

# Climate change effects on restoration of estuarine dynamics within the Delta region

Jeroen Wijsman, Tjeerd Bouma, Anneke van den Brink, Bregje van van Wesenbeeck

## Climate change in the Dutch Delta

- Autonomous changes
  - Sea level rise
  - River discharges
  - Temperature increase
- Human adaptation
  - Increase safety level
  - Restore connections between basins
  - Restoration estuarine dynamics
- Effects on nature
  - Water quality (more marine and brackish waters)
  - Changes in habitats and species composition. Present species and habitats will be replaced by new species and habitats
  - Natura-2000 goals will have to be dynamic to anticipate on changes

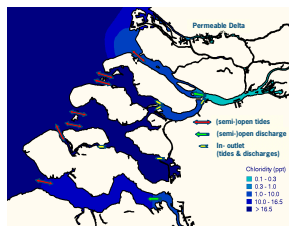


Figure 1: Configuration "Permeable Delta" indicating water exchanges between basins and corresponding salt distribution

## Model species: Pacific oyster

- Exotic invasive species
- Introduced in 1964 in the Oosterschelde
- Bioengineer: creates its own habitat: oyster reef
- At present >700 ha oyster reefs in the Oosterschelde
- Habitat model available



Figure 3: Oyster reef in the Oosterschelde

## Habitat model

- Abiotic data from Deltamodel:
  - Water depth; bottom shear stress, salinity, temperature, Chlorophyll, e.t.c.
- Knowledge rules: habitat suitability Pacific oyster as function of abiotic data
- Result is potential habitat suitability maps
- Quantitative evaluation different scenarios

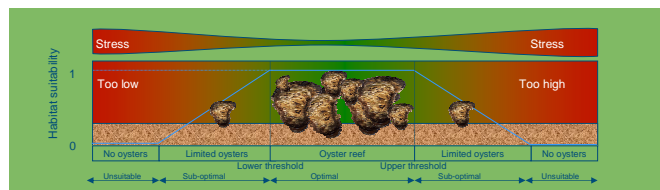


Figure 4: Habitat suitability of oysters as a function of its environment

## Aims of this study

- Predict the effects of climate change and human adaptations on (potential) valuable habitats and species in the Dutch Delta region
- Testing of coupling of models of climate change, hydrodynamics, water quality and habitats.

## Approach

- Abiotic conditions for in the Dutch Delta for various design scenario's will be calculated by 1-D Deltamodel
- Results will be projected on 2-D maps (Figure 2)
- Maps of abiotic conditions are translated to potential habitat suitability maps
- Pacific oyster as pet organism

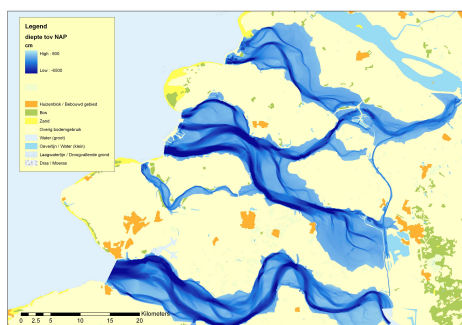


Figure 2: Map of the research area in the Southwestern Delta. Bottom morphology is indicated in blue (units cm NAP).

## Field and lab experiments

- Experiments to determine knowledge rules on the establishment of Oysters in new areas as function of abiotic conditions, as this is an important limiting step in understanding the spreading



Figure 5: Measurement of "pull strength" on oysters