

# **Ecosystem Resilience**

## **Managing our fisheries for a sustainable future**

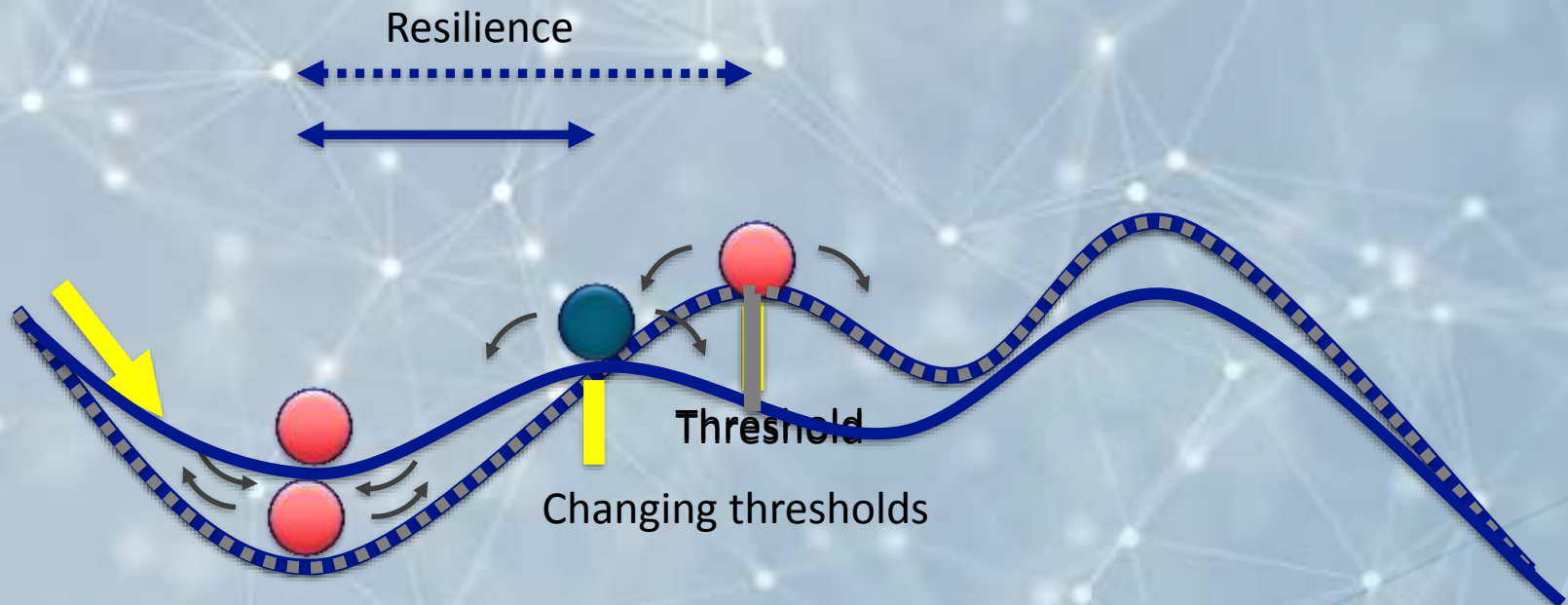
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&  
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# Resilience of marine ecosystems

- The capacity of a system to absorb or withstand perturbations and other stressors such that the system remains within the same regime, essentially maintaining its structure and functions;
- ~~From a stable, resilient system, an increase in stressors can push the system past a distinct threshold and keep its identity.~~



# Resilience at risk in Europe



If record high ocean temps continue ...



# The importance of biodiversity

- In *Ecopath with Ecosim*, it can be translated into:
  - System Omnivory Index
  - Ascendency
  - Shannon diversity index
  - Keystoneness

*Ecological Monographs*, 85(1), 2015, pp. 29–47  
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## Keystone species: toward an operational concept for marine biodiversity conservation

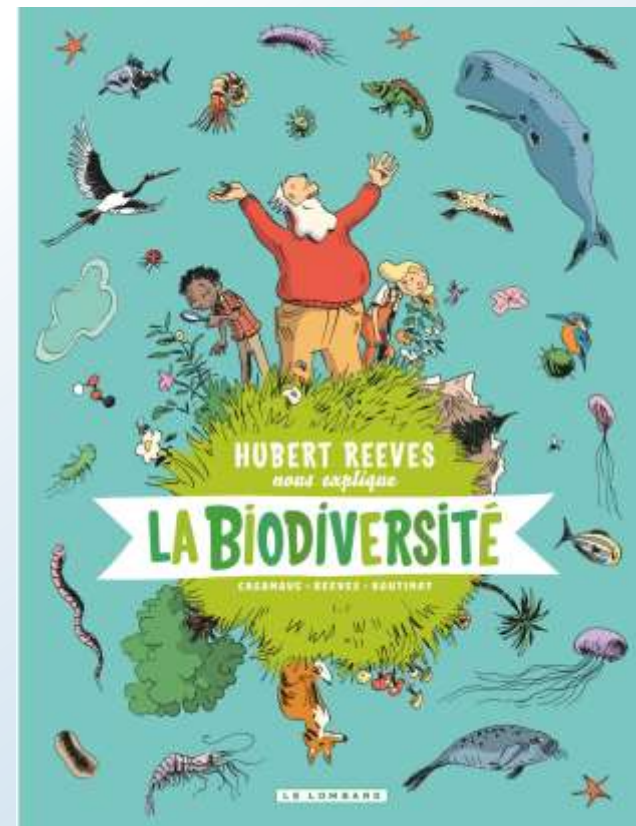
AUDREY VALLS,<sup>1,5</sup> MARTA COLL,<sup>2,3,4</sup> AND VILLY CHRISTENSEN<sup>1</sup>

### Climate-driven changes in functional biogeography of Arctic marine fish communities

André Fraïner<sup>a,1</sup>, Raul Primicerio<sup>a</sup>, Susanne Kortsch<sup>a</sup>, Magnus Aune<sup>b</sup>, Andrey V. Dolgov<sup>c</sup>, Maria Fosshelm<sup>d</sup>, and Michaela M. Aschan<sup>a</sup>

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# Can we use ecosystem models to address the overall resilience of our MareFrame systems?



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## EcoBase provides a series of open-access models:

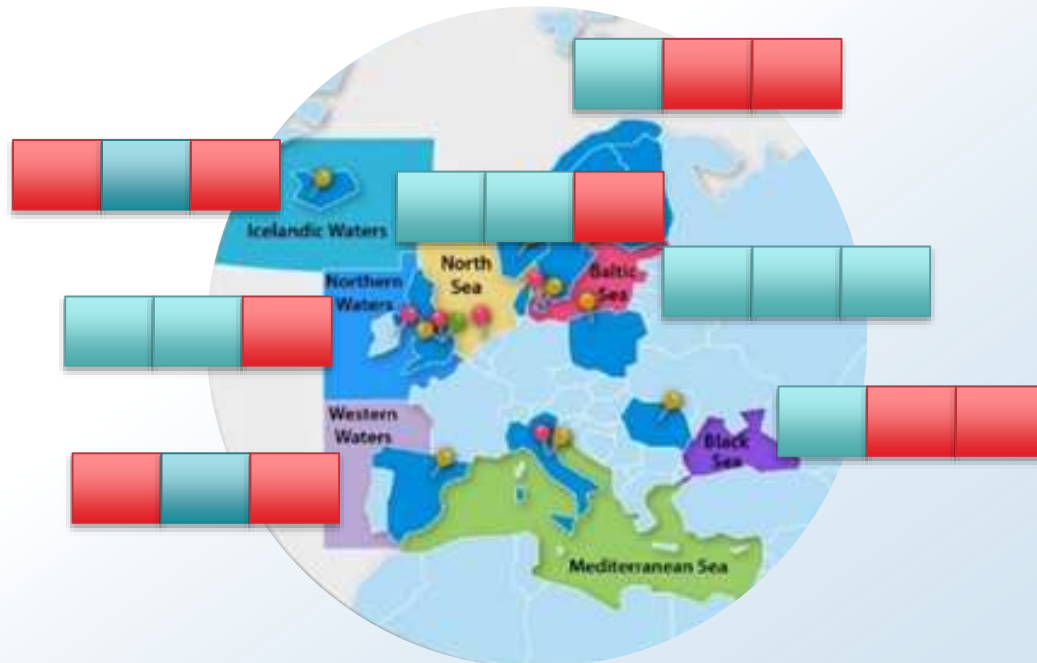
- Iceland (Samb 1999)
- West Coast of Scotland (Morissette and Pitcher 2005)
- North Sea (Mackinson and Daskalov 2008)
- Barents Sea (Blanchard *et al.* 2002)
- Baltic Sea (Tomczak *et al.* 2012)
- Black Sea (Akoglu *et al.* 2014)
- Mediterranean (Tecchio *et al.* 2013)
- Bay of Biscay (Lasalle *et al.* 2012)



# Can we use ecosystem models to address the overall resilience of our MareFrame systems?



- **Maintain biodiversity and sustainable stocks** while preserving **ecosystems' structure and functions** for the next generations.
- What are the main 3 species fished and what is their **keystoneness**?
  -  Very important species compared to the rest
  -  Less important species compared to the rest



# How do we reach that sustainable use of our marine resources?

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- And how can we manage less resilient systems?
- We can still maintain healthier fisheries in more resilient systems, where complexity is more important

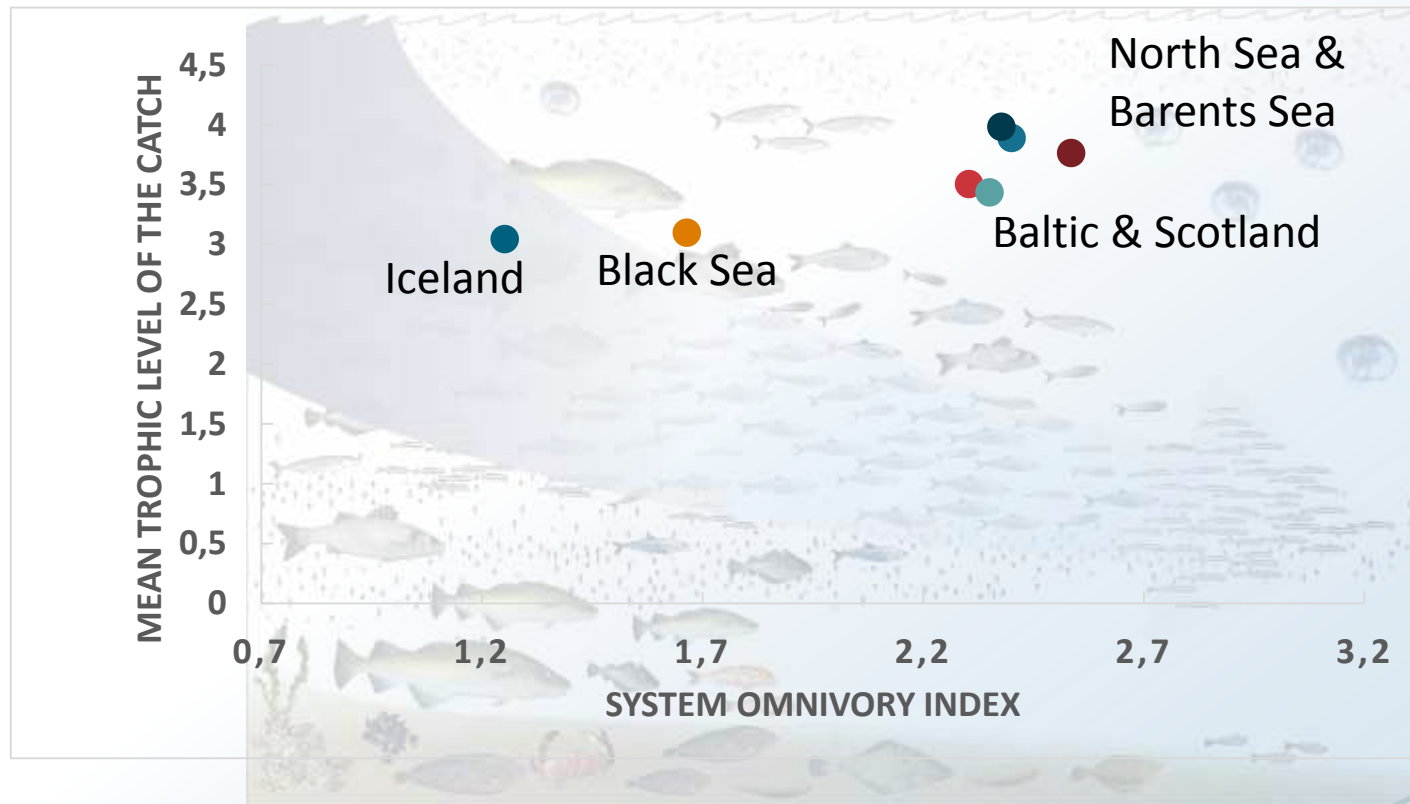






# How do we reach that sustainable use of our marine resources?

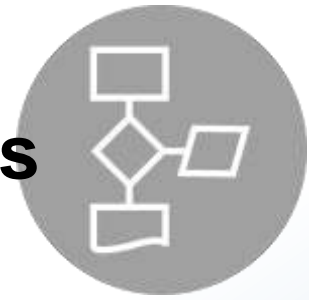
- Some fisheries are still catching **high TL** stocks – **not** fishing down the foodwebs
- They are also the countries that don't catch too much **keystone** species



Mediterranean?

# MAJOR THREATS on marine ecosystems

## Conservation targets



### Different threats affect different species within our ecosystems

- Fishing & overfishing
- Climate change
- Marine traffic
  - Getting more and more important in the North
- Pollution
- Military
  - Sonar, explosions...
- Human constructions
  - Drilling, pilling, windmills, ports...
- Oil & Gas

These effects are **CUMULATIVE**

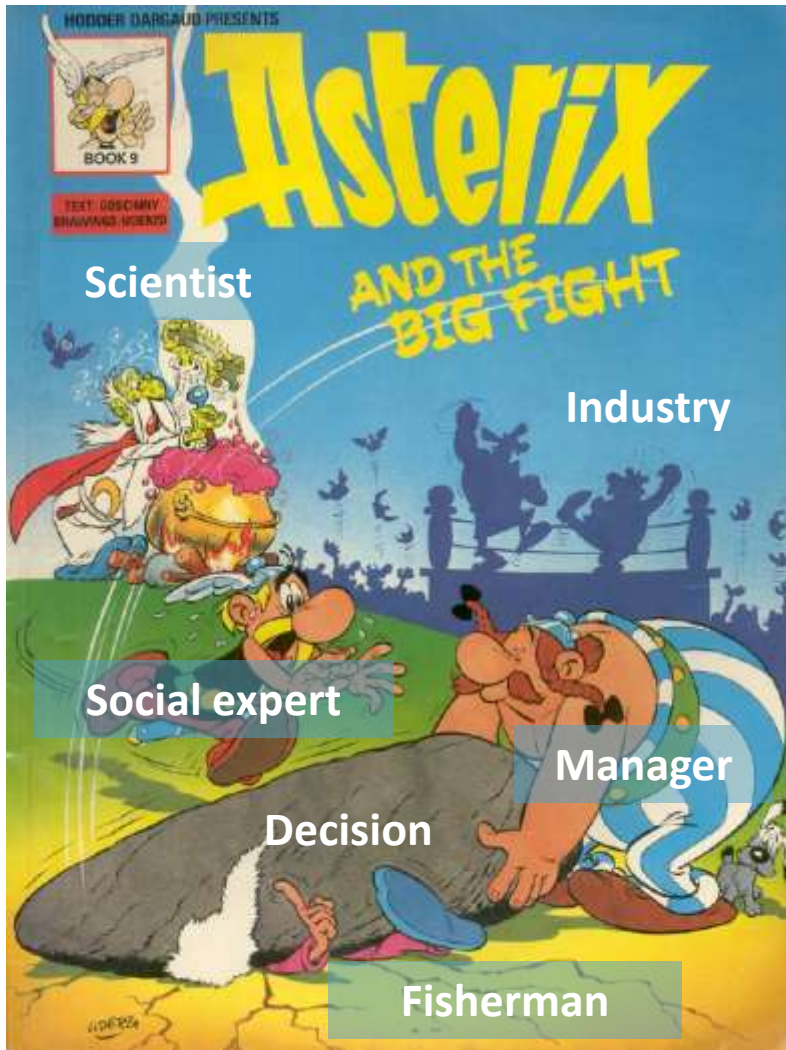
**TARGET UMBRELLA & KEY SPECIES**



# What about our own resilience to this?

## The future of our resources?

### Integrated approach = COLLABORATION



Ecosystem-based fisheries management involves a certain level of **resilience** at the ecosystem level, but should also be linked to the **socio-economic** systems that depend on these marine resources.

# EDUCATION

# COLLABORATION Across borders

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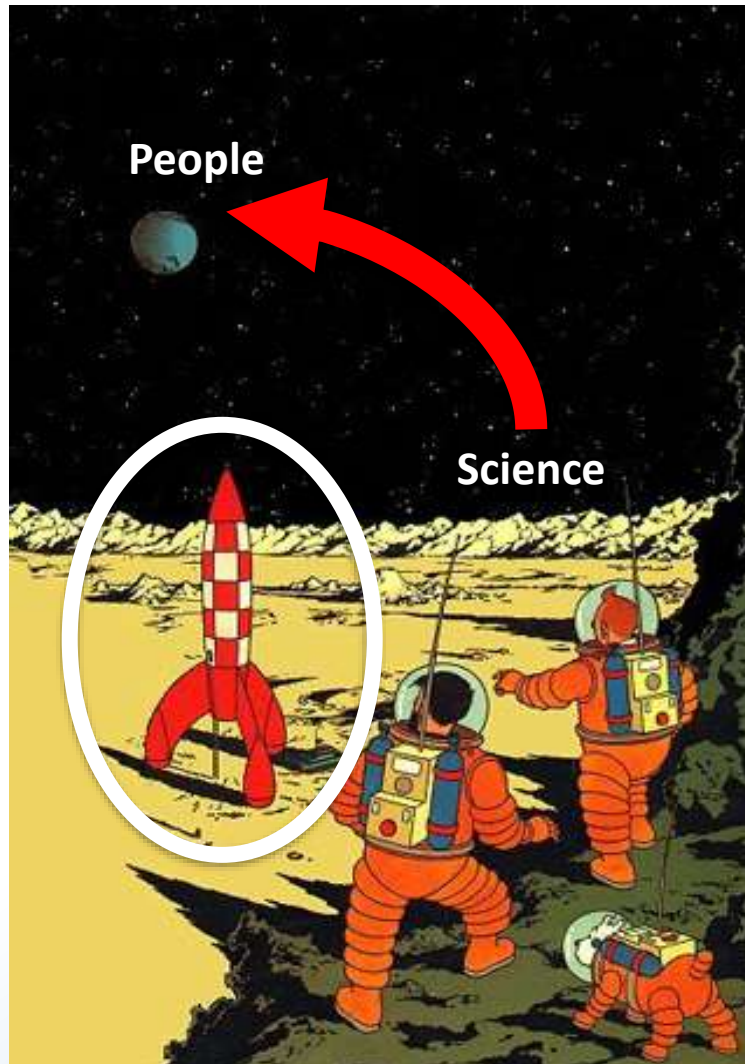
# SCIENCE by itself will not solve everything



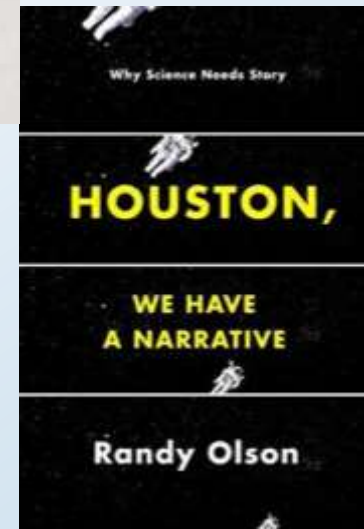
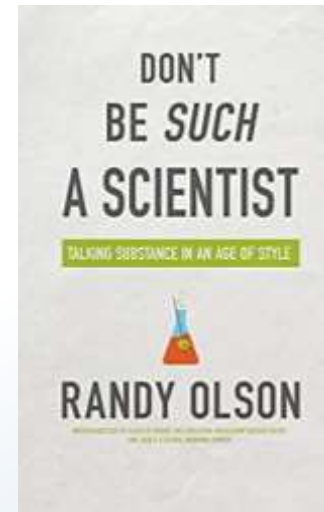
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1	2	3
<b>LEARNING</b> Observe, collect data, analyze, create knowledge	<b>EXPERTISE</b> shaping our knowledge for a specific case	<b>ACTIONS</b> Solutions, politics, economics, education <b>COMMUNICATE!</b>

# Be that link between science and “the real world”



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...and it's not rocket science!

# Best ways to be resilient

## It's about **optimism**



- How to ensure the resilience of these exploited ecosystems to safeguard a sustainable future for oceans and their users?
- Doom and gloom don't work anymore;
- Share **SUCCESS STORIES**
- Inspiration
- **SOLUTIONS**; not problems
- HOPE

UIT

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# MareFrame

## THANK YOU!

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