

Governmental, academic and industrial research – joining forces to meet future ocean challenges?

Adi Kellermann, ICES Head of Science Programme
Ocean Sustainability Science Symposium, Kiel, Germany
5 March 2015

Marine Science Network since 1902

20 Member Countries

Intergovernmental Organization

360 Institutes and a global network of 4,000 scientists

1,600+ scientists participating in activities annually

120+ Expert Groups addressing diverse issues of marine ecosystems and ocean sustainability

ICES in a Nutshell

ICES
CIEM

ICES is a meeting place for science

1902

1939

2008

What are the issues?

- Ocean change, observatories, modelling and forecasting
- Recreation and leisure activities
- Deep sea prospecting and mining
- Marine litter
- Ocean acidification
- Food security (capture fisheries, aquaculture, sea food processing)

- Driven by human activities across various scales individual to industrial
- Requires physical, chemical, biological and economical ocean understanding
- In politics' language: societal challenges

The challenge: global food security

By 2050 there will be 9-10 billion people on earth

These people will want to eat!

Food production has to increase to meet increased consumption

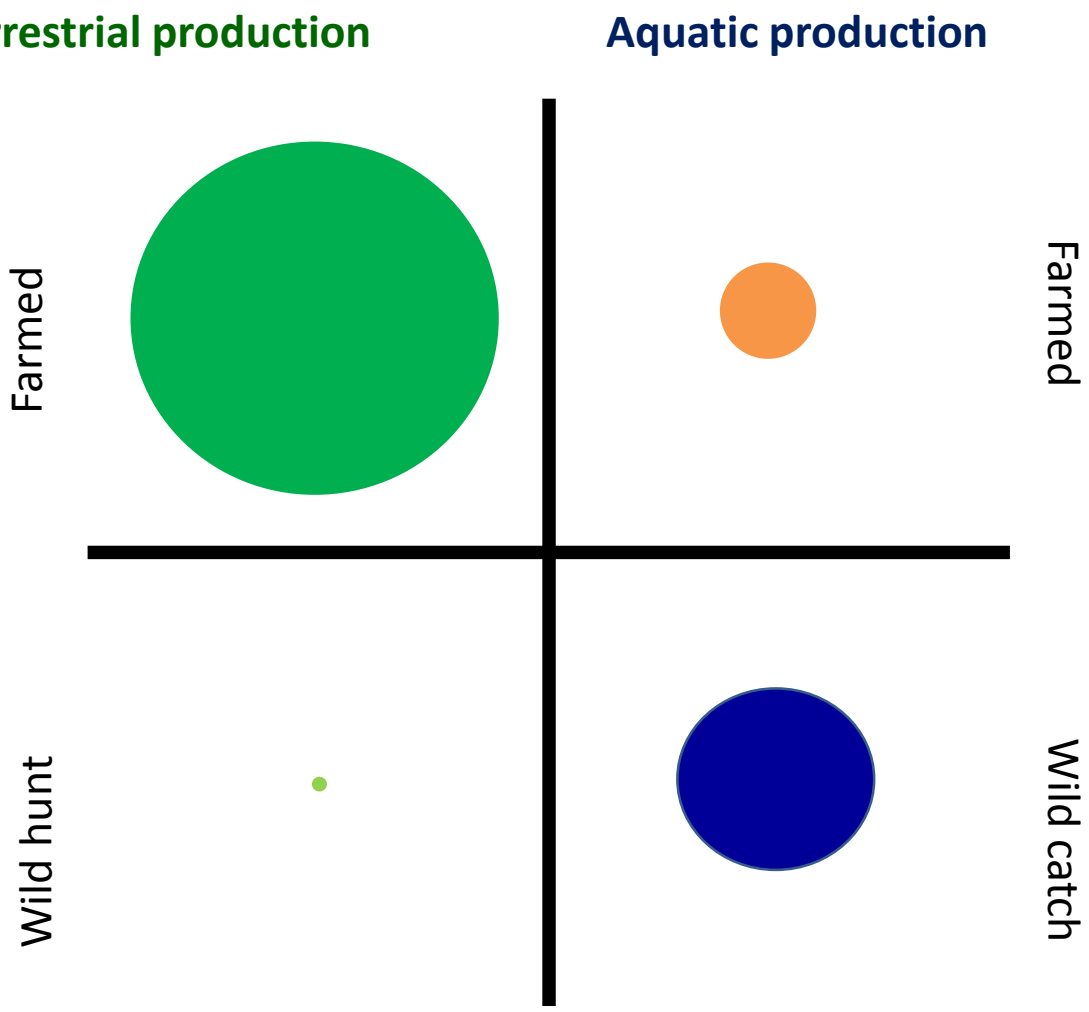
Terrestrial food production may well be at its limits (climate change!)

Sea food from capture fisheries today is at its limits, levelling off

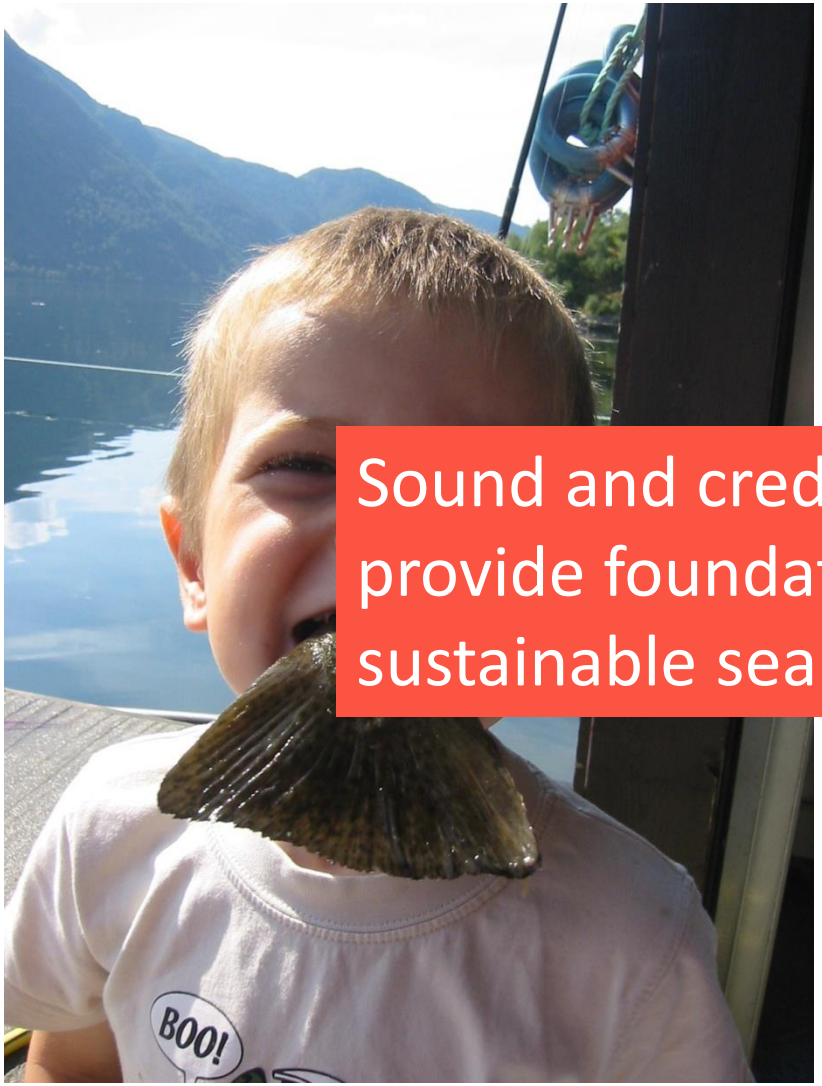
There is a clear demand for increasing sea food production and a role for aquaculture

The challenge: global food security

Worlds “muscle food” production:



The challenge: global food security



A few simple numbers and thoughts…

Oceans and seas represent over **70%** of the earth's surface

Primary production in the oceans is **comparable** with the terrestrial primary

99 %

nts!

Sound and credible science needed to provide foundations for clean, safe and sustainable sea food production

FAO estimate food requirement in 2050 to be **70%** above today's food supply.

50 mill tons of seafood needed to keep seafood consumption at today's level.

Societal challenges - Policy responses: EU

- 3 September 2008 The European Commission launched its "**European Marine and Maritime Research, Technology and Innovation Strategy**"
- Objective: create a coherent **European Research Area** framework in support of a sustainable use of oceans and seas' implemented under the Integrated Maritime Policy (**IMP**)
- **Integrated Maritime Policy (IMP) calls for intensified cooperation between the marine and the maritime research communities in Europe to create synergies**

Who are they, the research institutes, the academia and the “maritime” research communities?

“The maritime research sector”: a diverse community on the industrial side

- **ocean transport and distribution sectors (shipyards, shipping lines, equipment suppliers, installation facilities, ports),**
- **offshore operations: mineral extraction, oil & gas, offshore and tidal energy**
- **fisheries, aquaculture, sea food processing**
- **(“blue”) biotechnology: pharmaceuticals from ocean, genetic resources**
- **touristic activities: cruise ships, leisure boats**
- **goal: to build a competitive and sustainable maritime industry**

Who are they, the research institutes, the academia and the “maritime” research communities?

“The marine research sector”: another diverse community

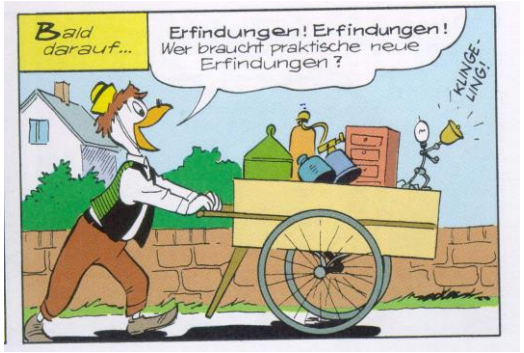
- **governmental research and universities**
- **applied science: fisheries and aquaculture management**
- **applied science: environmental impacts**
- **basic science: from molecules to ecosystems**
- **ocean physics, ocean chemistry and biology**
- **marine climatology**
- **marine geology**
- **operational ocean monitoring and modelling**

Research priorities - the maritime world

The maritime industry comprises diverse activities which potentially have effects on the marine environment,

these activities imply research needs, because the goal is:

- **to achieve competitiveness by producing and applying cutting edge science**
- **to run safe and efficient maritime operations**
- **to position the maritime industry to meet future challenges**
- **to achieve sustainable operations**
- **to have research results available on a short time scale**
- **innovation!**

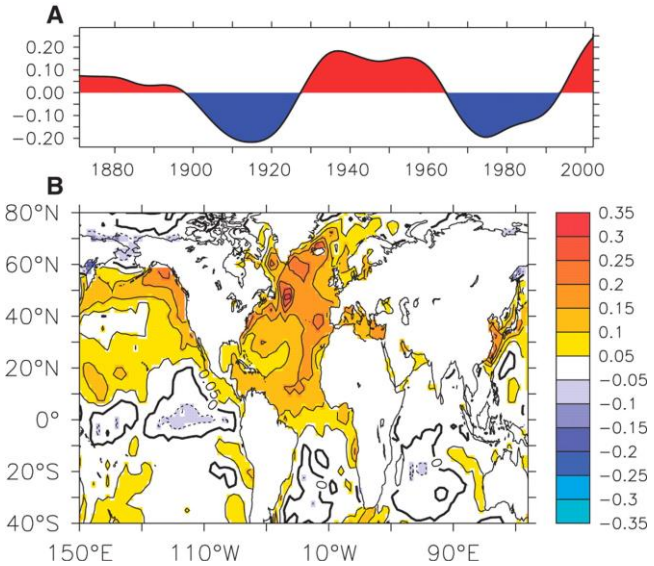


Research priorities - marine Science (1/3)

What drives research needs of marine science (1):

Understanding ecosystems: how they function, how they change

- **ecosystem observation (field surveys, new technologies, observatories)**
- **data integration and assimilation**
- **models (IBM, E2E, global to ecosystem scale)**
- **quantifying goods and services**
- **decadal to century variability and time series**

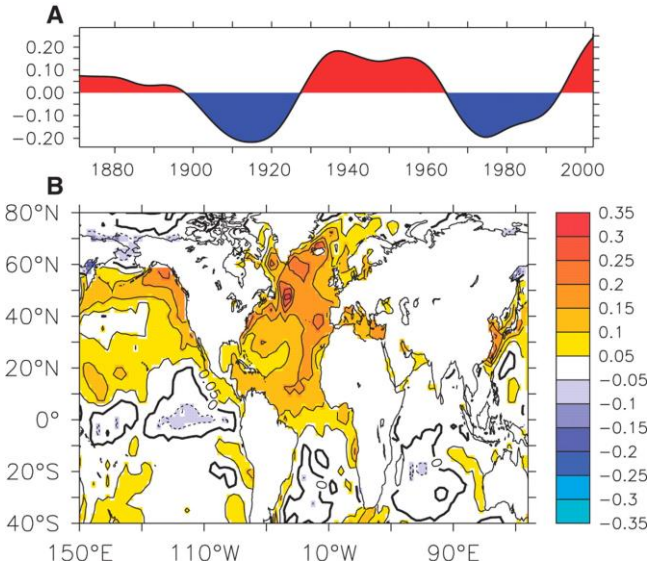


Research priorities - marine Science (1/3)

What drives research needs of marine science (1):

Understanding ecosystems: how they function, how they change

- **ecosystem observation (field surveys, new technologies, observatories)**
- **data integration and assimilation**
- **models (IBM, E2E, global to ecosystem scale)**
- **quantifying goods and services**
- **decadal to century variability and time series**



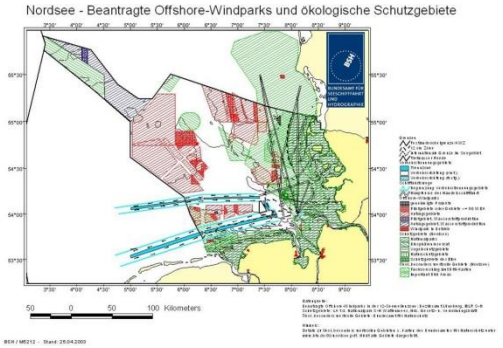
Curiosity!

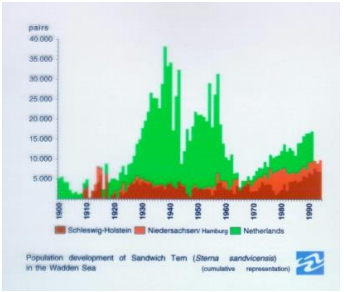
Research priorities - marine Science (2/3)

What drives the research needs of marine science (2):

Monitoring and assessment of impacts of human activities on the oceans and their changing environments:

- humans are part of the ecosystem
- mitigation of impacts, adaptation to changes
- quantify uncertainty in the information
- integrate the social and economic sciences





Research priorities - marine Science (3/3)

What drives the research needs of marine science (3):

Develop options for sustainable use of the oceans:

- **develop management tools for human activities**
- **identify governance issues**
- **holistic approach in support of the EAM needed**
- **provide the knowledge for meeting the challenges of tomorrow: the food challenge, ocean energy, biotechnology, non-renewables**
- **integrate ecosystem models with socio-economical models**
- **Marine Spatial Planning**

MARCOM+
Integrating Marine & Maritime Science Communities

ICES International Council for the Exploration of the Sea
CIEM Conseil International pour l'Exploration de la Mer

Overcome distances and create commonalities

- **Create areas of common interests (e.g., done in MARCOM+ 2010-12)**

- Aquatic **living resources** (sustainability, coastal and sea-based aquaculture, capture fisheries, transport and processing, future vessels);
- **Ocean energy** (synergies between ocean energy/fisheries and aquaculture, green off-shore installations, cost-effectiveness);
- Ocean resources for blue **biotechnology** (pharmaceuticals, material research for maritime products);
- Impact of **climate change** on maritime activities;
- Human activities and impact on **ecosystems** (resilience, vulnerability, marine litter);
- Maritime **spatial** planning (incl. building with nature, coastal architecture and maintenance);
- **Human health** and wellness (from the oceans);
- **Non living** ocean resources (incl. extraction technologies);
- Maritime transport as **vector** for non-native species.

MARCOM+
Integrating Marine & Maritime Science Communities

ICES International Council for the Exploration of the Sea
CIEM Conseil International pour l'Exploration de la Mer

How could it look like in the real world?

- Starting point: the ocean is a changing environment, change means uncertainty, uncertainty can be scientifically quantified!

- Science to help developing tools to adapt to changes:
- of the climate regime, atmosphere and oceans
- "economical regimes" (trade agreements, policies, governance)
- behavioural changes (e.g. due to fuel prices, subsidies, literacy)

- create job opportunities for the marine research communities
- create market opportunities for the maritime industries
- science made by people for people!

- achieve a common understanding of sustainability

Thank you for listening!

www.ices.dk