ACCRA, 12th March 2010

“Climate change in Portugal – Scenarios, Impacts and Adaptation Measures (SIAM Project)

-CC Scenarios Coastal zones
-Fisheries Forests and biodiversity
-Agriculture Energy
-Tourism Water resources
-Health

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SUMMARY:

INTRODUCTION:

OBJECTIVES:

   Marine Climate evolution:
   Wind speed
   Seawater temperature
   Upwelling
   NAO
   River outflows

   Importante commercial species:
   Sardine
   Common octopus
   Bluefin tuna
   Horse mackerel
   Silver hake

MITIGATION STRATEGIES FOR THE FISHERIES SECTOR

CONCLUSIONS: Key elements for the Future
The Portuguese fisheries have a strong cultural tradition
Portugal has one of the most high levels of fish consumption (> 65 kg / per capita / year)
Multi-species → multi-gears → multi-fleet = small scale fisheries are dominant in Portugal
TAC’s, quotas, decommissions, as the support of the EU fisheries policy appears not be fair and equal to all MS

(World, Portuguese and Spanish fishery landings)
Marine Pollution in the coastal zones is increasing and without visible return
Overfishing lead to a break in the complexity of the food chain of important fishing grounds, with a decease of over one trophic level, between 1950 and 2000. *(in Scientific American, July 2003)*
Fishing estimates between 1950 and 1999: data for invertebrates, groundfish, pelagic fish and Peruvian anchoveta is from FAO catches statistics. Discards are estimated by FAO as a proportion of reported catches. IUU (Illegal, Unreported or Unregulated) values were estimated for five years periods, taking into account the dominant law regime and used fishing gears. More reliable estimations of discards and IUU are needed for the transition to a ecological management (in Nature, vol. 418, August 2002)
High level of biodiversity in the Portuguese waters
Geographical distribution of some pelagic fishes and annual isotherm (°C) values from SST.
Geographical distribution of some demersal fishes and annual isotherm (°C) values from SST
SIAM Project – Objectives

- Development of evolution scenarios for the fisheries sector, such as population dynamics analysis and production of marine resources:
  
  sardine, octopus, bluefin tuna (SIAM I)

  coastal resources, horse mackerel, hake and bivalves (SIAM II)

- Development of future intervention measures to adapt and/or mitigate the predicted alterations
SIAM Project – Marine climate evolution

Climate scenarios based in circulation models (global and regional) from the UK Hadley Centre for Climate Prediction and Research, HadCM3 and HadRM3, to predict alterations:

- average value and seazonality of wind speed,
- surface seawater temperature and sea level.
- upwelling regime

At the same time, predict alterations to the Northern Atlantic Oscilation (air pressure) and river outflows (precipitation and subterranean water levels)

The prediction are made until the end of XXI century, under the two scenarios from the SRES (Special Report on Emission Scenarios):   **A2 – Economical approach**

**B2 – Ecological approach**
SIAM Project – Marine climate evolution

July seawater surface temperature in the control simulation of the HadRM3 model

Wind speed annual average (m/s) control simulation (left) and differences between control, B2 (centre) and A2 (right)
NAO signal rise effect over winds and oceanic circulation on the Northeast Atlantic (Marshall et al., 2001)
Sardine

Historical Landings (x1000 tons)

Sardina pilchardus (Walbaum, 1792)
Northern quadrant winds intensification on the Portuguese continental coast.
Octopus

Life cycle

- F. Adulta
- F. Juvenil
- F. Embrionaria
- F. Paralarvar (planctônica)

Paralarva

C_T = 2 - 12 mm
P_T = 1 - 60 mg
Octopus

Prediction for 2100 (HadRM-GGA2)

- Guadiana river outflow reduction
- Surface seawater temperature rise
Bluefin tuna

Climate effects analysis

NAO – North Atlantic Oscillation
WWF – Western Winds Frequency
SST – Seawater Surface Temperature
LPUE – Landings Per Unit of Effort
Bluefin tuna

Prediction for 2100 (HadRM-GGA2)

Global rise of the seawater surface temperature (in the Portuguese coast it may reach +4.0ºC)

Further migrations

Higher reproductive success (abundance increase)
Regional strategies could be a more effective measure, involving the fishermen's, administration and scientists.

Sardine (Sardina pilchardus)

Common Octopus (Octopus vulgaris)

SIAM Project – Climate change in Portugal
Horse mackerel and Hake

Future trend analysis

Horse mackerel, *Trachurus trachurus*

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Silver hake, *Merluccius merluccius*

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Predicted trends (2080 – 2100) for the relative abundance of the length classes. The arrows indicate the intensity of the variation.
SIAM Project – Mitigation strategies for the sector

Mitigation (stability) VS Adaptation (flexibility)

- Development of the mariculture production (practicing ecological equilibrium and fish quality\security
- Higher range of fished species
- Exploring of new fishing banks
- Development of multi-specific fleets (adaptation of the vessels)
- Development and proper application of fishing politics adapted to the climate changes and to the geographical reallocation of the resources
SIAM Project – Mitigation strategies for the sector

- Continue the precautionary approach in the exploration of marine resources, defining basic principles: relative stability, capacity adjustment, ecossistemic management

- In time planning for the protection of fishing villages and ports, giving in account the expected water level rise and storm surges

- Promote measures to protect species (eg. marine reserves)

- Support innovative measures for protection of marine resources and coastal erosion (eg. artificial reefs)

- Implementation of dialogue channels and open communication between scientific and political sectors and the agents connected to the fisheries sector, contributing to the shared participation (eg. RAC’s)
CONCLUSIONS: The scientific knowledge must be complemented with outreach actions taking in account the link between science, policies and the economic society.
CONCLUSIONS: Establishing an effective marine planning system beyond the RAC (UE fisheries policies) and cooperative governance in the Iberian waters (region 3)
CONCLUSIONS: Key elements for the Future

- New and complementary studies related with climate changes and mitigation measures, like SIAM project, are necessary.

- Concerning fisheries, long term measures are needed, such as more flexibility in the UE legislation, promoting adaptation measures like fleets displacement, gear changing, new fishing areas and target species.

- Adoption of measures to strongly reduce discards and illegal or non reported catches.
CONCLUSIONS: Key elements for the Future

- Application of ecosystematic approach, as integrated management of fishing activities, in a sustainable way, helping to found new to solutions for the exploration of marine ressources, based in appropriate scientific advice and adaptative measures

- Education and technical formation are required to all agents related with fisheries

- The quantity and quality of data (environmental, fishing effort, landings, discards, etc.) need to increase, to provide new and better long term models of prediction
G. BOCSH (XVII CENTURY)
«PROMONETORY?»
Thanks
for your attention