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Introduction

The expansion of Port of Zeeland has taken an area from Western Scheldt, which is part of Natura 2000. As a consequence, the Schorerpolder is used as a nature compensation of the construction. Along with the plans, four alternatives of the polder are studied that includes the redesign of dike and bridge.

Dikes and bridge are often known as grey infrastructure and have less prospect on green development. Our group has the task to look at how the biodiversity of hard substrates can be increased. The increased biodiversity can contribute to ecological/natural value of a dike as well as create educational and recreational opportunities.

Research Question

To what extent can biodiversity be enhanced into rich dike designs of Schorerpolder?

Methods

Data Collection

- Desk research to gather necessary information
- Quick scan of the current biodiversity
- Examine opportunities of utilizing hard substrate

Data Analysis

- Design possible solutions
- Evaluation of the alternatives

Key factors of rich dikes

- Wave attack
- Tidal influence
- Current velocity
- Type of material
- Grading (Fine or coarse)
- Orientation
- Salinity

Opportunities

Type A

Grass and flower-type vegetation

Hydroblocks with/without ecotop

Type B

Grass-type vegetation

Mastic asphalt with lava chunks

Improved Dikes

- Hydroblocks with ecotop
- Hydroblocks without ecotop
- Mastic Asphalt

Tidal Pools

Shellfish attachment on pillars

Hard substrate placement

Specie List

Type A		Type B	
Plant	Animal	Plant	Animal
Big teasel	Bee	Tall fescue	Bee
Sea lavender	Isopoda	Kropaar	Isopoda
Zaais ardrakker	Amphipoda	Beach beet	Amphipoda
Sea cabbage	Patella vulgata	Zoutmeide	Patella vulgata
Sea fennel	Littorina littorea	Salicornea	Littorina littorea
Green algae	Cirripedia	Brown algae	Cirripedia
		Red algae	Magellano gigas
		Green algae	Mytilus edulis

Results

Opportunities

	Alternative Separated Functions	Alternative Open Connection	Alternative Reduced Tide	Alternative Open and Reduced
Improved dikes	✓	✓	✓	✓
Tidal pools	✓	✓	✓	✓
Hard substrate placement		✓	✓	
Shellfish attachment on pillars			✓	

Discussion

The provided solutions explore the possibility of optimizing hard structures for habitat creation. They are aiming at the improvement of habitat diversity, so the bio-productivity and the biodiversity can be increased. However, quantifying the outcomes within the alternatives are rather complex.

The evaluation is done by looking at which alternative can provide the most solutions to promote biodiversity. It is important to note that in this case, tidal influence has become the essential factor in determining the applicability.

As for the solutions, they need to be under water level. The presence of culvert can play an important role in retaining water in the polder.

Future Research

Ecosystem is not a single system, the surrounding environment also have influence. There is less research about how the ecosystem interaction between dike and salt marsh, we believe the future research question should be:

To what extent the ecosystem of salt marsh can influence the biodiversity on the hard structure in Schorerpolder?

Conclusion

To conclude, the evaluation shows that Alternative Reduced tide can enhance biodiversity the most when utilizing hard substrates in Schorerpolder.

The design considers the tidal influence and still enables the application of all opportunities.

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Acknowledgements

This project would not have been possible without the support of the Tim van Oijen. We are especially indebted to Alco Nijssen who provided GIS data, and Bram Verkruyssen, who have been supportive of our estuarine dynamic.