Shared Socioeconomic Pathways (SSPs) for fisheries and aquaculture in Europe

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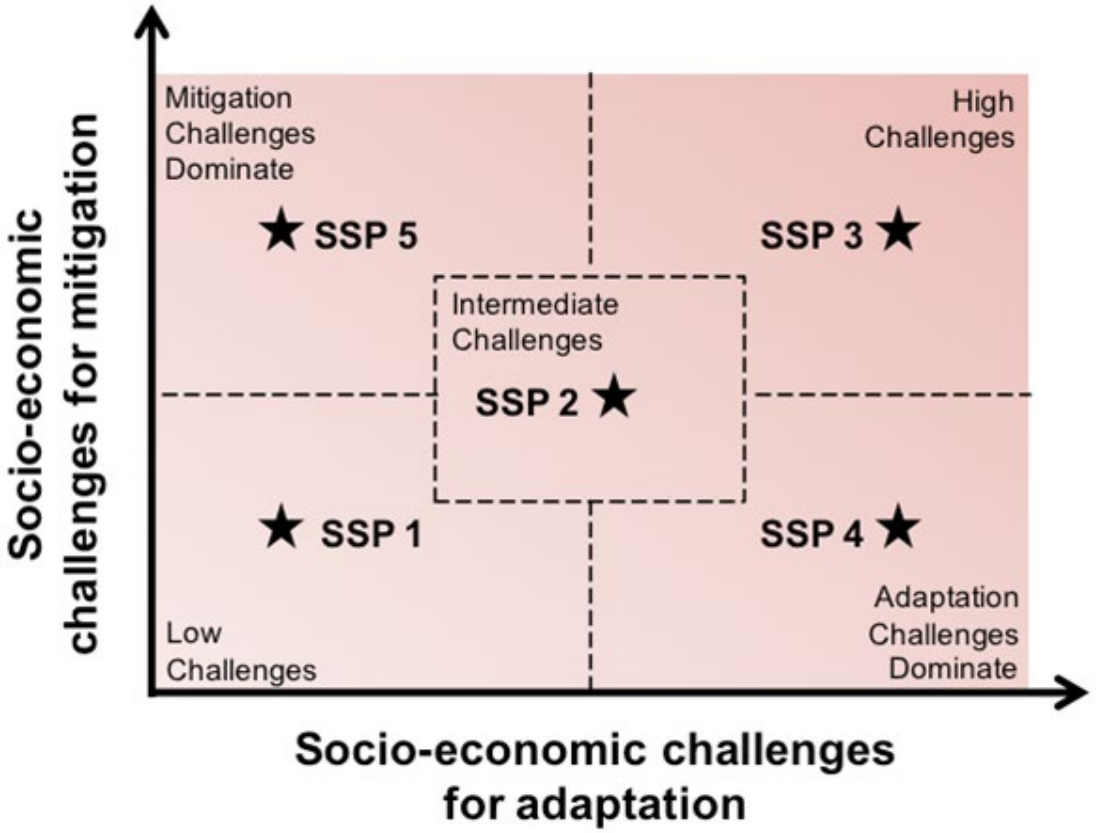
Shared Socioeconomic Pathways (SSPs)



Shared Socio-economic Pathways (SSPs) have been designed by the IPCC to be used alongside the Representative Concentration Pathways (RCPs) to analyse **feedbacks between climate change and socioeconomic factors**.

Certain model outputs are available 'off the shelf' for each Shared Socio-economic Pathway (SSP).

The CERES socio-political scenarios…

van Vuuren & Carter (2014) provided a suggestion for mapping the previous generation of IPCC SRES scenarios onto the new scenarios framework of representative concentration pathways (RCPs) and shared socio-economic pathways (SSPs)

It should be noted that none of the CERES socio-political scenarios assume RCP2.6 or SSP4.

World Markets – RCP 8.5 and SSP5 (A1F1)

- People aspire to personal independence, material wealth and greater mobility, all of which have a negative effect on wider societal and environmental goals.
- Pressure grows to reduce taxes and strip away regulation. More public services are privatized or privately managed
- Consumerism
- High fossil fuel dependency
- Highly engineered infrastructure and ecosystems

National Enterprise – RCP 8.5 and SSP3 (A2)

- Increased national isolation and independence.
- Long-term economic growth limited by government policies, that limit international competition and protect national industries.
- Conservation and the environment are not a main priority
- High resource intensity and fossil fuel dependency
- Low investments in technology development and education
- Weak international governance and local institutions

Global Sustainability – RCP 4.5 and SSP1 (B1)

- People aspire to high levels of welfare and a healthy environment. The best way to achieve this is through international co-operation.
- People see their personal interests as being connected to a strong and co-operative society.
- Policies are coordinated at the European Union and international level.
- Decreasing income inequality
- Low resource intensity and fossil fuel dependency
- Environmentalism

Local Stewardship – RCP 6.0 and SSP2 (B2)

- Public policies aim to promote economic activities that are small scale and regional.
- An important focus is on using technology and new ideas to make the best use of local and regional resources
- Global environmental problems receive less attention
- Moderate population growth
- Slowly converging incomes between industrialized and developing countries
- A rich mosaic of local strategies to manage ecosystems and ecosystem services

CERES

Climate change and European aquatic RESources

World Markets [RCP 8.5, SSP5]

"Growth is good"!

"We've got the whole world in our hands"!

National Enterprise [RCP 8.5, SSP3]

"Pull up the drawbridge"

Note: Working together for a harmonious existence.

"Think local, act local"

Global Sustainability [RCP 4.5, SSP1]

Local Stewardship [RCP 6.0, SSP2]

Operationalised Scenarios

What could it mean for Marine Fisheries?

World Markets [RCP 8.5, SSP5]

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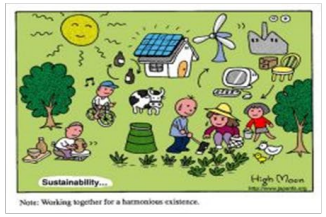


"Think local, act local"

Global Sustainability [RCP 4.5, SSP1]

Local Stewardship [RCP 6.0, SSP2]

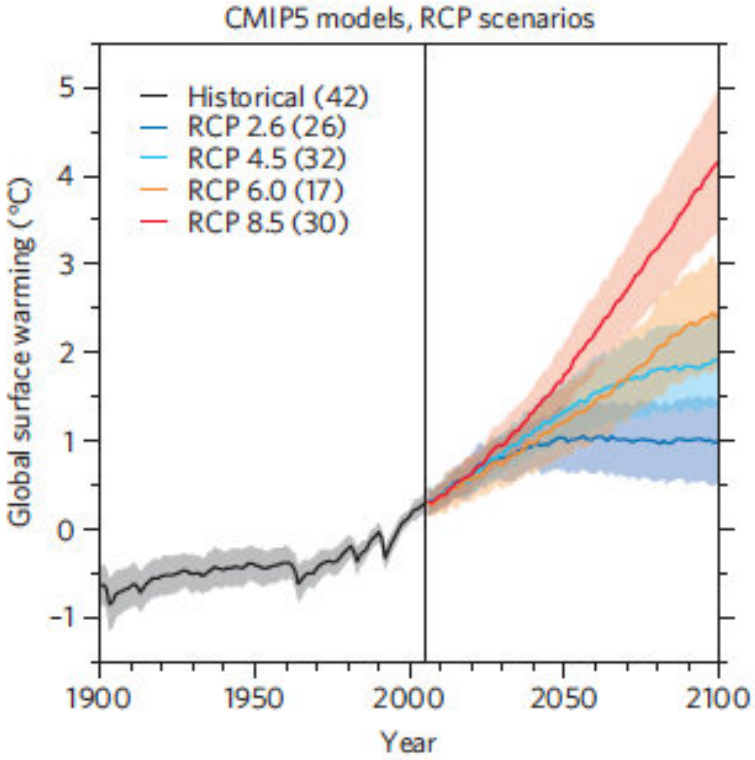
- Change in stocks' distribution and abundance

IPCC Scenarios

Representative Concentration Pathways (RCPs) are four greenhouse gas concentration (not emission) trajectories adopted by the IPCC.

In **CERES** modellers created spatially and temporally detailed projections of **future marine and freshwater conditions** under **RCP 8.5** and **RCP 4.5.**

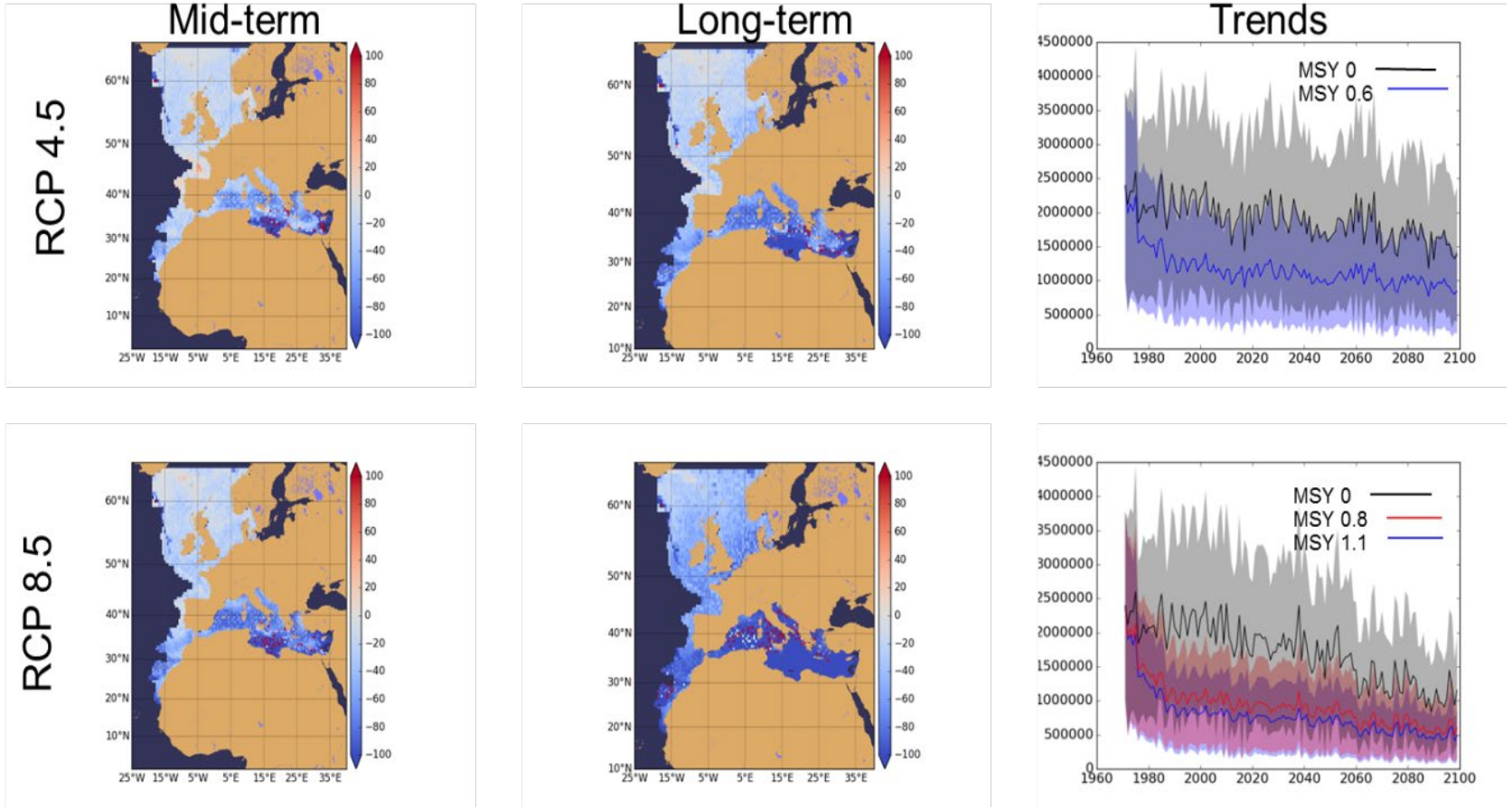
Global warming (in °C) expected under each RCP



Kay et al., 2018, D1.3

Change in stocks' distribution and abundance

Example Mackerel



Sailley et al, 2019, D2.3

Operationalised Scenarios

What could it mean for Marine Fisheries?

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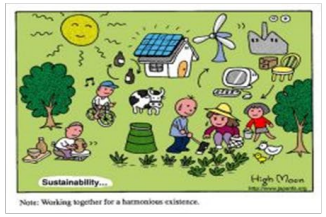


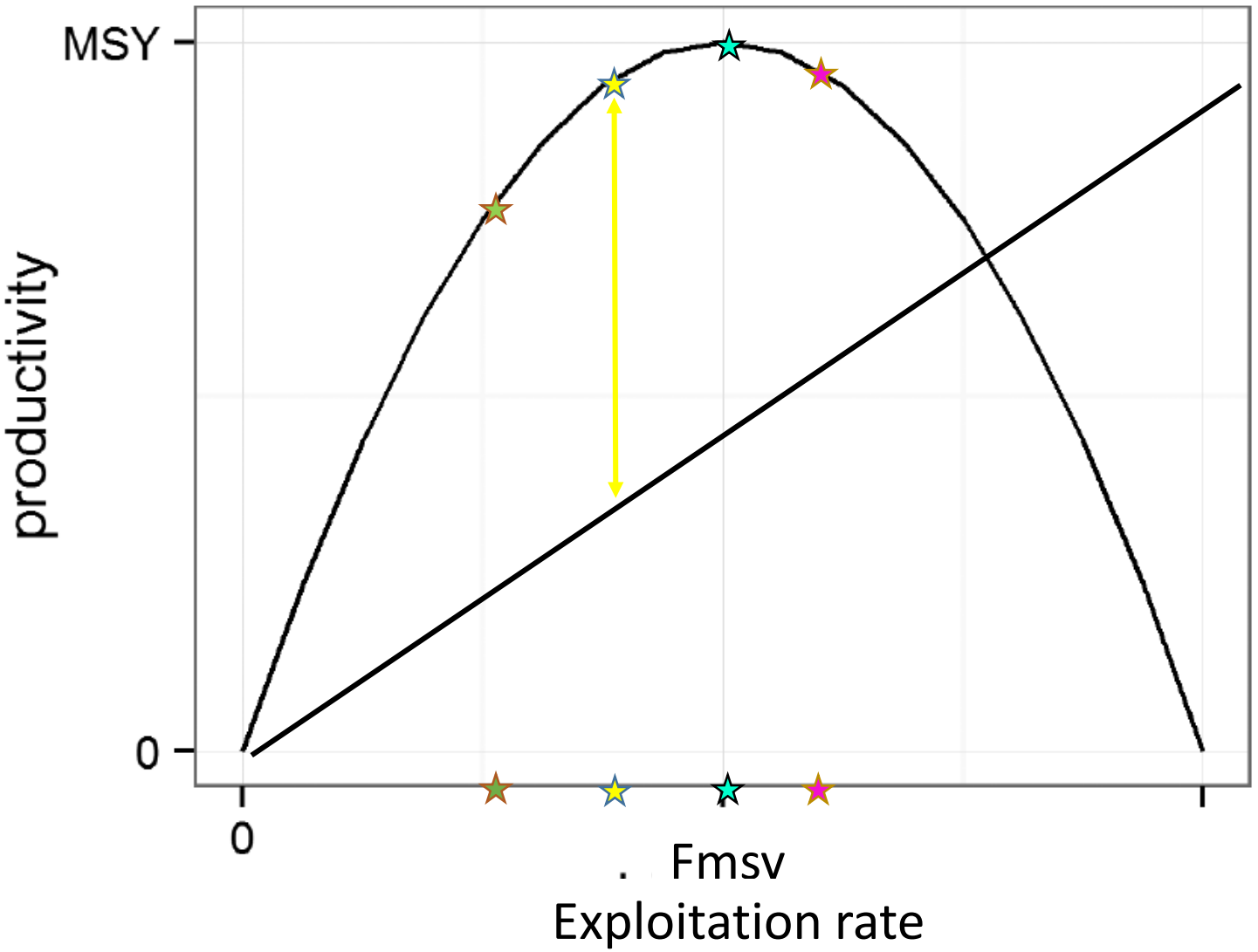
"Think local, act local"

Global Sustainability [RCP 4.5, SSP1]

Local Stewardship [RCP 6.0, SSP2]

- Change in stocks' distribution and abundance
- Management:
  - Exploitation level

Exploitation level



Global Sustainability
~ 60%Fmsy

World Market
~ 80%Fmsy

Local Stewardship
Fmsy

National Enterprise
~ 110%Fmsy

Operationalised Scenarios

What could it mean for Marine Fisheries?

World Markets [RCP 8.5, SSP5]

"Growth is good"!

National Enterprise [RCP 8.5, SSP3]

"Pull up the drawbridge"

"We've got the whole world in our hands"!

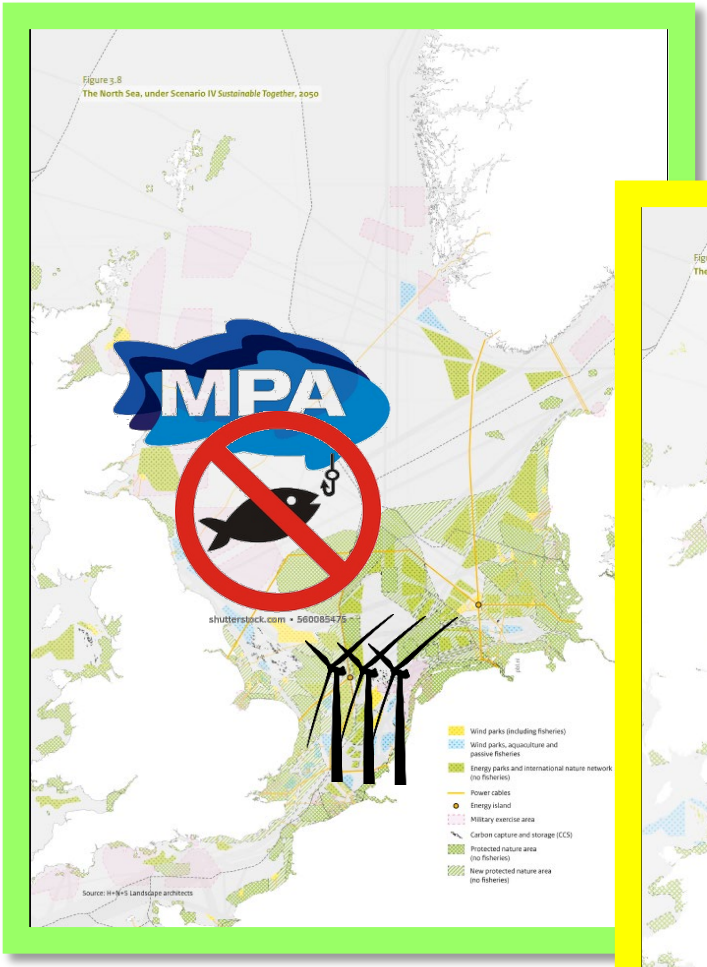
"Think local, act local"

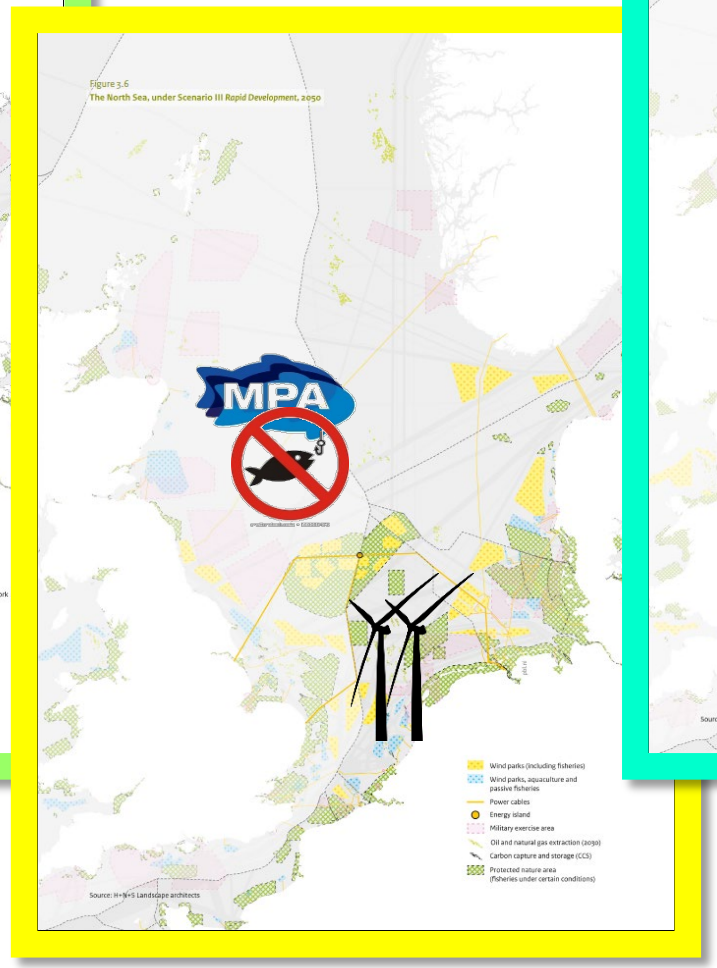
Global Sustainability [RCP 4.5, SSP1]

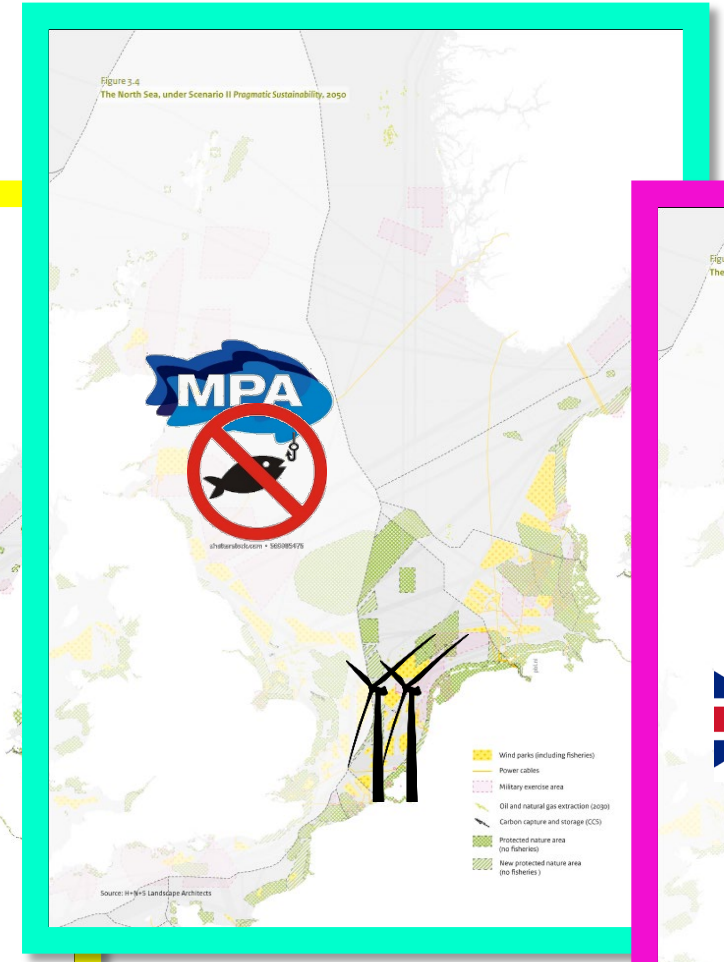
Local Stewardship [RCP 6.0, SSP2]

- Change in stocks' distribution and abundance
- Management:
  - Exploitation level
  - Access to fishing grounds

Access to fishing grounds: North Sea example







Matthijsen et al, 2019

Operationalised Scenarios

What could it mean for Marine Fisheries?

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National Enterprise [RCP 8.5, SSP3]

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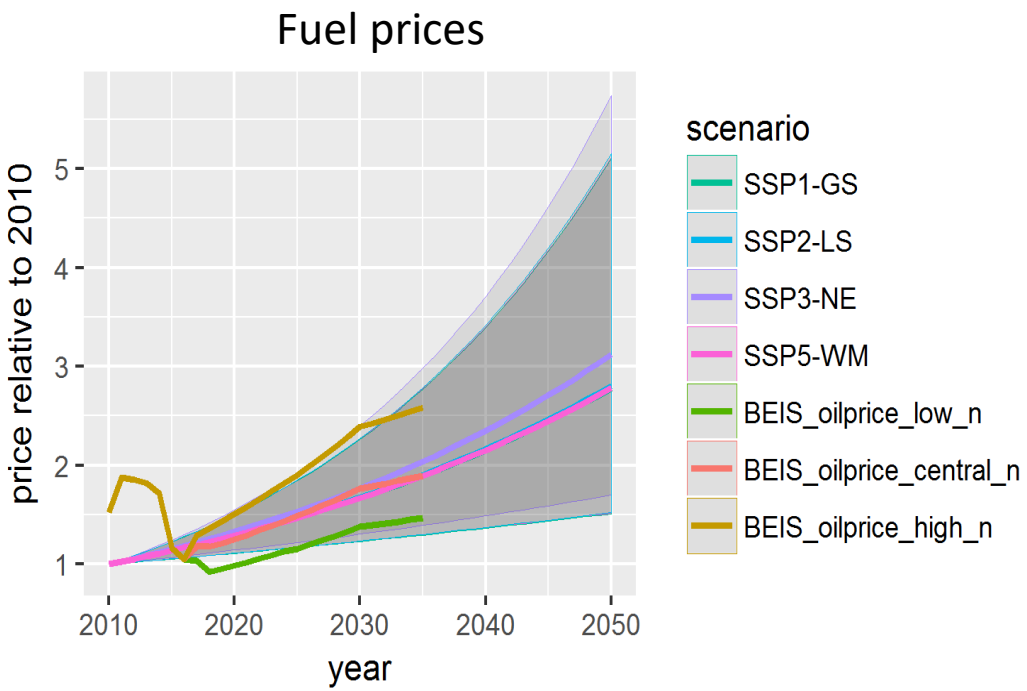
"Think local, act local"

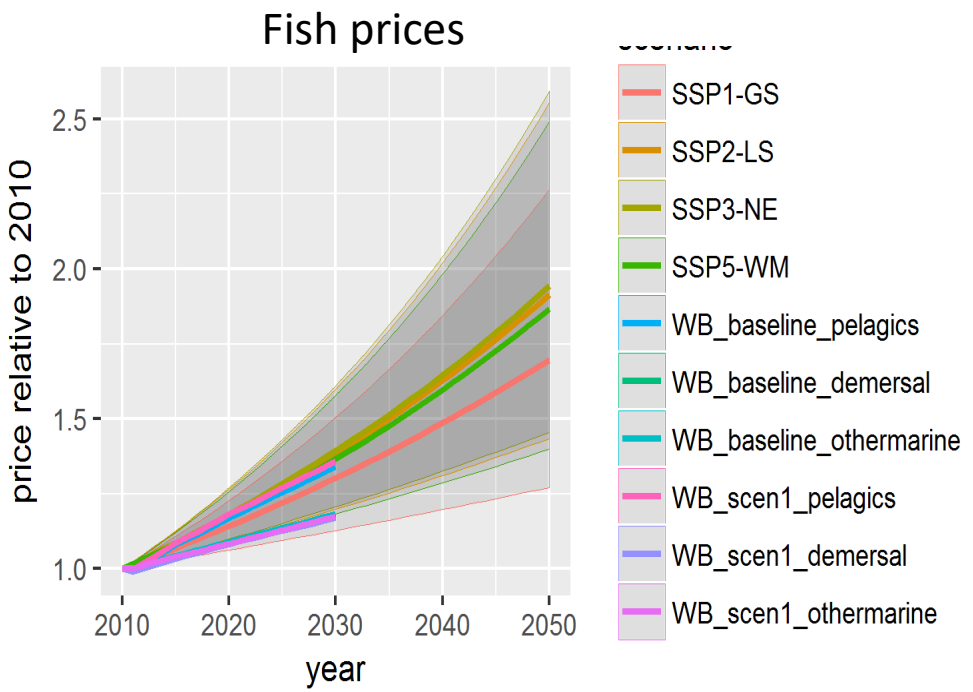
Global Sustainability [RCP 4.5, SSP1]

Local Stewardship [RCP 6.0, SSP2]

- Change in stocks' distribution and abundance
- Management:
  - Exploitation level
  - Access to fishing grounds
- Global economic environment
  - Prices of fuel and fish

Prices





Wageningen Economic Research, 2018, unpublished MAGNET results

Operationalised Scenarios

What could it mean for Marine Fisheries?

World Markets [RCP 8.5, SSP5]

"Growth is good"!

National Enterprise [RCP 8.5, SSP3]

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"Think local, act local"

Global Sustainability [RCP 4.5, SSP1]

Local Stewardship [RCP 6.0, SSP2]

- Change in stocks' distribution and abundance
- Management:
  - Exploitation level
  - Access to fishing grounds
- Global economic environment
  - Prices of fuel and fish
- Technological advances
  - Reduction of energy use

Reduction of fuel use

World Market
-75% use

National Enterprise
-37% use

Global Sustainability
-75% use

Local Stewardship
-37% use

Operationalised Scenarios

What could it mean for Marine Aquaculture?

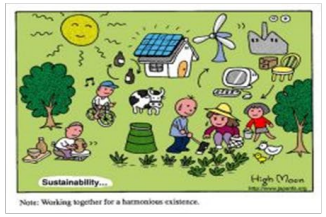
World Markets [RCP 8.5, SSP5]

"Growth is good"!

National Enterprise [RCP 8.5, SSP3]

"Pull up the drawbridge"

"We've got the whole world in our hands"!



"Think local, act local"

Global Sustainability [RCP 4.5, SSP1]

Local Stewardship [RCP 6.0, SSP2]

- Change in disease outbreak
- Global economic environment
  - Prices of fuel and fish
- Technological advances
  - Reduction of energy use

Why define standardised scenarios ?

- Future remains largely uncertain
- What-if scenarios allow to bound futures
- Alignment with international standards & IPCC
- Integration of information from various sources
- Improved collaboration
- Contribution to the growing literature on future of oceans
- Contribution to IPCC and other (local) initiatives
- Uptake by managers

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