Coastal vision: assessing long term coastal protection strategies for the Belgian Coast

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1. INTRODUCTION

On December 22, 2017, the Flemish government took the initial decision to draw up a long-term 'Coastal Vision' (Vlaamse Regering, 2017). This will be done together with all parties involved in the field. The Coastal Vision project will establish the socially most desirable measures that are necessary to gradually protect our coast and the hinterland against a sea level rise of up to 3 meters in the long term.

The Flemish government is already working on coastal protection via the Coastal Safety Master Plan, which has been implemented in all coastal municipalities since 2011. The objective of the Master Plan is to protect the coastal region against a 1000-year storm until 2050. The Coastal Safety Master Plan takes into account a sea level rise of up to 30 cm by 2050. It is designed on the basis of the climate scenario available at the time. Most projections show that the sea level will rise more strongly and faster after 2050 and that additional efforts will have to be made in addition to the interventions provided for in the Master Plan in order to protect the entire coast against flooding after 2050.

A coastal vision project has therefore been set up to explore the space needed and the best position for various measures and alternatives to protect the Belgian coast against the consequences of higher sea levels and stronger and more powerful waves. The study and comparison of different solutions allows to identify the most desired alternative consisting of a future coast line and associated space.

In this paper the project coastal vision will be presented. A general overview of the study approach will be given with a focus on how alternative solutions, including dune for dyke options, will be assessed in order to identify the most desired future coastal protection strategy highlighting the evaluation aspects related to building a resilient coast.

2. LONG TERM COASTAL PROTECTION STRATEGIES

The central objective is to also ensure the protection of the coast against a 1000-year storm after 2050 against a higher and accelerated sea level rise. The speed and magnitude of sea level rise are uncertain. In order to be sufficiently prepared and to be able to act quickly, an 'adaptive coastal protection' is assumed. 'Adaptive' here means coastal protection that is relatively easy to adapt. So that not only the safety level remains up to standard, but also the lifespan of the infrastructure is extended under increasingly rapidly evolving sea level rises. To give a clearer shape to the adaptive character, we are investigating three scenarios: protecting the coast and the hinterland against a sea level rise of up to 1 meter, up to 2 meter and up to 3 meter. We are also investigating how protection can be scaled up gradually and what the tipping points are at which upscaling is necessary.

In the current research phase, all parties involved work together via 'workbenches' on the basis of the most recent scientific insights, their own research and their own wishes, to develop a strategic plan. This should become a roadmap with the most socially desirable measures to protect our coast against a 1000-year storm in the event of a sea level rise of up to 3 meter.

3. APPROACH

The final goal of the study is to determine the most desired strategy expressed as the position of the future coast line and associated space in which the future coastal defense measures can be implemented. To be able to assess and compare alternatives that cover different spaces, potential measures will therefore be designed, visualized and assessed (see Figure 1).

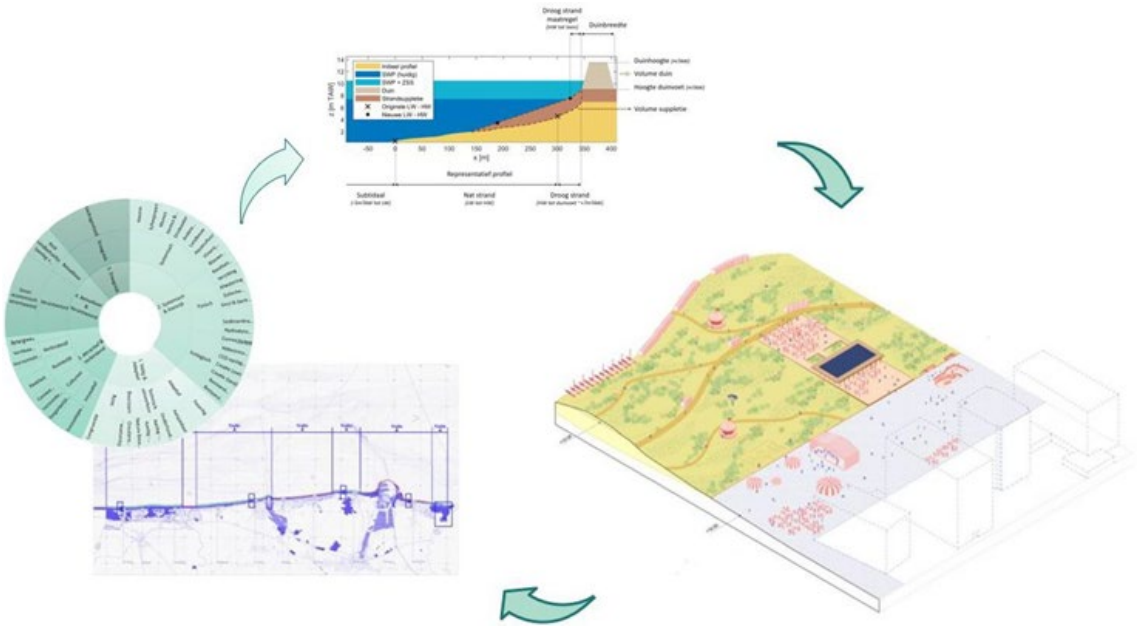

Figure 1: Approach for assessing most suitable coastal protection strategies consisting of the following steps. 1: Designing safe solutions. 2: Spatial design, visualize concepts. 3: Assess the different alternative solutions. Based on the assessment adaptations can be proposed.

As the study is focussing on a strategic level, the design and assessments are focusing on the required amount of detail to allow selecting high-potential alternatives that gradually will be further detailed. The potential measures for ports and along the coast that are considered in this strategic study therefore cover the most important applications in hard solutions (hard measures on dikes and quay walls, storm surge barriers, locks,...), but wherever possible also soft solutions (dune nourishments and dune for dyke solutions), or hybrid cases (Consortium Hoogtij(d) (IMDC, ORG, Arcadis), 2021). Basic design dimensions are determined that give input in the required space and form a starting point for the spatial design. As for the assessment different criteria have been defined that not only allow to investigate effects, but also look for opportunities, taking the interests of the stakeholders into account. Along the process aspects related to building a resilient coast such as potential for nature based solutions, robustness, adaptivity, resiliency and impact on maintenance are taken into account.

4. CONCLUSION

The Coastal Vision project focuses on coastal protection strategies in the long term against a higher and accelerated sea level rise. A wide range of solutions with corresponding space claims are therefore investigated including dune for dike solutions. An assessment frame is applied to investigate in gradual increasing detail the different solutions.

5. ACKNOWLEDGEMENTS

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6. REFERENCES

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