

Engaging managers and stakeholders SSA5

The Limfjord Experience

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SPICOSA Study Site Applications

- 1 Gulf of Riga
- 2 Gulf of Gdansk
- 3 Oder Estuary
- 4 Himmerfjorden
- 5 Limfjorden
- 6 Sonderled
- 7 Clyde Sea
- 8 Cork Harbour
- 9 Scheldt Delta
- 10 Pertuis Charentais
- 11 Guadiana Estuary
- 12 Barcelona Coast
- 13 Thau Lagoon
- 14 Taranto Mare Piccolo
- 15 Venice Lagoon
- 16 Thermaikos Gulf
- 17 Izmit Bay
- 18 Danube Delta



Stakeholder group

Members of established forums:

- Environmental managers
- aquaculture
- Fisheries

Extended to include other sectors such as:

- Tourism
- Agriculture
- Recreational fishermen

Primary Stakeholders

Commercial mussel fishermen:

- Concerned about prices and market demand
- Fear competition from mussel farmers
- Pressure from environmentalists concerning habitat destruction from dredging activities



Primary Stakeholders

Mussel farmers:

- New activity
- Potential conflict with mussel fishermen and with environmentalists
- Concerned about developing profitable mussel production



Primary Stakeholders

Nature Managers:

Management according to regulations, e.g. implementation of the WFD in DK waters (initial plan out 7 Jan 2010)



Primary Stakeholders

Nature Conservation:

- Reduce hypoxia & N/P loadings
- Secure shallow water mussels as food for birds
- Close mussel fishery by dredging and increase mussel farming



Stakeholder characteristics

Cultural & educational background (constitutional monarchy since 1849)

150 years of democracy and free speech

>100 years of public education for 7-12 years
(primary, secondary)

>100 years of public education of adults (folks high schools, trade schools, universities, etc.)

>80 years of public voting for both men and women

>50 years of following a Danish educational tradition
with focus on individual schooling in opinion forming
and public debating

10-20 years of high computer literacy

System Design (spring 2008)



- Policy issues:**
- 1) regulation of nutrient effluents to reduce eutrophication;
 - 2) closure of the mussel fishery due to national implementation of international directives
 - 3) resource conflicts between mussel fishers and mussel farmers.

Scenarios



- 1) reductions of Total N and P
- 2) closure of the wild mussel fishery
- 3) introduction of line-mussel culture

Phosphor loading

FosforOut

January 2010: Phosphorous loadings =100% previous year
(slide the cursor to change the value)

Mussel fishery vessel

FisheryOut

January 2010: Mussel fishery vessel=51
(slide the cursor to change the value)

Nitrogen loading

NitrogenOut

January 2010: Nitrogen loadings=100% previous year
(slide the cursor to change the value)

Week quota vessel

WeekQuotaOut

January 2010: Week quota vessel=85/45/30 tons/vessel/week
(slide the cursor to change the value)

Price

PriceOut

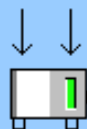
January 2010: Price=150€/Ton
(slide the cursor to change the value)

Line mussel recruitment

RecruitLmOut

January 2010: Line mussel recruitment=0gram ww/m²
(slide the cursor to change the value)

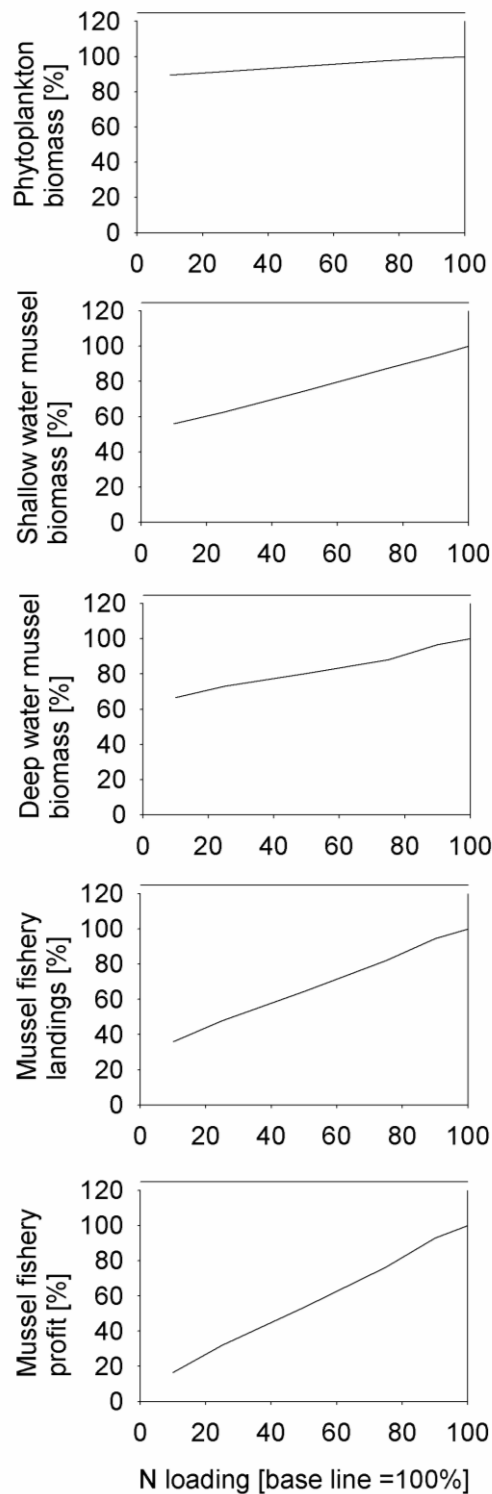
click here or here to switch on/off



SwitchOUT

On/OFF switch Hypoxia: red = 0, green = 1
click on the switch to change the value

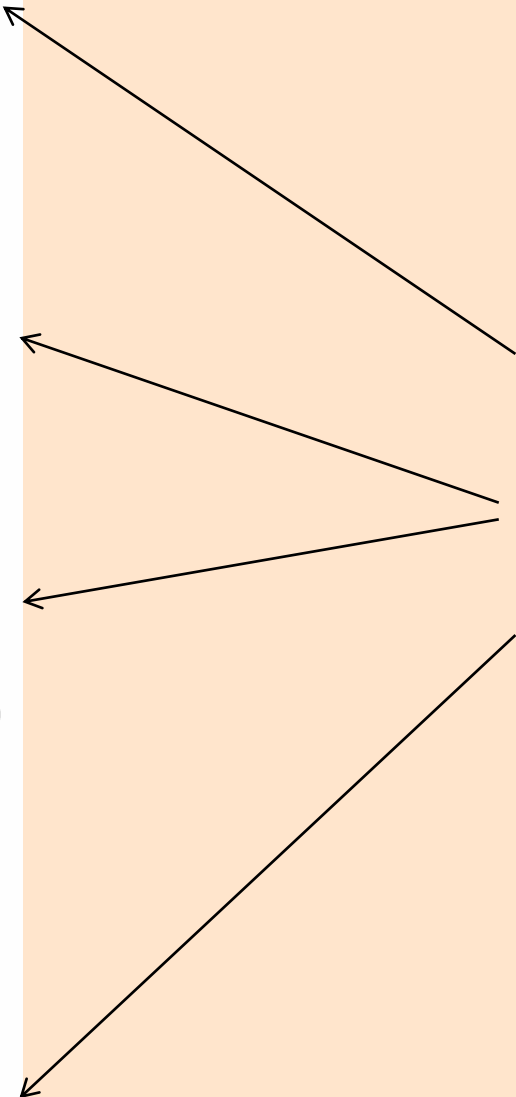
A.



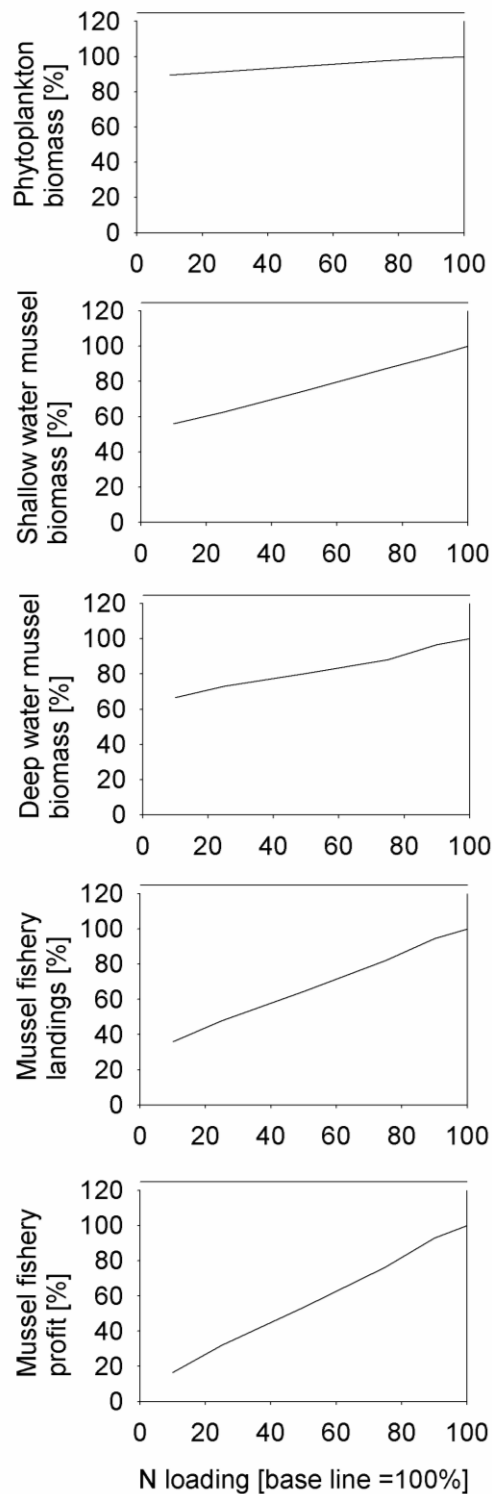
RESULTS of Scenario 1. Reductions of total N and P loadings

Reductions in N alone to WFD target (47% level) showed:

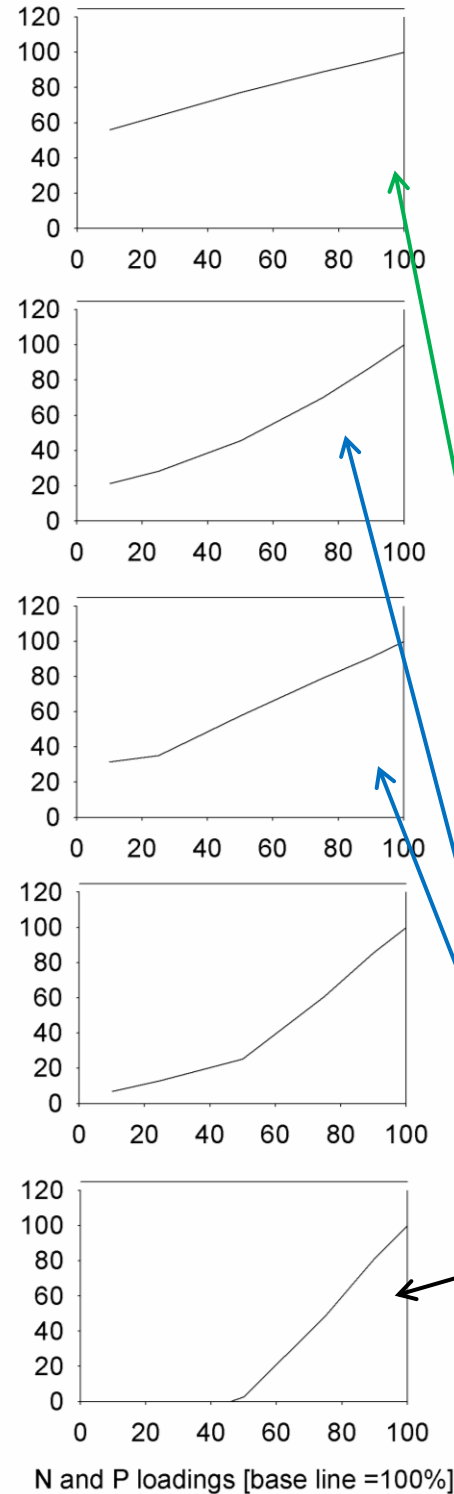
1. **Minor decrease in phytoplankton biomass**
2. **Decrease (~25%) of shallow and deep water mussel biomass**
3. **Decrease (~50%) of mussel fishery profit**



A.



B.



RESULTS of Scenario 1. Reductions of total N and P loadings

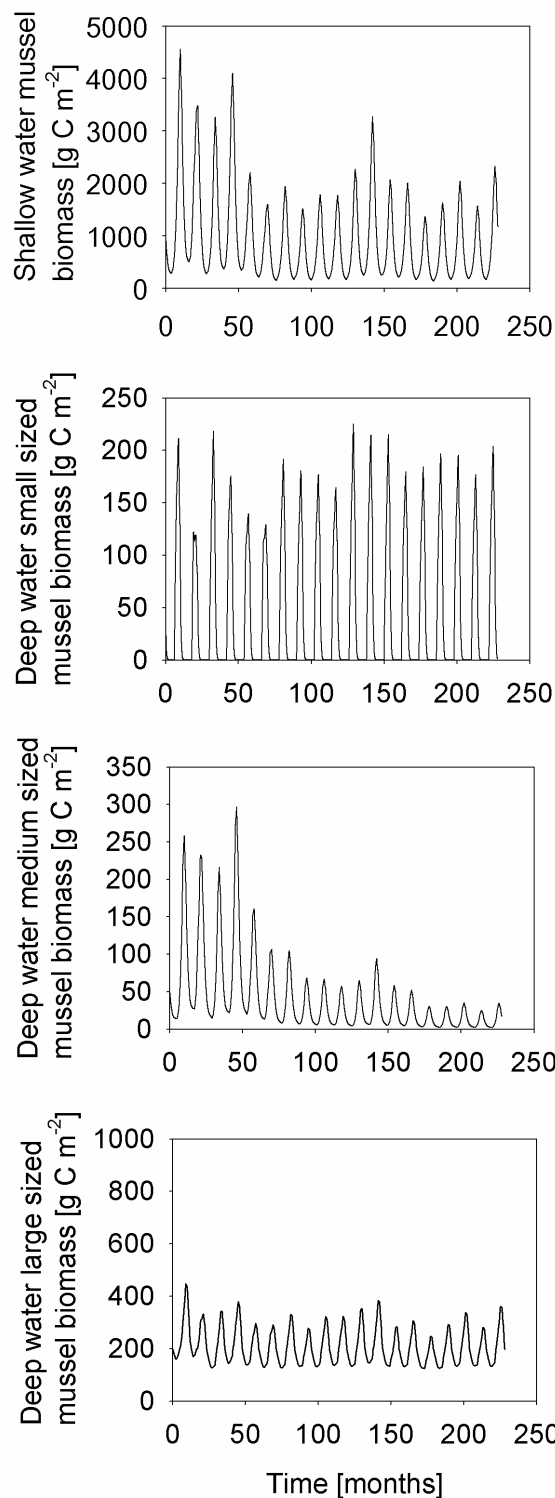
Reductions in N alone to WFD target (47% level) showed:

1. Minor decrease in phytoplankton biomass
2. Decrease (~25%) of shallow and deep water mussel biomass
3. Decrease (~50%) of mussel fishery profit

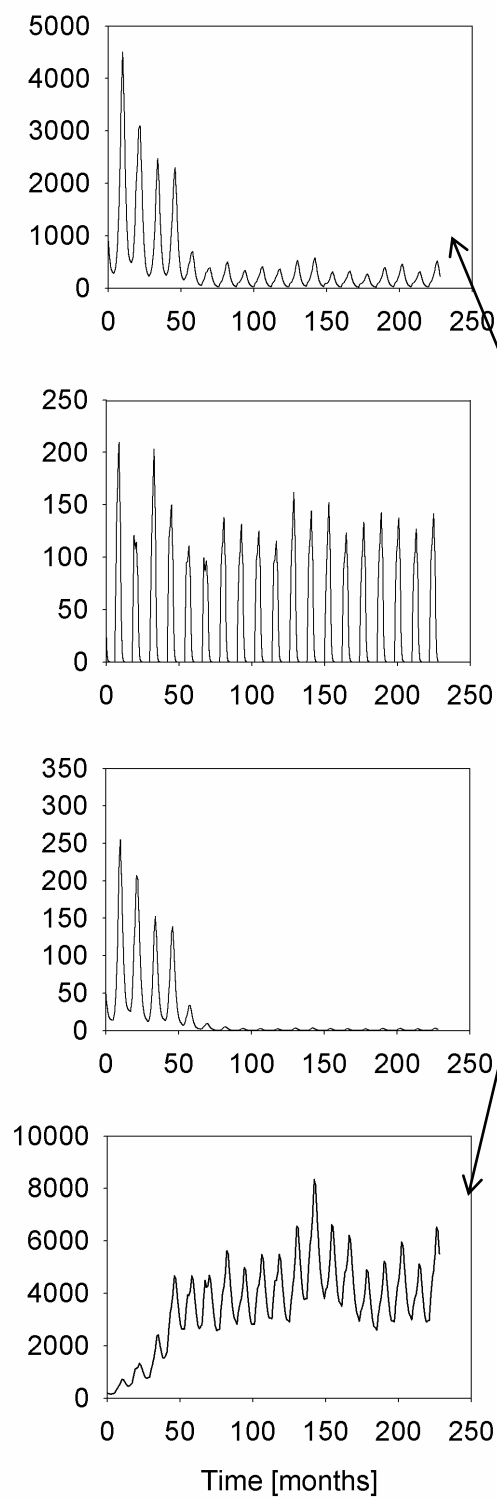
Reductions in N and P to the 47% level would result in:

1. Minor decrease in phytoplankton biomass (~20%)
2. Decrease (~50%) of shallow and deep water mussel biomass
3. Almost collapse of mussel fishery

A. Scenario: base-line (1985-2003)

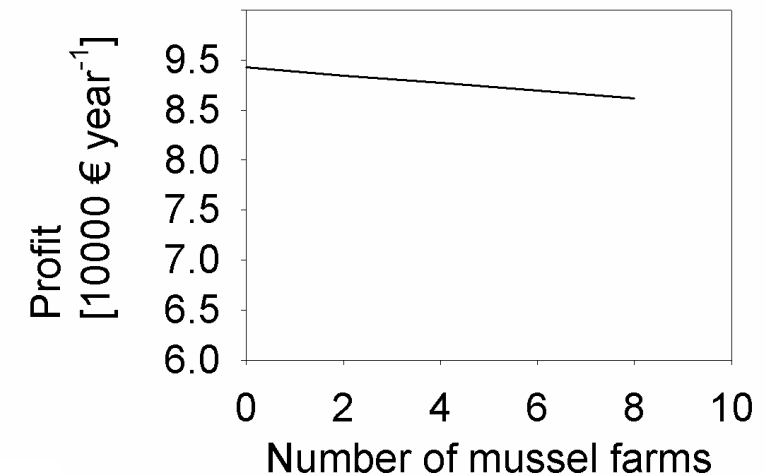
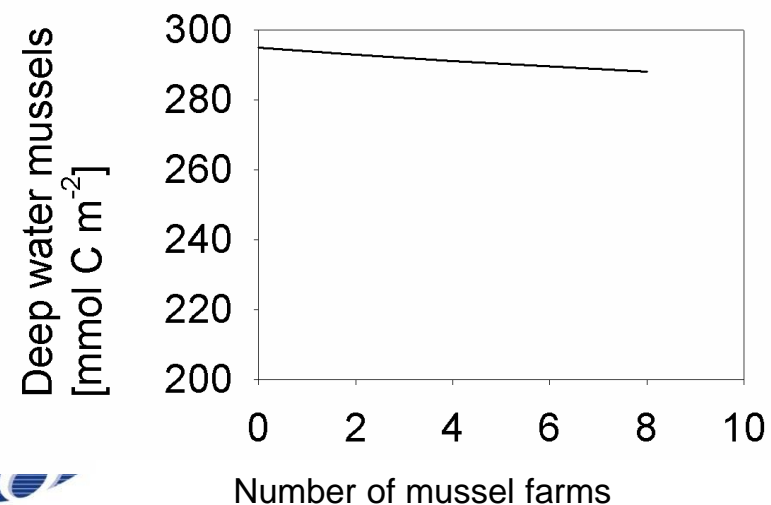
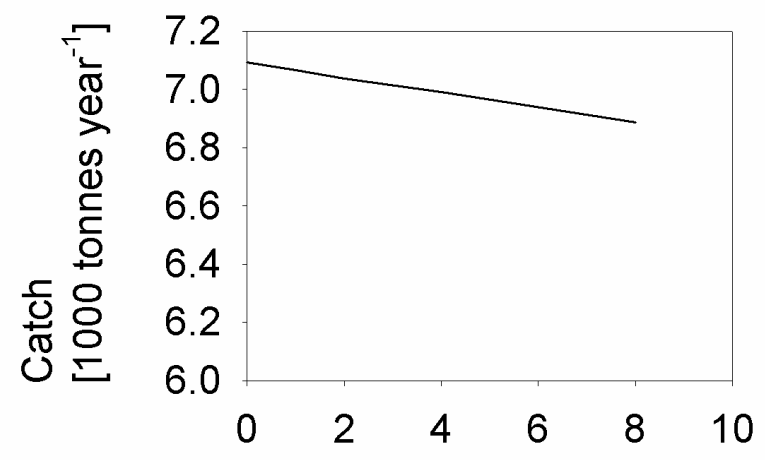
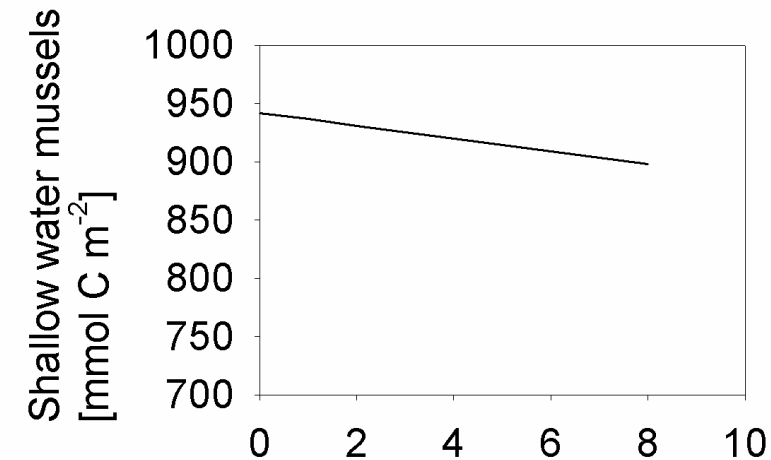
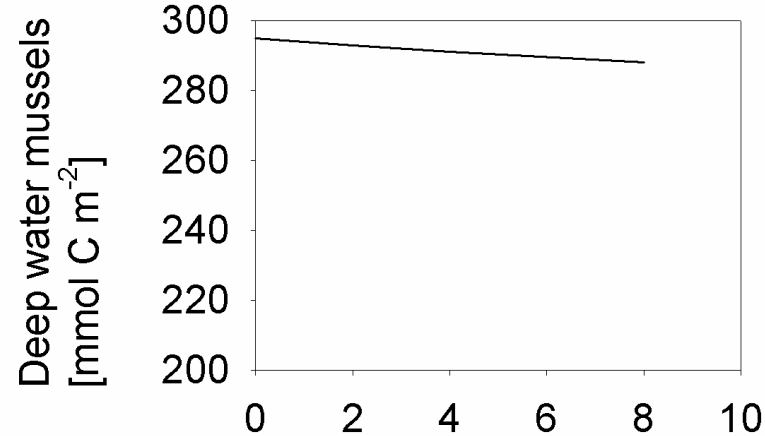
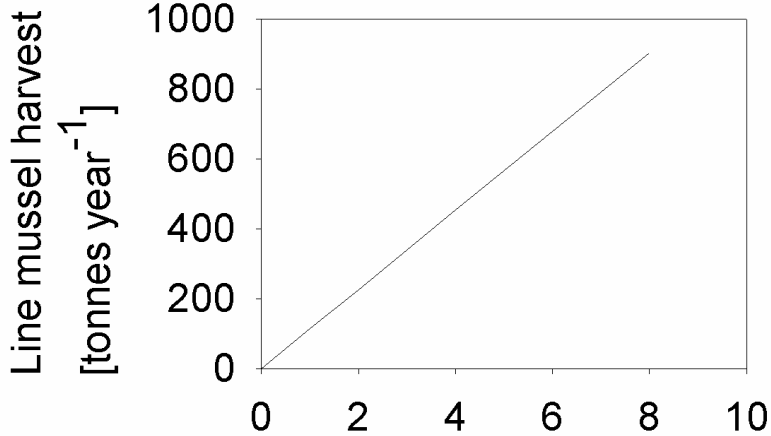


B. Scenario: closure of mussel fishery



RESULTS of Scenario 2. Closure of wild mussel fishery

1. a >10 fold increase in hitherto fishable mussel biomass
2. a >10 fold decrease in **shallow-water** and medium-sized deep-water mussel biomass
3. an annual profit loss of ~€6.2 million



RESULTS

Scenario 3. Introduction of line mussel culture

had little impact
on wild mussel
fishery
had little impact on
shallow-water
mussel biomass

Scenario simulation results provided

- both recognizable and unexpected results, which stimulated discussion among stakeholders
- credible overview of the ecosystem they were familiar with
- cognition of a higher ecosystem complexity than hitherto understood
- changes in stakeholder perceptions

The SAF seems well qualified for developing a common understanding of the needs and consequences of change as part of the public consultation process and merging public and scientific information.



