature and environment. NIOZ conducts research and monitors the Roggenplaat nourishment together with Wageningen Marine Research (Wesseling, Zand moet bedreigde Roggenplaat redden, 2019).

Wageningen Marine Research

This research organization researches the impact of the Roggenplaat nourishment on the functioning of the ecosystem. Also, together with Detares, NIOZ and HZ University of Applied Sciences, they conduct physical-morphological research. Another important role Wageningen Marine research had was to closely look out for possible negative effects for the nearby mussel plots and monitor the effects of the sand nourishment (Wageningen University and Research). They were assigned by Rijkswaterstaat.

Bureau Waardenburg

Bureau Waardenburg is a research organization that was assigned by Rijkswaterstaat to map the effects of the project on nature values and how these negative effects could be reduced. There is a monitoring program to follow the effects of the project. This research report is put together in light of the Natuurbeschermingswet and with the help from NIOZ.

4.1.3 Interests

Natuurmonumenten

Natuurmonumenten is an association that protects natural areas, valuable landscapes and cultural heritage. Giving nature space in the Netherlands is their main focus. In this project, Natuurmonumenten is also the initiator of the project and part of the steering committee. This association is the manager of nature in the *Zuidwestelijke Delta* and sees the importance of the Roggenplaat. Their main interest in this project is therefore to preserve this specific type of nature. This project is not the first time that Natuurmonumenten is involved in the Oosterschelde regarding the zandhonger problem. In another (smaller) experiment nourishment, Natuurmonumenten collaborated with Rijkswaterstaat.

In the pre-project phase, the main goal and task of Natuurmonumenten were to gain public attention and support for this project. An important part of showing the public support and interest for the Roggenplaat nourishment was trough a crowd-funding action. People could sign their *zandtekening* (directly translated: sand-signature) and donate money. This action yielded around 13 thousand euros. On the total 12,3 million euro costs for the project, it's not a significant amount of money. But the message helped with speeding up the project and showing the government the importance (Interviewee 5, personal communication, May 20, 2020; Interviewee 3, personal communication, May 15, 2020). Among that, other things that Natuurmonumenten did where boat trips, and explanations of the natural value Roggenplaat (e.g. trough forest rangers). Overall, this association had a great contribution to gaining public support and informing the social environment.

Later on in the project, together with the earlier mentioned Boskalis and Rijkswaterstaat, they did the omgevingsmanagement. This is informing the social environment (e.g.

entrepreneurs, inhabitants and visiters) what plans the initiators had and showing what the results would be going to be (Interviewee 5, personal communication, May 26, 2020). Also, Natuurmonumenten was the main source of communication to the public. This was beneficial for Rijkswaterstaat because they are bound to certain communication. After all, it's a governmental body. In that case, ''you have to be careful with what you are saying because if you say something wrong, it can follow the minister to the house of representatives where she must justify what has been said'' (Interviewee 3, personal communication, May 15, 2020). Rijkswaterstaat was aware of the things that Natuurmomumenten did, but Natuurmonumenten was, in the end, responsible for the communication (Interviewee 3, personal communication, May 15, 2020). Natuurmomumenten acquired a spot on the steering committee trough financing (crowdfunding), but with a relatively small amount of money. This makes it rather difficult to sit at the table as a small financial contributor. However, they contributed by helping the communication of the project by sending people (Interviewee 3, personal communication, May 15, 2020).

Recreationists and citizens

The recreation sector consists of multiple types of actors who are involved in the Oosterschelde on land and in water. This includes the diving sport, cyclers, hikers, sport fishers and people who sail. The project was interesting for them but they had no direct stake in the project. It was more the involvement for the information about the project in the area they recreate in (Interviewee 5, personal communication, May 26, 2020). My interviewee from the University of applied sciences (HZ) stated: ''they just sat there to stay updated on the area they love'' (Interviewee 1, personal communication, April 24, 2020). A partly intertwined actor are the citizens. These people financially contributed to the project or gave their 'zandtekening' to preserve the Roggenplaat. The main interest of the citizens (and some companies) in the project is the view that the Roggenplaat is important for nature and that it needs to be saved (Interviewee 5, personal communication, May 26, 2020).

Nationaal Park Oosterschelde

Nationaal Park Oosterschelde (as an organization) is a consultative body that is responsible for the functioning of the Oosterschelde (Nationaal Park Oosterschelde, n.d.). There is an independent chairman on this organization but the secretariat is provided by the Province and the communication is a part of IVN Zeeland (Nature and Education Zeeland). This actor is involved from the start and in the early years (2010 & 2013), addressed the problem of the Roggenplaat and put it on the agenda (Nationaal Park Oosterschelde, 2020). Together with the other involved actors, they looked at possible solutions. Their main interest is the preservation of the function of the Oosterschelde, including the Roggenplaat and its function for nature.

Het Zeeuwse Landschap

This actor is an organization that controls approximately 10.000 hectares of natural area in Zeeland. Their goal is to maintain and restore the values of nature. Their interest in the Roggenplaat project is based on the important function the Roggenplaat has for nature. The Roggenplaat is not under control of the Zeeuwse Landschap. However, they decided to donate 30.000 euro to the Roggenplaat nourishment (Het Zeeuwse Landschap, 2014). This non-profit organization is other then the donation not specifically involved in the project.

4.1.5 Relative positions, Coalitions and Oppositions

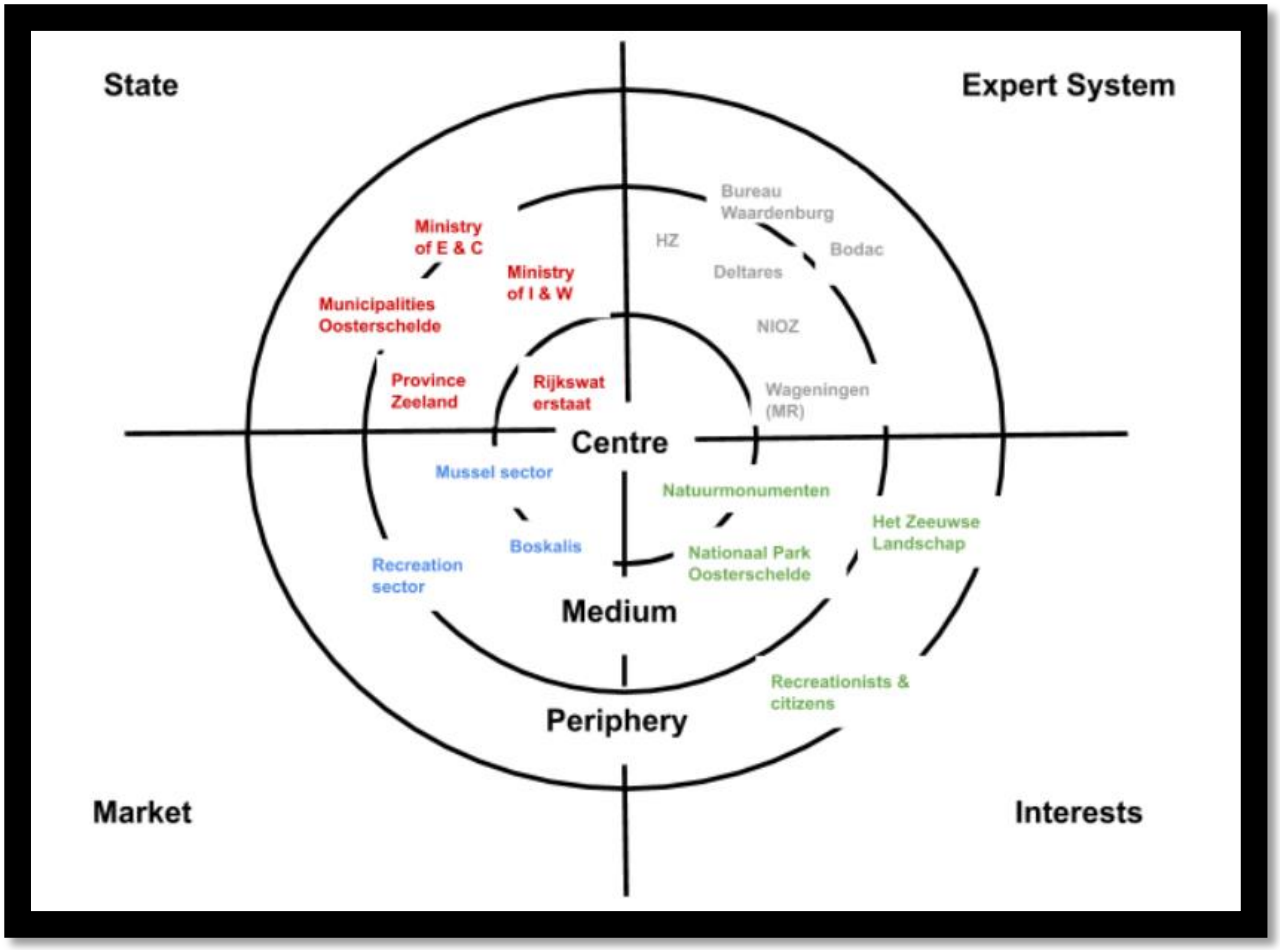

Figure 8. Map of actors and their relative positions in the policy arrangement

To view the relevant actors, following the typology of Arts et al. (2000) market, state, interests and expert system, I want to view the relative positions and their influences in the policy arrangement. The actors from the different clusters are divided in center, medium of periphery according to the interviews and documents. This provides a good basis for the power relations between the actors. While there are different clusters, the relative positions can be illustrated and used for the analysis of resources and power. The coalition consists of the important actors from state and interests, namely Rijkswaterstaat, Natuurmonumenten, the province of Zeeland, Nationaal Park Oosterschelde & the Oosterschelde municipalities. This is grounded in the collective financing and managing (solution finding) of the project, with shared views on the importance of the Roggenplaat nourishment. The type of solution was agreed upon by these actors, it was the best solution for the situation. The opposition consists largely of the mussel growers. Next to the mussel sector, some actors from the recreation sector and other entrepreneurs (e.g. fishermen) also had suggestions and ideas about the project. The interest is mainly economically because it might harm their sector and income. The interest in nature is not directly relevant to those actors. The mussel sector was partly politically supported by the Province of Zeeland, because the economic sector is also important for them. It is good to mention that the opposition and coalition are not two extremes, the coalition understands the importance of the mussel sector and their worries and the oppositions understand the reason of the Roggenplaat nourishment.

The collaboration between the actors was (mainly) good, there is no information withheld

and the goal was to turn the project into something nice (Interviewee 5, personal communication, May 20, 2020; Interviewee 4, personal communication, May 20, 2020). In the beginning, the actors wanted to get to know each other and that worked out to be positive for the rest of the project, this is indicated by the shared knowledge and risk assessment for the mussel sector. Mistakes could be addressed and it is considered as a comfortable way of working, in the end, most of the actors are satisfied with the result. This equal collaboration contributed to a successful result.

Actor networks were not strongly present in this project. As raised in the chapter on Natuurmonumenten and Rijkswaterstaat, these actors have worked together once before in the Oosterschelde but this collaboration is pretty new. The knowledge partners from the state in this region work together and can be considered as a network but execute independent research for Rijkswaterstaat. There are actors (and individuals) that know each other because it's a relatively small region. They have met in projects before and have to work together in the future, so that is also a reason for the involvement of all actors and the aim for a good collaboration (Interviewee 3, personal communication, May 15, 2020).

4.2 Rules

The dimension of the rules can be used to described the influence of institutional rules on the other dimensions and evaluating them (Liefferink, 2006). In the case of the Roggenplaat, one can see how these institutions relate to the newer NBS practice. Rules can be divided into different dimensions. There are formal and informal rules. These informal rules are sometimes rules of the game for interaction between actors. These are mutually agreed rules for interaction between actors. The formal rules are to be held by all actors and shape how an actor views the project and acts. The involved actors have an important role in creating these procedures and informal rules. These different types will be discussed in this chapter.

4.2.1 Laws & Permits

First, there are the formal laws, these are rules applicable to this project and bounded by the government. These laws are connected with (almost) every action taken in space. For the Roggenplaat, there are certain laws bounded to action and requires the requests of permits before one can start with executing the project. In this specific context, there are 3 important laws and the accompanying permits. Firstly, because this project has taken place in a national park (Oosterschelde) and therefore regards building in nature, the law 'natuurbescherming' (nature protection) is applicable. Secondly, the 'Waterwet' is active since the project is implemented on and in water. Thirdly, because the sand that is used to level up the Roggenplaat needs to be extracted, there needs to be an earth removal permit. Consistent with the earth removal permit, and because of the scale of the earth removal, there has to be an assessment of the MER (milieueffectrapportage). All the requests for the permits that are needed happen via standard procedures. These procedures include the filling in of standard forms, the writing of letters and extra documents to back up the statements for requesting a permit (such as the design of the project, test on the protection of species etc.).

Waterwet

In 2009, the waterwet is brought into force. This law states that the construction or change of an *waterstaatswerk* needs to take place via a project plan (article 5.4), introduced by the initiator (Rijkswaterstaat, 2016). According to article 2.1 of the waterwet, the application of this law is aimed

at following three points. First, preventing and, where needed, minimalization of floodings, water inundations and water scarcity. Second, protecting and improving the chemical and ecological quality of water systems. Finally, the fulfillment of societal functions through water systems (Rijkswaterstaat, 2016). The project must meet the waterwet. In this case, the project did meet the waterwet, it even strengthens the three focus points mentioned earlier (Interviewee 3, personal communication, May 15, 2020). In case of preventing and, where needed, minimalization of flooding, water inundations and water scarcity, the sand nourishment of the Roggenplaat leads to less costs for the reinforcements of dikes that are protecting the coast. This project can be seen as a form of adaptive delta management, where the sandbank breaks the waves and prevents flooding as a buffer. In case of the protection and improvement of the chemical and ecological quality of water systems, the ecological quality will be improved due to the strengthening and preservation of the area. The benthic fauna will temporarily disappear but will regenerate after 1-5 years. Furthermore, the sand nourishment doesn't pollute the water and doesn't negatively affect area-specific measures (such as shellfish banks and the planting of seaweed) (Rijkswaterstaat, 2016). For the last focus point, the fulfillment of the societal functions through water systems, the project doesn't negatively affect power generation, recreation, fishery, shellfish farming, the extraction of drinking water and the function of cooling- and process water. Concluding, the project is in line with the goals of the waterwet (Rijkswaterstaat, 2016).

Natuurbeschermingswet, Natuurnetwerk & Flora- en faunawet

Another important permit that is required for the creation and monitoring of the Sand nourishment on the Roggenplaat is the *natuurbeschermingsvergunning* (nature protection permit). The initiator of the project did a request for a permit that lasts 8 years for the creation and monitoring of the project. During the time that the permits where requested, the new natuurbeschermigswet was coming into effect. The request then followed the new Natuurbeschermingswet that entered in January 2017. The assessment for the sand nourishment Roggenplaat was an assessment in the context of the *natuurbeschermingswet 1998, natuurnetwerk & Flora- en faunawet*. The assessment was assigned by Rijkswaterstaat to bureau Waardenburg (ecological consultancy firm). The goal was to map the effects on protected ecological features and to address how negative effects can be reduced (Boudewijn, 2016). The extensive rapport that is created by bureau Waardenburg describes the background of the project, the appearance of protected ecological features, the effects of the project on these values and the tests based on the *natuurbeschermingswet* 1998, the *flora- en faunawet* and *NNN* (Natuurnetwerk Nederland). The latter mentioned concept is a network of nature in the Netherlands, also known as the EHS (Ecologische Hoofdstructuur). The rule for plans inside NNN is: operations are not permitted unless it's excluded that the operation harms the NNN (*Nee, tenzij principe*) (Bureau Waardenburg, 2019; van Zijderveld, persoonlijke communicatie, 2020). The research follows the Natura 2000 goals and names the effects of the sand nourishment and monitoring on the benthic fauna, seals, breeding and non-breeding birds, habitat types, ecological development, morphological development etcetera (Boudewijn, 2016).

The request for the suitable assessment regarding the *natuurwet* included the importance that the design was very carefully explained, also since the sand nourishment was 'only' 200 acres. The soil life, on the 7 locations where the sand is added, returns after 2-4 years, therefore still keeping the sandbank available for the birds. If the project covered a larger surface, the foraging function would temporarily disappear because of the loss of the soil (Interviewee 5, personal

communication, May 26, 2020).

The conclusion of the rapport shows three points. First, there are no negative effects on the general conservation goals of the Oosterschelde. Secondly, the nourishment and extraction of sand don't have negative effects on the realization of the core tasks of the Oosterschelde (it's even essential for the realization). Thirdly, the effects that are present are only temporary and simplify the realization of the conservation goals. In the context of the NNN, the characteristics of the NNN are not being affected. To conclude with the natuurbeschermingswet 1998, there are no significant negative effects. There is only a temporary loss of the foraging area of non-breeding birds but will lead to conservation and improvement of the foraging possibility in the (near) future (Boudewijn, 2016). The conclusion of the assessment based on the *flora- en faunawet* is that there is a small chance for the death of individual protected fish, a small chance of the disturbance of certain seals and porpoise and no effects on other protected animals. This conclusion leads to the need for an exemption for the disturbance of seals based on article 3.5 of the wet natuurbescherming (Jonkvorst & Boudewijn, 2016). These assessments and background documents of the project lead to the issuing of the permit. In this case, the Province of Zeeland is the granter of the permit. The permit is granted based on article 2.7, clause 2 and affective till 1 January 2025 (Provincie Zeeland, 2017). There were specific instructions for the project (e.g. disturbances distances seals), as a result of the assessments of Bureau Waardenburg and the Province of Zeeland.

Next to the *natuurbeschermingswet*, the Province also checked the project in light of the Omgevingsplan Zeeland 2012-2018 (Provincial plan for Zeeland). This measurement concluded that there is no significant damage to the characteristics and values of the protected nature in Zeeland and the inevitable disturbance is reduced to the minimum, therefore, there is no contradiction with the Omgevingsplan Zeeland 2012-2018 (Provincie Zeeland, 2017).

Ontgrondingwet

The last direct law that is applicable to the project regards the excavation of sand for the nourishment on the Roggenplaat. Rijkswaterstaat Zee en Delta requested an earth removal permit for the sand-excavation site Roompot. For the request, a standard form with the characteristics of the request and an accompanying letter and documents where send to the Human Environment and Transport Inspectorate (Ministry of infrastructure and environment). The accompanying documents also included the *m.e.r.-beoordelingsnotitie* and *Project plan Waterwet* from the previous requests. Specific for the earth removal permit, several documents cover assessments of the excavation on the surrounding area, water, soil etc. These documents are the following: Map of the sand-excavation site (Kaart ontgrondingslocatie), archeological bureau investigation (Archeologisch Bureauonderzoek), preliminary investigation conventional explosives (Vooronderzoek Conventionele Explosieven) and a sediment investigation (waterbodemonderszoek). To elaborate on the conclusion of the issuing of the permit, the advice of the different assessments as written in the above will be mentioned.

Advice preliminary investigation conventional explosives

Many actions of war took place in the Oosterschelde, where different ships and planes crashed and mines where found. However, given the project, there is expected to be no risks for conventional explosives. The layer of sand that is being extracted (maximum of 4 meters) is post-war and therefore contains no risks containing conventional explosives (Bodac, 2016).

Archeological bureau investigation

This investigation shows that one can expect to encounter archeological remains in the sand-excavation site and the nourishment area Roggenplaat. This expectation relates to the remains of settlements, cemetery, terps, harbors, dikes, shipwrecks from the roman time to the new time. Also, it's not out of the question that there can be shipwrecks and plane wrecks present from the second world war. The chances of the appearance of archeological remains are considered small but artifacts and flintstones can appear (van Lil & van den Brenk, 2016).

Sediment investigations

The sediment investigation also showed that the extraction of sand is not producing negative effects (Interviewee 3, personal communication, May 15, 2020). And therefore, the permit could be issued.

4.2.2 Procedure

Because Rijkswaterstaat is the main initiator, the project follows standard procedures. This includes the omgevingsmanagement. The core idea of the omgevingsmanagement is to execute a project in good collaboration with actors. This is aimed at exploring and involving of the relevant actors. For this project, the initiators executed the omgevingsmanagement and involved all the actors. They listened to the actors with direct interests like the mussel sector and other actors of the recreation sector on water. There are meetings with the actors where they can give their view on the problem and offer certain solutions, ideas, scenarios etc. Actors who not directly have an interest are more involved to stay updated on the changes happening in the area and because they are interested (Interviewee 5, personal communication, May 26, 2020).

The standard procedure also contains a tool with the responsibilities of the actors and actions in certain scenarios. This tool is called the *beslissingsboom,* it's an elaboration of what to do in certain scenarios and who is responsible. Who is going to act and how are they going to act (Interviewee 5, personal communication, May 26, 2020). For example, if the sand is being placed on the Roggenplaat and directly damages the plots, there are protocols how is responded to that situation. Who is going to respond, who needs to be informed, how is responded etcetera (Interviewee 5, personal communication, May 26, 2020).

As described in the section of laws and permits, Rijkswaterstaat needed three permits to execute the project. Because the mussel sector was not satisfied with the way the damage regulation was being used for this project, they filed an objection for the issuing of these permits. The normal so-called *nadeelcompensatie* regulation couldn't be used here according to the mussel sector: ''the litigation was, in the end, not aimed at stopping the project but was aimed at the enforcing of a solid damage regulation'' (Interviewee 4, personal communication, May 20, 2020).

The *nadeelcompensatie* regulation is aimed at citizens and companies who encounter temporary or permanent drawbacks from state grounded measures. In some cases, these actors have right on reimbursement of damage (e.g. loss in turnover) (Rijkswaterstaat, Schadevergoeding in de vorm van nadeelcompensatie en planschade, 2019). The minister of Infrastructure and Water management follows the policy rule *nadeelcompensatie Infrastructuur en Waterstaat 2019*. In certain cases, the drawbacks that are encountered can (partly) be compensated by the government. The mussel growers didn't agree on this damage regulation and therefore first filed an objection for issuing the permits by the licensing authorities (Ministry of infrastructure and Water management and the Province of Zeeland). These authorities justified the issuing of the permits and rejected the

objection, the mussel sector did appeal against this at the Council of State. The Council of State is a neutral actor in this procedure and they also rejected the objections made by the sector. The representative of the mussel sector said about the objections: ''the problem was that the assessment from the issuing of the permits doesn't include the fact if there is any damage being done, they said that it's not a part of the assessment in getting a permit based on the Waterwet and the Natuurbeschermingswet.'' (Interviewee 4, personal communication, May 20, 2020). This means that the failing damage regulation, how the mussel sector sees the nadeelcompensatie regulation, cannot be a reason to destroy the issued permits. That procedure was a big part of the project and caused a delay (of approximately a year).

4.2.3 Policy

The start of the design and execution of the project had its ground in policy regarding the Zandhonger that is threatening the Oosterschelde. The research on *EZZO* (effecten zeespiegelstijging en zandhonger Oosterschelde) and the *MIRT verkenning Zandhonger Oosterschelde* (ontwerp-Rijksstructuurvisie) put forward the importance of the Roggenplaat as a top priority. The best solution that was found is to level up the sandbank using sand nourishment. The importance of dealing with zandhonger came from the negative effects that the erosion of the sandbanks have on the nature and the conservation of dikes (Witteveen+Bos, 2014). The assessments of the effects showed that measures were taken against zandhonger (nourishments) to succeed in preventing negative effects from zandhonger on nature. The priority of this vision was the Roggenplaat nourishment. It was described as phase 1 (2015-2025), to maintain the conservation goals in a short period. There are however multiple scenarios and possibilities for phase 2 (2025-2060). These scenarios gives a view on how to deal with zandhonger on the long-term and are chosen based on the knowledge of the active sea level rise, further development of erosion, population development of waders and the actual effectiveness of the interventions (Witteveen+Bos, 2014).

Together with the Zandhonger, as an intertwined component, the Natura 2000 policy is a very important factor. There is a strict policy regarding the protection of nature in the Netherlands. From that policy, there is an obligation to maintain the foraging function of the Roggenplaat and protect the area-specific nature (van Zijderveld, 2020). More specifically, one of the core tasks of the Oosterschelde is to 'maintain banks for resting and foraging non-breeding birds and resting areas for regular seals' (Natura 2000, 2006). To show the role of the Natura 2000 law in the Netherlands, the representative from the mussel sector stated: ''(…) natura 2000 legislation is very strong legislation and the council of state is still always a council that is very strict in keeping nature legislation'' (Interviewee 4, personal communication, May 20, 2020).

The *Oosterscheldevisie* is a document that is put together because of the formal procedure (end of the Oosterscheldevie till 2017), the substantive urgency and as input for the Provincial plan for Zeeland. This vision gives area-specific guidelines for the Oosterschelde and is important for the main focus of development in this area (Provincie Zeeland, 2018). In this document, the water safety and protection and conservation of nature (according to Natura 2000) are two important frames for future developments in the Oosterschelde. Next to these frames, an important challenge for the Oosterschelde that is brought forward is the Zandhonger, which threatens the conservation of the Natura 2000 guidelines. So, in this document as input for policy, zandhonger and the call for action are mentioned.

4.3 Resources

4.3.1 Money

The Roggenplaat nourishment had the total costs of 12,3 million euros (Omroep Zeeland, 2014). The Ministry of Infrastructure and Water management with the executing body Rijkswaterstaat was the main initiator, the state promised to finance half of the costs for this project (Interviewee 3, personal communication, May 15, 2020). The other actors were responsible for the other half of the costs. So, other actors that financed the project were seven Oosterschelde municipalities, the Province of Zeeland, Zeeuwse Landschap, LNV (Ministry of Agriculture, Nature and Food Quality), Natuurmonumenten and citizens (via the crowdfunding action) (Rijkswaterstaat, 2020). Another important part of the costs is covered with the acquiring of a subsidy. This is the subsidy program Interreg V Vlaanderen-Nederland that stimulates transgressing projects that set in on innovation, sustainable energy, a healthy environment and labor market. This was mainly needed for the monitoring of the project after the implementation. The Province of Zeeland was responsible for finding the rest of the financing with the help of the other actors (Interviewee 5, personal communication, May 26, 2020).

Fig 9. Donators take a look at the Roggenplaat (copyright Wereldregio)

As mentioned in the part about Natuurmonumenten, crowd funding was a factor in the signal given to the state that this project was important. As my interviewee from Natuurmonumenten mentioned: ''this is not a big contribution in euro's but the public support and the interest from society are recognized by the minister (…). Apparently, society also finds this very important, let's give this priority.'' (Interviewee 5, personal communication, May 26, 2020). The money that was yielded gave Natuurmonumenten a place on the board. Therefore, while 12/13 thousand euros is a small amount of money in comparison with the 12,3 million, the symbolic value (message) was important for speeding up the project (Interviewee 5, personal communication, May 20, 2020; Interviewee 1, personal communication, April 24, 2020). There is however still money missing for the monitoring of the project in the next years. The actors were trying to acquire another subsidy but unfortunately, this request was denied (Interviewee 5, personal communication, May 26,

2020). So, there is still missing money for year 5-10 of monitoring. The monitoring helps in seeing how the nourishment develops over time.

4.3.2 Knowledge

There is a project group for the research of building with nature, also a part of Rijkswaterstaat. The HZ works together with different knowledge partners such as Deltares, NIOZ and Wageningen Marine research. For the design of the project, these different actors are knowledge partners of the state in this region. The different actors are very specialized in different kinds of research and therefore work together to create a design that includes different kinds of knowledge. Deltares is for example specialized in animals, morphology (Interviewee 1, personal communication, April 24, 2020)

During the project, the different actors kept all the knowledge and data open. This helped in the idea for the mussel growers that for example, Rijkswaterstaat wouldn't withhold information. In this shared knowledge, a significant part of the collaboration between the coalition and the opposition was the collaborative making of risk analyses. Wageningen, who helps the mussel sector more often in research, made a risk analysis of the possible risk of the sand nourishment. This helped the opposition to get more comfortable with the project, knowing that they were involved and that the knowledge was correctly collected. As my interviewee from PO mosselcultuur stated: ''The risk analysis was, I guess, a collective conclusion that we agreed on the risks'' (Interviewee 4, personal communication, May 20, 2020).

Knowledge was a very important part of the project because this was the first sand nourishment in an intertidal area on a big scale. Also, for Building with nature projects, system-based knowledge is crucial. As the project manager (HZ) from the design stated: ''There could be cases where the knowledge of the environment and system are inadequately taken into account (…) that could lead to a bad design.'' (Interviewee 1, personal communication, April 24, 2020). From Ecoshape (executor of the innovation program Building with Nature) some knowledge and guidelines are taken into account. Knowledge across Building with Nature projects is shared and created. In the build-up to the project, there was active research on the problem of zandhonger. There were smaller sand nourishments to investigate how to best execute at a larger scale. There are lessons taken from those experiments and used for the Roggenplaat nourishment. This included the following things: the sand cannot be placed too high (otherwise the sand will raise), you have to include the mussel growers (important sector) and the nourishment should take place using the tides (so that no sand is transported to the plots) (Interviewee 5, personal communication, May 26, 2020). These are more technical lessons regarding the nourishment. On the other hand, a lesson regarding the procedure of earlier nourishments was that one needs to involve all the relevant actors in the design of the project. In the past, the normal way of working was to design a plan, present it and acquire feedback from the actors. ''Nowadays, you have to start from the bottom, make the problem clear, mention the possibilities or the scenarios and collectively agree on a design'' (Interviewee 5, personal communication, May 26, 2020). This has a positive effect because the problems and interests of the different actors are integrated at an early stage. This results in a design that is hopefully beneficial for the different actors. Using this way of working on the Roggenplaat nourishment, several details were included in the design, for example, the distance between the nourishment and the plots. This lead to the 7 locations that were available for the nourishment after the including of the conditions provided by the advice bureaus and other actors.

4.3.3 Power

An interesting aspect of the project is the number of financers, there are about 8 different types of actors as mentioned in the section about money. Normally in the world of planning, the actors who finance a project are included in the project and get a saying. For example, Natuurmonumenten acquired a spot on the board with the crowdfunding (Interviewee 1, personal communication, April 24, 2020). However, it is difficult for a small financer on the board, it creates some kind of imbalance between the actors (Interviewee 3, personal communication, May 15, 2020). Rijkswaterstaat was named the most important actor by various actors (Interviewee 1, 2020; Interviewee 4, 2020; Interviewee 5, 2020). As the main initiator, the executor of the wider zandhonger problem and as a governmental body, this is the actor with the biggest share in this project.

The power relations are mainly based on the resources of the actors. These are for example knowledge, money or actions and can be used as instruments to exercise influence for actors to steer at a certain outcome (Wiering & Immink, 2006). To return to Natuurmonumenten as a part of the board as a small financer, they however send people to help with the communication (Interviewee 3, personal communication, May 15, 2020). This was helpful for Rijkswaterstaat and strengthens the position of Natuurmonumenten in the project, also with the help of the omgevingsmanagement and to show the public support for the project to the state. Because knowledge was shared between the actors, it was no instrument for actors to exercise influence on the project. This shared knowledge was important to gain more trust from the mussel sector. It was used to steer at an outcome where all the actors were satisfied. Unfortunately, the mussel sector is not satisfied with the way Rijkswaterstaat handled the problem. Natuurmonumenten and Rijkswaterstaat were already connected to the start of the project. They worked together for the zandhonger problem before and are planning to keep on working together in future sand nourishments. The knowledge that is used for the project is mainly brought forward by the knowledge partners of the state (Interviewee 1, personal communication, April 24, 2020). These partners like Deltares and the HZ helps the state in projects when they need advice or knowledge of any kind. Rijkswaterstaat as the initiator assigns the research to these knowledge partners. This is for the knowledge institutions a way to neutrally give advice for the project and not a way to steer the project in any direction other than based on facts.

Although a policy arrangement is a moment in time, this moment is always connecting to ongoing processes and history. A way in which this can be seen is the standpoint of the mussel sector connected to experiences in the past. During the construction of the Oosterscheldekering, there was damage to the fishers. And also damage that was not during the execution of the new Oosterscheldekering but also years after (Interviewee 5, personal communication, May 26, 2020). Also as the project manager from Rijkswaterstaat stated: ‘’partly what caused the mussel sector to distrust this project has to do with some difficulties from the past that causes them to distrust the state’’ (Interviewee 3, personal communication, May 15, 2020). This creates the thought of the mussel growers that when things go wrong and there is damage over the years, they are afraid to end up empty-handed (Interviewee 4, personal communication, May 20, 2020) The way of working however helped the mussel sector to gain more trust in the project and initiators. There is carefully listened to the worries of the mussel sector, the execution of the project is done with great care and the collective approach also helped (Interviewee 5, personal communication, May 26, 2020; Interviewee 4, personal communication, May 20, 2020). The collective approach made that the standpoint of the initiators was: ‘’lets together make the monitorings program that good, that if there is damage to one of the plots, the monitoring shows that it’s because of the project’’

(Interviewee 5, personal communication, May 26, 2020). The power relation of these actors is not shifted to the initiators. The mussel sector felt like they were being listened to (Interviewee 4, personal communication, May 20, 2020). Rijkswaterstaat knew the importance and power of the sector, it's an important sector for Zeeland and they could use the press when things went wrong. As my interviewee from the HZ mentioned: ''the fishery, of course, has a very strong influence on the acting of Rijkswaterstaat. It's a very special and well-organized sector'' (Interviewee 1, personal communication, April 24, 2020). Therefore, the relation of the coalition and the opposition was one of mutual respect and collaboration. The important actors had tools to excersice influence on the project, there is no sigifcant power inbalance.

4.4 Discourses

To in-depth understand the drives and actions of the actors, there is the dimension of discourses. These discourses and programs can be divided in two levels, general ideas about the organization of society and concrete ideas around the policy of the project at stake (Liefferink, 2006). General ideas about society can shape how an actor encounters a project. Also, the different views on the policy of the project implies the strategic positions for actors in the policy arrangement. This consists of the ideas around the causes and character of the problem and possible solutions. For this analysis, there will be discussed what different problem definitions there are. As mentioned before, general discourses about society can affect how actors encounter with this project. The discourses and programs of the two levels will be elaborate in the following.

4.4.1 Problem definition

For the character and causes of the problem. The interviews pointed out that identifying of the problem was the same for the coalition. Rijkswaterstaat and Natuurmonumenten as two important actors saw the necessity of the Roggenplaat as an important sandbank for birds and seals. This necessity was grounded in Natura 2000 policy, the problem of Zandhonger (Rijkswaterstaat) and a letter that described the problem from Nationaalpark Oosterschelde. As for Natuurmonumenten nature is the main interest in the project, my contact from that organization stated: '' we think it's important that this place is remaining available as a foraging area for birds. In that sense, the interests are the same, but Rijkswaterstaat at the same time also has an interest from the perspective of water safety'' (Interviewee 5, personal communication, May 26, 2020). The problem for Rijkswaterstaat, therefore, reaches further and includes water safety as it is a core task of Rijkswaterstaat. The importance of the project is also seen by Nationaalpark Oosterschelde, the ministry of infrastructure and water management, citizens and entrepreneurs trough the crowd-funding and the Province of Zeeland.

On the other hand, the mussel sector understands the goal of the project: '' We had nothing against the purpose of the project to save the numerous birds and seals (…)'' (Interviewee 4, personal communication, May 20, 2020). The saving of nature was something that they understood. The main problem of the mussel sector was: ''if you execute a project but then lay the consequences on one or two companies, that's something you can't do'' (Interviewee 4, personal communication, May 20, 2020). This was connected to the direct economical interest they had in the project. The problem definition of the mussel sector is not about the problem of Zandhonger itself but rather on the problem the project can cause. My contact from the HZ describes the problem as being grounded in the interpretation of risks: ''that has everything to do with risk assessment. That's the thing with risks, one person takes more risk than another or sees it more as problems, that's exactly where the

mussel sector legally invested into the fullest (…) because they say: it is a risk for my company.'' (Interviewee 1, personal communication, April 24, 2020). Furthermore, another interesting perspective is mentioned by my interviewee from Natuurmonumenten. He said that if you ask the economical sector if they think this is an important project, the answer would be a hard no, they want to let it be this way and check on it in a couple of years. As he further mentioned: ''There is a contradictory interest in that statement, at the same time, it's trivial that if you let this proceed, the plots will all be gone'' (Interviewee 5, personal communication, May 26, 2020). Because if you don't execute the Roggenplaat nourishment, the sandbank will be gone in 50-70 years, and so will the plots.

The cause of the erosion and therefore losing foraging function of the Roggenplaat isn't any different for the actors. It's a natural phenomenon that is called Zandhonger, it's caused by the Oosterscheldekering. The current is strong enough to break sand of the bank but not strong enough to leave sand on the bank. This has no further impact on the project and is agreed upon by the actors.

4.4.2 Solution finding

As brought up in the policy section, the *MIRT-verkenning* lead to the solution of nourishments for the sandbanks in the Oosterschelde. This solution was considered the best way to deal with Zandhonger and to maintain the foraging function for birds and other nature. One of the initiators (Natuurmonumenten) says the following about the MIRT: ''There are a few possibilities described, the best possibility that came forward was the nourishment of existing sandbanks.'' (Interviewee 5, personal communication, May 26, 2020). An important factor for solutions to keep in mind is that the area in which the project takes place in a protected nature park. Two of the interviewees, when asked about other solutions, mentioned the placement of some kind of dam or wall around the nourishment so that the sand can't move (Interviewee 4, personal communication, May 20, 2020; Interviewee 3, personal communication, May 15, 2020). However, this can't fit in a Natura 2000 area.

There is also another solution mentioned by the interviewees. This has to do with the Zandhonger challenge in the first place. Through the *MIRT-verkenning*, Rijkswaterstaat found out that the Natura 2000 goals were being compromised. In this case, one can either adjust the goals in the area or act to maintain these goals. Following my interviewee from Rijkswaterstaat, there is been tried to do things differently. While the whole operation (strategy on zandhonger) stopped several times, the project manager from Rijkswaterstaat and others proceeded with the operation. '' Of course, you could also say, that's a dangerous path you then follow, we give up the Oosterschelde. With doing that, you break the migration route or an important link in that route and we find that terrible or not, but that's in fact a very cheap solution.'' (Interviewee 5, personal communication, May 26, 2020). That is the other way, and the easiest, it takes fanatics to break with the current cultures in planning and actively bring these new cultures (Interviewee 3, personal communication, May 15, 2020). His project required a new kind of knowledge, monitoring, and experiment but also a very careful approach. The project manager of the design (HZ) said about this: ''extraordinary is that we are working in a natural area and we very carefully, and that's really innovative, looked at the suitability of the measures.'' (Interviewee 1, personal communication, April 24, 2020). According to the interviewees, some actors worked hard to create that new knowledge, experiment and monitor to deal with the zandhonger challenge in this natural area. So, while the nourishment was the best

solution for the problem, it took some time and effort to eventually execute the Roggenplaat (with a history of experiments, research and monitoring).

4.4.3 General Discourse

The finding of a solution and the problem definition was more specifically aimed at the project. As mentioned in the introduction, the general ideas about the organization of society can structure the strategy of an actor. In the power section, the bad experiences of the mussel sector were already mentioned. These past experiences from the past influence the standing point of the mussel sector. Rijkswaterstaat is a governmental body and the mussel sector had distrust against the state from bad experiences in the past. This leads to some form of distrust regarding the project. They are afraid that history repeats itself and they stand empty-handed when things go wrong. They, therefore, wanted a better damage regulation so that they are being compensated when damage is done by the project. This is the reason that they made objections against the issued permits. This was also part of the distrust from the sector against the state from the bad experiences and damage by measures from the state in the past (Interviewee 5, personal communication, May 26, 2020).

Another point of view that had a role in the project has to do with the solution and project itself. Rijkswaterstaat chose to do things differently and take measures in this natural area. This took much time, effort, money and research. Especially the project manager from Rijkswaterstaat and others were important for breaking the existing cultures, otherwise, people will easily fall back into the old habits. For many years, he is working on this issue and is very driven to get it done (Interviewee 2, personal communication, April 30, 2020). He mentioned in his interview: ''It's important for these kinds of things to have fanatics that keep going on, you can see that this is needed to break with existing cultures.'' (Interviewee 3, personal communication, May 15, 2020). This is an important strategy for the project: to have actors who really want to make it happen. The underlying thoughts of actors about the importance of these natural area have a part in the strategy of these actors in the project. This conception refers to a discourse on nature conservation and restoration. From society and the state is, trough the Natura 2000 policy, these areas are considered as valuable and important. This importance can be seen in the crowdfunding, the financing by various actors, and the strict rules regarding nature areas.

The discourse of vital economy vs nature restoration is also an discourse that can be seen on this project. As mentioned before, nature is considered as important for the Netherlands. However, there is also major attention for the economy. The vital economy and the restoration of nature are both dominant factors in the planning and development of areas. That is one of the reasons why there was, apart from the main reason of nature restoration, also attention for the vital economy in that area (Interviewee 1, personal communication, April 24, 2020). This is also interesting because Building with Nature and nature-based solutions are approaches that are multifunctional. The combination and involvement of different aspects in the design and execution are a part of these approaches. This nature restoration vs. vital economy discourse brought knowledge on how to include both aspects in the design so that there is no negative effects on one or the other (Interviewee 1, personal communication, April 24, 2020).

4.5 Overview of the dimensions (PAA)

This chapter shows an overview of the results in the form of a table (on the next page) as described in the previous chapters. The policy arrangement is presented according to the four dimensions, and are interwoven. As mentioned in the section on PAA theory, the dimensions are strongly connected. Something that illustrates this is the relation between the available resources and tools from the actors and the relative positions in the policy arrangement (e.g. Rijkswaterstaat is a big financer and has the best knowledge to execute the project). Another example is the importance of nature restoration and the amount of financers (e.g. citizens, companies, municipalities and the Province of Zeeland). This overview structures the descriptive results, and forms a basis for the conclusion.

Table 2
Overview of the dimensions of the PAA according to the Roggenplaat nourishment project

Actors	Rules	Resources and power	Discourses
State - Rijkswaterstaat - Ministry of Infrastructure and Water management - Ministry of Economic Affairs and Climate Policy - Oosterschelde Municipalities - Province of Zeeland	Law: - Waterwet - Ontgrondingswet - Natuurbeschermingswet - Permits	Money: - Several financers from different layers (market, state & interests) - Interreg Subsidy - Crowdfunding - Financing *Zandhonger* strategy	Problem Definition: - Loss of important Nature - Meeting Natura 2000 goals - Failing damage regulation - Guarantee Water-safety
Market: - Mussel sector - Boskalis - Recreation sector	Procedures: - Omgevingsmanagement - 'Beslissingsboom' - Nadeelcompensatieregeling - Conditions brought up by actors, research, policy, laws etc.	Knowledge: - Collaborative Risk analysis - Shared knowledge - System-based knowledge - Knowledge from previous experiments and Ecoshape	Solution finding: - Sand nourishment - Give up the Oosterschelde - Nourishment with hard elements (e.g. dam wall)
Expert system: - Bodac - NIOZ - Wageningen Marine Research - HZ University of Applied Sciences - Deltares - Bureau Waardenburg	Policy: - Natura 2000 - Oosterscheldevisie - EZZO (effecten zeespiegelstijging en zandhonger Oosterschelde)	Power: - Different financers and therefore strengthened positions - Actors from different types (i.e. state, market & interests) have power - Different tools to exercises influence (e.g. money, press, manpower, economic crucial position, support from other actors)	General Discourse: - Distrust against the state (Mussel sector) - Importance of nature conservation - Breaking of existing cultures→ BwN - Vital economy vs. nature regeneration
Interest: - Natuurmonumenten - Recreationists - Citizens - Nationaalpark Oosterschelde - Het Zeeuwse Landschap			
Coalitions and oppositions: -Opposition, mussel sector (politically supported by Province of Zeeland) and partly recreation sector - Coalition including: Rijkswaterstaat, Natuurmonumenten, Province of Zeeland - Networks of knowledge partners - Deep collaboration (acquaintance)			

5. Conclusion

This last chapter describes the conclusion of this thesis. First, the conclusions are presented, after which the discussion will be elaborated in which limitations of this study and recommendations for follow-up research and thereafter policy will emerge. Finally, a critical reflection will be discussed.

5.1 Conclusion

At the start of this study, I formulated the main research question: *'What are the institutional conditions that influence success for the policy arrangement of the nature-based solution project on the Roggenplaat?'* To answer this question, four sub-questions were drawn up according to the four dimensions of the policy arrangement. These dimensions are actors and their coalitions, rules, resources and power and discourses which are discussed in the result section. They help in analyzing the institutional conditions that influence success or failure are and consequently what lessons can be formulated according to the Roggenplaat nourishment. Following the structure of the PAA, the conclusion of the institutional conditions for success will be discussed for each dimension.

Actors and their coalitions

For the Roggenplaat nourishment project, there was a deep collaboration between the actors. As can be seen, various actors from state, market, expert system and interests were equally involved and invested in getting to know each other before the project started. This resulted in a collaboration where actors have a better understanding of what kind of people they are working with, which creates a mutual respect between the actors and a positive atmosphere during the collaboration. However, the mussel sector entered the project with some feelings of distrust against the state (and therefore partly against this project) due to bad experiences in the past. This negatively influenced collaboration and formed an obstacle for mutual trust. With this in mind, the overall positive evaluated deeper collaboration supported collective learning during the project. To illustrate this statement, during the execution of the project the contractor encountered some vagueness regarding the design of the project. A malicious contractor would not mention this and (financially) profit from . However, the contractor in this case brought forward the lack of clarity in order to collectively work it out. These concessions in collaboration are based on the collective agreed-upon approach: let's make this a successful and nice project. In the end, the actors expressed to each other that this way of working is very comfortable. This kind of *deeper equal collaboration with mutual trust* is therefore seen as a condition that influenced the success of this project in the Oosterschelde.

The acquaintance between actors, finding out what drives the others and what personalities they have, took a part in the positively evaluated collaboration. However, this investment in getting to know each other costs time. While a positive deep collaboration is a positive aspect, there needs to be available time for actors to get acquainted. As can be detected here, the condition of a solid collaboration is related to the available time.

Another condition for the success of the project is the *overall satisfaction of the involved actors.* This factor is mentioned by multiple interviewees and goes further than this project. Namely, if the relationship with the actors has been negatively affected through this project, the relation for future projects in that area will also be influenced, due to the failed collaboration in the past. On that

account, the satisfaction of the actors is not only important for the outcome of this project, but also for future collaborations. In this case, most of the actors are satisfied with the project, only the mussel sector can't be satisfied since there is still a chance for them to end up empty-handed when damage to their plots occurs.

Rules

From a technical standing point, the project is successfully being executed because of the good preparation and carefulness of the tender. The involved actors, policy and accompanying formal and informal rules shaped the design of the sand nourishment. This is for example the distance to the mussel plots, avoidance of natural growing oyster reefs and the height of the sand nourishment. All these conditions lead to the seven locations of the sand nourishment on the Roggenplaat. Consequently, a condition that influences success is *whether these determined conditions (from actors, policy and rules) are accomplished.* In this case, the first results show that the conditions determined beforehand are met.

The next condition is about the formal rules and procedures regarding the Roggenplaat nourishment. Especially for this project, the *nadeelcompensatie* regulation played an important role in the expressed problem of the mussel sector. This problem has a strong relationship with the dynamic character of the Roggenplaat NBS project. The complex and dynamic character of this natural system makes it difficult to implement the *nadeelcompensatie* regulation because, in a dynamic natural system, it's difficult to trace the damage back to the sand nourishment (as a cause). Therefore, the mussel sector is afraid that they will not be compensated when damage appears. This *illustrated mismatch between everyday regulation or rules and the implementation of dynamic NBS projects* is a condition that negatively influences the success of this project.

Resources and power

The first condition that influences the success of the resources and power dimension is time. This condition is about whether the project is executed within the time limit but is also related to the time taken for preparation and monitoring of the project. As mentioned with the condition on a deeper equal collaboration, there needs to be time for the actors to be acquainted. The same is applicable for the preparation and monitoring, it's important to take the time to make a solid preparation for the project.

Another closely related condition that influences success is whether the project is executed within the determined budget. In the case of the Roggenplaat, the costs were within the budget. The budget also influenced the project in another way. Namely, the available budget made the exploration of the zandhonger with experiments, monitoring and research possible. This exploration was important for the sand nourishment on the Roggenplaat because this lead to knowledge and lessons that prevented failure or obstacles for the Roggenplaat nourishment. For example the identification of the mussel sector as an important actor or reducing the height of the nourishment so that the sand lasts longer. Both time and budget made knowledge and preparation possible for better implementation on the Roggenplaat.

The main difficulties of this NBS is connected to the dynamic character of natural systems. For the Oosterschelde is an intertidal zone, one has to deal with uncertainties and dynamic natural systems. This creates one other condition for success, namely that there is *solid system-based knowledge and continuous learning on the implementation of this NBS project and the area.* As stated in the above, monitoring, experiments and research are important factors to create this knowledge

and to keep learning for a successful implementation. However, there will always be uncertainties and chances of failure due to the mentioned character of this NBS project.

Discourses

The main discourse that came forward in this study has to do with the multifunctional character of NBS. Specifically aimed at the Roggenplaat project, nature restoration was the main goal of the project. However, another important aspect concerning the implementation is vital economy, in this case the mussel sector. There are multiple aspects in the context of the Roggenplaat, such as important nature, economy and societal functions that should be included in the design and implementation to create a project that is beneficial for these aspects. A condition for the influence of success according to this discourse is *to have a broad frame, in which there is openness for different context-specific aspects (e.g. economy, nature, society) to be included.* Following this discourse and the multifunctional character, the project should include the interests and needs from economy, nature and society. The Roggenplaat showed specifically that the vital economy is a very important aspect and crucial for a successful result, the economy will remain an important factor in future NBS.

To summarize, the main institutional conditions from the different dimensions that influence the success of this NBS project are mentioned in the table below. In the chapter on policy recommendations, these conditions will be used to formulate recommendations for future NBS projects. The conditions mentioned in the table are strongly related to the character of the NBS project on the Roggenplaat, but can be included in other projects that deals with dynamic natural systems, multifunctional solutions and accompanying uncertainties. Concludingly, these conditions caused the overall success of this project. The mentioned mismatch of rules and the chance of failure however lead to the fact that the mussel sector can't label it as successful.

Table 3

Overview of the factors for evaluation (from actors and media) for the Roggenplaat project

Dimensions	Conditions that influence success
Actors and Coalitions	Satisfaction of actors
Rules	Deep equal Collaboration
	Mismatch rules
Resources and Power	Time
	Budget
	System-based Knowledge and continuous learning
Discourses	Nature restoration versus Vital economy (framing)

5.2 Discussion

This study shed a light on the institutional conditions for success retrieved from the NBS project on the Roggenplaat. The main findings, thus the institutional conditions are the following: deep equal collaboration with mutual trust and supported learning, solid system-based knowledge and continuous learning, framing with openness for the involvement of multiple aspects (e.g. nature, economy, society etc.) and connection of everyday regulation and rules to the implementation and character of the NBS. These institutional conditions can partly be related to the difficulties mentioned in the literature on BwN and NBS.

The main knowledge gap that was presented in the introduction is the lack of clear guidelines for the implementation of NBS in rural/coastal areas and the lack of clearness from some parts of the concept. The dynamic circumstances of rural of coastal NBS make this quite difficult in practice. There will always be uncertainties in what happens in a natural system and what consequences that might have for NBS and the environment. Therefore, the analysis of this unique case evolving in conditions that influence success adds to the advice for shared learning across projects to improve NBS practices (thinknature, 2019; Nesshöver, et al., 2017; Raymond, et al., 2017). The intertidal zone in which the NBS took place is a very dynamic and complex system and the results can be applied for NBS with these characteristics for a better practice. There are several other difficulties mentioned in the literature that can be connected to this case.

Nesshöver et al. formulated five steps for coping with multiple actors and possible challenges for the successful implementation of NBS as mentioned in the research goal section. Some steps can be recognized in the formulated conditions. One of the steps from Nesshöver et al. is the evaluation and monitoring for mutual learning (Nesshöver, et al., 2017). The monitoring was an important part of the Roggenplaat project and still is (to measure the effects of the nourishment). The evaluation was a part of my interviews and used for a subjective evaluation of the project, leading to the formulation of the lessons. For instance, the mussel sector mentioned that the remaining risk of failure (open end) is a reason why they can't call it a success. This hopefully creates knowledge for future projects to learn from these problems and outcomes.

This project also shows, what is often described in the literature on NBS and BwN, that's it's very important to involve the different interdisciplinary actors (thinknature, 2019; Ecoshape, 2018). This project can confirm in this literature that the active involvement of actors indeed increases the chance of a successful result. Here I want to add that the deeper collaboration (lesson four) between the actors of the Roggenplaat is considered to be a factor for success, as found in this study. I interpret this kind of collaboration as an addition to what is mentioned it in the literature, not as a prerequisite but as a helpful factor for a positive outcome.

The achieving of equitable trade-offs, as stated by Nesshöver, can also be recognized here. For instance, the fact that the conditions brought forward by the mussel sector and other sources shaped and adjusted the design of the project. Besides, the Ministry of Economic Affairs and Climate Policy also made *wisselpercelen* available in case there was damage on the mussel plots. The initiators also tried to gain a common understanding of the multifunctional solution, trough the sharing of knowledge, listening to the involved actors and explaining the ideas. According to the literature, BwN projects can be described as win-win solutions (Wesselink & De Vriend, 2009). While this project is described as successful by almost al actors, the mussel sector can still experience negative effects of the nourishment. Thus, the active involvement and production of equitable trade-offs might not always be fully reachable.

Another difficulty brought forward in the literature is the 'lack of sufficient guidance and

technical support in terms of instructions for implementation and maintenance' (thinknature, 2019, p. 93). This project created much system-based knowledge on the area and on the succesfull implementation of BwN. With the extensive preperation and monitoring, knowledge is build-up to implement NBS here with including the different conditions brought forward by actors, research and rules. However, this project did not lead to the formulation of specific guidelines for implementation but did create usefull knowledge for next projects.

With this study, I hope I have produced useful knowledge and lessons for policymakers in implementing these practices since it can be hard to include all the different disciplines and actors and apply these projects within everyday embedded routines and institutions (Janssen, van Tatenhove, Otter, & Mol, 2015). However, since the focus lies on one case of Building with Nature, this study has low external validity. The formulated lessons are bounded to the context of the project and are specifically related to the Roggenplaat nourishment. For a representative view of the project, I tried to include the most important actors from the state, market, interests and expert system to get a balanced perspective. This balanced perspective makes the study reliable in the sense that all perspectives are included. The study of the Roggenplaat was aimed at the four dimensions of the policy arrangement approach. This gave a broad perspective of the project and in the formulation of lessons. However, this can also be a limitation for the study since it can lead to more general results. The interview guides were based on the four dimensions of the PAA. Resulting in relatively comparable data and the guaranteeing of internal validity. The interviews were on the other hand adjusted according to the different roles and knowledge of the actors to get the right information. In the analysis of the interviews, I found out that some specific knowledge of the project (e.g. amount of financers, roles of actors) remained somewhat vague and needed to be supplemented by documents, and sometimes made it hard to clarify that information. My interview guides could consequently be more thorough in some aspects.

In this study, I used interviews and (policy) documents as a main source for the analysis. Besides that, also media articles about the project served as input for the factors of evaluation. Methodological triangulation is often used as a way to provide the credibility and validity of the study. Because I have used two main sources of data-gathering, this can be a limitation for the credibility and validity of this study. An observation was planned during the study but not executed due to certain circumstances.

The literature on NBS and BwN weighs heavily on the importance of the active involvement of multiple actors from various disciplines. I would, therefore, suggest that further research on practice-oriented knowledge for NBS aims at the actor perspective. From the policy arrangement approach, the dimension of actors and their coalition can be used as an explanatory variable throughout the study. Consequently, more practical lessons and guidelines can be formulated for the practice of NBS related to the involvement of the actors from different disciplines and with different interests. A second suggestion for further research is based on the problem of the insufficient damage regulation as raised by the mussel sector. Following this mismatch, the research could focus on the execution of BwN projects concerning everyday policy practices. The mentioned mismatch, in this case, is reduced to the damage regulation, but there is a chance that more mismatches can be found in other projects. Research can help in finding better interaction between new BwN projects and policy practice. These institutions can be analyzed in order to identify contradictions.

5.3 Policy recommendations

I have seen that for the different dimensions several conditions produce the (overall) successful result. From the results of the dimensions, I have formulated four lessons for the further use of Building with Nature (or NBS) projects. These lessons are policy recommendations for the practice of future projects, taking into account the limitations of this research and the Roggenplaat as a single case. These lessons are grounded in the policy arrangement approach, and consequently don't include technical lessons that are produced from this project (e.g. monitoring gadgets, nourishment based on tide or kick-start for soil-life). The following lessons can be adapted by planners or policymakers:

The first lesson I want to draw is: *Future NBS projects should apply a frame that creates openness for the involvement of different aspects (e.g. economy, nature, society) due to the multifunctional character of NBS.* The discourse on nature restoration vs. vital economy strongly came forward in this project, as there was the main focus on restoring the sandbank for nature but at the same time a focus on the crucial economic sector in that region. The conditions put forward by the economic sector and other factors (e.g. rules, policy and involved actors) were applied to the project and lead to knowledge on the interaction of nature restoration and vital economy. For future projects, conditions from multiple aspects (economy, society and nature) need to be included and must be a starting point for the design and implementation.

The second lesson my study shows is: *In the context of the dynamic character of NBS in natural systems, there needs to be extensive system-based knowledge and continuous learning (trough monitoring and research).* As mentioned in the result section on knowledge, the preparation and experiments in the Oosterschelde lead to important lessons for the Roggenplaat nourishment (e.g. the involvement of the mussel sector or the height of the nourishment). I would recommend investing in good preparation, the conducting of research and intensive monitoring to create an continuous learning on the natural system and prevent possible failure.

The third lesson is: *It's important to identify which rules are related to NBS projects and determine potential contradictory rules in order to adjust them and therefore prevent difficulties of the implementation and outcome of the project.* The main reason that made me formulate this lesson is grounded in the *nadeelcompensatie* regulation that caused the problem for the mussel sector. This regulation is not sufficient according to this sector and originated the need for a custom regulation such as a regulation based on a statistical method brought forward by an involved researcher. This indicated the mismatch of the implementation of NBS and everyday regulations and rules. This problem might occur more often in the future and can be a reason to identify contradictory policy practices, rules or routines and produce new ones that better fit NBS.

The last lesson I want to mention is: *A deeper equal collaboration (e.g. getting to know each other at the start) including mutual trust and encouraged collective learning has positive effects for the outcome of the dynamic NBS project and the experiences of the actors.* The actors invested in getting to know each other, resulting in a better collaboration because the actors know better what people they are working with, what drives them and how their personalities are. This positive effect can partly be retrieved from a situation during the project where the design was obscure. The contractor brought this forward to collectively work it out to make the project successful. In the same scenario, a malicious contractor would not mention this and profit from this obscurity. The actors expressed in the end that this is a pleasant way of working that can be used in the future.

Because Building with nature projects are multi-disciplinary and include various types of actors, based on the results, this way of working can be beneficial for future projects.

5.4 Reflection

During my study, I experienced that it's important to produce a solid research plan. This creates good conditions and guiding lines for the rest of the study. I sometimes needed to clarify some of the concepts in a later stage of the study, such as the operationalization of the PAA.

The Policy arrangement approach is a method that was comfortable to work with. In the analysis of the data, it provided a structured way of working. It helped in getting an accessible external structure of the study. Also in coding the interviews and documents, this helped in separating the information into usable clusters (also due to the accessibility of atlas.ti). However, because the different dimensions are strongly interwoven, it sometimes felt like I was repeating things.

A setback in the gathering of my data was the coronavirus that suddenly appeared. This made it more difficult to interact with the interviewees and come up with creative ways to analyze the four dimensions (e.g. letting the actors fill in the map of actors). Something related to this is that I needed to conduct online interviews, this sometimes didn't work as well as it should be. Another thing that I experienced was a mistake with the recording of one of the interviews, the recording only shows video but doesn't include audio. Therefore, I could not analyze it properly, since the information was less detailed. Another aspect of the coronavirus that I encountered myself is the working experience. Normally, I separate home from school as good as possible, I go to the library to write and work. At home, I noticed that I am more easily distracted.

Lastly, I want to mention that there were more interesting things said during the interviews. It's was challenging for me to focus on the relevant information and leave out the parts that are not involved in my study.

Words of gratitude

Finally, I want to thank all my interviewees for taking the time to have an interview and help me in gathering data. Also, a special thanks to Maria Kaufmann for the good suggestions, help and feedback during the developing of my study. Concluding, I want to express my gratitude for the people that helped me with suggestions and feedback throughout the thesis.

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