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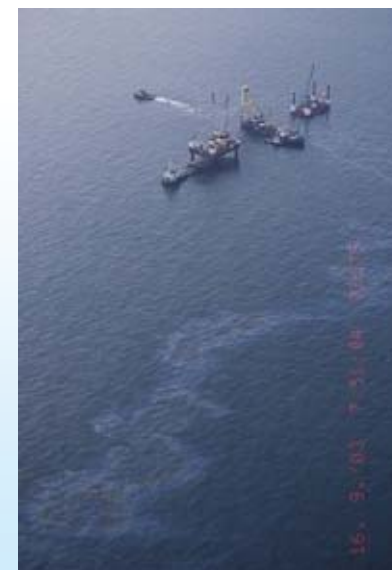Tonsberg (NO), 24-26 Sept.'12

TASK F – Environmental & socio-economic sensitivity

CURRENT 'STATE OF THE ART'

Ronny Schallier

MUMM/RBINS (BE)

Environmental sensitivity - Norwegian west coast - example

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'Task F' in Brief

- *Towards a common approach on sensitivity mapping*

  - *Establish common criteria & qualitative descriptions*

  - *Main focus on potential coastal impact (incl. seasonal variability)*

  - *Build on work already done → BA, BRISK*

  - *Draw on a major socio-economic analysis in OSPAR*

- *Undertake a Workshop (early 2013) to agree on approach*

- *Result: Preliminary report on joint environmental & socio-economic sensitivity mapping*

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Contents

- **Current 'State of the Art'**

1. Bonn Agreement

    1.1. National systems of sensitivity mapping

    1.2. BA Workshop on sensitivity mapping

2. BRISK

3. OSPAR/IMO

- **Conclusions - Way Ahead**

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1. Bonn Agreement

1.1. National systems of sensitivity mapping

source: BA Compilation, 2005
national pres., 2008

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National systems of sensitivity mapping
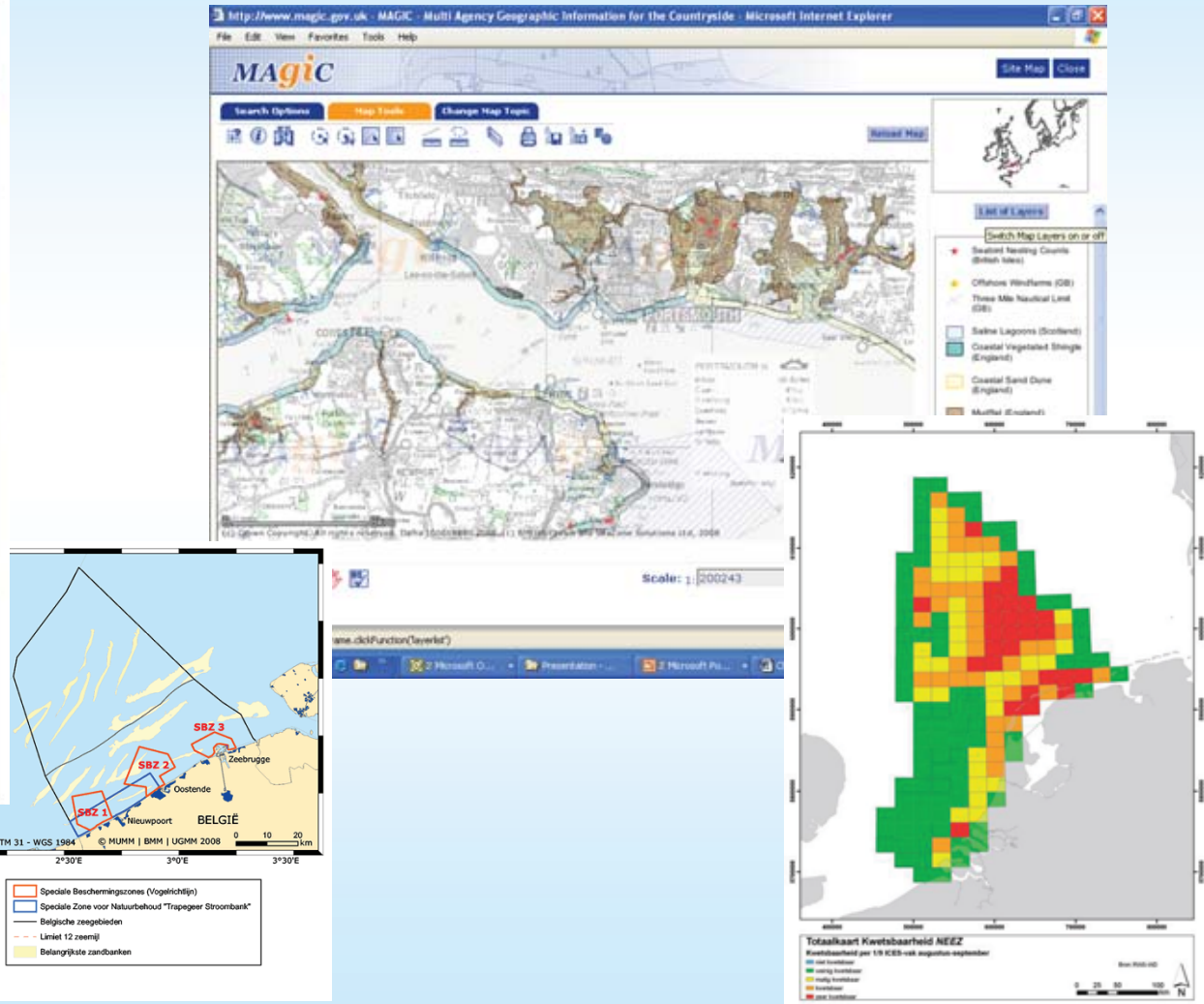
National systems of sensitivity mapping

- **Level of detail and development varies significantly**

- **But several <u>STRIKING SIMILARITIES</u> in basic approach!**

<u>EXAMPLES</u> → →

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National Systems

Ex.1:

Some CPs: only 'mapping' of sensitive sites

(UK, IRL)

Most CPs: RANKING of sensitivity, based on pre-defined criteria

(NO, SE, GE, NL, FR, BE, DK)

- **Qualitative: 'Low' → 'Medium' → 'High'**
- **Quantitative: using classification scales (e.g. 0 → 9)**

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National Systems

Ex.2:

Most, if not all CPs take into account:

- **SHORELINE TYPE** sensitivity based on geomorphological characteristics (cf. ESI Gundlach & Hayes)

- **CONSERVATION VALUE** of a resource as important criteria (Protected Areas)

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ESI	Shoreline type
1	Exposed rocky shore, solid structures, rocky cliffs
2	Exposed wave-cut platforms in bedrock, mud or clay; exposed scarps and steep slopes in clay
3	Fine- to medium-grained sand beaches Scarps and steep slopes in sand
4	Coarse-grained sand beaches
5	Mixed sand and gravel beaches
6	Gravel beaches (granules & pebbles) Riprap structures and gravel beaches (cobbles & boulders)
7	Exposed tidal flats
8	Sheltered rocky shore and scarps in bedrock, mud or clay; Sheltered solid structures, riprap, rocky rubble shores, peat shorelines
9	Sheltered tidal flats, vegetated low banks
10	Salt & brackish water marshes, freshwater marshes, swamps, mangroves

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National Systems

Ex.3:

Many CPs focus on COASTAL sensitivity

(UK, SE, IRL, FR, (GE-North Sea))

Many other CPs however also consider OFFSHORE sensitivity

(BE, NL, NO, DK, (GE-Baltic))

e.g. also sensitive marine habitats, seabird areas, fisheries resources, ...

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National Systems

Ex.4:

Some CPs focus on **ECOLOGICAL** sensitivity (ENV. S. in '<u>strict</u>' sense) (BE, NL, GE)

<u>Most CPs</u>: also **SOCIO-ECONOMIC** sensitivity (ENV. S. in '<u>broad</u>' sense) (UK, NO, FR, IRL, SE, DK)

Socio-economic criteria vary considerably, but interesting approaches used (FR, NO)

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1. Bonn Agreement

1.2. BA Workshop on Sensitivity Mapping

source: Workshop Report 2008

(OTSOPA 08/2/2-E)

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Workshop on Sensitivity Mapping (2008)

- **<u>General conclusions (1)</u>:**

Level of detail/development of CP maps varies significantly

→ Hesitation towards BA-wide harmonization

→ However, there was perceived benefit to produce a generic, simplified sensitivity map in the BA area

Workshop on Sensitivity Mapping (2008)

- **<u>General conclusions (2)</u>:**

The (quantitative) sensitivity info was, in some cases, seen as <u>too detailed</u> (~'*Keep it simple*')

→ **It should be clear which environmental info is needed, as a <u>MINIMUM STANDARD</u>, to support response**

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Workshop on Sensitivity Mapping (2008)

- **General conclusions (3):**

MAIN CRITERIA for sensitivity of coastal (and marine) areas:

- Geomorphologic characteristics – shoreline type

- Sensitive natural and socio-economic resources (ENV in broad sense)

- Designated protected areas or other areas of ecological importance

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2. BRISK

Source: BRISK Environm. Vulnerability Report,

COWI, Jan.'12

BRISK – Environmental Vulnerability work

- **According to MUMM, the BRISK method & work is**:

  - Simple <u>and</u> effective

  - <u>Systematic</u> (step-by-step) approach

  - Well-documented & underpinned by <u>literature</u>

  - Principles <u>in line</u> with previous BA findings & conclusions

  = Example of '**BEST PRACTICE**'

  <u>WHY/HOW</u> ?? → →

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BRISK Methodology

- **RANKING** performed as part of Baltic Sea Risk Assessment

    [Risk of damage = probability x vulnerability]

- **QUALITATIVE** ranking

- **COASTAL & MARINE** vulnerability

- **SHORELINE TYPE** considered

- **PROTECTED AREAS** considered

- Ranking of **ECOLOGICAL** & **HUMAN USE** features

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BRISK Methodology

Ranking process in 2 main steps:

- **STEP 1** : Identification of features

- **STEP 2** : Vulnerability ranking of identified features

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STEP 1 : Selection of Features (BRISK)

- **Open waters**
- **Coastal habitats**
  - Rocky shores & stone reefs
  - Sandy beaches
  - Underwater sandbanks
  - Shallow inlets & bays
  - Coastal lagoons
  - Estuaries
- **Flora**
  - Seagrass meadows (*Zostera*)

- **Fish**
  - Spawning areas in shallow water (demersal eggs)
  - Offshore spawning areas (pelagic eggs)
  - Nursery areas in shallow water
- **Birds**
  - Wintering areas (sea & shore birds)
  - Staging areas (migrating sea & shore birds)
  - Breeding areas (sea & shore birds)
  - Moulting areas (sea birds)
- **Marine mammals**
  - Breeding, moulting and haul-out sites for seals
- **Protected Areas**
- **Fish farms**

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STEP 2 : BRISK Vulnerability Ranking

- **Vulnerability scores:**

  - Score 4 = **VERY HIGH**

  - Score 3 = **HIGH**

  - Score 2 = **MODERATE**

  - Score 1 = **LOW**

- **Seasons:**

  - <u>Winter</u>: Dec., Jan., Feb.

  - <u>Spring</u>: Mar., Apr., May

  - <u>Summer</u>: Jun., Jul., Aug.

  - <u>Autumn</u>: Sept., Oct., Nov.

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Step 2 – Issues taking into consideration in ranking <u>each</u> feature

(1) <u>FATE of oil</u>

- In terms of oil degradation and removal

- Varies considerably

- Main factors:
  - Wave/tidal energy exposure
  - Shoreline slope
  - Substrate type

(2) <u>IMPACT of oil on organisms/habitats</u>

- Effects of oil on organisms
  - Smothering
  - Toxicity
  - Tainting

- Population & life cycle considerations
  - Densely populated (small) areas
  - Spawning & nursery areas
  - Threatened species & habitats
  - (etc.)

Step 2 – Ranking process for <u>each</u> feature

1. **Ecol. characteristics, significance & location**

2. **(Qualitative) assessment of vulnerability**

   (in terms of fate & impact of oil)

3. **Assign vulnerability ranking**   **(per season)**

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BRISK – Assigned Vulnerability Ranking of selected features

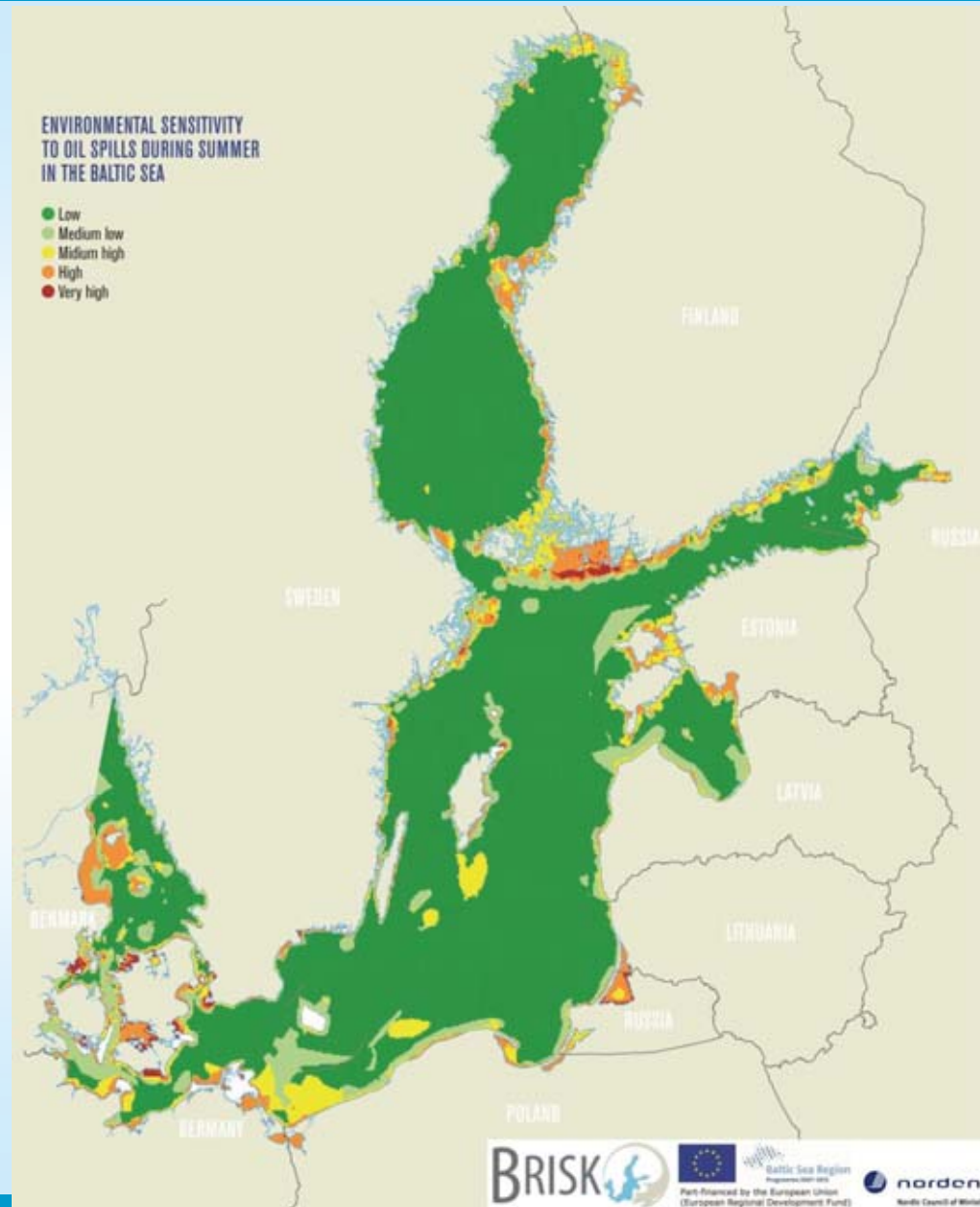| Environmental feature	WI	SP	SU	AU
Rocky shores and stone reefs (sheltered)	4	4	4	4
Sandy beaches	1	1	2	1
Underwater sand banks (water < 10 m)	2	3	3	3
Estuaries	2	4	4	3
Coastal lagoons	2	4	4	3
Shallow inlets and bays	2	4	4	3
Seagrass meadows	3	4	4	3
Fish – shallow spawning areas	3	4	4	3
Fish – shallow nursery areas	3	4	4	3
Fish – offshore spawning areas	0	1	2	1
Protected areas	4	4	4	4
Aquaculture facilities	4	4	4	4
(Birds, marine mammals, etc.)	…	…	…	…

BRISK - Results

Total vulnerability of an area

= **SUM of all individual scores** of features in that area

End result:

Regional sensitivity map per season

ENVIRONMENTAL SENSITIVITY
TO OIL SPILLS DURING SUMMER
IN THE BALTIC SEA

- Low
- Medium low
- Midium high
- High
- Very high

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BRISK – Final remarks in view of BE AWARE

- BRISK method **applicable in BE-AWARE**

- **Challenge:** adapt to **'wider North Sea' (BA) context**

    1. ≠ SENSITIVE FEATURES

    2. Fragile MARINE/SUBSEA HABITATS (!)
       ('blowout' scenarios with subsurface spills/response)

    3. Expand SOCIO-ECONOMIC part (!!)

→ Main adaptations in **STEP 1**
→ Perhaps also in **STEP 2** (soc.-econ. part)

3. OSPAR/IMO

- Marine (deep-sea) habitats
- Socio-economic analysis

<u>OSPAR sources</u>:

- Report OSPAR List of threatened and/or declining species & habitats
- OSPAR (EFTEC) Draft Interim Report on Regional Economic & Social Analysis

<u>IMO sources</u>:

- IMO Res. A.949(23) - Guidelines on places of refuge for ships in need of assistance
- IMO/IPIECA Report on Sensitivity mapping for oil spill response

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Valuable marine (subsea) habitats in wider North Sea

To be selected as sensitive features ??

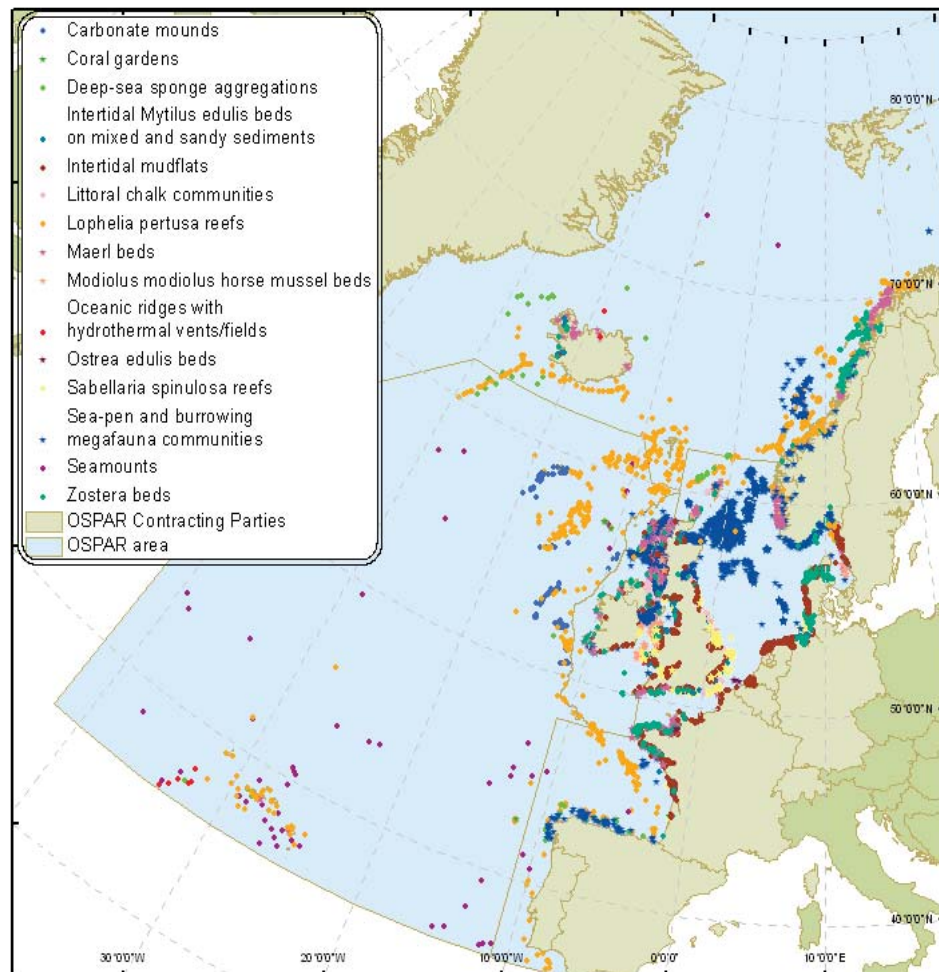→ **Offshore areas with special conservation value**

Doggerbank, Frisian Front, …

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OSPAR list of threatened/declining Species & Habitats

Legend:
- Carbonate mounds
- Coral gardens
- Deep-sea sponge aggregations
- Intertidal Mytilus edulis beds on mixed and sandy sediments
- Intertidal mudflats
- Littoral chalk communities
- Lophelia pertusa reefs
- Maerl beds
- Modiolus modiolus horse mussel beds
- Oceanic ridges with hydrothermal vents/fields
- Ostrea edulis beds
- Sabellaria spinulosa reefs
- Sea-pen and burrowing megafauna communities
- Seamounts
- Zostera beds
- OSPAR Contracting Parties
- OSPAR area

→ **Several** <u>**marine/deep-sea**</u> **habitats:**

- *Lophelia pertusa* **coldwater coral reefs**

- **Coral gardens**

- **Carbonate mounds**

- **Deep-sea Sponge aggregations**

- **Seapen and burrowing megafauna**

- **Maerl beds**

- **Oyster grounds**

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To be taken up in STEP 1 – list of sensitive features?

- Carbonate mounds
- Coral gardens
- Deep-sea sponge aggregations
- Intertidal Mytilus edulis beds on mixed and sandy sediments
- Intertidal mudflats
- Littoral chalk communities
- Lophelia pertusa reefs
- Maerl beds
- Modiolus modiolus horse mussel beds
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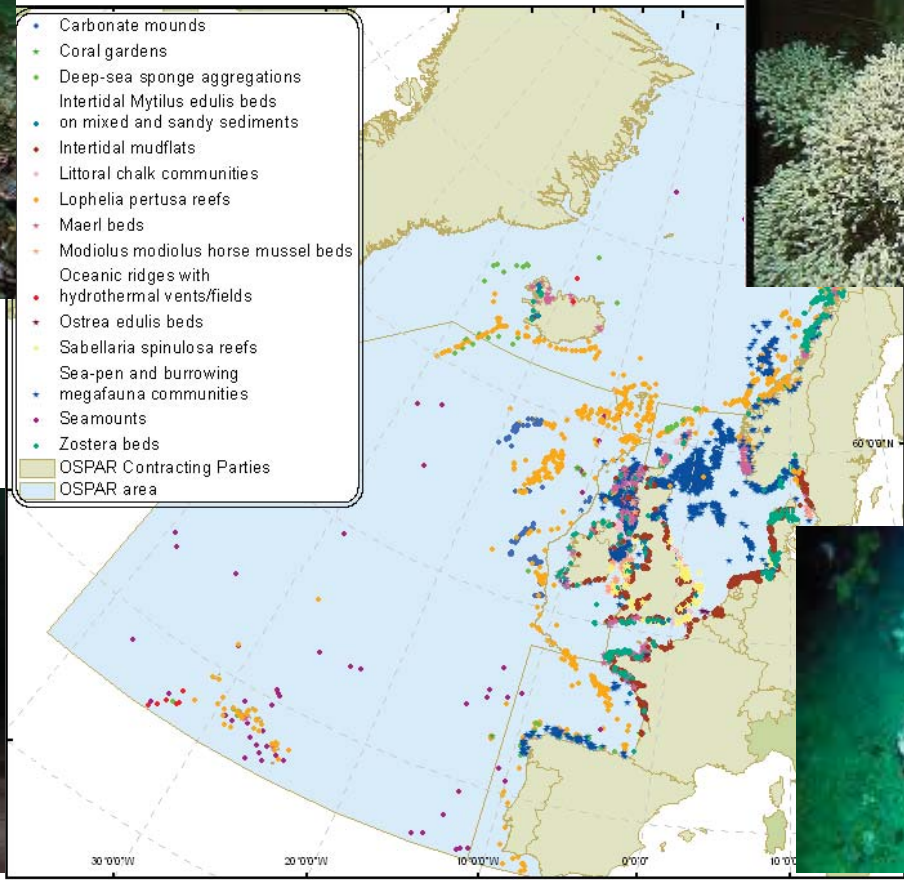
Socio-economic analysis

- **OSPAR regional Economic and Social Analysis (ESA)**

  - Is part of initial assessment MSFD

    (*Marine Strategy Framework Directive*)

  - Aims to improve understanding of the socio-economic (SE) impacts and effects in context of MSFD implementation

    (*'Good Environmental Status' in marine waters by 2020*)

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Socio-economic Analysis

▪ **OSPAR socio-economic analysis (ESA)**

- <u>Region-wide</u> data gathering & analysis

- OSPAR countries to perform ESAs, <u>as coordinated and comparable as possible</u>

- Based on national ESAs, compiling an **<u>regional analysis of uses of OSPAR marine waters</u>**, and the costs for their degradation

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Socio-economic analysis

- **<u>Comprehensive work !</u>**
    - Commercial sea fisheries
    - Ports and shipping
    - Recreation
    - Renewable energy
    - Oil & Gas
    - Aquaculture
    - Submarine cable setting & maintenance
    - Aggregate extraction
    - Military
    - Fish processing industry
    - Research
    - Gas storage
    - Dredging, shipbuilding, water abstraction, education, ...

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Q1 : Is OSPAR's ESA too detailed for BE AWARE ?

- **IMO Res. A. 949** (23) → **Risk assessment factors:**
  - **Fisheries**
  - **Economic/industrial facilities**
  - **Amenity resources & tourism**

- **IMO/IPIECA Report** (2011) → **sensitive SE features:**
  - **Fisheries & aquaculture**
  - **Water intakes**
  - **Tourism & recreation**
  - **Port & industrial activities**
  - **Industry (e.g. oil) related infrastructures**
  - **Cultural sites**

  STEP 1 - Selection of (sensitive) SE features = Crucial

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Q2: How to perform ranking of SE Features ??

+ *Separate or joint ecological & socio-economic ranking /maps?*

- ■ **2 interesting socio-economic sensitivity approaches in BA:**

  - – French approach: The *CEDRE* index

  - – Norwegian approach: The *DNV* method

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FR – The *CEDRE* index

- **Based on** length of interruption of an affected activity/service

- **Combination of:**
    - Activity: type, seasonality
    - Pollution: type of pollutant, type/volume of arrivals

- **Highest sensitivity also defined for** activities that are more difficult to displace/protect **from the (less visible) pollution**
    - e.g. aquaculture <-> maritime transport

- **Sensitivity is ranked for every activity/area (5 ranks)**

- **Socio-economic Index** separate **from ecol./geomorph. Index**

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NO – The *DNV* method

- *DNV* <u>sums up</u> ecological & socio-economic sensitivity

- **Ranking based on 4 factors**
  1. Natural occurrence   *(Is resource part of natural system in the area?)*
  2. Compensation   *(Can resource be economically compensated?)*
  3. Conservation value
  4. Sensitivity towards oil

- **In ranking features: <u>factors 1.&2. interesting</u> !**
  – If 'Natural occurrence'   = **YES** → Sensitivity X 2
  – If 'Compensation' factor = **NO** → Sensitivity X 2

SE sensitivity will never 'offset' ecological sensitivity of area (!)

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Overall Conclusions – Way Ahead

- **Current 'State of Art':**
  - BA Work: excellent 'learning process'
  - BRISK method: <u>BEST PRACTICE</u> applicable for BE-AWARE

- <u>**Challenge**</u>: Adapting BRISK method to 'North Sea' context
  1. Broaden list of features – incl. marine habitats
  2. Broaden socio-economic part

- <u>**Aim Workshop TASK F**</u>:

  <u>Agree</u> upon adapted 'BRISK' method with adapted features & steps (~ North Sea context)