Vegetated foreshores as coastal protection strategy

Coping with uncertainties and implementation

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PART 1
Nature-Based Flood Defense (NBFD): multifunctional and natural dynamics

Importance of NBFD
- Call for sustainability
- Negative environmental and ecological consequences of conventional ‘hard’ flood protection infrastructure
- Need for adaptive solutions

Salt Marshes
Oyster reefs
Mangroves
Sand Nourishments
Impact of vegetated foreshore on wave runup

By Vincent Vuik and waterschap Noorderzijlvest, January 2015
NBFD approaches: dealing with uncertainties

Challenges for implementation

• Multifunctional design
• Dealing with uncertainties

• Focus on the interactions among actors
Framework to analyze actor-interactions in NBFD projects

Describing the NBFD games: game theory

Game theory is “the logical analysis of situations of conflict and cooperation” (Straffin, 1993)
Two Dutch NBFD games are:

1. Design game
2. Project objective game

These games were found in Dutch NBFD projects.

NBFD games 1: the design game

Valuation depend on institutional context and external environment

Flood defense actor

Valuation depend on institutional context and external environment

Nature actor

... in this game limited incentive for NBFD design

Design NBFD dike

Traditional dike design

4

n/a

4

2

4

0

0

4
NBFD game 2: project objective game

This game is played at the institutional level and affects the design game.

Nature actor

Flood defense actor

Propose integrated project objective

- Integrated project objective: 4 : 1
  - Single objective: 0 : 3
  - Single objective & cooperation: 2 : 4

Separate nature project

- Single objective: 1 : 4
  - Single objective & cooperation: 2 : 3

Conclusions

- NBFD projects imply different interactions among actors
- We showed two NBFD games: the design game and the project objective game. But there may be more games
- Understanding NBFD implementation requires understanding factors affecting valuation of outcomes
- Game theory helps to structure, but does not solve or predict games.
Thank you

This work is a co-production of the BE SAFE team. More information: [www.citg.tudelft.nl/be-safe](http://www.citg.tudelft.nl/be-safe)

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### Research approach

Analyze NBFD case studies to find: what games are being played in NBFD projects at different levels under different institutional settings and what solutions are employed?

<table>
<thead>
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<th>Game</th>
<th>Institutional Setting</th>
<th>Level</th>
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<tr>
<td>NBFD Game</td>
<td>Determining</td>
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<td>Regular project</td>
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<td>Pilot</td>
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- Single objective flood protection projects
- Multi-objective projects

- Strategic NBFD Game
- Strategic NBFD Game
- Strategic NBFD Game
- Strategic NBFD Game

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