



European Research Area
The Oceans
New substance – and how

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Brussels June 11, 2004

The Oceans

Many uses of the Oceans:

- Oil and gas
- Wind, wave and ocean current power
- Transportation, shipping
- Recreation

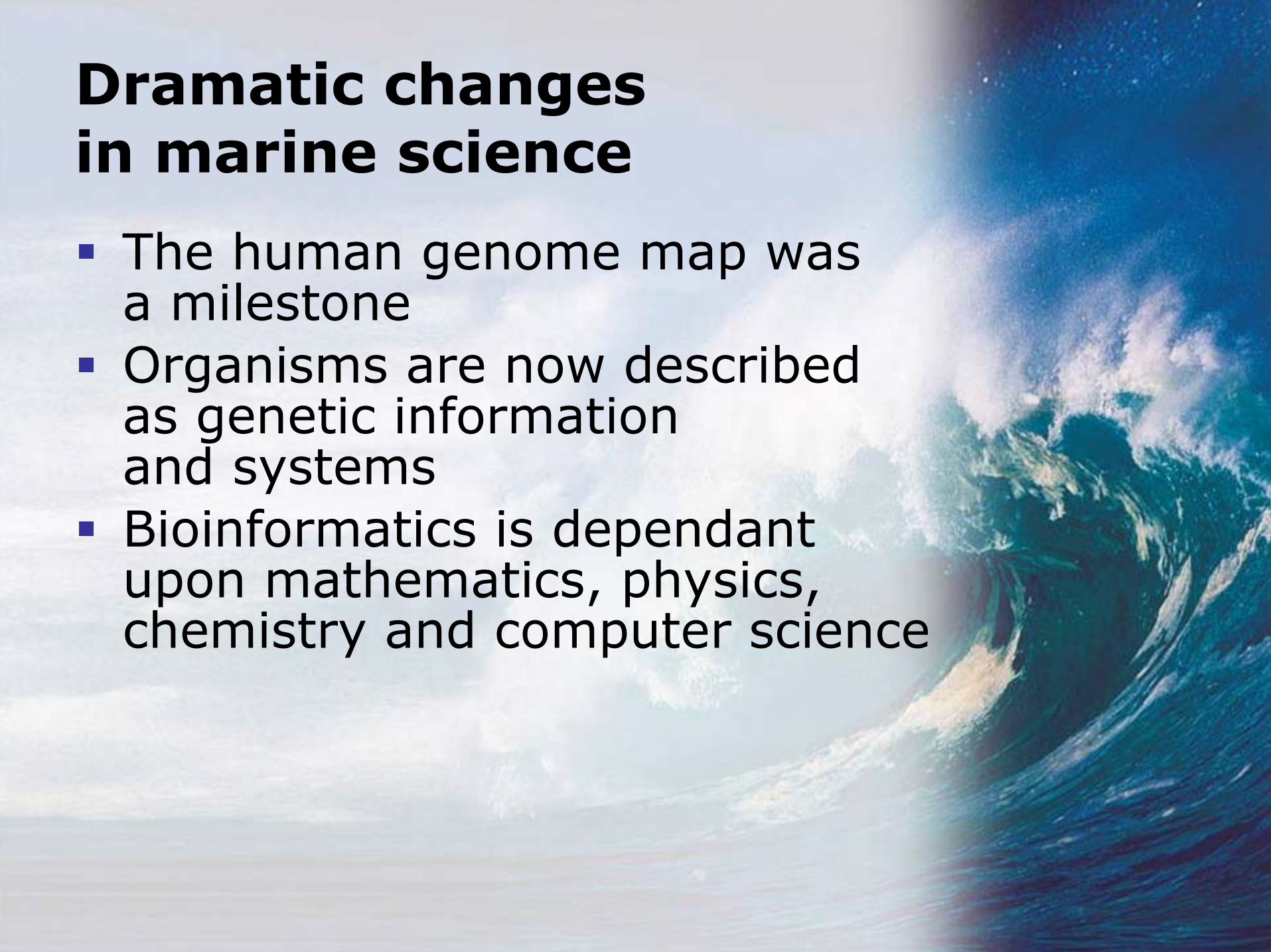
These 10 minutes:

- The sea bottom
- Sea water column
- Ocean surface



Dramatic changes in marine science

- The human genome map was a milestone
- Organisms are now described as genetic information and systems
- Bioinformatics is dependant upon mathematics, physics, chemistry and computer science



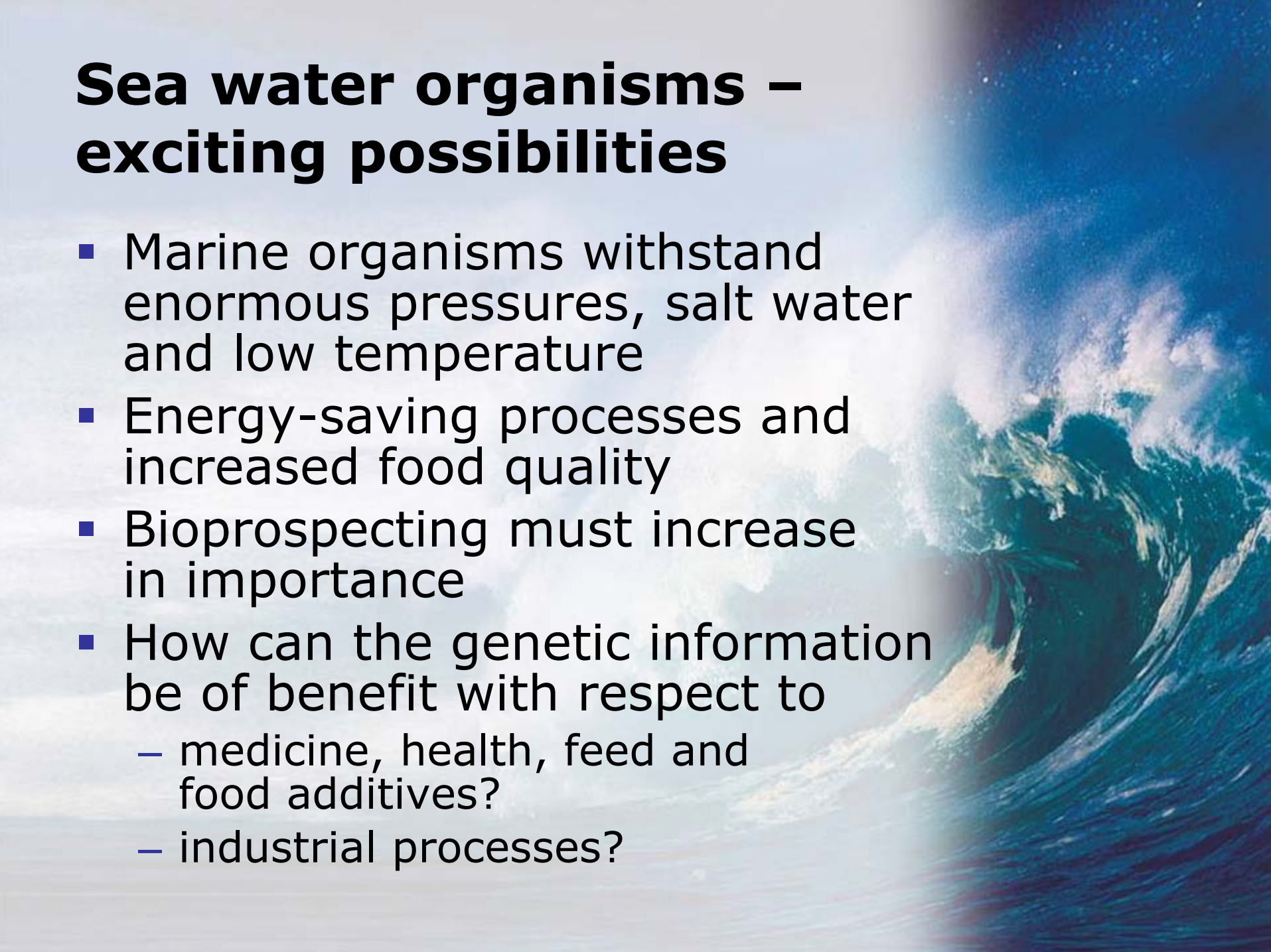
Sustainability!

- All marine activities must have sustainability as headline
- Always to be based on best science and practice
- Health of the environment, the marine organisms and the people
- Sustainability requires multi-disciplinarity
- Marine research is dependant upon basic and generic research



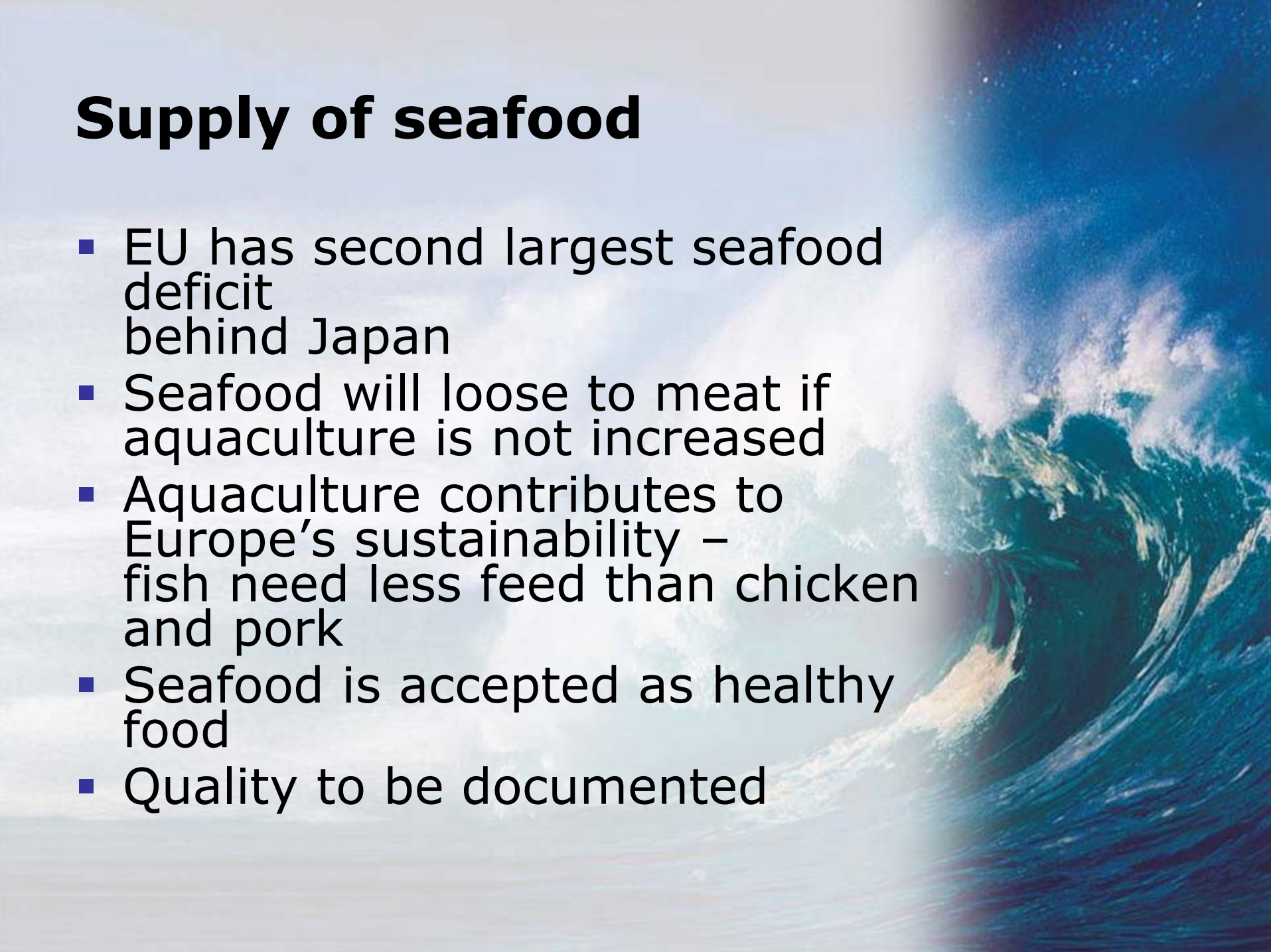
Sea water organisms – exciting possibilities

- Marine organisms withstand enormous pressures, salt water and low temperature
- Energy-saving processes and increased food quality
- Bioprospecting must increase in importance
- How can the genetic information be of benefit with respect to
 - medicine, health, feed and food additives?
 - industrial processes?



Supply of seafood

- EU has second largest seafood deficit behind Japan
- Seafood will lose to meat if aquaculture is not increased
- Aquaculture contributes to Europe's sustainability – fish need less feed than chicken and pork
- Seafood is accepted as healthy food
- Quality to be documented



Aquaculture needs science

- Fish needs feed, but supplies are limited
 - Plants, plankton, cultured algae, bio-proteins from natural gas

A blue boat is positioned in the center of a large, circular, floating aquaculture cage. The cage is made of dark metal frames and is surrounded by water. The boat is emitting a bright light, possibly for illumination or signaling. The background shows a vast expanse of water and a clear sky.

- Harvesting on lower trophical levels and possible use of GM techniques to be resolved?

- Scientific and ethical issues are legio

Traditional fisheries not to be forgotten

- Still an enormous potential if well managed
- Strategic exploitation of the commercial fish stocks, causing minimum damage to other parts of the ecosystem
- Selective fishing based on basic knowledge of fish behaviour
- Fisheries management more complicated
- Use of advanced technology



Ocean research

- Ecosystem management to be aimed at
 - need basic understanding of life and processes in the oceans (G.O. Sars on the Mid-Atlantic Ridge)
- How will climate change affect the stocks?
- Need of
 - Heavy ocean science infrastructure
 - Surveillance systems for stocks, fishing and environment



Coastal Zones – vital for regional development

- Coastal zones under pressure: Transportation, aquaculture, fishing, industry and recreation have stakes
- Science, technology and societal research to be combined in order to manage the pressures on the coastal zones
- Diversity – complexity – dynamics



Conclusions

- Protection and exploitation of the marine resources are increasingly important to EUs development
- There are numerous challenges that can best be solved within a European context, i.e. shipping, fishing, aquaculture, industry, recreation, regional development
- The research challenges are multi-disciplinary and often need heavy and costly infrastructure

