Whales & socio-environment in the Barents Sea

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Objectives and Hypothesis:

The poster presents part of the research work done in 2015, which focuses on whale species vulnerability. Fieldwork methodology on whales 'perception by local fishermen communities and other relevant stakeholders allows us to discuss traditional whaling, within the artisanal fishery cycle. This activity is important to sustain local coastal communities inhabiting in extreme cold climate in the Arctic. We also present a test to map and model whales' vulnerability. Both approaches help to understand the place of whales in the Barents Sea. This research focusing on socioecological approach to Minke whale (*Balaenoptera acurostrata*) in Lofoten (Norway) allows to meet a number strong recommendations to the Marine Spatial Plans.

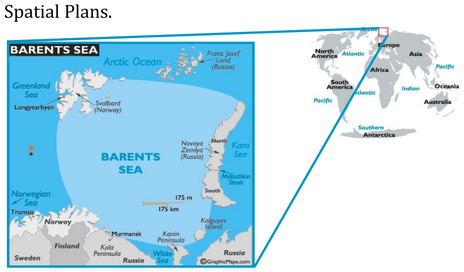

Fig. 1- Barents Sea location map (Source: worldAtlas.com, 2015)

Methodology:

Socioecological perception of Lofoten inhabitants:

(1) 48 deep interviews were done:

In order to understand better the perception that local coastal communities have on whales in cold climates, we chose ethnographic methods using fieldwork, living for some time in relevant villages, communicating through both short conversations on spots and a number of deep interviews to inhabitants and representative stake holders, whose activity is oriented upon whales (i.e. fishermen, whale hunters, whale processing plant workers, and other local inhabitants related to whales).

Fig. 2- Alta, Engraved rocks. 4.200 BC (Source: F. Breton, 2015)

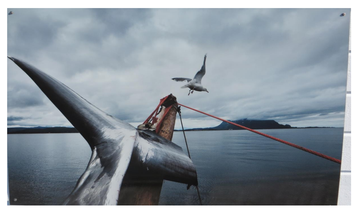

Fig. 3- The whaling in Lofoten Islands (Source: Marcus Bleasdale - nationalgeographic.com, 2013)

(2) Minke whales' vulnerability map

MAXENT algorithm based on presence-only (Phillips, Dudík, & Schapire, 2004) has been used to map the mink whale spatial distribution on the Barents Sea. The result is a probability spatial distribution model (SDM), which geographically predicts the suitable habitat for the species based on species observations (Global Biodiversity Information) and environmental predictors (depth, continental slope, sea bed habitats, distance to ice and ecosystem type).

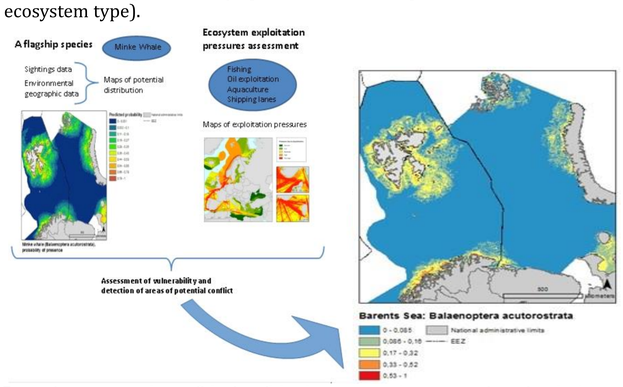

Fig. 4 -Economic sectors at stake are: fisheries, oil development, vessels routes, tourist cruises, harbours, etc. (Source: UAB-SGR Interfase, 2015)

Results

(1) Socioecological perceptions:

- Historically local people have their economy based on seasonal fishery cycles: Cod in late winter time, (*Gadus Morhua*); herring (*Clupea harengus*) in spring, and minke whale (*Baleaneptora acurostrata*) in late spring and summer, and mackerel (Scomber scombrus), haddock (*Melanogrammus aeglefinus*) and fish species in autumn.
- Whaling is only practiced on minke species, with fixed quotas on captures, based on scientific monitoring of their stock (done by Norwegian Marine Research Institute in collaboration with other institutes such as Polar Institute)
- Whales happened to be an important local resource for food security. Whale meat is partly commercialized but also distributed within local communities' households and schools.
- Whales' hunting supports a strong cultural Identity, "métier" proudness and sea territorial responsibilities. Whaling in Lofoten is documented since the end of 19th century.
- Minke whale survival, following field work results, is not a matter of local hunting, which is gathered in lower quantities than established quota.

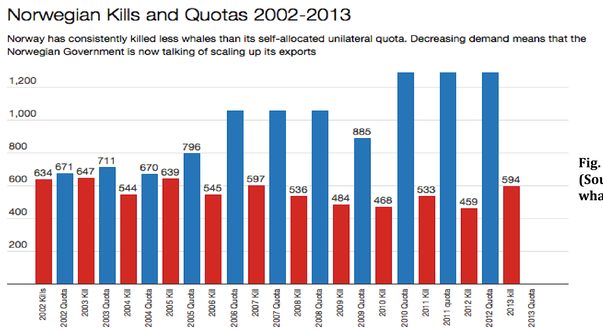

Fig. 5 – Norwegian kills and quotas 2002-2013 (Source: Whale and Dolphin Conservation whales.org, 2015)

- Commercial whaling has been censured because of its high impact that has caused dramatic diminution of stocks. A moratorium was dictated by International Whaling Commission in 1982 to stop commercial whaling, causing also an important impact in the small Lofoten fishermen communities. In 1987 when moratorium on whaling went into force in Norway, it was a «big shock» for small scale fishermen, «because we knew that the stock was big and healthy, and whale brought extra incomes to our families» (T. S., Lofoten Whaler Union).
- «After 5 years of scientific research, it happened that whalers were right. The minke population is healthy. We gather within the ecosystem based management» (A.H.H.) (IMR).
- The moratorium is remembered as a «disaster». Fishermen sold or destroyed their boats. Most of the processing plants closed. This moratorium imposed by global governance caused an important impact on Lofoten.
- This action had an important side effect on local fishermen communities that help maintaining coastal settlements and services, as well as coastal landscapes & ecosystems in extreme cold climate.
- Local small scale whaling is strongly associated with Local Ecological Knowledge (LEK) on whales, their movement, living cycles and on the status of water and ice. This LEK is extremely important in a time of high climatic variability and whale comportment changes.
- Main risk for whale and human that people see is that whale can be much affected by pollution accumulation.
- So there is a need expressed by local fishermen communities to be more involved in the management of the commons. Improve the collaboration with scientists, on the good quality of the marine environment and healthy ecosystems.
- This demand is coherent with the revival of local communities in many places of the world and of course in Europe and, with concerns for tracing food quality and focusing on Km 0 food, in a time of energetic, social and economic transitions.

(2) Minke whales' vulnerability map:

- The method for quantifying anthropogenic pressures, as presented in this test, can be seen as a useful tool for MSP and the implementation of the EU MSFD in the Barents Sea. It can be reproduced for other marine mammal species as well as anthropogenic pressures. Most of the included data sets could be improved in collaboration with Norwegian institutes.
- This kind of test should be discussed with whalers and whale scientists to see how to integrate LEK and scientists knowledge in this mapping and modeling exercises.
- Other activities that local controlled whaling has more impact on the future of whale (water contamination, accumulation of contaminants along the food web, presence and planned increase of oil platform and navigation routes, etc.).

Main conclusions and recommendations for MSP:

- If whaling of Minke continues to be managed as it is with an important shared of whalers and scientist the sustainability of this species is not endangered. Other anthropogenic impacts such as water contamination, presence and plant oil increase, navigation routes, and tourism cruises could be more dangerous for mink whales and for other whale species.
- Most of the interviewed people perceive that "it will be more and more difficult to fish if big oil business, aquaculture and opening of new navigation routes without to say the climate change impacts".
- The participation of fishermen communities (including whalers) into MSP making and ICZM would be an important milestone for a better management of Barents Sea.
- There is an important common idea that whales should be at the center of the MSP decisions and their corridors should be protected. Fishermen communities and their inhabitants express in the future vision the fact that they want to play a more important role for the conservation of Barents Sea socio ecosystems (in an ethic way).
- Exploring how society envisions whales' vulnerability, today and the potential situation tomorrow, identifying those conflictive issues among the main economic sectors in Norway and the major climate change threats that compromise whales' survivals a main challenge for Arctic local communities and countries. Our research brought new lights on what are the place, role and future of marine mammals, looking for the perception of local communities and their local knowledge which is especially important, in such a complex and rapid changing Arctic region.

Achievements in collaboration and in the future:

- At present we are collaborating (UAB, UIT, UNIS, Svalbard Museum) to write some papers on whales, seals and polar bears, and how society cope with them and envisage their future in a high climate variability. We are also planning to make some event at UAB inviting main researchers (Svein Jentoft, Tora Hultgreen, Tore Haugh from IMR who has followed closely the research work and the models).
- We are interested in continuing collaboration during next years on understanding whales' migration and social perception of these animal routes, deepening on Local Environment Knowledge. We would like to work in two main directions: (1) Continuing the research in the Arctic with Iceland (University of Akureyri), Faroe Islands and Greenland. For these societies whales are a vital resource, and it is needed to understand the social and individual impacts that global whaling and sealing prohibition have provoked. How affected local communities can be involved in the governance of these issues; (2) Looking at the migration routes to the Mediterranean, and the network of MPAs to better understand how whales can be better considered along MSPs and how local communities can manage local MPAs and the whale issue. These two direction are coherent with recommendations to MSP and ICZM in these areas.

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